



DIJET CARBIDE TOOLS

Solid Carbide End Mills

DIJET CARBIDE TOOLS

Meeting the Trust of Customers

The industrial world poses various difficult problems toward tooling. Dijet has been meeting the trust of customers with continuous development of new tools and materials using our experience of more than 50 years as a total carbide tool manufacturer.



DV-SCMS

C38



Aluminum End Mills

C45



One-Cut 70

C40



One-Cut Super Radius

C74



One-Cut Ball









C95



One-Cut Ball Hard



C107

Solid Carbide End Mills

Product Name	Beam End Mill							
Type	Solid Carbide with Mono-block Diamond							
								
Page	C-13	C-14	C-15	C-17	C-16	C-18	C-20	C-19
Catalog Number	VN-SPES2	VN-ALES2	VN-OCES2	VN-OCES2-LS	VN-OCES2-R	VN-OCAS2	VN-OCAS2-LS	VN-OCAS2-R
No. of Flutes	2 Flutes							
Flute Helix	30°							
Length of Cut	Regular							
Diameter	3 ~ 12mm	3 ~ 12mm	3 ~ 12mm	3 ~ 12mm	3 ~ 12mm	3 ~ 12mm	3 ~ 12mm	3 ~ 12mm
Coating	None							
Graphite	⊙		⊙	⊙	⊙			
Carbon	⊙		⊙	⊙	⊙			
MMC (30% ceramics)	⊙		⊙	⊙	⊙			
Machinable Ceramics	⊙		⊙	⊙	⊙			
Epoxy Resin	⊙		⊙	⊙	⊙			
Aluminum Alloy		⊙				⊙	⊙	⊙
Copper Alloy		⊙				⊙	⊙	⊙
Quartz Glass		⊙				⊙	⊙	⊙
Features	30° Helix angle, sharp corner edge, no center cutting.	30° Helix angle, sharp corner edge, high rake angle.	30° Helix angle, sharp corner edge.	30° Helix angle, sharp corner edge, long shank type.	30° Helix angle, with corner radius.	30° Helix angle, sharp corner edge.	30° Helix angle, sharp corner edge, long shank type.	30° Helix angle, with corner radius.

⊙ = First Choice ○ = Second Choice

Solid Carbide End Mills

Beam End Mill	
Solid Carbide with Mono-block Diamond	
	
C-21	C-22
VN-DBS2	VN-ALBS2
2 Flutes	
17°	
Regular	
2 ~ 8mm	2 ~ 8mm
None	
	◎
	○
◎	
◎	
	◎
	◎
"S" type geometry.	"S" type geometry, high rake angle.

◎ = First Choice ○ = Second Choice

Solid Carbide End Mills

Use	Conventional							
Page	C-23	C-25	C-25	C-27	C-23	C-28	C-28	C-27
Catalog Number	SEM2	DZ-OCES2	DC-OCEL2	NSES2	SEM4	DZ-OCES4	DZ-OCEL4	NSES4
No. of Flutes	2 Flutes				4 Flutes			
Flute Helix	30°							
Length of Cut	Regular		Long	Regular		Long	Regular	
Diameter	1 ~ 12mm	1 ~ 30mm	3 ~ 25mm	16 ~ 30mm	2 ~ 12mm	3 ~ 30mm	3 ~ 25mm	16 ~ 30mm
Coating	TiAlN			None	TiAlN			None
Carbon Steel Alloy Steel	◎	◎	◎	◎	◎	◎	◎	◎
Hardened Steel	~45HRC	◎	◎	◎	◎	◎	◎	◎
	~50HRC	○	○		○	○		
	~65HRC							
Stainless Steel	○	○			○	○		
Cast Iron	◎	◎	◎	◎	◎	◎	◎	◎
Aluminum Alloy				○				○
Copper Alloy								
Graphite								
Titanium Alloy								
Plastic								
Features	30° Helix angle, standard length of cut.	30° Helix angle, standard length of cut.	30° Helix angle, long length of cut.	30° Helix angle, standard length of cut.	30° Helix angle, standard length of cut.	30° Helix angle, standard length of cut.	30° Helix angle, long length of cut.	30° Helix angle, standard length of cut.

◎ = First Choice ○ = Second Choice

Solid Carbide End Mills

Conventional					Roughing	For Stainless, Heat Resistant & Titanium
C-30	C-32	C-32	C-32	C-32	C-36	C-38
DV-SOCS3	DZ-SOCS4	DZ-SOCM4	DZ-SOCL4	DZ-SOCLS4	DZ-OCRS	DV-SCMS
3 Flutes	4 Flutes				3-4 Flutes	6-8 Flutes
45°					20°	45°
Regular		Medium	Long	Regular		
3 ~ 20mm	3 ~ 22mm	3 ~ 20mm	6 ~ 20mm	3 ~ 22mm	4 ~ 25mm	6 ~ 16mm
Value Coating	TiAIN					Value Coating
◎	◎	◎	◎	◎	◎	○
◎	◎	◎	◎	◎	◎	○
◎	◎	◎	◎	◎		
◎	◎	◎				◎
◎	◎	◎	◎	◎	◎	
○	○	○	○	○		◎
45° Helix angle, standard length of cut, unique center cutting edge for plunging.	45° Helix angle, standard length of cut.	45° Helix angle, medium length of cut.	45° Helix angle, long length of cut.	45° Helix angle, long shank type.	20° Helix angle, for deep width of cut, low cutting force.	45° Helix angle, for heat-resistant alloy, standard length of cut with 0.2mm corner radius.

◎ = First Choice ○ = Second Choice









Solid Carbide End Mills

Use	For Hardened Steel						General Cutting for Aluminum		
Page	C-39, C-40	C-40	C-42	C-43	C-40	C-44	C-45	C-45	C-47
Catalog Number	DZH-SEF DV-SEH	DV-SEH-R02	DV-SEHM	DV-SEHL	DV-SEHLS-R02	DZ-SEPL	AL-SEESS2	AL-SEES2	AL-SEES2-R02
No. of Flutes	4-8 Flutes		6 Flutes			2 Flutes			
Flute Helix	50°					60°	45°		
Length of Cut	Regular		Long	Regular	Long	Short	Regular		
Diameter	.250 ~ .750" 1 ~ 32mm	3 ~ 30mm	6 ~ 20mm	6 ~ 20mm	12 ~ 20mm	16 ~ 30mm	1 ~ 30mm	0.4 ~ 30mm	1 ~ 12mm
Coating	Value Coating					TiAIN	None		
Carbon Steel Alloy Steel									
Hardened Steel	~45HRC	○	○	○	○	○			
	~50HRC	○	○	○	○	○			
	~65HRC	⊙	⊙	⊙	⊙	⊙	⊙		
Stainless Steel									
Cast Iron	○	○	○	○	○				
Aluminum Alloy							⊙	⊙	⊙
Copper Alloy							○	○	○
Graphite									
Titanium Alloy									
Plastic							○	○	○
Features	50° Helix angle, for high hardened steel.	50° Helix angle, for high hardened steel with corner radius of 0.2mm.	50° Helix angle, for high hardened steel with medium flute length.	50° Helix angle, for high hardened steel with long flute length.	50° Helix angle, for high hardened steel w/corner radius of 0.2mm, long slim shank.	60° Helix angle, long length of cut for welds and hardened steel.	45° Helix angle, short length of cut with sharp corner edge.	45° Helix angle, standard length of cut with sharp corner edge.	45° Helix angle, standard length of cut with 0.2mm corner radius.

⊙ = First Choice

○ = Second Choice

Solid Carbide End Mills

General Cutting for Aluminum							
							
C-50	C-53	C-54	C-56	C-57	C-58, C-59	C-59	C-62
AL-SEEM2	AL-SEEL2	AL-SEEL2-R02	AL-SEE-MS2	AL-SEEL2-LS	AL-SEES3	AL-SEEZ3	AL-SEES3-LS
2 Flutes					3 Flutes		
45°					45°		
Medium	Long				Regular		
3 ~ 20mm	1 ~ 25mm	3 ~ 12mm	2 ~ 20mm	3 ~ 20mm	3 ~ 25mm .250 ~ 1.0"	3 ~ 25mm	3 ~ 22mm
None							
◎	◎	◎	◎	◎	◎	◎	◎
○	○	○	○	○	○	○	○
45° Helix angle, medium length of cut with sharp corner edge.	45° Helix angle, long length of cut with sharp corner edge.	45° Helix angle, long length of cut with 0.2mm corner radius.	45° Helix angle, medium shank type with sharp corner edge.	45° Helix angle, long shank type with sharp corner edge.	45° Helix angle, high feed cutting with sharp corner edge.	45° Helix angle, high feed cutting, standard length of cut with slim shank.	45° Helix angle, long shank type with sharp corner edge.

◎ = First Choice ○ = Second Choice

Solid Carbide Radius End Mills

Use	General Cutting for Aluminum		Roughing for Aluminum				Helical Cutting for Aluminum
Page	C-63	C-65	C-67	C-69	C-70	C-71	C-72
Catalog Number	AL-SEES3-LS-R02	AL-SEES3-XLS-R02	AL-OCRS	AL-OCRL	AL-OCRS-LS	AL-OCRS-XLS	AL-OCHE
No. of Flutes	3 Flutes						2 Flutes
Flute Helix	45°		30°				
Length of Cut	Regular		Long	Regular			
Diameter	6 ~ 22mm	6 ~ 22mm	3 ~ 30mm	6 ~ 30mm	6 ~ 30mm	6 ~ 22mm	4 ~ 16mm
Coating	None						DLC
Carbon Steel Alloy Steel							
Hardened Steel	~45HRC						
	~50HRC						
	~65HRC						
Stainless Steel							
Cast Iron							
Aluminum Alloy	◎	◎	◎	◎	◎	◎	◎
Copper Alloy	○	○					
Graphite							
Titanium Alloy							
Plastic							
Features	45° Helix angle, long shank type with 0.2mm corner radius.	45° Helix angle, standard length of cut with extra long shank and 0.2mm corner radius.	30° Helix angle, for deep width of cut.	30° Helix angle, for deep width of cut with long length of cut.	30° Helix angle, for deep width of cut, long length of cut with slim shank.	30° Helix angle, for long length of cut with extra long slim shank.	30° Helix angle, high efficient cutting with standard length of cut and 0.5mm corner radius.







◎ = First Choice ○ = Second Choice

Solid Carbide Radius End Mills

Conventional								
								
C-74	C-74	C-75	C-78	C-78	C-78	C-78	C-80	C-82
DV-OCSR	DV-OCSRLN	DV-OCSR TN	DZ-SOCS4	DZ-SOCS4 (slim shank)	DZ-SOCM4	DZ-SOCLS4	DZ-SED-R	DV-SED-LS-R
3 Flutes			4 Flutes				2 Flutes	
50°			45°				30°	
Regular					Medium	Regular		
2 ~ 20mm	4 ~ 16mm	2 ~ 16mm	3 ~ 20mm	10 ~ 22mm	6 ~ 12mm	6 ~ 16mm	3 ~ 20mm	3 ~ 20mm
Value Coating			TiAlN					Value Coating
○	○	○	◎	◎	◎	◎	○	○
◎	◎	◎	◎	◎	◎	◎	○	○
◎	◎	◎	◎	◎	◎	◎		
◎	◎	◎						
			◎	◎	◎	◎		
○	○	○	◎	◎	◎	◎	○	○
			○	○	○	○		
50° Helix angle, high efficient cutting.	50° Helix angle, high efficient cutting with long neck.	50° Helix angle, high efficient cutting with taper neck.	45° Helix angle, standard length of cut.	45° Helix angle, standard length of cut with slim shank.	45° Helix angle, medium length of cut.	45° Helix angle, standard length of cut with long slim shank.	30° Helix angle, standard length of cut with corner radius.	30° Helix angle, conventional type with long shank.









◎ = First Choice ○ = Second Choice

Solid Carbide Radius End Mills for Aluminum

Use	For Stainless, Heat Resistant & Titanium	For Aluminum				Roughing For Aluminum
						
Page	C-83	C-85	C-86	C-89	C-90	C-93
Catalog Number	DV-OCSAR4	AL-SEES2-R	AL-SEES2-LS-R	AL-SEES3-R	AL-SEES3-LS-R	AL-OCRS-R
No. of Flutes	4 Flutes	2 Flutes		3 Flutes		
Flute Helix	42° - 45°	45°				30°
Length of Cut	Regular					
Diameter	3 ~ 20mm	6 ~ 20mm	6 ~ 22mm	6 ~ 20mm	6 ~ 22mm	6 ~ 25mm
Coating	Value Coating	None				
Carbon Steel	○					
Alloy Steel	○					
Hardened Steel	~45HRC					
	~50HRC					
	~65HRC					
Stainless Steel	⊙					
Cast Iron						
Aluminum Alloy		⊙	⊙	⊙	⊙	⊙
Copper Alloy		○	○	○	○	
Graphite						
Titanium Alloy	⊙					
Plastic						
Features	42°-45° Helix angle, for heat resistant alloys, unequal pitch and irregular helix with corner radius.	45° Helix angle, standard length of cut.	45° Helix angle, standard length of cut, long slim shank and corner radius.	45° Helix angle, standard length of cut.	45° Helix angle, standard length of cut with long slim shank.	30° Helix angle, for deep width of cut.

⊙ = First Choice ○ = Second Choice

Solid Carbide Ball Nose End Mills

Conventional							
							
C-95	C-95	C-97	C-97	C-97	C-99	C-100	C-101
DZ-OCSB	DZ-OCUB	DZ03-OCSB	DZ03-OCSB-LN	DZ03-OCUB	DZ-OCLB-S	DZ-OCLB-T	DZ-SSB
2 Flutes							
30°							
Regular							
1 ~ 25mm	6 ~ 20mm	1 ~ 25mm	1 ~ 4mm	6 ~ 20mm	4 ~ 25mm	4 ~ 12mm	3 ~ 12mm
TiAlN							
◎	◎	◎	◎	◎	◎	◎	◎
◎	◎	◎	◎	◎	◎	◎	◎
◎	◎	◎	◎	◎	○	○	◎
○	○	◎	◎	◎	○	○	○
○	○						○
◎	◎	◎	◎	◎	◎	◎	◎
○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○
○	○	○	○	○			○
30° Helix angle, regular type.	30° Helix angle, with slim shank.	30° Helix angle, regular type.	30° Helix angle, long neck type.	30° Helix angle, with slim shank.	30° Helix angle, extra long straight shank.	30° Helix angle, extra long taper neck.	30° Helix angle, standard length of cut fits into shrink fit holders.









◎ = First Choice ○ = Second Choice

Solid Carbide Ball Nose End Mills

Use	Conventional			For High Hardened Steel		For Aluminum
Page	C-102	C-103	C-104	C-105	C-107	C-109
Catalog Number	DZ-SCBE	DZ-SBEL-T	DZ-SBEL	DV-OCSB	DH-OCHB	AL-DBPS
No. of Flutes	2 Flutes					
Flute Helix	30°		25°	30°	45°	25°
Length of Cut	Regular		Long	Regular		
Diameter	0.3 ~ 4mm	2 ~ 20mm	1 ~ 30mm	1 ~ 25mm	3 ~ 12mm	1 ~ 12mm
Coating	TiAlN			Value Coating	DH	None
Carbon Steel Alloy Steel	◎	◎	◎	◎		
Hardened Steel	~45HRC	○	○	○	◎	◎
	~50HRC	○	○	○	◎	◎
	~65HRC				◎	◎
Stainless Steel						
Cast Iron	◎	◎	◎	◎		
Aluminum Alloy	○	○	○	○		◎
Copper Alloy	○	○	○	○		○
Graphite				○		
Titanium Alloy				○		
Plastic						○
Features	30° Helix angle, super short length of cut, taper neck.	30° Helix angle, taper neck.	30° Helix angle, long length of cut.	30° Helix angle, for high hardened steel.	45° Helix angle, for high hardened steel (up to 70HRC). Shrink fit shank.	30° Helix angle, high rake angle.

◎ = First Choice ○ = Second Choice

Solid Carbide Counter Sink End Mills

Multi-Purpose						Chamfering	
							
C-110	C-110	C-110	C-111	C-111	C-111	C-113	C-114
VSE	VSESS	VSE-LS	DZ-VSE	DZ-VSESS	DZ-VSE-LS	AL-VME	AL-VME-LS
2 Flutes						1 Flute	
30°						-	
Regular							
1 ~ 20mm	4 ~ 10mm	3 ~ 20mm	1 ~ 20mm	4 ~ 10mm	3 ~ 20mm	3 ~ 10mm	3 ~ 10mm
None			TiAIN			None	
○	○	○	◎	◎	◎		
			○	○	○		
○	○	○	◎	◎	◎		
○	○	○	○	○	○	◎	◎
○	○	○	○	○	○		
○	○	○	○	○	○		
30° Helix angle, multi-purpose.	30° Helix angle, multi-purpose.	30° Helix angle, multi-purpose with long shank.	30° Helix angle, multi-purpose.	30° Helix angle, multi-purpose.	30° Helix angle, multi-purpose with long shank.	For chamfering aluminum.	For chamfering aluminum with long shank.

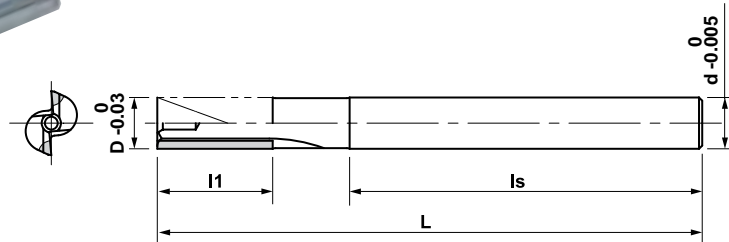
◎ = First Choice ○ = Second Choice

Beam End Mill

METRIC

VN-SPES2 Type

- 2 Flute with 30° Helix



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	l1	ls	L	d
VN-SPES2-030	•	3	6	45	60	4
VN-SPES2-040	•	4	7	43	60	4
VN-SPES2-050	•	5	7	48	65	6
VN-SPES2-060	•	6	9	46	65	6
VN-SPES2-080	•	8	9	66	85	8
VN-SPES2-100	•	10	12	78	100	10
VN-SPES2-120	•	12	12	98	120	12

Material	Graphite		Carbon		Metal Matrix Composite (up to 30% Ceramic content)		Machinable Ceramics	
Type of Machining - Shoulder Cutting	$V_c=250\text{m/min}$ $a_p=0.5D$ $a_e=0.05D$		$V_c=200\text{m/min}$ $a_p=0.5D$ $a_e=0.33D$		$V_c=30\text{m/min}$ $a_p=0.5D$ $a_e=0.02D$		$V_c=8\text{m/min}$ $a_p=0.33D$ $a_e=0.08D$	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	27,000	1,600	21,000	1,300	3,200	190	850	15
4	20,000	1,600	16,000	1,300	2,400	190	700	15
5	16,000	1,900	13,000	1,400	1,900	190	500	16
6	13,000	2,100	10,000	1,400	1,600	220	400	16
8	10,000	2,400	8,000	1,400	1,200	220	320	16
10	8,000	2,400	6,400	1,300	1,000	220	250	15
12	6,500	2,600	5,300	1,300	800	200	200	15

Material	Graphite		Carbon		Metal Matrix Composite (up to 30% Ceramic content)		Machinable Ceramics	
Type of Machining - Slotting	$V_c=250\text{m/min}$ $a_p=0.5D$ $a_e=D$		$V_c=200\text{m/min}$ $a_p=0.5D$ $a_e=D$		$V_c=30\text{m/min}$ $a_p=0.5D$ $a_e=D$		$V_c=8\text{m/min}$ $a_p=0.33D$ $a_e=D$	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	27,000	700	21,000	1,200	3,200	60	850	8
4	20,000	700	16,000	1,200	2,400	50	700	8
5	16,000	800	13,000	1,300	1,900	50	500	9
6	13,000	900	10,000	1,300	1,600	60	400	9
8	10,000	1,000	8,000	1,300	1,200	60	320	9
10	8,000	1,000	6,400	1,200	1,000	55	250	8
12	6,500	1,100	5,300	1,200	800	55	200	8

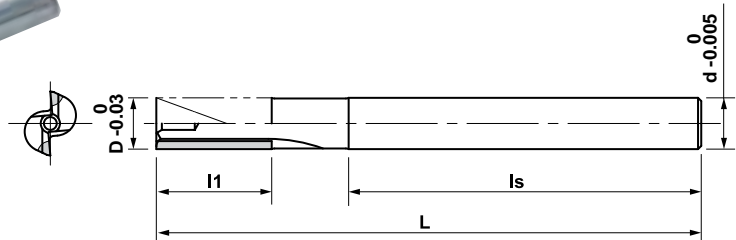
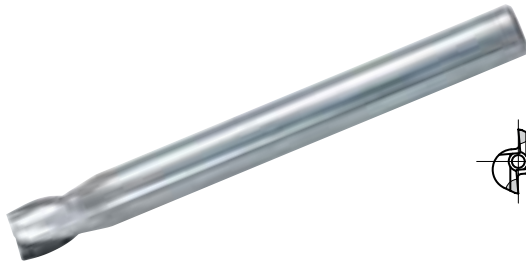


METRIC

Beam End Mill

VN-ALES2 Type

- 2 Flute with 30° Helix for Aluminum



CATALOG NUMBER	STK	DIMENSIONS				
		D	l1	ls	L	d
VN-ALES2-030	•	3	6	45	60	4
VN-ALES2-040	•	4	7	43	60	4
VN-ALES2-050	•	5	7	48	65	6
VN-ALES2-060	•	6	9	46	65	6
VN-ALES2-080	•	8	9	66	85	8
VN-ALES2-100	•	10	12	78	100	10
VN-ALES2-120	•	12	12	98	120	12

Material	Aluminum Alloy	Copper Alloy	Quartz Glass (Note: tool needs to be modified for this material)			
Type of Machining - Shoulder Cutting	$V_c=350\text{m/min}$ $a_p=0.5D$ $a_e=0.33D$	$V_c=200\text{m/min}$ $a_p=0.5D$ $a_e=0.05D$	$V_c=60\text{m/min}$ $a_p=0.5D$ $a_e=0.1D$			
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	37,000	750	21,000	1,250	6,300	190
4	28,000	1,100	16,000	1,300	4,800	190
5	22,000	1,100	13,000	1,550	3,800	210
6	19,000	1,300	10,000	1,700	3,200	220
8	14,000	1,400	8,000	1,900	2,400	220
10	11,000	1,500	6,400	2,000	2,000	200
12	9,000	1,800	5,300	2,100	1,600	200

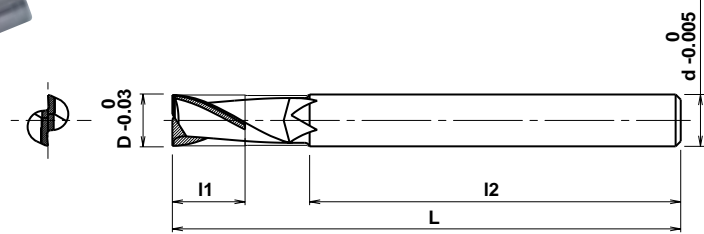
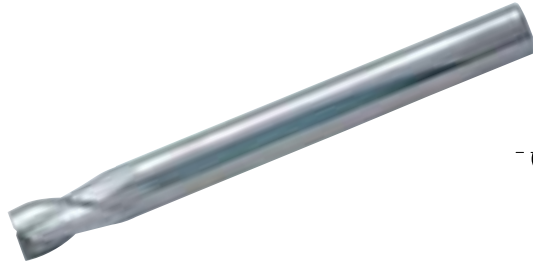
Material	Aluminum Alloy	Copper Alloy	Quartz Glass (Note: tool needs to be modified for this material)			
Type of Machining - Slotting	$V_c=350\text{m/min}$ $a_p=0.5D$ $a_e=D$	$V_c=200\text{m/min}$ $a_p=0.5D$ $a_e=D$	$V_c=60\text{m/min}$ $a_p=0.1D$ $a_e=D$			
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	37,000	700	21,000	500	6,300	100
4	28,000	1,000	16,000	550	4,800	100
5	22,000	1,050	13,000	650	3,800	120
6	19,000	1,200	10,000	700	3,200	120
8	14,000	1,300	8,000	800	2,400	130
10	11,000	1,400	6,400	800	2,000	110
12	9,000	1,700	5,300	850	1,600	110

Beam End Mill

METRIC

VN-OCES2 Type

- 2 Flute with 30° Helix and possible center cutting



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	I2	L	d
VN-OCES2030	●	3.0	6	45	60	4
VN-OCES2031	□	3.1	6	45	60	4
VN-OCES2032	□	3.2	6	45	60	4
VN-OCES2033	□	3.3	6	45	60	4
VN-OCES2034	□	3.4	6	45	60	4
VN-OCES2035	□	3.5	6	45	60	4
VN-OCES2036	□	3.6	7	43	60	4
VN-OCES2037	□	3.7	7	43	60	4
VN-OCES2038	□	3.8	7	43	60	4
VN-OCES2039	□	3.9	7	43	60	4
VN-OCES2040	●	4.0	7	43	60	4
VN-OCES2041	□	4.1	7	43	60	6
VN-OCES2042	□	4.2	7	43	60	6
VN-OCES2043	□	4.3	7	43	60	6
VN-OCES2044	□	4.4	7	43	60	6
VN-OCES2045	□	4.5	7	43	60	6
VN-OCES2046	□	4.6	7	43	60	6
VN-OCES2047	□	4.7	7	43	60	6
VN-OCES2048	□	4.8	7	43	60	6
VN-OCES2049	□	4.9	7	43	60	6
VN-OCES2050	●	5.0	7	48	65	6
VN-OCES2051	□	5.1	9	46	65	6
VN-OCES2052	□	5.2	9	46	65	6
VN-OCES2053	□	5.3	9	46	65	6
VN-OCES2054	□	5.4	9	46	65	6
VN-OCES2055	□	5.5	9	46	65	6
VN-OCES2056	□	5.6	9	46	65	6
VN-OCES2057	□	5.7	9	46	65	6
VN-OCES2058	□	5.8	9	46	65	6
VN-OCES2059	□	5.9	9	46	65	6
VN-OCES2060	●	6.0	9	46	65	6
VN-OCES2061	□	6.1	9	46	65	8
VN-OCES2062	□	6.2	9	46	65	8
VN-OCES2063	□	6.3	9	46	65	8
VN-OCES2064	□	6.4	9	46	65	8
VN-OCES2065	□	6.5	9	46	65	8
VN-OCES2066	□	6.6	9	46	65	8
VN-OCES2067	□	6.7	9	46	65	8
VN-OCES2068	□	6.8	9	46	65	8
VN-OCES2069	□	6.9	9	46	65	8
VN-OCES2070	□	7.0	9	66	85	8
VN-OCES2071	□	7.1	9	66	85	8
VN-OCES2072	□	7.2	9	66	85	8
VN-OCES2073	□	7.3	9	66	85	8
VN-OCES2074	□	7.4	9	66	85	8
VN-OCES2075	□	7.5	9	66	85	8

CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	I2	L	d
VN-OCES2076	□	7.6	9	66	85	8
VN-OCES2077	□	7.7	9	66	85	8
VN-OCES2078	□	7.8	9	66	85	8
VN-OCES2079	□	7.9	9	66	85	8
VN-OCES2080	●	8.0	9	66	85	8
VN-OCES2081	□	8.1	9	66	85	10
VN-OCES2082	□	8.2	9	66	85	10
VN-OCES2083	□	8.3	9	66	85	10
VN-OCES2084	□	8.4	9	66	85	10
VN-OCES2085	□	8.5	9	66	85	10
VN-OCES2086	□	8.6	9	66	85	10
VN-OCES2087	□	8.7	9	66	85	10
VN-OCES2088	□	8.8	9	66	85	10
VN-OCES2089	□	8.9	9	66	85	10
VN-OCES2090	□	9.0	9	81	100	10
VN-OCES2091	□	9.1	9	81	100	10
VN-OCES2092	□	9.2	9	81	100	10
VN-OCES2093	□	9.3	9	81	100	10
VN-OCES2094	□	9.4	9	81	100	10
VN-OCES2095	□	9.5	9	81	100	10
VN-OCES2096	□	9.6	12	78	100	10
VN-OCES2097	□	9.7	12	78	100	10
VN-OCES2098	□	9.8	12	78	100	10
VN-OCES2099	□	9.9	12	78	100	10
VN-OCES2100	●	10.0	12	78	100	10
VN-OCES2101	□	10.1	12	78	100	12
VN-OCES2102	□	10.2	12	78	100	12
VN-OCES2103	□	10.3	12	78	100	12
VN-OCES2104	□	10.4	12	78	100	12
VN-OCES2105	□	10.5	12	78	100	12
VN-OCES2106	□	10.6	12	78	100	12
VN-OCES2107	□	10.7	12	78	100	12
VN-OCES2108	□	10.8	12	78	100	12
VN-OCES2109	□	10.9	12	78	100	12
VN-OCES2110	□	11.0	12	98	120	12
VN-OCES2111	□	11.1	12	98	120	12
VN-OCES2112	□	11.2	12	98	120	12
VN-OCES2113	□	11.3	12	98	120	12
VN-OCES2114	□	11.4	12	98	120	12
VN-OCES2115	□	11.5	12	98	120	12
VN-OCES2116	□	11.6	12	98	120	12
VN-OCES2117	□	11.7	12	98	120	12
VN-OCES2118	□	11.8	12	98	120	12
VN-OCES2119	□	11.9	12	98	120	12
VN-OCES2120	●	12.0	12	98	120	12

- Stocked standard
- Inquire regarding delivery

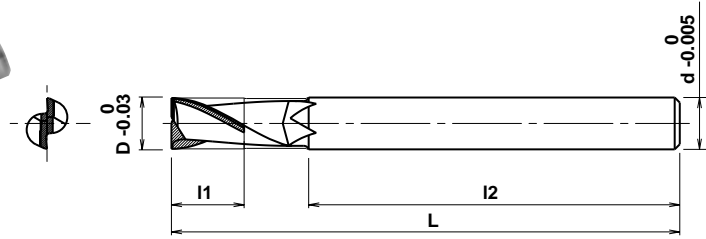
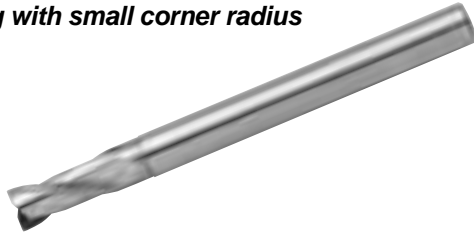


METRIC

Beam End Mill

VN-OCES2-R Type

- 2 Flute with 30° Helix, possible center cutting with small corner radius



CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
VN-OCES2030R015	□	3.0	0.15	6	45	60	4
VN-OCES2035R015	□	3.5	0.15	6	45	60	4
VN-OCES2040R015	□	4.0	0.15	7	43	60	4
VN-OCES2045R015	□	4.5	0.15	7	43	60	6
VN-OCES2050R015	□	5.0	0.15	7	48	65	6
VN-OCES2055R015	□	5.5	0.15	9	46	65	6
VN-OCES2060R025	□	6.0	0.25	9	46	65	6
VN-OCES2065R025	□	6.5	0.25	9	46	65	8
VN-OCES2070R025	□	7.0	0.25	9	66	85	8
VN-OCES2075R025	□	7.5	0.25	9	66	85	8

CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
VN-OCES2080R025	□	8.0	0.25	9	66	85	8
VN-OCES2085R025	□	8.5	0.25	9	66	85	10
VN-OCES2090R025	□	9.0	0.25	9	81	100	10
VN-OCES2095R025	□	9.5	0.25	9	81	100	10
VN-OCES2100R040	□	10.0	0.40	12	78	100	10
VN-OCES2105R040	□	10.5	0.40	12	78	100	12
VN-OCES2110R040	□	11.0	0.40	12	98	120	12
VN-OCES2115R040	□	11.5	0.40	12	98	120	12
VN-OCES2120R040	□	12.0	0.40	12	98	120	12

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data for VN-OCES2 & VN-OCES2-R

Material	Graphite		Carbon		Metal Matrix Composite (up to 30% Ceramic content)		Machinable Ceramics	
Type of Machining - Shoulder Cutting	Vc=250m/min ap=0.5D ae=0.05D 		Vc=200m/min ap=0.5D ae=0.33D 		Vc=30m/min ap=0.5D ae=0.02D 		Vc=8m/min ap=0.33D ae=0.08D 	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	27,000	1,600	21,000	1,300	3,200	190	850	15
4	20,000	1,600	16,000	1,300	2,400	190	700	15
5	16,000	1,900	13,000	1,400	1,900	190	500	16
6	13,000	2,100	10,000	1,400	1,600	220	400	16
8	10,000	2,400	8,000	1,400	1,200	220	320	16
10	8,000	2,400	6,400	1,300	1,000	220	250	15
12	6,500	2,600	5,300	1,300	800	200	200	15

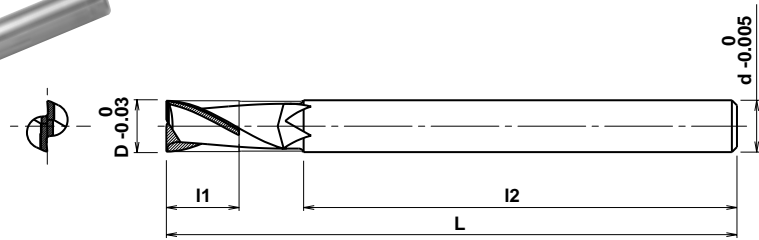
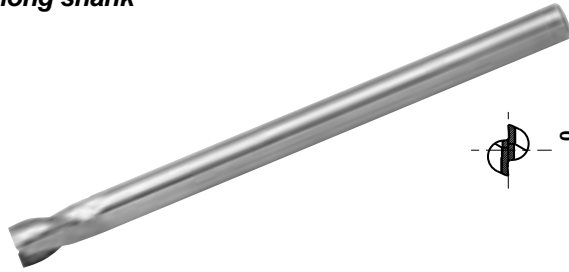
Material	Graphite		Carbon		Metal Matrix Composite (up to 30% Ceramic content)		Machinable Ceramics	
Type of Machining - Slotting	Vc=250m/min ap=0.5D ae=D 		Vc=200m/min ap=0.5D ae=D 		Vc=30m/min ap=0.5D ae=D 		Vc=8m/min ap=0.33D ae=D 	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	27,000	700	21,000	1,200	3,200	60	850	8
4	20,000	700	16,000	1,200	2,400	50	700	8
5	16,000	800	13,000	1,300	1,900	50	500	9
6	13,000	900	10,000	1,300	1,600	60	400	9
8	10,000	1,000	8,000	1,300	1,200	60	320	9
10	8,000	1,000	6,400	1,200	1,000	55	250	8
12	6,500	1,100	5,300	1,200	800	55	200	8

Beam End Mill

METRIC

VN-OCES2-LS Type

- 2 Flute with 30° Helix, possible center cutting and long shank



CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	I2	L	d
VN-OCES2030-LS	<input type="checkbox"/>	3.0	6	66	80	4
VN-OCES2040-LS	<input type="checkbox"/>	4.0	7	64	80	4
VN-OCES2050-LS	<input type="checkbox"/>	5.0	7	69	85	4
VN-OCES2060-LS	<input type="checkbox"/>	6.0	9	69	85	5
VN-OCES2080-LS	<input type="checkbox"/>	8.0	9	89	105	7
VN-OCES2100-LS	<input type="checkbox"/>	10.0	12	102	120	9
VN-OCES2120-LS	<input type="checkbox"/>	12.0	12	122	140	11

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Graphite		Carbon		Metal Matrix Composite (up to 30% Ceramic content)	
	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
Type of Machining - Shoulder Cutting	Vc=125m/min ap=0.5D ae=0.05D		Vc=100m/min ap=0.5D ae=0.2D		Vc=15m/min ap=0.5D ae=0.02D	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	13,500	125	10,500	80	1,600	20
4	10,000	125	8,000	80	1,200	20
5	8,000	125	6,500	80	950	20
6	6,500	140	5,000	120	800	20
8	5,000	140	4,000	120	600	20
10	4,000	140	3,200	120	500	20
12	3,250	140	2,650	120	400	20

Material	Graphite		Carbon		Metal Matrix Composite (up to 30% Ceramic content)	
	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
Type of Machining - Slotting	Vc=125m/min ap=0.5D ae=D		Vc=100m/min ap=0.5D ae=D		Vc=15m/min ap=0.5D ae=D	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	13,500	30	10,500	60	1,600	3
4	10,000	30	8,000	60	1,200	3
5	8,000	30	6,500	60	950	3
6	6,500	40	5,000	90	800	4
8	5,000	40	4,000	90	600	4
10	4,000	40	3,200	90	500	4
12	3,250	40	2,650	90	400	4



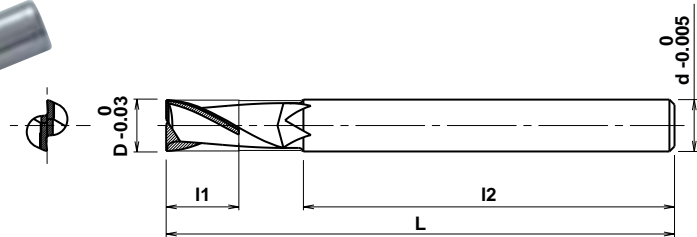
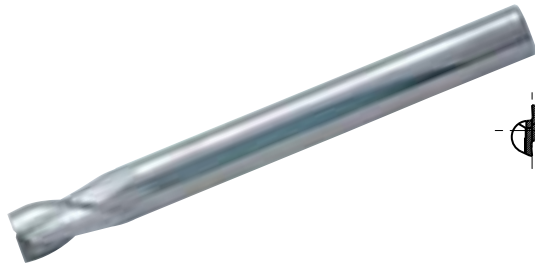
METRIC

Beam End Mill

VN-OCAS2 Type

- For aluminum cutting

- 2 Flute with 30° Helix possible center cutting



CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	I2	L	d
VN-OCAS2030	•	3.0	6	45	60	4
VN-OCAS2031	□	3.1	6	45	60	4
VN-OCAS2032	□	3.2	6	45	60	4
VN-OCAS2033	□	3.3	6	45	60	4
VN-OCAS2034	□	3.4	6	45	60	4
VN-OCAS2035	□	3.5	6	45	60	4
VN-OCAS2036	□	3.6	7	43	60	4
VN-OCAS2037	□	3.7	7	43	60	4
VN-OCAS2038	□	3.8	7	43	60	4
VN-OCAS2039	□	3.9	7	43	60	4
VN-OCAS2040	•	4.0	7	43	60	4
VN-OCAS2041	□	4.1	7	43	60	6
VN-OCAS2042	□	4.2	7	43	60	6
VN-OCAS2043	□	4.3	7	43	60	6
VN-OCAS2044	□	4.4	7	43	60	6
VN-OCAS2045	□	4.5	7	43	60	6
VN-OCAS2046	□	4.6	7	43	60	6
VN-OCAS2047	□	4.7	7	43	60	6
VN-OCAS2048	□	4.8	7	43	60	6
VN-OCAS2049	□	4.9	7	43	60	6
VN-OCAS2050	•	5.0	7	48	65	6
VN-OCAS2051	□	5.1	9	46	65	6
VN-OCAS2052	□	5.2	9	46	65	6
VN-OCAS2053	□	5.3	9	46	65	6
VN-OCAS2054	□	5.4	9	46	65	6
VN-OCAS2055	□	5.5	9	46	65	6
VN-OCAS2056	□	5.6	9	46	65	6
VN-OCAS2057	□	5.7	9	46	65	6
VN-OCAS2058	□	5.8	9	46	65	6
VN-OCAS2059	□	5.9	9	46	65	6
VN-OCAS2060	•	6.0	9	46	65	6
VN-OCAS2061	□	6.1	9	46	65	8
VN-OCAS2062	□	6.2	9	46	65	8
VN-OCAS2063	□	6.3	9	46	65	8
VN-OCAS2064	□	6.4	9	46	65	8
VN-OCAS2065	□	6.5	9	46	65	8
VN-OCAS2066	□	6.6	9	46	65	8
VN-OCAS2067	□	6.7	9	46	65	8
VN-OCAS2068	□	6.8	9	46	65	8
VN-OCAS2069	□	6.9	9	46	65	8
VN-OCAS2070	□	7.0	9	66	85	8
VN-OCAS2071	□	7.1	9	66	85	8
VN-OCAS2072	□	7.2	9	66	85	8
VN-OCAS2073	□	7.3	9	66	85	8
VN-OCAS2074	□	7.4	9	66	85	8
VN-OCAS2075	□	7.5	9	66	85	8

CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	I2	L	d
VN-OCAS2076	□	7.6	9	66	85	8
VN-OCAS2077	□	7.7	9	66	85	8
VN-OCAS2078	□	7.8	9	66	85	8
VN-OCAS2079	□	7.9	9	66	85	8
VN-OCAS2080	•	8.0	9	66	85	8
VN-OCAS2081	□	8.1	9	66	85	10
VN-OCAS2082	□	8.2	9	66	85	10
VN-OCAS2083	□	8.3	9	66	85	10
VN-OCAS2084	□	8.4	9	66	85	10
VN-OCAS2085	□	8.5	9	66	85	10
VN-OCAS2086	□	8.6	9	66	85	10
VN-OCAS2087	□	8.7	9	66	85	10
VN-OCAS2088	□	8.8	9	66	85	10
VN-OCAS2089	□	8.9	9	66	85	10
VN-OCAS2090	□	9.0	9	81	100	10
VN-OCAS2091	□	9.1	9	81	100	10
VN-OCAS2092	□	9.2	9	81	100	10
VN-OCAS2093	□	9.3	9	81	100	10
VN-OCAS2094	□	9.4	9	81	100	10
VN-OCAS2095	□	9.5	9	81	100	10
VN-OCAS2096	□	9.6	12	78	100	10
VN-OCAS2097	□	9.7	12	78	100	10
VN-OCAS2098	□	9.8	12	78	100	10
VN-OCAS2099	□	9.9	12	78	100	10
VN-OCAS2100	•	10.0	12	78	100	10
VN-OCAS2101	□	10.1	12	78	100	12
VN-OCAS2102	□	10.2	12	78	100	12
VN-OCAS2103	□	10.3	12	78	100	12
VN-OCAS2104	□	10.4	12	78	100	12
VN-OCAS2105	□	10.5	12	78	100	12
VN-OCAS2106	□	10.6	12	78	100	12
VN-OCAS2107	□	10.7	12	78	100	12
VN-OCAS2108	□	10.8	12	78	100	12
VN-OCAS2109	□	10.9	12	78	100	12
VN-OCAS2110	□	11.0	12	98	120	12
VN-OCAS2111	□	11.1	12	98	120	12
VN-OCAS2112	□	11.2	12	98	120	12
VN-OCAS2113	□	11.3	12	98	120	12
VN-OCAS2114	□	11.4	12	98	120	12
VN-OCAS2115	□	11.5	12	98	120	12
VN-OCAS2116	□	11.6	12	98	120	12
VN-OCAS2117	□	11.7	12	98	120	12
VN-OCAS2118	□	11.8	12	98	120	12
VN-OCAS2119	□	11.9	12	98	120	12
VN-OCAS2120	•	12.0	12	98	120	12

• Stocked standard

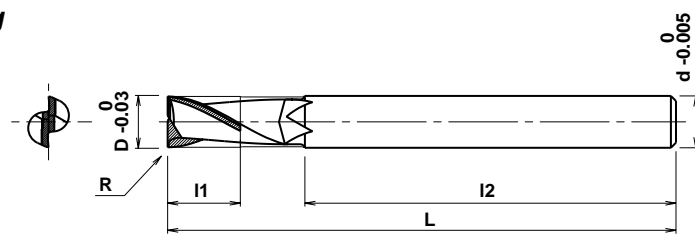
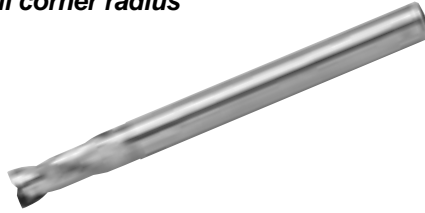
□ Inquire regarding delivery

Beam End Mill

METRIC

VN-OCAS2-R Type

- 2 Flute with 30° Helix, possible center cutting and small corner radius



CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
VN-OCAS2030R015	<input type="checkbox"/>	3.0	0.15	6	45	60	4
VN-OCAS2035R015	<input type="checkbox"/>	3.5	0.15	6	45	60	4
VN-OCAS2040R015	<input type="checkbox"/>	4.0	0.15	7	43	60	4
VN-OCAS2045R015	<input type="checkbox"/>	4.5	0.15	7	43	60	6
VN-OCAS2050R015	<input type="checkbox"/>	5.0	0.15	7	48	65	6
VN-OCAS2055R015	<input type="checkbox"/>	5.5	0.15	9	46	65	6
VN-OCAS2060R025	<input type="checkbox"/>	6.0	0.25	9	46	65	6
VN-OCAS2065R025	<input type="checkbox"/>	6.5	0.25	9	46	65	8
VN-OCAS2070R025	<input type="checkbox"/>	7.0	0.25	9	66	85	8
VN-OCAS2075R025	<input type="checkbox"/>	7.5	0.25	9	66	85	8

CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
VN-OCAS2080R025	<input type="checkbox"/>	8.0	0.25	9	66	85	8
VN-OCAS2085R025	<input type="checkbox"/>	8.5	0.25	9	66	85	10
VN-OCAS2090R025	<input type="checkbox"/>	9.0	0.25	9	81	100	10
VN-OCAS2095R025	<input type="checkbox"/>	9.5	0.25	9	81	100	10
VN-OCAS2100R040	<input type="checkbox"/>	10.0	0.40	12	78	100	10
VN-OCAS2105R040	<input type="checkbox"/>	10.5	0.40	12	78	100	12
VN-OCAS2110R040	<input type="checkbox"/>	11.0	0.40	12	98	120	12
VN-OCAS2115R040	<input type="checkbox"/>	11.5	0.40	12	98	120	12
VN-OCAS2120R040	<input type="checkbox"/>	12.0	0.40	12	98	120	12

• Stocked standard

Inquire regarding delivery

Recommended Cutting Data for VN-OCAS2 & VN-OCAS2-R

Material	Aluminum Alloy	Copper Alloy	Quartz Glass (Note: tool needs to be modified for this material)			
Type of Machining - Shoulder Cutting	$V_c=350\text{m/min}$ $a_p=0.5D$ $a_e=0.33D$	$V_c=200\text{m/min}$ $a_p=0.5D$ $a_e=0.05D$	$V_c=60\text{m/min}$ $a_p=0.5D$ $a_e=0.1D$			
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	37,000	750	21,000	1,250	6,300	190
4	28,000	1,100	16,000	1,300	4,800	190
5	22,000	1,100	13,000	1,550	3,800	210
6	19,000	1,300	10,000	1,700	3,200	220
8	14,000	1,400	8,000	1,900	2,400	220
10	11,000	1,500	6,400	2,000	2,000	200
12	9,000	1,800	5,300	2,100	1,600	200

Material	Aluminum Alloy	Copper Alloy	Quartz Glass (Note: tool needs to be modified for this material)			
Type of Machining - Slotting	$V_c=350\text{m/min}$ $a_p=0.5D$ $a_e=D$	$V_c=200\text{m/min}$ $a_p=0.5D$ $a_e=D$	$V_c=60\text{m/min}$ $a_p=0.1D$ $a_e=D$			
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
3	37,000	700	21,000	500	6,300	100
4	28,000	1,000	16,000	550	4,800	100
5	22,000	1,050	13,000	650	3,800	120
6	19,000	1,200	10,000	700	3,200	120
8	14,000	1,300	8,000	800	2,400	130
10	11,000	1,400	6,400	800	2,000	110
12	9,000	1,700	5,300	850	1,600	110

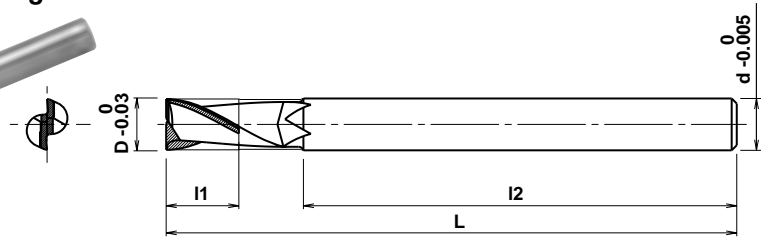
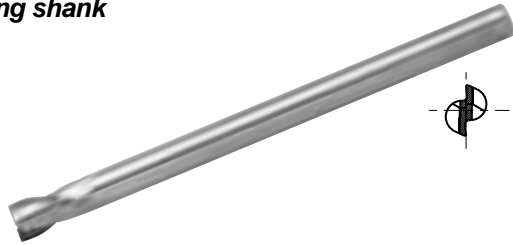


METRIC

Beam End Mill

VN-OCAS2-LS Type

- For aluminum cutting
- 2 Flute with 30° Helix, possible center cutting and long shank



CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	I2	L	d
VN-OCAS2030-LS	<input type="checkbox"/>	3.0	6	66	80	4
VN-OCAS2040-LS	<input type="checkbox"/>	4.0	7	64	80	4
VN-OCAS2050-LS	<input type="checkbox"/>	5.0	7	69	85	4
VN-OCAS2060-LS	<input type="checkbox"/>	6.0	9	69	85	5
VN-OCAS2080-LS	<input type="checkbox"/>	8.0	9	89	105	7
VN-OCAS2100-LS	<input type="checkbox"/>	10.0	12	102	120	9
VN-OCAS2120-LS	<input type="checkbox"/>	12.0	12	122	140	11

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Aluminum Alloy		Carbon	
	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
Type of Machining - Shoulder Cutting	Vc=175m/min ap=0.5D ae=0.2D 		Vc=100m/min ap=0.5D ae=0.05D 	
Diameter	3	4	5	6
	18,500	14,000	11,000	9,500
	140	140	140	160
	10,500	8,000	6,500	5,000
	70	70	70	100
	7,000	4,000	3,200	2,650
	160	160	160	100

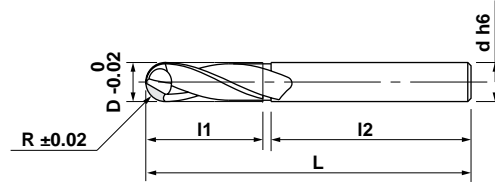
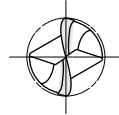
Material	Aluminum Alloy		Carbon	
	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
Type of Machining - Slotting	Vc=175m/min ap=0.5Dc ae=Dc 		Vc=100m/min ap=0.5Dc ae=Dc 	
Diameter	3	4	5	6
	18,500	14,000	11,000	9,500
	100	100	100	120
	10,500	8,000	6,500	5,000
	20	20	20	30
	7,000	4,000	3,200	2,650
	120	120	120	30

Beam Ball Nose End Mill

METRIC

VN-DBS2 Type

- S shape curved cutting edge
- Negative cutting edge at radius makes it strong



CATALOG NUMBER	STK	DIMENSIONS					
		D	R	l1	l2	L	d
VN-DBS2-020	•	2	1	7	66	80	4
VN-DBS2-030	•	3	1.5	10	66	80	4
VN-DBS2-040	•	4	2	15	62	80	4
VN-DBS2-050	•	5	2.5	18	74	100	6
VN-DBS2-060	•	6	3	20	77	100	6
VN-DBS2-080	•	8	4	30	77	110	8

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Metal Matrix Composite (up to 30% Ceramic content)		Machinable Ceramics	
Type of Machining	$V_c=25\text{m/min}$ $a_p=0.1D$ $a_e=0.3D$		$V_c=8\text{m/min}$ $a_p=0.1D$ $a_e=0.3D$	
	Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)
2	6,500	800	2,100	140
3	4,500	700	1,400	130
4	3,300	650	1,000	110
5	2,500	600	850	110
6	2,200	600	700	110
8	1,600	500	500	90

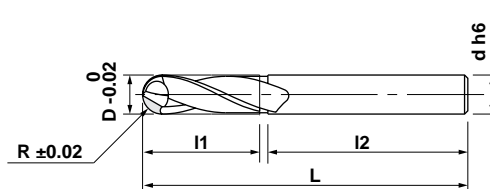
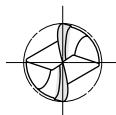


METRIC

Beam Ball Nose End Mill for Aluminum

VN-ALBS2 Type

- For aluminum cutting
- S shape curved cutting edge
- Positive cutting edge at radius provides smooth cutting



CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
VN-ALBS2-020	•	2	1	7	66	80	4
VN-ALBS2-030	•	3	1.5	10	66	80	4
VN-ALBS2-040	•	4	2	15	62	80	4
VN-ALBS2-050	•	5	2.5	18	74	100	6
VN-ALBS2-060	•	6	3	20	77	100	6
VN-ALBS2-080	•	8	4	30	77	110	8

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Graphite		Carbon		Aluminum Alloy		Copper Alloy	
Type of Machining	Vc=200m/min ap=0.1D ae=0.3D		Vc=150m/min ap=0.1D ae=0.3D		Vc=250m/min ap=0.1D ae=0.3D		Vc=130m/min ap=0.1D ae=0.3D	
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
2	53,000	900	40,000	700	65,000	1,000	34,000	550
3	35,000	1,000	26,000	750	44,000	1,300	23,000	700
4	26,000	1,100	20,000	800	33,000	1,300	17,000	700
5	21,000	1,400	16,000	1,000	27,000	1,700	14,000	900
6	17,500	1,700	13,000	1,300	22,000	2,300	11,500	1,200
8	13,000	2,300	10,000	1,700	16,000	2,900	8,500	1,500

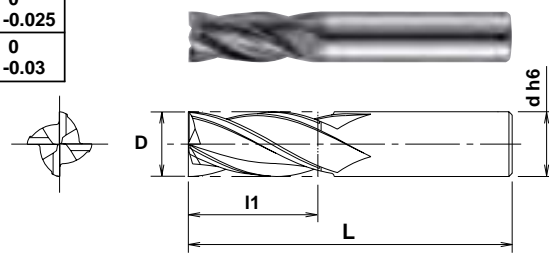
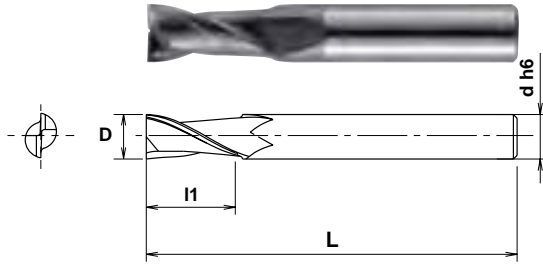
Solid Carbide End Mills

METRIC

SEM2 & SEM4 Type

- 2 & 4 Flute styles with 30° Helix

Tolerances	
5mm	0 -0.02
6mm, 8mm	0 -0.025
10mm, 12mm	0 -0.03



SEM2

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
SEM2010	•	1	3	40	4
SEM2015	•	1.5	4.5	40	4
SEM2020	•	2	6.5	40	4
SEM2025	•	2.5	6.5	40	4
SEM2030	•	3	9	50	6
SEM2040	•	4	12	50	6
SEM2050	•	5	15	50	6
SEM2060	•	6	16	50	6
SEM2080	•	8	20	64	8
SEM2100	•	10	22	70	10
SEM2120	•	12	25	75	12

SEM4

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
SEM4020	•	2	6.5	40	4
SEM4025	•	2.5	6.5	40	4
SEM4030	•	3	9	50	6
SEM4040	•	4	12	50	6
SEM4050	•	5	15	50	6
SEM4060	•	6	16	50	6
SEM4080	•	8	20	64	8
SEM4100	•	10	22	70	10
SEM4120	•	12	25	75	12

Recommended Cutting Data for SEM2

Material	Carbon Steel, Cast Iron				Alloy Steel 25 ~ 40HRC				Hardened Alloy Steel 40 ~ 50 HRC			
	Type of Machining		Type of Machining		Type of Machining		Type of Machining		Type of Machining		Type of Machining	
Diameter	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting			
		Vf (mm/min)			Vf (mm/min)			Vf (mm/min)				
1	31,800	140	230	19,100	80	140	9,500	40	60			
2	15,900	240	280	9,500	140	170	4,770	65	75			
3	10,600	240	280	6,400	140	170	3,180	65	75			
4	8,000	240	280	4,800	140	170	2,380	65	75			
5	6,300	240	280	3,800	140	170	1,900	65	75			
6	5,300	340	400	3,200	200	240	1,600	90	110			
8	4,000	340	400	2,400	200	240	1,200	90	110			
10	3,200	340	400	1,900	200	240	950	90	110			
12	2,700	360	400	1,600	220	240	800	100	110			



METRIC

Solide Carbide End Mills

Recommended Cutting Data for SEM4

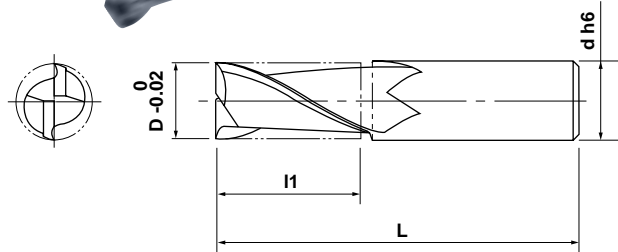
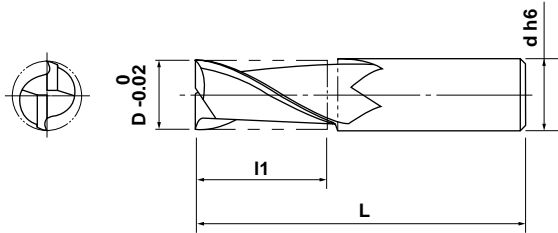
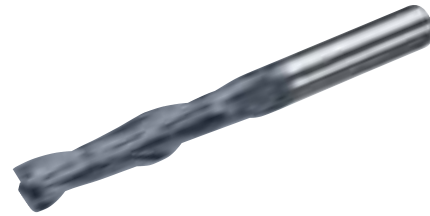
Material	Carbon Steel, Cast Iron			Alloy Steel 25 ~ 40HRC			Hardened Alloy Steel 40 ~ 50 HRC		
Type of Machining	Shoulder Cutting		Slotting	Shoulder Cutting		Slotting	Shoulder Cutting		Slotting
	Vf (mm/min)		Vf (mm/min)	Vf (mm/min)		Vf (mm/min)	Vf (mm/min)		Vf (mm/min)
Diameter	N (min ⁻¹)	Vf (mm/min)		N (min ⁻¹)	Vf (mm/min)		N (min ⁻¹)	Vf (mm/min)	
2	15,900	400	500	9,550	240	300	4,770	110	140
2.5	12,700	400	500	7,600	240	300	3,810	110	140
3	10,600	400	500	6,400	240	300	3,180	110	140
4	8,000	400	520	4,800	240	310	2,380	110	140
5	6,300	400	520	3,800	240	310	1,900	110	140
6	5,300	600	520	3,200	360	310	1,600	160	140
8	4,000	600	520	2,400	360	310	1,200	160	140
10	3,200	600	520	1,900	360	310	950	160	140
12	2,700	600	520	1,600	360	310	800	160	140

Solid Carbide End Mills

METRIC

DZ-OCES2000 & DZ-OCEL2000 Type

- 2 Flute with 30° Helix



DZ-OCES2

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
DZ-OCES2010	•	1.0	2.5	40	4
DZ-OCES2015	•	1.5	4	40	4
DZ-OCES2020	•	2.0	6	40	4
DZ-OCES2025	•	2.5	8	40	4
DZ-OCES2030	•	3.0	10	45	6
DZ-OCES2-1/8	□	3.175	10	45	6
DZ-OCES2035	•	3.5	11	45	6
DZ-OCES2040	•	4.0	12	45	6
DZ-OCES2045	•	4.5	14	45	6
DZ-OCES2-3/16	□	4.762	15	50	6
DZ-OCES2050	•	5.0	15	50	6
DZ-OCES2055	•	5.5	15	50	6
DZ-OCES2060	•	6.0	15	50	6
DZ-OCES2-1/4	□	6.35	15	50	6
DZ-OCES2065	•	6.5	15	50	6
DZ-OCES2070	•	7.0	20	60	8
DZ-OCES2075	•	7.5	20	60	8
DZ-OCES2-5/16	□	7.938	20	60	8
DZ-OCES2080	•	8.0	20	60	8
DZ-OCES2085	•	8.5	20	60	8
DZ-OCES2090	•	9.0	20	65	10
DZ-OCES2095	•	9.5	20	65	10
DZ-OCES2-3/8	□	9.525	25	70	10
DZ-OCES2100	•	10.0	25	70	10
DZ-OCES2110	•	11	25	75	12
DZ-OCES2120	•	12	25	75	12
DZ-OCES2130	•	13	30	80	12
DZ-OCES2140	•	14	35	90	16
DZ-OCES2150	•	15	35	90	16
DZ-OCES2160	•	16	35	90	16
DZ-OCES2170	•	17	40	105	20
DZ-OCES2180	•	18	40	105	20
DZ-OCES2190	•	19	40	105	20
DZ-OCES2200	•	20	40	105	20
DZ-OCES2210	•	21	50	120	25
DZ-OCES2220	•	22	50	120	25
DZ-OCES2230	•	23	50	120	25
DZ-OCES2240	•	24	50	120	25
DZ-OCES2250	•	25	50	120	25
DZ-OCES2260	•	26	50	120	25
DZ-OCES2270	•	27	50	120	25
DZ-OCES2280	•	28	60	130	25
DZ-OCES2290	•	29	60	130	25
DZ-OCES2300	•	30	60	130	32

DZ-OCEL2

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
DZ-OCEL2030	•	3.0	20	60	6
DZ-OCEL2035	•	3.5	22	60	6
DZ-OCEL2040	•	4.0	24	60	6
DZ-OCEL2045	•	4.5	28	60	6
DZ-OCEL2050	•	5.0	30	70	6
DZ-OCEL2055	•	5.5	30	70	6
DZ-OCEL2060	•	6.0	30	70	6
DZ-OCEL2065	•	6.5	40	90	8
DZ-OCEL2070	•	7.0	40	90	8
DZ-OCEL2075	•	7.5	40	90	8
DZ-OCEL2080	•	8.0	40	90	8
DZ-OCEL2085	•	8.5	40	100	10
DZ-OCEL2090	•	9.0	40	100	10
DZ-OCEL2095	•	9.5	40	100	10
DZ-OCEL2100	•	10.0	50	110	10
DZ-OCEL2110	•	11.0	50	110	12
DZ-OCEL2120	•	12.0	50	110	12
DZ-OCEL2130	•	13.0	60	120	12
DZ-OCEL2140	•	14.0	70	130	16
DZ-OCEL2150	•	15.0	70	130	16
DZ-OCEL2160	•	16.0	70	130	16
DZ-OCEL2170	•	17.0	70	140	20
DZ-OCEL2180	•	18.0	70	140	20
DZ-OCEL2190	•	19.0	70	140	20
DZ-OCEL2200	•	20.0	70	140	20
DZ-OCEL2210	•	21.0	80	150	25
DZ-OCEL2220	•	22.0	80	150	25
DZ-OCEL2230	•	23.0	80	150	25
DZ-OCEL2240	•	24.0	80	150	25
DZ-OCEL2250	•	25.0	80	150	25

• Stocked standard

□ Inquire regarding delivery



METRIC

Solid Carbide End Mills

Recommended Cutting Data for DZ-OCES2000

Material	Carbon Steel, Cast Iron			Alloy Steel 25 ~ 40HRC			Hardened Alloy Steel 40 ~ 50 HRC					
Type of Machining												
	$a_p=1.5D$ $a_e \leq 0.2D$		$a_p \leq 0.2D$ ($D \leq \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)		$a_p=1.5D$ $a_e \leq 0.2D$		$a_p \leq 0.2D$ ($D \leq \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)		$a_p=1.5D$ $a_e \leq 0.2D$		$a_p \leq 0.2D$ ($D \leq \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)	
Diameter	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting			
		Vf (mm/min)			Vf (mm/min)			Vf (mm/min)				
0.5	38,200	55	90	38,200	55	90	19,100	15	40			
1	31,800	140	230	19,100	80	140	9,500	40	60			
2	15,900	240	280	9,500	140	170	4,770	65	75			
3	10,600	240	280	6,400	140	170	3,180	65	75			
4	8,000	240	280	4,800	140	170	2,380	65	75			
5	6,300	240	280	3,800	140	170	1,900	65	75			
6	5,300	340	400	3,200	200	240	1,600	90	110			
8	4,000	340	400	2,400	200	240	1,200	90	110			
10	3,200	340	400	1,900	200	240	950	90	110			
12	2,700	360	400	1,600	220	240	800	100	110			
16	2,000	360	400	1,200	220	240	600	100	110			
20	1,600	360	320	950	220	190	480	100	90			
25	1,300	330	260	800	200	160	380	90	70			
30	1,100	280	220	650	170	130	320	80	60			

Recommended Cutting Data for DZ-OCEL2000

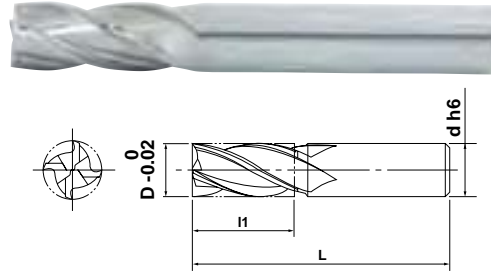
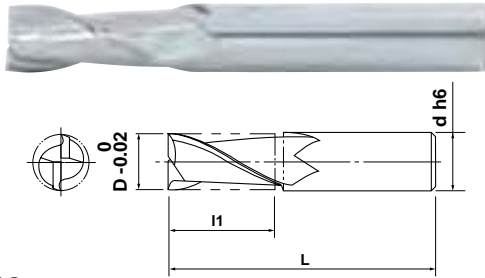
Material	Carbon Steel, Cast Iron			Alloy Steel 25 ~ 40 HRC			Hardened Alloy Steel 40 ~ 50 HRC					
Type of Machining												
	$a_p=1.5D$ $a_e \leq 0.2D$		$a_p \leq 0.2D$ ($D = \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)		$a_p=1.5D$ $a_e \leq 0.2D$		$a_p \leq 0.2D$ ($D = \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)		$a_p=1.5D$ $a_e \leq 0.2D$		$a_p \leq 0.2D$ ($D = \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)	
Diameter	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting			
		Vf (mm/min)			Vf (mm/min)			Vf (mm/min)				
3	10,600	70	90	6,400	40	50	3,180	20	25			
4	8,000	110	90	4,800	70	50	2,380	30	25			
6	5,300	160	90	3,200	100	50	1,600	45	25			
8	4,000	160	90	2,400	100	50	1,200	45	25			
10	3,200	160	90	1,900	100	50	950	45	25			
12	2,700	160	90	1,600	100	50	800	45	25			
16	2,000	140	90	1,200	80	50	600	40	25			
20	1,600	180	90	950	110	50	480	50	25			
25	1,300	180	90	800	110	50	380	50	25			

Solid Carbide End Mills

METRIC

NSES2 & NSES4 Type

- 2 & 4 Flute styles with 30° Helix



NSES2

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
NSES-2160	•	16.0	32	110	16
NSES-2180	•	18.0	36	110	20
NSES-2200	•	20.0	40	130	20
NSES-2220	•	22.0	44	130	25
NSES-2250	•	25.0	50	140	25
NSES-2300	•	30.0	60	160	32

NSES4

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
NSES-4160	•	16.0	32	110	16
NSES-4180	•	18.0	36	110	20
NSES-4200	•	20.0	40	130	20
NSES-4220	•	22.0	44	130	25
NSES-4250	•	25.0	50	140	25
NSES-4300	•	30.0	60	160	32

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Carbon Steel, Alloy Steel, Cast Iron (S50C, SCM, FC) 25HRC				Hardened Alloy Steel, Tool Steel (SCM, SKD61, SKD11) 25 ~ 40HRC			
	 $a_p = 1.5D$ $a_e \leq 0.2D$				 $a_p = 1.5D$ $a_e \leq 0.2D$			
Diameter	Vc (m/min)	n (min ⁻¹)	fz (mm/t)	Vf (mm/min)	Vc (m/min)	n (min ⁻¹)	fz (mm/t)	Vf (mm/min)
16	35	700	0.08	110	20	400	0.08	65
20	35	550	0.10	110	20	300	0.10	60
25	35	450	0.10	90	20	250	0.10	50
30	35	350	0.10	70	20	200	0.10	40

Material	Carbon Steel, Alloy Steel, Cast Iron (S50C, SCM, FC) 25HRC				Hardened Alloy Steel, Tool Steel (SCM, SKD61, SKD11) 25 ~ 40HRC			
	 $a_p \leq 0.2D$ ($D \leq \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)				 $a_p \leq 0.2D$ ($D \leq \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)			
Diameter	Vc (m/min)	n (min ⁻¹)	fz (mm/t)	Vf (mm/min)	Vc (m/min)	n (min ⁻¹)	fz (mm/t)	Vf (mm/min)
16	35	700	0.08	110	20	400	0.08	65
20	35	550	0.10	110	20	300	0.10	60
25	35	450	0.10	90	20	250	0.10	50
30	35	350	0.10	70	20	200	0.10	40

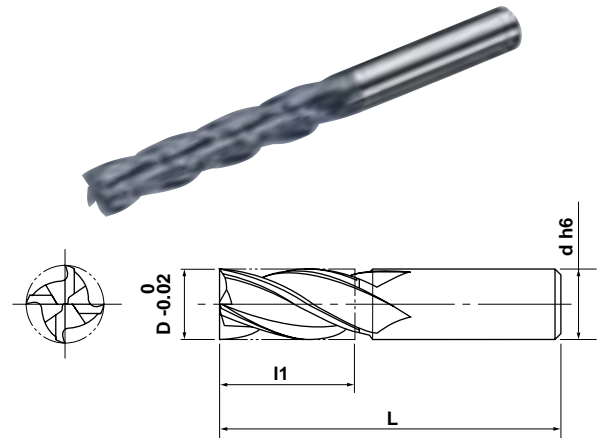
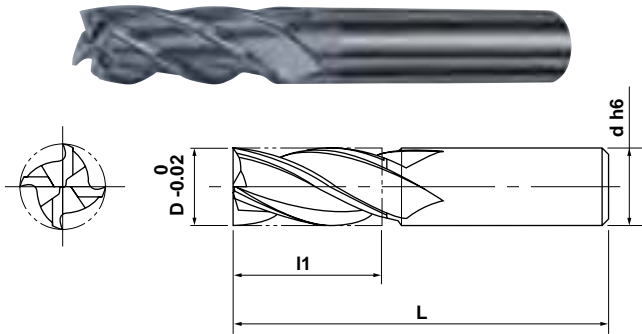
Note: Above cutting data is for 2 flute type. If using 4 flute type increase feed speed 1.5 times.



METRIC

Solid Carbide End Mills

DZ-OCES4000 & DZ-OCEL4000 Type
- 4 Flute with 30° Helix



DZ-OCES4

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
DZ-OCES4030	•	3.0	10	45	6
DZ-OCES4035	•	3.5	11	45	6
DZ-OCES4040	•	4.0	12	45	6
DZ-OCES4045	•	4.5	14	45	6
DZ-OCES4050	•	5.0	15	50	6
DZ-OCES4055	•	5.5	15	50	6
DZ-OCES4060	•	6.0	15	50	6
DZ-OCES4065	•	6.5	15	50	6
DZ-OCES4070	•	7.0	20	60	8
DZ-OCES4075	•	7.5	20	60	8
DZ-OCES4080	•	8.0	20	60	8
DZ-OCES4085	•	8.5	20	60	8
DZ-OCES4090	•	9.0	20	65	10
DZ-OCES4095	•	9.5	20	65	10
DZ-OCES4100	•	10.0	25	70	10
DZ-OCES4110	•	11.0	25	75	12
DZ-OCES4120	•	12.0	25	75	12
DZ-OCES4130	•	13.0	30	80	12
DZ-OCES4140	•	14.0	35	90	16
DZ-OCES4150	•	15.0	35	90	16
DZ-OCES4160	•	16.0	35	90	16
DZ-OCES4170	•	17.0	40	105	20
DZ-OCES4180	•	18.0	40	105	20
DZ-OCES4190	•	19.0	40	105	20
DZ-OCES4200	•	20.0	40	105	20
DZ-OCES4210	•	21.0	50	120	25
DZ-OCES4220	•	22.0	50	120	25
DZ-OCES4230	•	23.0	50	120	25
DZ-OCES4240	•	24.0	50	120	25
DZ-OCES4250	•	25.0	50	120	25
DZ-OCES4260	•	26.0	50	120	25
DZ-OCES4270	•	27.0	50	120	25
DZ-OCES4280	•	28.0	60	130	25
DZ-OCES4290	•	29.0	60	130	25
DZ-OCES4300	•	30.0	60	130	32

DZ-OCEL4

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
DZ-OCEL4030	•	3.0	20	60	6
DZ-OCEL4035	•	3.5	22	60	6
DZ-OCEL4040	•	4.0	24	60	6
DZ-OCEL4045	•	4.5	28	60	6
DZ-OCEL4050	•	5.0	30	70	6
DZ-OCEL4055	•	5.5	30	70	6
DZ-OCEL4060	•	6.0	30	70	6
DZ-OCEL4065	•	6.5	40	90	8
DZ-OCEL4070	•	7.0	40	90	8
DZ-OCEL4075	•	7.5	40	90	8
DZ-OCEL4080	•	8.0	40	90	8
DZ-OCEL4085	•	8.5	40	100	10
DZ-OCEL4090	•	9.0	40	100	10
DZ-OCEL4095	•	9.5	40	100	10
DZ-OCEL4100	•	10.0	50	110	10
DZ-OCEL4110	•	11.0	50	110	12
DZ-OCEL4120	•	12.0	50	110	12
DZ-OCEL4130	•	13.0	60	120	12
DZ-OCEL4140	•	14.0	70	130	16
DZ-OCEL4150	•	15.0	70	130	16
DZ-OCEL4160	•	16.0	70	130	16
DZ-OCEL4170	•	17.0	70	140	20
DZ-OCEL4180	•	18.0	70	140	20
DZ-OCEL4190	•	19.0	70	140	20
DZ-OCEL4200	•	20.0	70	140	20
DZ-OCEL4210	•	21.0	80	150	25
DZ-OCEL4220	•	22.0	80	150	25
DZ-OCEL4230	•	23.0	80	150	25
DZ-OCEL4240	•	24.0	80	150	25
DZ-OCEL4250	•	25.0	80	150	25

Solid Carbide End Mills

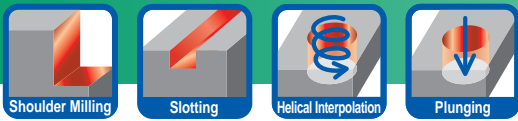
METRIC

Recommended Cutting Data for DZ-OCES4000

Material	Carbon Steel, Cast Iron			Alloy Steel 25 ~ 40HRC			Hardened Alloy Steel 40 ~ 50 HRC		
Type of Machining									
	$a_p=1.5D$ $a_e \leq 0.2D$	$a_p \leq 0.5D$		$a_p=1.5D$ $a_e \leq 0.2D$	$a_p \leq 0.5D$		$a_p=1.5D$ $a_e \leq 0.2D$	$a_p \leq 0.5D$	
Diameter	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting
		Vf (mm/min)			Vf (mm/min)			Vf (mm/min)	
2	15,900	400	500	9,550	240	300	4,770	110	140
2.5	12,700	400	500	7,600	240	300	3,810	110	140
3	10,600	400	500	6,400	240	300	3,180	110	140
4	8,000	400	520	4,800	240	310	2,380	110	140
5	6,300	400	520	3,800	240	310	1,900	110	140
6	5,300	600	520	3,200	360	310	1,600	160	140
8	4,000	600	520	2,400	360	310	1,200	160	140
10	3,200	600	520	1,900	360	310	950	160	140
12	2,700	600	520	1,600	360	310	800	160	140
16	2,000	600	500	1,200	360	300	600	160	140
20	1,600	650	520	950	390	310	480	180	140
25	1,300	650	520	800	390	310	380	180	140
30	1,100	550	440	650	330	260	320	150	120

Recommended Cutting Data for DZ-OCEL4000

Material	Carbon Steel, Cast Iron			Alloy Steel 25 ~ 40 HRC			Hardened Alloy Steel 40 ~ 50 HRC		
Type of Machining									
	$a_p=1.5D$ $a_e \leq 0.2D$	$a_p \leq 0.2D$ ($D = \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)		$a_p=1.5D$ $a_e \leq 0.2D$	$a_p \leq 0.2D$ ($D = \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)		$a_p=1.5D$ $a_e \leq 0.2D$	$a_p \leq 0.2D$ ($D = \phi 3$) $a_p \leq 0.5D$ ($D > \phi 3$)	
Diameter	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting	N (min ⁻¹)	Shoulder Cutting	Slotting
		Vf (mm/min)			Vf (mm/min)			Vf (mm/min)	
3	10,600	120	170	6,400	70	100	3,180	30	45
4	8,000	190	170	4,800	110	100	2,380	50	45
6	5,300	280	170	3,200	170	100	1,600	75	45
8	4,000	280	170	2,400	170	100	1,200	75	45
10	3,200	280	170	1,900	170	100	950	75	45
12	2,700	280	170	1,600	170	100	800	75	45
16	2,000	240	170	1,200	140	100	600	65	45
20	1,600	310	170	950	180	100	480	80	45
25	1,300	310	170	800	180	100	380	80	45

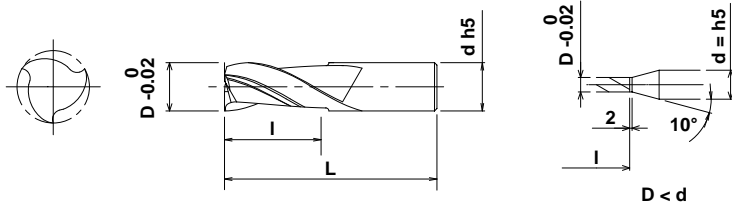
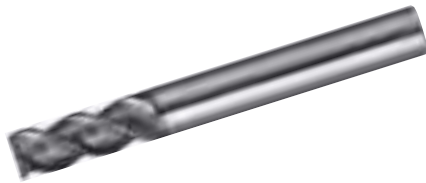


METRIC

Solid Carbide End Mills

DV-SOCS3 Type

- 3 Flute with 45° Helix for advanced plunging performance
- New unique center cutting edge geometry

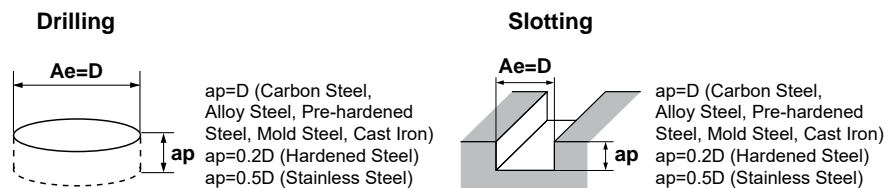


CATALOG NUMBER	STK	DIMENSIONS			
		D	I	L	d
DV-SOCS3030	•	3	8	60	6
DV-SOCS3040	•	4	11	60	6
DV-SOCS3050	•	5	13	60	6
DV-SOCS3060	•	6	13	60	6
DV-SOCS3080	•	8	19	75	8
DV-SOCS3100	•	10	22	80	10
DV-SOCS3120	•	12	26	100	12
DV-SOCS3160	•	16	32	110	16
DV-SOCS3200	•	20	38	125	20

Recommended Cutting Data for continuous milling & drilling

Material	Carbon Steel, Cast Iron (C55, GG25)			Alloy Steel, Pre-Hardened Steel, Mold Steel (P20, 1.2311)			
	Diameter	n (min ⁻¹)	Vf (mm/min)		n (min ⁻¹)	Vf (mm/min)	
			Drilling	Slotting		Drilling	Slotting
3	10,600	330	480	6,400	160	290	
4	8,000	370	490	4,800	190	300	
5	6,300	370	490	3,800	210	300	
6	5,300	350	490	3,200	230	300	
8	4,000	350	490	2,400	240	300	
10	3,200	350	490	1,900	240	300	
12	2,700	350	490	1,600	220	300	
16	2,000	320	460	1,200	220	290	
20	1,600	300	440	950	190	280	

Material	Hardened Tool Steel (40-50HRC) (1.2344, 1.2379)			Stainless Steel (SUS304, SUS316)			
	Diameter	n (min ⁻¹)	Vf (mm/min)		n (min ⁻¹)	Vf (mm/min)	
			Drilling	Slotting		Drilling	Slotting
3	3,200	80	90	6,400	100	190	
4	2,400	95	120	4,800	120	240	
5	1,900	100	120	3,800	130	260	
6	1,600	110	120	3,200	150	250	
8	1,200	110	120	2,400	140	240	
10	950	110	110	1,900	130	220	
12	800	100	110	1,600	130	220	
16	600	100	100	1,200	120	200	
20	480	95	90	950	110	180	



- Notes:**
1. In case of drilling, use coolant.
 2. Above figures should be adjusted according to machine & work rigidity.
 3. Use step feed when drilling chips become long.

Solid Carbide End Mills

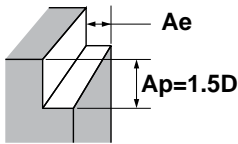
METRIC

Recommended Cutting Data for DV-SOCS3 for Shoulder Cutting & Slotting

1. Shoulder Cutting

Material	Carbon Steel, Cast Iron (C55, GG25)		Alloy Steel, Mold Steel Pre-Hardened Steel (P20, 1.2311)		Hardened Tool Steel 40-50HRC (1.2344, 1.2379)		Stainless Steel (SUS304, SUS316)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
Diameter 3	12,700	770	7,400	450	3,800	200	7,400	300
4	9,600	900	5,500	550	2,850	210	5,500	440
5	7,500	900	4,500	640	2,200	210	4,500	540
6	6,300	1,100	3,700	650	1,900	280	3,700	520
8	4,800	1,200	2,800	700	1,400	280	2,800	510
10	3,800	1,200	2,200	700	1,100	240	2,200	500
12	3,200	1,100	1,850	620	950	240	1,850	480
16	2,400	850	1,400	500	700	200	1,400	420
20	1,900	700	1,100	400	560	180	1,100	360

Shoulder Cutting

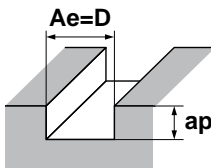


Ae=0.2D (Carbon Steel, Alloy Steel, Pre-hardened Steel, Mold Steel, Cast Iron)
 Ae=0.1D (Hardened Steel, Stainless)

2. Slotting

Material	Carbon Steel, Cast Iron (C55, GG25)		Alloy Steel, Mold Steel Pre-Hardened Steel (P20, 1.2311)		Hardened Tool Steel 40-50HRC (1.2344, 1.2379)		Stainless Steel (SUS304, SUS316)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
Diameter 3	10,600	480	6,400	290	3,200	90	6,400	190
4	8,000	490	4,800	300	2,400	120	4,800	240
5	6,300	490	3,800	300	1,900	120	3,800	260
6	5,300	490	3,200	300	1,600	120	3,200	250
8	4,000	490	2,400	300	1,200	120	2,400	240
10	3,200	490	1,900	300	950	110	1,900	220
12	2,700	490	1,600	300	800	110	1,600	220
16	2,000	460	1,200	290	600	100	1,200	200
20	1,600	440	950	280	480	90	950	180

Slotting



ap=D (Carbon Steel, Alloy Steel, Pre-hardened Steel, Mold Steel, Cast Iron)
 ap=0.2D (Hardened Steel)
 ap=0.5D (Stainless Steel)

- Notes:**
1. Use air to evacuate chip, on stainless steel use coolant.
 2. Above figures should be adjusted according to machine & work rigidity.

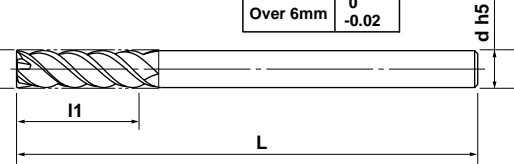
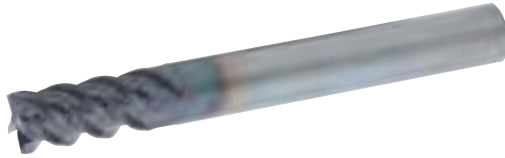


METRIC

Solid Carbide End Mills

DZ-SOCS4, DZ-SOCM4, DZ-SOCL4, DZ-SOCLS4 Type

- 4 Flute with 45° Helix and sharp corner



DZ-SOCS4

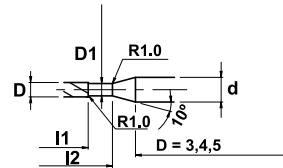
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		D	l1	L	d
DZ-SOCS4030	•	3.0	8	60	6
DZ-SOCS4040	•	4.0	11	60	6
DZ-SOCS4050	•	5.0	13	60	6
DZ-SOCS4060	•	6.0	13	60	6
DZ-SOCS4070	•	7.0	16	70	8
DZ-SOCS4080	•	8.0	19	75	8
DZ-SOCS4090	•	9.0	19	80	10
DZ-SOCS4100-S8	•	10.0	22	80	8
DZ-SOCS4100	•	10.0	22	80	10
DZ-SOCS4110	•	11.0	22	100	12
DZ-SOCS4120-S10	•	12.0	26	100	10
DZ-SOCS4120	•	12.0	26	100	12
DZ-SOCS4130	•	13.0	26	100	12
DZ-SOCS4140-S12	•	14.0	26	110	12
DZ-SOCS4140	•	14.0	26	110	16
DZ-SOCS4150	•	15.0	26	110	16
DZ-SOCS4160-S14	•	16.0	32	110	14
DZ-SOCS4160	•	16.0	32	110	16
DZ-SOCS4170	•	17.0	32	110	16
DZ-SOCS4180-S16	•	18.0	32	125	16
DZ-SOCS4180	•	18.0	32	125	20
DZ-SOCS4190	•	19.0	32	125	20
DZ-SOCS4200-S18	•	20.0	38	125	18
DZ-SOCS4200	•	20.0	38	125	20
DZ-SOCS4220-S20	•	22.0	40	130	20

DZ-SOCM4

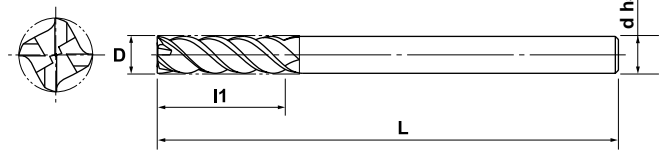
CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
DZ-SOCM4030	•	3.0	16	60	6
DZ-SOCM4040	•	4.0	18	60	6
DZ-SOCM4050	•	5.0	21	60	6
DZ-SOCM4060	•	6.0	21	60	6
DZ-SOCM4070	•	7.0	24	70	6
DZ-SOCM4080	•	8.0	26	75	8
DZ-SOCM4090	•	9.0	26	80	10
DZ-SOCM4100	•	10.0	34	90	10
DZ-SOCM4110	•	11.0	34	100	12
DZ-SOCM4120	•	12.0	38	100	12
DZ-SOCM4130	•	13.0	38	100	12
DZ-SOCM4140	•	14.0	38	110	16
DZ-SOCM4150	•	15.0	38	110	16
DZ-SOCM4160	•	16.0	48	110	16
DZ-SOCM4170	•	17.0	48	110	16
DZ-SOCM4180	•	18.0	48	125	20
DZ-SOCM4190	•	19.0	48	125	20
DZ-SOCM4200	•	20.0	56	130	20

DZ-SOCL4

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
DZ-SOCL4060	•	6.0	25	70	6
DZ-SOCL4080	•	8.0	35	90	8
DZ-SOCL4100	•	10.0	45	100	10
DZ-SOCL4120	•	12.0	55	120	12
DZ-SOCL4160	•	16.0	65	135	16
DZ-SOCL4200	•	20.0	75	155	20



Tolerances	
Up to 6mm	0 -0.015
Over 6mm	0 -0.02



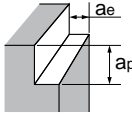
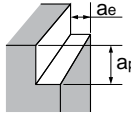
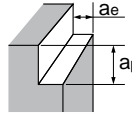
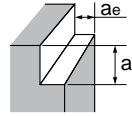
DZ-SOCLS4

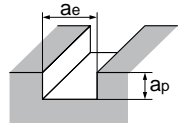
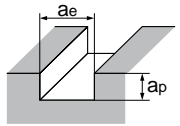
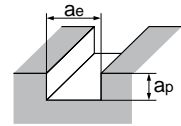
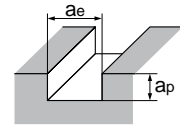
CATALOG NUMBER	STK	DIMENSIONS					
		D	l1	D1	l2	L	d
DZ-SOCLS4030	•	3.0	5	2.9	10.5	80	6
DZ-SOCLS4040	•	4.0	6	3.8	14	80	6
DZ-SOCLS4050	•	5.0	8	4.8	17.5	100	6
DZ-SOCLS4060	•	6.0	9	-	-	120	5
DZ-SOCLS4060-S5.8	•	6.0	9	-	-	120	5.8
DZ-SOCLS4070	•	7.0	9	-	-	120	6
DZ-SOCLS4070-S6.8	•	7.0	9	-	-	120	6.8
DZ-SOCLS4080	•	8.0	12	-	-	135	7
DZ-SOCLS4080-S7.8	•	8.0	12	-	-	135	7.8
DZ-SOCLS4090	•	9.0	12	-	-	135	8
DZ-SOCLS4090-S8.8	•	9.0	12	-	-	135	8.8
DZ-SOCLS4100	•	10.0	15	-	-	150	9
DZ-SOCLS4100-S9.8	•	10.0	15	-	-	150	9.8
DZ-SOCLS4110	•	11.0	15	-	-	150	10
DZ-SOCLS4120	•	12.0	18	-	-	160	11
DZ-SOCLS4130	•	13.0	18	-	-	160	12
DZ-SOCLS4140	•	14.0	18	-	-	160	13
DZ-SOCLS4150	•	15.0	22	-	-	180	14
DZ-SOCLS4160	•	16.0	24	-	-	180	15
DZ-SOCLS4170	•	17.0	24	-	-	180	16
DZ-SOCLS4180	•	18.0	27	-	-	180	16
DZ-SOCLS4190	•	19.0	30	-	-	200	16
DZ-SOCLS4200	•	20.0	30	-	-	200	20
DZ-SOCLS4200-S18	•	20.0	30	-	-	200	18
DZ-SOCLS4220-S20	•	22.0	35	-	-	220	20

Solid Carbide End Mills

METRIC

Recommended Cutting Data for DZ-SOCS4

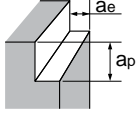
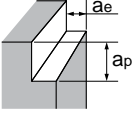
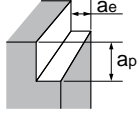
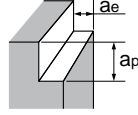
Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Shoulder Cutting	 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.1D$		 $a_p=1.5D$ $a_e=0.1D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	10,600	650	6,400	390	3,180	170	6,400	260
4	8,000	750	4,800	480	2,380	180	4,800	390
5	6,300	750	3,800	540	1,900	180	3,800	460
6	5,300	950	3,200	570	1,600	240	3,200	450
8	4,000	1,000	2,400	600	1,200	240	2,400	440
10	3,200	1,000	1,900	600	950	200	1,900	420
12	2,700	900	1,600	540	800	210	1,600	420
16	2,000	800	1,200	480	600	170	1,200	390
20	1,600	800	950	480	480	150	950	350
22	1,500	800	900	450	450	140	900	350

Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Slotting	 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=0.2D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	8,500	750	5,300	470	2,650	150	5,300	320
4	6,400	780	4,000	490	2,000	200	4,000	400
5	5,100	780	3,200	490	1,600	200	3,200	440
6	4,250	780	2,650	490	1,350	200	2,650	420
8	3,200	780	2,000	490	1,000	200	2,000	400
10	2,550	780	1,600	490	800	190	1,600	380
12	2,100	780	1,400	490	660	170	1,400	390
16	1,600	610	1,000	380	500	140	1,000	340
20	1,250	580	800	320	400	120	800	320
22	1,150	550	750	300	360	110	750	300

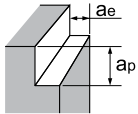
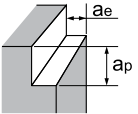
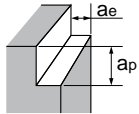
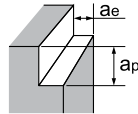
METRIC

Solid Carbide End Mills

Recommended Cutting Data for DZ-SOCM4

Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Shoulder Cutting	 $a_p=2.5D$ $a_e=0.02D$		 $a_p=2.5D$ $a_e=0.02D$		 $a_p=2.5D$ $a_e=0.01D$		 $a_p=2.5D$ $a_e=0.02D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	7,420	455	4,240	260	2,120	110	4,240	170
4	5,570	520	3,180	320	1,590	120	3,180	260
5	4,450	530	2,540	360	1,270	120	2,540	305
6	3,700	660	2,120	380	1,060	160	2,120	300
8	2,785	690	1,590	320	790	160	1,590	290
10	2,220	690	1,270	305	630	130	1,270	280
12	1,850	615	1,060	300	530	140	1,060	280
16	1,390	555	790	270	390	110	790	260
20	1,110	555	630	250	310	95	630	230

Recommended Cutting Data for DZ-SOCL4

Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Shoulder Cutting	 $a_p=3D$ $a_e=0.02D$		 $a_p=3D$ $a_e=0.02D$		 $a_p=3D$ $a_e=0.01D$		 $a_p=3D$ $a_e=0.02D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	2,650	475	1,590	280	800	120	1,590	220
8	1,990	500	1,190	240	600	120	1,190	220
10	1,590	500	950	230	480	100	950	210
12	1,330	440	800	220	400	105	800	210
16	990	400	600	200	300	85	600	195
20	800	400	470	190	240	75	480	180

Solid Carbide End Mills

METRIC

Recommended Cutting Data for DZ-SOCLS4

Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Shoulder Cutting	<p>$a_p=1.5D$ $a_e=0.1D$</p>		<p>$a_p=1.5D$ $a_e=0.1D$</p>		<p>$a_p=1.5D$ $a_e=0.05D$</p>		<p>$a_p=1.5D$ $a_e=0.1D$</p>	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	5,300	325	3,180	195	1,590	85	3,180	130
4	3,980	370	2,390	240	1,190	90	2,390	195
5	3,180	380	1,910	270	950	90	1,900	230
6	2,650	475	1,590	280	800	120	1,600	225
8	1,990	500	1,190	240	600	120	1,200	220
10	1,590	500	950	230	480	100	950	210
12	1,330	440	800	220	400	105	800	210
16	1,000	400	600	200	300	85	600	195
20	790	320	470	190	240	70	470	170

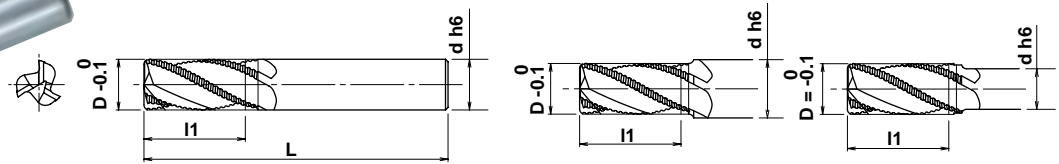
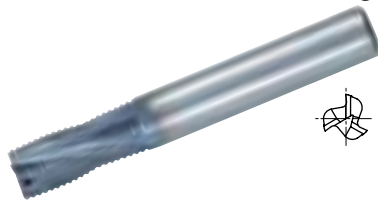


METRIC

Solid Carbide End Mills

DZ-OCRS Type

- 3 & 4 Flute, 20° Helix, for roughing with low cutting force and high feed machining



CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	L	d	Flutes
DZ-OCRS3040	□	4.0	8	55	6	3
DZ-OCRS3050	□	5.0	10	57	6	3
DZ-OCRS3060	●	6.0	14	57	6	3
DZ-OCRS3070	□	7.0	16	63	8	3
DZ-OCRS3080	●	8.0	17	63	8	3
DZ-OCRS3090	□	9.0	22	72	10	3
DZ-OCRS4100	●	10.0	23	72	10	4
DZ-OCRS4110	□	11.0	26	83	12	4
DZ-OCRS4120	●	12.0	28	83	12	4
DZ-OCRS4130	□	13.0	28	85	12	4

CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	L	d	Flutes
DZ-OCRS4140	□	14.0	28	95	12	4
DZ-OCRS4150	□	15.0	32	95	16	4
DZ-OCRS4160	□	16.0	32	95	16	4
DZ-OCRS4170	□	17.0	36	115	16	4
DZ-OCRS4180	□	18.0	36	115	16	4
DZ-OCRS4190	□	19.0	40	115	20	4
DZ-OCRS4200	□	20.0	40	115	20	4
DZ-OCRS4220	□	22.0	44	130	20	4
DZ-OCRS4240	□	24.0	50	130	25	4
DZ-OCRS4250	□	25.0	50	130	25	4

Recommended Cutting Data

● Stocked standard □ Inquire regarding delivery

Material	Carbon Steel (S45C) ~280HB		Alloy Steel (SCM·SNCM) ~280HB		Tool Die Steel (SK) ~255HB		Tool Steel (SKT) ~255HB		Mold Steel (NAK) 35~45HRC	
	Cast Iron (FC) ~260HB		Nodular Cast Iron (FCD) ~300HB				Die Steel (SKD) ~255HB			
Type of Machining - Shoulder Cutting										
	$ap \leq 1.5D$ $ae \leq 0.5D$		$ap \leq 1.5D$ $ae \leq 0.5D$		$ap \leq 1.5D$ $ae \leq 0.5D$		$ap \leq 1.5D$ $ae \leq 0.5D$		$ap \leq 1.5D$ $ae \leq 0.5D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
4	8,000	420	8,000	380	4,800	190	5,600	270	3,400	90
5	6,400	440	6,400	400	3,800	200	4,500	280	2,700	90
6	5,300	440	5,300	400	3,200	200	3,700	280	2,300	90
7	4,600	460	4,600	410	2,700	200	3,200	290	2,000	100
8	4,000	480	4,000	430	2,400	220	2,800	300	1,700	110
9	3,500	480	3,500	430	2,100	220	2,500	310	1,500	110
10	3,200	640	3,200	580	1,900	290	2,200	400	1,400	130
11	2,900	640	2,900	580	1,700	280	2,000	400	1,200	120
12	2,700	630	2,700	570	1,600	280	1,900	400	1,100	120
13	2,500	630	2,500	570	1,500	280	1,700	390	1,100	120
14	2,300	580	2,300	520	1,400	260	1,600	360	1,000	120
15	2,100	580	2,100	520	1,300	260	1,500	360	900	110
16	2,000	580	2,000	520	1,200	260	1,400	360	900	110
17	1,900	570	1,900	510	1,120	250	1,300	350	800	110
18	1,800	540	1,800	490	1,060	240	1,200	330	800	100
19	1,700	540	1,700	490	1,000	240	1,200	330	700	100
20	1,600	540	1,600	490	950	240	1,100	320	700	100
22	1,400	520	1,400	470	870	240	1,000	320	600	100
24	1,300	520	1,300	470	800	240	900	320	600	100
25	1,300	520	1,300	470	760	230	900	320	500	90

- Notes:
- The figure should be adjusted according to the machine rigidity or work rigidity.
 - If the depth of cut, ap , is small when shoulder cutting, increase Spindle speed and Feed speed.
 - If chatter occurs, reduce the depth of cut, ap , or Spindle speed and keep feed tooth the same.
 - Recommended using down cutting when shoulder cutting.

Solid Carbide End Mills

METRIC

Recommended Cutting Data for DZ-OCRS

Material	Carbon Steel (S45C) ~280HB		Alloy Steel (SCM•SNCM) ~280HB		Tool Die Steel (SK) ~255HB		Tool Steel (SKT) ~255HB		Mold Steel (NAK) 35~45HRC	
	Cast Iron (FC) ~260HB		Nodular Cast Iron (FCD) ~300HB				Die Steel (SKD) ~255HB			
Type of Machining - Slotting										
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
4	8,000	320	8,000	290	4,800	140	5,600	200	3,400	70
5	6,400	330	6,400	300	3,800	150	4,500	210	2,700	70
6	5,300	330	5,300	300	3,200	150	3,700	210	2,300	70
7	4,600	350	4,600	320	2,700	150	3,200	220	2,000	90
8	4,000	360	4,000	320	2,400	170	2,800	230	1,700	100
9	3,500	360	3,500	320	2,100	170	2,500	230	1,500	100
10	3,200	480	3,200	430	1,900	220	2,200	300	1,400	110
11	2,900	480	2,900	430	1,700	210	2,000	300	1,200	100
12	2,700	470	2,700	420	1,600	210	1,900	300	1,100	100
13	2,500	470	2,500	420	1,500	210	1,700	290	1,100	100
14	2,300	440	2,300	400	1,400	200	1,600	270	1,000	100
15	2,100	440	2,100	400	1,300	200	1,500	270	900	90
16	2,000	440	2,000	400	1,200	200	1,400	270	900	90
17	1,900	430	1,900	390	1,120	190	1,300	260	800	90
18	1,800	410	1,800	370	1,060	180	1,200	250	800	90
19	1,700	410	1,700	370	1,000	180	1,200	250	700	80
20	1,600	410	1,600	370	950	180	1,100	240	700	80
22	1,400	390	1,400	350	870	180	1,000	240	600	80
24	1,300	390	1,300	350	800	180	900	240	600	80
25	1,300	390	1,300	350	760	170	900	240	500	70

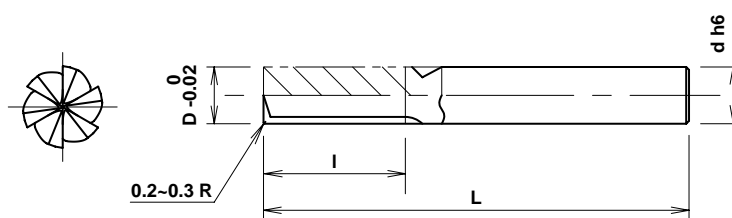
- Notes:**
1. The figure should be adjusted according to the machine rigidity or work rigidity.
 2. If the depth of cut, a_p , is small when shoulder cutting, increase Spindle speed and Feed speed.
 3. If chatter occurs, reduce the depth of cut, a_p , or Spindle speed and keep feed tooth the same.
 4. Recommended using down cutting when shoulder cutting.

METRIC

Solid Carbide End Mills

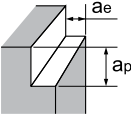
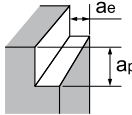
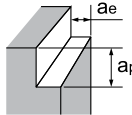
DV-SCMS Type

- Multi Flute with 45° Helix, low cutting force for heat-resistant alloys
- High efficient machining possible by trochoidal milling



CATALOG NUMBER	STK	DIMENSIONS				
		D	I	L	D	FLUTES
DV-SCMS6060	•	6	15	50	6	6
DV-SCMS6080	•	8	20	70	8	6
DV-SCMS6100	•	10	25	75	10	6
DV-SCMS8120	•	12	26	100	12	8
DV-SCMS8160	•	16	32	100	16	8

Recommended Cutting Data

Material	Stainless Steel (SUS304)		Titanium Alloy (Ti-6Al-4V)		Heat Resistant Alloy (Inconel 718)	
	Type of Machining	 $a_p \leq 1.5D$ $a_e \leq 0.1D$		 $a_p \leq 1.5D$ $a_e \leq 0.1D$		 $a_p \leq 1.5D$ $a_e \leq 0.05D$
Diameter	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)	N (min ⁻¹)	Vc (mm/min)
6	8,000	2,100	8,000	2,100	2,100	380
8	6,000	2,100	6,000	2,100	1,600	310
10	4,800	2,100	4,800	2,100	1,300	310
12	4,000	2,100	4,000	2,100	1,100	350
16	3,000	1,700	3,000	1,700	800	260

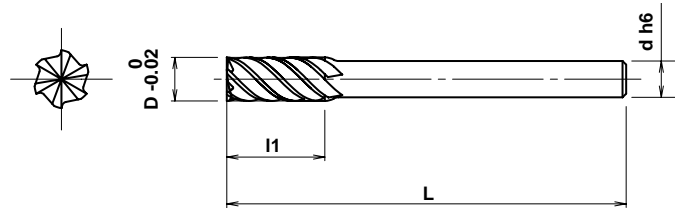
- Notes:**
1. Above cutting conditions are for general guidance.
 2. Figures should be adjusted according to machining shape, purpose and rigidity of both machine and work clamping.
 3. Recommend to use down cutting.
 4. Recommend for wet cutting, using cutting fluid for heat-resistant alloys.

Solid Carbide End Mills

INCH

DZH-SEFS Type

- 6 Flute with 50° Helix for hardened material up to 65HRC



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	L	d	Flutes
DZH-SEFS6250	•	.250	.500	2.50	.156	6
DZH-SEFS6312	•	.312	.625	3.00	.250	6
DZH-SEFS6375	•	.375	.750	3.25	.312	6
DZH-SEFS6500	•	.500	1.00	4.00	.375	6
DZH-SEFS6625	•	.625	1.25	4.50	.500	6
DZH-SEFS6750	•	.750	1.50	5.00	.625	6

Recommended Cutting Data for Shoulder Cutting

Work Materials	D.O.C. and W.O.C.	Tool Diameter											
		.250"		.3125"		.375"		.500"		.625"		.750"	
		N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.
Hardened Die Steel 55~65HRC	<p>$a_p \leq 1.5D$ $a_e \leq 0.1D$</p>	1,240	15	1,100	12	1,050	12	800	9	650	7	550	6
Hardened Die Steel 45~55HRC		1,800	28	1,600	25	1,450	24	1,100	18	900	14	750	12
Die Steel 30~45HRC		2,300	33	2,000	30	1,900	27	1,400	21	1,150	16	950	14
Alloy Steel 35~45HRC		2,600	62	2,400	55	2,200	51	1,650	38	1,300	31	1,100	26
Low Carbon Steel 25~30HRC		4,000	280	3,600	250	3,400	230	2,500	170	2,000	140	1,700	120
Cast Iron ~45HRC		4,000	290	3,600	260	3,400	240	2,500	180	2,000	145	1,700	120

Recommended Cutting Data for Grooving

Work Materials	D.O.C. and W.O.C.	Tool Diameter											
		.250"		.3125"		.375"		.500"		.625"		.750"	
		N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.
Hardened Die Steel 55~65HRC	<p>$a_p \leq 0.2D$ $a_e = D$</p>	1,000	13	900	12	850	11	650	8	500	6	400	5
Hardened Die Steel 45~55HRC		1,600	20	1,500	18	1,350	17	1,000	12	800	10	700	8
Die Steel 30~45HRC		2,000	41	1,600	36	1,650	34	1,250	26	1,000	21	850	17
Alloy Steel 35~45HRC		2,700	50	2,400	45	2,200	42	1,650	31	1,300	25	1,100	21
Low Carbon Steel 25~30HRC		3,200	60	2,800	54	2,650	50	1,950	37	1,550	30	1,300	25
Cast Iron ~45HRC		3,200	65	2,800	58	2,650	54	1,950	40	1,550	32	1,300	27

METRIC

Solid Carbide End Mills

DV-SEH, DV-SEH-R02 & DV-SEHLS-R02 Type
 - 4, 6 & 8 Flute with 50° Helix for high hardened steel up to 70 HRC



Fig.1

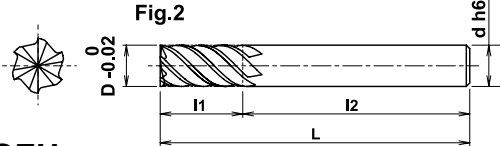
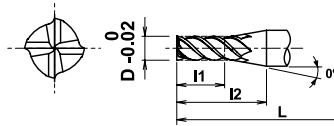
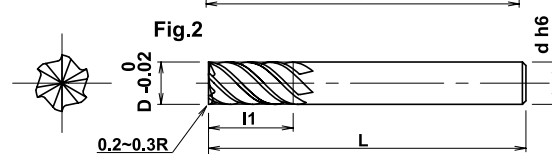
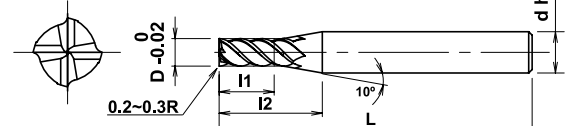


Fig.1

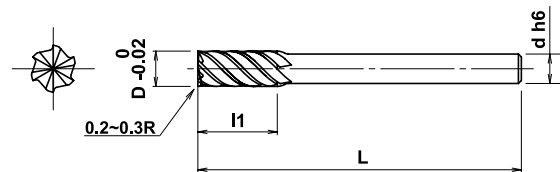


DV-SEH

	CATALOG NUMBER	STK	DIMENSIONS					FIG.	
			D	I1	I2	L	d		
SHORT	DV-SEHS4010	•	1.0	2	12	60	6	4	1
	DV-SEHS4015	•	1.5	3	12	60	6	4	1
	DV-SEHS4020	•	2.0	4	12	60	6	4	1
	DV-SEHS4025	•	2.5	5	12	60	6	4	1
	DV-SEHS4030	•	3.0	7	17	60	6	4	1
	DV-SEHS4040	•	4.0	9	16	60	6	4	1
	DV-SEHS4050	•	5.0	12	16	60	6	4	1
	DV-SEHS6060	•	6.0	13	-	60	6	6	2
REGULAR	DV-SEHH4010	•	1.0	3.5	13	60	6	4	1
	DV-SEHH4015	•	1.5	5	14	60	6	4	1
	DV-SEHH4020	•	2.0	7	15	60	6	4	1
	DV-SEHH4025	•	2.5	8	15	60	6	4	1
	DV-SEHH4030	•	3.0	10	20	60	6	4	1
	DV-SEHH4035	•	3.5	12	20	60	6	4	1
	DV-SEHH4040	•	4.0	12	19	60	6	4	1
	DV-SEHH4045	•	4.5	15	20	60	6	4	1
	DV-SEHH4050	•	5.0	15	19	60	6	4	1
	DV-SEHH4055	•	5.5	15	18	60	6	4	1
	DV-SEHH6060	•	6.0	15	-	60	6	6	2
	DV-SEHH6065	•	6.5	20	25	75	8	6	1
	DV-SEHH6070	•	7.0	20	24	75	8	6	1
	DV-SEHH6075	•	7.5	20	22	75	8	6	1
	DV-SEHH6080	•	8.0	20	-	75	8	6	2
	DV-SEHH6085	•	8.5	25	30	80	10	6	1
	DV-SEHH6090	•	9.0	25	29	80	10	6	1
	DV-SEHH6095	•	9.5	25	27	80	10	6	1
	DV-SEHH6100	•	10.0	25	-	80	10	6	2
	DV-SEHH6105	•	10.5	30	35	100	12	6	1
	DV-SEHH6110	•	11.0	30	34	100	12	6	1
	DV-SEHH6115	•	11.5	30	32	100	12	6	1
	DV-SEHH6120	•	12.0	30	-	100	12	6	2
	DV-SEHH6130	•	13.0	35	45	105	16	6	1
	DV-SEHH6140	•	14.0	35	42	105	16	6	1
	DV-SEHH6150	•	15.0	40	44	110	16	6	1
	DV-SEHH6160	•	16.0	40	-	110	16	6	2
	DV-SEHH6170	•	17.0	40	50	120	20	6	1
	DV-SEHH6180	•	18.0	40	47	120	20	6	1
	DV-SEHH6190	•	19.0	45	49	125	20	6	1
	DV-SEHH6200	•	20.0	45	-	125	20	6	2
	DV-SEHH6220	•	22.0	45	55	135	25	6	1
DV-SEHH6240	•	24.0	50	54	140	25	6	1	
DV-SEHH8250	•	25.0	50	-	140	25	8	2	
DV-SEHH8260	•	26.0	50	-	140	25	8	2	
DV-SEHH8280	•	28.0	55	-	145	25	8	2	
DV-SEHH8300	•	30.0	60	67	165	32	8	1	
DV-SEHH8320	•	32.0	70	-	175	32	8	2	

DV-SEH-R02

	CATALOG NUMBER	STK	DIMENSIONS					FIG.	
			D	I1	I2	L	d		
	DV-SEHH4030-R02	•	3.0	10	20	60	6	4	1
	DV-SEHH4040-R02	•	4.0	12	19	60	6	4	1
	DV-SEHH4045-R02	•	4.5	15	20	60	6	4	1
	DV-SEHH4050-R02	•	5.0	15	19	60	6	4	1
	DV-SEHH6060-R02	•	6.0	15	-	60	6	6	2
	DV-SEHH6070-R02	•	7.0	20	24	75	8	6	1
	DV-SEHH6080-R02	•	8.0	20	-	75	8	6	2
	DV-SEHH6090-R02	•	9.0	25	29	80	10	6	1
	DV-SEHH6100-R02	•	10.0	25	-	80	10	6	2
	DV-SEHH6120-R02	•	12.0	30	-	100	12	6	2
	DV-SEHH6140-R02	•	14.0	35	42	105	16	6	1
	DV-SEHH6160-R02	•	16.0	40	-	110	16	6	2
	DV-SEHH6200-R02	•	20.0	45	-	125	20	6	2
	DV-SEHH8250-R02	•	25.0	50	-	140	25	8	2
	DV-SEHH8300-R02	•	30.0	60	67	165	32	8	1



DV-SEHLS-R02

	CATALOG NUMBER	STK	DIMENSIONS			
			D	I1	L	d
	DV-SEHLS6120-S10-R02	•	12.0	30	125	10
	DV-SEHLS6160-S14-R02	•	16.0	40	140	14
	DV-SEHLS6200-S18-R02	•	20.0	45	160	18

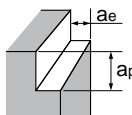
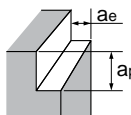
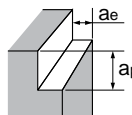
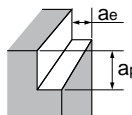
Solid Carbide End Mills

INCH

DZ-SEH, DV-SEH-R02 & DV-SEHLS-R02 Type

- 4, 6 & 8 Flute with 50° Helix for high hardened steel up to 70 HRC

Recommended Cutting Data

Material	Tool & Die Steel, Mold Steel SKD, SKH, NAK (~45HRC) (1.2344, 1.2379, 1.2311, P20)		Hardened Steel SKD, SKT (45~55HRC) (1.2344, 1.2379)		Hardened Steel SKD, SKH (55~65HRC) (1.2344, 1.2379)		Hardened Steel SKD, SKH (65~70HRC) (1.2344, 1.2379)	
	 $a_p \leq 1.5D$ $a_e \leq 0.05D$		 $a_p \leq 1.5D$ $a_e \leq 0.04D$		 $a_p \leq 1.5D$ $a_e \leq 0.04D$ (MAX. 0.6mm)		 $a_p \leq 1.5D$ $a_e \leq 0.02D$ (MAX. 0.4mm)	
Type of Machining - Shoulder Cutting								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	40,000	700	25,000	410	20,000	320	10,000	130
2	24,000	950	15,000	560	12,000	430	6,400	220
3	24,000	1,300	15,000	800	12,000	600	6,000	250
4	18,000	1,800	12,000	1,100	9,500	800	5,100	300
6	12,000	2,200	8,000	1,400	6,500	1,100	3,500	420
8	10,000	2,200	6,000	1,400	5,000	1,100	2,500	420
10	8,000	2,200	5,000	1,400	4,000	1,100	2,000	420
12	6,500	1,900	4,000	1,200	3,300	900	1,700	350
16	5,000	1,480	3,000	930	2,500	700	1,300	260
20	3,800	1,150	2,300	730	2,000	550	1,000	200
25	3,000	920	1,800	580	1,600	450	800	160
30	2,500	680	1,500	430	1,300	330	700	140
32	2,300	550	1,400	350	1,200	300	650	120

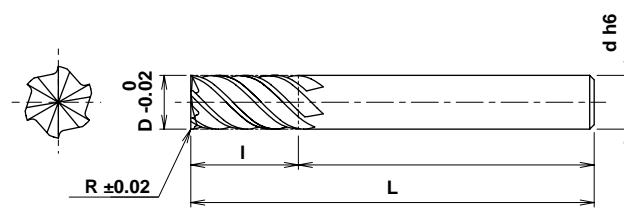
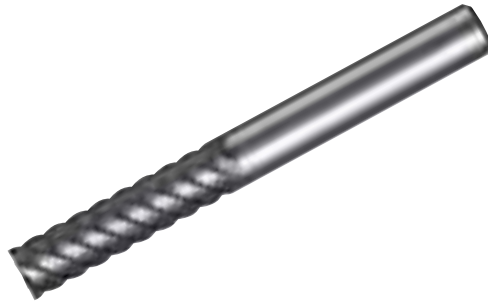
- Notes:**
- Above cutting conditions are general guidance.
 - Figures should be adjusted according to purpose, rigidity of machine, machining shape and work clamping.
 - Recommend to down cut with air blow or mist coolant.

METRIC

Solid Carbide End Mills

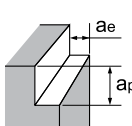
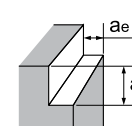
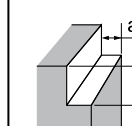
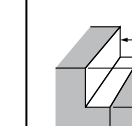
DV-SEHM Type

- 6 Flute with 50° Helix for high hardened steel up to 70 HRC



CATALOG NUMBER	STK	DIMENSIONS				
		D	I	L	d	FLUTES
DV-SEHM6060	•	6	20	65	6	6
DV-SEHM6080	•	8	28	80	8	6
DV-SEHM6100	•	10	35	90	10	6
DV-SEHM6120	•	12	45	110	12	6
DV-SEHM6160	•	16	55	120	16	6
DV-SEHM6200	•	20	60	140	20	6

Recommended Cutting Data

Material	Tool & Die Steel, Mold Steel SKD, SKH, NAK (~45HRC)		Hardened Steel SKD, SKT (45-55HRC)		Hardened Steel SKD, SKH (55-65HRC)		Hardened Steel SKD, SKH (65-70HRC)	
	 $a_p \leq 2.25D$ $a_e \leq 0.03D$		 $a_p \leq 2.25D$ $a_e \leq 0.025D$		 $a_p \leq 2.25D$ $a_e \leq 0.025D$		 $a_p \leq 2.25D$ $a_e \leq 0.01D$	
Diameter	N (min ⁻¹)	Vf (mm/min)	N (min ⁻¹)	Vf (mm/min)	N (min ⁻¹)	Vf (mm/min)	N (min ⁻¹)	Vf (mm/min)
6	10,600	1,900	6,400	1,200	5,300	1,000	2,700	320
8	8,000	1,900	4,800	1,200	4,000	1,000	2,000	360
10	6,400	1,900	3,800	1,200	3,200	1,000	1,600	380
12	5,300	1,600	3,200	1,000	2,700	800	1,300	240
16	4,000	1,200	2,400	700	2,000	600	1,000	180
20	3,200	1,000	1,900	600	1,600	500	800	140

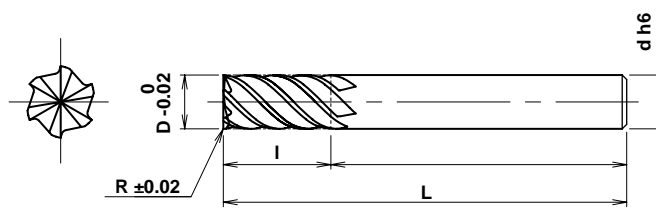
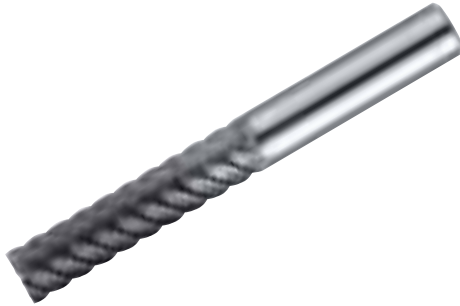
- Notes:**
- Above cutting conditions are for general guidance.
 - Figures should be adjusted according to machining shape, purpose and rigidity of both machine and work clamping.
 - Recommend to use down cutting.

Solid Carbide End Mills

METRIC

DV-SEHL Type

- 6 Flute with 50° Helix for high hardened steel up to 70 HRC



CATALOG NUMBER	STK	DIMENSIONS				
		D	I	L	d	FLUTES
DV-SEHL6060	•	6	26	70	6	6
DV-SEHL6080	•	8	36	90	8	6
DV-SEHL6100	•	10	46	100	10	6
DV-SEHL6120	•	12	56	120	12	6
DV-SEHL6160	•	16	66	135	16	6
DV-SEHL6200	•	20	76	155	20	6

Recommended Cutting Data

Material	Tool & Die Steel, Mold Steel SKD, SKH, NAK (~45HRC)		Hardened Steel SKD, SKT (45-55HRC)		Hardened Steel SKD, SKH (55-65HRC)	
	Type of Machining - Shoulder Cutting	 $a_p \leq 3D$ $a_e \leq 0.01D$		 $a_p \leq 3D$ $a_e \leq 0.01D$		 $a_p \leq 3D$ $a_e \leq 0.01D$
Diameter	N (min ⁻¹)	Vf (mm/min)	N (min ⁻¹)	Vf (mm/min)	N (min ⁻¹)	Vf (mm/min)
6	3,180	760	2,650	480	2,100	380
8	2,390	720	1,990	480	1,590	380
10	1,910	690	1,590	480	1,270	380
12	1,590	670	1,330	480	1,060	380
16	1,190	570	1,000	420	800	340
20	950	510	800	380	640	310

- Notes:**
- Above cutting conditions are for general guidance.
 - Figures should be adjusted according to machining shape, purpose and rigidity of both machine and work clamping.
 - Recommend to use down cutting.

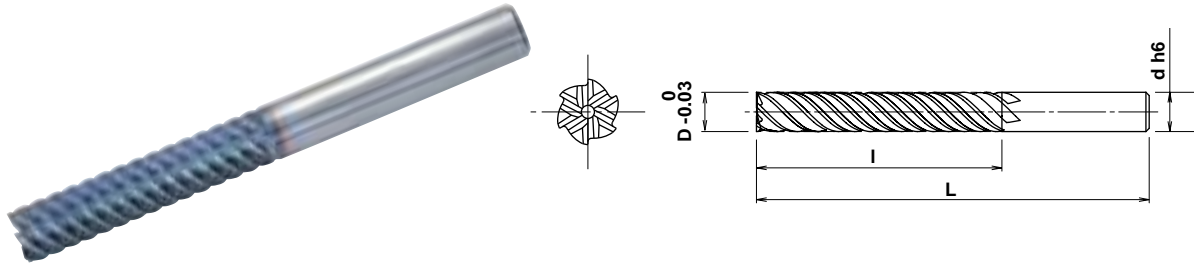


METRIC

Solid Carbide End Mills

DZ-SEPL Type

- 6 Flute with 60° Helix for welds and hardened steel up to 60 HRC



CATALOG NUMBER	STK	DIMENSIONS			
		D	I	L	d
DZ-SEPL6160	•	16	70	150	16
DZ-SEPL6200	•	20	100	180	20
DZ-SEPL6250	•	25	100	180	25
DZ-SEPL6300	•	30	110	200	32

Recommended Cutting Data

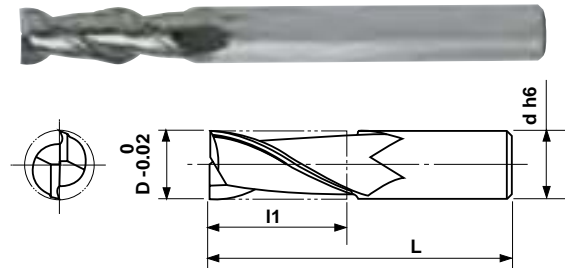
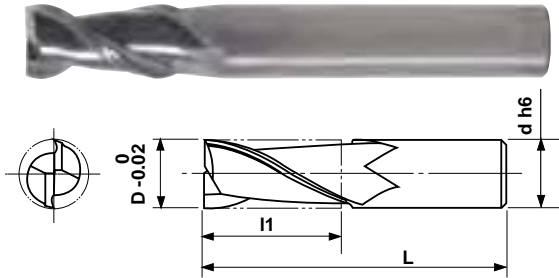
Material	Hardness 45~60HRC			
Type of Machining - Shoulder Cutting	<p>$a_p=1.5D$ $a_e \leq 0.1D$</p>		<p>$a_p=1.5D$ $a_e \leq 0.01D$</p>	
	Roughing		Finishing	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
16	300	35	400	100
20	240	20	320	90
25	190	30	250	80
30	160	35	210	70

Solid Carbide End Mills for Aluminum

METRIC

AL-SEESS & AL-SEES2 Type

- 2 Flute with 45° Helix and sharp corner



AL-SEESS

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEESS2010	•	1.0	2	40	4
AL-SEESS2015	•	1.5	3	40	4
AL-SEESS2020	•	2.0	4	40	4
AL-SEESS2025	•	2.5	5	40	4
AL-SEESS2030	•	3.0	6	50	6
AL-SEESS2035	•	3.5	7	50	6
AL-SEESS2040	•	4.0	8	50	6
AL-SEESS2045	•	4.5	9	50	6
AL-SEESS2050	•	5.0	10	55	6
AL-SEESS2055	•	5.5	11	55	6
AL-SEESS2060	•	6.0	12	55	6
AL-SEESS2065	•	6.5	13	55	6
AL-SEESS2070	•	7.0	14	65	8
AL-SEESS2075	•	7.5	15	65	8
AL-SEESS2080	•	8.0	16	65	8
AL-SEESS2085	•	8.5	17	65	8
AL-SEESS2090	•	9.0	18	70	10
AL-SEESS2095	•	9.5	19	70	10
AL-SEESS2100	•	10.0	20	70	10
AL-SEESS2120	•	12.0	24	80	12
AL-SEESS2130	□	13.0	26	85	12
AL-SEESS2140	•	14.0	28	95	16
AL-SEESS2150	□	15.0	30	95	16
AL-SEESS2160	•	16.0	32	95	16
AL-SEESS2180	•	18.0	36	115	20
AL-SEESS2200	•	20.0	40	115	20
AL-SEESS2210	□	21.0	42	130	25
AL-SEESS2220	•	22.0	44	130	25
AL-SEESS2230	□	23.0	46	130	25
AL-SEESS2240	•	24.0	48	130	25
AL-SEESS2250	□	25.0	50	130	25
AL-SEESS2260	•	26.0	52	130	32
AL-SEESS2270	□	27.0	54	130	32
AL-SEESS2280	•	28.0	56	140	32
AL-SEESS2290	□	29.0	58	140	32
AL-SEESS2300	•	30.0	60	140	32

- Stocked standard
- Inquire regarding delivery

AL-SEES2

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES2004-3	□	0.4	0.8	40	3
AL-SEES20045-3	□	0.45	0.9	40	3
AL-SEES2005-3	□	0.5	1	40	3
AL-SEES20055-3	□	0.55	1.1	40	3
AL-SEES2006-3	□	0.6	1.2	40	3
AL-SEES20065-3	□	0.65	1.3	40	3
AL-SEES2007-3	□	0.7	1.4	40	3
AL-SEES20075-3	□	0.75	1.5	40	3
AL-SEES2008-3	□	0.8	1.6	40	3
AL-SEES20085-3	□	0.85	1.7	40	3
AL-SEES2009-3	□	0.9	2	40	3
AL-SEES20095-3	□	0.95	2	40	3
AL-SEES2010-3	□	1.0	2.8	40	3
AL-SEES2010	•	1.0	2.8	40	4
AL-SEES2011-3	□	1.1	2.8	40	3
AL-SEES2012-3	□	1.2	2.8	40	3
AL-SEES2013-3	□	1.3	2.8	40	3
AL-SEES2014-3	□	1.4	2.8	40	3
AL-SEES2015-3	□	1.5	4.4	40	3
AL-SEES2015	•	1.5	4.4	40	4
AL-SEES2016-3	□	1.6	4.4	40	3
AL-SEES2017-3	□	1.7	4.4	40	3
AL-SEES2018-3	□	1.8	4.4	40	3
AL-SEES2019-3	□	1.9	4.4	40	3
AL-SEES2020-3	□	2.0	7	40	3
AL-SEES2020	•	2.0	7	40	4
AL-SEES2021-3	□	2.1	7	40	3
AL-SEES2022-3	□	2.2	7	40	3
AL-SEES2023-3	□	2.3	7	40	3
AL-SEES2024-3	□	2.4	7	40	3
AL-SEES2025-3	□	2.5	9	40	3
AL-SEES2025	•	2.5	9	40	4
AL-SEES2026-3	□	2.6	9	40	3
AL-SEES2027-3	□	2.7	9	40	3
AL-SEES2028-3	□	2.8	9	40	3
AL-SEES2029-3	□	2.9	9	40	3
AL-SEES2030-3	□	3.0	11	50	3
AL-SEES2030	•	3.0	11	50	6
AL-SEES2031	□	3.1	11	50	6
AL-SEES2032	□	3.2	11	50	6
AL-SEES2033	□	3.3	11	50	6
AL-SEES2034	□	3.4	11	50	6
AL-SEES2035	•	3.5	12	50	6
AL-SEES2036	□	3.6	12	50	6

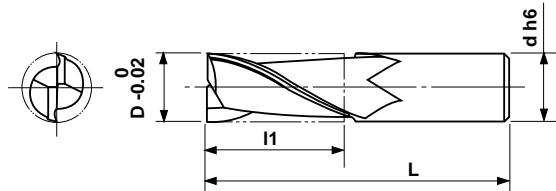


METRIC

Solid Carbide End Mills for Aluminum

AL-SEES2 Type

- 2 Flute with 45° Helix and sharp corner



CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES2037	□	3.7	12	50	6
AL-SEES2038	□	3.8	12	50	6
AL-SEES2039	□	3.9	12	50	6
AL-SEES2040	•	4.0	14	50	6
AL-SEES2041	□	4.1	14	50	6
AL-SEES2042	□	4.2	14	50	6
AL-SEES2043	□	4.3	14	50	6
AL-SEES2044	□	4.4	14	50	6
AL-SEES2045	•	4.5	16	50	6
AL-SEES2046	□	4.6	16	50	6
AL-SEES2047	□	4.7	16	50	6
AL-SEES2048	□	4.8	16	50	6
AL-SEES2049	□	4.9	16	50	6
AL-SEES2050	•	5.0	17	55	6
AL-SEES2051	□	5.1	17	55	6
AL-SEES2052	□	5.2	17	55	6
AL-SEES2053	□	5.3	17	55	6
AL-SEES2054	□	5.4	17	55	6
AL-SEES2055	•	5.5	17	55	6
AL-SEES2056	□	5.6	17	55	6
AL-SEES2057	□	5.7	17	55	6
AL-SEES2058	□	5.8	17	55	6
AL-SEES2059	□	5.9	17	55	6
AL-SEES2060	•	6.0	17	55	6
AL-SEES2061	□	6.1	17	55	6
AL-SEES2062	□	6.2	17	55	6
AL-SEES2063	□	6.3	17	55	6
AL-SEES2064	□	6.4	17	55	6
AL-SEES2065	•	6.5	17	55	6
AL-SEES2066	□	6.6	17	55	6
AL-SEES2067	□	6.7	17	55	6
AL-SEES2068	□	6.8	17	55	6
AL-SEES2069	□	6.9	17	55	6
AL-SEES2070	•	7.0	22	65	8
AL-SEES2071	□	7.1	22	65	8
AL-SEES2072	□	7.2	22	65	8
AL-SEES2073	□	7.3	22	65	8
AL-SEES2074	□	7.4	22	65	8
AL-SEES2075	•	7.5	22	65	8
AL-SEES2076	□	7.6	22	65	8
AL-SEES2077	□	7.7	22	65	8
AL-SEES2078	□	7.8	22	65	8
AL-SEES2079	□	7.9	22	65	8
AL-SEES2080	•	8.0	22	65	8

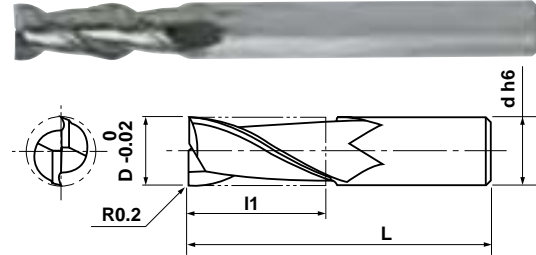
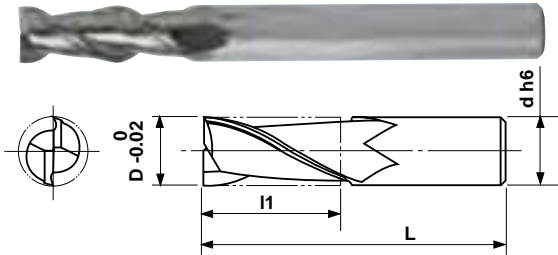
CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES2081	□	8.1	22	65	8
AL-SEES2082	□	8.2	22	65	8
AL-SEES2083	□	8.3	22	65	8
AL-SEES2084	□	8.4	22	65	8
AL-SEES2085	•	8.5	22	65	8
AL-SEES2086	□	8.6	22	65	8
AL-SEES2087	□	8.7	22	65	8
AL-SEES2088	□	8.8	22	65	8
AL-SEES2089	□	8.9	22	65	8
AL-SEES2090	•	9.0	22	70	10
AL-SEES2091	□	9.1	22	70	10
AL-SEES2092	□	9.2	22	70	10
AL-SEES2093	□	9.3	22	70	10
AL-SEES2094	□	9.4	22	70	10
AL-SEES2095	•	9.5	22	70	10
AL-SEES2096	□	9.6	22	70	10
AL-SEES2097	□	9.7	22	70	10
AL-SEES2098	□	9.8	22	70	10
AL-SEES2099	□	9.9	22	70	10
AL-SEES2100	•	10.0	28	75	10
AL-SEES2101	□	10.1	28	75	10
AL-SEES2102	□	10.2	28	75	10
AL-SEES2103	□	10.3	28	75	10
AL-SEES2104	□	10.4	28	75	10
AL-SEES2105	□	10.5	28	75	10
AL-SEES2106	□	10.6	28	75	12
AL-SEES2107	□	10.7	28	75	12
AL-SEES2108	□	10.8	28	75	12
AL-SEES2109	□	10.9	28	75	12
AL-SEES2110	□	11.0	28	80	12
AL-SEES2111	□	11.1	28	80	12
AL-SEES2112	□	11.2	28	80	12
AL-SEES2113	□	11.3	28	80	12
AL-SEES2114	□	11.4	28	80	12
AL-SEES2115	□	11.5	28	80	12
AL-SEES2116	□	11.6	28	80	12
AL-SEES2117	□	11.7	28	80	12
AL-SEES2118	□	11.8	28	80	12
AL-SEES2119	□	11.9	28	80	12
AL-SEES2120	•	12.0	28	80	12
AL-SEES2130	•	13.0	35	85	12
AL-SEES2140	•	14.0	40	95	16
AL-SEES2150	•	15.0	40	95	16
AL-SEES2160	•	16.0	40	95	16

Solid Carbide End Mills for Aluminum

METRIC

AL-SEES2 & AL-SEES2-R02 Type

- 2 Flute with 45° Helix, sharp corner or small corner radius



AL-SEES2

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES2170	□	17.0	45	115	20
AL-SEES2180	•	18.0	45	115	20
AL-SEES2190	□	19.0	45	115	20
AL-SEES2200	•	20.0	45	115	20
AL-SEES2210	•	21.0	55	130	25
AL-SEES2220	•	22.0	55	130	25
AL-SEES2230	•	23.0	55	130	25
AL-SEES2240	•	24.0	55	130	25
AL-SEES2250	•	25.0	55	130	25
AL-SEES2260	•	26.0	55	130	32
AL-SEES2270	•	27.0	55	130	32
AL-SEES2280	•	28.0	65	140	32
AL-SEES2290	•	29.0	65	140	32
AL-SEES2300	•	30.0	65	140	32

AL-SEES-R02

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES2010-R02	□	1.0	2.8	40	4
AL-SEES2015-R02	□	1.5	4.4	40	4
AL-SEES2020-R02	□	2.0	7	40	4
AL-SEES2030-R02	□	3.0	11	50	6
AL-SEES2040-R02	□	4.0	14	50	6
AL-SEES2050-R02	□	5.0	17	55	6
AL-SEES2060-R02	□	6.0	17	55	6
AL-SEES2080-R02	□	8.0	22	65	8
AL-SEES2100-R02	□	10.0	28	75	10
AL-SEES2120-R02	□	12.0	28	80	12

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data for AL-SEESS, AL-SEES2, AL-SEES2-R02

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Shoulder Cutting								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.4	32,000	380	32,000	380	32,000	380	32,000	380
0.5	32,000	480	32,000	480	32,000	480	32,000	480
0.75	32,000	700	32,000	700	32,000	700	32,000	700
1	32,000	900	32,000	900	32,000	900	32,000	900
1.5	32,000	1,400	32,000	1,400	32,000	1,400	32,000	1,400
2	32,000	1,900	32,000	1,900	32,000	1,900	25,000	1,500
3	24,000	2,200	22,000	2,000	24,000	2,200	17,000	1,500
4	18,000	2,200	16,000	2,000	18,000	2,200	13,000	1,500
5	15,000	2,200	13,000	2,000	15,000	2,200	10,000	1,500
6	12,000	2,200	10,000	2,000	12,000	2,200	8,500	1,500
8	9,000	1,800	8,000	1,600	9,000	1,800	6,500	1,300
10	7,300	1,800	6,000	1,600	7,300	1,800	5,000	1,300
12	6,000	1,800	5,000	1,600	6,000	1,800	4,000	1,300
16	4,500	1,500	4,000	1,400	4,500	1,500	3,000	1,000
20	3,600	1,500	3,000	1,400	3,600	1,500	2,500	1,000
25	3,000	1,500	2,500	1,400	3,000	1,500	2,000	1,000
30	2,500	1,250	2,100	1,050	2,500	1,250	1,700	850

**METRIC**

Solid Carbide End Mills for Aluminum

Recommended Cutting Data for AL-SEESS, AL-SEES2 & AL-SEES2-R02

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.4	32,000	230	32,000	230	32,000	230	32,000	230
0.5	32,000	290	32,000	290	32,000	290	32,000	290
0.75	32,000	430	32,000	430	32,000	430	32,000	430
1	32,000	570	32,000	570	32,000	570	32,000	570
1.5	32,000	860	32,000	860	32,000	860	29,000	780
2	32,000	1,100	27,000	1,000	32,000	1,100	22,000	800
3	21,000	1,100	18,000	1,000	21,000	1,100	14,000	800
4	16,000	1,100	13,000	1,000	16,000	1,100	11,000	800
5	12,000	1,100	10,000	1,000	12,000	1,100	8,900	800
6	10,000	1,100	9,000	1,000	10,000	1,100	7,400	800
8	8,000	1,100	7,000	1,000	8,000	1,100	5,500	800
10	6,000	1,100	5,500	1,000	6,000	1,100	4,500	800
12	5,000	1,100	4,500	1,000	5,000	1,100	3,700	800
16	4,000	1,000	3,300	800	4,000	1,000	2,700	700
20	3,000	900	2,700	800	3,000	900	2,200	650
25	2,500	900	2,000	700	2,500	900	1,800	650
30	2,000	800	1,800	700	2,000	800	1,500	600

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

Solid Carbide End Mills for Aluminum

METRIC

High Speed Cutting Data for AL-SEESS, AL-SEES2, AL-SEES2-R02

Solid Carbide End Mills

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.4	50,000	600	50,000	600	50,000	600	50,000	600
0.5	50,000	750	50,000	750	50,000	750	50,000	750
0.75	50,000	1,100	50,000	1,100	50,000	1,100	50,000	1,100
1	50,000	1,500	50,000	1,500	50,000	1,500	50,000	1,500
1.5	50,000	2,200	50,000	2,200	50,000	2,200	50,000	2,200
2	50,000	3,000	50,000	3,000	50,000	3,000	50,000	3,000
3	50,000	4,500	45,000	4,000	50,000	4,500	37,000	3,300
4	40,000	4,500	34,000	4,000	40,000	4,500	27,000	3,300
5	32,000	4,500	27,000	4,000	32,000	4,500	22,000	3,300
6	27,000	4,500	22,000	4,000	27,000	4,500	18,000	3,300
8	20,000	4,000	17,000	3,400	20,000	4,000	14,000	2,800
10	16,000	4,000	13,000	3,200	16,000	4,000	11,000	2,800
12	13,000	3,200	11,000	2,800	13,000	3,200	9,000	2,200
16	10,000	3,000	8,500	2,500	10,000	3,000	7,000	2,100
20	8,000	2,400	7,000	2,100	8,000	2,400	5,500	1,700
25	6,500	2,200	5,500	2,000	6,500	2,200	4,500	1,600
30	5,000	1,800	4,500	1,600	5,000	1,800	3,700	1,300

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.4	50,000	360	50,000	360	50,000	360	50,000	360
0.5	50,000	450	50,000	450	50,000	450	50,000	450
0.75	50,000	670	50,000	670	50,000	670	50,000	670
1	50,000	900	50,000	900	50,000	900	50,000	900
1.5	50,000	1,350	50,000	1,350	50,000	1,350	50,000	1,350
2	50,000	1,800	50,000	1,800	50,000	1,800	48,000	1,700
3	48,000	2,500	40,000	2,100	48,000	2,500	32,000	1,700
4	36,000	2,500	30,000	2,100	36,000	2,500	23,000	1,700
5	28,000	2,500	24,000	2,100	28,000	2,500	19,000	1,700
6	23,000	2,500	20,000	2,100	23,000	2,500	16,000	1,700
8	18,000	2,500	15,000	2,100	18,000	2,500	12,000	1,700
10	14,000	2,500	12,000	2,100	14,000	2,500	9,500	1,700
12	12,000	2,500	10,000	2,100	12,000	2,500	8,000	1,700
16	9,000	2,500	8,000	2,100	9,000	2,500	6,000	1,700
20	7,000	2,100	6,000	1,800	7,000	2,100	4,800	1,400
25	5,700	2,000	4,800	1,700	5,700	2,000	3,800	1,300
30	4,700	1,600	4,000	1,400	4,700	1,600	3,200	1,100

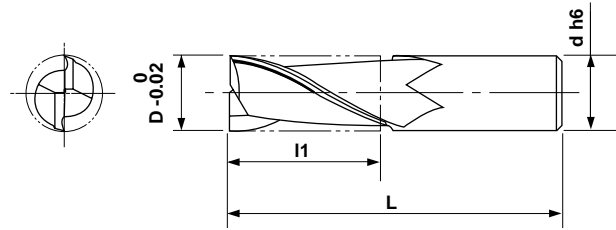


METRIC

Solid Carbide End Mills for Aluminum

AL-SEEM2 Type

- 2 Flute with 45° Helix and sharp corner



CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEEM2030	□	3.0	16	60	6
AL-SEEM2040	□	4.0	20	60	6
AL-SEEM2050	□	5.0	25	65	6
AL-SEEM2060	□	6.0	25	65	6
AL-SEEM2070	□	7.0	32	75	8
AL-SEEM2080	□	8.0	32	75	8
AL-SEEM2090	□	9.0	32	80	8

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEEM2100	□	10.0	40	80	10
AL-SEEM2110	□	11.0	40	90	10
AL-SEEM2120	□	12.0	40	90	12
AL-SEEM2140	□	14.0	57	110	12
AL-SEEM2160	□	16.0	57	110	16
AL-SEEM2180	□	18.0	60	130	16
AL-SEEM2200	□	20.0	60	130	20

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=1.5D$ $a_e=0.4D$		 $a_p=1.5D$ $a_e=0.4D$		 $a_p=1.5D$ $a_e=0.4D$		 $a_p=1.5D$ $a_e=0.4D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	20,000	1,800	19,000	1,700	20,000	1,800	15,000	1,350
4	16,000	1,800	14,000	1,700	16,000	1,800	11,000	1,350
5	12,000	1,800	11,000	1,700	12,000	1,800	9,000	1,350
6	10,000	1,800	9,500	1,700	10,000	1,800	7,500	1,350
7	9,000	1,800	8,000	1,700	9,000	1,800	6,500	1,200
8	8,000	1,600	7,000	1,500	8,000	1,600	5,500	1,100
9	7,000	1,300	6,300	1,200	7,000	1,300	5,000	1,000
10	6,000	1,300	5,700	1,200	6,000	1,300	4,500	900
11	5,500	1,300	5,200	1,200	5,500	1,300	4,000	900
12	5,000	1,300	4,700	1,200	5,000	1,300	3,700	900
14	4,500	1,300	4,000	1,200	4,500	1,300	3,200	900
16	4,000	1,200	3,500	1,100	4,000	1,200	2,800	900
18	3,500	1,200	3,200	1,100	3,500	1,200	2,500	900
20	3,000	1,000	2,800	900	3,000	1,000	2,200	800

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

Solid Carbide End Mills for Aluminum

METRIC

Recommended Cutting Data for AL-SEEM2

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Slotting	 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	19,000	1,000	17,000	900	19,000	1,000	12,000	630
4	14,000	1,000	12,000	850	14,000	1,000	9,500	630
5	11,000	1,000	10,000	850	11,000	1,000	7,600	630
6	9,500	1,000	8,500	850	9,500	1,000	6,500	630
7	8,000	1,000	7,200	850	8,000	1,000	5,500	630
8	7,000	1,000	6,400	850	7,000	1,000	5,000	630
9	6,300	1,000	5,600	850	6,300	1,000	4,200	630
10	5,700	1,000	5,000	850	5,700	1,000	3,800	630
11	5,200	1,000	4,600	850	5,200	1,000	3,500	630
12	4,700	1,000	4,200	850	4,700	1,000	3,200	630
14	4,000	1,000	3,600	850	4,000	1,000	2,800	630
16	3,500	1,000	3,200	850	3,500	1,000	2,400	630
18	3,200	1,000	2,800	850	3,200	1,000	2,100	630
20	2,800	850	2,500	750	2,800	850	1,900	570

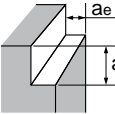
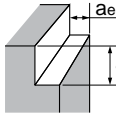
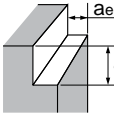
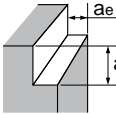
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

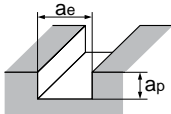
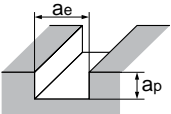
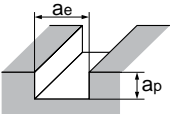
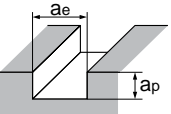


METRIC

Solid Carbide End Mills for Aluminum

High Speed Cutting Data for AL-SEEM2

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	32,000	2,800	32,000	2,800	32,000	2,800	26,000	2,300
4	32,000	3,800	28,000	3,300	32,000	3,800	20,000	2,400
5	25,000	3,800	22,000	3,300	25,000	3,800	16,000	2,400
6	21,000	3,800	18,000	3,300	21,000	3,800	13,000	2,400
7	18,000	3,600	16,000	3,300	18,000	3,600	11,000	2,200
8	16,000	3,200	14,000	3,300	16,000	3,200	10,000	2,000
9	14,000	3,200	12,000	3,000	14,000	3,200	9,000	2,000
10	12,000	3,200	11,000	3,000	12,000	3,200	8,000	2,000
11	11,000	3,200	10,000	3,000	11,000	3,200	7,000	2,000
12	10,000	3,200	9,000	2,700	10,000	3,200	6,600	2,000
14	9,000	3,200	8,000	2,700	9,000	3,200	5,600	2,000
16	8,000	2,800	7,000	2,450	8,000	2,800	5,000	1,750
18	7,000	2,500	6,000	2,100	7,000	2,500	4,500	1,600
20	6,000	2,100	5,500	1,900	6,000	2,100	4,000	1,400

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	32,000	1,600	32,000	1,600	32,000	1,600	23,000	1,100
4	28,000	1,900	24,000	1,600	28,000	1,900	17,000	1,100
5	22,000	1,900	19,000	1,600	22,000	1,900	14,000	1,100
6	19,000	1,900	16,000	1,600	19,000	1,900	12,000	1,100
7	16,000	1,900	13,000	1,600	16,000	1,900	10,000	1,100
8	14,000	1,900	12,000	1,600	14,000	1,900	9,000	1,100
9	12,000	1,900	11,000	1,600	12,000	1,900	8,000	1,100
10	11,000	1,900	9,500	1,600	11,000	1,900	7,000	1,100
11	10,000	1,900	8,600	1,600	10,000	1,900	6,200	1,100
12	9,500	1,900	8,000	1,600	9,500	1,900	5,800	1,100
14	8,000	1,900	7,000	1,600	8,000	1,900	5,000	1,100
16	7,000	1,800	6,000	1,600	7,000	1,800	4,500	1,100
18	6,000	1,700	5,300	1,600	6,000	1,700	4,000	1,100
20	5,700	1,700	4,800	1,400	5,700	1,700	3,500	1,000

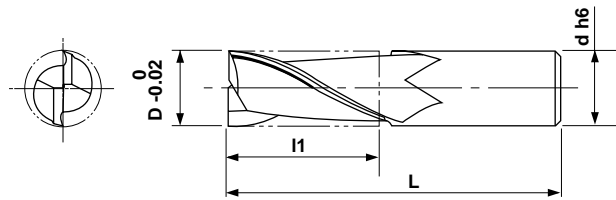
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

Solid Carbide End Mills for Aluminum

METRIC

AL-SEEL2 Type

- 2 Flute with 45° Helix and sharp corner



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEEL2010-3	□	1.0	4.5	45	3
AL-SEEL2011-3	□	1.1	5	45	3
AL-SEEL2012-3	□	1.2	5.4	45	3
AL-SEEL2013-3	□	1.3	5.9	45	3
AL-SEEL2014-3	□	1.4	6.3	45	3
AL-SEEL2015-3	□	1.5	6.8	50	3
AL-SEEL2016-3	□	1.6	7.2	50	3
AL-SEEL2017-3	□	1.7	7.7	50	3
AL-SEEL2018-3	□	1.8	8.1	50	3
AL-SEEL2019-3	□	1.9	8.6	50	3
AL-SEEL2020-3	□	2.0	9.0	55	3
AL-SEEL2021-3	□	2.1	9.5	55	3
AL-SEEL2022-3	□	2.2	9.9	55	3
AL-SEEL2023-3	□	2.3	10.4	55	3
AL-SEEL2024-3	□	2.4	10.8	55	3
AL-SEEL2025-3	□	2.5	11.3	60	3
AL-SEEL2026-3	□	2.6	11.7	60	3
AL-SEEL2027-3	□	2.7	12.2	60	3
AL-SEEL2028-3	□	2.8	12.6	60	3
AL-SEEL2029-3	□	2.9	13.1	60	3
AL-SEEL2030-3	□	3.0	13.5	65	3
AL-SEEL2030	●	3.0	22	65	6
AL-SEEL2031	□	3.1	22	65	6
AL-SEEL2032	□	3.2	22	65	6
AL-SEEL2033	□	3.3	22	65	6
AL-SEEL2034	□	3.4	22	65	6
AL-SEEL2035	□	3.5	24	65	6
AL-SEEL2036	□	3.6	24	65	6
AL-SEEL2037	□	3.7	24	65	6
AL-SEEL2038	□	3.8	24	65	6
AL-SEEL2039	□	3.9	24	65	6
AL-SEEL2040	●	4.0	26	65	6
AL-SEEL2041	□	4.1	26	65	6
AL-SEEL2042	□	4.2	26	65	6
AL-SEEL2043	□	4.3	26	65	6
AL-SEEL2044	□	4.4	26	65	6
AL-SEEL2045	□	4.5	30	65	6
AL-SEEL2046	□	4.6	30	65	6
AL-SEEL2047	□	4.7	30	65	6
AL-SEEL2048	□	4.8	30	65	6
AL-SEEL2049	□	4.9	30	65	6
AL-SEEL2050	●	5.0	32	75	6
AL-SEEL2051	□	5.1	32	75	6
AL-SEEL2052	□	5.2	32	75	6

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEEL2053	□	5.3	32	75	6
AL-SEEL2054	□	5.4	32	75	6
AL-SEEL2055	□	5.5	32	75	6
AL-SEEL2056	□	5.6	32	75	6
AL-SEEL2057	□	5.7	32	75	6
AL-SEEL2058	□	5.8	32	75	6
AL-SEEL2059	□	5.9	32	75	6
AL-SEEL2060	●	6.0	32	75	6
AL-SEEL2061	□	6.1	32	75	6
AL-SEEL2062	□	6.2	32	75	6
AL-SEEL2063	□	6.3	32	75	6
AL-SEEL2064	□	6.4	32	75	6
AL-SEEL2065	□	6.5	42	95	6
AL-SEEL2066	□	6.6	42	95	6
AL-SEEL2067	□	6.7	42	95	6
AL-SEEL2068	□	6.8	42	95	6
AL-SEEL2069	□	6.9	42	95	6
AL-SEEL2070	●	7.0	42	95	8
AL-SEEL2071	□	7.1	42	95	8
AL-SEEL2072	□	7.2	42	95	8
AL-SEEL2073	□	7.3	42	95	8
AL-SEEL2074	□	7.4	42	95	8
AL-SEEL2075	□	7.5	42	95	8
AL-SEEL2076	□	7.6	42	95	8
AL-SEEL2077	□	7.7	42	95	8
AL-SEEL2078	□	7.8	42	95	8
AL-SEEL2079	□	7.9	42	95	8
AL-SEEL2080	●	8.0	42	95	8
AL-SEEL2081	□	8.1	42	95	8
AL-SEEL2082	□	8.2	42	95	8
AL-SEEL2083	□	8.3	42	95	8
AL-SEEL2084	□	8.4	42	95	8
AL-SEEL2085	□	8.5	42	110	10
AL-SEEL2086	□	8.6	42	110	10
AL-SEEL2087	□	8.7	42	110	10
AL-SEEL2088	□	8.8	42	110	10
AL-SEEL2089	□	8.9	42	110	10
AL-SEEL2090	●	9.0	42	110	10
AL-SEEL2091	□	9.1	42	110	10
AL-SEEL2092	□	9.2	42	110	10
AL-SEEL2093	□	9.3	42	110	10
AL-SEEL2094	□	9.4	42	110	10
AL-SEEL2095	□	9.5	42	110	10
AL-SEEL2096	□	9.6	42	110	10

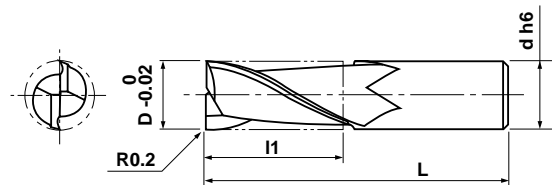
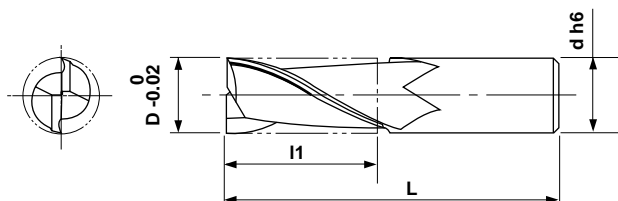


METRIC

Solid Carbide End Mills for Aluminum

AL-SEEL2 & AL-SEEL2-R02 Type

- 2 Flute with 45° Helix, sharp corner or small corner radius



AL-SEEL2

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-SEEL2097	<input type="checkbox"/>	9.7	42	110	10
AL-SEEL2098	<input type="checkbox"/>	9.8	42	110	10
AL-SEEL2099	<input type="checkbox"/>	9.9	42	110	10
AL-SEEL2100	<input checked="" type="checkbox"/>	10.0	53	120	10
AL-SEEL2101	<input type="checkbox"/>	10.1	53	120	10
AL-SEEL2102	<input type="checkbox"/>	10.2	53	120	10
AL-SEEL2103	<input type="checkbox"/>	10.3	53	120	10
AL-SEEL2104	<input type="checkbox"/>	10.4	53	120	10
AL-SEEL2105	<input type="checkbox"/>	10.5	53	120	12
AL-SEEL2106	<input type="checkbox"/>	10.6	53	120	12
AL-SEEL2107	<input type="checkbox"/>	10.7	53	120	12
AL-SEEL2108	<input type="checkbox"/>	10.8	53	120	12
AL-SEEL2109	<input type="checkbox"/>	10.9	53	120	12
AL-SEEL2110	<input type="checkbox"/>	11.0	53	120	12
AL-SEEL2111	<input type="checkbox"/>	11.1	53	120	12
AL-SEEL2112	<input type="checkbox"/>	11.2	53	120	12
AL-SEEL2113	<input type="checkbox"/>	11.3	53	120	12
AL-SEEL2114	<input type="checkbox"/>	11.4	53	120	12
AL-SEEL2115	<input type="checkbox"/>	11.5	53	120	12
AL-SEEL2116	<input type="checkbox"/>	11.6	53	120	12
AL-SEEL2117	<input type="checkbox"/>	11.7	53	120	12
AL-SEEL2118	<input type="checkbox"/>	11.8	53	120	12
AL-SEEL2119	<input type="checkbox"/>	11.9	53	120	12
AL-SEEL2120	<input checked="" type="checkbox"/>	12.0	53	120	12
AL-SEEL2130	<input checked="" type="checkbox"/>	13.0	65	130	12
AL-SEEL2140	<input checked="" type="checkbox"/>	14.0	75	140	16
AL-SEEL2150	<input checked="" type="checkbox"/>	15.0	75	140	16
AL-SEEL2160	<input checked="" type="checkbox"/>	16.0	75	140	16
AL-SEEL2170	<input type="checkbox"/>	17.0	75	150	20
AL-SEEL2180	<input checked="" type="checkbox"/>	18.0	75	150	20
AL-SEEL2190	<input type="checkbox"/>	19.0	75	150	20
AL-SEEL2200	<input checked="" type="checkbox"/>	20.0	75	150	20
AL-SEEL2210	<input checked="" type="checkbox"/>	21.0	85	160	25
AL-SEEL2220	<input checked="" type="checkbox"/>	22.0	85	160	25
AL-SEEL2230	<input checked="" type="checkbox"/>	23.0	85	160	25
AL-SEEL2240	<input checked="" type="checkbox"/>	24.0	85	160	25
AL-SEEL2250	<input checked="" type="checkbox"/>	25.0	85	160	25

AL-SEEL2-R02

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-SEEL2030-R02	<input type="checkbox"/>	3.0	22	65	6
AL-SEEL2040-R02	<input type="checkbox"/>	4.0	26	65	6
AL-SEEL2050-R02	<input type="checkbox"/>	5.0	32	75	6
AL-SEEL2060-R02	<input type="checkbox"/>	6.0	32	75	6
AL-SEEL2080-R02	<input type="checkbox"/>	8.0	42	95	8
AL-SEEL2100-R02	<input type="checkbox"/>	10.0	53	120	10
AL-SEEL2120-R02	<input type="checkbox"/>	12.0	53	120	12

- Stocked standard
- Inquire regarding delivery

Solid Carbide End Mills for Aluminum

METRIC

Recommended Cutting Data for AL-SEEL2 & AL-SEEL2-R02

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Shoulder Cutting	 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	32,000	700	32,000	700	32,000	700	30,000	660
1.5	32,000	1,000	32,000	1,000	32,000	1,000	20,000	660
2	28,000	1,200	23,000	1,000	28,000	1,200	16,000	660
3	19,000	1,200	16,000	1,000	19,000	1,200	10,000	660
4	14,000	1,200	12,000	1,000	14,000	1,200	8,000	660
5	11,000	1,200	9,500	1,000	11,000	1,200	6,000	660
6	9,500	1,200	8,000	1,000	9,500	1,200	5,000	660
8	7,000	1,200	6,000	1,000	7,000	1,200	4,000	660
10	5,700	1,200	4,800	1,000	5,700	1,200	3,200	660
12	4,700	1,200	4,000	1,000	4,700	1,200	2,600	660
16	3,500	1,000	3,000	900	3,500	1,000	2,000	600
20	2,800	800	2,400	700	2,800	800	1,600	500
25	2,300	800	1,900	650	2,300	800	1,300	500

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended, if needed, try reducing the depth of cut to 0.2D and the feed speed to 20-50% from above data.

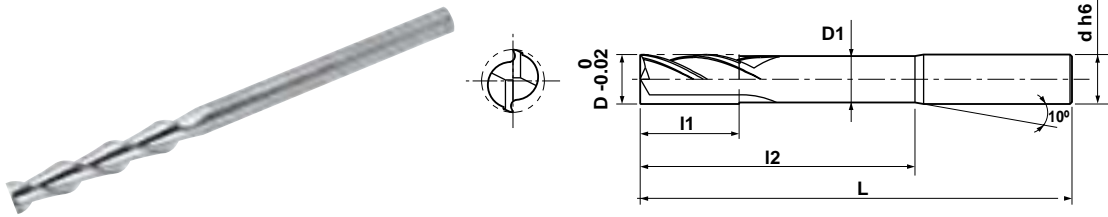


METRIC

Solid Carbide End Mills for Aluminum

AL-SEE-MS2 Type

- 2 Flute with 45° Helix, sharp corner and undersized neck



CATALOG NUMBER	STK	DIMENSIONS					
		D	I1	D1	I2	L	d
AL-SEE-MS2020	□	2.0	20	-	50	140	4
AL-SEE-MS2030	□	3.0	20	2.8	50	140	4
AL-SEE-MS2040	□	4.0	26	3.8	55	140	6
AL-SEE-MS2050	□	5.0	30	4.7	65	140	6
AL-SEE-MS2060	□	6.0	30	5.7	65	140	6
AL-SEE-MS2080	□	8.0	40	7.6	80	140	8
AL-SEE-MS2100	□	10.0	50	9.5	100	180	10
AL-SEE-MS2120	□	12.0	50	11.4	100	180	12
AL-SEE-MS2140	□	14.0	70	13.2	100	180	16
AL-SEE-MS2150	□	15.0	70	14	100	180	16
AL-SEE-MS2160	□	16.0	70	15	100	180	16
AL-SEE-MS2180	□	18.0	70	17	140	220	20
AL-SEE-MS2200	□	20.0	70	19	140	220	20

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
2	28,000	1,200	23,000	1,000	28,000	1,200	16,000	700
3	19,000	1,200	16,000	1,000	19,000	1,200	10,000	700
4	14,000	1,200	12,000	1,000	14,000	1,200	8,000	700
5	11,000	1,100	9,500	1,000	11,000	1,100	6,000	700
6	9,500	1,100	8,000	1,000	9,500	1,100	5,300	700
8	7,000	1,100	6,000	900	7,000	1,100	4,000	600
10	5,700	850	4,800	720	5,700	850	3,200	500
12	4,700	700	4,000	600	4,700	700	2,600	450
14	4,000	700	3,500	600	4,000	700	2,200	450
15	3,800	700	3,200	600	3,800	700	2,100	450
16	3,500	700	3,000	600	3,500	700	2,000	400
18	3,200	700	2,600	520	3,200	700	1,800	360
20	2,800	600	2,400	480	2,800	600	1,600	320

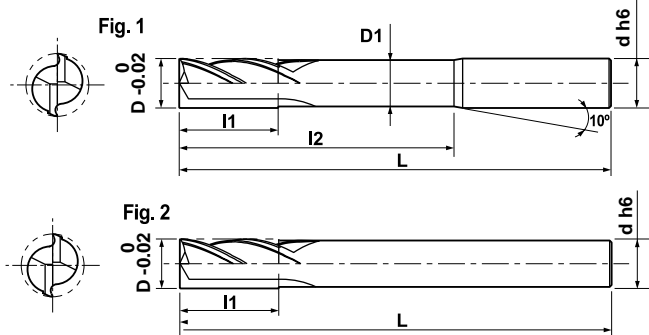
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended, if needed, try reducing the depth of cut to 0.2D and the feed speed to 20-50% from above data.

Solid Carbide End Mills for Aluminum

METRIC

AL-SEEL2-LS Type

- 2 Flute with 45° Helix, sharp corner, long shank and undersized neck



CATALOG NUMBER	STK	DIMENSIONS						FIG.
		D	l1	D1	l2	L	d	
AL-SEEL2030-LS	□	3.0	22	2.8	50	150	6	1
AL-SEEL2040-LS	□	4.0	26	3.8	55	150	6	1
AL-SEEL2050-LS	□	5.0	32	4.7	65	150	6	1
AL-SEEL2060-LS	□	6.0	32	5.7	65	150	6	1
AL-SEEL2080-LS	□	8.0	42	7.6	80	150	8	1
AL-SEEL2100-LS	□	10.0	53	-	-	200	8	2
AL-SEEL2120-LS	□	12.0	53	-	-	200	10	2
AL-SEEL2140-LS	□	14.0	75	-	-	200	12	2
AL-SEEL2150-LS	□	15.0	75	-	-	200	12	2
AL-SEEL2160-LS	□	16.0	75	15	120	200	16	1
AL-SEEL2180-LS	□	18.0	75	-	-	250	16	2
AL-SEEL2200-LS	□	20.0	75	19	150	250	20	1

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Shoulder Cutting								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	17,000	1,100	14,000	900	17,000	1,100	9,500	600
4	13,000	1,100	11,000	900	13,000	1,100	7,000	600
5	10,000	1,000	8,900	900	10,000	1,000	5,500	600
6	8,500	1,000	7,400	900	8,500	1,000	4,800	600
8	6,500	1,000	5,500	900	6,500	1,000	3,500	550
10	5,000	750	4,500	700	5,000	750	3,000	450
12	4,000	750	3,700	600	4,000	750	2,300	400
14	3,600	700	3,200	600	3,600	700	2,000	400
15	3,300	700	2,900	600	3,300	700	1,900	380
16	3,000	600	2,700	550	3,000	600	1,800	380
18	2,800	600	2,500	500	2,800	600	1,400	350
20	2,500	600	2,200	450	2,500	600	1,100	350

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended, if needed, try reducing the depth of cut to 0.2D and the feed speed to 20-50% from above data.

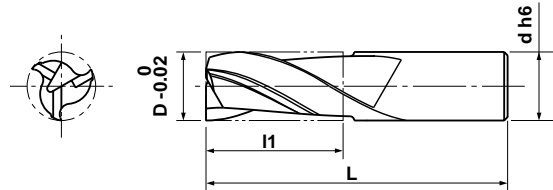


INCH

Solid Carbide End Mills for Aluminum

AL-SEES3 Type

- 3 Flute with 45° Helix and sharp corner



CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES30250	•	.250	.750	3.00	.250
AL-SEES30312	•	.312	1.00	3.25	.312
AL-SEES30375	•	.375	1.25	3.75	.375
AL-SEES30500	•	.500	1.50	4.50	.500
AL-SEES30625	•	.625	2.00	5.00	.625
AL-SEES30750	•	.750	2.25	5.75	.750
AL-SEES31000	•	1.00	3.00	6.50	.625

Recommended Cutting Data

Type of Machining	Tool Diameter													
	.250"		.312"		.375"		.500"		.625"		.750"		1.00"	
	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.	N r.p.m.	F i.p.m.
Shoulder Cutting $a_p = 1.5D$ $a_e = 0.3D$	8,000	72	7,000	65	7,000	60	5,000	45	4,000	35	3,500	30	2,500	25
Slotting $a_p = D$ $a_e = D$	2,500	24	2,700	21	2,500	19	1,900	15	1,500	12	1,250	10	950	7

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

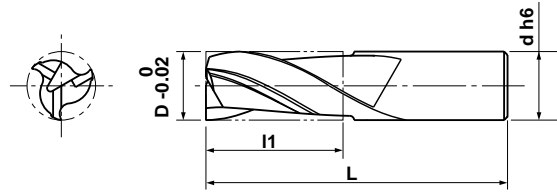


Solid Carbide End Mills for Aluminum

METRIC

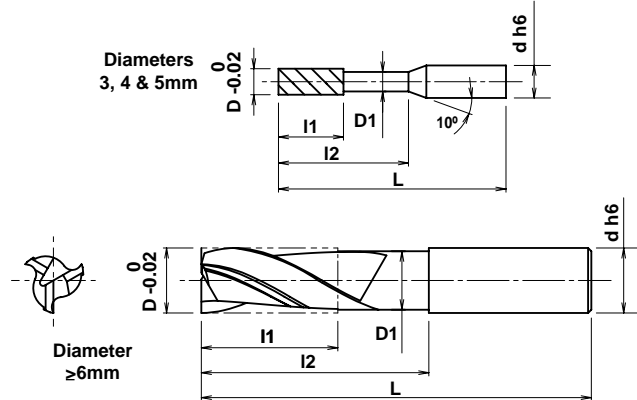
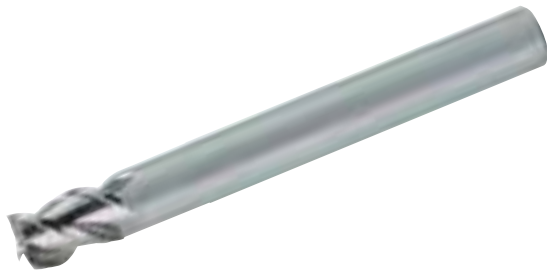
AL-SEES3 & AL-SEEZ3 Type

- 3 Flute with 45° Helix and sharp corner



AL-SEES3

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-SEES3030	•	3.0	5	50	6
AL-SEES3040	•	4.0	6	50	6
AL-SEES3050	•	5.0	8	50	6
AL-SEES3060	•	6.0	9	55	6
AL-SEES3080	•	8.0	12	65	8
AL-SEES3100	•	10.0	15	75	10
AL-SEES3120	•	12.0	18	80	12
AL-SEES3160	•	16.0	24	95	16
AL-SEES3200	•	20.0	30	115	20
AL-SEES3250	•	25.0	38	130	25



AL-SEEZ3

CATALOG NUMBER	STK	DIMENSIONS					
		D	l1	D1	l2	L	d
AL-SEEZ3030	•	3.0	5	2.8	9	55	6
AL-SEEZ3040	•	4.0	6	3.8	12	55	6
AL-SEEZ3050	•	5.0	8	4.8	15	55	6
AL-SEEZ3060	•	6.0	9	5.8	18	60	6
AL-SEEZ3080	•	8.0	12	7.8	24	70	8
AL-SEEZ3100	•	10.0	15	9.8	30	75	10
AL-SEEZ3120	•	12.0	18	11.7	36	80	12
AL-SEEZ3160	•	16.0	24	15.7	48	95	16
AL-SEEZ3200	•	20.0	30	19.7	60	115	20
AL-SEEZ3250	•	25.0	38	24.7	75	130	25

**METRIC**

Solid Carbide End Mills for Aluminum

Recommended Cutting Data for AL-SEES3 & AL-SEEZ3

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting	
	 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	24,000	4,800	22,000	4,400	24,000	4,800	17,000	3,400
4	18,000	4,500	16,000	4,000	18,000	4,500	13,000	3,200
5	15,000	4,500	13,000	4,000	15,000	4,500	10,000	3,200
6	12,000	4,200	10,000	3,500	12,000	4,200	8,500	3,000
8	9,000	3,600	8,000	3,200	9,000	3,600	6,500	2,600
10	7,300	3,200	6,000	2,700	7,300	3,200	5,000	2,200
12	6,000	3,000	5,000	2,500	6,000	3,000	4,000	2,000
16	4,500	2,500	4,000	2,200	4,500	2,500	3,000	1,600
20	3,600	2,100	3,000	1,800	3,600	2,100	2,500	1,500
25	3,000	1,800	2,500	1,500	3,000	1,800	2,000	1,200

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting	
	 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	21,000	3,100	18,000	2,700	21,000	3,100	14,000	2,100
4	16,000	2,500	13,000	2,000	16,000	2,500	11,000	1,700
5	12,000	2,100	10,000	1,800	12,000	2,100	8,900	1,600
6	10,000	2,000	9,000	1,800	10,000	2,000	7,400	1,500
8	8,000	2,000	7,000	1,750	8,000	2,000	5,500	1,400
10	6,000	1,800	5,500	1,650	6,000	1,800	4,500	1,350
12	5,000	1,800	4,500	1,600	5,000	1,800	3,700	1,300
16	4,000	1,600	3,300	1,300	4,000	1,600	2,700	1,000
20	3,000	1,350	2,700	1,200	3,000	1,350	2,200	1,000
25	2,500	1,100	2,000	900	2,500	1,100	1,800	800

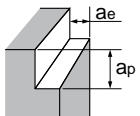
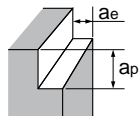
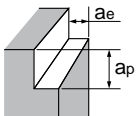
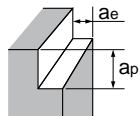
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

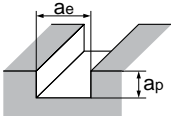
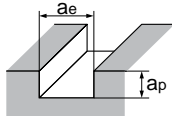
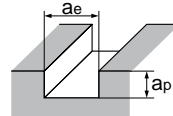
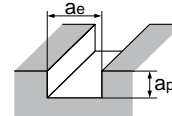


Solid Carbide End Mills for Aluminum

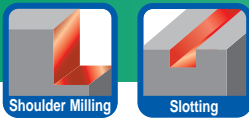
METRIC

High Speed Cutting Data for AL-SEES3 & AL-SEEZ3

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	50,000	9,000	45,000	8,100	50,000	9,000	37,000	6,600
4	40,000	8,000	34,000	6,800	40,000	8,000	27,000	5,400
5	32,000	8,000	27,000	6,800	32,000	8,000	22,000	5,400
6	27,000	6,800	22,000	5,500	27,000	6,800	18,000	4,500
8	20,000	6,000	17,000	5,000	20,000	6,000	14,000	4,200
10	16,000	5,600	13,000	4,500	16,000	5,600	11,000	3,900
12	13,000	5,200	11,000	4,400	13,000	5,200	9,000	3,600
16	10,000	4,500	8,500	3,800	10,000	4,500	7,000	3,100
20	8,000	4,000	7,000	3,500	8,000	4,000	5,500	2,800
25	6,500	3,200	5,500	2,800	6,500	3,200	4,500	2,200

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	48,000	5,600	40,000	4,800	48,000	5,600	32,000	3,800
4	36,000	5,600	30,000	4,800	36,000	5,600	23,000	3,800
5	28,000	5,600	24,000	4,800	28,000	5,600	19,000	3,800
6	23,000	5,600	20,000	4,800	23,000	5,600	16,000	3,800
8	18,000	5,000	15,000	4,200	18,000	5,000	12,000	3,300
10	14,000	4,200	12,000	3,600	14,000	4,200	9,500	2,800
12	12,000	3,800	10,000	3,200	12,000	3,800	8,000	2,600
16	9,000	3,100	8,000	2,800	9,000	3,100	6,000	2,100
20	7,000	2,800	6,000	2,400	7,000	2,800	4,800	1,900
25	5,700	2,200	4,800	1,900	5,700	2,200	3,800	1,500

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

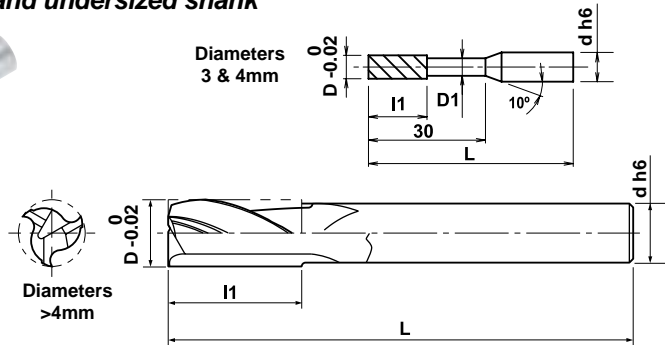


METRIC

Solid Carbide End Mills for Aluminum

AL-SEES3-LS Type

- 3 Flute with 45° Helix, sharp corner, long shank and undersized shank



CATALOG NUMBER	STK	DIMENSIONS				
		D	I1	L	D1	d
AL-SEES3030-LS	•	3.0	5	70	2.8	4
AL-SEES3040-LS	•	4.0	6	70	3.8	4
AL-SEES3050-LS	•	5.0	8	80	-	4
AL-SEES3060-LS	•	6.0	9	80	-	4
AL-SEES3060-LS-S5.8	•	6.0	9	80	-	5.8
AL-SEES3070-LS	•	7.0	10	100	-	6
AL-SEES3070-LS-S6.8	•	7.0	10	100	-	6.8
AL-SEES3080-LS	•	8.0	12	100	-	6
AL-SEES3080-LS-S7.8	•	8.0	12	100	-	7.8

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES3090-LS	•	9.0	14	120	8
AL-SEES3090-LS-S8.8	•	9.0	14	120	8.8
AL-SEES3100-LS	•	10.0	15	130	8
AL-SEES3100-LS-S9.8	•	10.0	15	130	9.8
AL-SEES3120-LS	•	12.0	18	150	10
AL-SEES3140-LS	•	14.0	21	160	12
AL-SEES3160-LS	•	16.0	24	180	14
AL-SEES3180-LS	•	18.0	27	180	16
AL-SEES3200-LS	•	20.0	30	200	18
AL-SEES3220-LS	•	22.0	33	200	20

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	19,000	2,200	16,000	1,800	19,000	2,200	10,600	950
4	14,300	1,800	11,900	1,600	14,300	1,800	8,000	880
5	11,400	1,600	10,000	1,400	11,400	1,600	6,400	830
6	9,500	1,400	8,000	1,200	9,500	1,400	5,000	750
8	7,000	1,100	6,000	1,000	7,000	1,100	4,000	650
10	5,700	1,000	4,800	850	5,700	1,000	3,200	570
12	4,700	940	4,000	800	4,700	940	2,600	520
14	4,000	880	3,400	750	4,000	880	2,200	500
16	3,500	800	3,000	700	3,500	800	2,000	450
18	3,200	800	2,600	650	3,200	800	1,800	450
20	2,800	700	2,400	600	2,800	700	1,600	400
22	2,600	650	2,100	520	2,600	650	1,400	350

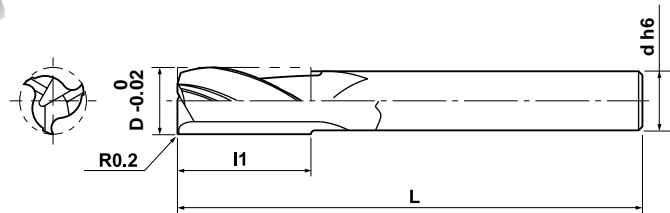
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended, if needed, try reducing the depth of cut to 0.2D and the feed speed to 20-50% from above data.

Solid Carbide End Mills for Aluminum

METRIC

AL-SEES3-LS-R02 Type

- 3 Flute with 45° Helix and 0.2 corner radius



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-SEES3060-LS-R02	•	6.0	9	80	4
AL-SEES3080-LS-R02	•	8.0	12	100	6
AL-SEES3100-LS-R02	•	10.0	15	130	8
AL-SEES3120-LS-R02	•	12.0	18	150	10
AL-SEES3140-LS-R02	•	14.0	21	160	12
AL-SEES3160-LS-R02	•	16.0	24	180	14
AL-SEES3180-LS-R02	•	18.0	27	180	16
AL-SEES3200-LS-R02	•	20.0	30	200	18
AL-SEES3220-LS-R02	•	22.0	33	200	20

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Shoulder Cutting								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	10,000	1,500	9,000	1,350	10,000	1,500	7,400	1,100
8	8,000	1,400	7,000	1,250	8,000	1,400	5,500	1,000
10	6,000	1,200	5,500	1,100	6,000	1,200	4,500	900
12	5,000	1,100	4,500	1,000	5,000	1,100	3,700	800
14	4,500	1,000	3,900	900	4,500	1,000	3,200	750
16	4,000	1,000	3,300	800	4,000	1,000	2,700	670
18	3,500	950	3,000	800	3,500	950	2,500	670
20	3,000	900	2,700	800	3,000	900	2,200	670
22	2,900	900	2,500	750	2,900	900	2,000	600

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended, if needed, try reducing the depth of cut to 0.2D and the feed speed to 20-50% from above data.

**METRIC**

Solid Carbide End Mills for Aluminum

High Speed Cutting Data for AL-SEES3-LS-R02

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Shoulder Cutting								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	20,000	2,600	17,000	2,200	20,000	2,600	12,000	1,600
8	15,000	2,100	13,000	1,800	15,000	2,100	9,000	1,300
10	12,000	2,000	10,000	1,800	12,000	2,000	7,300	1,200
12	10,000	2,000	9,000	1,800	10,000	2,000	6,000	1,200
14	8,500	1,850	7,500	1,600	8,500	1,850	5,000	1,100
16	7,500	1,650	6,500	1,400	7,500	1,650	4,500	1,000
18	6,500	1,500	6,000	1,400	6,500	1,500	4,000	1,000
20	6,000	1,500	5,000	1,250	6,000	1,500	3,600	900
22	5,500	1,400	4,800	1,200	5,500	1,400	3,300	800

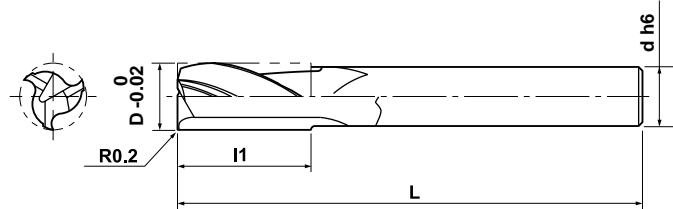
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended, if needed, try reducing the depth of cut to 0.2D and the feed speed to 20-50% from above data.

Solid Carbide End Mills for Aluminum

METRIC

AL-SEES3-XLS-R02 Type

- 3 Flute with 45° Helix, long shank and 0.2 corner radius



CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-SEES3060-XLS-R02	•	6.0	9	100	5
AL-SEES3080-XLS-R02	•	8.0	12	140	7
AL-SEES3100-XLS-R02	•	10.0	15	160	9
AL-SEES3120-XLS-R02	•	12.0	18	180	11
AL-SEES3140-XLS-R02	•	14.0	21	200	13
AL-SEES3160-XLS-R02	•	16.0	24	220	15
AL-SEES3180-XLS-R02	•	18.0	27	240	17
AL-SEES3200-XLS-R02	•	20.0	30	250	18
AL-SEES3220-XLS-R02	•	22.0	33	250	20

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Shoulder Cutting	 $L = Dc \times 4$ $a_e = Dc \times 0.25$ $a_p = Dc \times 1.5$		 $L = Dc \times 4$ $a_e = Dc \times 0.25$ $a_p = Dc \times 1.5$		 $L = Dc \times 4$ $a_e = Dc \times 0.25$ $a_p = Dc \times 1.5$		 $L = Dc \times 4$ $a_e = Dc \times 0.25$ $a_p = Dc \times 1.5$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	20,000	3,600	20,000	3,400	20,000	3,600	13,500	2,100
8	18,000	3,600	18,000	3,300	18,000	3,600	12,000	2,100
10	14,000	4,200	14,000	4,000	14,000	4,200	9,500	2,400
12	12,000	4,800	10,500	3,800	12,000	4,800	8,000	2,800
14	10,000	4,200	9,000	3,400	10,000	4,200	7,000	2,600
16	9,000	4,000	8,000	3,200	9,000	4,000	6,000	2,400
18	8,000	3,800	7,200	3,100	8,000	3,800	5,400	2,200
20	7,200	3,600	6,500	3,000	7,200	3,600	5,000	2,100
22	6,500	3,400	6,000	2,800	6,500	3,400	4,800	2,100

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, not recommended.

AL-SEES3-XLS-R02

Reduce speeds and feeds when overhang length is as shown in table

L/D	n (min ⁻¹) Vf (mm/min)	a _e
4~5	0%	0.2Dc
5~6	10~20%	0.15Dc
6~7	30~40%	0.1Dc
7~8	40~50%	0.075Dc
8~9	50~60%	0.05Dc
9~10	60~70%	0.025Dc



METRIC

Solid Carbide End Mills for Aluminum

Recommended Cutting Data for AL-SEES3-XLS-R02

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
Type of Machining - Slotting	 $L = D_c \times 4$ $a_e = D_c$ $a_p = D_c \times 0.25$		 $L = D_c \times 4$ $a_e = D_c$ $a_p = D_c \times 0.25$		 $L = D_c \times 4$ $a_e = D_c$ $a_p = D_c \times 0.25$		 $L = D_c \times 4$ $a_e = D_c$ $a_p = D_c \times 0.25$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	15,000	5,250	14,000	4,600	15,000	5,250	11,000	3,500
8	12,500	4,150	12,000	3,800	12,500	4,150	9,000	2,700
10	11,000	3,500	10,500	3,500	11,000	3,500	8,000	2,300
12	9,600	3,100	9,000	2,800	9,600	3,100	7,000	2,000
14	8,600	2,750	8,200	2,500	8,600	2,750	6,200	1,800
16	7,800	2,650	7,400	2,400	7,800	2,650	5,600	1,700
18	7,000	2,520	6,700	2,300	7,000	2,520	5,000	1,600
20	6,400	2,560	6,000	2,300	6,400	2,560	4,600	1,600
22	6,000	2,520	5,800	2,300	6,000	2,520	4,400	1,700

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, not recommended.

AL-SEES3-XLS-R02

Reduce speeds and feeds when overhang length is as shown in table

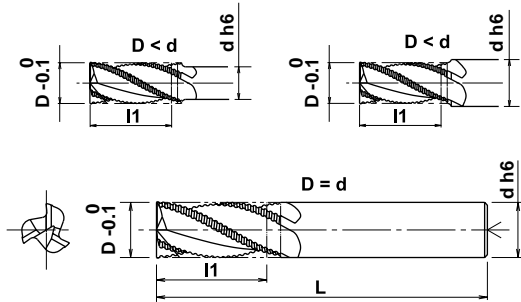
L/D	n (min ⁻¹) Vf (mm/min)		a _e
	Diameter Under ø10	Diameter Over ø10	
4~5	0%	0%	0.2D _c
5~6	40~50%	10~20%	0.1D _c
6~7	50~60%	20~30%	0.05D _c
7~8	60~70%	30~50%	0.05D _c
8~9	70~80%	40~60%	0.025D _c
9~10	70~80%	50~70%	0.025D _c

Solid Carbide End Mills for Aluminum

METRIC

AL-OCRS Type

- 3 Flute with 30° Helix for roughing



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-OCRS3030	•	3.0	6	50	6
AL-OCRS3035	•	3.5	7	50	6
AL-OCRS3040-4	•	4.0	8	55	4
AL-OCRS3040	•	4.0	8	55	6
AL-OCRS3050-4	•	5.0	10	55	4
AL-OCRS3050	•	5.0	10	55	6
AL-OCRS3060	•	6.0	13	55	6
AL-OCRS3070	□	7.0	17	65	8
AL-OCRS3080	•	8.0	17	65	8
AL-OCRS3090	□	9.0	17	70	8
AL-OCRS3100	•	10.0	20	75	10
AL-OCRS3110	□	11.0	25	80	12
AL-OCRS3120	•	12.0	25	80	12

CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-OCRS3130	□	13.0	28	85	12
AL-OCRS3140	•	14.0	28	95	12
AL-OCRS3150	□	15.0	34	95	16
AL-OCRS3160	•	16.0	34	95	16
AL-OCRS3170	□	17.0	37	115	16
AL-OCRS3180	•	18.0	37	115	16
AL-OCRS3190	□	19.0	40	115	20
AL-OCRS3200	•	20.0	40	115	20
AL-OCRS3220	•	22.0	46	130	20
AL-OCRS3240	•	24.0	51	130	25
AL-OCRS3250	•	25.0	51	130	25
AL-OCRS3300	•	30.0	51	140	25

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
Type of Machining - Shoulder Cutting						
	ap=1.5D ae ≤ 0.25D		ap=1.5D ae ≤ 0.25D		ap=1.5D ae ≤ 0.25D	
Diameter						
3	40,000	2,700	40,000	2,700	25,000	1,100
4	36,000	2,700	36,000	2,700	20,000	1,100
5	30,000	5,400	30,000	5,400	16,000	2,200
6	27,000	6,100	27,000	6,100	13,000	2,300
8	20,000	6,000	20,000	6,000	10,000	2,300
10	16,000	5,800	16,000	5,800	8,000	2,300
12	13,000	5,300	13,000	5,300	6,500	2,100
14	11,000	5,200	11,000	5,200	5,700	2,000
16	10,000	5,100	10,000	5,100	5,000	2,000
18	9,000	4,900	9,000	4,900	4,400	1,900
20	8,000	4,800	8,000	4,800	4,000	1,900
25	6,400	4,600	6,400	4,600	3,200	1,800



METRIC

Solid Carbide End Mills for Aluminum

Recommended Cutting Data for AL-OCRS

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)	
Type of Machining - Slotting						
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	30,000	1,800	30,000	1,800	16,000	700
4	24,000	2,200	24,000	2,200	12,000	900
5	19,000	2,300	19,000	2,300	10,000	900
6	16,000	2,400	16,000	2,400	8,000	1,000
8	12,000	2,500	12,000	2,500	6,000	1,000
10	9,500	2,600	9,500	2,600	5,000	1,000
12	8,000	2,100	8,000	2,100	4,000	900
14	6,800	1,600	6,800	1,600	3,400	700
16	6,000	1,600	6,000	1,600	3,000	700
18	5,300	1,500	5,300	1,500	2,700	650
20	4,700	1,300	4,700	1,300	2,400	550
25	3,800	950	3,800	950	1,900	400

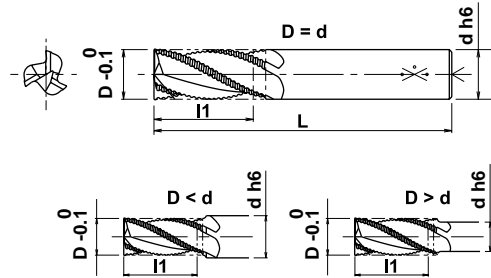
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

Solid Carbide End Mills for Aluminum

METRIC

AL-OCRL Type

- 3 Flute with 30° Helix for roughing



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-OCRL3060	•	6.0	26	75	6
AL-OCRL3070	□	7.0	33	95	8
AL-OCRL3080	•	8.0	33	95	8
AL-OCRL3090	□	9.0	33	110	8
AL-OCRL3100	•	10.0	38	120	10
AL-OCRL3110	□	11.0	45	125	12
AL-OCRL3120	•	12.0	45	125	12
AL-OCRL3130	□	13.0	50	130	12
AL-OCRL3140	•	14.0	50	140	12
AL-OCRL3150	□	15.0	62	140	16

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-OCRL3160	•	16.0	62	140	16
AL-OCRL3170	□	17.0	67	150	16
AL-OCRL3180	•	18.0	67	150	16
AL-OCRL3190	□	19.0	70	150	20
AL-OCRL3200	•	20.0	70	150	20
AL-OCRL3220	•	22.0	78	160	20
AL-OCRL3240	•	24.0	82	160	25
AL-OCRL3250	•	25.0	82	160	25
AL-OCRL3300	•	30.0	82	180	25

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)	
	 $a_p \leq 3D$ $a_e \leq 0.05D$ ($\phi D \leq \phi 12$) $a_p \leq 0.1D$ ($\phi 13 \leq \phi D \leq \phi 19$) $a_e \leq 0.25D$ ($\phi 20 \leq \phi D \leq \phi 30$)		 $a_p \leq 3D$ $a_e \leq 0.05D$ ($\phi D \leq \phi 12$) $a_p \leq 0.1D$ ($\phi 13 \leq \phi D \leq \phi 19$) $a_e \leq 0.25D$ ($\phi 20 \leq \phi D \leq \phi 30$)		 $a_p \leq 3D$ $a_e \leq 0.05D$ ($\phi D \leq \phi 12$) $a_p \leq 0.1D$ ($\phi 13 \leq \phi D \leq \phi 19$) $a_e \leq 0.25D$ ($\phi 20 \leq \phi D \leq \phi 30$)	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	13,000	980	13,000	980	7,000	420
8	10,000	750	10,000	750	5,000	300
10	8,000	750	8,000	750	4,000	300
12	7,000	750	7,000	750	3,500	300
14	6,000	750	6,000	750	3,000	300
16	6,000	900	6,000	900	3,000	360
18	6,000	1,100	6,000	1,100	3,000	450
20	7,000	1,700	7,000	1,700	3,400	680
25	6,000	1,800	6,000	1,800	3,200	800
30	5,000	1,800	5,000	1,800	2,600	800

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended.

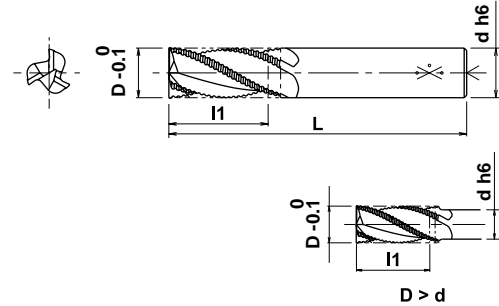


METRIC

Solid Carbide End Mills for Aluminum

AL-OCRS-LS Type

- 3 Flute with 30° Helix, long shank and undersize neck for roughing



CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-OCRS3060-LS	•	6.0	9	75	5
AL-OCRS3070-LS	□	7.0	11	95	6
AL-OCRS3080-LS	•	8.0	13	95	6
AL-OCRS3080-LS-S7	□	8.0	13	80	7
AL-OCRS3090-LS	□	9.0	15	110	8
AL-OCRS3100-LS	•	10.0	17	120	8
AL-OCRS3100-LS-S9	□	10.0	17	100	9
AL-OCRS3110-LS	□	11.0	17	125	10
AL-OCRS3120-LS	•	12.0	20	125	10
AL-OCRS3120-LS-S11	□	12.0	20	100	11
AL-OCRS3130-LS	□	13.0	20	130	12
AL-OCRS3140-LS	•	14.0	23	140	12
AL-OCRS3140-LS-S13	□	14.0	23	110	13

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-OCRS3150-LS	□	15.0	23	140	14
AL-OCRS3160-LS	•	16.0	25	140	14
AL-OCRS3160-LS-S15	□	16.0	25	110	15
AL-OCRS3170-LS	□	17.0	28	150	16
AL-OCRS3180-LS	•	18.0	28	150	16
AL-OCRS3180-LS-S17	□	18.0	28	135	17
AL-OCRS3190-LS	□	19.0	31	150	18
AL-OCRS3200-LS	•	20.0	31	150	18
AL-OCRS3220-LS	•	22.0	34	160	20
AL-OCRS3240-LS	•	24.0	37	160	22
AL-OCRS3250-LS	•	25.0	40	160	24
AL-OCRS3300-LS	•	30.0	46	180	25

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)	
Type of Machining - Shoulder Cutting	<p>$a_p \leq D$ $a_e \leq 0.25D$</p>		<p>$a_p \leq D$ $a_e \leq 0.25D$</p>		<p>$a_p \leq D$ $a_e \leq 0.25D$</p>	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	26,000	5,700	26,000	5,700	13,000	2,300
8	20,000	5,700	20,000	5,700	10,000	2,300
10	16,000	5,700	16,000	5,700	8,000	2,300
12	13,000	5,200	13,000	5,200	6,500	2,100
14	11,000	4,800	11,000	4,800	5,700	2,000
16	10,000	4,500	10,000	4,500	5,000	2,000
18	9,000	4,000	9,000	4,000	4,400	1,900
20	8,000	3,200	8,000	3,200	4,000	1,300
25	6,000	2,500	6,000	2,500	3,200	1,000
30	5,000	1,900	5,000	1,900	2,600	800

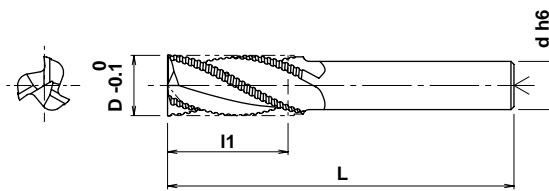
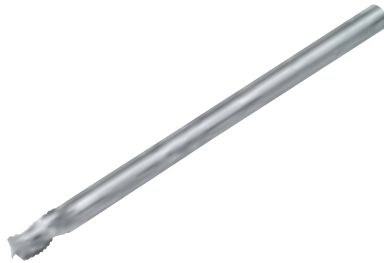
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended.

Solid Carbide End Mills for Aluminum

METRIC

AL-OCRS-XLS Type

- 3 Flute with 30° Helix, long shank and undersize neck for roughing



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-OCRS3060-XLS	□	6.0	9	100	5
AL-OCRS3080-XLS	□	8.0	12	140	7
AL-OCRS3100-XLS	□	10.0	15	160	9
AL-OCRS3120-XLS	□	12.0	18	180	11
AL-OCRS3140-XLS	□	14.0	21	200	13
AL-OCRS3160-XLS	□	16.0	24	220	15
AL-OCRS3180-XLS	□	18.0	27	240	17
AL-OCRS3200-XLS	□	20.0	30	250	18
AL-OCRS3220-XLS	□	22.0	33	250	20

Recommended Cutting Data

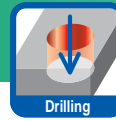
Material	Aluminum Alloy (A5052)				Cast Aluminum (Up to 13% Si)			
	Shoulder Cutting		Shoulder Cutting		Shoulder Cutting		Shoulder Cutting	
Type of Machining - Shoulder Cutting								
	$a_p=1.0D$ $a_e=0.25D$ $(D \leq \phi 10)$ $a_e=0.1D$		$a_p=0.5D$ $a_e=0.5D$ $(D \leq \phi 10)$ $a_e=0.1D$		$a_p=1.0D$ $a_e=0.25D$ $(D \leq \phi 10)$ $a_e=0.1D$		$a_p=0.5D$ $a_e=0.5D$ $(D \leq \phi 10)$ $a_e=0.1D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	7,200	750	6,500	685	7,200	750	6,500	650
8	6,800	850	6,200	750	6,800	850	6,200	720
10	6,400	1,280	5,800	1,080	6,400	1,280	5,800	1,000
12	6,000	1,500	5,400	1,080	6,000	1,500	5,400	1,000
16	4,500	1,500	4,200	1,150	4,500	1,350	4,200	1,000
22	3,600	1,350	3,600	1,200	3,600	1,200	3,600	1,000

AL-OCRS-XLS

Reduce speeds and feeds when overhang length is as shown in table

L/D	(min ⁻¹)	(mm/min)
7~8	0%	0%
8~9	0%	25%
9~10	0%	50%

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.
 6. Full slotting is not recommended.

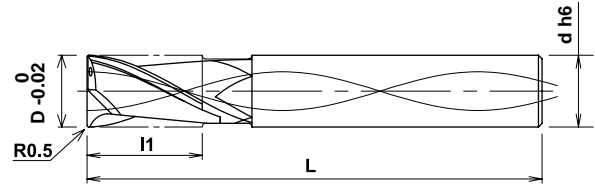
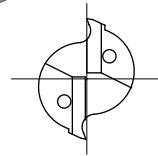
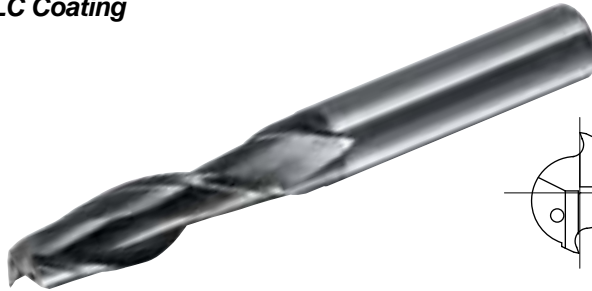


METRIC

Solid Carbide End Mills

AL-OCHE Type

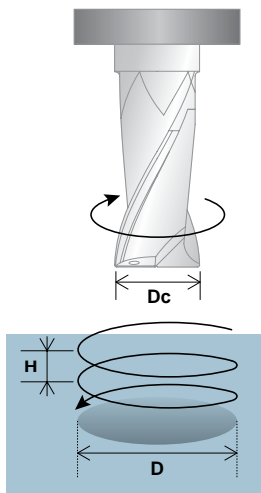
- 2 Flute with 30° Helix and coolant thru
- DLC Coating



CATALOG NUMBER	STK	DIMENSIONS			
		D	I1	L	d
AL-OCHE2040	•	4	16	60	4
AL-OCHE2060	•	6	22	74	6
AL-OCHE2080	•	8	31	90	8
AL-OCHE2100	•	10	37	105	10
AL-OCHE2120	•	12	43	113	12
AL-OCHE2160	•	16	55	130	16

Recommended Cutting Data

Helical Milling



Material	Aluminum Alloy (A5052, A7075)			
Tool Dia. Dc (mm)	Hole Dia. D (mm)	Maximum Depth T (mm)	Spindle Speed n (min ⁻¹)	Feed Speed Vf (mm/min)
4	5 ~ 7	15	16,000	960
6	7 ~ 11	21	10,600	1,060
8	10 ~ 15	30	8,000	2,000
10	12 ~ 19	36	6,400	1,600
12	14 ~ 23	42	5,300	1,300
16	18 ~ 31	54	4,000	1,000

Material	Cast Aluminum Alloy (Up to 13% Si)			
Tool Dia. Dc (mm)	Hole Dia. D (mm)	Maximum Depth T (mm)	Spindle Speed n (min ⁻¹)	Feed Speed Vf (mm/min)
4	5 ~ 7	15	14,400	860
6	7 ~ 11	21	9,500	950
8	10 ~ 15	30	7,200	1,800
10	12 ~ 19	36	5,700	1,400
12	14 ~ 23	42	4,800	1,200
16	18 ~ 31	54	3,600	900

Tool Path Diameter Dk (mm)	Helical Interpolation Depth/Tool Path Rev. H (mm)
1	2.6
2	5
3	6.4
4	7.4
5	8.2
6	8.8
7	9.4
8	9.8
9	10.2
10	10.6
11	11
12	11.3
13	11.5
14	11.8
15	12

- Notes:**
1. Tool path diameter: Dk = Hole diameter D - Tool diameter Dc.
 2. In case of blind hole, last revolution of H should be reduced to 0.8-2.0mm.
 3. In case of through hole, top of tool must come through by 1mm or more due to the tools corner radius of 0.5mm.
 4. Use internal coolant.
 5. Above data applies to solid work piece, when enlarging core hole ae should be 75% of Dc or less and recommend using flood coolant also.
 6. If machine or work piece lack rigidity or chatter occurs, reduce speed and feed with the same ratio to H.



Solid Carbide End Mills

METRIC

Recommended Cutting Data for AL-OCHE

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	
Type of Machining - Shoulder Cutting							
	Diameter						
	4	16,000	1,800	16,000	1,800	14,000	1,700
	6	10,000	1,800	10,000	1,800	9,500	1,700
	8	8,000	1,600	8,000	1,600	7,000	1,500
	10	6,000	1,300	6,000	1,300	5,700	1,200
	12	5,000	1,300	5,000	1,300	4,700	1,200
16	4,000	1,200	4,000	1,200	3,500	1,100	

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	
Type of Machining - Slotting							
	Diameter						
	4	14,000	1,000	14,000	1,000	12,000	850
	6	9,500	1,000	9,500	1,000	8,500	850
	8	7,000	1,000	7,000	1,000	6,400	850
	10	5,700	1,000	5,700	1,000	5,000	850
	12	4,700	1,000	4,700	1,000	4,200	850
16	3,500	1,000	3,500	1,000	3,200	850	

High Speed Cutting Data for AL-OCHE

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	
Type of Machining - Shoulder Cutting							
	Diameter						
	4	32,000	3,800	32,000	3,800	28,000	3,300
	6	21,000	3,800	21,000	3,800	18,000	3,300
	8	16,000	3,200	16,000	3,200	14,000	3,300
	10	12,000	3,200	12,000	3,200	11,000	3,000
	12	10,000	3,200	10,000	3,200	9,000	2,700
16	8,000	2,800	8,000	2,800	7,000	2,450	

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	
Type of Machining - Slotting							
	Diameter						
	4	28,000	1,900	28,000	1,900	24,000	1,600
	6	19,000	1,900	19,000	1,900	16,000	1,600
	8	14,000	1,900	14,000	1,900	12,000	1,600
	10	11,000	1,900	11,000	1,900	9,500	1,600
	12	9,500	1,900	9,500	1,900	8,000	1,600
16	7,000	1,800	7,000	1,800	6,000	1,600	

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

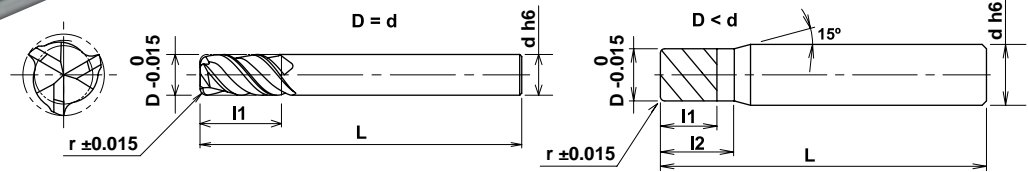
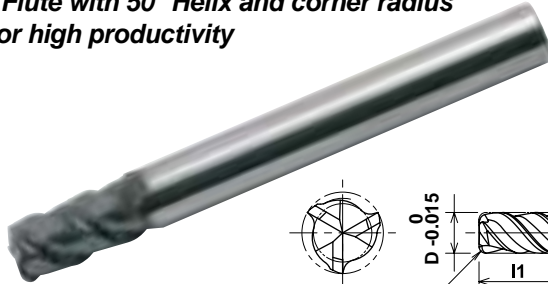


METRIC

Solid Carbide Radius End Mills

DV-OCSR & DV-OCSRLN Type

- 3 Flute with 50° Helix and corner radius
- For high productivity

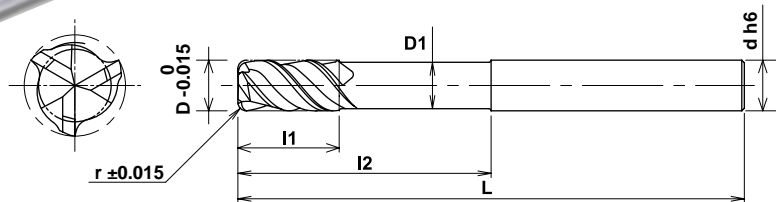
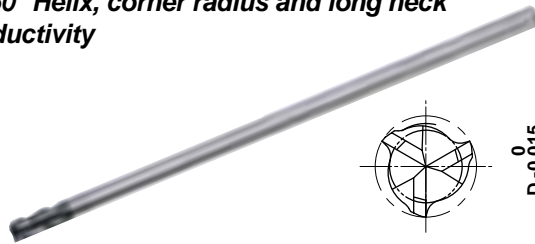


DV-OCSR

CATALOG NUMBER	STK	DIMENSIONS					
		D	r	I1	I2	L	d
DV-OCSR3020-R05	•	2.0	0.5	4	6	70	6
DV-OCSR3030-R08	•	3.0	0.8	6	9	70	6
DV-OCSR3040-R10	•	4.0	1.0	8	12	70	6
DV-OCSR3050-R12	•	5.0	1.2	10	15	70	6
DV-OCSR3060-R15	•	6.0	1.5	12	-	90	6
DV-OCSR3080-R20	•	8.0	2.0	16	-	100	8
DV-OCSR3100-R10	•	10.0	1.0	20	-	110	10
DV-OCSR3100-R20	•	10.0	2.0	20	-	110	10
DV-OCSR3120-R20	•	12.0	2.0	24	-	120	12
DV-OCSR3160-R30	•	16.0	3.0	32	-	160	16
DV-OCSR3160-R30-L	•	16.0	3.0	32	-	185	16
DV-OCSR3200-R30	•	20.0	3.0	40	-	160	20

DV-OCSRLN Type

- 3 Flute with 50° Helix, corner radius and long neck
- For high productivity



DV-OCSRLN

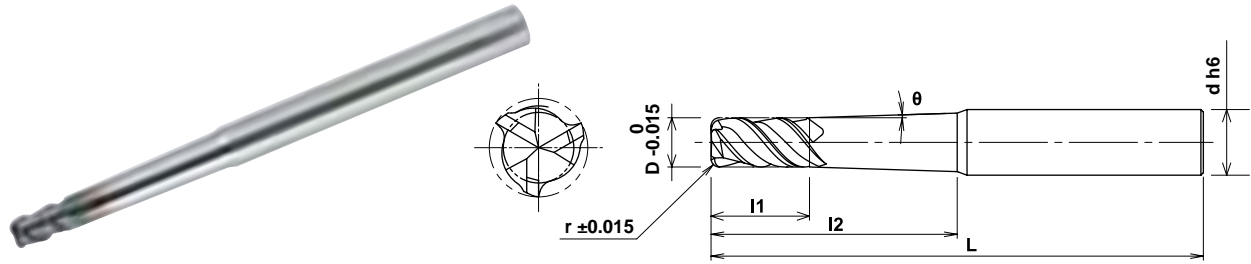
CATALOG NUMBER	STK	DIMENSIONS						
		D	r	I1	I2	L	D1	d
DV-OCSRLN3040-R10-20	•	4.0	1.0	6	20	80	3.8	4
DV-OCSRLN3040-R10-28	•	4.0	1.0	6	28	80	3.8	4
DV-OCSRLN3060-R15-30	•	6.0	1.5	9	30	90	5.7	6
DV-OCSRLN3060-R15-42	•	6.0	1.5	9	42	100	5.7	6
DV-OCSRLN3060-R15-55	•	6.0	1.5	9	55	115	5.7	6
DV-OCSRLN3080-R20-40	•	8.0	2.0	12	40	100	7.6	8
DV-OCSRLN3080-R20-56	•	8.0	2.0	12	56	115	7.6	8
DV-OCSRLN3080-R20-72	•	8.0	2.0	12	72	130	7.6	8
DV-OCSRLN3100-R20-50	•	10.0	2.0	15	50	110	9.5	10
DV-OCSRLN3100-R20-70	•	10.0	2.0	15	70	130	9.5	10
DV-OCSRLN3100-R20-90	•	10.0	2.0	15	90	150	9.5	10
DV-OCSRLN3120-R20-60	•	12.0	2.0	18	60	120	11.5	12
DV-OCSRLN3120-R30-60	•	12.0	3.0	18	60	120	11.5	12
DV-OCSRLN3120-R20-85	•	12.0	2.0	18	85	145	11.5	12
DV-OCSRLN3120-R20-110	•	12.0	2.0	18	110	170	11.5	12
DV-OCSRLN3160-R30-80	•	16.0	3.0	24	80	150	15.5	16
DV-OCSRLN3160-R30-120	•	16.0	3.0	24	120	185	15.5	16

Solid Carbide Radius End Mills

METRIC

DV-OCSRTN Type

- 3 Flute with 50° Helix, corner radius and taper neck
- For high productivity



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS						
		D	r	θ	l1	l2	L	d
DV-OCSRTN3020-R05-12	•	2.0	0.5	1°	3	12	70	6
DV-OCSRTN3020-R05-16	•	2.0	0.5	1°	3	16	70	6
DV-OCSRTN3020-R05-20	•	2.0	0.5	1°	3	20	70	6
DV-OCSRTN3030-R08-18	•	3.0	0.8	1°	4.5	18	80	6
DV-OCSRTN3030-R08-24	•	3.0	0.8	1°	4.5	24	80	6
DV-OCSRTN3030-R08-30	•	3.0	0.8	1°	4.5	30	80	6
DV-OCSRTN3040-R10-24	•	4.0	1.0	1°	6	24	90	6
DV-OCSRTN3040-R10-30	•	4.0	1.0	1°	6	30	90	6
DV-OCSRTN3040-R10-40	•	4.0	1.0	1°	6	40	90	6
DV-OCSRTN3050-R12-30	•	5.0	1.2	1°	7.5	30	90	6
DV-OCSRTN3050-R12-40	•	5.0	1.2	1°	7.5	40	100	8
DV-OCSRTN3050-R12-50	•	5.0	1.2	1°	7.5	50	110	8
DV-OCSRTN3060-R15-40	•	6.0	1.5	1°	9	40	100	8
DV-OCSRTN3060-R15-55	•	6.0	1.5	1°	9	55	115	8
DV-OCSRTN3060-R15-67	•	6.0	1.5	0°50'	9	67	130	8
DV-OCSRTN3080-R20-55	•	8.0	2.0	1°	12	55	115	10
DV-OCSRTN3080-R20-70	•	8.0	2.0	0°50'	12	70	130	10
DV-OCSRTN3080-R20-90	•	8.0	2.0	1°	12	90	150	12
DV-OCSRTN3100-R20-73	•	10.0	2.0	0°50'	15	73	135	12
DV-OCSRTN3100-R20-95	•	10.0	2.0	1°	15	95	155	16
DV-OCSRTN3100-R20-115	•	10.0	2.0	1°	15	115	175	16
DV-OCSRTN3120-R20-80	•	12.0	2.0	1°	18	80	140	16
DV-OCSRTN3120-R20-105	•	12.0	2.0	1°	18	105	165	16
DV-OCSRTN3160-R30-105	•	16.0	3.0	1°	24	105	180	20
DV-OCSRTN3160-R30-135	•	16.0	3.0	0°50'	24	135	200	20
DV-OCSRTN3160-R30-155	•	16.0	3.0	0°50'	24	155	220	20

**METRIC**

Solid Carbide Radius End Mills

Recommended Cutting Data for DV-OCSR, DV-OCSRLN & DV-OCSRTN

Work Materials	L/D	Tool Diameter								
		2mm x R0.5			3mm x R0.8			4mm x R1.0		
		ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)
Carbon Steel (C50, C55) Below 250HB	Up to 5D	0.12	15,000	5,100	0.20	10,000	5,100	0.25	7,000	4,800
	6 ~ 8D	0.08	7,000	1,900	0.13	5,300	2,700	0.17	3,500	2,300
	9 ~ 11D	0.06	5,000	1,000	0.10	3,000	1,500	0.12	2,300	1,500
Mold Steel (1.2311, P20) 30-43HRC	Up to 5D	0.12	12,000	4,000	0.20	8,500	4,300	0.25	6,000	4,000
	6 ~ 8D	0.08	7,000	1,900	0.13	5,300	2,700	0.17	3,500	2,300
	9 ~ 11D	0.06	4,800	980	0.10	3,000	1,500	0.12	2,300	1,500
Die Steel (1.2344, 1.2379) Below 255HB	Up to 5D	0.12	12,000	4,000	0.20	8,500	4,300	0.25	6,000	4,000
	6 ~ 8D	0.08	7,000	1,900	0.13	5,300	2,700	0.17	3,500	2,300
	9 ~ 11D	0.06	4,800	980	0.10	3,000	1,500	0.12	2,300	1,500
Hardened Die Steel (1.2344, 1.2379) 40-50HRC	Up to 5D	0.10	9,600	2,900	0.18	6,300	2,800	0.22	4,700	2,800
	6 ~ 8D	0.07	4,800	1,400	0.11	3,000	1,300	0.15	2,300	1,400
	9 ~ 11D	0.05	4,000	700	0.09	2,600	1,100	0.10	1,900	1,100
Hardened Die Steel (1.2344, 1.2379) 55-60HRC	Up to 5D	0.10	4,800	1,300	0.16	3,000	1,200	0.20	2,300	1,200
	6 ~ 8D	0.06	4,000	980	0.10	2,600	1,000	0.13	1,900	1,000
	9 ~ 11D	0.05	3,000	550	0.08	2,000	800	0.10	1,500	800
Gray & Nodular Cast Iron (GG, GGG) Below 300HB	Up to 5D	0.13	15,000	5,600	0.22	10,000	5,600	0.27	8,000	5,900
	6 ~ 8D	0.09	8,700	1,900	0.14	5,800	3,200	0.16	4,300	3,200
	9 ~ 11D	0.07	5,600	1,200	0.11	3,700	2,000	0.13	2,700	2,000

Work Materials	L/D	Tool Diameter								
		5mm x R1.2			6mm x R1.5			8mm x R2.0		
		ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)
Carbon Steel (C50, C55) Below 250HB	Up to 5D	0.30	5,700	4,800	0.37	4,800	4,800	0.50	3,500	4,700
	6 ~ 8D	0.20	2,800	2,300	0.25	2,300	2,300	0.34	1,700	2,300
	9 ~ 11D	0.14	1,900	1,600	0.18	1,500	1,500	0.24	1,100	1,400
Mold Steel (1.2311, P20) 30-43HRC	Up to 5D	0.30	5,000	4,200	0.37	4,200	4,200	0.50	3,000	4,000
	6 ~ 8D	0.20	2,800	2,300	0.25	2,300	2,300	0.34	1,700	2,300
	9 ~ 11D	0.14	1,900	1,600	0.18	1,500	1,500	0.24	1,100	1,400
Die Steel (1.2344, 1.2379) Below 255HB	Up to 5D	0.30	5,000	4,200	0.37	4,200	4,200	0.50	3,000	4,000
	6 ~ 8D	0.20	2,800	2,300	0.25	2,300	2,300	0.34	1,700	2,300
	9 ~ 11D	0.14	1,900	1,600	0.18	1,500	1,500	0.24	1,100	1,400
Hardened Die Steel (1.2344, 1.2379) 40-50HRC	Up to 5D	0.27	2,200	1,600	0.33	1,800	1,600	0.45	1,300	1,500
	6 ~ 8D	0.18	1,900	1,400	0.22	1,500	1,300	0.30	1,100	1,300
	9 ~ 11D	0.12	1,500	1,100	0.16	1,300	1,100	0.20	900	1,100
Hardened Die Steel (1.2344, 1.2379) 55-60HRC	Up to 5D	0.24	1,900	1,200	0.30	1,500	1,200	0.40	1,100	1,100
	6 ~ 8D	0.16	1,500	1,000	0.20	1,300	1,000	0.27	900	900
	9 ~ 11D	0.11	1,200	800	0.14	1,000	800	0.19	700	700
Gray & Nodular Cast Iron (GG, GGG) Below 300HB	Up to 5D	0.33	6,000	5,600	0.40	5,300	5,900	0.55	3,800	5,600
	6 ~ 8D	0.22	3,500	3,200	0.27	2,900	3,200	0.37	2,100	3,100
	9 ~ 11D	0.15	2,200	2,000	0.20	1,800	2,000	0.26	1,300	1,900

ap = Depth of cut, n = Spindle speed, Vf = Feed Speed

Solid Carbide Radius End Mills

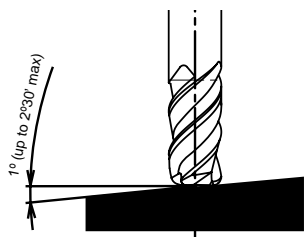
METRIC

Recommended Cutting Data for DV-OCSR, DV-OCSRLN & DV-OCSRTN

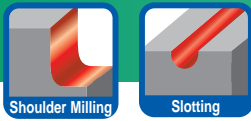
Work Materials	L/D	Tool Diameter								
		10mm x R1.0			10mm x R2.0			12mm x R2.0		
		ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)
Carbon Steel (C50, C55) Below 250HB	Up to 5D	0.25	2,800	4,700	0.50	2,800	4,700	0.50	2,300	4,600
	6 ~ 8D	0.17	1,400	2,300	0.34	1,400	2,300	0.34	1,100	2,200
	9 ~ 11D	0.12	900	1,500	0.24	900	1,500	0.24	700	1,400
Mold Steel (1.2311, P20) 30-43HRC	Up to 5D	0.25	2,400	4,000	0.50	2,400	4,000	0.50	2,000	4,000
	6 ~ 8D	0.17	1,400	2,300	0.34	1,400	2,300	0.34	1,100	2,200
	9 ~ 11D	0.12	900	1,500	0.24	900	1,500	0.24	700	1,400
Die Steel (1.2344, 1.2379) Below 255HB	Up to 5D	0.25	2,400	4,000	0.50	2,400	4,000	0.50	2,000	4,000
	6 ~ 8D	0.17	1,400	2,300	0.34	1,400	2,300	0.34	1,100	2,200
	9 ~ 11D	0.12	900	1,500	0.24	900	1,500	0.24	700	1,400
Hardened Die Steel (1.2344, 1.2379) 40-50HRC	Up to 5D	0.20	1,900	2,900	0.45	1,900	2,900	0.45	1,500	2,700
	6 ~ 8D	0.15	900	1,300	0.30	900	1,300	0.30	700	1,200
	9 ~ 11D	0.10	700	1,000	0.20	700	1,000	0.20	600	1,100
Hardened Die Steel (1.2344, 1.2379) 55-60HRC	Up to 5D	0.20	900	1,200	0.40	900	1,200	0.40	700	1,100
	6 ~ 8D	0.13	700	900	0.27	700	900	0.27	600	900
	9 ~ 11D	0.10	600	800	0.19	600	800	0.19	500	800
Gray & Nodular Cast Iron (GG, GGG) Below 300HB	Up to 5D	0.27	3,000	5,600	0.55	3,000	5,600	0.55	2,500	5,600
	6 ~ 8D	0.16	1,700	3,100	0.37	1,700	3,100	0.37	1,400	3,100
	9 ~ 11D	0.13	1,000	1,800	0.26	1,000	1,800	0.26	800	1,700

Work Materials	L/D	Tool Diameter								
		12mm x R3.0			16mm x R3.0			20mm x R3.0		
		ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)	ap (mm)	n (min ⁻¹)	Vf (mm/min)
Carbon Steel (C50, C55) Below 250HB	Up to 5D	0.75	2,300	4,600	0.75	1,800	4,500	0.80	1,400	3,500
	6 ~ 8D	0.50	1,100	2,200	0.50	900	2,200	0.50	700	1,700
	9 ~ 11D	0.36	700	1,400	0.36	600	1,500	0.36	400	1,000
Mold Steel (1.2311, P20) 30-43HRC	Up to 5D	0.75	2,000	4,000	0.75	1,600	4,000	0.80	1,200	3,000
	6 ~ 8D	0.50	1,100	2,200	0.50	900	2,200	0.50	700	1,700
	9 ~ 11D	0.36	700	1,400	0.36	600	1,500	0.36	400	1,000
Die Steel (1.2344, 1.2379) Below 255HB	Up to 5D	0.75	2,000	4,000	0.75	1,600	4,000	0.80	1,200	3,000
	6 ~ 8D	0.50	1,100	2,200	0.50	900	2,200	0.50	700	1,700
	9 ~ 11D	0.36	700	1,400	0.36	600	1,500	0.36	400	1,000
Hardened Die Steel (1.2344, 1.2379) 40-50HRC	Up to 5D	0.70	1,500	2,700	0.70	1,200	2,700	0.70	900	2,000
	6 ~ 8D	0.45	700	1,200	0.45	600	1,300	0.45	450	1,000
	9 ~ 11D	0.30	600	1,100	0.30	500	1,100	0.30	380	800
Hardened Die Steel (1.2344, 1.2379) 55-60HRC	Up to 5D	0.60	700	1,100	0.60	600	1,200	0.60	450	900
	6 ~ 8D	0.40	600	900	0.40	500	1,000	0.40	380	700
	9 ~ 11D	0.30	500	800	0.30	400	800	0.30	300	600
Gray & Nodular Cast Iron (GG, GGG) Below 300HB	Up to 5D	0.80	2,500	5,600	0.80	2,000	5,600	0.90	1,500	4,200
	6 ~ 8D	0.55	1,400	3,100	0.55	1,100	3,000	0.55	800	2,200
	9 ~ 11D	0.40	800	1,700	0.40	700	1,900	0.40	500	1,400

ap = Depth of cut, n = Spindle speed, Vf = Feed Speed



- Notes:**
1. Figures should be adjusted according to machine rigidity or work rigidity.
 2. If chattering occurs, reduce depth of cut or spindle speed & keep feed/tooth.
 3. Use air blow.
 4. If good surface is required, recommend to reduce the feed-rate.
 5. In case of ramping, 1° (up to 2°30') is recommended.

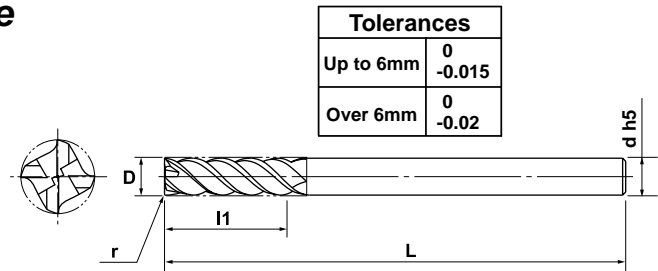
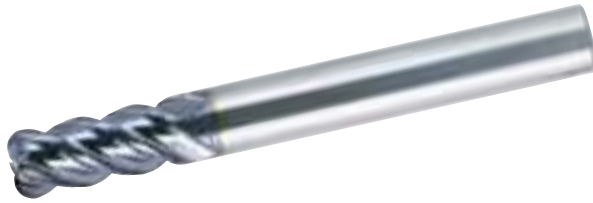


METRIC

Solid Carbide Radius End Mills

DZ-SOCS, DZ-SOCM & DZ-SOCL Type

- 4 Flute with 45° Helix and corner radius



DZ-SOCS

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SOCS4030-02	•	3.0	0.2	8	60	6
DZ-SOCS4030-05	•	3.0	0.5	8	60	6
DZ-SOCS4040-02	•	4.0	0.2	11	60	6
DZ-SOCS4040-05	•	4.0	0.5	11	60	6
DZ-SOCS4040-10	•	4.0	1.0	11	60	6
DZ-SOCS4050-02	•	5.0	0.2	13	60	6
DZ-SOCS4050-05	•	5.0	0.5	13	60	6
DZ-SOCS4050-10	•	5.0	1.0	13	60	6
DZ-SOCS4060-03	•	6.0	0.3	13	60	6
DZ-SOCS4060-05	•	6.0	0.5	13	60	6
DZ-SOCS4060-10	•	6.0	1.0	13	60	6
DZ-SOCS4060-15	•	6.0	1.5	13	60	6
DZ-SOCS4080-03	•	8.0	0.3	19	75	8
DZ-SOCS4080-05	•	8.0	0.5	19	75	8
DZ-SOCS4080-10	•	8.0	1.0	19	75	8
DZ-SOCS4080-15	•	8.0	1.5	19	75	8
DZ-SOCS4080-20	•	8.0	2.0	19	75	8
DZ-SOCS4100-03	•	10.0	0.3	22	80	10
DZ-SOCS4100-05	•	10.0	0.5	22	80	10
DZ-SOCS4100-10	•	10.0	1.0	22	80	10
DZ-SOCS4100-15	•	10.0	1.5	22	80	10
DZ-SOCS4100-20	•	10.0	2.0	22	80	10
DZ-SOCS4120-05	•	12.0	0.5	26	100	12
DZ-SOCS4120-10	•	12.0	1.0	26	100	12
DZ-SOCS4120-15	•	12.0	1.5	26	100	12
DZ-SOCS4120-20	•	12.0	2.0	26	100	12
DZ-SOCS4120-30	•	12.0	3.0	26	100	12
DZ-SOCS4160-10	•	16.0	1.0	32	110	16
DZ-SOCS4160-15	•	16.0	1.5	32	110	16
DZ-SOCS4160-20	•	16.0	2.0	32	110	16
DZ-SOCS4160-30	•	16.0	3.0	32	110	16
DZ-SOCS4200-10	•	20.0	1.0	38	125	20
DZ-SOCS4200-15	•	20.0	1.5	38	125	20
DZ-SOCS4200-20	•	20.0	2.0	38	125	20
DZ-SOCS4200-30	•	20.0	3.0	38	125	20

DZ-SOCS (undersized neck)

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SOCS4100S8-03	•	10.0	0.3	22	80	8
DZ-SOCS4100S8-05	•	10.0	0.5	22	80	8
DZ-SOCS4100S8-10	•	10.0	1.0	22	80	8
DZ-SOCS4120S10-05	•	12.0	0.5	26	100	10
DZ-SOCS4120S10-10	•	12.0	1.0	26	100	10
DZ-SOCS4120S10-20	•	12.0	2.0	26	100	10

DZ-SOCS cont. (undersized neck)

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SOCS4140S12-05	•	14.0	0.5	26	110	12
DZ-SOCS4140S12-10	•	14.0	1.0	26	110	12
DZ-SOCS4140S12-20	•	14.0	2.0	26	110	12
DZ-SOCS4160S14-05	•	16.0	0.5	32	110	14
DZ-SOCS4160S14-10	•	16.0	1.0	32	110	14
DZ-SOCS4160S14-20	•	16.0	2.0	32	110	14
DZ-SOCS4180S16-05	•	18.0	0.5	32	125	16
DZ-SOCS4180S16-10	•	18.0	1.0	32	125	16
DZ-SOCS4180S16-20	•	18.0	2.0	32	125	16
DZ-SOCS4200S18-10	•	20.0	1.0	38	125	18
DZ-SOCS4200S18-20	•	20.0	2.0	38	125	18
DZ-SOCS4200S18-30	•	20.0	3.0	38	125	18
DZ-SOCS4220S20-10	•	22.0	1.0	40	130	20
DZ-SOCS4220S20-20	•	22.0	2.0	40	130	20
DZ-SOCS4220S20-30	•	22.0	3.0	40	130	20

DZ-SOCM

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SOCM4060-05	•	6.0	0.5	21	60	6
DZ-SOCM4060-10	•	6.0	1.0	21	60	6
DZ-SOCM4080-05	•	8.0	0.5	26	75	8
DZ-SOCM4080-10	•	8.0	1.0	26	75	8
DZ-SOCM4080-20	•	8.0	2.0	26	75	8
DZ-SOCM4100-05	•	10.0	0.5	34	90	10
DZ-SOCM4100-10	•	10.0	1.0	34	90	10
DZ-SOCM4100-20	•	10.0	2.0	34	90	10
DZ-SOCM4120-10	•	12.0	1.0	38	100	12
DZ-SOCM4120-20	•	12.0	2.0	38	100	12
DZ-SOCM4120-30	•	12.0	3.0	38	100	12

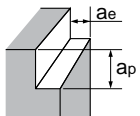
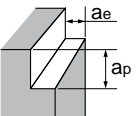
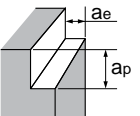
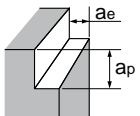
DZ-SOCL (undersized neck with long shank)

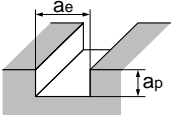
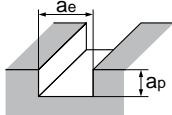
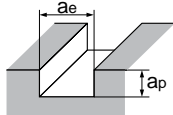
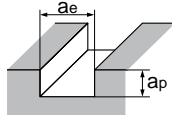
CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SOCLS4060-05	•	6.0	0.5	9	120	5.8
DZ-SOCLS4060-10	•	6.0	1.0	9	120	5.8
DZ-SOCLS4080-05	•	8.0	0.5	12	135	7.8
DZ-SOCLS4080-10	•	8.0	1.0	12	135	7.8
DZ-SOCLS4100-05	•	10.0	0.5	15	150	9
DZ-SOCLS4100-10	•	10.0	1.0	15	150	9
DZ-SOCLS4120-05	•	12.0	0.5	18	160	11
DZ-SOCLS4120-10	•	12.0	1.0	18	160	11
DZ-SOCLS4160-10	•	16.0	1.0	24	180	15
DZ-SOCLS4160-20	•	16.0	2.0	24	180	15

Solid Carbide Radius End Mills

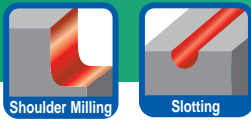
METRIC

Recommended Cutting Data for DZ-SOCS, DZ-SOCM & DZ-SOCL

Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Die Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Shoulder Cutting	 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.1D$		 $a_p=1.5D$ $a_e=0.1D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	10,600	650	6,400	390	3,180	170	6,400	260
4	8,000	750	4,800	480	2,380	180	4,800	390
5	6,300	750	3,800	540	1,900	180	3,800	460
6	5,300	950	3,200	570	1,600	240	3,200	450
8	4,000	1,000	2,400	600	1,200	240	2,400	440
10	3,200	1,000	1,900	600	950	200	1,900	420
12	2,700	900	1,600	540	800	210	1,600	420
16	2,000	800	1,200	480	600	170	1,200	390
20	1,600	800	950	480	480	150	950	350
22	1,500	800	900	450	450	140	900	350

Material	Carbon Steel, Cast Iron (SS400 • S50C • FC250)		Alloy Steel, Mold Steel (SCM440 • NAK80)		Hardened Die Steel (SKD61) 40~50HRC		Stainless Steel (SUS304)	
Type of Machining - Slotting	 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=0.2D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	8,500	750	5,300	470	2,650	150	5,300	320
4	6,400	780	4,000	490	2,000	200	4,000	400
5	5,100	780	3,200	490	1,600	200	3,200	440
6	4,250	780	2,650	490	1,350	200	2,650	420
8	3,200	780	2,000	490	1,000	200	2,000	400
10	2,550	780	1,600	490	800	190	1,600	380
12	2,100	780	1,400	490	660	170	1,400	390
16	1,600	610	1,000	380	500	140	1,000	340
20	1,250	580	800	320	400	120	800	320
22	1,150	550	750	300	360	110	750	300

- Notes:**
1. Data is relevant to standard type.
 2. Apply 40-80% above data to middle type, long type and long shank type.
 3. Please use a rigid and precise machine and holder.
 4. Recommend using coolant on stainless steel.

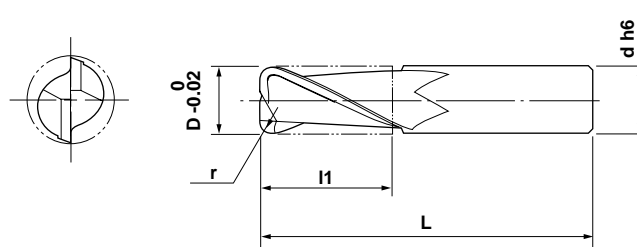
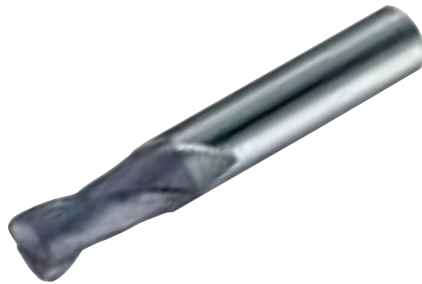


METRIC

Solid Carbide Radius End Mills

DZ-SED-R Type

- 2 Flute with 30° Helix and corner radius



CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SED-2030-R0.5	□	3.0	0.5	10	45	6
DZ-SED-2030-R1	□	3.0	1.0	12	45	6
DZ-SED-2040-R0.5	□	4.0	0.5	12	45	6
DZ-SED-2040-R1	□	4.0	1.0	12	45	6
DZ-SED-2040-R1.5	□	4.0	1.5	12	45	6
DZ-SED-2050-R0.5	□	5.0	0.5	15	50	6
DZ-SED-2050-R1	□	5.0	1.0	15	50	6
DZ-SED-2050-R1.5	□	5.0	1.5	15	50	6
DZ-SED-2050-R2	□	5.0	2.0	15	50	6
DZ-SED-2060-R0.5	□	6.0	0.5	15	55	6
DZ-SED-2060-R1	□	6.0	1.0	15	55	6
DZ-SED-2060-R1.5	□	6.0	1.5	15	55	6
DZ-SED-2060-R2	□	6.0	2.0	15	55	6
DZ-SED-2060-R2.5	□	6.0	2.5	15	55	6
DZ-SED-2080-R0.5	□	8.0	0.5	20	65	8
DZ-SED-2080-R1	□	8.0	1.0	20	65	8
DZ-SED-2080-R1.5	□	8.0	1.5	20	65	8
DZ-SED-2080-R2	□	8.0	2.0	20	65	8
DZ-SED-2080-R2.5	□	8.0	2.5	20	65	8
DZ-SED-2080-R3	□	8.0	3.0	20	65	8
DZ-SED-2100-R0.5	□	10.0	0.5	25	75	10
DZ-SED-2100-R1	□	10.0	1.0	25	75	10
DZ-SED-2100-R1.5	□	10.0	1.5	25	75	10
DZ-SED-2100-R2	□	10.0	2.0	25	75	10
DZ-SED-2100-R2.5	□	10.0	2.5	25	75	10
DZ-SED-2100-R3	□	10.0	3.0	25	75	10
DZ-SED-2100-R4	□	10.0	4.0	25	75	10
DZ-SED-2120-R0.5	□	12.0	0.5	25	80	12
DZ-SED-2120-R1	□	12.0	1.0	25	80	12
DZ-SED-2120-R1.5	□	12.0	1.5	25	80	12
DZ-SED-2120-R2	□	12.0	2.0	25	80	12
DZ-SED-2120-R2.5	□	12.0	2.5	25	80	12
DZ-SED-2120-R3	□	12.0	3.0	25	80	12
DZ-SED-2120-R4	□	12.0	4.0	25	80	12
DZ-SED-2120-R5	□	12.0	5.0	25	80	12

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SED-2130-R0.5	□	13.0	0.5	28	85	12
DZ-SED-2130-R1	□	13.0	1.0	28	85	12
DZ-SED-2130-R1.5	□	13.0	1.5	28	85	12
DZ-SED-2130-R2	□	13.0	2.0	28	85	12
DZ-SED-2130-R2.5	□	13.0	2.5	28	85	12
DZ-SED-2130-R3	□	13.0	3.0	28	85	12
DZ-SED-2130-R4	□	13.0	4.0	28	85	12
DZ-SED-2130-R5	□	13.0	5.0	28	85	12
DZ-SED-2140-R0.5	□	14.0	0.5	28	85	12
DZ-SED-2140-R1	□	14.0	1.0	28	85	12
DZ-SED-2140-R1.5	□	14.0	1.5	28	85	12
DZ-SED-2140-R2	□	14.0	2.0	28	85	12
DZ-SED-2140-R2.5	□	14.0	2.5	28	85	12
DZ-SED-2140-R3	□	14.0	3.0	28	85	12
DZ-SED-2140-R4	□	14.0	4.0	28	85	12
DZ-SED-2140-R5	□	14.0	5.0	28	85	12
DZ-SED-2160-R0.5	□	16.0	0.5	35	100	16
DZ-SED-2160-R1	□	16.0	1.0	35	100	16
DZ-SED-2160-R1.5	□	16.0	1.5	35	100	16
DZ-SED-2160-R2	□	16.0	2.0	35	100	16
DZ-SED-2160-R2.5	□	16.0	2.5	35	100	16
DZ-SED-2160-R3	□	16.0	3.0	35	100	16
DZ-SED-2160-R4	□	16.0	4.0	35	100	16
DZ-SED-2160-R5	□	16.0	5.0	35	100	16
DZ-SED-2200-R0.5	□	20.0	0.5	45	115	20
DZ-SED-2200-R1	□	20.0	1.0	45	115	20
DZ-SED-2200-R1.5	□	20.0	1.5	45	115	20
DZ-SED-2200-R2	□	20.0	2.0	45	115	20
DZ-SED-2200-R2.5	□	20.0	2.5	45	115	20
DZ-SED-2200-R3	□	20.0	3.0	45	115	20
DZ-SED-2200-R4	□	20.0	4.0	45	115	20
DZ-SED-2200-R5	□	20.0	5.0	45	115	20

Solid Carbide Radius End Mills

METRIC

Recommended Cutting Data for DZ-SED-R

Material	Carbon Steel, Cast Iron			Alloy Steel 25 ~ 40HRC			Hardened Alloy Steel 40 ~ 50 HRC		
Type of Machining	 $a_p = 1.5D$ $a_e \leq 0.2D$		 $a_p \leq 0.2D$ $(D \leq \phi 3)$ $a_p \leq 0.5D$ $(D > \phi 3)$	 $a_p = 1.5D$ $a_e \leq 0.2D$		 $a_p \leq 0.2D$ $(D \leq \phi 3)$ $a_p \leq 0.5D$ $(D > \phi 3)$	 $a_p = 1.5D$ $a_e \leq 0.2D$		 $a_p \leq 0.2D$ $(D \leq \phi 3)$ $a_p \leq 0.5D$ $(D > \phi 3)$
	Diameter	N (min ⁻¹)	Shoulder Cutting Vf (mm/min)	Slotting Vf (mm/min)	N (min ⁻¹)	Shoulder Cutting Vf (mm/min)	Slotting Vf (mm/min)	N (min ⁻¹)	Shoulder Cutting Vf (mm/min)
0.5	38,200	55	90	38,200	55	90	19,100	15	40
1	31,800	140	230	19,100	80	140	9,500	40	60
2	15,900	240	280	9,500	140	170	4,770	65	75
3	10,600	240	280	6,400	140	170	3,180	65	75
4	8,000	240	280	4,800	140	170	2,380	65	75
5	6,300	240	280	3,800	140	170	1,900	65	75
6	5,300	340	400	3,200	200	240	1,600	90	110
8	4,000	340	400	2,400	200	240	1,200	90	110
10	3,200	340	400	1,900	200	240	950	90	110
12	2,700	360	400	1,600	220	240	800	100	110
16	2,000	360	400	1,200	220	240	600	100	110
20	1,600	360	320	950	220	190	480	100	90
25	1,300	330	260	800	200	160	380	90	70
30	1,100	280	220	650	170	130	320	80	60

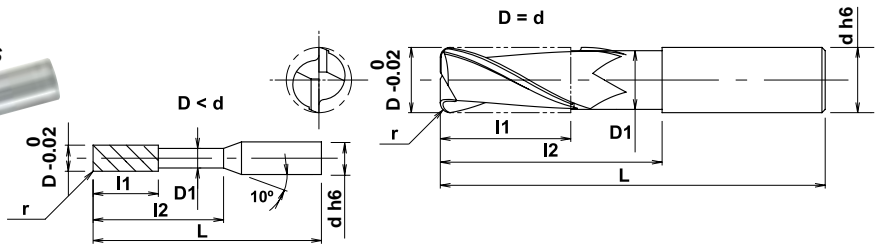


METRIC

Solid Carbide Radius End Mills

DV-SED-LS-R Type

- 2 Flute with 30° Helix and corner radius



CATALOG NUMBER	STK	DIMENSIONS						
		D	r	I1	D1	I2	L	d
DV-SED-2030-LS-R0.5	□	3.0	0.5	4.5	2.8	16	80	4
DV-SED-2030-LS-R1	□	3.0	1.0	4.5	2.8	16	80	4
DV-SED-2040-LS-R0.5	□	4.0	0.5	6	3.8	20	90	4
DV-SED-2040-LS-R1	□	4.0	1.0	6	3.8	20	90	4
DV-SED-2040-LS-R1.5	□	4.0	1.5	6	3.8	20	90	4
DV-SED-2050-LS-R0.5	□	5.0	0.5	7.5	4.8	25	100	6
DV-SED-2050-LS-R1	□	5.0	1.0	7.5	4.8	25	100	6
DV-SED-2050-LS-R1.5	□	5.0	1.5	7.5	4.8	25	100	6
DV-SED-2050-LS-R2	□	5.0	2.0	7.5	4.8	25	100	6
DV-SED-2060-LS-R0.5	□	6.0	0.5	9	5.8	33	110	6
DV-SED-2060-LS-R1	□	6.0	1.0	9	5.8	33	110	6
DV-SED-2060-LS-R1.5	□	6.0	1.5	9	5.8	33	110	6
DV-SED-2060-LS-R2	□	6.0	2.0	9	5.8	33	110	6
DV-SED-2060-LS-R2.5	□	6.0	2.5	9	5.8	33	110	6
DV-SED-2080-LS-R0.5	□	8.0	0.5	12	7.7	43	130	8
DV-SED-2080-LS-R1	□	8.0	1.0	12	7.7	43	130	8
DV-SED-2080-LS-R1.5	□	8.0	1.5	12	7.7	43	130	8
DV-SED-2080-LS-R2	□	8.0	2.0	12	7.7	43	130	8
DV-SED-2080-LS-R2.5	□	8.0	2.5	12	7.7	43	130	8
DV-SED-2080-LS-R3	□	8.0	3.0	12	7.7	43	130	8
DV-SED-2100-LS-R0.5	□	10.0	0.5	15	9.7	60	150	10
DV-SED-2100-LS-R1	□	10.0	1.0	15	9.7	60	150	10
DV-SED-2100-LS-R1.5	□	10.0	1.5	15	9.7	60	150	10
DV-SED-2100-LS-R2	□	10.0	2.0	15	9.7	60	150	10
DV-SED-2100-LS-R2.5	□	10.0	2.5	15	9.7	60	150	10
DV-SED-2100-LS-R3	□	10.0	3.0	15	9.7	60	150	10
DV-SED-2100-LS-R4	□	10.0	4.0	15	9.7	60	150	10
DV-SED-2120-LS-R0.5	□	12.0	0.5	18	11.7	74	160	12
DV-SED-2120-LS-R1	□	12.0	1.0	18	11.7	74	160	12
DV-SED-2120-LS-R1.5	□	12.0	1.5	18	11.7	74	160	12

CATALOG NUMBER	STK	DIMENSIONS						
		D	r	I1	D1	I2	L	d
DV-SED-2120-LS-R2	□	12.0	2.0	18	11.7	74	160	12
DV-SED-2120-LS-R2.5	□	12.0	2.5	18	11.7	74	160	12
DV-SED-2120-LS-R3	□	12.0	3.0	18	11.7	74	160	12
DV-SED-2120-LS-R4	□	12.0	4.0	18	11.7	74	160	12
DV-SED-2120-LS-R5	□	12.0	5.0	18	11.7	74	160	12
DV-SED-2140-LS-R0.5	□	14.0	0.5	21	13.7	76	170	14
DV-SED-2140-LS-R1	□	14.0	1.0	21	13.7	76	170	14
DV-SED-2140-LS-R1.5	□	14.0	1.5	21	13.7	76	170	14
DV-SED-2140-LS-R2	□	14.0	2.0	21	13.7	76	170	14
DV-SED-2140-LS-R2.5	□	14.0	2.5	21	13.7	76	170	14
DV-SED-2140-LS-R3	□	14.0	3.0	21	13.7	76	170	14
DV-SED-2140-LS-R4	□	14.0	4.0	21	13.7	76	170	14
DV-SED-2140-LS-R5	□	14.0	5.0	21	13.7	76	170	14
DV-SED-2160-LS-R0.5	□	16.0	0.5	24	15.7	80	180	16
DV-SED-2160-LS-R1	□	16.0	1.0	24	15.7	80	180	16
DV-SED-2160-LS-R1.5	□	16.0	1.5	24	15.7	80	180	16
DV-SED-2160-LS-R2	□	16.0	2.0	24	15.7	80	180	16
DV-SED-2160-LS-R2.5	□	16.0	2.5	24	15.7	80	180	16
DV-SED-2160-LS-R3	□	16.0	3.0	24	15.7	80	180	16
DV-SED-2160-LS-R4	□	16.0	4.0	24	15.7	80	180	16
DV-SED-2160-LS-R5	□	16.0	5.0	24	15.7	80	180	16
DV-SED-2200-LS-R0.5	□	20.0	0.5	30	19.7	85	200	20
DV-SED-2200-LS-R1	□	20.0	1.0	30	19.7	85	200	20
DV-SED-2200-LS-R1.5	□	20.0	1.5	30	19.7	85	200	20
DV-SED-2200-LS-R2	□	20.0	2.0	30	19.7	85	200	20
DV-SED-2200-LS-R2.5	□	20.0	2.5	30	19.7	85	200	20
DV-SED-2200-LS-R3	□	20.0	3.0	30	19.7	85	200	20
DV-SED-2200-LS-R4	□	20.0	4.0	30	19.7	85	200	20
DV-SED-2200-LS-R5	□	20.0	5.0	30	19.7	85	200	20

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Carbon Steel, Cast Iron		Alloy Steel (SKD61 • SKD11) 25~40HRC		Hardened Alloy Steel (SKD61 • SKD11) 40~50HRC	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	10,600	70	6,400	40	3,180	20
4	8,000	110	4,800	70	2,380	30
6	5,300	160	3,200	100	1,600	45
8	4,000	160	2,400	100	1,200	45
10	3,200	160	1,900	100	950	45
12	2,700	160	1,600	100	800	45
16	2,000	140	1,200	80	600	40
20	1,600	180	950	110	480	50

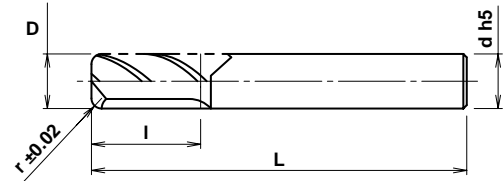
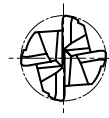
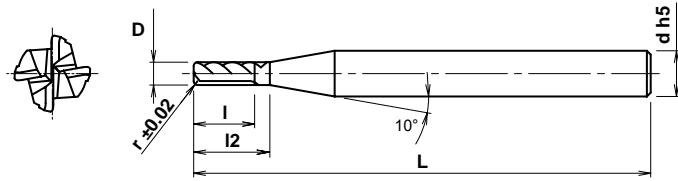
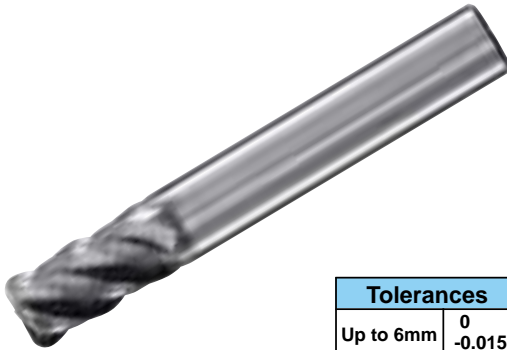
L/D	Tool Diameter	
	ap	ae
Up to 4D	1.5D	0.2D
5 ~ 6D	1.5D	0.1D
7 ~ 8D	1.5D	0.05D

Solid Carbide Radius End Mills

METRIC

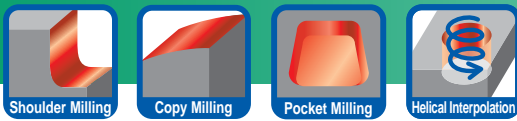
DV-OCSAR Type

- 4 Flute with 42°-45° Helix, corner radius
- For heat resistant Alloy, Ti-Alloy & Stainless Steel



Tolerances	
Up to 6mm	0 -0.015
Over 6mm	0 -0.02

CATALOG NUMBER	STK	DIMENSIONS					
		D	r	l	l2	L	d
DV-OCSAR4030-05	•	3.0	0.5	8	10	60	6
DV-OCSAR4040-05	•	4.0	0.5	11	13	60	6
DV-OCSAR4040-10	•	4.0	1.0	11	13	60	6
DV-OCSAR4050-05	•	5.0	0.5	13	15	60	6
DV-OCSAR4050-10	•	5.0	1.0	13	15	60	6
DV-OCSAR4060-05	•	6.0	0.5	13	-	60	6
DV-OCSAR4060-10	•	6.0	1.0	13	-	60	6
DV-OCSAR4080-05	•	8.0	0.5	19	-	75	8
DV-OCSAR4080-10	•	8.0	1.0	19	-	75	8
DV-OCSAR4080-20	•	8.0	2.0	19	-	75	8
DV-OCSAR4100-05	•	10.0	0.5	22	-	80	10
DV-OCSAR4100-10	•	10.0	1.0	22	-	80	10
DV-OCSAR4100-20	•	10.0	2.0	22	-	80	10
DV-OCSAR4120-05	•	12.0	0.5	26	-	100	12
DV-OCSAR4120-10	•	12.0	1.0	26	-	100	12
DV-OCSAR4120-20	•	12.0	2.0	26	-	100	12
DV-OCSAR4120-30	•	12.0	3.0	26	-	100	12
DV-OCSAR4160-10	•	16.0	1.0	32	-	110	16
DV-OCSAR4160-20	•	16.0	2.0	32	-	110	16
DV-OCSAR4160-30	•	16.0	3.0	32	-	110	16
DV-OCSAR4200-10	•	20.0	1.0	38	-	125	20
DV-OCSAR4200-20	•	20.0	2.0	38	-	125	20
DV-OCSAR4200-30	•	20.0	3.0	38	-	125	20



METRIC

Solid Carbide Radius End Mills

Recommended Cutting Data for DV-OCSAR4

Material	Stainless Steel (SUS304)		Titanium Alloy (Ti6Al-4V)		Heat-Resistant Alloy (718)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
Type of Machining - Shoulder Cutting						
	$a_p \leq 1.5D$ $a_e \leq 0.1D$		$a_p \leq 1.5D$ $a_e \leq 0.1D$		$a_p \leq 1.5D$ $a_e \leq 0.1D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	11,000	1,200	11,000	1,200	4,200	320
4	8,000	1,200	8,000	1,200	3,200	320
5	6,400	1,200	6,400	1,200	2,500	320
6	5,400	1,200	5,400	1,200	2,100	320
8	4,000	1,200	4,000	1,200	1,600	320
10	3,200	1,300	3,200	1,300	1,300	320
12	2,700	1,300	2,700	1,300	1,100	280
16	2,000	960	2,000	960	800	200
20	1,600	770	1,600	770	640	160

- Notes:**
1. Above cutting conditions are for general guidance.
 2. The figures to be adjusted according to machining shape, purpose and rigidity of machine and work clamping.
 3. Recommend to use down cutting.
 4. Recommend to use wet cutting condition, it is effective to use cutting fluid for heat-resistant alloy.

Recommended Cutting Data for DV-OCSAR4

Material	Stainless Steel (SUS304)		Titanium Alloy (Ti6Al-4V)		Heat-Resistant Alloy (Inconel 718)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
Type of Machining - Slotting						
	$a_p \leq D$		$a_p \leq D$		$a_p \leq 0.3D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	11,000	670	11,000	670	3,200	160
4	8,000	750	8,000	750	2,400	180
5	6,400	800	6,400	800	1,900	175
6	5,300	740	5,300	740	1,600	180
8	4,000	800	4,000	800	1,200	190
10	3,200	900	3,200	900	950	210
12	2,700	900	2,700	900	800	200
16	2,000	640	2,000	640	600	150
20	1,600	510	1,600	510	480	120

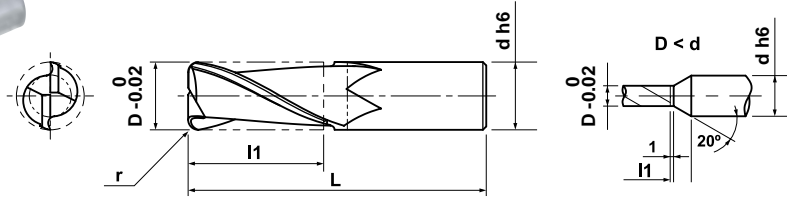
- Notes:**
1. Above cutting conditions are for general guidance.
 2. The figures to be adjusted according to machining shape, purpose and rigidity of machine and work clamping.
 3. Recommend to use wet cutting condition, it is effective to use cutting fluid for heat-resistant alloy.

Solid Carbide Radius End Mills for Aluminum

METRIC

AL-SEES2-R Type

- 2 Flute with 45° Helix and corner radius



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-SEES2060-R04*	□	6.0	0.4	17	55	6
AL-SEES2060-R05	●	6.0	0.5	17	55	6
AL-SEES2060-R08*	□	6.0	0.8	17	55	6
AL-SEES2060-R10	●	6.0	1.0	17	55	6
AL-SEES2060-R12*	□	6.0	1.2	17	55	6
AL-SEES2060-R15	●	6.0	1.5	17	55	6
AL-SEES2060-R16*	□	6.0	1.6	17	55	6
AL-SEES2060-R20	●	6.0	2.0	17	55	6
AL-SEES2060-R25	●	6.0	2.5	17	55	6
AL-SEES2080-R04*	□	8.0	0.4	22	65	8
AL-SEES2080-R05	●	8.0	0.5	22	65	8
AL-SEES2080-R08*	□	8.0	0.8	22	65	8
AL-SEES2080-R10	●	8.0	1.0	22	65	8
AL-SEES2080-R12*	□	8.0	1.2	22	65	8
AL-SEES2080-R15	●	8.0	1.5	22	65	8
AL-SEES2080-R16*	□	8.0	1.6	22	65	8
AL-SEES2080-R20	●	8.0	2.0	22	65	8
AL-SEES2080-R25	●	8.0	2.5	22	65	8
AL-SEES2080-R30	●	8.0	3.0	22	65	8
AL-SEES2100-R04*	□	10.0	0.4	28	75	10
AL-SEES2100-R05	●	10.0	0.5	28	75	10
AL-SEES2100-R08*	□	10.0	0.8	28	75	10
AL-SEES2100-R10	●	10.0	1.0	28	75	10
AL-SEES2100-R12*	□	10.0	1.2	28	75	10
AL-SEES2100-R15	●	10.0	1.5	28	75	10
AL-SEES2100-R16*	□	10.0	1.6	28	75	10
AL-SEES2100-R20	●	10.0	2.0	28	75	10
AL-SEES2100-R25	●	10.0	2.5	28	75	10
AL-SEES2100-R30	●	10.0	3.0	28	75	10
AL-SEES2100-R32*	□	10.0	3.2	28	75	10
AL-SEES2100-R35	●	10.0	3.5	28	75	10
AL-SEES2100-R40	●	10.0	4.0	28	75	10
AL-SEES2120-R04*	□	12.0	0.4	28	80	12
AL-SEES2120-R05	●	12.0	0.5	28	80	12
AL-SEES2120-R08*	□	12.0	0.8	28	80	12
AL-SEES2120-R10	●	12.0	1.0	28	80	12
AL-SEES2120-R12*	□	12.0	1.2	28	80	12
AL-SEES2120-R15	●	12.0	1.5	28	80	12
AL-SEES2120-R16*	□	12.0	1.6	28	80	12
AL-SEES2120-R20	●	12.0	2.0	28	80	12
AL-SEES2120-R25	●	12.0	2.5	28	80	12
AL-SEES2120-R30	●	12.0	3.0	28	80	12
AL-SEES2120-R32*	□	12.0	3.2	28	80	12
AL-SEES2120-R35	●	12.0	3.5	28	80	12
AL-SEES2120-R40	●	12.0	4.0	28	80	12
AL-SEES2120-R50	●	12.0	5.0	28	80	12

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-SEES2140-R04*	□	14.0	0.4	40	95	16
AL-SEES2140-R05	●	14.0	0.5	40	95	16
AL-SEES2140-R08*	□	14.0	0.8	40	95	16
AL-SEES2140-R10	●	14.0	1.0	40	95	16
AL-SEES2140-R12*	□	14.0	1.2	40	95	16
AL-SEES2140-R15	●	14.0	1.5	40	95	16
AL-SEES2140-R16*	□	14.0	1.6	40	95	16
AL-SEES2140-R20	●	14.0	2.0	40	95	16
AL-SEES2140-R25	●	14.0	2.5	40	95	16
AL-SEES2140-R30	●	14.0	3.0	40	95	16
AL-SEES2140-R32*	□	14.0	3.2	40	95	16
AL-SEES2140-R35	●	14.0	3.5	40	95	16
AL-SEES2140-R40	●	14.0	4.0	40	95	16
AL-SEES2140-R50	●	14.0	5.0	40	95	16
AL-SEES2160-R04*	□	16.0	0.4	40	95	16
AL-SEES2160-R05	●	16.0	0.5	40	95	16
AL-SEES2160-R08*	□	16.0	0.8	40	95	16
AL-SEES2160-R10	●	16.0	1.0	40	95	16
AL-SEES2160-R12*	□	16.0	1.2	40	95	16
AL-SEES2160-R15	●	16.0	1.5	40	95	16
AL-SEES2160-R16*	□	16.0	1.6	40	95	16
AL-SEES2160-R20	●	16.0	2.0	40	95	16
AL-SEES2160-R25	●	16.0	2.5	40	95	16
AL-SEES2160-R30	●	16.0	3.0	40	95	16
AL-SEES2160-R32*	□	16.0	3.2	40	95	16
AL-SEES2160-R35	●	16.0	3.5	40	95	16
AL-SEES2160-R40	●	16.0	4.0	40	95	16
AL-SEES2160-R50	●	16.0	5.0	40	95	16
AL-SEES2200-R04*	□	20.0	0.4	45	115	20
AL-SEES2200-R05	●	20.0	0.5	45	115	20
AL-SEES2200-R08*	□	20.0	0.8	45	115	20
AL-SEES2200-R10	●	20.0	1.0	45	115	20
AL-SEES2200-R12*	□	20.0	1.2	45	115	20
AL-SEES2200-R15	●	20.0	1.5	45	115	20
AL-SEES2200-R16*	□	20.0	1.6	45	115	20
AL-SEES2200-R20	●	20.0	2.0	45	115	20
AL-SEES2200-R25	●	20.0	2.5	45	115	20
AL-SEES2200-R30	●	20.0	3.0	45	115	20
AL-SEES2200-R32*	□	20.0	3.2	45	115	20
AL-SEES2200-R35	●	20.0	3.5	45	115	20
AL-SEES2200-R40	●	20.0	4.0	45	115	20
AL-SEES2200-R50	●	20.0	5.0	45	115	20

*H5 shank tolerance

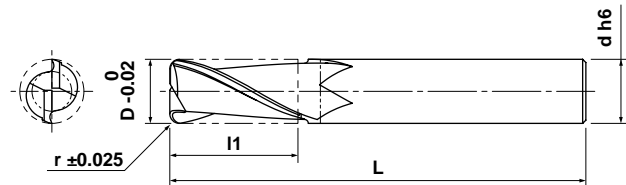
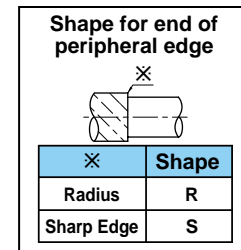
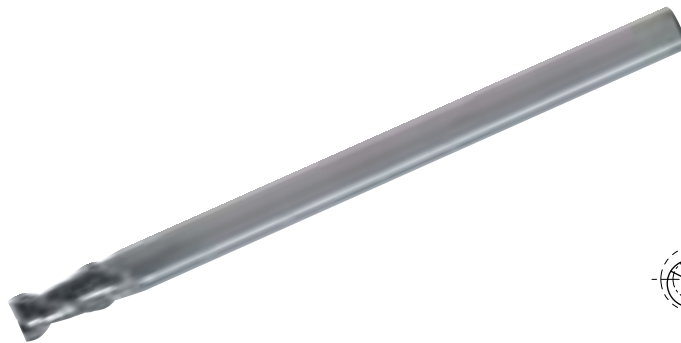
- Stocked standard
- Inquire regarding delivery



METRIC Solid Carbide Radius End Mills for Aluminum

AL-SEES2-LS-R Type

- 2 Flute with 45° Helix and corner radius



CATALOG NUMBER	STK	DIMENSIONS					
		D	r	l1	L	d	Shape
AL-SEES2060-LS-R05	□	6	0.5	9	80	5.8	S
AL-SEES2060-LS-R10	□	6	1	9	80	5.8	S
AL-SEES2080-LS-R05	□	8	0.5	12	100	7.8	S
AL-SEES2080-LS-R10	□	8	1	12	100	7.8	S
AL-SEES2080-LS-R15	□	8	1.5	12	100	7.8	S
AL-SEES2100-LS-R05	□	10	0.5	15	130	9.8	S
AL-SEES2100-LS-R10	□	10	1	15	130	9.8	S
AL-SEES2100-LS-R15	□	10	1.5	15	130	9.8	S
AL-SEES2100-LS-R20	□	10	2	15	130	9.8	S
AL-SEES2120-LS-R05	□	12	0.5	18	150	11	R
AL-SEES2120-LS-R10	□	12	1	18	150	11	R
AL-SEES2120-LS-R15	□	12	1.5	18	150	11	R
AL-SEES2120-LS-R20	□	12	2	18	150	11	R
AL-SEES2120-LS-R25	□	12	2.5	18	150	11	R
AL-SEES2120-LS-R30	□	12	3	18	150	11	R
AL-SEES2140-LS-R05	□	14	0.5	21	160	13	R
AL-SEES2140-LS-R10	□	14	1	21	160	13	R
AL-SEES2140-LS-R15	□	14	1.5	21	160	13	R
AL-SEES2140-LS-R20	□	14	2	21	160	13	R
AL-SEES2140-LS-R25	□	14	2.5	21	160	13	R
AL-SEES2140-LS-R30	□	14	3	21	160	13	R
AL-SEES2160-LS-R05	□	16	0.5	24	180	15	R
AL-SEES2160-LS-R10	□	16	1	24	180	15	R
AL-SEES2160-LS-R15	□	16	1.5	24	180	15	R
AL-SEES2160-LS-R20	□	16	2	24	180	15	R
AL-SEES2160-LS-R25	□	16	2.5	24	180	15	R
AL-SEES2160-LS-R30	□	16	3	24	180	15	R
AL-SEES2160-LS-R40	□	16	4	24	180	15	R

CATALOG NUMBER	STK	DIMENSIONS					
		D	r	l1	L	d	Shape
AL-SEES2180-LS-R05	□	18	0.5	27	180	17	R
AL-SEES2180-LS-R10	□	18	1	27	180	17	R
AL-SEES2180-LS-R15	□	18	1.5	27	180	17	R
AL-SEES2180-LS-R20	□	18	2	27	180	17	R
AL-SEES2180-LS-R25	□	18	2.5	27	180	17	R
AL-SEES2180-LS-R30	□	18	3	27	180	17	R
AL-SEES2180-LS-R40	□	18	4	27	180	17	R
AL-SEES2200-LS-R05	□	20	0.5	30	200	18	R
AL-SEES2200-LS-R10	□	20	1	30	200	18	R
AL-SEES2200-LS-R15	□	20	1.5	30	200	18	R
AL-SEES2200-LS-R20	□	20	2	30	200	18	R
AL-SEES2200-LS-R25	□	20	2.5	30	200	18	R
AL-SEES2200-LS-R30	□	20	3	30	200	18	R
AL-SEES2200-LS-R35	□	20	3.5	30	200	18	R
AL-SEES2200-LS-R40	□	20	4	30	200	18	R
AL-SEES2200-LS-R50	□	20	5	30	200	18	R
AL-SEES2220-LS-R05	□	22	0.5	33	200	20	R
AL-SEES2220-LS-R10	□	22	1	33	200	20	R
AL-SEES2220-LS-R15	□	22	1.5	33	200	20	R
AL-SEES2220-LS-R20	□	22	2	33	200	20	R
AL-SEES2220-LS-R25	□	22	2.5	33	200	20	R
AL-SEES2220-LS-R30	□	22	3	33	200	20	R
AL-SEES2220-LS-R35	□	22	3.5	33	200	20	R
AL-SEES2220-LS-R40	□	22	4	33	200	20	R
AL-SEES2220-LS-R50	□	22	5	33	200	20	R

Solid Carbide Radius End Mills for Aluminum

METRIC

Recommended Cutting Data for AL-SEES2-R & AL-SEES2-LS-R

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	12,000	2,400	10,000	2,000	12,000	2,400	8,500	1,700
8	9,000	2,300	8,000	2,000	9,000	2,300	6,500	1,600
10	7,300	2,200	6,000	1,800	7,300	2,200	5,000	1,500
12	6,000	2,100	5,000	1,800	6,000	2,100	4,000	1,400
14	5,200	2,000	4,500	1,800	5,200	2,000	3,500	1,400
16	4,500	2,000	4,000	1,800	4,500	2,000	3,000	1,400
20	3,600	1,800	3,000	1,500	3,600	1,800	2,500	1,250

AL-SEES2-LS-R

Reduce speeds and feeds when overhang length is as shown in table

L/D	ae
5D	0.2D
5~6D	0.15D
6~7D	0.1D
7~8D	0.05D
8~9D	0.025D
9~10D	0.025D

Recommended Cutting Data for AL-SEES2-R

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	10,000	1,500	9,000	1,350	10,000	1,500	7,400	1,100
8	8,000	1,500	7,000	1,250	8,000	1,500	5,500	1,000
10	6,000	1,200	5,500	1,100	6,000	1,200	4,500	900
12	5,000	1,200	4,500	1,100	5,000	1,200	3,700	900
14	4,500	1,200	3,900	1,100	4,500	1,200	3,200	900
16	4,000	1,200	3,300	1,100	4,000	1,200	2,700	900
20	3,000	1,200	2,700	1,000	3,000	1,200	2,200	900

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.



METRIC Solid Carbide Radius End Mills for Aluminum

High Speed Cutting Data for AL-SEES2-R & AL-SEES2-LS-R

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting	
	 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	27,000	4,000	22,000	3,300	27,000	3,500	18,000	2,700
8	20,000	4,000	17,000	3,300	20,000	3,500	14,000	2,700
10	16,000	4,000	13,000	3,300	16,000	3,500	11,000	2,700
12	13,000	4,000	11,000	3,300	13,000	3,500	9,000	2,700
14	11,000	4,000	10,000	3,300	11,000	3,500	8,000	2,700
16	10,000	4,000	8,500	3,300	10,000	3,500	7,000	2,700
20	8,000	3,600	7,000	3,100	8,000	3,500	5,500	2,500

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting	
	 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	23,000	3,500	20,000	3,000	23,000	3,500	16,000	2,400
8	18,000	3,500	15,000	3,000	18,000	3,500	12,000	2,400
10	14,000	3,500	12,000	3,000	14,000	3,500	9,500	2,400
12	12,000	3,500	10,000	3,000	12,000	3,500	8,000	2,400
14	10,000	3,500	9,000	3,000	10,000	3,500	7,000	2,400
16	9,000	3,500	8,000	3,000	9,000	3,500	6,000	2,400
20	7,000	3,200	6,000	2,700	7,000	3,100	4,800	2,100

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

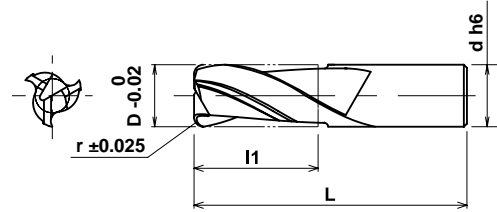


Solid Carbide Radius End Mills for Aluminum

METRIC

AL-SEES3-R

- 3 Flute with 45° Helix and corner radius



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-SEES3060-R05	•	6.0	0.5	9	60	6
AL-SEES3060-R10	•	6.0	1.0	9	60	6
AL-SEES3080-R05	•	8.0	0.5	12	70	8
AL-SEES3080-R10	•	8.0	1.0	12	70	8
AL-SEES3080-R15	□	8.0	1.5	12	70	8
AL-SEES3100-R05	•	10.0	0.5	15	80	10
AL-SEES3100-R10	•	10.0	1.0	15	80	10
AL-SEES3100-R15	□	10.0	1.5	15	80	10
AL-SEES3100-R20	□	10.0	2.0	15	80	10
AL-SEES3120-R05	•	12.0	0.5	18	90	12
AL-SEES3120-R10	•	12.0	1.0	18	90	12
AL-SEES3120-R15	□	12.0	1.5	18	90	12
AL-SEES3120-R20	□	12.0	2.0	18	90	12
AL-SEES3120-R25	□	12.0	2.5	18	90	12

- Stocked standard
- Inquire regarding delivery

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-SEES3140-R05	□	14.0	0.5	21	100	16
AL-SEES3140-R10	□	14.0	1.0	21	100	16
AL-SEES3140-R15	□	14.0	1.5	21	100	16
AL-SEES3140-R20	□	14.0	2.0	21	100	16
AL-SEES3140-R25	□	14.0	2.5	21	100	16
AL-SEES3160-R05	•	16.0	0.5	21	110	16
AL-SEES3160-R10	•	16.0	1.0	21	110	16
AL-SEES3160-R15	□	16.0	1.5	21	110	16
AL-SEES3160-R20	□	16.0	2.0	21	110	16
AL-SEES3160-R25	□	16.0	2.5	21	110	16
AL-SEES3160-R30	•	16.0	3.0	21	110	16
AL-SEES3200-R05	•	20.0	0.5	33	120	20
AL-SEES3200-R10	•	20.0	1.0	33	120	20
AL-SEES3200-R15	□	20.0	1.5	33	120	20
AL-SEES3200-R20	□	20.0	2.0	33	120	20
AL-SEES3200-R25	□	20.0	2.5	33	120	20
AL-SEES3200-R30	•	20.0	3.0	33	120	20
AL-SEES3200-R40	□	20.0	4.0	33	120	20

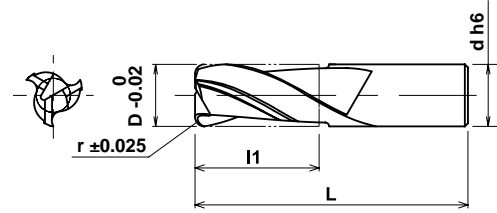


METRIC

Solid Carbide Radius End Mills for Aluminum

AL-SEES3-LS-R Type

- 3 Flute with 45° Helix, long shank and corner radius



CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-SEES3060-LS-R04	□	6.0	0.4	9	80	5.8
AL-SEES3060-LS-R05	●	6.0	0.5	9	80	5.8
AL-SEES3060-LS-R08	□	6.0	0.8	9	80	5.8
AL-SEES3060-LS-R10	●	6.0	1.0	9	80	5.8
AL-SEES3060-LS-R12	□	6.0	1.2	9	80	5.8
AL-SEES3060-LS-R16	□	6.0	1.6	9	80	5.8
AL-SEES3080-LS-R04	□	8.0	0.4	12	100	7.8
AL-SEES3080-LS-R05	●	8.0	0.5	12	100	7.8
AL-SEES3080-LS-R08	□	8.0	0.8	12	100	7.8
AL-SEES3080-LS-R10	●	8.0	1.0	12	100	7.8
AL-SEES3080-LS-R12	□	8.0	1.2	12	100	7.8
AL-SEES3080-LS-R15	●	8.0	1.5	12	100	7.8
AL-SEES3080-LS-R16	□	8.0	1.6	12	100	7.8
AL-SEES3100-LS-R04	□	10.0	0.4	15	130	9.8
AL-SEES3100-LS-R05	●	10.0	0.5	15	130	9.8
AL-SEES3100-LS-R08	□	10.0	0.8	15	130	9.8
AL-SEES3100-LS-R10	●	10.0	1.0	15	130	9.8
AL-SEES3100-LS-R12	□	10.0	1.2	15	130	9.8
AL-SEES3100-LS-R15	●	10.0	1.5	15	130	9.8
AL-SEES3100-LS-R16	□	10.0	1.6	15	130	9.8
AL-SEES3100-LS-R20	●	10.0	2.0	15	130	9.8
AL-SEES3100-LS-R32	□	10.0	3.2	15	130	9.8
AL-SEES3120-LS-R04	□	12.0	0.4	18	150	11
AL-SEES3120-LS-R05	●	12.0	0.5	18	150	11
AL-SEES3120-LS-R08	□	12.0	0.8	18	150	11
AL-SEES3120-LS-R10	●	12.0	1.0	18	150	11
AL-SEES3120-LS-R12	□	12.0	1.2	18	150	11
AL-SEES3120-LS-R15	●	12.0	1.5	18	150	11
AL-SEES3120-LS-R16	□	12.0	1.6	18	150	11
AL-SEES3120-LS-R20	●	12.0	2.0	18	150	11
AL-SEES3120-LS-R25	●	12.0	2.5	18	150	11
AL-SEES3120-LS-R30	●	12.0	3.0	18	150	11
AL-SEES3120-LS-R32	□	12.0	3.2	18	150	11
AL-SEES3140-LS-R04	□	14.0	0.4	21	160	13
AL-SEES3140-LS-R05	●	14.0	0.5	21	160	13
AL-SEES3140-LS-R08	□	14.0	0.8	21	160	13
AL-SEES3140-LS-R10	●	14.0	1.0	21	160	13
AL-SEES3140-LS-R12	□	14.0	1.2	21	160	13
AL-SEES3140-LS-R15	●	14.0	1.5	21	160	13
AL-SEES3140-LS-R16	□	14.0	1.6	21	160	13
AL-SEES3140-LS-R20	●	14.0	2.0	21	160	13
AL-SEES3140-LS-R25	●	14.0	2.5	21	160	13
AL-SEES3140-LS-R30	●	14.0	3.0	21	160	13
AL-SEES3140-LS-R32	□	14.0	3.2	21	160	13

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-SEES3160-LS-R04	□	16.0	0.4	24	180	15
AL-SEES3160-LS-R05	●	16.0	0.5	24	180	15
AL-SEES3160-LS-R08	□	16.0	0.8	24	180	15
AL-SEES3160-LS-R10	●	16.0	1.0	24	180	15
AL-SEES3160-LS-R12	□	16.0	1.2	24	180	15
AL-SEES3160-LS-R15	●	16.0	1.5	24	180	15
AL-SEES3160-LS-R16	□	16.0	1.6	24	180	15
AL-SEES3160-LS-R20	●	16.0	2.0	24	180	15
AL-SEES3160-LS-R25	●	16.0	2.5	24	180	15
AL-SEES3160-LS-R30	●	16.0	3.0	24	180	15
AL-SEES3160-LS-R32	□	16.0	3.2	24	180	15
AL-SEES3160-LS-R35	●	16.0	3.5	24	180	15
AL-SEES3160-LS-R40	●	16.0	4.0	24	180	15
AL-SEES3180-LS-R05	●	18.0	0.5	27	180	17
AL-SEES3180-LS-R10	●	18.0	1.0	27	180	17
AL-SEES3180-LS-R15	●	18.0	1.5	27	180	17
AL-SEES3180-LS-R20	●	18.0	2.0	27	180	17
AL-SEES3180-LS-R25	●	18.0	2.5	27	180	17
AL-SEES3180-LS-R30	●	18.0	3.0	27	180	17
AL-SEES3180-LS-R35	●	18.0	3.5	27	180	17
AL-SEES3180-LS-R40	●	18.0	4.0	27	180	17
AL-SEES3200-LS-R04	□	20.0	0.4	30	200	18
AL-SEES3200-LS-R05	●	20.0	0.5	30	200	18
AL-SEES3200-LS-R08	□	20.0	0.8	30	200	18
AL-SEES3200-LS-R10	●	20.0	1.0	30	200	18
AL-SEES3200-LS-R12	□	20.0	1.2	30	200	18
AL-SEES3200-LS-R15	●	20.0	1.5	30	200	18
AL-SEES3200-LS-R16	□	20.0	1.6	30	200	18
AL-SEES3200-LS-R20	●	20.0	2.0	30	200	18
AL-SEES3200-LS-R25	●	20.0	2.5	30	200	18
AL-SEES3200-LS-R30	●	20.0	3.0	30	200	18
AL-SEES3200-LS-R32	□	20.0	3.2	30	200	18
AL-SEES3200-LS-R35	●	20.0	3.5	30	200	18
AL-SEES3200-LS-R40	●	20.0	4.0	30	200	18
AL-SEES3200-LS-R50	●	20.0	5.0	30	200	18
AL-SEES3220-LS-R05	●	22.0	0.5	33	200	20
AL-SEES3220-LS-R10	●	22.0	1.0	33	200	20
AL-SEES3220-LS-R15	●	22.0	1.5	33	200	20
AL-SEES3220-LS-R20	●	22.0	2.0	33	200	20
AL-SEES3220-LS-R25	●	22.0	2.5	33	200	20
AL-SEES3220-LS-R30	●	22.0	3.0	33	200	20
AL-SEES3220-LS-R35	●	22.0	3.5	33	200	20
AL-SEES3220-LS-R40	●	22.0	4.0	33	200	20
AL-SEES3220-LS-R50	●	22.0	5.0	33	200	20

● Stocked standard □ Inquire regarding delivery

Solid Carbide Radius End Mills for Aluminum

METRIC

Recommended Cutting Data for AL-SEES3-R & AL-SEES3-LS-R

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$		 $a_p=1.5D$ $a_e=0.3D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	12,000	3,600	10,000	3,000	12,000	3,600	8,500	2,500
8	9,000	3,600	8,000	3,000	9,000	3,600	6,500	2,500
10	7,300	3,600	6,000	3,000	7,300	3,600	5,000	2,500
12	6,000	3,600	5,000	3,000	6,000	3,600	4,000	2,400
16	4,500	3,000	4,000	2,600	4,500	3,000	3,000	2,000
20	3,600	2,500	3,000	2,100	3,600	2,500	2,500	1,700

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$		 $a_p=D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	10,000	2,000	9,000	1,800	10,000	2,000	7,400	1,500
8	8,000	2,000	7,000	1,800	8,000	2,000	5,500	1,500
10	6,000	2,000	5,500	1,800	6,000	2,000	4,500	1,500
12	5,000	2,000	4,500	1,800	5,000	2,000	3,700	1,500
16	4,000	2,000	3,300	1,800	4,000	2,000	2,700	1,500
20	3,000	1,800	2,700	1,600	3,000	1,800	2,200	1,300

Additional Cutting Data for longer tools

L/D	Tool Diameter			
	n (min ⁻¹)	Vf (mm/min)	a_p	a_e
Up to 4D	0%	0%	1.5D	0.3D
5 ~ 6D	25%	30%	1.2D	0.1D
7 ~ 8D	40%	50%	1.0D	0.05D

- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.



METRIC

Solid Carbide Radius End Mills for Aluminum

High Speed Cutting Data for AL-SEES3-R & AL-SEES3-LS-R

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting		Type of Machining - Shoulder Cutting	
	 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$		 $a_p=1.5D$ $a_e=0.2D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	27,000	4,500	22,000	3,700	27,000	4,500	18,000	3,000
8	20,000	7,400	17,000	6,200	20,000	7,400	14,000	5,000
10	16,000	7,400	13,000	6,200	16,000	7,400	11,000	5,000
12	13,000	6,500	11,000	5,500	13,000	6,500	9,000	4,500
16	10,000	5,500	8,500	4,600	10,000	5,500	7,000	3,800
20	8,000	4,800	7,000	4,200	8,000	4,800	5,500	3,300

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)		Copper Alloy (C1100)	
	Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting		Type of Machining - Slotting	
	 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$		 $a_p=0.5D$ $a_e=D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	23,000	3,900	20,000	3,400	23,000	3,900	16,000	2,700
8	18,000	4,800	15,000	4,000	18,000	4,800	12,000	3,200
10	14,000	5,000	12,000	4,400	14,000	5,000	9,500	3,500
12	12,000	4,800	10,000	4,000	12,000	4,800	8,000	3,200
16	9,000	4,000	8,000	3,600	9,000	4,000	6,000	2,700
20	7,000	3,500	6,000	3,000	7,000	3,500	4,800	2,400

Additional Cutting Data for longer tools

L/D	Tool Diameter			
	n (min ⁻¹)	Vf (mm/min)	ap	ae
Up to 4D	0%	0%	1.5D	0.3D
5 ~ 6D	25%	30%	1.2D	0.1D
7 ~ 8D	40%	50%	1.0D	0.05D

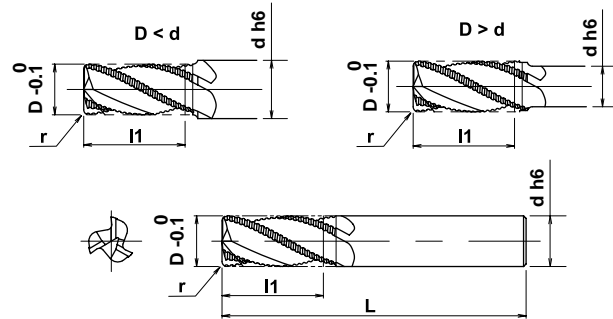
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. In case of ramping, recommend reducing the above data by 30-60%.

Solid Carbide Radius End Mills for Aluminum

METRIC

AL-OCRS-R Type

- 3 Flute with 30° Helix and corner radius



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-OCRS3060-R10	□	6.0	1.0	13	55	6
AL-OCRS3080-R10	□	8.0	1.0	17	65	8
AL-OCRS3100-R10	□	10.0	1.0	20	75	10
AL-OCRS3100-R20	□	10.0	2.0	20	75	10
AL-OCRS3120-R10	□	12.0	1.0	25	80	12
AL-OCRS3120-R20	□	12.0	2.0	25	80	12
AL-OCRS3140-R10	□	14.0	1.0	28	95	12
AL-OCRS3140-R20	□	14.0	2.0	28	95	12
AL-OCRS3160-R10	□	16.0	1.0	34	95	16
AL-OCRS3160-R20	□	16.0	2.0	34	95	16
AL-OCRS3160-R30	□	16.0	3.0	34	95	16
AL-OCRS3180-R10	□	18.0	1.0	37	115	16
AL-OCRS3180-R20	□	18.0	2.0	37	115	16
AL-OCRS3180-R30	□	18.0	3.0	37	115	16
AL-OCRS3200-R10	□	20.0	1.0	40	115	20
AL-OCRS3200-R20	□	20.0	2.0	40	115	20
AL-OCRS3200-R30	□	20.0	3.0	40	115	20
AL-OCRS3250-R30	□	25.0	3.0	51	130	25
AL-OCRS3250-R40	□	25.0	4.0	51	130	25
AL-OCRS3250-R50	□	25.0	5.0	51	130	25

Recommended Cutting Data

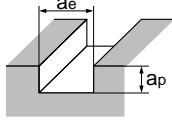
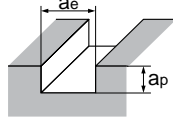
Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)	
	 $a_p \leq 1.5D$ $a_e \leq 0.25D$		 $a_p \leq 1.5D$ $a_e \leq 0.25D$		 $a_p \leq 1.5D$ $a_e \leq 0.25D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	27,000	6,100	27,000	6,100	13,000	2,300
8	20,000	6,000	20,000	6,000	10,000	2,300
10	16,000	5,800	16,000	5,800	8,000	2,300
12	13,000	5,300	13,000	5,300	6,500	2,100
14	11,000	5,200	11,000	5,200	5,700	2,000
16	10,000	5,100	10,000	5,100	5,000	2,000
18	9,000	4,900	9,000	4,900	4,400	1,900
20	8,000	4,800	8,000	4,800	4,000	1,900
25	6,400	4,600	6,400	4,600	3,200	1,800



METRIC

Solid Carbide Radius End Mills for Aluminum

Recommended Cutting Data for AL-OCRS-R

Material	Aluminum Alloy (A5052)		Aluminum Alloy (A7075)		Cast Aluminum Alloy (Up to 13% Si)	
Type of Machining - Slotting	 $a_e \leq D$ $a_p = D$		 $a_e \leq D$ $a_p = D$		 $a_e \leq D$ $a_p = D$	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
6	16,000	2,400	16,000	2,400	8,000	1,000
8	12,000	2,500	12,000	2,500	6,000	1,000
10	9,500	2,600	9,500	2,600	5,000	1,000
12	8,000	2,100	8,000	2,100	4,000	900
14	6,800	1,600	6,800	1,600	3,400	700
16 (R1, R2)	6,000	1,600	6,000	1,600	3,000	700
16 (R3)	6,000	1,100	6,000	1,100	3,000	540
18 (R1, R2)	5,300	1,500	5,300	1,500	2,700	650
18 (R3)	5,300	950	5,300	950	2,700	500
20 (R1, R2)	4,700	1,300	4,700	1,300	2,400	550
20 (R3)	4,700	840	4,700	840	2,400	430
25	3,800	680	3,800	680	1,900	340

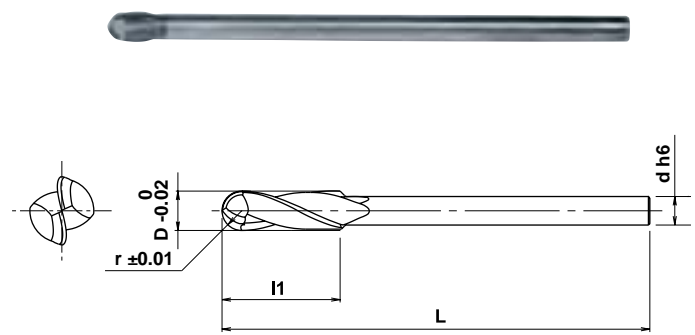
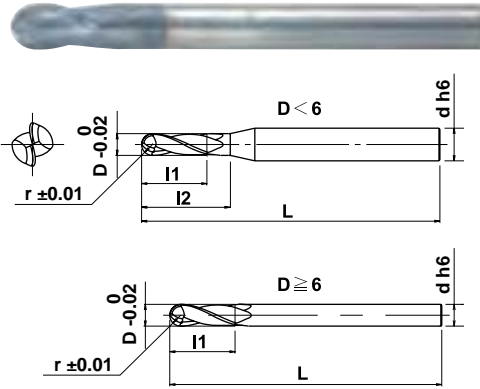
- Notes:**
1. Use water soluble oil.
 2. Use caution when handling, tools are extremely sharp.
 3. Figures should be adjusted according to machining shape, rigidity of machine and work clamping.
 4. If machine does not have enough spindle speed, reduce the feed speed to the same ratio as above.
 5. If peripheral machining with a small depth (ae), reduce the speed and feed to the same ratio.

Solid Carbide Ball Nose End Mills

METRIC

DZ-OCSB & DZ-OCUB Type

- 2 Flute with 30° Helix



DZ-OCSB

CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
DZ-OCSB2010	•	1.0	0.5	1.5	3	50	4
DZ-OCSB2010-2.5T	•	1.0	0.5	2.5	4.5	50	4
DZ-OCSB2012	•	1.2	0.6	1.8	3.5	50	4
DZ-OCSB2014	•	1.4	0.7	2.1	4	50	4
DZ-OCSB2015	•	1.5	0.75	2.25	4.5	50	4
DZ-OCSB2016	•	1.6	0.8	2.4	4.5	50	4
DZ-OCSB2018	•	1.8	0.9	2.7	5	50	4
DZ-OCSB2020	•	2.0	1.0	3	5.5	50	6
DZ-OCSB2020-5T	•	2.0	1.0	5	7	50	6
DZ-OCSB2025	•	2.5	1.25	3.75	6.5	50	6
DZ-OCSB2030	•	3.0	1.5	4.5	8	60	6
DZ-OCSB2030-8T	•	3.0	1.5	8	10	60	6
DZ-OCSB2035	•	3.5	1.75	5.25	9.5	60	6
DZ-OCSB2040S4	•	4.0	2.0	6	-	70	4
DZ-OCSB2040	•	4.0	2.0	6	10.5	70	6
DZ-OCSB2040-8T	•	4.0	2.0	8	10	70	6
DZ-OCSB2050	•	5.0	2.5	7.5	12.5	80	6
DZ-OCSB2050-10T	•	5.0	2.5	10	12	80	6
DZ-OCSB2060	•	6.0	3.0	9	-	90	6
DZ-OCSB2060-12T	•	6.0	3.0	12	-	90	6
DZ-OCSB2060-L120	•	6.0	3.0	9	-	120	6
DZ-OCSB2080	•	8.0	4.0	12	-	100	8
DZ-OCSB2080-14T	•	8.0	4.0	14	-	100	8
DZ-OCSB2080-L120	•	8.0	4.0	12	-	120	8
DZ-OCSB2100	•	10.0	5.0	15	-	100	10
DZ-OCSB2100-18T	•	10.0	5.0	18	-	100	10
DZ-OCSB2100-L140	•	10.0	5.0	15	-	140	10
DZ-OCSB2120	•	12.0	6.0	18	-	110	12
DZ-OCSB2120-22T	•	12.0	6.0	22	-	110	12
DZ-OCSB2120-L140	•	12.0	6.0	18	-	140	12
DZ-OCSB2160-30T-L140	•	16.0	8.0	30	-	140	16
DZ-OCSB2160-L140	•	16.0	8.0	24	-	140	16
DZ-OCSB2160	•	16.0	8.0	24	-	160	16
DZ-OCSB2160-L180	•	16.0	8.0	24	-	180	16
DZ-OCSB2200-L140	•	20.0	10.0	30	-	140	20
DZ-OCSB2200-L160	•	20.0	10.0	30	-	160	20
DZ-OCSB2200	•	20.0	10.0	30	-	180	20
DZ-OCSB2250	•	25.0	12.5	38	-	180	25

DZ-OCUB

CATALOG NUMBER	STK	DIMENSIONS				
		D	R	I1	L	d
DZ-OCUB2060	•	6.0	3.0	9	120	5
DZ-OCUB2060-S5.8	•	6.0	3.0	9	120	5.8
DZ-OCUB2070	•	7.0	3.5	10.5	120	6
DZ-OCUB2080	•	8.0	4.0	12	120	7
DZ-OCUB2080-S7.8	•	8.0	4.0	12	120	7.8
DZ-OCUB2090	•	9.0	4.5	13.5	120	8
DZ-OCUB2100	•	10.0	5.0	15	140	9
DZ-OCUB2110	•	11.0	5.5	16.5	140	10
DZ-OCUB2120	•	12.0	6.0	18	140	11
DZ-OCUB2140	•	14.0	7.0	21	160	12
DZ-OCUB2160	•	16.0	8.0	24	180	15
DZ-OCUB2200	•	20.0	10.0	30	180	18

**METRIC**

Solid Carbide Ball Nose End Mills

Recommended Cutting Data for DZ-OCSB & DZ-OCUB

Material	Carbon Steel S55C (180~280HB)		Alloy Steel SKD SNCR (180~280HB)		Mold Steel NAK55 NAK80 (35~45HRC)		Tool Steel SKD SNCR (300HB)	
Type of Machining								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	43,000	2,000	38,000	1,900	32,000	1,600	38,000	1,900
2	21,500	1,700	19,000	1,520	16,000	1,280	19,000	1,520
3	14,000	1,400	12,500	1,250	11,000	1,100	12,500	1,250
4	11,000	1,390	9,500	950	8,300	870	9,500	960
6	7,100	1,350	6,300	740	5,500	690	6,300	740
8	5,300	1,350	4,700	740	4,100	570	4,700	740
10	4,400	1,320	3,800	750	3,300	560	3,800	750
12	3,500	1,180	3,100	710	2,750	550	3,100	720
14	3,000	1,100	2,600	680	2,300	530	2,600	680
16	2,600	1,100	2,300	680	2,050	530	2,300	680
20	2,100	1,050	1,900	690	1,650	520	1,900	690
25	1,700	1,000	1,500	670	1,320	520	1,500	670

Material	Hardened Steel SKD SKT (45~60HRC)		Stainless Steel SUS420J2 (270HB)		Gray Cast Iron FC250 (350N/mm ²)		Ductile Iron FCD450 FCD550 (550N/mm ²)	
Type of Machining								
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	22,500	670	34,500	1,700	50,000	4,000	44,500	3,500
2	11,200	560	17,200	1,370	33,000	4,000	22,000	2,600
3	7,500	380	11,500	1,150	22,000	3,500	15,000	2,300
4	5,600	290	8,600	860	16,500	2,060	11,000	1,400
6	3,750	230	5,700	680	11,000	2,060	7,500	1,400
8	2,800	200	4,300	680	8,200	2,060	5,500	1,400
10	2,250	200	3,450	680	6,600	2,000	4,500	1,330
12	1,900	200	2,900	670	5,500	1,860	3,700	1,260
14	1,600	180	2,500	650	4,800	1,720	2,200	1,160
16	1,400	180	2,150	650	4,100	1,720	2,800	1,160
20	1,100	160	1,700	630	3,300	1,650	2,300	1,120
25	900	180	1,400	630	2,600	1,630	1,800	1,120

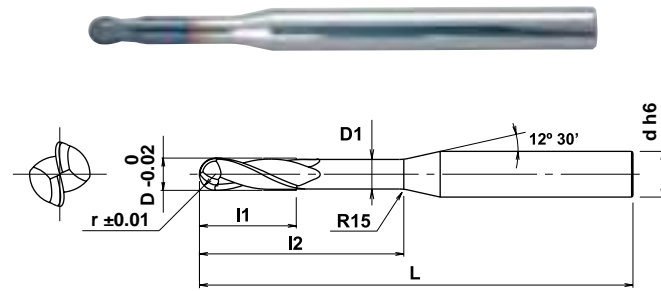
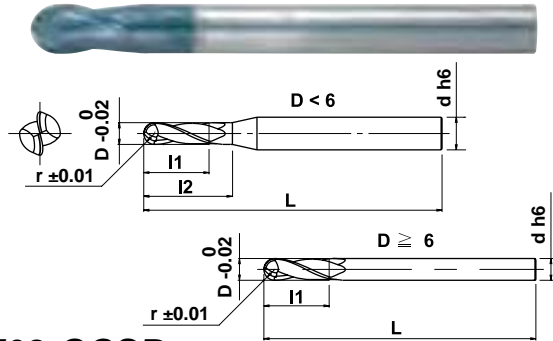
Note: Figures to be adjusted according to machine rigidity or work rigidity.

Solid Carbide Ball Nose End Mills

METRIC

DZ03-OCSB, DZ03-OCSB-LN & DZ03-OCUB Type

- 2 Flute with 30° Helix

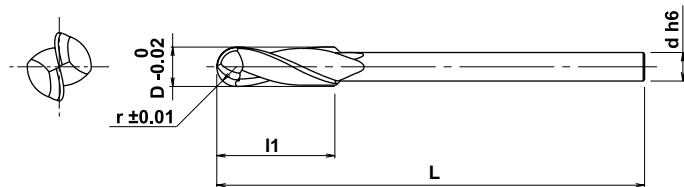


DZ03-OCSB

CATALOG NUMBER	STK	DIMENSIONS					
		D	R	I1	I2	L	d
DZ03-OCSB2010	•	1.0	0.5	1.5	3	50	4
DZ03-OCSB2015	•	1.5	0.75	2.25	4.5	50	4
DZ03-OCSB2020	•	2.0	1.0	3	5.5	50	6
DZ03-OCSB2025	•	2.5	1.25	3.75	6.5	50	6
DZ03-OCSB2030	•	3.0	1.5	4.5	8	60	6
DZ03-OCSB2040S4	•	4.0	2.0	6	-	70	4
DZ03-OCSB2040	•	4.0	2.0	6	10.5	70	6
DZ03-OCSB2050	•	5.0	2.5	7.5	12.5	80	6
DZ03-OCSB2060	•	6.0	3.0	9	-	90	6
DZ03-OCSB2060-L120	•	6.0	3.0	9	-	120	6
DZ03-OCSB2080	•	8.0	4.0	12	-	100	8
DZ03-OCSB2080-L120	•	8.0	4.0	12	-	120	8
DZ03-OCSB2100	•	10.0	5.0	15	-	100	10
DZ03-OCSB2100-L140	•	10.0	5.0	15	-	140	10
DZ03-OCSB2120	•	12.0	6.0	18	-	110	12
DZ03-OCSB2120-L140	•	12.0	6.0	18	-	140	12
DZ03-OCSB2160-L140	•	16.0	8.0	24	-	140	16
DZ03-OCSB2160	•	16.0	8.0	24	-	160	16
DZ03-OCSB2160-L180	•	16.0	8.0	24	-	180	16
DZ03-OCSB2200-L140	•	20.0	10.0	30	-	140	20
DZ03-OCSB2200-L160	•	20.0	10.0	30	-	160	20
DZ03-OCSB2200	•	20.0	10.0	30	-	180	20

DZ03-OCSB-LN (long neck)

CATALOG NUMBER	STK	DIMENSIONS							
		D	R	I1	I2	L	D1	d	
DZ03-OCSB2010-6LN	•	1.0	0.5	1	6	60	0.95	4	
DZ03-OCSB2010-11LN	•	1.0	0.5	1	11	60	0.95	4	
DZ03-OCSB2010-17LN	•	1.0	0.5	1	17	60	0.95	4	
DZ03-OCSB2010-21LN	•	1.0	0.5	1	21	60	0.95	4	
DZ03-OCSB2015-6LN	•	1.5	0.75	1.5	6	60	1.45	4	
DZ03-OCSB2015-11LN	•	1.5	0.75	1.5	11	60	1.45	4	
DZ03-OCSB2015-17LN	•	1.5	0.75	1.5	17	60	1.45	4	
DZ03-OCSB2020S4-6LN	•	2.0	1.0	2	6	60	1.95	4	
DZ03-OCSB2020S4-9LN	•	2.0	1.0	2	9	60	1.95	4	
DZ03-OCSB2020-9LN	•	2.0	1.0	2	9	60	1.95	6	
DZ03-OCSB2020S4-11LN	•	2.0	1.0	2	11	60	1.95	4	
DZ03-OCSB2020-11LN	•	2.0	1.0	2	11	60	1.95	6	
DZ03-OCSB2020S4-17LN	•	2.0	1.0	2	17	60	1.95	4	
DZ03-OCSB2020-17LN	•	2.0	1.0	2	17	60	1.95	6	
DZ03-OCSB2020S4-21LN	•	2.0	1.0	2	21	60	1.95	4	
DZ03-OCSB2020-21LN	•	2.0	1.0	2	21	60	1.95	6	
DZ03-OCSB2025S4-11LN	•	2.5	1.25	2.5	11	60	2.45	4	
DZ03-OCSB2025S4-17LN	•	2.5	1.25	2.5	17	60	2.45	4	
DZ03-OCSB2025S4-21LN	•	2.5	1.25	2.5	21	60	2.45	4	
DZ03-OCSB2030-9LN	•	3.0	1.5	3	9	60	2.95	6	
DZ03-OCSB2030-17LN	•	3.0	1.5	3	17	60	2.95	6	
DZ03-OCSB2030-21LN	•	3.0	1.5	3	21	60	2.95	6	
DZ03-OCSB2040-13LN	•	4.0	2.0	4	13	70	3.95	6	
DZ03-OCSB2040-17LN	•	4.0	2.0	4	17	70	3.95	6	
DZ03-OCSB2040-21LN	•	4.0	2.0	4	21	70	3.95	6	



DZ03-OCUB (undersized)

CATALOG NUMBER	STK	DIMENSIONS				
		D	R	I1	L	d
DZ03-OCUB2060	•	6.0	3.0	9	120	5
DZ03-OCUB2070	•	7.0	3.5	10.5	120	6
DZ03-OCUB2080	•	8.0	4.0	12	120	7
DZ03-OCUB2090	•	9.0	4.5	13.5	120	8
DZ03-OCUB2100	•	10.0	5.0	15	140	9

CATALOG NUMBER	STK	DIMENSIONS				
		D	R	I1	L	d
DZ03-OCUB2110	•	11.0	5.5	16.5	140	10
DZ03-OCUB2120	•	12.0	6.0	18	140	11
DZ03-OCUB2160	•	16.0	8.0	24	180	15
DZ03-OCUB2200	•	20.0	10.0	30	180	18



METRIC

Solid Carbide Ball Nose End Mills

Recommended Cutting Data for DZ03-OCSB, DZ03-OCSB-LN & DZ03-OCUB

Material	Carbon Steel C55, S55C (180~280HB)		Tool & Die Steel 1.2344, 1.2379, SKD SNCM (below 300HB)		Mold Steel 1.2311, P20, NAK55 NAK80 (35~45HRC)		Stainless Steel 1.4301, 1.4401, SUS420J2 (below 270HB)	
Type of Machining	<p>$a_p = 0.3D$ $a_e = 0.5D$</p>		<p>$a_p = 0.3D$ $a_e = 0.5D$</p>		<p>$a_p = 0.3D$ $a_e = 0.5D$</p>		<p>$a_p = 0.3D$ $a_e = 0.5D$</p>	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	50,000	2,500	45,000	2,200	38,000	1,900	38,000	1,900
2	25,000	2,000	22,000	1,700	19,000	1,500	19,000	1,500
3	17,000	1,700	15,000	1,500	12,700	1,270	12,700	1,270
4	12,700	1,600	11,000	1,100	9,500	950	9,500	950
6	8,500	1,600	7,400	900	6,400	800	6,400	800
8	6,400	1,600	5,600	900	4,800	670	4,800	800
10	5,000	1,500	4,500	900	3,800	650	3,800	750
12	4,200	1,400	3,700	850	3,200	640	3,200	750
16	3,200	1,300	2,800	840	2,400	620	2,400	700
20	2,500	1,250	2,200	800	1,900	600	1,900	700
25	2,000	1,200	1,800	800	1,500	600	1,500	650

Material	Hardened Steel 1.2344, 1.2379, SKD, SKT (45~52HRC)		Hardened Steel 1.2344, 1.2379, SKD, SKT (55~60HRC)		Cast Iron GG25, FC250 (Tensile Strength 350N/mm ²)		Nodular Cast Iron GGG45, GGG55 FCD450 FCD550 (Tensile strength 550N/mm ²)	
Type of Machining	<p>$a_p = 0.3D$ $a_e = 0.5D$</p>		<p>$a_p = 0.3D$ $a_e = 0.5D$</p>		<p>$a_p = 0.3D$ $a_e = 0.5D$</p>		<p>$a_p = 0.3D$ $a_e = 0.5D$</p>	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	31,000	1,200	25,000	750	60,000	4,800	54,000	4,300
2	16,000	950	12,000	600	40,000	4,800	27,000	3,200
3	10,000	600	8,500	430	26,000	4,100	18,000	2,700
4	8,000	500	6,300	320	20,000	3,400	13,000	2,000
6	5,300	370	4,200	250	13,000	2,500	9,000	1,700
8	4,000	320	3,200	250	9,900	2,500	6,700	1,700
10	3,200	320	2,500	220	8,000	2,400	5,400	1,600
12	2,700	300	2,100	210	6,600	2,200	4,500	1,500
16	2,000	260	1,600	200	5,000	2,100	3,400	1,400
20	1,600	260	1,200	200	4,000	2,000	2,700	1,300
25	1,300	270	1,000	200	3,200	1,900	2,100	1,300

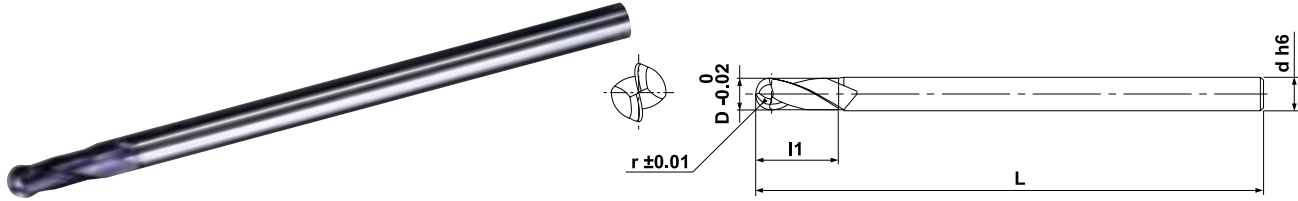
Note: Figures to be adjusted according to machine rigidity or work rigidity.

Solid Carbide Ball Nose End Mills

METRIC

DZ-OCLB-S Type

- 2 Flute with 30° Helix and extra long straight shank



CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-OCLB2040-12S120	•	4.0	2.0	12	120	4
DZ-OCLB2040-20S120	•	4.0	2.0	20	120	4
DZ-OCLB2060-18S160	•	6.0	3.0	18	160	6
DZ-OCLB2060-18S220	•	6.0	3.0	18	220	6
DZ-OCLB2060-22S160	•	6.0	3.0	22	160	6
DZ-OCLB2060-22S220	•	6.0	3.0	22	220	6
DZ-OCLB2080-22S160	•	8.0	4.0	22	160	8
DZ-OCLB2080-22S220	•	8.0	4.0	22	220	8
DZ-OCLB2100-25S160	•	10.0	5.0	25	160	10
DZ-OCLB2100-25S220	•	10.0	5.0	25	220	10
DZ-OCLB2100-35S160	•	10.0	5.0	35	160	10
DZ-OCLB2100-35S220	•	10.0	5.0	35	220	10
DZ-OCLB2120-35S160	•	12.0	6.0	35	160	12
DZ-OCLB2120-35S220	•	12.0	6.0	35	220	12
DZ-OCLB2120-45S220	•	12.0	6.0	45	220	12
DZ-OCLB2160-40S220	•	16.0	8.0	40	220	16
DZ-OCLB2160-40S280	•	16.0	8.0	40	280	16
DZ-OCLB2160-50S280	•	16.0	8.0	50	280	16
DZ-OCLB2200-40S220	•	20.0	10.0	40	220	20
DZ-OCLB2200-50S280	•	20.0	10.0	50	280	20
DZ-OCLB2250-50S220	•	25.0	12.5	50	220	25
DZ-OCLB2250-50S280	•	25.0	12.5	50	280	25
DZ-OCLB2250-70S280	•	25.0	12.5	70	280	25

Recommended Cutting Data

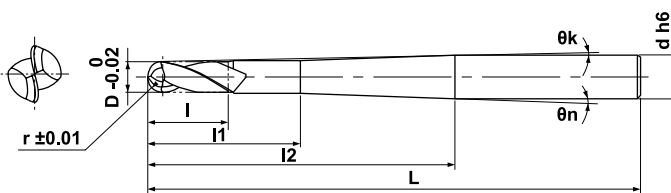
Material	Carbon Steel		Alloy Steel		Mold Steel (~45HRC)	
Type of Machining						
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
4	8,800	1,300	7,200	1,080	4,800	480
6	5,800	1,600	4,800	1,350	3,200	580
8	4,400	1,320	3,600	1,080	2,400	530
10	3,500	1,230	2,900	1,010	1,900	500
12	2,900	1,160	2,400	960	1,600	480
16	2,200	990	1,800	810	1,200	410
20	1,750	790	1,400	630	950	320
25	1,400	630	1,100	500	750	260

**METRIC**

Solid Carbide Ball Nose End Mills

DZ-OCLB-T Type

- 2 Flute with 30° Helix and extra long taper shank



CATALOG NUMBER	STK	DIMENSIONS								
		D	r	l	l1	l2	θn	θk	L	d
DZ-OCLB2040-10T160	•	4.0	2.0	10	20	85	2°39'	2°5'	160	10
DZ-OCLB2040-10T220	•	4.0	2.0	10	20	120	1°43'	1°28'	220	10
DZ-OCLB2040-10T280	•	4.0	2.0	10	20	150	1°19'	1°10'	280	10
DZ-OCLB2040-16T160	•	4.0	2.0	16	35	100	2°39'	1°46'	160	10
DZ-OCLB2040-16T220	•	4.0	2.0	16	35	120	2°1'	1°28'	220	10
DZ-OCLB2040-16T280	•	4.0	2.0	16	35	150	1°30'	1°10'	280	10
DZ-OCLB2060-17T160	•	6.0	3.0	17	30	90	2°52'	1°59'	160	12
DZ-OCLB2060-17T160A	•	6.0	3.0	17	25	90	2°39'	1°59'	160	12
DZ-OCLB2060-17T220	•	6.0	3.0	17	30	120	1°55'	1°29'	220	12
DZ-OCLB2060-17T280	•	6.0	3.0	17	30	150	1°26'	1°11'	280	12
DZ-OCLB2060-22T160	•	6.0	3.0	22	38	100	2°46'	1°47'	160	12
DZ-OCLB2060-22T220	•	6.0	3.0	22	38	120	2°6'	1°29'	220	12
DZ-OCLB2060-22T280	•	6.0	3.0	22	38	150	1°32'	1°11'	280	12
DZ-OCLB2080-20T160	•	8.0	4.0	20	30	90	1°55'	1°20'	160	12
DZ-OCLB2080-20T220	•	8.0	4.0	20	30	120	1°16'	1°	220	12
DZ-OCLB2080-20T280	•	8.0	4.0	20	30	150	0°57'	0°48'	280	12
DZ-OCLB2080-24T160	•	8.0	4.0	24	38	100	1°51'	1°12'	160	12
DZ-OCLB2080-24T220	•	8.0	4.0	24	38	120	1°24'	1°	220	12
DZ-OCLB2080-24T280	•	8.0	4.0	24	38	150	1°1'	0°48'	280	12
DZ-OCLB2100-25T160	•	10.0	5.0	25	35	90	3°7'	2°2'	160	16
DZ-OCLB2100-25T220	•	10.0	5.0	25	35	120	2°1'	1°30'	220	16
DZ-OCLB2100-25T220A	•	10.0	5.0	25	35	150	1°30'	1°12'	220	16
DZ-OCLB2100-25T280	•	10.0	5.0	25	35	150	1°30'	1°12'	280	16
DZ-OCLB2100-33T160	•	10.0	5.0	33	38	100	2°46'	1°50'	160	16
DZ-OCLB2100-33T220	•	10.0	5.0	33	38	120	2°6'	1°30'	220	16
DZ-OCLB2100-33T280	•	10.0	5.0	33	38	150	1°32'	1°12'	280	16
DZ-OCLB2120-30T160	•	12.0	6.0	30	38	90	2°12'	1°22'	160	16
DZ-OCLB2120-30T220	•	12.0	6.0	30	38	120	1°24'	1°1'	220	16
DZ-OCLB2120-33T160	•	12.0	6.0	33	38	100	1°51'	1°14'	160	16
DZ-OCLB2120-33T220	•	12.0	6.0	33	38	120	1°24'	1°1'	220	16
DZ-OCLB2120-33T280	•	12.0	6.0	33	38	150	1°1'	0°48'	280	16

Recommended Cutting Data

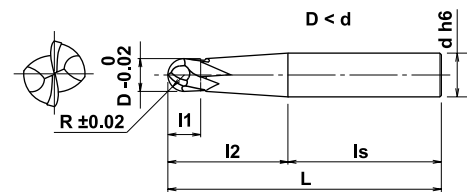
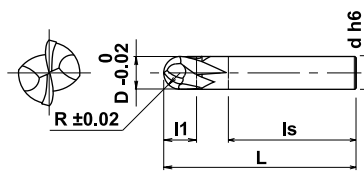
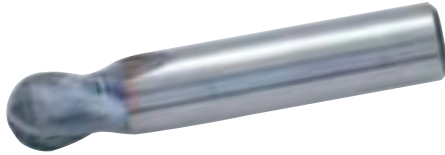
Material	Carbon Steel		Alloy Steel		Mold Steel (~45HRC)	
Type of Machining						
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
4	8,800	1,300	7,200	1,080	4,800	480
6	5,800	1,600	4,800	1,350	3,200	580
8	4,400	1,320	3,600	1,080	2,400	530
10	3,500	1,230	2,900	1,010	1,900	500
12	2,900	1,160	2,400	960	1,600	480

Solid Carbide Ball Nose End Mills

METRIC

DZ-SSB Type

- 2 Flute with 30° Helix super short length



CATALOG NUMBER	STK	DIMENSIONS						
		D	r	l1	l2	ls	L	d
DZ-SSB2030S025	•	3.0	1.5	3	-	19	25	3
DZ-SSB2030S045	•	3.0	1.5	3	-	36	45	3
DZ-SSB2030T040-6	•	3.0	1.5	3	12	28	40	6
DZ-SSB2030T045-6	•	3.0	1.5	3	17	28	45	6
DZ-SSB2040S030	•	4.0	2.0	4	-	23	30	4
DZ-SSB2040S040	•	4.0	2.0	4	-	30	40	4
DZ-SSB2040S050	•	4.0	2.0	4	-	40	50	4
DZ-SSB2040T040-6	•	4.0	2.0	4	12	28	40	6
DZ-SSB2040T050-6	•	4.0	2.0	4	22	28	50	6
DZ-SSB2050T040-6	•	5.0	2.5	5	12	28	40	6
DZ-SSB2050T050-6	•	5.0	2.5	5	22	28	50	6
DZ-SSB2050T060-6	•	5.0	2.5	5	32	28	60	6
DZ-SSB2060S040	•	6.0	3.0	6	-	28	40	6
DZ-SSB2060S050	•	6.0	3.0	6	-	38	50	6
DZ-SSB2060S060	•	6.0	3.0	6	-	48	60	6
DZ-SSB2080S050	•	8.0	4.0	8	-	36	50	8
DZ-SSB2080S070	•	8.0	4.0	8	-	56	70	8
DZ-SSB2080S090	•	8.0	4.0	8	-	76	90	8
DZ-SSB2100S060	•	10.0	5.0	10	-	44	60	10
DZ-SSB2100S080	•	10.0	5.0	10	-	64	80	10
DZ-SSB2100S100	•	10.0	5.0	10	-	84	100	10
DZ-SSB2110T065-12	•	11.0	5.5	11	24	41	65	12
DZ-SSB2120S065	•	12.0	6.0	12	-	47	65	12
DZ-SSB2120S085	•	12.0	6.0	12	-	67	85	12
DZ-SSB2120S110	•	12.0	6.0	12	-	92	110	12

Recommended Cutting Data

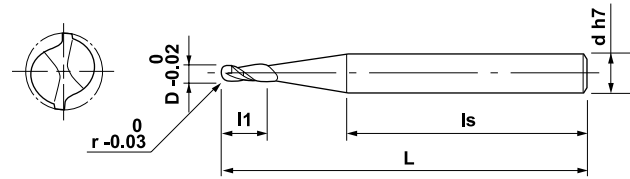
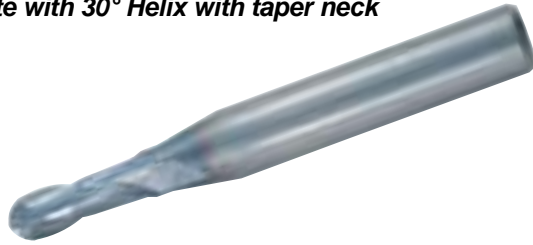
Material	Carbon Steel		Die Steel		Mold Steel (~45HRC)	
Type of Machining						
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
3	11,700	110	9,500	90	6,400	55
4	8,800	150	7,200	120	4,800	75
5	7,000	170	5,700	140	3,800	85
6	5,800	230	4,800	190	3,200	110
7	5,000	230	4,100	190	2,700	110
8	4,400	350	3,600	290	2,400	170
10	3,500	420	2,900	340	1,900	210
12	2,900	480	2,400	390	1,600	240

**METRIC**

Solid Carbide Ball Nose End Mills

DZ-SCBE Type

- 2 Flute with 30° Helix with taper neck



CATALOG NUMBER	STK	DIMENSIONS					
		D	r	l1	ls	L	d
DZ-SCBE-2003	□	0.3	0.15	1	30.8	40	3
DZ-SCBE-2004	□	0.4	0.2	1	31.1	40	3
DZ-SCBE-2005	□	0.5	0.25	1	31.4	40	3
DZ-SCBE-2006	□	0.6	0.3	2	30.7	40	3
DZ-SCBE-2007	□	0.7	0.35	2	31	40	3
DZ-SCBE-2008	□	0.8	0.4	2.5	30.8	40	3
DZ-SCBE-2009	□	0.9	0.45	2.5	31.1	40	3
DZ-SCBE-2010	□	1.0	0.5	3	28	40	4
DZ-SCBE-2011	□	1.1	0.55	3	28.3	40	4
DZ-SCBE-2012	□	1.2	0.6	3	28.6	40	4
DZ-SCBE-2014	□	1.4	0.7	3	29.1	40	4
DZ-SCBE-2015	□	1.5	0.75	5	27.4	40	4
DZ-SCBE-2016	□	1.6	0.8	5	27.7	40	4
DZ-SCBE-2018	□	1.8	0.9	5	28.3	40	4
DZ-SCBE-2020	□	2.0	1.0	6	27.8	40	4
DZ-SCBE-2022	□	2.2	1.1	6	28.4	40	4
DZ-SCBE-2024	□	2.4	1.2	6	29	40	4
DZ-SCBE-2025	□	2.5	1.25	8	27.2	40	4
DZ-SCBE-2026	□	2.6	1.3	8	27.5	40	4
DZ-SCBE-2028	□	2.8	1.4	8	28.1	40	4
DZ-SCBE-2030	□	3.0	1.5	8	33.2	45	4
DZ-SCBE-2032	□	3.2	1.6	10	31.7	45	4
DZ-SCBE-2034	□	3.4	1.7	10	32.3	45	4
DZ-SCBE-2035	□	3.5	1.75	10	32.6	45	4
DZ-SCBE-2036	□	3.6	1.8	10	32.9	45	4
DZ-SCBE-2038	□	3.8	1.9	10	33.4	45	4
DZ-SCBE-2040	□	4.0	2.0	12	26.3	45	6

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

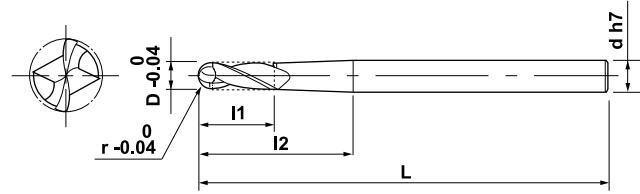
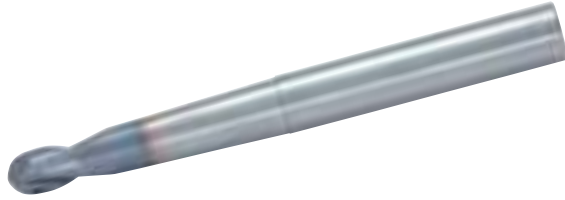
Material	Carbon Steel		Die Steel		Mold Steel (~45HRC)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
0.5	38,200	360	38,200	360	38,200	360
1	35,000	600	28,600	490	19,100	290
1.5	23,300	1,000	19,100	820	12,700	490
2	17,500	1,100	14,300	900	9,500	540
2.5	14,000	1,100	11,500	900	7,600	540
3	11,700	1,100	9,500	900	6,400	540
3.5	10,000	1,100	8,200	900	5,500	540
4	8,800	1,100	7,200	900	4,800	540

Solid Carbide Ball Nose End Mills

METRIC

DZ-SBEL-T Type

- 2 Flute with 30° Helix and taper neck



Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS					
		D	r	l1	l2	L	d
DZ-SBEL-R1.0-T	<input type="checkbox"/>	2.0	1.0	3	25	80	4
DZ-SBEL-R1.5-T	<input type="checkbox"/>	3.0	1.5	4	35	100	6
DZ-SBEL-R2.0-T	<input type="checkbox"/>	4.0	2.0	6	35	100	6
DZ-SBEL-R2.5-T	<input type="checkbox"/>	5.0	2.5	7	40	115	8
DZ-SBEL-R3.0-T	<input type="checkbox"/>	6.0	3.0	8	45	115	8
DZ-SBEL-R3.5-T	<input type="checkbox"/>	7.0	3.5	10	45	125	10
DZ-SBEL-R4.0-T	<input type="checkbox"/>	8.0	4.0	12	55	125	10
DZ-SBEL-R5.0-T	<input type="checkbox"/>	10.0	5.0	15	65	140	12
DZ-SBEL-R6.0-T	<input type="checkbox"/>	12.0	6.0	18	75	150	16
DZ-SBEL-R8.0-T	<input type="checkbox"/>	16.0	8.0	23	85	180	20
DZ-SBEL-R10.0-T	<input type="checkbox"/>	20.0	10.0	25	105	220	25

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

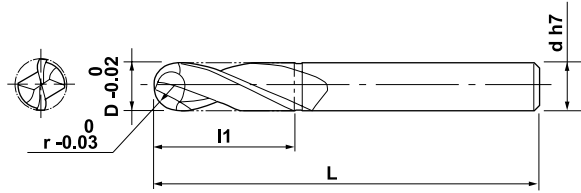
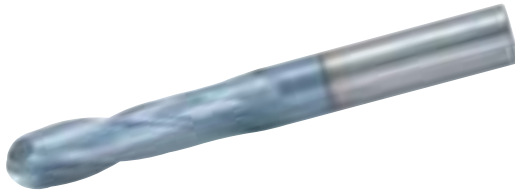
Material	Carbon Steel		Die Steel		Mold Steel (~45HRC)	
Type of Machining						
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
2	17,500	85	14,300	70	9,500	40
3	11,700	110	9,500	90	6,400	55
4	8,800	150	7,200	120	4,800	75
5	7,000	170	5,700	140	3,800	85
6	5,800	230	4,800	190	3,200	110
7	5,000	230	4,100	190	2,700	110
8	4,400	350	3,600	290	2,400	170
10	3,500	420	2,900	340	1,900	210
12	2,900	480	2,400	390	1,600	240
16	2,200	480	1,800	390	1,200	240
20	1,750	480	1,400	390	950	240

**METRIC**

Solid Carbide Ball Nose End Mills

DZ-SBEL Type

- 2 Flute with 30° Helix and long length of cut



CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
DZ-SBEL-R0.5	<input type="checkbox"/>	1.0	0.5	5	45	4
DZ-SBEL-R0.75	<input type="checkbox"/>	1.5	0.75	8	45	4
DZ-SBEL-R1.0	<input type="checkbox"/>	2.0	1.0	10	50	4
DZ-SBEL-R1.25	<input type="checkbox"/>	2.5	1.25	13	50	4
DZ-SBEL-R1.5	<input type="checkbox"/>	3.0	1.5	15	55	4
DZ-SBEL-R1.75	<input type="checkbox"/>	3.5	1.75	18	55	4
DZ-SBEL-R2.0	<input type="checkbox"/>	4.0	2.0	20	60	4
DZ-SBEL-R2.25	<input type="checkbox"/>	4.5	2.25	23	60	6
DZ-SBEL-R2.5	<input type="checkbox"/>	5.0	2.5	25	70	6
DZ-SBEL-R2.75	<input type="checkbox"/>	5.5	2.75	28	80	6
DZ-SBEL-R3.0	<input type="checkbox"/>	6.0	3.0	30	80	6
DZ-SBEL-R3.5	<input type="checkbox"/>	7.0	3.5	30	80	8
DZ-SBEL-R4.0	<input type="checkbox"/>	8.0	4.0	35	90	8
DZ-SBEL-R4.5	<input type="checkbox"/>	9.0	4.5	40	90	10
DZ-SBEL-R5.0	<input type="checkbox"/>	10.0	5.0	45	100	10
DZ-SBEL-R5.5	<input type="checkbox"/>	11.0	5.5	45	100	10
DZ-SBEL-R6.0	<input type="checkbox"/>	12.0	6.0	50	100	12
DZ-SBEL-R6.5	<input type="checkbox"/>	13.0	6.5	50	110	12
DZ-SBEL-R7.0	<input type="checkbox"/>	14.0	7.0	55	120	12
DZ-SBEL-R7.5	<input type="checkbox"/>	15.0	7.5	55	120	16
DZ-SBEL-R8.0	<input type="checkbox"/>	16.0	8.0	55	130	16
DZ-SBEL-R8.5	<input type="checkbox"/>	17.0	8.5	55	130	20
DZ-SBEL-R9.0	<input type="checkbox"/>	18.0	9.0	55	130	20
DZ-SBEL-R9.5	<input type="checkbox"/>	19.0	9.5	58	140	20
DZ-SBEL-R10.0	<input type="checkbox"/>	20.0	10.0	60	150	20
DZ-SBEL-R12.5	<input type="checkbox"/>	25.0	12.5	65	150	25

- Stocked standard
- Inquire regarding delivery

Recommended Cutting Data

Material	Carbon Steel		Die Steel		Mold Steel (~45HRC)	
	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
Type of Machining						
	1	35,000	300	28,600	250	19,100
2	17,500	800	14,300	650	9,500	400
3	11,700	800	9,500	650	6,400	400
4	8,800	900	7,200	750	4,800	440
5	7,000	1,000	5,700	800	3,800	500
6	5,800	1,000	4,800	800	3,200	500
8	4,400	1,100	3,600	900	2,400	540
10	3,500	1,100	2,900	900	1,900	540
12	2,900	1,100	2,400	900	1,600	540
16	2,200	900	1,800	750	1,200	540
20	1,750	700	1,400	600	950	340
25	1,400	600	1,100	500	750	300

Solid Carbide Ball Nose End Mills

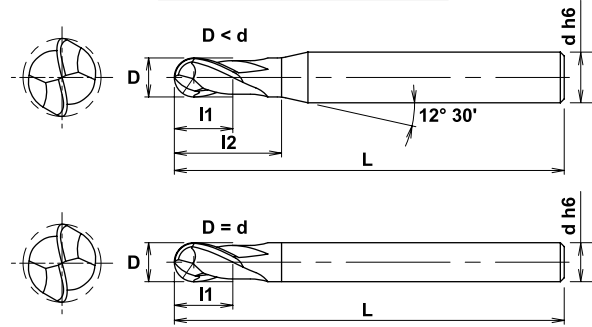
METRIC

DV-OCSB Type

- 2 Flute with 30° Helix for hardened material up to 65HRC



D	D	r
1 ~ 2.5	0 -0.01	±0.005
3 ~ 12	0 -0.02	±0.005
16 ~ 20	0 -0.02	±0.01



CATALOG NUMBER	STK	DIMENSIONS					
		D	r	l1	l2	L	d
DV-OCSB2010	•	1.0	0.5	1.5	3.0	50	4
DV-OCSB2010-2.5T	•	1.0	0.5	2.5	4.5	50	4
DV-OCSB2012	•	1.2	0.6	1.8	3.5	50	4
DV-OCSB2015	•	1.5	0.75	2.25	4.5	50	4
DV-OCSB2016	•	1.6	0.8	2.4	4.5	50	4
DV-OCSB2020	•	2.0	1.0	3.0	5.5	50	6
DV-OCSB2020-5T	•	2.0	1.0	5.0	7.0	50	6
DV-OCSB2025	•	2.5	1.25	3.75	6.5	50	6
DV-OCSB2030	•	3.0	1.5	4.5	8.0	60	6
DV-OCSB2030-8T	•	3.0	1.5	8.0	10.0	60	6
DV-OCSB2040S4	•	4.0	2.0	6.0	-	70	4
DV-OCSB2040	•	4.0	2.0	6.0	10.5	70	6
DV-OCSB2040-8T	•	4.0	2.0	8.0	10.5	70	6
DV-OCSB2050	•	5.0	2.5	7.5	12.5	80	6
DV-OCSB2050-10T	•	5.0	2.5	10.0	12.5	80	6
DV-OCSB2060	•	6.0	3.0	9.0	-	90	6
DV-OCSB2060-12T	•	6.0	3.0	12.0	-	90	6
DV-OCSB2060-L120	•	6.0	3.0	9.0	-	120	6
DV-OCSB2080	•	8.0	4.0	12.0	-	100	8
DV-OCSB2080-14T	•	8.0	4.0	14.0	-	100	8
DV-OCSB2080-L120	•	8.0	4.0	12.0	-	120	8
DV-OCSB2100	•	10.0	5.0	15.0	-	100	10
DV-OCSB2100-18T	•	10.0	5.0	18.0	-	100	10
DV-OCSB2100-L140	•	10.0	5.0	15.0	-	140	10
DV-OCSB2120	•	12.0	6.0	18.0	-	110	12
DV-OCSB2120-22T	•	12.0	6.0	22.0	-	110	12
DV-OCSB2120-L140	•	12.0	6.0	18.0	-	140	12
DV-OCSB2160-30T-L140	•	16.0	8.0	30.0	-	140	16
DV-OCSB2160-L140	•	16.0	8.0	24.0	-	140	16
DV-OCSB2160	•	16.0	8.0	24.0	-	160	16
DV-OCSB2160-L180	•	16.0	8.0	24.0	-	180	16
DV-OCSB2200-L140	•	20.0	10.0	30.0	-	140	20
DV-OCSB2200-L160	•	20.0	10.0	30.0	-	160	20
DV-OCSB2200	•	20.0	10.0	30.0	-	180	20

**METRIC**

Solid Carbide Ball Nose End Mills

Recommended Cutting Data for DV-OCSB

Material	Tool & Die Steel, Mold Steel SKD, SKH, NAK 1.2344, 1.2379, 1.2311, P20 (45HRC)		Hardened Steel SKD, SKT 1.2344, 1.2379 (45~55HRC)		Hardened Steel SKD, SKH 1.2344, 1.2379 (55~65HRC)	
	Type of Machining		Type of Machining		Type of Machining	
	<p>$a_p \leq 0.1D$ $a_e \leq 0.3D$</p>		<p>$a_p \leq 0.05D$ (max 0.5mm) $a_e \leq 0.1D$</p>		<p>$a_p \leq 0.03D$ (max 0.3mm) $a_e \leq 0.05D$</p>	
Diameter	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)	n (min ⁻¹)	Vf (mm/min)
1	32,000	1,600	25,000	1,300	22,000	1,100
2	28,000	1,700	22,000	1,400	20,000	1,200
3	24,000	1,800	21,000	1,500	18,000	1,300
4	20,000	2,000	18,000	1,600	14,000	1,400
6	16,000	2,200	13,000	1,800	10,000	1,500
8	12,000	2,300	10,000	2,000	8,000	1,500
10	10,000	2,200	8,000	1,800	6,000	1,400
12	8,000	2,000	6,500	1,700	5,000	1,200
16	6,000	1,800	5,000	1,500	4,000	1,000
20	5,000	1,500	4,000	1,200	3,000	800
25	4,000	1,200	4,000	1,000	2,000	600

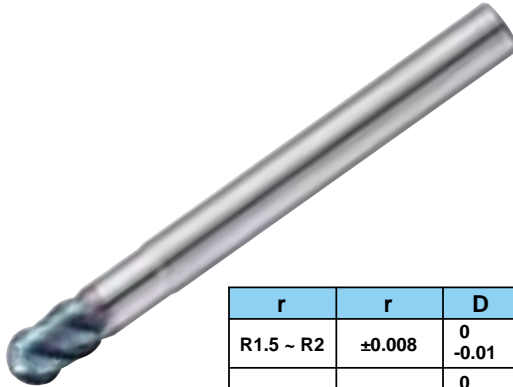
Note: Figures to be adjusted according to machine rigidity or work rigidity.

Solid Carbide Ball Nose End Mills

METRIC

DH-OCHB Type

- 4 Flute with 45°, for hardened material up to 70HRC
- High rigidity with un-equal pitch on flutes to control vibration



r	r	D
R1.5 ~ R2	±0.008	0 -0.01
R2.5 ~ R6	±0.008	0 -0.015

Fig. 1 Dc < Ds

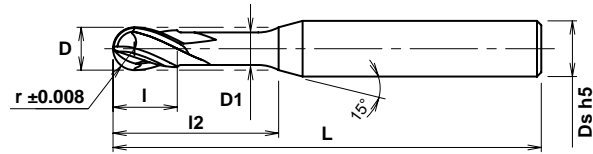
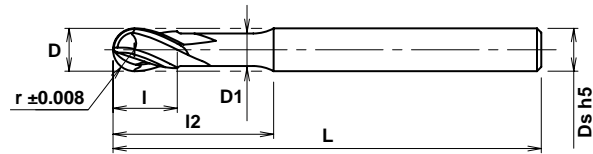


Fig. 2 Dc = Ds



CATALOG NUMBER	STK	DIMENSIONS							
		D	r	l	l2	L	D1	Ds	FIG.
DH-OCHB4030	•	3	1.5	4.5	9	70	2.9	6	1
DH-OCHB4040	•	4	2	6	12	70	3.8	6	1
DH-OCHB4050	•	5	2.5	7.5	15	80	4.8	6	1
DH-OCHB4060	•	6	3	9	18	90	5.7	6	2
DH-OCHB4080	•	8	4	12	24	100	7.6	8	2
DH-OCHB4100	•	10	5	15	30	100	9.5	10	2
DH-OCHB4120	•	12	6	18	36	110	11.4	12	2

Recommended Cutting Data for Finishing

Material	Tool & Die Steel, Mold Steel 1.2344, 1.2379, 1.2311, P20, P21 (~45HRC)		Hardened Steel 1.2344, 1.2379 (45~55HRC)		Hardened Steel 1.2344, 1.2379 (55~65HRC)		Hardened Steel 1.2379 (62~72HRC)		
	Type of Machining		Type of Machining		Type of Machining		Type of Machining		
Diameter		Spindle Speed n (min ⁻¹)	Feed Speed Vf (mm/min)	Spindle Speed n (min ⁻¹)	Feed Speed Vf (mm/min)	Spindle Speed n (min ⁻¹)	Feed Speed Vf (mm/min)	Spindle Speed n (min ⁻¹)	Feed Speed Vf (mm/min)
r (mm)	D (mm)								
1.5	3	25,500	4,000	21,200	3,000	17,000	2,000	12,700	1,000
2	4	19,100	4,000	15,900	3,000	12,700	2,000	9,500	1,000
2.5	5	15,300	4,000	12,700	3,000	10,200	2,000	7,600	1,000
3	6	12,700	4,000	10,600	3,000	8,500	2,000	6,400	1,000
4	8	9,500	4,000	8,000	3,000	6,400	2,000	4,800	1,000
5	10	7,600	4,000	6,400	3,000	5,100	2,000	3,800	1,000
6	12	6,400	4,000	5,300	3,000	4,200	2,000	3,200	1,000

Note: Figures to be adjusted according to machine rigidity or work rigidity.

**METRIC**

Solid Carbide Ball Nose End Mills

Recommended Cutting Data for DH-OCHB for roughing & semi-finishing

Material	Tool & Die Steel, Mold Steel 1.2344, 1.2379, 1.2311, P20, P21 (~45HRC)				Hardened Steel 1.2344, 1.2379 (45~55HRC)				Hardened Steel 1.2344, 1.2379 (55~65HRC)				Hardened Steel 1.2379 (62~72HRC)			
Type of Machining																
Diameter	Spindle Speed		Feed Speed		Spindle Speed		Feed Speed		Spindle Speed		Feed Speed		Spindle Speed			
	R (mm)	Dc (mm)	n (min ⁻¹)	Vf (mm/min)	ap x ae	n (min ⁻¹)	Vf (mm/min)	ap x ae	n (min ⁻¹)	Vf (mm/min)	ap x ae	n (min ⁻¹)	Vf (mm/min)	ap x ae		
1.5	3	19,100	3,000	0.22	15,900	2,250	0.22	12,700	1,500	0.18	9,500	750	0.05			
2	4	14,300	3,000	0.38	11,900	2,250	0.38	9,500	1,500	0.32	7,200	750	0.10			
2.5	5	11,500	3,000	0.60	9,500	2,250	0.60	7,600	1,500	0.50	5,700	750	0.15			
3	6	9,500	3,000	0.86	8,000	2,250	0.86	6,400	1,500	0.72	4,800	750	0.22			
4	8	7,200	3,000	1.54	6,000	2,250	1.54	4,800	1,500	1.28	3,600	750	0.38			
5	10	5,700	3,000	2.40	4,800	2,250	2.40	3,800	1,500	2.00	2,900	750	0.60			
6	12	4,800	3,000	3.46	4,000	2,250	3.46	3,200	1,500	2.88	2,400	750	0.86			

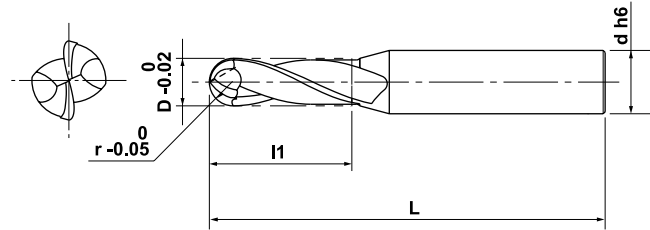
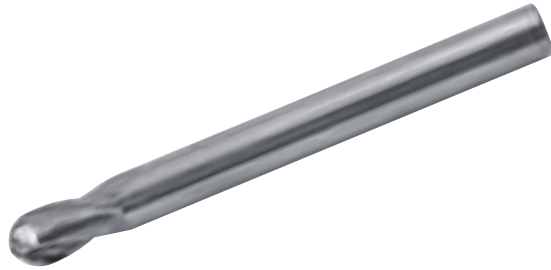
Note: Figures to be adjusted according to machine rigidity or work rigidity.

Solid Carbide Ball Nose End Mills

METRIC

AL-DBPS Type

- 2 Flute with 25° Helix for Aluminum

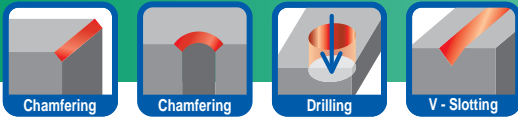


Solid Carbide End Mills

CATALOG NUMBER	STK	DIMENSIONS				
		D	r	l1	L	d
AL-DBPS2010	•	1.0	0.5	1.5	50	4
AL-DBPS2020	•	2.0	1.0	3	50	6
AL-DBPS2030	•	3.0	1.5	4.5	60	6
AL-DBPS2040	•	4.0	2.0	6	70	6
AL-DBPS2050	•	5.0	2.5	7.5	80	6
AL-DBPS2060	•	6.0	3.0	9	90	6
AL-DBPS2080	•	8.0	4.0	12	100	8
AL-DBPS2100	•	10.0	5.0	15	100	10
AL-DBPS2120	•	12.0	6.0	18	110	12

Recommended Cutting Data

Material	Aluminum Alloy				
Type of Machining					
Diameter	Vc (m/min)	n (min ⁻¹)	Vf (mm/min)		
			Roughing	Finishing	
1	150	44,700	360	500	
2	150	23,900	540	700	
3	150	15,900	540	800	
4	150	11,900	540	1,400	
5	150	9,500	540	1,300	
6	150	8,000	540	1,200	
8	150	6,000	540	1,100	
10	150	4,800	540	1,000	
12	150	4,000	540	900	

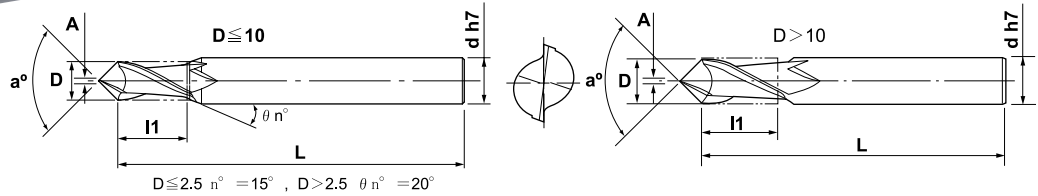
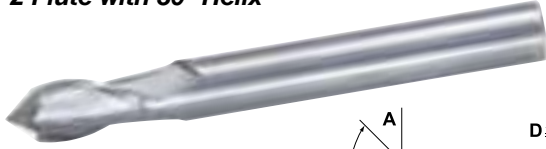


METRIC

Solid Carbide Counter Sink End Mills

VSE, VSESS & VSE-LS Type

- 2 Flute with 30° Helix



VSE

CATALOG NUMBER	STK	DIMENSIONS					
		a°	D	l1	L	d	A
VSE-010-60°	<input type="checkbox"/>	60°	1.0	2	40	4	0.15
VSE-015-60°	<input type="checkbox"/>	60°	1.5	3	40	4	0.15
VSE-020-60°	<input type="checkbox"/>	60°	2.0	4	40	4	0.15
VSE-025-60°	<input type="checkbox"/>	60°	2.5	5	40	4	0.15
VSE-030-60°	<input type="checkbox"/>	60°	3.0	6	50	6	0.4
VSE-040-60°	<input type="checkbox"/>	60°	4.0	8	50	6	0.4
VSE-050-60°	<input type="checkbox"/>	60°	5.0	10	60	8	0.4
VSE-060-60°	<input type="checkbox"/>	60°	6.0	12	70	8	0.4
VSE-080-60°	<input type="checkbox"/>	60°	8.0	16	80	10	0.35
VSE-100-60°	<input type="checkbox"/>	60°	10.0	18	90	12	0.35
VSE-120-60°	<input type="checkbox"/>	60°	12.0	20	100	12	0.35
VSE-160-60°	<input type="checkbox"/>	60°	16.0	30	120	16	0.35
VSE-200-60°	<input type="checkbox"/>	60°	20.0	40	140	20	0.35
VSE-010-90°	<input type="checkbox"/>	90°	1.0	2	40	4	0.15
VSE-015-90°	<input type="checkbox"/>	90°	1.5	3	40	4	0.15
VSE-020-90°	<input type="checkbox"/>	90°	2.0	4	40	4	0.15
VSE-025-90°	<input type="checkbox"/>	90°	2.5	5	40	4	0.15
VSE-030-90°	<input type="checkbox"/>	90°	3.0	6	50	6	0.4
VSE-040-90°	<input type="checkbox"/>	90°	4.0	8	50	6	0.4
VSE-050-90°	<input type="checkbox"/>	90°	5.0	10	60	8	0.4
VSE-060-90°	<input type="checkbox"/>	90°	6.0	12	70	8	0.4
VSE-080-90°	<input type="checkbox"/>	90°	8.0	16	80	10	0.3
VSE-100-90°	<input type="checkbox"/>	90°	10.0	18	90	12	0.3
VSE-120-90°	<input type="checkbox"/>	90°	12.0	20	100	12	0.3
VSE-160-90°	<input type="checkbox"/>	90°	16.0	30	120	16	0.3
VSE-200-90°	<input type="checkbox"/>	90°	20.0	40	140	20	0.3
VSE-010-120°	<input type="checkbox"/>	120°	1.0	2	40	4	0.15
VSE-015-120°	<input type="checkbox"/>	120°	1.5	3	40	4	0.15
VSE-020-120°	<input type="checkbox"/>	120°	2.0	4	40	4	0.15
VSE-025-120°	<input type="checkbox"/>	120°	2.5	5	40	4	0.15
VSE-030-120°	<input type="checkbox"/>	120°	3.0	6	50	6	0.4
VSE-040-120°	<input type="checkbox"/>	120°	4.0	8	50	6	0.4
VSE-050-120°	<input type="checkbox"/>	120°	5.0	10	60	8	0.4
VSE-060-120°	<input type="checkbox"/>	120°	6.0	12	70	8	0.4
VSE-080-120°	<input type="checkbox"/>	120°	8.0	16	80	10	0.4
VSE-100-120°	<input type="checkbox"/>	120°	10.0	18	90	12	0.4
VSE-120-120°	<input type="checkbox"/>	120°	12.0	20	100	12	0.4
VSE-160-120°	<input type="checkbox"/>	120°	16.0	30	120	16	0.4
VSE-200-120°	<input type="checkbox"/>	120°	20.0	40	140	20	0.4

- Stocked standard
- Inquire regarding delivery

A = size of flat face on end mill point

VSESS (Undersize Shank)

CATALOG NUMBER	STK	DIMENSIONS					
		a°	D	l1	L	d	A
VSESS-040-60°	<input type="checkbox"/>	60°	4.0	8	50	4	0.4
VSESS-060-60°	<input type="checkbox"/>	60°	6.0	12	70	6	0.4
VSESS-080-60°	<input type="checkbox"/>	60°	8.0	16	80	8	0.35
VSESS-100-60°	<input type="checkbox"/>	60°	10.0	18	90	10	0.35
VSESS-040-90°	<input type="checkbox"/>	90°	4.0	8	50	4	0.4
VSESS-060-90°	<input type="checkbox"/>	90°	6.0	12	70	6	0.4
VSESS-080-90°	<input type="checkbox"/>	90°	8.0	16	80	8	0.3
VSESS-100-90°	<input type="checkbox"/>	90°	10.0	18	90	10	0.3
VSESS-040-120°	<input type="checkbox"/>	120°	4.0	8	50	4	0.4
VSESS-060-120°	<input type="checkbox"/>	120°	6.0	12	70	6	0.4
VSESS-080-120°	<input type="checkbox"/>	120°	8.0	16	80	8	0.4
VSESS-100-120°	<input type="checkbox"/>	120°	10.0	18	90	10	0.4

VSE-LS (Long Shank)

CATALOG NUMBER	STK	DIMENSIONS					
		a°	D	l1	L	d	A
VSE-LS-030-60°	<input type="checkbox"/>	60°	3.0	6	80	3	0.4
VSE-LS-040-60°	<input type="checkbox"/>	60°	4.0	8	100	4	0.4
VSE-LS-050-60°	<input type="checkbox"/>	60°	5.0	10	110	5	0.4
VSE-LS-060-60°	<input type="checkbox"/>	60°	6.0	12	120	6	0.4
VSE-LS-080-60°	<input type="checkbox"/>	60°	8.0	16	150	8	0.35
VSE-LS-100-60°	<input type="checkbox"/>	60°	10.0	18	160	10	0.35
VSE-LS-120-60°	<input type="checkbox"/>	60°	12.0	20	180	12	0.35
VSE-LS-160-60°	<input type="checkbox"/>	60°	16.0	30	230	16	0.35
VSE-LS-200-60°	<input type="checkbox"/>	60°	20.0	40	250	20	0.35
VSE-LS-030-90°	<input type="checkbox"/>	90°	3.0	6	80	3	0.4
VSE-LS-040-90°	<input type="checkbox"/>	90°	4.0	8	100	4	0.4
VSE-LS-050-90°	<input type="checkbox"/>	90°	5.0	10	110	5	0.4
VSE-LS-060-90°	<input type="checkbox"/>	90°	6.0	12	120	6	0.4
VSE-LS-080-90°	<input type="checkbox"/>	90°	8.0	16	150	8	0.3
VSE-LS-100-90°	<input type="checkbox"/>	90°	10.0	18	160	10	0.3
VSE-LS-120-90°	<input type="checkbox"/>	90°	12.0	20	180	12	0.3
VSE-LS-160-90°	<input type="checkbox"/>	90°	16.0	30	230	16	0.3
VSE-LS-200-90°	<input type="checkbox"/>	90°	20.0	40	250	20	0.3
VSE-LS-030-120°	<input type="checkbox"/>	120°	3.0	6	80	3	0.4
VSE-LS-040-120°	<input type="checkbox"/>	120°	4.0	8	100	4	0.4
VSE-LS-050-120°	<input type="checkbox"/>	120°	5.0	10	110	5	0.4
VSE-LS-060-120°	<input type="checkbox"/>	120°	6.0	12	120	6	0.4
VSE-LS-080-120°	<input type="checkbox"/>	120°	8.0	16	150	8	0.4
VSE-LS-100-120°	<input type="checkbox"/>	120°	10.0	18	160	10	0.4
VSE-LS-120-120°	<input type="checkbox"/>	120°	12.0	20	180	12	0.4
VSE-LS-160-120°	<input type="checkbox"/>	120°	16.0	30	230	16	0.4
VSE-LS-200-120°	<input type="checkbox"/>	120°	20.0	40	250	20	0.4

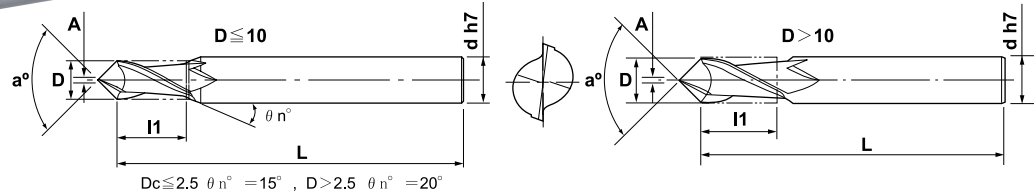
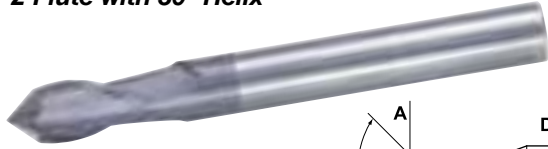


Solid Carbide Counter Sink End Mills

METRIC

DZ-VSE, DZ-VSESS & DZ-VSE-LS Type

- 2 Flute with 30° Helix



Solid Carbide End Mills

DZ-VSE

CATALOG NUMBER	STK	DIMENSIONS					
		a°	D	l1	L	d	A
DZ-VSE-010-60°	<input type="checkbox"/>	60°	1.0	2	40	4	0.15
DZ-VSE-015-60°	<input type="checkbox"/>	60°	1.5	3	40	4	0.15
DZ-VSE-020-60°	<input type="checkbox"/>	60°	2.0	4	40	4	0.15
DZ-VSE-025-60°	<input type="checkbox"/>	60°	2.5	5	40	4	0.15
DZ-VSE-030-60°	<input type="checkbox"/>	60°	3.0	6	50	6	0.4
DZ-VSE-040-60°	<input type="checkbox"/>	60°	4.0	8	50	6	0.4
DZ-VSE-050-60°	<input type="checkbox"/>	60°	5.0	10	60	8	0.4
DZ-VSE-060-60°	<input type="checkbox"/>	60°	6.0	12	70	8	0.4
DZ-VSE-080-60°	<input type="checkbox"/>	60°	8.0	16	80	10	0.35
DZ-VSE-100-60°	<input type="checkbox"/>	60°	10.0	18	90	12	0.35
DZ-VSE-120-60°	<input type="checkbox"/>	60°	12.0	20	100	12	0.35
DZ-VSE-160-60°	<input type="checkbox"/>	60°	16.0	30	120	16	0.35
DZ-VSE-200-60°	<input type="checkbox"/>	60°	20.0	40	140	20	0.35
DZ-VSE-010-90°	<input type="checkbox"/>	90°	1.0	2	40	4	0.15
DZ-VSE-015-90°	<input type="checkbox"/>	90°	1.5	3	40	4	0.15
DZ-VSE-020-90°	<input type="checkbox"/>	90°	2.0	4	40	4	0.15
DZ-VSE-025-90°	<input type="checkbox"/>	90°	2.5	5	40	4	0.15
DZ-VSE-030-90°	<input type="checkbox"/>	90°	3.0	6	50	6	0.4
DZ-VSE-040-90°	<input type="checkbox"/>	90°	4.0	8	50	6	0.4
DZ-VSE-050-90°	<input type="checkbox"/>	90°	5.0	10	60	8	0.4
DZ-VSE-060-90°	<input type="checkbox"/>	90°	6.0	12	70	8	0.4
DZ-VSE-080-90°	<input type="checkbox"/>	90°	8.0	16	80	10	0.3
DZ-VSE-100-90°	<input type="checkbox"/>	90°	10.0	18	90	12	0.3
DZ-VSE-120-90°	<input type="checkbox"/>	90°	12.0	20	100	12	0.3
DZ-VSE-160-90°	<input type="checkbox"/>	90°	16.0	30	120	16	0.3
DZ-VSE-200-90°	<input type="checkbox"/>	90°	20.0	40	140	20	0.3
DZ-VSE-010-120°	<input type="checkbox"/>	120°	1.0	2	40	4	0.15
DZ-VSE-015-120°	<input type="checkbox"/>	120°	1.5	3	40	4	0.15
DZ-VSE-020-120°	<input type="checkbox"/>	120°	2.0	4	40	4	0.15
DZ-VSE-025-120°	<input type="checkbox"/>	120°	2.5	5	40	4	0.15
DZ-VSE-030-120°	<input type="checkbox"/>	120°	3.0	6	50	6	0.4
DZ-VSE-040-120°	<input type="checkbox"/>	120°	4.0	8	50	6	0.4
DZ-VSE-050-120°	<input type="checkbox"/>	120°	5.0	10	60	8	0.4
DZ-VSE-060-120°	<input type="checkbox"/>	120°	6.0	12	70	8	0.4
DZ-VSE-080-120°	<input type="checkbox"/>	120°	8.0	16	80	10	0.4
DZ-VSE-100-120°	<input type="checkbox"/>	120°	10.0	18	90	12	0.4
DZ-VSE-120-120°	<input type="checkbox"/>	120°	12.0	20	100	12	0.4
DZ-VSE-160-120°	<input type="checkbox"/>	120°	16.0	30	120	16	0.4
DZ-VSE-200-120°	<input type="checkbox"/>	120°	20.0	40	140	20	0.4

- Stocked standard
- Inquire regarding delivery

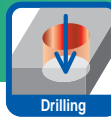
A = size of flat face on end mill point

DZ-VSESS (Undersize Shank)

CATALOG NUMBER	STK	DIMENSIONS					
		a°	D	l1	L	d	A
DZ-VSESS-040-60°	<input type="checkbox"/>	60°	4.0	8	50	4	0.4
DZ-VSESS-060-60°	<input type="checkbox"/>	60°	6.0	12	70	6	0.4
DZ-VSESS-080-60°	<input type="checkbox"/>	60°	8.0	16	80	8	0.35
DZ-VSESS-100-60°	<input type="checkbox"/>	60°	10.0	18	90	10	0.35
DZ-VSESS-040-90°	<input type="checkbox"/>	90°	4.0	8	50	4	0.4
DZ-VSESS-060-90°	<input type="checkbox"/>	90°	6.0	12	70	6	0.4
DZ-VSESS-080-90°	<input type="checkbox"/>	90°	8.0	16	80	8	0.3
DZ-VSESS-100-90°	<input type="checkbox"/>	90°	10.0	18	90	10	0.3
DZ-VSESS-040-120°	<input type="checkbox"/>	120°	4.0	8	50	4	0.4
DZ-VSESS-060-120°	<input type="checkbox"/>	120°	6.0	12	70	6	0.4
DZ-VSESS-080-120°	<input type="checkbox"/>	120°	8.0	16	80	8	0.4
DZ-VSESS-100-120°	<input type="checkbox"/>	120°	10.0	18	90	10	0.4

DZ-VSE-LS (Long Shank)

CATALOG NUMBER	STK	DIMENSIONS					
		a°	D	l1	L	d	A
DZ-VSE-LS-030-60°	<input type="checkbox"/>	60°	3.0	6	80	3	0.4
DZ-VSE-LS-040-60°	<input type="checkbox"/>	60°	4.0	8	100	4	0.4
DZ-VSE-LS-050-60°	<input type="checkbox"/>	60°	5.0	10	110	5	0.4
DZ-VSE-LS-060-60°	<input type="checkbox"/>	60°	6.0	12	120	6	0.4
DZ-VSE-LS-080-60°	<input type="checkbox"/>	60°	8.0	16	150	8	0.35
DZ-VSE-LS-100-60°	<input type="checkbox"/>	60°	10.0	18	160	10	0.35
DZ-VSE-LS-120-60°	<input type="checkbox"/>	60°	12.0	20	180	12	0.35
DZ-VSE-LS-160-60°	<input type="checkbox"/>	60°	16.0	30	230	16	0.35
DZ-VSE-LS-200-60°	<input type="checkbox"/>	60°	20.0	40	250	20	0.35
DZ-VSE-LS-030-90°	<input type="checkbox"/>	90°	3.0	6	80	3	0.4
DZ-VSE-LS-040-90°	<input type="checkbox"/>	90°	4.0	8	100	4	0.4
DZ-VSE-LS-050-90°	<input type="checkbox"/>	90°	5.0	10	110	5	0.4
DZ-VSE-LS-060-90°	<input type="checkbox"/>	90°	6.0	12	120	6	0.4
DZ-VSE-LS-080-90°	<input type="checkbox"/>	90°	8.0	16	150	8	0.3
DZ-VSE-LS-100-90°	<input type="checkbox"/>	90°	10.0	18	160	10	0.3
DZ-VSE-LS-120-90°	<input type="checkbox"/>	90°	12.0	20	180	12	0.3
DZ-VSE-LS-160-90°	<input type="checkbox"/>	90°	16.0	30	230	16	0.3
DZ-VSE-LS-200-90°	<input type="checkbox"/>	90°	20.0	40	250	20	0.3
DZ-VSE-LS-030-120°	<input type="checkbox"/>	120°	3.0	6	80	3	0.4
DZ-VSE-LS-040-120°	<input type="checkbox"/>	120°	4.0	8	100	4	0.4
DZ-VSE-LS-050-120°	<input type="checkbox"/>	120°	5.0	10	110	5	0.4
DZ-VSE-LS-060-120°	<input type="checkbox"/>	120°	6.0	12	120	6	0.4
DZ-VSE-LS-080-120°	<input type="checkbox"/>	120°	8.0	16	150	8	0.4
DZ-VSE-LS-100-120°	<input type="checkbox"/>	120°	10.0	18	160	10	0.4
DZ-VSE-LS-120-120°	<input type="checkbox"/>	120°	12.0	20	180	12	0.4
DZ-VSE-LS-160-120°	<input type="checkbox"/>	120°	16.0	30	230	16	0.4
DZ-VSE-LS-200-120°	<input type="checkbox"/>	120°	20.0	40	250	20	0.4

**METRIC**

Solid Carbide Counter Sink End Mills

Recommended Cutting Data for VSE, VSESS, VSE-LS and DZ-VSE, DZ-VSESS & DZ-VSE-LS

Type of Machining	Inside Chamfer	Center Point	Drilling	External Chamfer	Side Cutting	Grooving
60°	O	X	X	O	O	X
90°	O	O (only for cast iron)	X	O	O	O
120°	O	O	O	O	O	O

O = Recommended X = Not Recommended

For Inside Chamfers & Center Points

Material	HB	Vc (m/min)	f (mm/rev)		
			Ø3 ~ Ø6	Ø8 ~ Ø12	Ø16 ~ Ø20
Cast Iron	100 ~ 300	30 ~ 60	0.08 ~ 0.10	0.08 ~ 0.18	0.15 ~ 0.25
Aluminum Alloy	50 ~ 120	40 ~ 80	0.08 ~ 0.12	0.10 ~ 0.15	0.12 ~ 0.20
Carbon Steel	200 ~ 400	30 ~ 60	0.02 ~ 0.06	0.04 ~ 0.08	0.06 ~ 0.15
Alloy Steel	350	20 ~ 40	0.01 ~ 0.03	0.03 ~ 0.05	0.06 ~ 0.15

For External Chamfers & Side Cutting

Material	HB	Vc (m/min)	f (mm/rev)		
			Ø3 ~ Ø6	Ø8 ~ Ø12	Ø16 ~ Ø20
Cast Iron	100 ~ 300	60 ~ 120	0.02 ~ 0.06	0.04 ~ 0.08	0.06 ~ 0.12
Aluminum Alloy	50 ~ 120	80 ~ 160	0.02 ~ 0.07	0.04 ~ 0.10	0.06 ~ 0.15
Carbon Steel	200 ~ 400	50 ~ 100	0.02 ~ 0.04	0.03 ~ 0.06	0.05 ~ 0.08
Alloy Steel	350	40 ~ 60	0.01 ~ 0.02	0.02 ~ 0.05	0.04 ~ 0.06

For Grooving

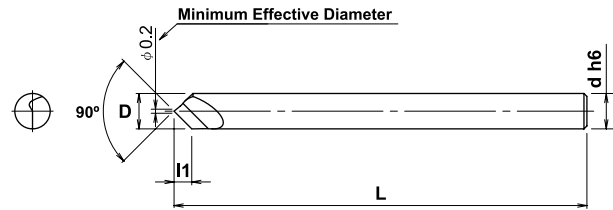
Material	HB	Vc (m/min)	f (mm/rev)		
			Ø3 ~ Ø6	Ø8 ~ Ø12	Ø16 ~ Ø20
Cast Iron	100 ~ 300	50 ~ 80	0.02 ~ 0.04	0.03 ~ 0.06	0.05 ~ 0.08
Aluminum Alloy	50 ~ 120	60 ~ 100	0.02 ~ 0.06	0.04 ~ 0.08	0.06 ~ 0.12
Carbon Steel	200 ~ 400	50 ~ 80	0.01 ~ 0.03	0.02 ~ 0.04	0.04 ~ 0.08
Alloy Steel	350	40 ~ 60	0.005 ~ 0.01	0.01 ~ 0.03	0.03 ~ 0.05

- Notes:**
1. In case of using long shank type (VSE-LS), recommended to use low cutting speed and feed rate.
 2. Please don't use for drilling, except 120° point angle.

Solid Carbide Chamfering End Mills for Aluminum

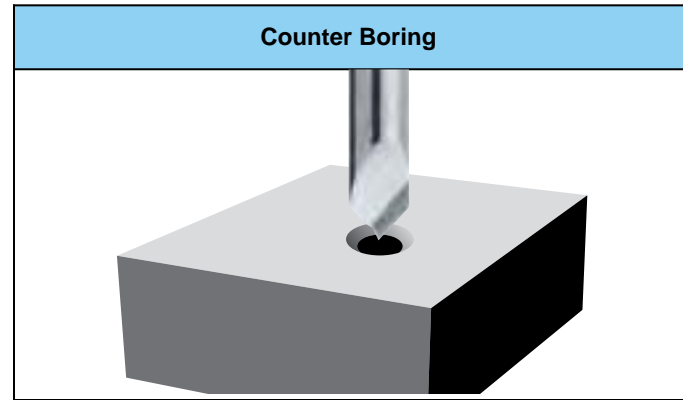
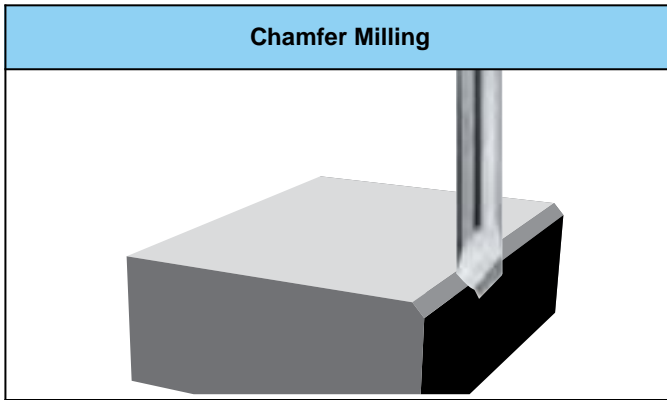
METRIC

AL-VME Type
- For Chamfering Aluminum



CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-VME-030-90°	•	3.0	1.5	50	3
AL-VME-040-90°	•	4.0	2	60	4
AL-VME-050-90°	•	5.0	2.5	70	5
AL-VME-060-90°	•	6.0	3	70	6
AL-VME-080-90°	•	8.0	4	75	8
AL-VME-100-90°	•	10.0	5	80	10

Recommended Cutting Data



Recommended Cutting Data

Type of Machining	Materials	Aluminum Alloy (5052) Aluminum Alloy Casting (Si≤13%)			Aluminum Alloy (7075)		
		Diameter D (mm)	n (min ⁻¹)	ap (mm)	Vf (mm/min)	n (min ⁻¹)	ap (mm)
	3	~20,000	0.5	2,000	~18,000	0.5	1,800
			1	1,000		1	900
	4	~16,000	0.7	2,000	~14,000	0.7	1,800
			1.4	1,000		1.4	900
	5	~14,000	0.8	2,200	~12,000	0.8	1,900
			1.8	1,100		1.8	1,000
	6	~12,000	1	2,400	~10,000	1	2,000
			2	1,200		2	1,000
	8	~8,000	1.3	2,000	~7,000	1.3	1,800
			2.5	1,000		2.5	880
	10	~6,000	1.5	1,800	~5,000	1.5	1,500
			3	900		3	700

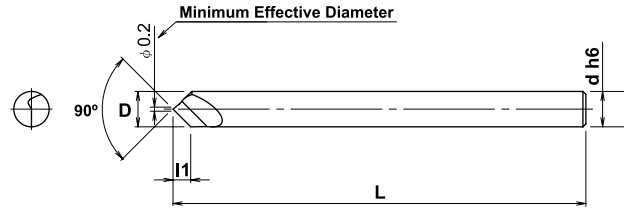
- Notes:**
- Above cutting conditions are for general guidance. Figures should be adjusted according to the machine rigidity or work rigidity.
 - Recommend to shorten overhung length as much as possible.
 - In case of counter boring, reduce spindle speed (n) 25% and feed speed (Vf) 50% of above figures.



METRIC Solid Carbide Chamfering End Mills for Aluminum

AL-VME-LS Type

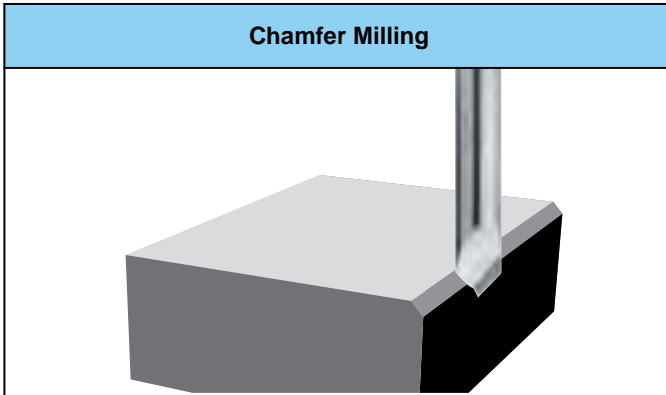
- For Chamfering Aluminum with long shank



CATALOG NUMBER	STK	DIMENSIONS			
		D	l1	L	d
AL-VME-030-90°-LS	•	3.0	1.5	80	3
AL-VME-040-90°-LS	•	4.0	2	100	4
AL-VME-050-90°-LS	•	5.0	2.5	110	5
AL-VME-060-90°-LS	•	6.0	3	120	6
AL-VME-080-90°-LS	•	8.0	4	120	8
AL-VME-100-90°-LS	•	10.0	5	140	10

- Stocked standard

Recommended Cutting Data



Recommended Cutting Data

Type of Machining	Materials	Aluminum Alloy (5052) Aluminum Alloy Casting (less than 13%Si)			Aluminum Alloy (7075)		
		Diameter D (mm)	n (min ⁻¹)	ap (mm)	Vf (mm/min)	n (min ⁻¹)	ap (mm)
	3	~15,000	0.5	550	~14,000	0.5	500
	4	~12,000	0.7	600	~10,000	0.7	500
	5	~10,000	0.8	600	~9,000	0.8	550
	6	~9,000	1	600	~8,000	1	550
	8	~6,000	1.3	550	~5,000	1.3	400
	10	~5,000	1.5	500	~4,000	1.5	400

- Notes:**
1. Counter boring is not suitable for these lengths of end mills.
 2. Above cutting conditions are for general guidance. Figures should be adjusted according to the machine rigidity or work rigidity.
 3. Recommend to shorten overhung length as much as possible.

CATALOG NUMBER	DESCRIPTION	PAGE NUMBER
A		
AL-DBPS2...	Solid Carbide Ball Nose End Mill for Aluminum	C-109
AL-OCHE2...	Solid Carbide End Mill for Aluminum	C-72
AL-OCRL3...	Solid Carbide End Mill for Aluminum	C-69
AL-OCRS3...	Solid Carbide End Mill for Aluminum	C-67
AL-OCRS3...LS	Solid Carbide End Mill for Aluminum	C-70
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