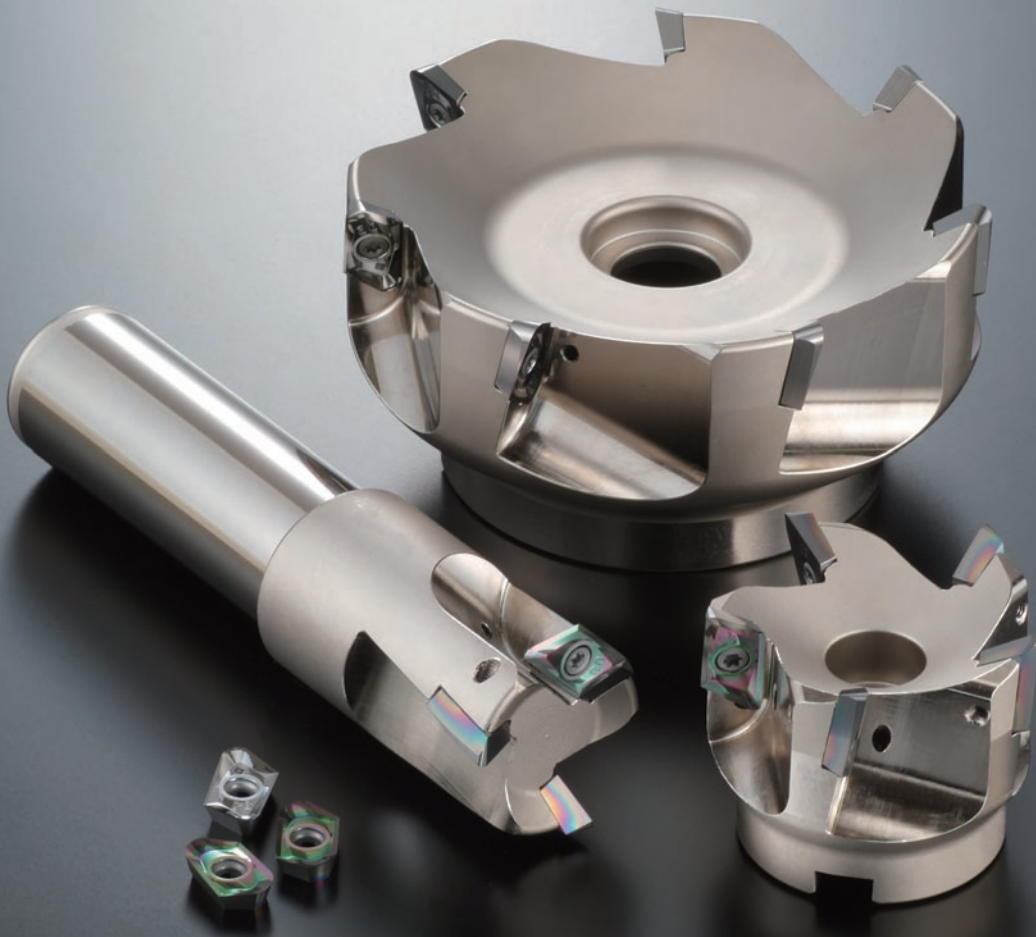


# SEC-WAVEMILL **WAX** series

Rev. 8

## High-speed, High-efficiency Cutter for Roughing to Finishing of Non-ferrous Metals





### ■ Features

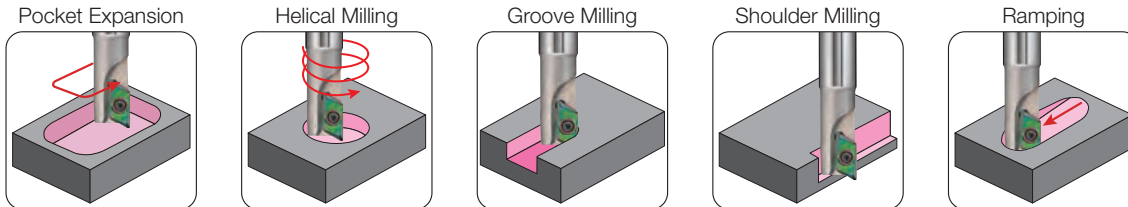
- Ideal for Roughing to Finishing of Non-ferrous Metals such as Aluminum Alloy
- Excellent Adhesion Resistance  
Top rake face of the insert has a lapped finish  
AURORA (DLC) Coat grade - DL1000, for improved adhesion resistance also available
- Safety Design  
Prevents dislodging of inserts caused by centrifugal force
- Coolant Compatible  
Coolant holes are a standard feature for the whole series

### ■ Product Range

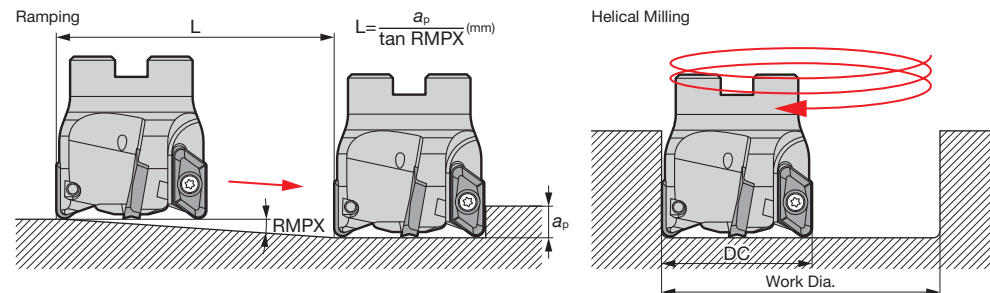
Type	Cat. No.	Dia. (mm)								
		ø20	ø25	ø32	ø40	ø50	ø63	ø80	ø100	ø125
Shell	WAX 3000-3.2					4	5			
	WAX 3000-3.2 <small>Inch Bore</small>							5	6	7
	WAX 3000-4.0					4	4			
	WAX 3000-4.0 <small>Inch Bore</small>							5	6	7
	WAX 4000-3.2					2	3			
	WAX 4000-3.2 <small>Inch Bore</small>							4	5	6
	WAX 4000-4.0					2	3			
	WAX 4000-4.0 <small>Inch Bore</small>							4	5	6
Shank	WAX 3000E-3.2	1	2	2	3					
	WAX 3000EL-3.2		2	2	3					
	WAX 3000E-4.0	1	2	2	3					
	WAX 3000EL-4.0		2	2	3					
	WAX 4000E-3.2		1	1	2					
	WAX 4000EL-3.2		1	1	2					
	WAX 4000E-4.0		1	1	2					
	WAX 4000EL-4.0		1	1	2					

Number in ● shows the number of teeth Inch Bore

### ■ Suitable for Various Applications




### ■ Ramping/Helical Milling Upper Limit and Allowable Maximum Spindle Speed




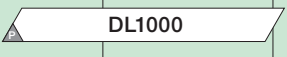
Dia. DC (mm)	Ramping		Helical Milling				Maximum Allowable Spindle Speed			
	WAX3000 Type/WAX4000 Type		WAX3000 Type		WAX4000 Type		WAX3000 Type		WAX4000 Type	
	Max. Ramping Angle RMPX (°)		Min. Bore Dia. (mm)	Max. Bore Dia. (mm)	Min. Bore Dia. (mm)	Max. Bore Dia. (mm)	n max (min <sup>-1</sup> )	v <sub>c</sub> (m/min)	n max (min <sup>-1</sup> )	v <sub>c</sub> (m/min)
20	28	—	22	33	—	—	14,000	880	—	—
25	17	26	29	43	27	43	29,000	2,200	11,000	860
32	12	18.5	43	57	38	57	25,000	2,500	9,000	900
40	9	13	59	73	54	73	23,000	2,900	20,000	2,500
50	7	9.5	79	93	74	93	20,000	3,100	18,000	2,800
63	5	7	105	119	100	119	18,000	3,500	16,000	3,100
80	3	5	139	153	134	153	16,000	4,000	14,000	3,500
100	3	4	179	193	174	193	14,000	4,400	12,000	3,700
125	2	3	229	243	224	243	13,000	5,100	11,000	4,300

Maximum ramping angle (RMPX) depends on cutter diameter DC (mm). Minimum milling distance (L) for any depth of cut can be calculated by the equation above. The n max speeds are set to prevent the inserts from dislodging by centrifugal force.

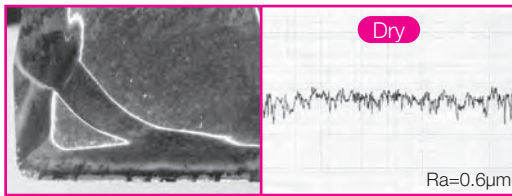
■ **Grade Features**

Work Material	Grade	Coating Thickness (μm)	Features
 N	DL1000	0.5	Coating with an extremely low coefficient of friction and excellent resistance to aluminum adhesion, provides stable cutting edge sharpness and chip evacuation. In combination with a dedicated carbide substrate for non-ferrous metals, wear resistance is further improved.

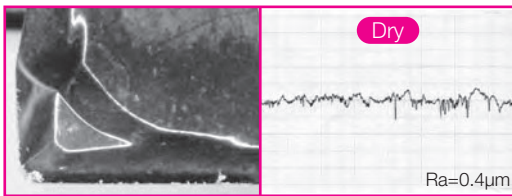
■ **Grade Application Range**

Work Material	Coated Carbide	Finishing to Light Cutting	Medium Cutting	Rough to Heavy Cutting
 N		 DL1000		

■ **Adhesion Resistance and Finished Surface Roughness**



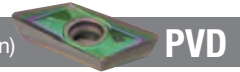
Work Material: ADC12, Grade: DL1000, Cutting Length: 7.5m  
Cutting Conditions:  $v_c = 100\text{m/min}$ ,  $f_z = 0.2\text{mm/t}$ ,  $a_p = 10\text{mm}$ ,  $a_e = 5\text{mm}$



Work Material: ADC12, Grade: DL1000, Cutting Length: 7.5m  
Cutting Conditions:  $v_c = 500\text{m/min}$ ,  $f_z = 0.2\text{mm/t}$ ,  $a_p = 10\text{mm}$ ,  $a_e = 5\text{mm}$

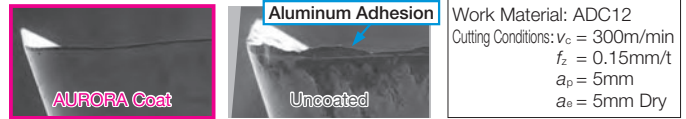
**AURORA Coat Features**

**AURORA Coat** (DLC: Diamond Like Carbon)

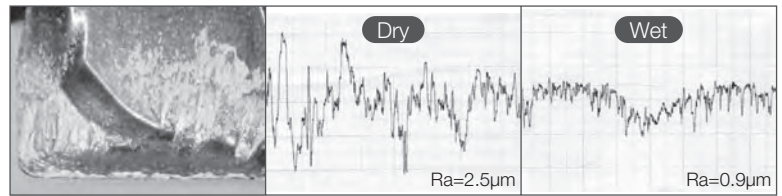


Using our proprietary PVD process technology, we have developed a hydrogen-free DLC coating that is extremely hard and smooth

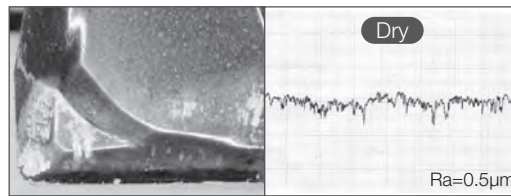
- Comparison of Cutting Edge Adhesion after Cutting ADC12



- Second only to diamond in terms of hardness, this flat and smooth coating has a low coefficient of friction and provides excellent adhesion resistance to deliver better quality machined surfaces
- Applicable for high-speed, high-efficiency cutting of aluminum alloys, copper alloys, resins and more

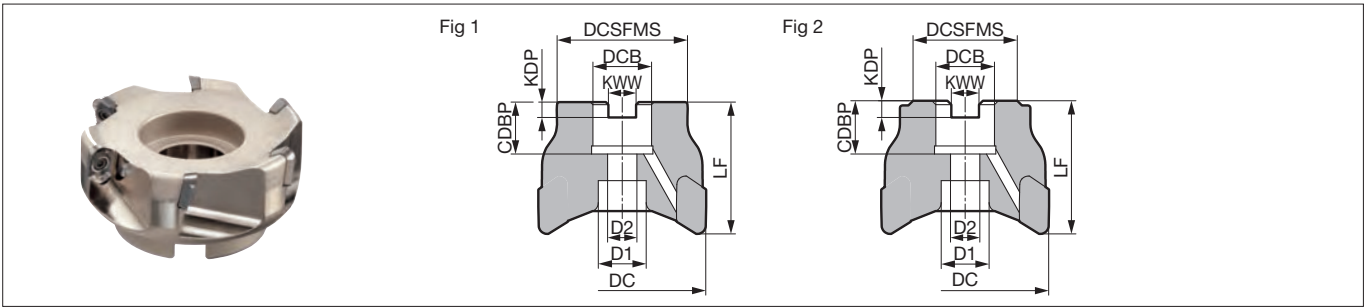


**Dry machining with DL1000 achieves better surface finish than wet machining with conventional tool**



**Maintains stable surface roughness as compared to conventional tool**

Rake Angle	Radial	6°	16.18mm 90°
	Axial	19° to 25°	



### ■ Body (Shell Type for RE = 3.2 and below)

Dimensions (mm)

	Cat. No.	Stock	Dia. DC	Boss DCSFMS	Height LF	Hole Dia. DCB	Keyway Width KWW	Keyway Depth KDP	Mounting Depth CDBP	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
Metric	<b>WAX 3050-3.2</b>	●	50	42	50	22	10.4	6.3	21	18	11	4	0.34	1
	<b>3063-3.2</b>	●	63	42	50	22	10.4	6.3	21	18	11	5	0.6	2
Inch	<b>WAX 3080-3.2</b>	●	80	57	50	25.4	9.5	6	25	26	14	5	1.0	1
	<b>3100-3.2</b>	●	100	67	63	31.75	12.7	8	32	28	17	6	2.2	1
	<b>3125-3.2</b>	●	125	87	63	38.1	15.9	10	35	30	21	7	3.5	1

Inserts are sold separately.

### ■ Body (Shell Type for RE = 4.0 and above)

	Cat. No.	Stock	Dia. DC	Boss DCSFMS	Height LF	Hole Dia. DCB	Keyway Width KWW	Keyway Depth KDP	Mounting Depth CDBP	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
Metric	<b>WAX 3050-4.0</b>	●	50	42	50	22	10.4	6.3	21	18	11	4	0.34	1
	<b>3063-4.0</b>	●	63	42	50	22	10.4	6.3	21	18	11	4	0.6	2
Inch	<b>WAX 3080-4.0</b>	●	80	57	50	25.4	9.5	6	25	26	14	5	1.0	1
	<b>3100-4.0</b>	●	100	67	63	31.75	12.7	8	32	28	17	6	2.2	1
	<b>3125-4.0</b>	●	125	87	63	38.1	15.9	10	35	30	21	7	3.5	1

Inserts are sold separately.

### ■ Parts

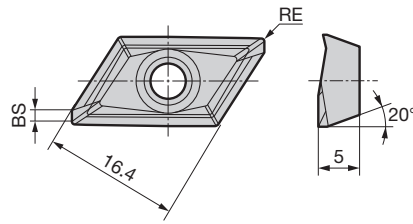
Flat Insert Screw	Wrench	Anti-seizure Cream
BFTX0408	3.0 TRD15	SUMI-P

## Insert

Dimensions (mm)

Grade Classification		Cemented Carbide	DLC			
Process	High-speed/Light Cutting	N	N			
	Medium Cutting		N			
	Roughing					
Cat. No.	H1	DL1000	Wiper BS	Corner Radius RE	Fig	
<b>AECT 16040PEFRA</b>	●	●	1.4	0.4	1	
<b>160408PEFRA</b>	●	●	1.0	0.8	1	
<b>160412PEFRA</b>	●	●	0.6	1.2	1	
<b>160416PEFRA</b>	●	●	0.5	1.6	1	
<b>160420PEFRA</b>	●	●	0.5	2.0	1	
<b>160430PEFRA</b>	●	●	0.7	3.0	1	
<b>160432PEFRA</b>	●	●	0.5	3.2	1	
<b>AECT 160440PEFRA</b>	●	●	0.5	4.0	1	
<b>160450PEFRA</b>	●	●	0.4	5.0	1	

Fig 1



Inserts with a corner radius of RE = 4.0 or greater are for use with bodies that have a "-4.0" part number suffix.

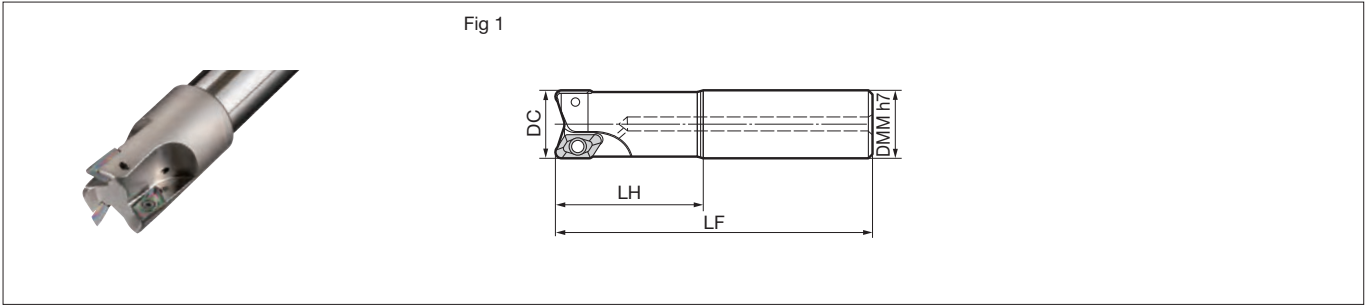
## Recommended Cutting Conditions

ISO	Work Material	Cutting Speed $v_c$ (m/min) Min. - <b>Optimum</b> - Max.	Feed Rate $f_z$ (mm/t) Min. - <b>Optimum</b> - Max.	Insert Grades
N	Aluminum Alloy	600 - <b>900</b> - 1,200	0.05 - <b>0.15</b> - 0.25	H1 DL1000

**Note** · The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.  
· For groove milling, adjust the feed rate to around 70% of the above values.

Rake Angle	Radial	6°	16, 18mm	90°
	Axial	19° to 25°		

Fig 1



■ Body (Shank Type for RE = 3.2 and below)

Dimensions (mm)

Cat. No.	Stock	Dia.		Head		Number of Teeth	Weight (kg)	Fig
		DC	DMM	LH	LF			
<b>WAX 3020E-3.2</b>	●	20	20	60	130	1	0.25	1
<b>3025E-3.2</b>	●	25	25	60	140	2	0.42	1
<b>3025EL-3.2</b>	●	25	25	60	200	2	0.63	1
<b>3032E-3.2</b>	●	32	32	70	150	2	0.75	1
<b>3032EL-3.2</b>	●	32	32	70	220	2	1.2	1
<b>3040E-3.2</b>	●	40	32	70	160	3	1.0	1
<b>3040EL-3.2</b>	●	40	32	70	220	3	1.4	1

Inserts are sold separately.

■ Body (Shank Type for RE = 4.0 and above)

Cat. No.	Stock	Dia.		Head		Number of Teeth	Weight (kg)	Fig
		DC	DMM	LH	LF			
<b>WAX 3020E-4.0</b>	●	20	20	60	130	1	0.25	1
<b>3025E-4.0</b>	●	25	25	60	140	2	0.42	1
<b>3025EL-4.0</b>	●	25	25	60	200	2	0.63	1
<b>3032E-4.0</b>	●	32	32	70	150	2	0.75	1
<b>3032EL-4.0</b>	●	32	32	70	220	2	1.2	1
<b>3040E-4.0</b>	●	40	32	70	160	3	1.0	1
<b>3040EL-4.0</b>	●	40	32	70	220	3	1.4	1

Inserts are sold separately.

■ Parts

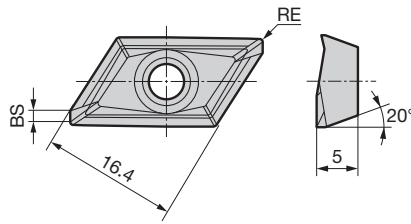
Applicable Cutter	Flat Insert Screw		Wrench	Anti-seizure Cream
WAX3020E Type	BFTX0407K	3.0	TRD15	SUMI-P
Other than above	BFTX0408			

## Insert

Dimensions (mm)

Grade Classification		Cemented Carbide	DLC		
Process	High-speed/Light Cutting	N	N		
	Medium Cutting		N		
	Roughing				
Cat. No.	H1	DL1000	Wiper BS	Corner Radius RE	Fig
<b>AECT 160404PEFRA</b>	●	●	1.4	0.4	1
<b>160408PEFRA</b>	●	●	1.0	0.8	1
<b>160412PEFRA</b>	●	●	0.6	1.2	1
<b>160416PEFRA</b>	●	●	0.5	1.6	1
<b>160420PEFRA</b>	●	●	0.5	2.0	1
<b>160430PEFRA</b>	●	●	0.7	3.0	1
<b>160432PEFRA</b>	●	●	0.5	3.2	1
<b>AECT 160440PEFRA</b>	●	●	0.5	4.0	1
<b>160450PEFRA</b>	●	●	0.4	5.0	1

Fig 1



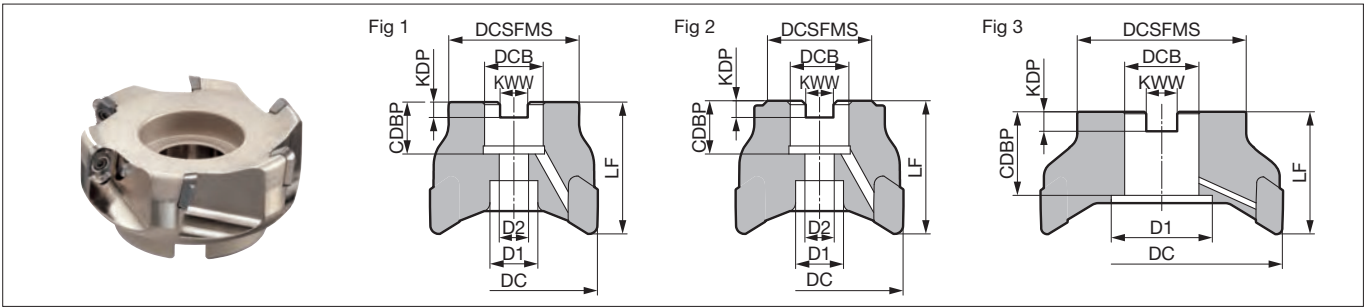
Inserts with a corner radius of RE = 4.0 or greater are for use with bodies that have a "-4.0" part number suffix.

## Recommended Cutting Conditions

ISO	Work Material	Cutting Speed $v_c$ (m/min)	Feed Rate $f_z$ (mm/t)	Insert Grades
		Min. - <b>Optimum</b> - Max.	Min. - <b>Optimum</b> - Max.	
<b>N</b>	Aluminum Alloy	600 - <b>900</b> - 1,200	0.05 - <b>0.15</b> - 0.25	H1 DL1000

**Note** · The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.  
 · For groove milling, adjust the feed rate to around 70% of the above values.

Rake Angle	Radial	6°	22.24mm	90°
	Axial	19° to 25°		



### ■ Body (Shell Type for RE = 3.2 and below)

Dimensions (mm)

	Cat. No.	Stock	Dia.		Height	Hole Dia.	Keyway Width	Keyway Depth	Mounting Depth	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
			DC	DCSFMS										
Metric	<b>WAX 4050-3.2</b>	●	50	42	50	16	8.4	5.6	18	14	9	2	0.37	1
	<b>4063-3.2</b>	●	63	49	50	22	10.4	6.3	21	18	11	3	0.54	2
Inch	<b>WAX 4080-3.2</b>	●	80	57	50	25.4	9.5	6	25	26	14	4	0.81	1
	<b>4100-3.2</b>	●	100	67	63	31.75	12.7	8	32	28	17	5	1.7	1
	<b>4125-3.2</b>	●	125	87	63	38.1	15.9	10	43	52	—	6	2.6	3

Inserts are sold separately.

### ■ Body (Shell Type for RE = 4.0 and above)

	Cat. No.	Stock	Dia.		Height	Hole Dia.	Keyway Width	Keyway Depth	Mounting Depth	Bolt D1	Bolt D2	Number of Teeth	Weight (kg)	Fig
			DC	DCSFMS										
Metric	<b>WAX 4050-4.0</b>	●	50	42	50	16	8.4	5.6	18	14	9	2	0.37	1
	<b>4063-4.0</b>	●	63	49	50	22	10.4	6.3	21	18	11	3	0.54	2
Inch	<b>WAX 4080-4.0</b>	●	80	57	50	25.4	9.5	6	25	26	14	4	0.81	1
	<b>4100-4.0</b>	●	100	67	63	31.75	12.7	8	32	28	17	5	1.7	1
	<b>4125-4.0</b>	●	125	87	63	38.1	15.9	10	43	52	—	6	2.6	3

Inserts are sold separately.

### ■ Parts

Flat Insert Screw	Wrench	Anti-seizure Cream
BFTX0511N	5.0	TRD20

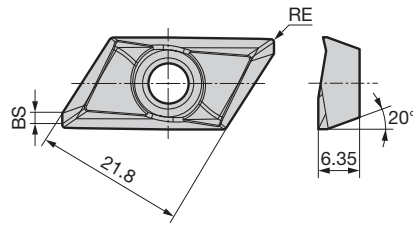


## ■ Insert

Dimensions (mm)

Grade Classification		Cemented Carbide	DLC		
Process	High-speed/Light Cutting	N	N		
	Medium Cutting		N		
	Roughing				
Cat. No.	H1	DL1000	Wiper BS	Corner Radius RE	Fig
<b>AECT 220604PEFRA</b>	●	●	1.5	0.4	1
<b>220608PEFRA</b>	●	●	1.2	0.8	1
<b>220612PEFRA</b>	●	●	0.8	1.2	1
<b>220616PEFRA</b>	●	●	0.4	1.6	1
<b>220620PEFRA</b>	●	●	0.5	2.0	1
<b>220630PEFRA</b>	●	●	0.6	3.0	1
<b>220632PEFRA</b>	●	●	0.4	3.2	1
<b>AECT 220640PEFRA</b>	●	●	1.2	4.0	1
<b>220650PEFRA</b>	●	●	0.4	5.0	1

Fig 1



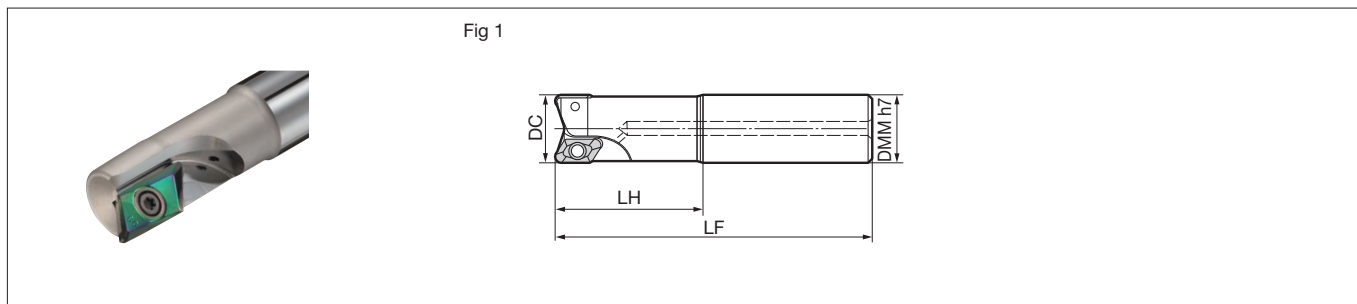
Inserts with a corner radius of RE = 4.0 or greater are for use with bodies that have a "-4.0" part number suffix.

## ■ Recommended Cutting Conditions

ISO	Work Material	Cutting Speed $v_c$ (m/min)	Feed Rate $f_z$ (mm/t)	Insert Grades
		Min. - <b>Optimum</b> - Max.	Min. - <b>Optimum</b> - Max.	
<b>N</b>	Aluminum Alloy	600 - <b>900</b> - 1,200	0.05 - <b>0.15</b> - 0.25	H1 DL1000

**Note** · The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.  
· For groove milling, adjust the feed rate to around 70% of the above values.

Rake Angle	Radial	6°	22.24mm 90°
	Axial	19° to 25°	



### ■ Body (Shank Type for RE = 3.2 and below)

Dimensions (mm)

Cat. No.	Stock	Dia. DC	Shank DMM	Head LH	Overall Length		Number of Teeth	Weight (kg)	Fig
					LF				
<b>WAX 4025E-3.2</b>	●	25	25	60	140		1	0.41	1
4025EL-3.2	●	25	25	60	200		1	0.63	1
4032E-3.2	●	32	32	70	150		1	0.72	1
4032EL-3.2	●	32	32	70	220		1	1.2	1
4040E-3.2	●	40	32	70	160		2	0.88	1
4040EL-3.2	●	40	32	70	220		2	1.2	1

Inserts are sold separately.

### ■ Body (Shank Type for RE = 4.0 and above)

Cat. No.	Stock	Dia. DC	Shank DMM	Head LH	Overall Length		Number of Teeth	Weight (kg)	Fig
					LF				
<b>WAX 4025E-4.0</b>	●	25	25	60	140		1	0.41	1
4025EL-4.0	●	25	25	60	200		1	0.63	1
4032E-4.0	●	32	32	70	150		1	0.72	1
4032EL-4.0	●	32	32	70	220		1	1.2	1
4040E-4.0	●	40	32	70	160		2	0.88	1
4040EL-4.0	●	40	32	70	220		2	1.2	1

Inserts are sold separately.

### ■ Parts

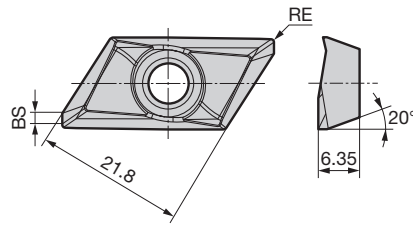
Applicable Cutter	Flat Insert Screw	Wrench	Anti-seizure Cream	
	Other than those below	BFTX0509N	5.0	TRD20
WAX4040E/EL Type	BFTX0511N			

## ■ Insert

Dimensions (mm)

Grade Classification		Cemented Carbide	DLC		
Process	High-speed/Light Cutting	N	N		
	Medium Cutting		N		
	Roughing				
Cat. No.	H1	DL1000	Wiper BS	Corner Radius RE	Fig
<b>AECT 220604PEFRA</b>	●	●	1.5	0.4	1
<b>220608PEFRA</b>	●	●	1.2	0.8	1
<b>220612PEFRA</b>	●	●	0.8	1.2	1
<b>220616PEFRA</b>	●	●	0.4	1.6	1
<b>220620PEFRA</b>	●	●	0.5	2.0	1
<b>220630PEFRA</b>	●	●	0.6	3.0	1
<b>220632PEFRA</b>	●	●	0.4	3.2	1
<b>AECT 220640PEFRA</b>	●	●	1.2	4.0	1
<b>220650PEFRA</b>	●	●	0.4	5.0	1

Fig 1




Inserts with a corner radius of RE = 4.0 or greater are for use with bodies that have a "-4.0" part number suffix.

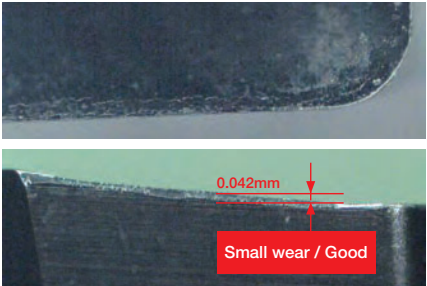
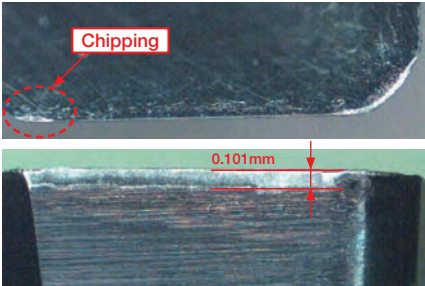
## ■ Recommended Cutting Conditions

ISO	Work Material	Cutting Speed $v_c$ (m/min)	Feed Rate $f_z$ (mm/t)	Insert Grades
		Min. - <b>Optimum</b> - Max.	Min. - <b>Optimum</b> - Max.	
<b>N</b>	Aluminum Alloy	600 - <b>900</b> - 1,200	0.05 - <b>0.15</b> - 0.25	H1 DL1000

**Note** · The cutting conditions above are a guide. Actual conditions will need to be adjusted according to machine rigidity, work clamp rigidity, depth of cut and other factors.  
· For groove milling, adjust the feed rate to around 70% of the above values.

## Application Examples

Aluminum Alloy		Sumitomo	—
	Tool	WAX3063-3.2	—
	Grade	H1	—
	Insert	AECT160420PEFRA	—
	Cutter Dia. (mm)	63	—
	Number of Teeth	5	—
	$V_c$ (m/min)	1,200	—
	$V_f$ (mm/min)	20,000	—
	$f_z$ (mm/t)	0.67	—
	$n$ (min <sup>-1</sup> )	6,000	—
	$a_p$ (mm)	1	—
	$a_e$ (mm)	50 to 63	—
	Coolant	Wet	—
	Results	Improved chip control	

Hard Nylon		Sumitomo	Competitor's Product
	Tool	WAX3050-3.2	—
	Grade	DL1000	—
	Insert	AECT160404PEFRA	—
	Cutter Dia. (mm)	50	—
	Number of Teeth	4	—
	$V_c$ (m/min)	1,256	—
	$V_f$ (mm/min)	2,500	—
	$f_z$ (mm/t)	0.078	—
	$n$ (min <sup>-1</sup> )	8,000	—
	$a_p$ (mm)	0.2 to 0.3	—
	$a_e$ (mm)	—	—
	Coolant	Wet	—
	Results	Excellent wear resistance	

Sumitomo Electric Cutting Tools Official Apps for iOS/Android



Cutting calculation App

### SumiTool Calculator



Grade & chipbreaker comparison App

### SumiTool Converter



#### < SAFETY NOTES >



- Very hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be used. Fire safety precautions must also be considered.

- Please handle with care as this product has sharp edges.
- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.

- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

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