













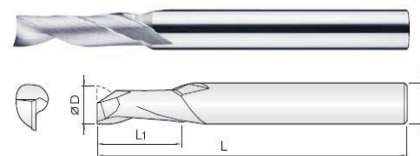
**A00 Series**  
**FOR Acrylonitrile Butadiene Styrene**



**Tool Selection Index**

| Hardness | EDP. NO | Appearance  | Flutes | Types                     | Page |
|----------|---------|---|--------|---------------------------|------|
|          | A50     |  | 1F     | End Mills                 | 196  |
|          | A51     |  | 1F     | Reverse Edge End Mills    | 197  |
|          | A52     |  | 2F     | End Mills                 | 198  |
|          | A53     |  | 3F     | End Mills                 | 199  |
|          | A30     |  | 2F     | Ball End Mills            | 200  |
|          | A31     |  | 3F     | Ball End Mills            | 201  |
|          | A20     |  | 2F     | Micro Rib End Mills       | 202  |
|          | A21     |  | 3F     | Micro Rib End Mills       | 204  |
|          | A10     |  | 2F     | Micro Rib Ball End Mills  | 205  |
|          | A11     |  | 3F     | Micro Rib Ball End Mills  | 207  |
|          | A54     |  | 2F     | Micro Long End Mills      | 208  |
|          | A33     |  | 2F     | Micro Long Ball End Mills | 211  |

**1 Flutes End Mills**

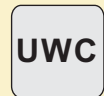


Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
 Excellent chip removing by a helix flute design.  
 Optimum for cut-off and wall machining.  
 Excellent wear resistance by applying ultra fine WC grade.

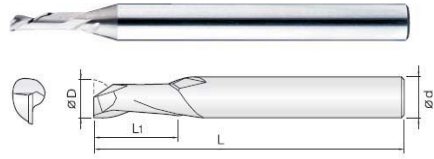
**Cutting Data**  
P217

| Size   | D Tolerance |
|--------|-------------|
| D ≤ Φ5 | +0~ -0.02mm |
| D > Φ5 | +0~ -0.03mm |

| Type               | Part Number        | Dimensions in mm |     |    |    |   | d |
|--------------------|--------------------|------------------|-----|----|----|---|---|
|                    |                    | D                | L1  | L2 | L  |   |   |
| 1                  | A50002005H04Z1-NON | 0.2              | 0.5 |    | 40 | 4 |   |
|                    | A50003009H04Z1-NON | 0.3              | 0.9 |    | 40 | 4 |   |
|                    | A50004012H04Z1-NON | 0.4              | 1.2 |    | 40 | 4 |   |
|                    | A50005015H04Z1-NON | 0.5              | 1.5 |    | 40 | 4 |   |
|                    | A50006018H04Z1-NON | 0.6              | 1.8 |    | 40 | 4 |   |
|                    | A50007021H04Z1-NON | 0.7              | 2.1 |    | 40 | 4 |   |
|                    | A50008024H04Z1-NON | 0.8              | 2.4 |    | 40 | 4 |   |
|                    | A50009027H04Z1-NON | 0.9              | 2.7 |    | 40 | 4 |   |
|                    | A50010030H06Z1-NON | 1                | 3   |    | 45 | 6 |   |
|                    | A50010045H06Z1-NON | 1                | 4.5 |    | 45 | 6 |   |
|                    | A50010060H06Z1-NON | 1                | 6   |    | 50 | 6 |   |
|                    | A50012030H06Z1-NON | 1.2              | 3   |    | 45 | 6 |   |
|                    | A50012050H06Z1-NON | 1.2              | 5   |    | 45 | 6 |   |
|                    | A50012060H06Z1-NON | 1.2              | 6   |    | 50 | 6 |   |
|                    | A50015040H06Z1-NON | 1.5              | 4   |    | 45 | 6 |   |
| A50015060H06Z1-NON | 1.5                | 6                |     | 50 | 6  |   |   |
| A50015080H06Z1-NON | 1.5                | 8                |     | 50 | 6  |   |   |
| A50020060H06Z1-NON | 2                  | 6                |     | 50 | 6  |   |   |
| A50020080H06Z1-NON | 2                  | 8                |     | 50 | 6  |   |   |
| A50020100H06Z1-NON | 2                  | 10               |     | 50 | 6  |   |   |
| A50030080H06Z1-NON | 3                  | 8                |     | 50 | 6  |   |   |
| A50030120H06Z1-NON | 3                  | 12               |     | 50 | 6  |   |   |
| A50030150H06Z1-NON | 3                  | 15               |     | 50 | 6  |   |   |
| A50040100H06Z1-NON | 4                  | 10               |     | 50 | 6  |   |   |
| A50040150H06Z1-NON | 4                  | 15               |     | 50 | 6  |   |   |
| A50040200H06Z1-NON | 4                  | 20               |     | 60 | 6  |   |   |
| A50050130H06Z1-NON | 5                  | 13               |     | 60 | 6  |   |   |
| A50050200H06Z1-NON | 5                  | 20               |     | 60 | 6  |   |   |
| A50050250H06Z1-NON | 5                  | 25               |     | 60 | 6  |   |   |
| A50060150H06Z1-NON | 6                  | 15               |     | 60 | 6  |   |   |
| A50060200H06Z1-NON | 6                  | 20               |     | 60 | 6  |   |   |
| A50060250H06Z1-NON | 6                  | 25               |     | 60 | 6  |   |   |
| A50080190H08Z1-NON | 8                  | 19               |     | 70 | 8  |   |   |
| A50080250H08Z1-NON | 8                  | 25               |     | 75 | 8  |   |   |
| A50100220H10Z1-NON | 10                 | 22               |     | 75 | 10 |   |   |
| A50100300H10Z1-NON | 10                 | 30               |     | 80 | 10 |   |   |
| A50120260H12Z1-NON | 12                 | 26               |     | 75 | 12 |   |   |
| A50120350H12Z1-NON | 12                 | 35               |     | 90 | 12 |   |   |



**1 Flutes Reverse Edge End Mills**

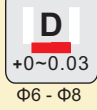
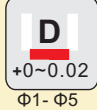


Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
 Downward chip direction by reverse helix design helps chip control.  
 No burr in work materials.  
 Optimum for unstable work clamping.  
 Excellent wear resistance by applying ultra fine WC grade.

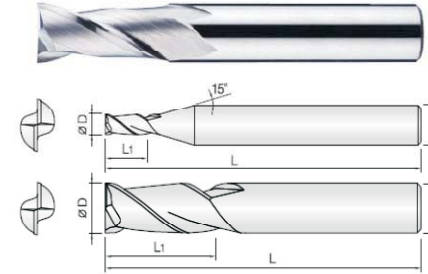
**Cutting Data**  
P217

| Size   | D Tolerance |
|--------|-------------|
| D ≤ Φ5 | +0~ -0.02mm |
| D > Φ5 | +0~ -0.03mm |

| Type               | Part Number        | Dimensions in mm |    |    |    |   | d |
|--------------------|--------------------|------------------|----|----|----|---|---|
|                    |                    | D                | L1 | L2 | L  |   |   |
| 1                  | A51010030H06Z1-NON | 1                | 3  |    | 50 | 6 |   |
|                    | A51010060H06Z1-NON | 1                | 6  |    | 60 | 6 |   |
|                    | A51020060H06Z1-NON | 2                | 6  |    | 60 | 6 |   |
|                    | A51020080H06Z1-NON | 2                | 8  |    | 60 | 6 |   |
|                    | A51030080H06Z1-NON | 3                | 8  |    | 60 | 6 |   |
|                    | A51030120H06Z1-NON | 3                | 12 |    | 65 | 6 |   |
|                    | A51040120H06Z1-NON | 4                | 12 |    | 65 | 6 |   |
|                    | A51040160H06Z1-NON | 4                | 16 |    | 70 | 6 |   |
|                    | A51050220H06Z1-NON | 5                | 22 |    | 75 | 6 |   |
|                    | A51060270H06Z1-NON | 6                | 27 |    | 75 | 6 |   |
| A51080320H08Z1-NON | 8                  | 32               |    | 90 | 8  |   |   |



**2 Flutes End Mills**

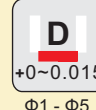
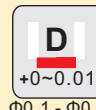


Endmills for Mild steel, Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
 Reinforced edge design for preventing edge chipping.  
 Improve tool performance by even run-out and tolerance control.  
 Excellent wear resistance by applying ultra fine WC grade.

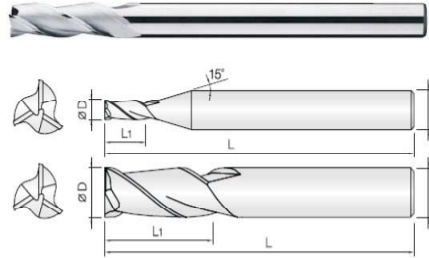
**Cutting Data**  
P215

| Size   | D Tolerance  |
|--------|--------------|
| D < Φ1 | +0~ -0.01mm  |
| D ≤ Φ5 | +0~ -0.015mm |
| D > Φ5 | +0~ -0.02mm  |

| Type | Part Number        | Dimensions in mm |     |    |    |    | d |
|------|--------------------|------------------|-----|----|----|----|---|
|      |                    | D                | L1  | L2 | L  |    |   |
| 2    | A52001002H03Z2-NON | 0.1              | 0.2 |    | 40 | 3  |   |
|      | A52D15003H03Z2-NON | 0.15             | 0.3 |    | 40 | 3  |   |
|      | A52002004H03Z2-NON | 0.2              | 0.4 |    | 40 | 3  |   |
|      | A52003006H03Z2-NON | 0.3              | 0.6 |    | 40 | 3  |   |
|      | A52004008H03Z2-NON | 0.4              | 0.8 |    | 40 | 3  |   |
|      | A52005010H03Z2-NON | 0.5              | 1   |    | 40 | 3  |   |
|      | A52006012H03Z2-NON | 0.6              | 1.2 |    | 40 | 3  |   |
|      | A52007014H03Z2-NON | 0.7              | 1.4 |    | 40 | 3  |   |
|      | A52008016H03Z2-NON | 0.8              | 1.6 |    | 40 | 3  |   |
|      | A52009018H03Z2-NON | 0.9              | 1.8 |    | 40 | 3  |   |
| UWC  | A52010025H03Z2-NON | 1                | 2.5 |    | 40 | 3  |   |
|      | A52010025H06Z2-NON | 1                | 2.5 |    | 40 | 6  |   |
|      | A52011025H03Z2-NON | 1.1              | 2.5 |    | 40 | 3  |   |
|      | A52012035H03Z2-NON | 1.2              | 3.5 |    | 40 | 3  |   |
|      | A52013040H03Z2-NON | 1.3              | 4   |    | 40 | 3  |   |
|      | A52014040H03Z2-NON | 1.4              | 4   |    | 40 | 3  |   |
|      | A52015040H03Z2-NON | 1.5              | 4   |    | 40 | 3  |   |
|      | A52015040H06Z2-NON | 1.5              | 4   |    | 40 | 6  |   |
|      | A52016040H03Z2-NON | 1.6              | 4   |    | 40 | 3  |   |
|      | A52017050H03Z2-NON | 1.7              | 5   |    | 40 | 3  |   |
| D    | A52018055H03Z2-NON | 1.8              | 5.5 |    | 40 | 3  |   |
|      | A52019060H03Z2-NON | 1.9              | 6   |    | 40 | 3  |   |
|      | A52020060H03Z2-NON | 2                | 6   |    | 40 | 3  |   |
|      | A52020060H06Z2-NON | 2                | 6   |    | 40 | 6  |   |
|      | A52025080H03Z2-NON | 2.5              | 8   |    | 40 | 3  |   |
|      | A52030080H03Z2-NON | 3                | 8   |    | 45 | 3  |   |
|      | A52030080H06Z2-NON | 3                | 8   |    | 45 | 6  |   |
|      | A52035100H06Z2-NON | 3.5              | 10  |    | 45 | 6  |   |
|      | A52040110H06Z2-NON | 4                | 11  |    | 45 | 6  |   |
|      | A52045110H06Z2-NON | 4.5              | 11  |    | 45 | 6  |   |
| D    | A52050130H06Z2-NON | 5                | 13  |    | 50 | 6  |   |
|      | A52060130H06Z2-NON | 6                | 13  |    | 50 | 6  |   |
|      | A52070160H08Z2-NON | 7                | 16  |    | 60 | 8  |   |
|      | A52080190H08Z2-NON | 8                | 19  |    | 60 | 8  |   |
|      | A52090190H10Z2-NON | 9                | 19  |    | 70 | 10 |   |
|      | A52100220H10Z2-NON | 10               | 22  |    | 70 | 10 |   |
|      | A52120260H12Z2-NON | 12               | 26  |    | 75 | 12 |   |



**3 Flutes End Mills**



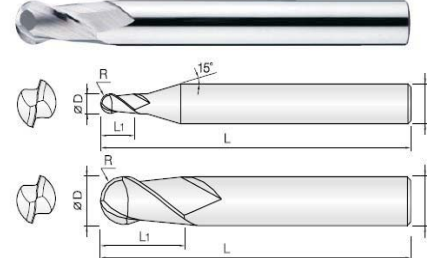
Endmills for Mild steel, Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
Reinforced edge design for preventing edge chipping.  
Minimize chattering by short flute design.  
Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P214

| Size     | D Tolerance  |
|----------|--------------|
| D ≤ Φ0.9 | +0~ -0.01mm  |
| D > Φ0.9 | +0~ -0.015mm |

| Type                        | Part Number        | Dimensions in mm |     |    |     |   | d |
|-----------------------------|--------------------|------------------|-----|----|-----|---|---|
|                             |                    | D                | L1  | L2 | L   |   |   |
| 3                           | A53003008H04Z3-NON | 0.3              | 0.8 |    | 40  | 4 |   |
|                             | A53003012H04Z3-NON | 0.3              | 1.2 |    | 40  | 4 |   |
|                             | A53004010H04Z3-NON | 0.4              | 1   |    | 40  | 4 |   |
|                             | A53004015H04Z3-NON | 0.4              | 1.5 |    | 40  | 4 |   |
|                             | A53005013H04Z3-NON | 0.5              | 1.3 |    | 40  | 4 |   |
|                             | A53005020H04Z3-NON | 0.5              | 2   |    | 45  | 4 |   |
|                             | A53006015H04Z3-NON | 0.6              | 1.5 |    | 40  | 4 |   |
|                             | A53006024H04Z3-NON | 0.6              | 2.4 |    | 45  | 4 |   |
|                             | A53007018H04Z3-NON | 0.7              | 1.8 |    | 40  | 4 |   |
|                             | A53007028H04Z3-NON | 0.7              | 2.8 |    | 45  | 4 |   |
| UWC                         | A53008020H04Z3-NON | 0.8              | 2   |    | 40  | 4 |   |
|                             | A53008032H04Z3-NON | 0.8              | 3.2 |    | 45  | 4 |   |
|                             | A53009025H04Z3-NON | 0.9              | 2.5 |    | 40  | 4 |   |
|                             | A53009036H04Z3-NON | 0.9              | 3.6 |    | 45  | 4 |   |
|                             | A53010025H04Z3-NON | 1                | 2.5 |    | 40  | 4 |   |
|                             | A53010040H04Z3-NON | 1                | 4   |    | 45  | 4 |   |
|                             | A53010060H04Z3-NON | 1                | 6   |    | 50  | 4 |   |
|                             | A53012030H04Z3-NON | 1.2              | 3   |    | 40  | 4 |   |
|                             | A53012050H04Z3-NON | 1.2              | 5   |    | 40  | 4 |   |
|                             | A53012070H04Z3-NON | 1.2              | 7   |    | 50  | 4 |   |
| D<br>+0~0.01<br>Φ0.3 - Φ0.9 | A53015040H04Z3-NON | 1.5              | 4   |    | 40  | 4 |   |
|                             | A53015060H04Z3-NON | 1.5              | 6   |    | 40  | 4 |   |
|                             | A53015090H04Z3-NON | 1.5              | 9   |    | 60  | 4 |   |
|                             | A53020050H04Z3-NON | 2                | 5   |    | 40  | 4 |   |
|                             | A53020080H04Z3-NON | 2                | 8   |    | 50  | 4 |   |
|                             | A53020100H04Z3-NON | 2                | 10  |    | 60  | 4 |   |
|                             | A53025060H04Z3-NON | 2.5              | 6   |    | 45  | 4 |   |
|                             | A53025100H04Z3-NON | 2.5              | 10  |    | 50  | 4 |   |
|                             | A53025150H04Z3-NON | 2.5              | 15  |    | 60  | 4 |   |
|                             | A53030080H04Z3-NON | 3                | 8   |    | 50  | 4 |   |
| D<br>+0~0.02<br>Φ1 - Φ6     | A53030120H04Z3-NON | 3                | 12  |    | 60  | 4 |   |
|                             | A53030150H04Z3-NON | 3                | 15  |    | 80  | 4 |   |
|                             | A53040100H04Z3-NON | 4                | 10  |    | 50  | 4 |   |
|                             | A53040150H04Z3-NON | 4                | 15  |    | 80  | 4 |   |
|                             | A53060200H06Z3-NON | 6                | 20  |    | 80  | 6 |   |
|                             | A53060300H06Z3-NON | 6                | 30  |    | 110 | 6 |   |
|                             | 30°<br>Helix Angle |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |
|                             |                    |                  |     |    |     |   |   |

**2 Flutes Ball End Mills**



Endmills for Mild steel, Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
Improve tool performance by even run-out and tolerance control.  
Very nice work surface finish.  
Excellent wear resistance by applying ultra fine WC grade.

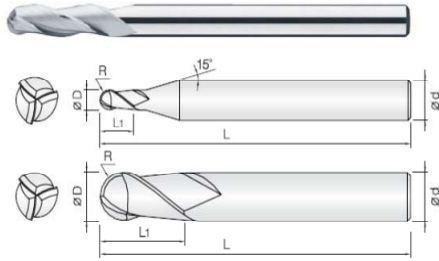
**Cutting Data**  
P214

| Size   | D Tolerance  |
|--------|--------------|
| D ≤ Φ6 | +0~ -0.01mm  |
| D > Φ6 | +0~ -0.015mm |

| Type                      | Part Number        | Dimensions in mm |     |    |     |    | d |
|---------------------------|--------------------|------------------|-----|----|-----|----|---|
|                           |                    | R X D            | L1  | L2 | L   |    |   |
| 2                         | A30001002H03Z2-NON | 0.05R X 0.1      | 0.2 |    | 38  | 3  |   |
|                           | A30D15003H03Z2-NON | 0.075R X         | 0.3 |    | 38  | 3  |   |
|                           | A30002004H03Z2-NON | 0.1R X 0.2       | 0.4 |    | 38  | 3  |   |
|                           | A30003006H03Z2-NON | 0.15R X 0.3      | 0.6 |    | 38  | 3  |   |
|                           | A30004008H03Z2-NON | 0.2R X 0.4       | 0.8 |    | 38  | 3  |   |
|                           | A30005010H03Z2-NON | 0.25R X 0.5      | 1   |    | 38  | 3  |   |
|                           | A30006012H03Z2-NON | 0.3R X 0.6       | 1.2 |    | 38  | 3  |   |
|                           | A30007014H03Z2-NON | 0.35R X 0.7      | 1.4 |    | 38  | 3  |   |
|                           | A30008016H03Z2-NON | 0.4R X 0.8       | 1.6 |    | 38  | 3  |   |
|                           | A30009018H03Z2-NON | 0.45R X 0.9      | 1.8 |    | 38  | 3  |   |
| UWC                       | A30010025H03Z2-NON | 0.5R X 1         | 2.5 |    | 50  | 3  |   |
|                           | A30010025H06Z2-NON | 0.5R X 1         | 2.5 |    | 50  | 6  |   |
|                           | A30010025100Z2-NON | 0.5R X 1         | 2.5 |    | 100 | 6  |   |
|                           | A30011025H03Z2-NON | 0.55R X 1.1      | 2.5 |    | 50  | 3  |   |
|                           | A30012030H03Z2-NON | 0.6R X 1.2       | 3   |    | 50  | 3  |   |
|                           | A30015040H03Z2-NON | 0.75R X 1.5      | 4   |    | 50  | 3  |   |
|                           | A30015040100Z2-NON | 0.75R X 1.5      | 4   |    | 100 | 6  |   |
|                           | A30020050H03Z2-NON | 1R X 2           | 5   |    | 50  | 3  |   |
|                           | A30020050H06Z2-NON | 1R X 2           | 5   |    | 50  | 6  |   |
|                           | A30020050100Z2-NON | 1R X 2           | 5   |    | 100 | 6  |   |
| R<br>±0.005<br>0.05R - 3R | A30025060H03Z2-NON | 1.25R X 2.5      | 6   |    | 50  | 3  |   |
|                           | A30025060100Z2-NON | 1.25R X 2.5      | 6   |    | 100 | 6  |   |
|                           | A30030080H03Z2-NON | 1.5R X 3         | 8   |    | 60  | 3  |   |
|                           | A30030080H06Z2-NON | 1.5R X 3         | 8   |    | 60  | 6  |   |
|                           | A30030080100Z2-NON | 1.5R X 3         | 8   |    | 100 | 6  |   |
|                           | A30035080H06Z2-NON | 1.75R X 3.5      | 8   |    | 65  | 6  |   |
|                           | A30040080H06Z2-NON | 2R X 4           | 8   |    | 65  | 6  |   |
|                           | A30040080120Z2-NON | 2R X 4           | 8   |    | 120 | 6  |   |
|                           | A30050120H06Z2-NON | 2.5R X 5         | 12  |    | 75  | 6  |   |
|                           | A30060120080Z2-NON | 3R X 6           | 12  |    | 80  | 6  |   |
| R<br>±0.01<br>4R - 6R     | A30060120100Z2-NON | 3R X 6           | 12  |    | 100 | 6  |   |
|                           | A30080140090Z2-NON | 4R X 8           | 14  |    | 90  | 8  |   |
|                           | A30080140110Z2-NON | 4R X 8           | 14  |    | 110 | 8  |   |
|                           | A30100180100Z2-NON | 5R X 10          | 18  |    | 100 | 10 |   |
|                           | A30100180120Z2-NON | 5R X 10          | 18  |    | 120 | 10 |   |
|                           | A30120220110Z2-NON | 6R X 12          | 22  |    | 110 | 12 |   |
|                           | A30120220130Z2-NON | 6R X 12          | 22  |    | 130 | 12 |   |
|                           | 30°<br>Helix Angle |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |
|                           |                    |                  |     |    |     |    |   |



**3 Flutes Ball End Mills**



Endmills for Mild steel, Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.

Minimize chattering by short flute design.

Very nice work surface finish.

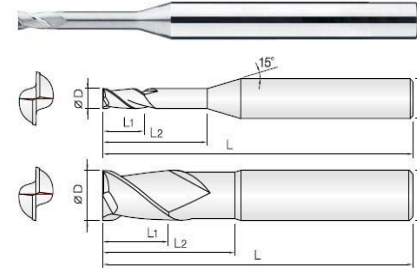
Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P214

| Size   | D Tolerance  |
|--------|--------------|
| D ≤ Φ6 | +0~ -0.01mm  |
| D > Φ6 | +0~ -0.015mm |

| Type                 | Part Number        | Dimensions in mm |     |    |     |   | d |
|----------------------|--------------------|------------------|-----|----|-----|---|---|
|                      |                    | R X D            | L1  | L2 | L   |   |   |
| 3                    | A31003008H04Z3-NON | 0.15R X 0.3      | 0.8 |    | 40  | 4 |   |
|                      | A31003012H04Z3-NON | 0.15R X 0.3      | 1.2 |    | 40  | 4 |   |
|                      | A31004010H04Z3-NON | 0.2R X 0.4       | 1   |    | 40  | 4 |   |
|                      | A31004015H04Z3-NON | 0.2R X 0.4       | 1.5 |    | 40  | 4 |   |
|                      | A31005013H04Z3-NON | 0.25R X 0.5      | 1.3 |    | 45  | 4 |   |
|                      | A31005020H04Z3-NON | 0.25R X 0.5      | 2   |    | 45  | 4 |   |
|                      | A31006015H04Z3-NON | 0.3R X 0.6       | 1.5 |    | 45  | 4 |   |
|                      | A31006024H04Z3-NON | 0.3R X 0.6       | 2.4 |    | 45  | 4 |   |
|                      | A31007018H04Z3-NON | 0.35R X 0.7      | 1.8 |    | 45  | 4 |   |
|                      | A31007028H04Z3-NON | 0.35R X 0.7      | 2.8 |    | 45  | 4 |   |
| UWC                  | A31008020H04Z3-NON | 0.4R X 0.8       | 2   |    | 45  | 4 |   |
|                      | A31008032H04Z3-NON | 0.4R X 0.8       | 3.2 |    | 45  | 4 |   |
|                      | A31009025H04Z3-NON | 0.45R X 0.9      | 2.5 |    | 50  | 4 |   |
|                      | A31009036H04Z3-NON | 0.45R X 0.9      | 3.6 |    | 50  | 4 |   |
|                      | A31010025H04Z3-NON | 0.5R X 1         | 2.5 |    | 50  | 4 |   |
|                      | A31010040H04Z3-NON | 0.5R X 1         | 4   |    | 50  | 4 |   |
|                      | A31010060H04Z3-NON | 0.5R X 1         | 6   |    | 60  | 4 |   |
|                      | A31012030H04Z3-NON | 0.6R X 1.2       | 3   |    | 50  | 4 |   |
|                      | A31012050H04Z3-NON | 0.6R X 1.2       | 5   |    | 50  | 4 |   |
|                      | A31012070H04Z3-NON | 0.6R X 1.2       | 7   |    | 60  | 4 |   |
| ±0.005<br>0.15R - 2R | A31015040H04Z3-NON | 0.75R X 1.5      | 4   |    | 50  | 4 |   |
|                      | A31015060H04Z3-NON | 0.75R X 1.5      | 6   |    | 50  | 4 |   |
|                      | A31015090H04Z3-NON | 0.75R X 1.5      | 9   |    | 60  | 4 |   |
|                      | A31020050H04Z3-NON | 1R X 2           | 5   |    | 50  | 4 |   |
|                      | A31020080H04Z3-NON | 1R X 2           | 8   |    | 50  | 4 |   |
|                      | A31020100H04Z3-NON | 1R X 2           | 10  |    | 60  | 4 |   |
|                      | A31025060H04Z3-NON | 1.25R X 2.5      | 6   |    | 50  | 4 |   |
|                      | A31025100H04Z3-NON | 1.25R X 2.5      | 10  |    | 60  | 4 |   |
|                      | A31025150H04Z3-NON | 1.25R X 2.5      | 15  |    | 70  | 4 |   |
|                      | A31030080H04Z3-NON | 1.5R X 3         | 8   |    | 50  | 4 |   |
| ±0.01<br>3R          | A31030120H04Z3-NON | 1.5R X 3         | 12  |    | 60  | 4 |   |
|                      | A31030150H04Z3-NON | 1.5R X 3         | 15  |    | 80  | 4 |   |
|                      | A31040100H04Z3-NON | 2R X 4           | 10  |    | 60  | 4 |   |
|                      | A31040150H04Z3-NON | 2R X 4           | 15  |    | 80  | 4 |   |
|                      | A31060200H06Z3-NON | 3R X 6           | 20  |    | 80  | 6 |   |
|                      | A31060300H06Z3-NON | 3R X 6           | 30  |    | 110 | 6 |   |
|                      | 30°<br>Helix Angle |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |
|                      |                    |                  |     |    |     |   |   |

**2 Flutes Micro Rib End Mills**



Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.

Minimize chattering by short flute design.

Excellent tool rigidity by short flute design at high speed, feed machining.

Reinforced edge design for preventing edge chipping.

Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P215

| Size   | D Tolerance |
|--------|-------------|
| D ≤ Φ5 | +0~ -0.01mm |
| D > Φ5 | +0~ -0.02mm |

| Type                 | Part Number        | Dimensions in mm |      |     |    |   | d |
|----------------------|--------------------|------------------|------|-----|----|---|---|
|                      |                    | D                | L1   | L2  | L  |   |   |
| 2                    | A20002005H04Z2-NON | 0.2              | 0.3  | 0.5 | 40 | 4 |   |
|                      | A20002010H04Z2-NON | 0.2              | 0.3  | 1   | 40 | 4 |   |
|                      | A20002015H04Z2-NON | 0.2              | 0.3  | 1.5 | 40 | 4 |   |
|                      | A20002020H04Z2-NON | 0.2              | 0.3  | 2   | 40 | 4 |   |
|                      | A20003010H04Z2-NON | 0.3              | 0.45 | 1   | 40 | 4 |   |
|                      | A20003020H04Z2-NON | 0.3              | 0.45 | 2   | 40 | 4 |   |
|                      | A20003030H04Z2-NON | 0.3              | 0.45 | 3   | 40 | 4 |   |
|                      | A20003050H04Z2-NON | 0.3              | 0.45 | 5   | 40 | 4 |   |
|                      | A20004020H04Z2-NON | 0.4              | 0.6  | 2   | 40 | 4 |   |
|                      | A20004030H04Z2-NON | 0.4              | 0.6  | 3   | 40 | 4 |   |
| UWC                  | A20004040H04Z2-NON | 0.4              | 0.6  | 4   | 40 | 4 |   |
|                      | A20004050H04Z2-NON | 0.4              | 0.6  | 5   | 40 | 4 |   |
|                      | A20004060H04Z2-NON | 0.4              | 0.6  | 6   | 40 | 4 |   |
|                      | A20005020H04Z2-NON | 0.5              | 1    | 2   | 45 | 4 |   |
|                      | A20005040H04Z2-NON | 0.5              | 1    | 4   | 45 | 4 |   |
|                      | A20005060H04Z2-NON | 0.5              | 1    | 6   | 45 | 4 |   |
|                      | A20005080H04Z2-NON | 0.5              | 1    | 8   | 45 | 4 |   |
|                      | A20005100H04Z2-NON | 0.5              | 1    | 10  | 45 | 4 |   |
|                      | A20006020H04Z2-NON | 0.6              | 1.2  | 2   | 45 | 4 |   |
|                      | A20006040H04Z2-NON | 0.6              | 1.2  | 4   | 45 | 4 |   |
| +0~0.01<br>Φ0.2 - Φ5 | A20006060H04Z2-NON | 0.6              | 1.2  | 6   | 45 | 4 |   |
|                      | A20006080H04Z2-NON | 0.6              | 1.2  | 8   | 45 | 4 |   |
|                      | A20006100H04Z2-NON | 0.6              | 1.2  | 10  | 45 | 4 |   |
|                      | A20007040H04Z2-NON | 0.7              | 1.4  | 4   | 45 | 4 |   |
|                      | A20007060H04Z2-NON | 0.7              | 1.4  | 6   | 45 | 4 |   |
|                      | A20007080H04Z2-NON | 0.7              | 1.4  | 8   | 45 | 4 |   |
|                      | A20007100H04Z2-NON | 0.7              | 1.4  | 10  | 45 | 4 |   |
|                      | A20008040H04Z2-NON | 0.8              | 1.6  | 4   | 45 | 4 |   |
|                      | A20008060H04Z2-NON | 0.8              | 1.6  | 6   | 45 | 4 |   |
|                      | A20008080H04Z2-NON | 0.8              | 1.6  | 8   | 45 | 4 |   |
| +0~0.02<br>Φ6        | A20008100H04Z2-NON | 0.8              | 1.6  | 10  | 45 | 4 |   |
|                      | A20008120H04Z2-NON | 0.8              | 1.6  | 12  | 45 | 4 |   |
|                      | A20009060H04Z2-NON | 0.9              | 1.8  | 6   | 45 | 4 |   |
|                      | A20009100H04Z2-NON | 0.9              | 1.8  | 10  | 45 | 4 |   |
|                      | A20009120H04Z2-NON | 0.9              | 1.8  | 12  | 45 | 4 |   |
|                      | A20010060H04Z2-NON | 1                | 2    | 6   | 50 | 4 |   |
|                      | A20010080H04Z2-NON | 1                | 2    | 8   | 50 | 4 |   |
|                      | A20010100H04Z2-NON | 1                | 2    | 10  | 50 | 4 |   |
|                      | A20010120H04Z2-NON | 1                | 2    | 12  | 50 | 4 |   |
|                      | A20010160H04Z2-NON | 1                | 2    | 16  | 50 | 4 |   |
| 30°<br>Helix Angle   | A20010200H04Z2-NON | 1                | 2    | 20  | 60 | 4 |   |
|                      | A20010250H04Z2-NON | 1                | 2    | 25  | 60 | 4 |   |
|                      | A20012060H04Z2-NON | 1.2              | 2.4  | 6   | 50 | 4 |   |
|                      | A20012080H04Z2-NON | 1.2              | 2.4  | 8   | 50 | 4 |   |
|                      | A20012100H04Z2-NON | 1.2              | 2.4  | 10  | 50 | 4 |   |
|                      | A20012120H04Z2-NON | 1.2              | 2.4  | 12  | 50 | 4 |   |
|                      | A20012160H04Z2-NON | 1.2              | 2.4  | 16  | 50 | 4 |   |
|                      | A20014060H04Z2-NON | 1.4              | 2.8  | 6   | 50 | 4 |   |





| Type | Part Number        | Dimensions in mm |     |    |     |   | d |
|------|--------------------|------------------|-----|----|-----|---|---|
|      |                    | D                | L1  | L2 | L   |   |   |
|      | A20014100H04Z2-NON | 1.4              | 2.8 | 10 | 50  | 4 |   |
|      | A20014160H04Z2-NON | 1.4              | 2.8 | 16 | 50  | 4 |   |
|      | A20015060H04Z2-NON | 1.5              | 3   | 6  | 50  | 4 |   |
|      | A20015100H04Z2-NON | 1.5              | 3   | 10 | 50  | 4 |   |
|      | A20015140H04Z2-NON | 1.5              | 3   | 14 | 50  | 4 |   |
|      | A20015160H04Z2-NON | 1.5              | 3   | 16 | 50  | 4 |   |
|      | A20015200H04Z2-NON | 1.5              | 3   | 20 | 60  | 4 |   |
|      | A20015250H04Z2-NON | 1.5              | 3   | 25 | 60  | 4 |   |
|      | A20015300H04Z2-NON | 1.5              | 3   | 30 | 70  | 4 |   |
|      | A20016060H04Z2-NON | 1.6              | 3.2 | 6  | 50  | 4 |   |
|      | A20020080H04Z2-NON | 2                | 4   | 8  | 50  | 4 |   |
|      | A20020100H04Z2-NON | 2                | 4   | 10 | 50  | 4 |   |
|      | A20020120H04Z2-NON | 2                | 4   | 12 | 50  | 4 |   |
|      | A20020140H04Z2-NON | 2                | 4   | 14 | 50  | 4 |   |
|      | A20020160H04Z2-NON | 2                | 4   | 16 | 50  | 4 |   |
|      | A20020180H04Z2-NON | 2                | 4   | 18 | 50  | 4 |   |
|      | A20020200H04Z2-NON | 2                | 4   | 20 | 60  | 4 |   |
|      | A20020250H04Z2-NON | 2                | 4   | 25 | 60  | 4 |   |
|      | A20020300H04Z2-NON | 2                | 4   | 30 | 70  | 4 |   |
|      | A20020350H04Z2-NON | 2                | 4   | 35 | 80  | 4 |   |
|      | A20020400H04Z2-NON | 2                | 4   | 40 | 80  | 4 |   |
|      | A20025120H04Z2-NON | 2.5              | 5   | 12 | 60  | 4 |   |
|      | A20025200H04Z2-NON | 2.5              | 5   | 20 | 60  | 4 |   |
|      | A20030080H06Z2-NON | 3                | 6   | 8  | 70  | 6 |   |
|      | A20030120H06Z2-NON | 3                | 6   | 12 | 70  | 6 |   |
|      | A20030160H06Z2-NON | 3                | 6   | 16 | 70  | 6 |   |
|      | A20030200H06Z2-NON | 3                | 6   | 20 | 70  | 6 |   |
|      | A20030250H06Z2-NON | 3                | 6   | 25 | 70  | 6 |   |
|      | A20030300H06Z2-NON | 3                | 6   | 30 | 80  | 6 |   |
|      | A20030400H06Z2-NON | 3                | 6   | 40 | 90  | 6 |   |
|      | A20030450H06Z2-NON | 3                | 6   | 45 | 90  | 6 |   |
|      | A20040120H06Z2-NON | 4                | 8   | 12 | 70  | 6 |   |
|      | A20040160H06Z2-NON | 4                | 8   | 16 | 70  | 6 |   |
|      | A20040200H06Z2-NON | 4                | 8   | 20 | 70  | 6 |   |
|      | A20040250H06Z2-NON | 4                | 8   | 25 | 70  | 6 |   |
|      | A20040300H06Z2-NON | 4                | 8   | 30 | 70  | 6 |   |
|      | A20040350H06Z2-NON | 4                | 8   | 35 | 80  | 6 |   |
|      | A20040400H06Z2-NON | 4                | 8   | 40 | 80  | 6 |   |
|      | A20040500H06Z2-NON | 4                | 8   | 50 | 100 | 6 |   |
|      | A20050160H06Z2-NON | 5                | 10  | 16 | 80  | 6 |   |
|      | A20050250H06Z2-NON | 5                | 10  | 25 | 80  | 6 |   |
|      | A20050350H06Z2-NON | 5                | 10  | 35 | 80  | 6 |   |
|      | A20060250H06Z2-NON | 6                | 12  | 25 | 80  | 6 |   |
|      | A20060350H06Z2-NON | 6                | 12  | 35 | 80  | 6 |   |
|      | A20060500H06Z2-NON | 6                | 12  | 50 | 120 | 6 |   |
|      | A20060600H06Z2-NON | 6                | 12  | 60 | 120 | 6 |   |



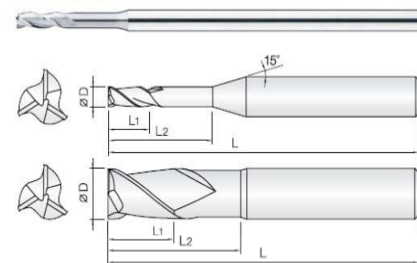
**UWC**

**D**  
+0~-0.01  
Φ0.2 - Φ5

**D**  
+0~-0.02  
Φ6

**30°**  
Helix Angle

**3 Flutes Micro Rib End Mills**



Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.

Minimize chattering by short flute design.

Excellent tool rigidity by short flute design at high speed, feed machining.

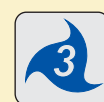
Reinforced edge design for preventing edge chipping.

Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P215

| Size   | D Tolerance |
|--------|-------------|
| D ≤ Φ4 | +0~-0.01mm  |
| D > Φ4 | +0~-0.02mm  |

| Type | Part Number        | Dimensions in mm |     |    |     |    | d |
|------|--------------------|------------------|-----|----|-----|----|---|
|      |                    | D                | L1  | L2 | L   |    |   |
|      | A21010050H04Z3-NON | 1                | 3   | 5  | 70  | 4  |   |
|      | A21010100H04Z3-NON | 1                | 3   | 10 | 70  | 4  |   |
|      | A21010150H04Z3-NON | 1                | 3   | 15 | 70  | 4  |   |
|      | A21010200H04Z3-NON | 1                | 3   | 20 | 70  | 4  |   |
|      | A21010250H04Z3-NON | 1                | 3   | 25 | 70  | 4  |   |
|      | A21015100H04Z3-NON | 1.5              | 4.5 | 10 | 70  | 4  |   |
|      | A21015150H04Z3-NON | 1.5              | 4.5 | 15 | 70  | 4  |   |
|      | A21015200H04Z3-NON | 1.5              | 4.5 | 20 | 70  | 4  |   |
|      | A21015250H04Z3-NON | 1.5              | 4.5 | 25 | 70  | 4  |   |
|      | A21015300H04Z3-NON | 1.5              | 4.5 | 30 | 70  | 4  |   |
|      | A21020100H04Z3-NON | 2                | 6   | 10 | 70  | 4  |   |
|      | A21020150H04Z3-NON | 2                | 6   | 15 | 70  | 4  |   |
|      | A21020200H04Z3-NON | 2                | 6   | 20 | 70  | 4  |   |
|      | A21020250H04Z3-NON | 2                | 6   | 25 | 70  | 4  |   |
|      | A21020300H04Z3-NON | 2                | 6   | 30 | 70  | 4  |   |
|      | A21030200080Z3-NON | 3                | 15  | 20 | 80  | 3  |   |
|      | A21030200H04Z3-NON | 3                | 9   | 20 | 80  | 4  |   |
|      | A21030300100Z3-NON | 3                | 15  | 30 | 100 | 3  |   |
|      | A21030300H04Z3-NON | 3                | 9   | 30 | 80  | 4  |   |
|      | A21040200080Z3-NON | 4                | 12  | 20 | 80  | 4  |   |
|      | A21040300100Z3-NON | 4                | 12  | 30 | 100 | 4  |   |
|      | A21060300100Z3-NON | 6                | 18  | 30 | 100 | 6  |   |
|      | A21060400150Z3-NON | 6                | 18  | 40 | 150 | 6  |   |
|      | A21080400120Z3-NON | 8                | 24  | 40 | 120 | 8  |   |
|      | A21080500150Z3-NON | 8                | 24  | 50 | 150 | 8  |   |
|      | A21100500120Z3-NON | 10               | 30  | 50 | 120 | 10 |   |
|      | A21100600150Z3-NON | 10               | 30  | 60 | 150 | 10 |   |
|      | A21120600150Z3-NON | 12               | 36  | 60 | 150 | 12 |   |
|      | A21160700160Z3-NON | 16               | 54  | 70 | 160 | 16 |   |



**UWC**

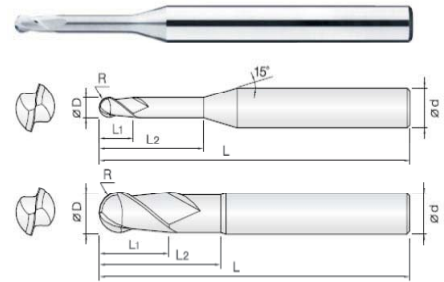
**D**  
+0~-0.01  
Φ1 - Φ4

**D**  
+0~-0.02  
Φ6 - Φ16

**30°**  
Helix Angle



**2 Flutes Micro Rib Ball End Mills**



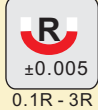
Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.

Minimize chattering by short flute design.  
Excellent tool rigidity by short flute design at high speed, feed machining.  
Reinforced edge design for preventing edge chipping.  
Excellent wear resistance by applying ultra fine WC grade.

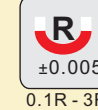
**Cutting Data**  
P216

| Size   | D Tolerance  |
|--------|--------------|
| D ≤ Φ6 | +0~ -0.01mm  |
| D > Φ6 | +0~ -0.015mm |

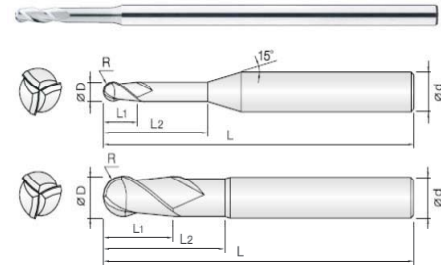
| Type               | Part Number        | Dimensions in mm |      |     |    |   | d |
|--------------------|--------------------|------------------|------|-----|----|---|---|
|                    |                    | R X D            | L1   | L2  | L  |   |   |
| 2                  | A10002005H04Z2-NON | 0.1R X 0.2       | 0.3  | 0.5 | 40 | 4 |   |
|                    | A10002010H04Z2-NON | 0.1R X 0.2       | 0.3  | 1   | 40 | 4 |   |
|                    | A10002015H04Z2-NON | 0.1R X 0.2       | 0.3  | 1.5 | 40 | 4 |   |
|                    | A10002020H04Z2-NON | 0.1R X 0.2       | 0.3  | 2   | 40 | 4 |   |
|                    | A10003010H04Z2-NON | 0.15R X 0.3      | 0.45 | 1   | 40 | 4 |   |
|                    | A10003020H04Z2-NON | 0.15R X 0.3      | 0.45 | 2   | 40 | 4 |   |
|                    | A10003030H04Z2-NON | 0.15R X 0.3      | 0.45 | 3   | 40 | 4 |   |
|                    | A10003050H04Z2-NON | 0.15R X 0.3      | 0.45 | 5   | 40 | 4 |   |
|                    | A10004020H04Z2-NON | 0.2R X 0.4       | 0.6  | 2   | 40 | 4 |   |
|                    | A10004030H04Z2-NON | 0.2R X 0.4       | 0.6  | 3   | 40 | 4 |   |
| A10004040H04Z2-NON | 0.2R X 0.4         | 0.6              | 4    | 40  | 4  |   |   |
| A10004050H04Z2-NON | 0.2R X 0.4         | 0.6              | 5    | 40  | 4  |   |   |
| A10004060H04Z2-NON | 0.2R X 0.4         | 0.6              | 6    | 40  | 4  |   |   |
| A10005020H04Z2-NON | 0.25R X 0.5        | 1                | 2    | 45  | 4  |   |   |
| A10005040H04Z2-NON | 0.25R X 0.5        | 1                | 4    | 45  | 4  |   |   |
| A10005060H04Z2-NON | 0.25R X 0.5        | 1                | 6    | 45  | 4  |   |   |
| A10005080H04Z2-NON | 0.25R X 0.5        | 1                | 8    | 45  | 4  |   |   |
| A10005100H04Z2-NON | 0.25R X 0.5        | 1                | 10   | 45  | 4  |   |   |
| A10006020H04Z2-NON | 0.3R X 0.6         | 1.2              | 2    | 45  | 4  |   |   |
| A10006040H04Z2-NON | 0.3R X 0.6         | 1.2              | 4    | 45  | 4  |   |   |
| A10006060H04Z2-NON | 0.3R X 0.6         | 1.2              | 6    | 45  | 4  |   |   |
| A10006080H04Z2-NON | 0.3R X 0.6         | 1.2              | 8    | 45  | 4  |   |   |
| A10006100H04Z2-NON | 0.3R X 0.6         | 1.2              | 10   | 45  | 4  |   |   |
| A10007040H04Z2-NON | 0.35R X 0.7        | 1.4              | 4    | 45  | 4  |   |   |
| A10007060H04Z2-NON | 0.35R X 0.7        | 1.4              | 6    | 45  | 4  |   |   |
| A10007080H04Z2-NON | 0.35R X 0.7        | 1.4              | 8    | 45  | 4  |   |   |
| A10007100H04Z2-NON | 0.35R X 0.7        | 1.4              | 10   | 45  | 4  |   |   |
| A10008040H04Z2-NON | 0.4R X 0.8         | 1.6              | 4    | 45  | 4  |   |   |
| A10008060H04Z2-NON | 0.4R X 0.8         | 1.6              | 6    | 45  | 4  |   |   |
| A10008080H04Z2-NON | 0.4R X 0.8         | 1.6              | 8    | 45  | 4  |   |   |
| A10008100H04Z2-NON | 0.4R X 0.8         | 1.6              | 10   | 45  | 4  |   |   |
| A10008120H04Z2-NON | 0.4R X 0.8         | 1.6              | 12   | 45  | 4  |   |   |
| A10009060H04Z2-NON | 0.45R X 0.9        | 1.8              | 6    | 45  | 4  |   |   |
| A10009100H04Z2-NON | 0.45R X 0.9        | 1.8              | 10   | 45  | 4  |   |   |
| A10009120H04Z2-NON | 0.45R X 0.9        | 1.8              | 12   | 45  | 4  |   |   |
| A10010060H04Z2-NON | 0.5R X 1           | 2                | 6    | 50  | 4  |   |   |
| A10010080H04Z2-NON | 0.5R X 1           | 2                | 8    | 50  | 4  |   |   |
| A10010100H04Z2-NON | 0.5R X 1           | 2                | 10   | 50  | 4  |   |   |
| A10010120H04Z2-NON | 0.5R X 1           | 2                | 12   | 50  | 4  |   |   |
| A10010160H04Z2-NON | 0.5R X 1           | 2                | 16   | 50  | 4  |   |   |
| A10010200H04Z2-NON | 0.5R X 1           | 2                | 20   | 60  | 4  |   |   |
| A10010250H04Z2-NON | 0.5R X 1           | 2                | 25   | 60  | 4  |   |   |
| A10012060H04Z2-NON | 0.6R X 1.2         | 2.4              | 6    | 50  | 4  |   |   |
| A10012080H04Z2-NON | 0.6R X 1.2         | 2.4              | 8    | 50  | 4  |   |   |
| A10012100H04Z2-NON | 0.6R X 1.2         | 2.4              | 10   | 50  | 4  |   |   |
| A10012120H04Z2-NON | 0.6R X 1.2         | 2.4              | 12   | 50  | 4  |   |   |
| A10012160H04Z2-NON | 0.6R X 1.2         | 2.4              | 16   | 50  | 4  |   |   |
| A10014060H04Z2-NON | 0.7R X 1.4         | 2.8              | 6    | 50  | 4  |   |   |



| Type               | Part Number        | Dimensions in mm |     |     |    |   | d |
|--------------------|--------------------|------------------|-----|-----|----|---|---|
|                    |                    | R X D            | L1  | L2  | L  |   |   |
| 2                  | A10014100H04Z2-NON | 0.7R X 1.4       | 2.8 | 10  | 50 | 4 |   |
|                    | A10014160H04Z2-NON | 0.7R X 1.4       | 2.8 | 16  | 50 | 4 |   |
|                    | A10015060H04Z2-NON | 0.75R X 1.5      | 3   | 6   | 50 | 4 |   |
|                    | A10015100H04Z2-NON | 0.75R X 1.5      | 3   | 10  | 50 | 4 |   |
|                    | A10015140H04Z2-NON | 0.75R X 1.5      | 3   | 14  | 50 | 4 |   |
|                    | A10015160H04Z2-NON | 0.75R X 1.5      | 3   | 16  | 50 | 4 |   |
|                    | A10015200H04Z2-NON | 0.75R X 1.5      | 3   | 20  | 60 | 4 |   |
|                    | A10015250H04Z2-NON | 0.75R X 1.5      | 3   | 25  | 60 | 4 |   |
|                    | A10015300H04Z2-NON | 0.75R X 1.5      | 3   | 30  | 70 | 4 |   |
|                    | A10016060H04Z2-NON | 0.8R X 1.6       | 3.2 | 6   | 50 | 4 |   |
| A10020080H04Z2-NON | 1R X 2             | 4                | 8   | 50  | 4  |   |   |
| A10020100H04Z2-NON | 1R X 2             | 4                | 10  | 50  | 4  |   |   |
| A10020120H04Z2-NON | 1R X 2             | 4                | 12  | 50  | 4  |   |   |
| A10020140H04Z2-NON | 1R X 2             | 4                | 14  | 50  | 4  |   |   |
| A10020160H04Z2-NON | 1R X 2             | 4                | 16  | 50  | 4  |   |   |
| A10020180H04Z2-NON | 1R X 2             | 4                | 18  | 50  | 4  |   |   |
| A10020200H04Z2-NON | 1R X 2             | 4                | 20  | 60  | 4  |   |   |
| A10020250H04Z2-NON | 1R X 2             | 4                | 25  | 60  | 4  |   |   |
| A10020300H04Z2-NON | 1R X 2             | 4                | 30  | 70  | 4  |   |   |
| A10020350H04Z2-NON | 1R X 2             | 4                | 35  | 80  | 4  |   |   |
| A10020400H04Z2-NON | 1R X 2             | 4                | 40  | 80  | 4  |   |   |
| A10025120H04Z2-NON | 1.25R X 2.5        | 5                | 12  | 60  | 4  |   |   |
| A10025200H04Z2-NON | 1.25R X 2.5        | 5                | 20  | 60  | 4  |   |   |
| A10030080H06Z2-NON | 1.5R X 3           | 6                | 8   | 70  | 6  |   |   |
| A10030120H06Z2-NON | 1.5R X 3           | 6                | 12  | 70  | 6  |   |   |
| A10030160H06Z2-NON | 1.5R X 3           | 6                | 16  | 70  | 6  |   |   |
| A10030200H06Z2-NON | 1.5R X 3           | 6                | 20  | 70  | 6  |   |   |
| A10030250H06Z2-NON | 1.5R X 3           | 6                | 25  | 70  | 6  |   |   |
| A10030300H06Z2-NON | 1.5R X 3           | 6                | 30  | 80  | 6  |   |   |
| A10030400H06Z2-NON | 1.5R X 3           | 6                | 40  | 90  | 6  |   |   |
| A10030450H06Z2-NON | 1.5R X 3           | 6                | 45  | 90  | 6  |   |   |
| A10040120H06Z2-NON | 2R X 4             | 8                | 12  | 70  | 6  |   |   |
| A10040160H06Z2-NON | 2R X 4             | 8                | 16  | 70  | 6  |   |   |
| A10040200H06Z2-NON | 2R X 4             | 8                | 20  | 70  | 6  |   |   |
| A10040250H06Z2-NON | 2R X 4             | 8                | 25  | 70  | 6  |   |   |
| A10040300H06Z2-NON | 2R X 4             | 8                | 30  | 70  | 6  |   |   |
| A10040350H06Z2-NON | 2R X 4             | 8                | 35  | 80  | 6  |   |   |
| A10040400H06Z2-NON | 2R X 4             | 8                | 40  | 80  | 6  |   |   |
| A10040500H06Z2-NON | 2R X 4             | 8                | 50  | 100 | 6  |   |   |
| A10050160H06Z2-NON | 2.5R X 5           | 10               | 16  | 80  | 6  |   |   |
| A10050250H06Z2-NON | 2.5R X 5           | 10               | 25  | 80  | 6  |   |   |
| A10050350H06Z2-NON | 2.5R X 5           | 10               | 35  | 80  | 6  |   |   |
| A10060250H06Z2-NON | 3R X 6             | 12               | 25  | 80  | 6  |   |   |
| A10060350H06Z2-NON | 3R X 6             | 12               | 35  | 80  | 6  |   |   |
| A10060500H06Z2-NON | 3R X 6             | 12               | 50  | 120 | 6  |   |   |
| A10060600H06Z2-NON | 3R X 6             | 12               | 60  | 120 | 6  |   |   |



**3 Flutes Micro Rib Ball End Mills**



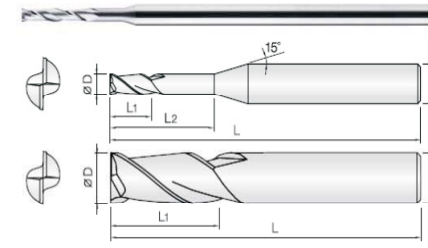
Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
 Minimize chattering by short flute design.  
 Optimum for high speed, feed condition by short flute design.  
 Reinforced edge design for preventing edge chipping.  
 Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P216

| Size   | D Tolerance  |
|--------|--------------|
| D ≤ Φ6 | +0~ -0.01mm  |
| D > Φ6 | +0~ -0.015mm |

| Type                | Part Number        | Dimensions in mm |     |    |     |    | d |
|---------------------|--------------------|------------------|-----|----|-----|----|---|
|                     |                    | R X D            | L1  | L2 | L   |    |   |
| 3                   | A11010050H04Z3-NON | 0.5R X 1         | 3   | 5  | 70  | 4  |   |
|                     | A11010100H04Z3-NON | 0.5R X 1         | 3   | 10 | 70  | 4  |   |
|                     | A11010150H04Z3-NON | 0.5R X 1         | 3   | 15 | 70  | 4  |   |
| UWC                 | A11010200H04Z3-NON | 0.5R X 1         | 3   | 20 | 70  | 4  |   |
|                     | A11010250H04Z3-NON | 0.5R X 1         | 3   | 25 | 70  | 4  |   |
|                     | A11015100H04Z3-NON | 0.75R X 1.5      | 4.5 | 10 | 70  | 4  |   |
|                     | A11015150H04Z3-NON | 0.75R X 1.5      | 4.5 | 15 | 70  | 4  |   |
|                     | A11015200H04Z3-NON | 0.75R X 1.5      | 4.5 | 20 | 70  | 4  |   |
|                     | A11015250H04Z3-NON | 0.75R X 1.5      | 4.5 | 25 | 70  | 4  |   |
|                     | A11015300H04Z3-NON | 0.75R X 1.5      | 4.5 | 30 | 70  | 4  |   |
|                     | A11020100H04Z3-NON | 1R X 2           | 6   | 10 | 70  | 4  |   |
|                     | A11020150H04Z3-NON | 1R X 2           | 6   | 15 | 70  | 4  |   |
|                     | A11020200H04Z3-NON | 1R X 2           | 6   | 20 | 70  | 4  |   |
| ±0.005<br>0.5R - 3R | A11020250H04Z3-NON | 1R X 2           | 6   | 25 | 70  | 4  |   |
|                     | A11020300H04Z3-NON | 1R X 2           | 6   | 30 | 70  | 4  |   |
|                     | A11030200080Z3-NON | 1.5R X 3         | 15  | 20 | 80  | 3  |   |
|                     | A11030200H04Z3-NON | 1.5R X 3         | 9   | 20 | 80  | 4  |   |
|                     | A11030300100Z3-NON | 1.5R X 3         | 15  | 30 | 100 | 3  |   |
|                     | A11030300H04Z3-NON | 1.5R X 3         | 9   | 30 | 80  | 4  |   |
|                     | A11040200080Z3-NON | 2R X 4           | 12  | 20 | 80  | 4  |   |
|                     | A11040300100Z3-NON | 2R X 4           | 12  | 30 | 100 | 4  |   |
|                     | A11060300100Z3-NON | 3R X 6           | 18  | 30 | 100 | 6  |   |
|                     | A11060400150Z3-NON | 3R X 6           | 18  | 40 | 150 | 6  |   |
| ±0.01<br>4R - 8R    | A11080400120Z3-NON | 4R X 8           | 24  | 40 | 120 | 8  |   |
|                     | A11080500150Z3-NON | 4R X 8           | 24  | 50 | 150 | 8  |   |
|                     | A11100500120Z3-NON | 5R X 10          | 30  | 50 | 120 | 10 |   |
|                     | A11100600150Z3-NON | 5R X 10          | 30  | 60 | 150 | 10 |   |
|                     | A11120600150Z3-NON | 6R X 12          | 36  | 60 | 150 | 12 |   |
|                     | A11160700160Z3-NON | 8R X 16          | 54  | 70 | 160 | 16 |   |
| 30°<br>Helix Angle  |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |
|                     |                    |                  |     |    |     |    |   |

**2 Flutes Micro Long End Mills**



Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.  
 Improve tool performance by even run-out and tolerance control.  
 Long flute helps chip control in deep groove machining.  
 Reinforced edge design for preventing edge chipping.  
 Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P216

| Size   | D Tolerance |
|--------|-------------|
| D ≤ Φ5 | +0~ -0.01mm |
| D > Φ5 | +0~ -0.02mm |

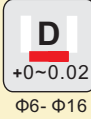
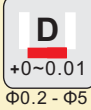
| Type                 | Part Number        | Dimensions in mm |     |     |    |   | d |
|----------------------|--------------------|------------------|-----|-----|----|---|---|
|                      |                    | D                | L1  | L2  | L  |   |   |
| 2                    | A54002010H03Z2-NON | 0.2              | 0.4 | 1   | 40 | 3 |   |
|                      | A54002015H03Z2-NON | 0.2              | 0.4 | 1.5 | 40 | 3 |   |
|                      | A54002020H03Z2-NON | 0.2              | 0.4 | 2   | 40 | 3 |   |
|                      | A54003010H03Z2-NON | 0.3              | 1   | -   | 45 | 3 |   |
|                      | A54003015H03Z2-NON | 0.3              | 1   | 1.5 | 45 | 3 |   |
|                      | A54003018H03Z2-NON | 0.3              | 1.8 | -   | 45 | 3 |   |
|                      | A54003020H03Z2-NON | 0.3              | 1   | 2   | 45 | 3 |   |
|                      | A54003025H03Z2-NON | 0.3              | 1   | 2.5 | 45 | 3 |   |
|                      | A54003030H03Z2-NON | 0.3              | 1   | 3   | 45 | 3 |   |
|                      | A54003040H03Z2-NON | 0.3              | 1   | 4   | 45 | 3 |   |
| UWC                  | A54004012H03Z2-NON | 0.4              | 1.2 | -   | 45 | 3 |   |
|                      | A54004020H03Z2-NON | 0.4              | 2   | -   | 45 | 3 |   |
|                      | A54004030H03Z2-NON | 0.4              | 1.2 | 3   | 45 | 3 |   |
|                      | A54004040H03Z2-NON | 0.4              | 1.2 | 4   | 45 | 3 |   |
|                      | A54004050H03Z2-NON | 0.4              | 1.2 | 5   | 45 | 3 |   |
|                      | A54005015H03Z2-NON | 0.5              | 1.5 | -   | 50 | 3 |   |
|                      | A54005020H03Z2-NON | 0.5              | 2   | -   | 50 | 3 |   |
|                      | A54005030H03Z2-NON | 0.5              | 1.5 | 3   | 50 | 3 |   |
|                      | A54005040H03Z2-NON | 0.5              | 1.5 | 4   | 50 | 3 |   |
|                      | A54005050H03Z2-NON | 0.5              | 1.5 | 5   | 50 | 3 |   |
| +0~0.01<br>Φ0.2 - Φ5 | A54005060H03Z2-NON | 0.5              | 1.5 | 6   | 50 | 3 |   |
|                      | A54005080H03Z2-NON | 0.5              | 1.5 | 8   | 50 | 3 |   |
|                      | A54005100H03Z2-NON | 0.5              | 1.5 | 10  | 50 | 3 |   |
|                      | A54006030H03Z2-NON | 0.6              | 3   | -   | 50 | 3 |   |
|                      | A54006060H03Z2-NON | 0.6              | 3   | 6   | 50 | 3 |   |
|                      | A54006080H03Z2-NON | 0.6              | 3   | 8   | 50 | 3 |   |
|                      | A54006100H03Z2-NON | 0.6              | 3   | 10  | 50 | 3 |   |
|                      | A54007030H03Z2-NON | 0.7              | 3   | -   | 50 | 3 |   |
|                      | A54007070H03Z2-NON | 0.7              | 3   | 7   | 50 | 3 |   |
|                      | A54007100H03Z2-NON | 0.7              | 3   | 10  | 50 | 3 |   |
| +0~0.02<br>Φ6 - Φ16  | A54007120H03Z2-NON | 0.7              | 3   | 12  | 50 | 3 |   |
|                      | A54008040H03Z2-NON | 0.8              | 4   | -   | 50 | 3 |   |
|                      | A54008080H03Z2-NON | 0.8              | 4   | 8   | 50 | 3 |   |
|                      | A54008100H03Z2-NON | 0.8              | 4   | 10  | 50 | 3 |   |
|                      | A54008120H03Z2-NON | 0.8              | 4   | 12  | 50 | 3 |   |
|                      | A54009040H03Z2-NON | 0.9              | 4   | -   | 50 | 3 |   |
|                      | A54009060H03Z2-NON | 0.9              | 4   | 6   | 50 | 3 |   |
|                      | A54009080H03Z2-NON | 0.9              | 4   | 8   | 50 | 3 |   |
|                      | A54009100H03Z2-NON | 0.9              | 4   | 10  | 50 | 3 |   |
|                      | A54010050H03Z2-NON | 1                | 5   | -   | 70 | 3 |   |
| 30°<br>Helix Angle   | A54010050H04Z2-NON | 1                | 5   | -   | 70 | 4 |   |
|                      | A54010100H03Z2-NON | 1                | 5   | 10  | 70 | 3 |   |
|                      | A54010100H04Z2-NON | 1                | 5   | 10  | 70 | 4 |   |
|                      | A54010150H03Z2-NON | 1                | 5   | 15  | 70 | 3 |   |
|                      | A54010150H04Z2-NON | 1                | 5   | 15  | 70 | 4 |   |
|                      | A54010200H03Z2-NON | 1                | 5   | 20  | 70 | 3 |   |
|                      | A54010200H04Z2-NON | 1                | 5   | 20  | 70 | 4 |   |
|                      | A54010250H03Z2-NON | 1                | 5   | 25  | 70 | 3 |   |
|                      |                    |                  |     |     |    |   |   |
|                      |                    |                  |     |     |    |   |   |



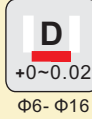
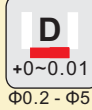




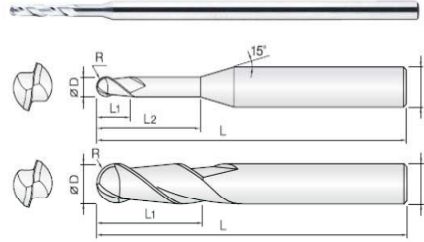
| Type | Part Number        | Dimensions in mm |    |    |     |   | d |
|------|--------------------|------------------|----|----|-----|---|---|
|      |                    | D                | L1 | L2 | L   | d |   |
|      | A54010250H04Z2-NON | 1                | 5  | 25 | 70  | 4 |   |
|      | A54010300H03Z2-NON | 1                | 5  | 30 | 70  | 3 |   |
|      | A54010300H04Z2-NON | 1                | 5  | 30 | 70  | 4 |   |
|      | A54010350H04Z2-NON | 1                | 5  | 35 | 80  | 4 |   |
|      | A54010400H04Z2-NON | 1                | 5  | 40 | 80  | 4 |   |
|      | A54015100H03Z2-NON | 1.5              | 10 | -  | 70  | 3 |   |
|      | A54015100H04Z2-NON | 1.5              | 10 | -  | 70  | 4 |   |
|      | A54015150H03Z2-NON | 1.5              | 10 | 15 | 70  | 3 |   |
|      | A54015150H04Z2-NON | 1.5              | 10 | 15 | 70  | 4 |   |
|      | A54015200H03Z2-NON | 1.5              | 10 | 20 | 70  | 3 |   |
|      | A54015200H04Z2-NON | 1.5              | 10 | 20 | 70  | 4 |   |
|      | A54015250H03Z2-NON | 1.5              | 10 | 25 | 70  | 3 |   |
|      | A54015250H04Z2-NON | 1.5              | 10 | 25 | 70  | 4 |   |
|      | A54015300H03Z2-NON | 1.5              | 10 | 30 | 70  | 3 |   |
|      | A54015300H04Z2-NON | 1.5              | 10 | 30 | 70  | 4 |   |
|      | A54015350H04Z2-NON | 1.5              | 10 | 35 | 80  | 4 |   |
|      | A54015400H04Z2-NON | 1.5              | 10 | 40 | 80  | 4 |   |
|      | A54020100H03Z2-NON | 2                | 10 | -  | 70  | 3 |   |
|      | A54020100H04Z2-NON | 2                | 10 | -  | 70  | 4 |   |
|      | A54020150H03Z2-NON | 2                | 10 | 15 | 70  | 3 |   |
|      | A54020150H04Z2-NON | 2                | 10 | 15 | 70  | 4 |   |
|      | A54020200H03Z2-NON | 2                | 10 | 20 | 70  | 3 |   |
|      | A54020200H04Z2-NON | 2                | 10 | 20 | 70  | 4 |   |
|      | A54020250H03Z2-NON | 2                | 10 | 25 | 70  | 3 |   |
|      | A54020250H04Z2-NON | 2                | 10 | 25 | 70  | 4 |   |
|      | A54020300H03Z2-NON | 2                | 10 | 30 | 70  | 3 |   |
|      | A54020300H04Z2-NON | 2                | 10 | 30 | 70  | 4 |   |
|      | A54020350H03Z2-NON | 2                | 10 | 35 | 70  | 3 |   |
|      | A54020350H04Z2-NON | 2                | 10 | 35 | 80  | 4 |   |
|      | A54020400H03Z2-NON | 2                | 10 | 40 | 80  | 3 |   |
|      | A54020400H04Z2-NON | 2                | 10 | 40 | 80  | 4 |   |
|      | A54025100H03Z2-NON | 2.5              | 10 | -  | 70  | 3 |   |
|      | A54025150H03Z2-NON | 2.5              | 15 | -  | 70  | 3 |   |
|      | A54025200H03Z2-NON | 2.5              | 15 | 20 | 70  | 3 |   |
|      | A54030100060Z2-NON | 3                | 10 | -  | 60  | 3 |   |
|      | A54030200080Z2-NON | 3                | 20 | -  | 80  | 3 |   |
|      | A54030200100Z2-NON | 3                | 20 | -  | 100 | 3 |   |
|      | A54030200120Z2-NON | 3                | 20 | -  | 120 | 3 |   |
|      | A54030150H06Z2-NON | 3                | 15 | -  | 80  | 6 |   |
|      | A54030200H06Z2-NON | 3                | 15 | 20 | 80  | 6 |   |
|      | A54030250H06Z2-NON | 3                | 15 | 25 | 80  | 6 |   |
|      | A54030300H06Z2-NON | 3                | 15 | 30 | 80  | 6 |   |
|      | A54040200080Z2-NON | 4                | 20 | -  | 80  | 4 |   |
|      | A54040200100Z2-NON | 4                | 20 | -  | 100 | 4 |   |
|      | A54040200130Z2-NON | 4                | 20 | -  | 130 | 4 |   |
|      | A54040200H06Z2-NON | 4                | 20 | -  | 80  | 6 |   |
|      | A54040250H06Z2-NON | 4                | 20 | 25 | 80  | 6 |   |
|      | A54040300H06Z2-NON | 4                | 20 | 30 | 80  | 6 |   |
|      | A54040400H06Z2-NON | 4                | 20 | 40 | 100 | 6 |   |
|      | A54050200H06Z2-NON | 5                | 20 | -  | 80  | 6 |   |
|      | A54050300100Z2-NON | 5                | 30 | -  | 100 | 5 |   |
|      | A54050300120Z2-NON | 5                | 30 | -  | 120 | 5 |   |
|      | A54060250080Z2-NON | 6                | 25 | -  | 80  | 6 |   |
|      | A54060300080Z2-NON | 6                | 30 | -  | 80  | 6 |   |
|      | A54060400100Z2-NON | 6                | 40 | -  | 100 | 6 |   |
|      | A54060400120Z2-NON | 6                | 40 | -  | 120 | 6 |   |
|      | A54060400150Z2-NON | 6                | 40 | -  | 150 | 6 |   |
|      | A54080300080Z2-NON | 8                | 30 | -  | 80  | 8 |   |



| Type | Part Number        | Dimensions in mm |    |    |     |    | d |
|------|--------------------|------------------|----|----|-----|----|---|
|      |                    | D                | L1 | L2 | L   | d  |   |
|      | A54080350090Z2-NON | 8                | 35 | -  | 90  | 8  |   |
|      | A54080400100Z2-NON | 8                | 40 | -  | 100 | 8  |   |
|      | A54080450120Z2-NON | 8                | 45 | -  | 120 | 8  |   |
|      | A54080450150Z2-NON | 8                | 45 | -  | 150 | 8  |   |
|      | A54100300080Z2-NON | 10               | 30 | -  | 80  | 10 |   |
|      | A54100350090Z2-NON | 10               | 35 | -  | 90  | 10 |   |
|      | A54100400100Z2-NON | 10               | 40 | -  | 100 | 10 |   |
|      | A54100500120Z2-NON | 10               | 50 | -  | 120 | 10 |   |
|      | A54100500150Z2-NON | 10               | 50 | -  | 150 | 10 |   |
|      | A54120300090Z2-NON | 12               | 30 | -  | 90  | 12 |   |
|      | A54120400100Z2-NON | 12               | 40 | -  | 100 | 12 |   |
|      | A54120500110Z2-NON | 12               | 50 | -  | 110 | 12 |   |
|      | A54120550130Z2-NON | 12               | 55 | -  | 130 | 12 |   |
|      | A54120550150Z2-NON | 12               | 55 | -  | 150 | 12 |   |
|      | A54160700160Z2-NON | 16               | 70 | -  | 160 | 16 |   |



**2 Flutes Micro Long Ball End Mills**



Endmills for Acryl, A.B.S, Aluminum, non-ferrous and non-metallic materials.

Improve tool performance by even run-out and tolerance control. Long flute helps chip control in deep groove machining. Excellent wear resistance by applying ultra fine WC grade.

**Cutting Data**  
P216

| Size   | D Tolerance  |
|--------|--------------|
| D ≤ Φ6 | +0~ -0.01mm  |
| D > Φ6 | +0~ -0.015mm |

| Type                  | Part Number        | Dimensions in mm |     |     |    |   | d |
|-----------------------|--------------------|------------------|-----|-----|----|---|---|
|                       |                    | R X D            | L1  | L2  | L  |   |   |
| 2                     | A33002010H03Z2-NON | 0.1R X 0.2       | 0.4 | -   | 40 | 3 |   |
|                       | A33002015H03Z2-NON | 0.1R X 0.2       | 0.4 | 1.5 | 40 | 3 |   |
|                       | A33002020H03Z2-NON | 0.1R X 0.2       | 0.4 | 2   | 40 | 3 |   |
| UWC                   | A33003010H03Z2-NON | 0.15R X 0.3      | 1   | -   | 45 | 3 |   |
|                       | A33003015H03Z2-NON | 0.15R X 0.3      | 1   | 1.5 | 45 | 3 |   |
|                       | A33003018H03Z2-NON | 0.15R X 0.3      | 1.8 | -   | 45 | 3 |   |
|                       | A33003020H03Z2-NON | 0.15R X 0.3      | 1   | 2   | 45 | 3 |   |
|                       | A33003025H03Z2-NON | 0.15R X 0.3      | 1   | 2.5 | 45 | 3 |   |
|                       | A33003030H03Z2-NON | 0.15R X 0.3      | 1   | 3   | 45 | 3 |   |
|                       | A33003040H03Z2-NON | 0.15R X 0.3      | 1   | 4   | 45 | 3 |   |
|                       | A33004012H03Z2-NON | 0.2R X 0.4       | 1.2 | -   | 45 | 3 |   |
|                       | A33004020H03Z2-NON | 0.2R X 0.4       | 2   | -   | 45 | 3 |   |
|                       | A33004030H03Z2-NON | 0.2R X 0.4       | 1.2 | 3   | 45 | 3 |   |
| R ±0.005<br>0.1R - 3R | A33004040H03Z2-NON | 0.2R X 0.4       | 1.2 | 4   | 45 | 3 |   |
|                       | A33004050H03Z2-NON | 0.2R X 0.4       | 1.2 | 5   | 45 | 3 |   |
|                       | A33005015H03Z2-NON | 0.25R X 0.5      | 1.5 | -   | 50 | 3 |   |
|                       | A33005020H03Z2-NON | 0.25R X 0.5      | 2   | -   | 50 | 3 |   |
|                       | A33005030H03Z2-NON | 0.25R X 0.5      | 1.5 | 3   | 50 | 3 |   |
|                       | A33005040H03Z2-NON | 0.25R X 0.5      | 1.5 | 4   | 50 | 3 |   |
|                       | A33005050H03Z2-NON | 0.25R X 0.5      | 1.5 | 5   | 50 | 3 |   |
|                       | A33005060H03Z2-NON | 0.25R X 0.5      | 1.5 | 6   | 50 | 3 |   |
|                       | A33005080H03Z2-NON | 0.25R X 0.5      | 1.5 | 8   | 50 | 3 |   |
|                       | A33005100H03Z2-NON | 0.25R X 0.5      | 1.5 | 10  | 50 | 3 |   |
| R ±0.01<br>4R - 8R    | A33006030H03Z2-NON | 0.3R X 0.6       | 3   | -   | 50 | 3 |   |
|                       | A33006060H03Z2-NON | 0.3R X 0.6       | 3   | 6   | 50 | 3 |   |
|                       | A33006080H03Z2-NON | 0.3R X 0.6       | 3   | 8   | 50 | 3 |   |
|                       | A33006100H03Z2-NON | 0.3R X 0.6       | 3   | 10  | 50 | 3 |   |
|                       | A33007030H03Z2-NON | 0.35R X 0.7      | 3   | -   | 50 | 3 |   |
|                       | A33007070H03Z2-NON | 0.35R X 0.7      | 3   | 7   | 50 | 3 |   |
|                       | A33007100H03Z2-NON | 0.35R X 0.7      | 3   | 10  | 50 | 3 |   |
|                       | A33007120H03Z2-NON | 0.35R X 0.7      | 3   | 12  | 50 | 3 |   |
|                       | A33008040H03Z2-NON | 0.4R X 0.8       | 4   | -   | 50 | 3 |   |
|                       | A33008080H03Z2-NON | 0.4R X 0.8       | 4   | 8   | 50 | 3 |   |
| 30°<br>Helix Angle    | A33008100H03Z2-NON | 0.4R X 0.8       | 4   | 10  | 50 | 3 |   |
|                       | A33008120H03Z2-NON | 0.4R X 0.8       | 4   | 12  | 50 | 3 |   |
|                       | A33009040H03Z2-NON | 0.45R X 0.9      | 4   | -   | 50 | 3 |   |
|                       | A33009060H03Z2-NON | 0.45R X 0.9      | 4   | 6   | 50 | 3 |   |
|                       | A33009080H03Z2-NON | 0.45R X 0.9      | 4   | 8   | 50 | 3 |   |
|                       | A33009100H03Z2-NON | 0.45R X 0.9      | 4   | 10  | 50 | 3 |   |
|                       | A33010050H03Z2-NON | 0.5R X 1         | 5   | -   | 70 | 3 |   |
|                       | A33010050H04Z2-NON | 0.5R X 1         | 5   | -   | 70 | 4 |   |
|                       | A33010100H03Z2-NON | 0.5R X 1         | 5   | 10  | 70 | 3 |   |
|                       | A33010100H04Z2-NON | 0.5R X 1         | 5   | 10  | 70 | 4 |   |
| A33010150H03Z2-NON    | 0.5R X 1           | 5                | 15  | 70  | 3  |   |   |
| A33010150H04Z2-NON    | 0.5R X 1           | 5                | 15  | 70  | 4  |   |   |
| A33010200H03Z2-NON    | 0.5R X 1           | 5                | 20  | 70  | 3  |   |   |
| A33010200H04Z2-NON    | 0.5R X 1           | 5                | 20  | 70  | 4  |   |   |
| A33010250H03Z2-NON    | 0.5R X 1           | 5                | 25  | 70  | 3  |   |   |



| Type                  | Part Number        | Dimensions in mm   |          |     |     |    | d |
|-----------------------|--------------------|--------------------|----------|-----|-----|----|---|
|                       |                    | R X D              | L1       | L2  | L   |    |   |
| 2                     | A33010250H04Z2-NON | 0.5R X 1           | 5        | 25  | 70  | 4  |   |
|                       | A33010300H03Z2-NON | 0.5R X 1           | 5        | 30  | 70  | 3  |   |
|                       | A33010300H04Z2-NON | 0.5R X 1           | 5        | 30  | 70  | 4  |   |
|                       | A33010350H04Z2-NON | 0.5R X 1           | 5        | 35  | 80  | 4  |   |
|                       | A33010400H04Z2-NON | 0.5R X 1           | 5        | 40  | 80  | 4  |   |
|                       | A33015100H03Z2-NON | 0.75R X 1.5        | 10       | -   | 70  | 3  |   |
|                       | A33015100H04Z2-NON | 0.75R X 1.5        | 10       | -   | 70  | 4  |   |
|                       | A33015150H03Z2-NON | 0.75R X 1.5        | 10       | 15  | 70  | 3  |   |
|                       | A33015150H04Z2-NON | 0.75R X 1.5        | 10       | 15  | 70  | 4  |   |
|                       | A33015200H03Z2-NON | 0.75R X 1.5        | 10       | 20  | 70  | 3  |   |
|                       | A33015200H04Z2-NON | 0.75R X 1.5        | 10       | 20  | 70  | 4  |   |
|                       | A33015250H03Z2-NON | 0.75R X 1.5        | 10       | 25  | 70  | 3  |   |
|                       | A33015250H04Z2-NON | 0.75R X 1.5        | 10       | 25  | 70  | 4  |   |
|                       | A33015300H03Z2-NON | 0.75R X 1.5        | 10       | 30  | 70  | 3  |   |
|                       | A33015300H04Z2-NON | 0.75R X 1.5        | 10       | 30  | 70  | 4  |   |
|                       | A33015350H04Z2-NON | 0.75R X 1.5        | 10       | 35  | 80  | 4  |   |
|                       | A33015400H04Z2-NON | 0.75R X 1.5        | 10       | 40  | 80  | 4  |   |
|                       | UWC                | A33020100H03Z2-NON | 1R X 2   | 10  | -   | 70 | 3 |
| A33020100H04Z2-NON    |                    | 1R X 2             | 10       | -   | 70  | 4  |   |
| A33020150H03Z2-NON    |                    | 1R X 2             | 10       | 15  | 70  | 3  |   |
| A33020150H04Z2-NON    |                    | 1R X 2             | 10       | 15  | 70  | 4  |   |
| A33020200H03Z2-NON    |                    | 1R X 2             | 10       | 20  | 70  | 3  |   |
| A33020200H04Z2-NON    |                    | 1R X 2             | 10       | 20  | 70  | 4  |   |
| A33020250H03Z2-NON    |                    | 1R X 2             | 10       | 25  | 70  | 3  |   |
| A33020250H04Z2-NON    |                    | 1R X 2             | 10       | 25  | 70  | 4  |   |
| A33020300H03Z2-NON    |                    | 1R X 2             | 10       | 30  | 70  | 3  |   |
| A33020300H04Z2-NON    |                    | 1R X 2             | 10       | 30  | 70  | 4  |   |
| A33020350H03Z2-NON    |                    | 1R X 2             | 10       | 35  | 70  | 3  |   |
| A33020350H04Z2-NON    |                    | 1R X 2             | 10       | 35  | 80  | 4  |   |
| A33020400H03Z2-NON    |                    | 1R X 2             | 10       | 40  | 80  | 3  |   |
| A33020400H04Z2-NON    |                    | 1R X 2             | 10       | 40  | 80  | 4  |   |
| A33025100H03Z2-NON    |                    | 1.25R X 2.5        | 10       | -   | 70  | 3  |   |
| A33025150H03Z2-NON    |                    | 1.25R X 2.5        | 15       | -   | 70  | 3  |   |
| A33025200H03Z2-NON    |                    | 1.25R X 2.5        | 15       | 20  | 70  | 3  |   |
| R ±0.005<br>0.1R - 3R |                    | A33030100060Z2-NON | 1.5R X 3 | 10  | -   | 60 | 3 |
|                       | A33030200080Z2-NON | 1.5R X 3           | 20       | -   | 80  | 3  |   |
|                       | A33030200100Z2-NON | 1.5R X 3           | 20       | -   | 100 | 3  |   |
|                       | A33030200120Z2-NON | 1.5R X 3           | 20       | -   | 120 | 3  |   |
|                       | A33030150H06Z2-NON | 1.5R X 3           | 15       | -   | 80  | 6  |   |
|                       | A33030200H06Z2-NON | 1.5R X 3           | 15       | 20  | 80  | 6  |   |
|                       | A33030250H06Z2-NON | 1.5R X 3           | 15       | 25  | 80  | 6  |   |
|                       | A33030300H06Z2-NON | 1.5R X 3           | 15       | 30  | 80  | 6  |   |
|                       | A33030400H06Z2-NON | 1.5R X 3           | 15       | 40  | 80  | 6  |   |
|                       | A33040200080Z2-NON | 2R X 4             | 20       | -   | 80  | 4  |   |
|                       | A33040200100Z2-NON | 2R X 4             | 20       | -   | 100 | 4  |   |
|                       | A33040200130Z2-NON | 2R X 4             | 20       | -   | 130 | 4  |   |
|                       | A33040200H06Z2-NON | 2R X 4             | 20       | -   | 80  | 6  |   |
|                       | A33040250H06Z2-NON | 2R X 4             | 20       | 25  | 80  | 6  |   |
|                       | A33040300H06Z2-NON | 2R X 4             | 20       | 30  | 80  | 6  |   |
|                       | A33040400H06Z2-NON | 2R X 4             | 20       | 40  | 100 | 6  |   |
|                       | A33040500H06Z2-NON | 2R X 4             | 20       | 50  | 100 | 6  |   |
|                       | A33050300100Z2-NON | 2.5R X 5           | 30       | -   | 100 | 5  |   |
| A33050300120Z2-NON    | 2.5R X 5           | 30                 | -        | 120 | 5   |    |   |
| R ±0.01<br>4R - 8R    | A33060300080Z2-NON | 3R X 6             | 30       | -   | 80  | 6  |   |
|                       | A33060400100Z2-NON | 3R X 6             | 40       | -   | 100 | 6  |   |
|                       | A33060400120Z2-NON | 3R X 6             | 40       | -   | 120 | 6  |   |
|                       | A33060400150Z2-NON | 3R X 6             | 40       | -   | 150 | 6  |   |
|                       | A33080450120Z2-NON | 4R X 8             | 45       | -   | 120 | 8  |   |

**30°**  
Helix Angle



**A20 / A21**

■ Apply 10% up values of below condition for A21      • RPM : rev./min   • Feed : mm/min

| Material | Outside Diameter | Effective Length | ABS / MC Nylon |       |                | Acrylic / Polyacetal |      |                | Polycarbonate |       |                |
|----------|------------------|------------------|----------------|-------|----------------|----------------------|------|----------------|---------------|-------|----------------|
|          |                  |                  | RPM            | FEED  | Ap Axial Depth | RPM                  | FEED | Ap Axial Depth | RPM           | FEED  | Ap Axial Depth |
| 0.5mm    | 2                |                  | 6,000          | 300   | 0.20           | 15,000               | 300  | 0.20           | 9,000         | 300   | 0.20           |
|          | 4                |                  | 6,000          | 300   | 0.20           | 15,000               | 300  | 0.20           | 9,000         | 300   | 0.20           |
|          | 6                |                  | 6,000          | 300   | 0.20           | 15,000               | 300  | 0.20           | 9,000         | 300   | 0.20           |
| 0.6mm    | 4                |                  | 6,000          | 340   | 0.20           | 14,400               | 300  | 0.20           | 8,800         | 540   | 0.20           |
|          | 6                |                  | 6,000          | 340   | 0.20           | 14,400               | 300  | 0.20           | 8,800         | 540   | 0.20           |
| 0.7mm    | 4                |                  | 6,000          | 380   | 0.20           | 13,800               | 300  | 0.20           | 8,600         | 780   | 0.20           |
|          | 6                |                  | 6,000          | 380   | 0.20           | 13,800               | 300  | 0.20           | 8,600         | 780   | 0.20           |
| 0.8mm    | 6                |                  | 6,000          | 420   | 0.20           | 13,200               | 300  | 0.20           | 8,400         | 1,000 | 0.20           |
|          | 8                |                  | 6,000          | 420   | 0.20           | 12,900               | 280  | 0.20           | 8,200         | 960   | 0.20           |
| 0.9mm    | 6                |                  | 6,000          | 460   | 0.20           | 12,600               | 300  | 0.20           | 8,200         | 1,300 | 0.20           |
|          | 10               |                  | 6,000          | 460   | 0.20           | 11,800               | 260  | 0.20           | 7,800         | 1,000 | 0.20           |
| 1mm      | 6                |                  | 6,000          | 500   | 0.30           | 12,000               | 300  | 0.30           | 8,000         | 1,500 | 0.30           |
|          | 8                |                  | 6,000          | 500   | 0.30           | 11,500               | 270  | 0.30           | 7,700         | 1,400 | 0.30           |
|          | 10               |                  | 6,000          | 500   | 0.30           | 11,000               | 240  | 0.30           | 7,500         | 1,200 | 0.30           |
|          | 12               |                  | 6,000          | 500   | 0.30           | 10,400               | 220  | 0.30           | 7,200         | 1,100 | 0.30           |
|          | 16               |                  | 6,000          | 500   | 0.30           | 9,300                | 160  | 0.30           | 6,700         | 830   | 0.30           |
| 1.2mm    | 6                |                  | 6,000          | 610   | 0.40           | 11,700               | 330  | 0.40           | 8,000         | 1,500 | 0.40           |
|          | 8                |                  | 6,000          | 610   | 0.40           | 11,200               | 300  | 0.40           | 7,700         | 1,400 | 0.40           |
|          | 10               |                  | 6,000          | 600   | 0.40           | 10,700               | 280  | 0.40           | 7,500         | 1,300 | 0.40           |
|          | 12               |                  | 6,000          | 600   | 0.40           | 10,200               | 250  | 0.40           | 7,200         | 1,200 | 0.40           |
| 1.4mm    | 6                |                  | 6,000          | 720   | 0.40           | 11,340               | 360  | 0.40           | 8,000         | 1,600 | 0.40           |
|          | 10               |                  | 6,000          | 700   | 0.40           | 10,700               | 310  | 0.40           | 7,700         | 1,400 | 0.40           |
|          | 16               |                  | 6,000          | 680   | 0.40           | 9,800                | 230  | 0.40           | 7,200         | 1,000 | 0.40           |
| 1.5mm    | 6                |                  | 6,100          | 780   | 0.50           | 11,200               | 380  | 0.50           | 8,000         | 1,600 | 0.50           |
|          | 10               |                  | 6,000          | 760   | 0.50           | 10,200               | 330  | 0.50           | 7,500         | 1,400 | 0.50           |
|          | 14               |                  | 6,000          | 730   | 0.50           | 9,600                | 270  | 0.50           | 7,000         | 1,100 | 0.50           |
|          | 16               |                  | 6,000          | 730   | 0.50           | 8,800                | 250  | 0.50           | 6,700         | 1,000 | 0.50           |
|          | 20               |                  | 5,900          | 700   | 0.50           | 7,600                | 180  | 0.50           | 6,100         | 750   | 0.50           |
| 1.6mm    | 6                |                  | 6,100          | 830   | 0.80           | 11,000               | 390  | 0.80           | 8,000         | 1,600 | 0.80           |
|          | 8                |                  | 6,100          | 1,000 | 1.00           | 10,100               | 440  | 1.00           | 7,900         | 1,700 | 1.00           |
| 2mm      | 10               |                  | 6,000          | 980   | 1.00           | 9,800                | 420  | 1.00           | 7,700         | 1,600 | 1.00           |
|          | 12               |                  | 6,000          | 970   | 1.00           | 9,500                | 400  | 1.00           | 7,500         | 1,600 | 1.00           |
|          | 14               |                  | 5,900          | 950   | 1.00           | 9,100                | 380  | 1.00           | 7,300         | 1,500 | 1.00           |
|          | 16               |                  | 5,900          | 930   | 1.00           | 8,800                | 360  | 1.00           | 7,100         | 1,400 | 1.00           |
|          | 18               |                  | 5,800          | 920   | 1.00           | 8,500                | 340  | 1.00           | 6,900         | 1,300 | 1.00           |
|          | 20               |                  | 5,700          | 890   | 1.00           | 8,000                | 300  | 1.00           | 6,500         | 1,200 | 1.00           |
|          | 25               |                  | 5,600          | 850   | 1.00           | 7,200                | 250  | 1.00           | 6,000         | 1,100 | 1.00           |
| 2.5mm    | 30               |                  | 5,400          | 800   | 1.00           | 6,200                | 190  | 1.00           | 5,400         | 850   | 1.00           |
|          | 12               |                  | 6,000          | 1,300 | 1.20           | 8,600                | 480  | 1.20           | 7,400         | 1,600 | 1.20           |
|          | 20               |                  | 5,700          | 1,100 | 1.00           | 6,800                | 350  | 1.00           | 6,200         | 1,300 | 1.00           |
| 3mm      | 8                |                  | 6,200          | 1,600 | 1.50           | 8,700                | 610  | 1.50           | 8,000         | 1,900 | 1.50           |
|          | 12               |                  | 6,000          | 1,500 | 1.50           | 8,000                | 560  | 1.50           | 7,500         | 1,800 | 1.50           |
|          | 16               |                  | 5,800          | 1,400 | 1.50           | 7,300                | 510  | 1.50           | 7,000         | 1,700 | 1.50           |
|          | 20               |                  | 5,600          | 1,300 | 1.50           | 6,400                | 440  | 1.50           | 6,300         | 1,800 | 1.50           |
|          | 25               |                  | 5,400          | 1,200 | 1.50           | 5,500                | 370  | 1.50           | 5,600         | 1,400 | 1.50           |
| 4mm      | 30               |                  | 5,200          | 1,100 | 1.50           | 4,500                | 290  | 1.50           | 4,800         | 1,200 | 1.50           |
|          | 40               |                  | 4,800          | 960   | 1.50           | 2,700                | 160  | 1.50           | 3,500         | 840   | 1.50           |
|          | 12               |                  | 5,000          | 1,400 | 2.00           | 7,000                | 520  | 2.00           | 5,800         | 1,500 | 2.00           |
|          | 16               |                  | 4,900          | 1,400 | 2.00           | 6,500                | 480  | 2.00           | 5,500         | 1,400 | 2.00           |
|          | 18               |                  | 4,800          | 1,400 | 2.00           | 6,300                | 470  | 2.00           | 5,400         | 1,400 | 2.00           |
|          | 20               |                  | 4,800          | 1,400 | 2.00           | 6,000                | 440  | 2.00           | 5,100         | 1,300 | 2.00           |
|          | 25               |                  | 4,700          | 1,300 | 2.00           | 5,600                | 410  | 2.00           | 4,900         | 1,300 | 2.00           |
| 5mm      | 30               |                  | 4,500          | 1,300 | 2.00           | 4,700                | 340  | 2.00           | 4,400         | 1,100 | 2.00           |
|          | 35               |                  | 4,300          | 1,300 | 2.00           | 4,200                | 300  | 2.00           | 4,100         | 1,100 | 2.00           |
|          | 40               |                  | 4,200          | 1,300 | 2.00           | 3,600                | 250  | 2.00           | 3,600         | 960   | 2.00           |
|          | 50               |                  | 3,900          | 1,200 | 2.00           | 2,400                | 160  | 2.00           | 2,900         | 780   | 2.00           |
|          | 16               |                  | 3,400          | 1,200 | 2.50           | 5,800                | 470  | 2.50           | 4,000         | 1,200 | 2.50           |
| 6mm      | 35               |                  | 3,200          | 1,100 | 2.50           | 3,900                | 260  | 2.50           | 2,900         | 910   | 2.50           |
|          | 35               |                  | 2,400          | 960   | 3.00           | 2,600                | 240  | 3.00           | 1,900         | 760   | 3.00           |
| 60       | 50               |                  | 2,200          | 890   | 3.00           | 1,900                | 170  | 3.00           | 1,700         | 670   | 3.00           |
|          | 60               |                  | 2,000          | 800   | 3.00           | 1,000                | 90   | 3.00           | 1,500         | 600   | 3.00           |

**A10 / A11**

■ Apply 10% up values of below condition for A11      • RPM : rev./min   • Feed : mm/min

| Material | Aluminium Alloys |                   |            | Plastic |                   |           |
|----------|------------------|-------------------|------------|---------|-------------------|-----------|
|          | Velocity         | Vc = 65 ~ 70m/min |            |         | Vc = 40 ~ 45m/min |           |
| Radius   | RPM              | FEED              | Ap         | RPM     | FEED              | Ap        |
| R0.1     | 35,000           | 420               | 0.008~0.01 | 35,000  | 1,000             | 0.05~0.15 |
| R0.2     | 35,000           | 560               | 0.005~0.01 | 35,000  | 1,100             | 0.07~0.2  |
| R0.25    | 35,000           | 700               | 0.003~0.01 | 28,000  | 1,200             | 0.08~0.25 |
| R0.3     | 35,000           | 910               | 0.006~0.03 | 24,000  | 1,200             | 0.1~0.3   |
| R0.4     | 26,000           | 940               | 0.006~0.05 | 18,000  | 900               | 0.13~0.3  |
| R0.5     | 21,000           | 970               | 0.005~0.08 | 14,000  | 700               | 0.17~0.5  |
| R0.6     | 18,000           | 1,010             | 0.04~0.09  | 12,000  | 600               | 0.2~0.6   |
| R0.7     | 15,000           | 1,020             | 0.05~0.1   | 10,000  | 500               | 0.23~0.7  |
| R0.75    | 14,000           | 1,010             | 0.06~0.12  | 9,500   | 480               | 0.25~0.75 |
| R0.8     | 13,000           | 1,010             | 0.08~0.13  | 9,000   | 450               | 0.27~0.8  |
| R0.9     | 12,000           | 1,060             | 0.09~0.15  | 8,000   | 400               | 0.3~0.9   |
| R1       | 11,000           | 1,100             | 0.03~0.21  | 7,000   | 350               | 0.33~1    |
| R1.5     | 6,900            | 760               | 0.03~0.23  | 4,800   | 240               | 0.5~1.5   |
| R2       | 5,200            | 690               | 0.01~0.28  | 3,600   | 180               | 0.6~2     |
| R2.5     | 4,200            | 590               | 0.16~0.31  | 2,900   | 150               | 0.8~2.5   |
| R3       | 3,500            | 550               | 0.22~0.36  | 2,400   | 120               | 1~3       |

**A54**

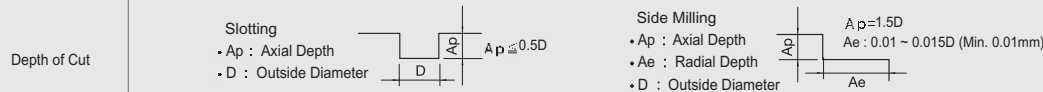
• RPM : rev./min   • Feed : mm/min

| Material         | ABS /Acrylic |      |
|------------------|--------------|------|
| Outside Diameter | RPM          | FEED |
| 0.2mm            | 50,000       | 100  |
| 0.4mm            | 50,000       | 200  |
| 0.5mm            | 50,000       | 240  |
| 0.6mm            | 40,000       | 240  |
| 0.8mm            | 30,000       | 240  |
| 1mm              | 24,000       | 240  |
| 2mm              | 6,500        | 240  |
| 3mm              | 8,000        | 240  |
| 4mm              | 6,000        | 240  |
| 5mm              | 4,800        | 240  |
| 6mm              | 4,000        | 260  |
| 8mm              | 3,000        | 260  |
| 10mm             | 3,000        | 260  |
| 12mm             | 2,000        | 260  |
| 16mm             | 1,400        | 260  |

**A33**

• RPM : rev./min   • Feed : mm/min

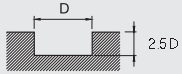
| Material         | ABS /Acrylic |      |
|------------------|--------------|------|
| Outside Diameter | RPM          | FEED |
| R0.1             | 37,000       | 50   |
| R0.2             | 37,000       | 100  |
| R0.3             | 37,000       | 140  |
| R0.4             | 37,000       | 190  |
| R0.5             | 32,000       | 210  |
| R1               | 16,000       | 210  |
| R1.5             | 11,000       | 210  |
| R2               | 8,200        | 210  |
| R2.5             | 6,000        | 250  |
| R3               | 5,500        | 250  |
| R4               | 4,100        | 280  |
| R5               | 3,200        | 280  |
| R6               | 2,700        | 330  |
| R8               | 2,200        | 330  |



**A50 / A51**

| Materia l        | Acrylic |       | Alloy Steels |       |
|------------------|---------|-------|--------------|-------|
| Outside Diameter | RPM     | FEED  | RPM          | FEED  |
| 1mm              | 32,000  | 2,000 | 23,000       | 1,300 |
| 2mm              | 32,000  | 2,200 | 23,000       | 1,500 |
| 3mm              | 25,000  | 2,400 | 18,000       | 1,700 |
| 4mm              | 20,000  | 2,400 | 15,000       | 1,800 |
| 5mm              | 15,000  | 2,200 | 12,000       | 1,800 |
| 6mm              | 13,500  | 2,300 | 10,000       | 1,800 |
| 8mm              | 10,000  | 2,400 | 7,800        | 1,900 |
| 10mm             | 8,000   | 2,400 | 6,000        | 2,000 |
| 12mm             | 7,000   | 2,200 | 5,000        | 1,900 |

|              |   |  |  |  |
|--------------|---|--|--|--|
| Depth of Cut |  |  |  |  |
|--------------|---|--|--|--|