## Bright (Uncoated) Finish

2 Flutes
19 LV48
Miniature General Purpose Double-End Roughing/Finishing Carbide Ball End Mills

| Milling Dia. | Length of Cut | Overall Length | Shank Dia. | Neck Length | Brand | Item No. | Milling Dia. | Length of Cut | Overall Length | Shank Dia. | Neck Length | Brand | Item No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| AlTin Finish |  |  |  |  |  |  | Bright (Uncoated) Finish |  |  |  |  |  |  |
| 2 Flutes |  |  |  |  |  |  | 2 Flutes |  |  |  |  |  |  |
| 1/32 in | 1/16 in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV68 | 1/32 in | 1/166 in | 1.5 in | $1 / 8$ in | 0 in |  | $19 \mathrm{LV47}$ |
| $3 / 64$ in | $3 / 32$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV72 | $1 / 32$ in | 564 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35C759 |
| 1/16 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV70 | $3 / 64$ in | $3 / 32$ in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV48 |
| $5 / 64$ in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV69 | $3 / 64$ in | $3 / 32$ in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35CZ60 |
| $3 / 32$ in | 3/16 in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV73 | 1/16 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV49 |
| 7/64 in | $3 / 16$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV71 | 1/16 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35CZ61 |
| 4 Flutes |  |  |  |  |  |  | 564 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV50 |
| $1 / 32$ in | 1/16 in | 1.5 in | $1 / 8$ in | 0 in | - | 19LW21 | $5 / 64$ in | $1 / 8$ in | 1.5 in | $1 / 8$ in | $13 / 8$ in | SGS Too | 41CG26 |
| $3 / 64$ in | $3 / 32$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LW22 | $5 / 64$ in | 5/32 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35CZ62 |
| 1/16 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LW24 | $3 / 32$ in | $3 / 16$ in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV51 |
| 564 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LW23 | $3 / 32$ in | 3/16 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35CZ63 |
| $3 / 32$ in | 3/6 in | 1.5 in | $1 / 8$ in | 0 in | - | 19LW25 | 7/64 in | $3 / 16$ in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV52 |
| 7/64 in | 3/16 in | 1.5 in | $1 / 8$ in | 0 in | - | 19LW26 | 7/64 in | 7/32 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35CZ64 |


| $\begin{aligned} & \text { Milling } \\ & \text { Dia. } \end{aligned}$ | Length of Cut | Over Leng | Shank Dia. | Neck Length | Brand | Item |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3 Flutes |  |  |  |  |  |  |
| 1/32 in | 5/64 | 1.5 in | in | Not Applicable | OS | 35C |
| 1/16 in | 1/8 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35C776 |
| $3 / 32$ in | 3/16 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | $35 C 277$ |
| 4 Flutes |  |  |  |  |  |  |
| /32 in | 1/16 | 1.5 in | 18 in | 0 in |  | 19LV89 |
| $1 / 32$ in | 5/64 | 1.5 in | \% in | Applica | OSG | 35CZ87 |
| 3/64 in | $3 / 32$ in | 1.5 in | 1/8 in | 0 in |  | 19LV90 |
| $3 / 64$ in | $3 / 32$ in | 1.5 in | in | Applica | OSG | 35CZ88 |
| 1/16 in | $1 / 8$ in | 1.5 i | in | 0 in |  | 19L |
| 1/16 in | 1/8 in | 1.5 in | $1 / 8$ in | ot Applica | OSG | 35CZ89 |
| 1/16 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | $13 / 8$ in | SGS To | 41CG07 |
| 4 in | $1 / 8$ in | 1.5 in | $1 / 8$ in | 0 in | - | 19LV92 |
| 564 in | 5/32 in | 1.5 in | $1 / 8$ in | Not Applica | OSG | 35CZ90 |
| $3 / 32$ in | 3/16 in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV93 |
| $3 / 32$ in | 3/16 in | 1.5 in | $1 / 8$ in | Not Applicab | OSG | 35CZ91 |
| 4 in | 3/16 in | 1.5 in | $1 / 8$ in | 0 in |  | 19LV94 |
| /64 in | 7/32 in | 1.5 in | $1 / 8$ in | Not Applicable | OSG | 35C |

## Corner-Radius End Mills

Corner-radius end mills have a square nose with slightly rounded corners that help distribute cutting forces evenly to prevent damage to the end mill and extend its life. Sometimes called bull-nose end mills, they create a flatbottomed groove with slightly rounded inside corners in milling applications that require a specific radius.

High-performance end mills are used in production milling.
Roughing/finishing end mills remove large amounts of material and create a smooth finish on the workpiece at the same time.
Finishing end mills create a finer finish on the workpiece than roughing and roughing/finishing end mills.

WIDIA HANITA:

## High-Performance Finishing Carbide Corner-Radius End Mills

| Milling Dia. |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Of | Lengt | Dia. |  | Brand | No. |
| AlTin Finish |  |  |  |  |  |  |
| 4 Flutes |  |  |  |  |  |  |
| $5 / 8$ in | $15 / 8$ in | $41 / 8$ in | 5/8 in | 0.03 in | Widia Hanita | 287RP4 |
| $3 / 4$ in | $15 / 8$ in | 4 in | $3 / 4$ in | 0.03 in | Widia Hanita | 287RP5 |
| $3 / 4$ in | $21 / 4$ in | 5 in | $3 / 4$ in | 0.12 in | Widia Hanita | 287RR6 |
| 5 Flutes |  |  |  |  |  |  |
| $1 / 4$ in | $3 / 8$ in | 2 | 1/4 in | 0.0 | Wid |  |
| $1 / 4$ in | $1 / 2$ in | 4 in | $1 / 4$ in | 0.015 in | Widia Hanita | 48JH13 |
| $1 / 4$ in | 5/8 in | 4 in | $1 / 4$ in | 0.015 in | Widia Hanita | 430G44 |
| $1 / 4$ in | $11 / 8$ in | 3 in | $1 / 4$ in | 0.06 in | Widia Hanita | 430F54 |
| $1 / 4$ in | 1 in | 3 in | $1 / 4$ in | 0.03 in | Widia Hanita | 48JE69 |
| $3 / 8$ in | $1 / 2$ in | 2 in | $3 / 8$ in | 0.12 in | Widia Hanita | 430F63 |
| $3 / 8$ in | $7 / 8$ in | $21 / 2$ in | $3 / 8$ in | 0.06 in | Widia Hanita | 48JG70 |
| $3 / 8$ in | 1 in | $21 / 2$ in | $3 / 8$ in | 0.12 in | Widia Hanita | 430F68 |
| $3 / 8$ in | $11 / 4$ in | 3 in | $3 / 8$ in | 0.03 in | Widia Hanita | 287RD9 |
| $3 / 8$ in | 1 in | 3 in | $3 / 8$ in | 0.015 in | Widia Hanita | 430F70 |
| $3 / 8$ in | $11 / 2$ in | 4 in | $3 / 8$ in | 0.015 in | Widia Hanita | 48JE74 |
| $1 / 2$ in | $5 / 8$ in | 5 in | $1 / 2$ in | 0.12 in | Widia Hanita | 430G71 |
| $1 / 2$ in | $11 / 4$ in | 3 in | $1 / 2$ in | 0.09 in | Widia Hanita | 430 F 85 |
| $1 / 2$ in | 1 in | 3 in | $1 / 2$ in | 0.12 in | Widia Hanita | 430F80 |
| $1 / 2$ in | $15 / 8$ in | 4 in | $1 / 2$ in | 0.12 in | Widia Hanita | 430F90 |
| $1 / 2$ in | $21 / 8$ in | 4 in | $1 / 2$ in | 0.12 in | Widia Hanita | 287RF2 |
| $1 / 2$ in | 2 in | 5 in | $1 / 2$ in | 0.06 in | Widia Hanita | 48JE80 |
| $5 / 8$ in | $3 / 4$ in | 3 in | $5 / 8$ in | 0.06 in | Widia Hanita | 430F93 |
| $5 / 8$ in | $11 / 4$ in | $31 / 2$ in | $5 / 8$ in | 0.12 in | Widia Hanita | $430 \mathrm{F98}$ |
| $5 / 8$ in | $15 / 8$ in | $31 / 2$ in | $5 / 8$ in | 0.03 in | Widia Hanita | 287RF6 |
| $5 / 8$ in | $11 / 4$ in | 4 in | $5 / 8$ in | 0.03 in | Widia Hanita | 48GW03 |
| $5 / 8$ in | $21 / 2$ in | $51 / 4$ in | $5 / 8$ in | 0.015 in | Widia Hanita | 48JE82 |
| $5 / 8$ in | $25 / 8$ in | 5 in | $5 / 8$ in | 0.03 in | Widia Hanita | 287RG1 |
| $3 / 4$ in | $13 / 4$ in | 4 in | $3 / 4$ in | 0.12 in | Widia Hanita | 287RXO |
| $3 / 4$ in | $15 / 8$ in | 4 in | $3 / 4$ in | 0.03 in | Widia Hanita | 430G12 |
| $3 / 4$ in | 1 in | 4 in | $3 / 4$ in | 0.12 in | Widia Hanita | 430G88 |
| $3 / 4$ in | $11 / 2$ in | 6 in | $3 / 4$ in | 0.12 in | Widia Hanita | 430G94 |
| $3 / 4$ in | $31 / 4$ in | 6 in | $3 / 4$ in | 0.03 in | Widia Hanita | 287RH1 |
| $3 / 4$ in | 3 in | 6 in | $3 / 4$ in | 0.12 in | Widia Hanita | 48JE91 |
| 1 in | $11 / 4$ in | 4 in | 1 in | 0.015 in | Widia Hanita | 430G97 |
| 1 in | $11 / 4 \mathrm{in}$ | 4 in | 1 in | $1 / 4$ in | Widia Hanita | 430G24 |
| 1 in | $13 / 4$ in | $5^{1 / 2}$ in | 1 in | 0.03 in | Widia Hanita | 48GW07 |
| 1 in | $21 / 4$ in | 5 in | 1 in | 0.03 in | Widia Hanita | 287RH5 |
| 1 in | $31 / 4$ in | 6 in | 1 in | $1 / 4$ in | Widia Hanita | 430G31 |
| 1 in | 4 in | 7 in | 1 in | 0.12 in | Widia Hanita | 48JE97 |
| /4 | 5 in |  |  |  |  |  |


| Milling | Length of Cut | Overall Shank Length Dia. |  | Corner <br> Radius | Brand | Item No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |
| 7 Flutes |  |  |  |  |  |  |
| $3 / 8$ in | 3/4 in | 4 in | 3/8 in | 0.015 in | Widia Hanita | 48GW35 |
| $3 / 8$ in | $11 / 8$ in | 3 in | $3 / 8$ in | 0.015 in | Widia Hanita | 48GW09 |
| $3 / 8$ in | $17 / 8$ in | 4 in | $3 / 8$ in | 0.015 in | Widia Hanita | 48GW24 |
| $1 / 2$ in | $11 / 2$ in | $31 / 2$ in | $1 / 2$ in | 0.12 in | Widia Hanita | 48GW13 |
| $1 / 2$ in | 1 in | $41 / 2$ in | $1 / 2$ in | 0.12 in | Widia Hanita | 48GW39 |
| $1 / 2$ in | $21 / 2$ in | $41 / 2$ in | $1 / 2$ in | 0.03 in | Widia Hanita | 48GW26 |
| $5 / 8$ in | $17 / 8$ in | 4 in | $5 / 8$ in | 0.06 in | Widia Hanita | 48GW15 |
| $5 / 8$ in | $11 / 4$ in | 5 in | $5 / 8$ in | 0.03 in | Widia Hanita | 48GW40 |
| $5 / 8$ in | $31 / 8$ in | $51 / 2$ in | $5 / 8$ in | 0.03 in | Widia Hanita | 48GW29 |
| $3 / 4$ in | $11 / 2$ in | $51 / 2$ in | $3 / 4$ in | 0.12 in | Widia Hanita | 48GW46 |
| $3 / 4$ in | $3^{3 / 4}$ in | 6 in | $3 / 4$ in | 0.12 in | Widia Hanita | 48GW33 |
| 1 in | 2 in | 6 in | 1 in | 0.06 in | Widia Hanita | 48GW48 |
| 1 in | 3 in | $51 / 2$ in | 1 in | 0.06 in | Widia Hanita | 48GW22 |
| 1 in | 5 in | $71 / 2$ in | 1 in | 0.06 in | Widia Hanita | 48GW34 |
| Bright (Uncoated) Finish |  |  |  |  |  |  |
| 3 Flutes |  |  |  |  |  |  |
| $1 / 8$ in | $1 / 4$ in | $11 / 2$ in | 1/8 in | 0 in |  | 55HL62 |
| 1/8 in | $1 / 2$ in | $11 / 2$ in | $1 / 8$ in | 0 in | - | 55HL08 |
| $3 / 16$ in | $5 / 8$ in | 2 in | $3 / 16$ in | 0 in | - | 55HL10 |
| $5 / 16$ in | 13/16 in | $21 / 2$ in | 5/16 in | 0 in | - | 55HL14 |
| 7/16 in | 1 in | $23 / 4$ in | 7/16 in | 0 in | - | 55HL18 |
| $3 / 4$ in | $11 / 2$ in | 4 in | $3 / 4 \mathrm{in}$ | 0 in | - | 55HL24 |
| 4 Flutes |  |  |  |  |  |  |
| $3 / 16$ in | $5 / 8$ in | 2 in | $3 / 16$ in | 0 in | - | 55HK69 |
| $1 / 4$ in | $3 / 4$ in | $21 / 2$ in | $1 / 4 \mathrm{in}$ | 0 in | - | 55HK71 |
| $5 / 16$ in | 13/16 in | $21 / 2$ in | $5 / 16$ in | 0 in | - | 55HK73 |
| 7/16 in | 1 in | $23 / 4$ in | $7 / 16$ in | 0 in | - | 55HK77 |
| $5 / 8$ in | $11 / 4$ in | $31 / 2$ in | $5 / 8$ in | 0 in | - | 55HK81 |
| $3 / 4$ in | $11 / 2$ in | 4 in | $3 / 4$ in | 0 in | - | 55HK83 |
| 1 in | $11 / 2$ in | 4 in | 1 in | 0 in | - | 55HK65 |
| 1 in | $11 / 2$ in | 4 in | 1 in | 0 in | - | 55HL06 |
| TiAIN Finish |  |  |  |  |  |  |
| 4 Flutes |  |  |  |  |  |  |
| $1 / 8$ in | $3 / 8$ in | $11 / 2$ in | $1 / 8$ in | 0.01 in | OSG | 30L659 |
| $1 / 8$ in | $1 / 2$ in | $11 / 2$ in | $1 / 8$ in | 0.01 in | Cleveland | 33GD65 |
| $3 / 16$ in | $5 / 8$ in | 2 in | $3 / 16$ in | 0.03 in | Widia Hanita | 430H21 |
| $3 / 16$ in | $3 / 4$ in | $21 / 2$ in | $3 / 16$ in | 0.01 in | Cleveland | 33GD71 |
| $1 / 4$ in | 7/16 in | $21 / 2$ in | $1 / 4$ in | 0.015 in | OSG | $30 \mathrm{L663}$ |


| Milling | Length |  | nk | Corner |  | Item |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Dia. | of Cut | Length | Dia. | Radius | Brand | No. |
| $1 / 4$ in | $1 / 2$ in | 2 in | $1 / 4$ in | 0.02 in | Cleveland | 33GD73 |
| $1 / 4$ in | $3 / 4$ in | $21 / 2$ in | $1 / 4$ in | 0.015 in | OSG | 30L665 |
| $3 / 8$ in | $1 / 2$ in | $21 / 2$ in | $3 / 8$ in | 0.03 in | OSG | $30 \mathrm{L670}$ |
| $3 / 8$ in | $5 / 8$ in | 2 in | $3 / 8$ in | 0.02 in | Cleveland | 33GD87 |
| $3 / 8$ in | 7/8 in | $21 / 2$ in | $3 / 8$ in | 0.015 in | OSG | $30 \mathrm{L678}$ |
| $3 / 8$ in | 1 in | $21 / 2$ in | $3 / 8$ in | 0.015 in | Widia Hanita | 430H69 |
| $3 / 8$ in | $11 / 8$ in | 3 in | $3 / 8$ in | 0.02 in | Cleveland | 33GD91 |
| $3 / 8$ in | 2 in | 4 in | $3 / 8$ in | 0.02 in | Cleveland | 33GD93 |
| $1 / 2$ in | $1 / 2$ in | $21 / 2$ in | $1 / 2$ in | 0.02 in | Cleveland | 33GE01 |
| $1 / 2$ in | $5 / 8$ in | $21 / 2$ in | $1 / 2$ in | 0.03 in | OSG | $30 \mathrm{L693}$ |
| $1 / 2$ in | $5 / 8$ in | 4 in | $1 / 2$ in | 0.06 in | Widia Hanita | 287RM2 |
| $1 / 2$ in | $11 / 4$ in | $31 / 2$ in | $1 / 2$ in | 0.015 in | OSG | $30 \mathrm{L696}$ |
| $1 / 2$ in | 1 in | 3 in | $1 / 2$ in | 0.06 in | OSG | $30 \mathrm{L686}$ |
| $1 / 2$ in | $11 / 4$ in | $31 / 2$ in | $1 / 2$ in | $1 / 8$ in | OSG | $30 \mathrm{L692}$ |
| $1 / 2$ in | 2 in | 4 in | $1 / 2$ in | 0.03 in | Cleveland | 33GE15 |
| $5 / 8$ in | $3 / 4$ in | 3 in | $5 / 8$ in | 0.03 in | Cleveland | 33GE20 |
| $5 / 8$ in | $11 / 4$ in | $31 / 2$ in | $5 / 8$ in | 0.09 in | Widia Hanita | 430H46 |
| $3 / 4$ in | $7 / 8$ in | 3 in | $3 / 4$ in | 0.03 in | Cleveland | 33GE31 |
| $3 / 4$ in | 1 in | 3 in | $3 / 4$ in | 0.03 in | Cleveland | 33GE33 |
| $3 / 4$ in | $11 / 2$ in | 4 in | $3 / 4$ in | 0.03 in | Widia Hanita | 430H50 |
| $3 / 4$ in | $15 / 8$ in | 4 in | $3 / 4$ in | 0.02 in | OSG | $30 L 725$ |
| $3 / 4$ in | $21 / 4$ in | 5 in | $3 / 4$ in | 0.06 in | OSG | 30 L 726 |
| 1 in | $11 / 2$ in | 4 in | 1 in | 0.03 in | OSG | $30 \mathrm{L651}$ |
| 1 in | $11 / 8$ in | $51 / 2$ in | 1 in | 0.03 in | Widia Hanita | 287RM7 |
| 1 in | $21 / 4$ in | 5 in | 1 in | $1 / 8$ in | Cleveland | 33GE53 |
| 1 in | 3 in | 5 in | 1 in | 0.03 in | Cleveland | 33GE55 |
| 1 in | 3 in | 5 in | 1 in | $1 / 8$ in | Cleveland | 33GE58 |
| 5 Flutes |  |  |  |  |  |  |
| 3/16 in | 7/16 in | 2 in | $3 / 16$ in | 0.03 in | OSG | 30M226 |
| $3 / 16$ in | $5 / 8$ in | $21 / 4$ in | $3 / 16$ in | 0.015 in | OSG | 30M227 |
| $1 / 4$ in | $3 / 8$ in | 2 in | $1 / 4$ in | 0.015 in | OSG | 30M232 |
| $3 / 8$ in | $1 / 2$ in | 2 in | $3 / 8$ in | 0.015 in | OSG | 30M245 |
| $3 / 8$ in | $7 / 8$ in | $21 / 2$ in | $3 / 8$ in | 0.03 in | OSG | 30M240 |
| $1 / 2$ in | $11 / 4$ in | $31 / 2$ in | $1 / 2$ in | 0.12 in | OSG | 30M264 |
| $5 / 8$ in | $3 / 4$ in | 3 in | $5 / 8$ in | 0.03 in | OSG | 30M293 |
| $5 / 8$ in | $11 / 4$ in | $31 / 2$ in | 5/8 in | 0.09 in | OSG | 30M291 |
| $3 / 4$ in | $11 / 2$ in | 4 in | $3 / 4$ in | 0.03 in | OSG | 30M312 |
| $3 / 4$ in | $11 / 8$ in | 4 in | $3 / 4$ in | 0.12 in | OSG | 30M319 |
| 1 in | $11 / 2$ in | 4 in | 1 in | 0.03 in | OSG | 30M201 |

