



# End Mills







## Make Putnam Tools your first choice for end mills.

Putnam Tools is a name that has been respected in American Industry for decades. In this catalog you will find a wide selection of roughing and finishing end mills, as well as specialty milling tools, to support your metalworking operations. Made from premium materials to exacting specifications, you can trust Putnam Tools to deliver the performance you need at the price that fits your budget.

Putnam Tool's knowledgeable sales application and technical support teams can be called upon to recommend the right end mill for your application and guide you to getting the most from your tool purchase.

Ask your distributor for Putnam Tools for your milling requirements. You'll find a wide range of products to satisfy everyday applications.

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## Metalcutting Safety (read this before using Putnam Tools products)

Modern metalcutting operations involve high energy, high spindle or cutter speeds, and high temperatures and cutting forces. Hot, flying chips may be projected from the workpiece during metalcutting. Although advanced cutting tool materials are designed and manufactured to withstand the high cutting forces and temperatures that normally occur in these operations, they are susceptible to fragmenting in service, particularly if they are subjected to over-stress, severe impact, or otherwise abused. Therefore, precautions should be taken to adequately protect workers, observers, and equipment against hot, flying chips, fragmented cutting tools, broken workpieces, or other similar projectiles. Machines should be fully guarded and personal protective equipment should be used at all times.

When grinding advanced cutting tool materials, a suitable means for collection and disposal of dust, mist, or sludge should be provided. Overexposure to dust or mist containing metallic particles can be hazardous to health, particularly if exposure

continues over an extended period of time, and may cause eye, skin, and mucous membrane irritation and temporary or permanent respiratory disease. Certain existing pulmonary and skin conditions may be aggravated by exposure to dust or mist. Adequate ventilation, respiratory protection, and eye protection should be provided when grinding, and workers should avoid breathing of and prolonged skin contact with dust or mist. General Industry Safety and Health Regulations, Part 1910, U.S. Department of Labor, published in Title 29 of the Code of Federal Regulations should be consulted. Obtain a copy from Putnam Tools and read the applicable Material Safety Data Sheet before grinding.

Cutting tools are only one part of the worker/machine-tool system. Many variables exist in machining operations, including the metal removal rate; the workpiece size, shape, strength and rigidity; the chucking and fixturing; the load carrying capability of centers; the cutter and spindle speed and torque limitations; the holder and boring

bar overhang; the available power; and the condition of the tooling and the machine. A safe metalcutting operation must take all of these variables, and others, into consideration.

Putnam Tools has no control over the end use of its products or the environment into which those products are placed. Putnam Tools urges that its customers adhere to the recommended standards of use of their metalcutting machines and tools, and that they follow procedures that ensure safe metalcutting operations. The information included throughout this catalog under the heading "Technical Data" and other recommendations on machining practices referred to herein are only advisory in nature and do not constitute representations or warranties and are not necessarily appropriate for any particular work environment or application.



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## Miniature 2-Flute



**Style 482 • 2-Flute, Miniature, Center Cutting, HSS**  
**Style 481 • 2-Flute, Miniature, Ball Nose, HSS**

### FEATURES

**ANSI SIZES** **HSS SUBSTRATE**

**GENERAL PURPOSE** **BRIGHT**

**2 FLUTE CC**

**2 FLUTE BALL CC**

**30°**

### APPLICATIONS

**ALLOY STEEL**

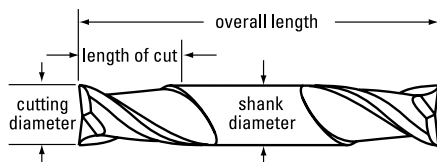
**TOOL STEEL**

**CARBON STEEL**

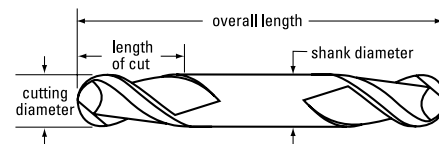
**CAST IRON**



Style 482 Center Cutting Bright



Style 481 Center Cutting Bright



| Cutting Diameter |         |      | Shank |       |       | No. of Flutes | Style 482 Bright |
|------------------|---------|------|-------|-------|-------|---------------|------------------|
| Frac             | Decimal | MM   | Dia.  | LOC   | OAL   |               |                  |
| 1/32             | .0313   | 0.79 | 3/16  | 3/64  | 2     | 2             | 94925            |
| 1/32             | .0313   | 0.79 | 3/16  | 3/32  | 2 1/4 | 2             | 94905            |
| 3/64             | .0469   | 1.19 | 3/16  | 1/16  | 2     | 2             | 94926            |
| 3/64             | .0469   | 1.19 | 3/16  | 9/64  | 2 1/4 | 2             | 94906            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/32  | 2     | 2             | 94927            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/16  | 2 1/4 | 2             | 94907            |
| 1/16             | .0625   | 1.59 | 3/16  | 7/32  | 2 1/2 | 2             | 94918            |
| 5/64             | .0781   | 1.98 | 3/16  | 1/8   | 2     | 2             | 94928            |
| 5/64             | .0781   | 1.98 | 3/16  | 15/64 | 2 1/4 | 2             | 94908            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/64  | 2     | 2             | 94929            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32  | 2 1/4 | 2             | 94909            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32  | 2 5/8 | 2             | 94919            |
| 7/64             | .1094   | 2.78 | 3/16  | 5/32  | 2     | 2             | 94930            |
| 7/64             | .1094   | 2.78 | 3/16  | 21/64 | 2 1/4 | 2             | 94910            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/16  | 2     | 2             | 94931            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/8   | 2 1/4 | 2             | 94911            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/4   | 3 1/8 | 2             | 94920            |
| 9/64             | .1406   | 3.57 | 3/16  | 7/32  | 2     | 2             | 94932            |
| 9/64             | .1406   | 3.57 | 3/16  | 13/32 | 2 1/4 | 2             | 94912            |
| 5/32             | .1563   | 3.97 | 3/16  | 15/64 | 2     | 2             | 94933            |
| 5/32             | .1563   | 3.97 | 3/16  | 7/16  | 2 1/4 | 2             | 94913            |
| 5/32             | .1563   | 3.97 | 3/16  | 7/8   | 3 1/4 | 2             | 94921            |
| 11/64            | .1719   | 4.37 | 3/16  | 1/4   | 2     | 2             | 94934            |
| 11/64            | .1719   | 4.37 | 3/16  | 1/2   | 2 1/4 | 2             | 94914            |
| 3/16             | .1875   | 4.76 | 3/16  | 9/32  | 2     | 2             | 94935            |
| 3/16             | .1875   | 4.76 | 3/16  | 1/2   | 2 1/4 | 2             | 94915            |

| Cutting Diameter |         |      | Shank |       |       | No. of Flutes | Style 481 Bright |
|------------------|---------|------|-------|-------|-------|---------------|------------------|
| Frac             | Decimal | MM   | Dia.  | LOC   | OAL   |               |                  |
| 1/32             | .0313   | 0.79 | 3/16  | 3/64  | 2     | 2             | 93130            |
| 1/32             | .0313   | 0.79 | 3/16  | 3/32  | 2 1/4 | 2             | 92840            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/32  | 2     | 2             | 93132            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/16  | 2 1/4 | 2             | 92842            |
| 1/16             | .0625   | 1.59 | 3/16  | 7/32  | 2 1/2 | 2             | 92844            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/64  | 2     | 2             | 93134            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32  | 2 1/4 | 2             | 92845            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32  | 2 5/8 | 2             | 92847            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/16  | 2     | 2             | 93136            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/8   | 2 1/4 | 2             | 92848            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/4   | 3 1/8 | 2             | 92850            |
| 5/32             | .1563   | 3.97 | 3/16  | 15/64 | 2     | 2             | 93138            |
| 5/32             | .1563   | 3.97 | 3/16  | 7/16  | 2 1/4 | 2             | 92851            |
| 5/32             | .1563   | 3.97 | 3/16  | 7/8   | 3 1/4 | 2             | 92853            |
| 3/16             | .1875   | 4.76 | 3/16  | 9/32  | 2     | 2             | 93140            |
| 3/16             | .1875   | 4.76 | 3/16  | 1/2   | 2 1/4 | 2             | 92854            |
| 3/16             | .1875   | 4.76 | 3/16  | 1     | 3 3/8 | 2             | 92856            |



Style 484 • 4-Flute, Miniature, Center Cutting, HSS

FEATURES

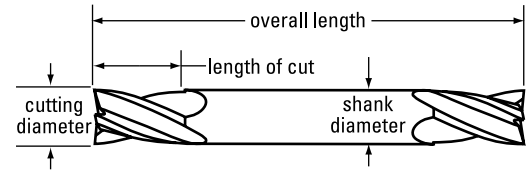
|                 |               |
|-----------------|---------------|
| ANSI SIZES      | HSS SUBSTRATE |
| GENERAL PURPOSE | BRIGHT        |
| 4 FLUTE NCC     |               |
| 30°             |               |

APPLICATIONS

|              |
|--------------|
| ALLOY STEEL  |
| TOOL STEEL   |
| CARBON STEEL |
| CAST IRON    |



Style 484 HSS Bright



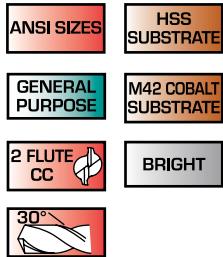
| Cutting Diameter |         |      | Shank |       |       | No. of Flutes | Style 484 Bright |
|------------------|---------|------|-------|-------|-------|---------------|------------------|
| Frac             | Decimal | MM   | Dia.  | LOC   | OAL   |               |                  |
| 1/16             | .0625   | 1.59 | 3/16  | 3/32  | 2     | 4             | 94878            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/64  | 2     | 4             | 94879            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32  | 2 1/4 | 4             | 94886            |
| 3/32             | .0938   | 2.38 | 3/16  | 1/2   | 2 5/8 | 4             | 94896            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/16  | 2     | 4             | 94880            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/8   | 2 1/4 | 4             | 94887            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/4   | 3 1/8 | 4             | 94897            |
| 5/32             | .1562   | 3.97 | 3/16  | 15/64 | 2     | 4             | 94881            |
| 5/32             | .1562   | 3.97 | 3/16  | 7/16  | 2 1/4 | 4             | 94888            |
| 5/32             | .1562   | 3.97 | 3/16  | 7/8   | 3 1/4 | 4             | 94898            |
| 3/16             | .1875   | 4.76 | 3/16  | 9/32  | 2     | 4             | 94882            |
| 3/16             | .1875   | 4.76 | 3/16  | 1/2   | 2 1/4 | 4             | 94889            |
| 3/16             | .1875   | 4.76 | 3/16  | 1     | 3 3/8 | 4             | 94899            |

## General-Purpose

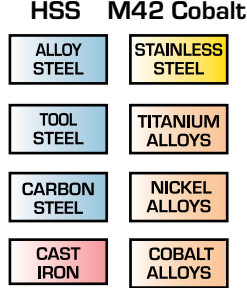


**Style 432 • 2-Flute, Center Cutting, HSS**  
**Style 442 • 2-Flute, Center Cutting, M42 Cobalt**

### FEATURES



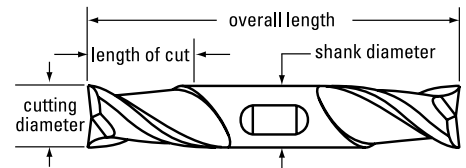
### APPLICATIONS



Style 432 HSS Bright



Style 442 M42 Cobalt Bright



| Cutting Diameter<br>Frac | Decimal | MM    | Shank<br>Dia. | LOC   | OAL    | No. of<br>Flutes | HSS                 |       | Cobalt              |
|--------------------------|---------|-------|---------------|-------|--------|------------------|---------------------|-------|---------------------|
|                          |         |       |               |       |        |                  | Style 432<br>Bright | TiN   | Style 442<br>Bright |
| 5/64                     | .0781   | 1.98  | 3/8           | 5/16  | 3 1/16 | 2                | —                   | —     | 91610               |
| 3/32                     | .0938   | 2.38  | 3/8           | 5/16  | 3 1/16 | 2                | —                   | —     | 91611               |
| 7/64                     | .1094   | 2.78  | 3/8           | 3/8   | 3 1/16 | 2                | 94584               | —     | —                   |
| 1/8                      | .1250   | 3.18  | 3/8           | 3/16  | 2 3/4  | 2                | 94950               | —     | —                   |
| 1/8                      | .1250   | 3.18  | 3/8           | 3/8   | 3 1/16 | 2                | 94830               | 96354 | 96122               |
| 9/64                     | .1406   | 3.57  | 3/8           | 7/16  | 3 1/8  | 2                | 94585               | —     | 91612               |
| 5/32                     | .1563   | 3.97  | 3/8           | 15/64 | 2 3/4  | 2                | 94951               | —     | —                   |
| 5/32                     | .1563   | 3.97  | 3/8           | 7/16  | 3 1/8  | 2                | 94831               | 96355 | 96123               |
| 11/64                    | .1719   | 4.37  | 3/8           | 7/16  | 3 1/4  | 2                | 94586               | —     | —                   |
| 3/16                     | .1875   | 4.76  | 3/8           | 9/32  | 2 3/4  | 2                | 94952               | —     | —                   |
| 3/16                     | .1875   | 4.76  | 3/8           | 7/16  | 3 1/4  | 2                | 94832               | 96356 | 96124               |
| 13/64                    | .2031   | 5.16  | 3/8           | 1/2   | 3 1/4  | 2                | 94587               | —     | —                   |
| 7/32                     | .2188   | 5.56  | 3/8           | 21/64 | 2 7/8  | 2                | 94953               | —     | —                   |
| 7/32                     | .2188   | 5.56  | 3/8           | 1/2   | 3 1/4  | 2                | 94833               | 96357 | 96125               |
| 15/64                    | .2344   | 5.95  | 3/8           | 1/2   | 3 3/8  | 2                | 94588               | —     | —                   |
| 1/4                      | .2500   | 6.35  | 3/8           | 3/8   | 2 7/8  | 2                | 94954               | —     | —                   |
| 1/4                      | .2500   | 6.35  | 3/8           | 1/2   | 3 3/8  | 2                | 94834               | 96358 | 96126               |
| 17/64                    | .2656   | 6.75  | 3/8           | 9/16  | 3 3/8  | 2                | 94589               | —     | —                   |
| 9/32                     | .2813   | 7.14  | 3/8           | 9/16  | 3 3/8  | 2                | 94835               | 96359 | 96127               |
| 19/64                    | .2969   | 7.54  | 3/8           | 9/16  | 3 1/2  | 2                | 94590               | —     | —                   |
| 5/16                     | .3125   | 7.94  | 3/8           | 9/16  | 3 1/2  | 2                | 94836               | 96360 | 96128               |
| 21/64                    | .3281   | 8.33  | 3/8           | 9/16  | 3 1/2  | 2                | 94591               | —     | —                   |
| 11/32                    | .3438   | 8.73  | 3/8           | 9/16  | 3 1/2  | 2                | 94837               | 96361 | 96129               |
| 23/64                    | .3594   | 9.13  | 3/8           | 9/16  | 3 1/2  | 2                | 94592               | —     | —                   |
| 3/8                      | .3750   | 9.53  | 3/8           | 9/16  | 3 1/2  | 2                | 94838               | 96362 | 96130               |
| 25/64                    | .3906   | 9.92  | 1/2           | 13/16 | 4 1/8  | 2                | 94593               | —     | —                   |
| 13/32                    | .4063   | 10.32 | 1/2           | 13/16 | 3 3/4  | 2                | —                   | —     | 96131               |
| 13/32                    | .4063   | 10.32 | 1/2           | 13/16 | 4 1/8  | 2                | 94839               | 96363 | —                   |
| 27/64                    | .4219   | 10.72 | 1/2           | 13/16 | 4 1/8  | 2                | 94594               | —     | —                   |
| 7/16                     | .4375   | 11.11 | 1/2           | 13/16 | 3 3/4  | 2                | —                   | —     | 96132               |
| 7/16                     | .4375   | 11.11 | 1/2           | 13/16 | 4 1/8  | 2                | 94840               | 96364 | —                   |
| 29/64                    | .4531   | 11.51 | 1/2           | 13/16 | 4 1/8  | 2                | 94595               | —     | —                   |
| 15/32                    | .4688   | 11.91 | 1/2           | 13/16 | 4 1/8  | 2                | 94841               | —     | —                   |
| 31/64                    | .4844   | 12.30 | 1/2           | 13/16 | 4 1/8  | 2                | 94596               | —     | —                   |
| 1/2                      | .5000   | 12.70 | 1/2           | 13/16 | 4 1/8  | 2                | 94842               | 96365 | 96133               |

continued on next page





**Style 432 • 2-Flute, Center Cutting, HSS**  
**Style 442 • 2-Flute, Center Cutting, M42 Cobalt**  
 (continued)

| Cutting Diameter |         |       | Shank |        |       | No. of Flutes | HSS              |       | Cobalt           |
|------------------|---------|-------|-------|--------|-------|---------------|------------------|-------|------------------|
| Frac             | Decimal | MM    | Dia.  | LOC    | OAL   |               | Style 432 Bright | TiN   | Style 442 Bright |
| 17/32            | .5313   | 13.49 | 5/8   | 1 1/8  | 4 1/2 | 2             | 95400            | —     | —                |
| 9/16             | .5625   | 14.29 | 5/8   | 1 1/8  | 5     | 2             | 94843            | 96366 | 96134            |
| 19/32            | .5938   | 15.08 | 5/8   | 1 1/8  | 4 1/2 | 2             | 95401            | —     | —                |
| 5/8              | .6250   | 15.88 | 5/8   | 1 1/8  | 5     | 2             | 94844            | 96367 | 96135            |
| 21/32            | .6563   | 16.67 | 3/4   | 1 5/16 | 5 5/8 | 2             | 95402            | —     | —                |
| 11/16            | .6875   | 17.46 | 3/4   | 1 5/16 | 5 5/8 | 2             | 94845            | —     | —                |
| 23/32            | .7188   | 18.26 | 3/4   | 1 5/16 | 5 5/8 | 2             | 95403            | —     | —                |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/16 | 5     | 2             | —                | —     | 96136            |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/16 | 5 5/8 | 2             | 94846            | 96368 | —                |
| 13/16            | .8125   | 20.64 | 7/8   | 1 9/16 | 6 1/8 | 2             | 94847            | —     | —                |
| 7/8              | .8750   | 22.23 | 7/8   | 1 9/16 | 5 1/2 | 2             | —                | —     | 96137            |
| 7/8              | .8750   | 22.23 | 7/8   | 1 9/16 | 6 1/8 | 2             | 94848            | 96369 | —                |
| 15/16            | 0.9375  | 23.81 | 1     | 1 5/8  | 5 7/8 | 2             | 94849            | —     | —                |
| 1                | 1.0000  | 25.40 | 1     | 1 5/8  | 6 3/8 | 2             | 94850            | 96370 | 96138            |

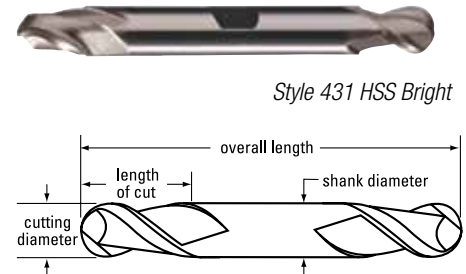
**Style 431 • Ball Nose, 2-Flute, Center Cutting, HSS**

FEATURES

|                 |                      |
|-----------------|----------------------|
| ANSI SIZES      | HSS SUBSTRATE        |
| GENERAL PURPOSE | M42 COBALT SUBSTRATE |
| 2 FLUTE CC      | BRIGHT               |
| 30°             |                      |

APPLICATIONS

|              |
|--------------|
| ALLOY STEEL  |
| TOOL STEEL   |
| CARBON STEEL |
| CAST IRON    |



| Cutting Diameter |         |       | Shank |        |        | No. of Flutes | Style 431 Bright |
|------------------|---------|-------|-------|--------|--------|---------------|------------------|
| Frac             | Decimal | MM    | Dia.  | LOC    | OAL    |               |                  |
| 1/8              | .1250   | 3.18  | 3/8   | 3/16   | 3 1/8  | 2             | 93142            |
| 1/8              | .1250   | 3.18  | 3/8   | 3/8    | 3 1/16 | 2             | 92857            |
| 5/32             | .1563   | 3.97  | 3/8   | 7/16   | 3 1/8  | 2             | 92858            |
| 3/16             | .1875   | 4.76  | 3/8   | 9/32   | 3 1/4  | 2             | 93143            |
| 3/16             | .1875   | 4.76  | 3/8   | 7/16   | 3 1/4  | 2             | 92859            |
| 7/32             | .2188   | 5.56  | 3/8   | 1/2    | 3 1/4  | 2             | 92860            |
| 1/4              | .2500   | 6.35  | 3/8   | 3/8    | 3 3/8  | 2             | 93144            |
| 1/4              | .2500   | 6.35  | 3/8   | 1/2    | 3 3/8  | 2             | 92861            |
| 9/32             | .2813   | 7.14  | 3/8   | 9/16   | 3 3/8  | 2             | 92862            |
| 5/16             | .3125   | 7.94  | 3/8   | 9/16   | 3 1/2  | 2             | 92863            |
| 11/32            | .3438   | 8.73  | 3/8   | 9/16   | 3 1/2  | 2             | 92864            |
| 3/8              | .3750   | 9.53  | 3/8   | 9/16   | 3 1/2  | 2             | 92865            |
| 7/16             | .4375   | 11.11 | 1/2   | 13/16  | 4 1/8  | 2             | 92866            |
| 1/2              | .5000   | 12.70 | 1/2   | 13/16  | 4 1/8  | 2             | 92867            |
| 5/8              | .6250   | 15.88 | 5/8   | 1 1/8  | 5      | 2             | 92868            |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/16 | 5 5/8  | 2             | 92869            |
| 1                | 1.0000  | 25.40 | 1     | 1 5/8  | 6 3/8  | 2             | 92871            |

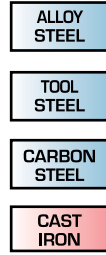


### Style 428 • 2-Flute, Keyway, Straight Flutes, Center Cutting

#### FEATURES



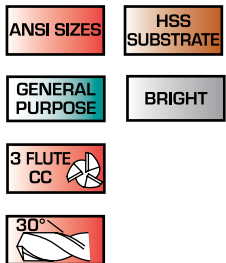
#### APPLICATIONS



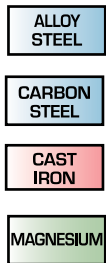
| Cutting Diameter |         |       | Shank |       |        | No. of Flutes | Style 428 Bright |
|------------------|---------|-------|-------|-------|--------|---------------|------------------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL    |               |                  |
| 1/8              | .1250   | 3.18  | 3/8   | 3/8   | 3 1/16 | 2             | 92350            |
| 3/16             | .1875   | 4.76  | 3/8   | 7/16  | 3 1/4  | 2             | 92351            |
| 1/4              | .2500   | 6.35  | 3/8   | 1/2   | 3 3/8  | 2             | 92352            |
| 5/16             | .3125   | 7.94  | 3/8   | 9/16  | 3 1/2  | 2             | 92353            |
| 3/8              | .3750   | 9.53  | 3/8   | 9/16  | 3 1/2  | 2             | 92354            |
| 7/16             | .4375   | 11.11 | 1/2   | 13/16 | 4 1/8  | 2             | 92355            |
| 1/2              | .5000   | 12.70 | 1/2   | 13/16 | 4 1/8  | 2             | 92356            |

### Style 433 • 3-Flute Center Cutting HSS

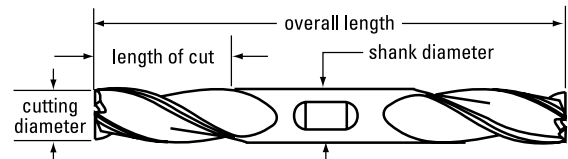
#### FEATURES



#### APPLICATIONS



Style 433 Bright



| Cutting Diameter |         |       | Shank |       |        | No. of Flutes | Style 433 Bright |
|------------------|---------|-------|-------|-------|--------|---------------|------------------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL    |               |                  |
| 1/8              | .1250   | 3.18  | 3/8   | 3/8   | 3 1/16 | 3             | 92965            |
| 3/16             | .1875   | 4.76  | 3/8   | 1/2   | 3 1/4  | 3             | 92966            |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 3 3/8  | 3             | 92967            |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 3 1/2  | 3             | 92968            |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 3 1/2  | 3             | 92969            |
| 7/16             | .4375   | 11.11 | 1/2   | 1     | 4 1/8  | 3             | 92970            |
| 1/2              | .5000   | 12.70 | 1/2   | 1     | 4 1/8  | 3             | 92971            |
| 9/16             | .5625   | 14.29 | 5/8   | 1 3/8 | 5      | 3             | 92972            |
| 5/8              | .6250   | 15.88 | 5/8   | 1 3/8 | 5      | 3             | 92973            |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 5 5/8  | 3             | 92974            |



- Style 434 • 4-Flute, Non-Center Cutting, HSS
- Style 435 • 4-Flute, Center Cutting, HSS
- Style 444 • 4-Flute, Non-Center Cutting, M42 Cobalt
- Style 445 • 4-Flute, Center Cutting, M42 Cobalt

FEATURES

|             |                      |
|-------------|----------------------|
| ANSI SIZES  | HSS SUBSTRATE        |
| HEAVY DUTY  | M42 COBALT SUBSTRATE |
| 4 FLUTE NCC | BRIGHT               |
| 4 FLUTE CC  | TiN                  |
| 30°         |                      |

APPLICATIONS

| HSS          |                 | M42 Cobalt |                 |
|--------------|-----------------|------------|-----------------|
| ALLOY STEEL  | STAINLESS STEEL | TOOL STEEL | TITANIUM ALLOYS |
| CARBON STEEL | NICKEL ALLOYS   | CAST IRON  | COBALT ALLOYS   |



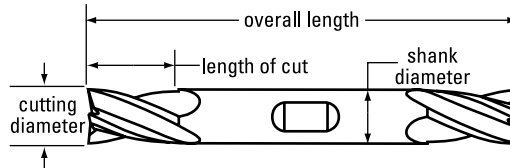
Style 434 TiN



Style 435 Bright



Style 445 M42 Cobalt Bright



| Cutting Diameter |         |      | Shank Dia. | LOC   | OAL    | No. of Flutes | HSS                     |                     |                         | M42 Cobalt          |       |
|------------------|---------|------|------------|-------|--------|---------------|-------------------------|---------------------|-------------------------|---------------------|-------|
| Frac             | Decimal | MM   |            |       |        |               | Non-CC Style 434 Bright | CC Style 435 Bright | Non-CC Style 444 Bright | CC Style 445 Bright |       |
| 7/64             | .1094   | 2.78 | 3/8        | 3/8   | 3 1/16 | 4             | 94571                   | —                   | —                       | —                   | —     |
| 1/8              | .1250   | 3.18 | 3/8        | 3/16  | 2 3/4  | 4             | 94940                   | —                   | —                       | —                   | —     |
| 1/8              | .1250   | 3.18 | 3/8        | 3/8   | 3 1/16 | 4             | 94855                   | 96403               | 94815                   | 96022               | 96083 |
| 9/64             | .1406   | 3.57 | 3/8        | 7/16  | 3 1/8  | 4             | 94572                   | —                   | —                       | —                   | 96744 |
| 5/32             | .1563   | 3.97 | 3/8        | 15/64 | 2 3/4  | 4             | 94941                   | —                   | —                       | —                   | —     |
| 5/32             | .1563   | 3.97 | 3/8        | 7/16  | 3 1/8  | 4             | 94856                   | 96404               | —                       | 96023               | 96745 |
| 11/64            | .1719   | 4.37 | 3/8        | 1/2   | 3 1/4  | 4             | 94573                   | —                   | —                       | —                   | 96746 |
| 3/16             | .1875   | 4.76 | 3/8        | 9/32  | 2 3/4  | 4             | 94942                   | —                   | —                       | —                   | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 1/2   | 3 1/4  | 4             | 94857                   | 96405               | 94816                   | 96024               | 96084 |
| 13/64            | .2031   | 5.16 | 3/8        | 9/16  | 3 1/4  | 4             | 94574                   | —                   | —                       | —                   | 96747 |
| 7/32             | .2188   | 5.56 | 3/8        | 21/64 | 2 7/8  | 4             | 94943                   | —                   | —                       | —                   | —     |
| 7/32             | .2188   | 5.56 | 3/8        | 9/16  | 3 1/4  | 4             | 94858                   | 96406               | —                       | 96025               | 96748 |
| 15/64            | .2344   | 5.95 | 3/8        | 5/8   | 3 3/8  | 4             | 94575                   | —                   | —                       | —                   | 96749 |
| 1/4              | .2500   | 6.35 | 3/8        | 3/8   | 2 7/8  | 4             | 94944                   | —                   | —                       | —                   | —     |
| 1/4              | .2500   | 6.35 | 3/8        | 5/8   | 3 3/8  | 4             | 94859                   | 96407               | 94817                   | 96026               | 96085 |
| 17/64            | .2656   | 6.75 | 3/8        | 11/16 | 3 3/8  | 4             | 94576                   | —                   | —                       | —                   | —     |
| 9/32             | .2813   | 7.14 | 3/8        | 11/16 | 3 3/8  | 4             | 94860                   | 96408               | —                       | 96027               | 96750 |
| 19/64            | .2969   | 7.54 | 3/8        | 3/4   | 3 1/2  | 4             | 94577                   | —                   | —                       | —                   | —     |
| 5/16             | .3125   | 7.94 | 3/8        | 3/4   | 3 1/2  | 4             | 94861                   | 96409               | 94818                   | 96028               | 96086 |
| 21/64            | .3281   | 8.33 | 3/8        | 3/4   | 3 1/2  | 4             | 94578                   | —                   | —                       | —                   | —     |
| 11/32            | .3438   | 8.73 | 3/8        | 3/4   | 3 1/2  | 4             | 94862                   | 96410               | —                       | 96029               | 96751 |
| 23/64            | .3594   | 9.13 | 3/8        | 3/4   | 3 1/2  | 4             | 94579                   | —                   | —                       | —                   | —     |
| 3/8              | .3750   | 9.53 | 3/8        | 3/4   | 3 1/2  | 4             | 94863                   | 96411               | 94819                   | 96030               | 96087 |

continued on next page

General-Purpose



Style 434 • 4-Flute, Non-Center Cutting, HSS  
 Style 435 • 4-Flute, Center Cutting, HSS  
 Style 444 • 4-Flute, Non-Center Cutting, M42 Cobalt  
 Style 445 • 4-Flute, Center Cutting, M42 Cobalt  
 (continued)

| Cutting Diameter |         |       | Shank |       |       | No. of Flutes | HSS                 |        |                 | M42 Cobalt          |                 |
|------------------|---------|-------|-------|-------|-------|---------------|---------------------|--------|-----------------|---------------------|-----------------|
|                  |         |       |       |       |       |               | Non-CC<br>Style 434 |        | CC<br>Style 435 | Non-CC<br>Style 444 | CC<br>Style 445 |
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL   | Bright        | TiN                 | Bright | Bright          | Bright              |                 |
| 25/64            | .3906   | 9.92  | 1/2   | 1     | 4 1/8 | 4             | 94580               | —      | —               | —                   | —               |
| 13/32            | .4063   | 10.32 | 1/2   | 1     | 4 1/8 | 4             | 94864               | 96412  | —               | 96031               | 96752           |
| 27/64            | .4219   | 10.72 | 1/2   | 1     | 4 1/8 | 4             | 94581               | —      | —               | —                   | —               |
| 7/16             | .4375   | 11.11 | 1/2   | 1     | 4 1/8 | 4             | 94865               | 96413  | —               | 96032               | 96753           |
| 29/64            | .4531   | 11.51 | 1/2   | 1     | 4 1/8 | 4             | 94582               | —      | —               | —                   | —               |
| 15/32            | .4688   | 11.91 | 1/2   | 1     | 4 1/8 | 4             | 94866               | —      | —               | —                   | —               |
| 31/64            | .4844   | 12.30 | 1/2   | 1     | 4 1/8 | 4             | 94583               | —      | —               | —                   | —               |
| 1/2              | .5000   | 12.70 | 1/2   | 1     | 4 1/8 | 4             | 94867               | 96414  | 94820           | 96033               | 96088           |
| 17/32            | .5313   | 13.49 | 5/8   | 1 3/8 | 5     | 4             | 95500               | —      | —               | —                   | —               |
| 9/16             | .5625   | 14.29 | 5/8   | 1 3/8 | 5     | 4             | 94868               | 96415  | —               | 96034               | 96754           |
| 19/32            | .5938   | 15.08 | 5/8   | 1 3/8 | 5     | 4             | 95501               | —      | —               | —                   | —               |
| 5/8              | .6250   | 15.88 | 5/8   | 1 3/8 | 5     | 4             | 94869               | 96416  | 94821           | 96035               | 96089           |
| 11/16            | .6875   | 17.46 | 3/4   | 1 5/8 | 5 5/8 | 4             | 94870               | —      | —               | —                   | —               |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 5 5/8 | 4             | 94871               | 96417  | 94822           | 96036               | 96090           |
| 13/16            | .8125   | 20.64 | 7/8   | 1 7/8 | 6 1/8 | 4             | 94872               | —      | —               | —                   | —               |
| 7/8              | .8750   | 22.23 | 7/8   | 1 7/8 | 6 1/8 | 4             | 94873               | 96418  | 94823           | 96037               | —               |
| 15/16            | .9375   | 23.81 | 1     | 1 7/8 | 6 3/8 | 4             | 94874               | —      | —               | —                   | —               |
| 1                | 1.0000  | 25.40 | 1     | 1 7/8 | 6 3/8 | 4             | 94875               | 96419  | 94824           | 96038               | 96755           |





Style 182 • 2-Flute, Miniature, Center Cutting, HSS  
 Style 181 • 2-Flute, Ball Nose, Miniature, HSS

FEATURES

ANSI SIZES: HSS SUBSTRATE  
 GENERAL PURPOSE: BRIGHT  
 2 FLUTE NCC  
 2 FLUTE BALL CC

APPLICATIONS

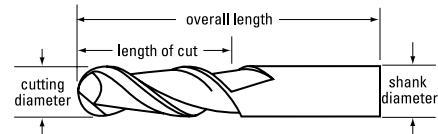
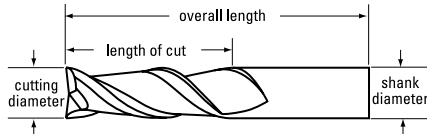
ALLOY STEEL  
 TOOL STEEL  
 CARBON STEEL



Style 182 Bright



Style 181 Ball Nose Bright



| Cutting Diameter |         |      | Shank |       |       | No. of Flutes | Style 182 Bright |
|------------------|---------|------|-------|-------|-------|---------------|------------------|
| Frac             | Decimal | MM   | Dia.  | LOC   | OAL   |               |                  |
| 1/32             | .0312   | 0.79 | 3/16  | 3/64  | 1 1/2 | 2             | 93068            |
| 1/32             | .0312   | 0.79 | 3/16  | 3/32  | 1 1/2 | 2             | 91478            |
| 3/64             | .0469   | 1.19 | 3/16  | 1/16  | 1 1/2 | 2             | 93067            |
| 3/64             | .0469   | 1.19 | 3/16  | 9/64  | 1 1/2 | 2             | 91477            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/32  | 1 1/2 | 2             | 93072            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/16  | 1 1/2 | 2             | 91482            |
| 5/64             | .0781   | 1.98 | 3/16  | 1/8   | 1 1/2 | 2             | 93071            |
| 5/64             | .0781   | 1.98 | 3/16  | 15/64 | 1 1/2 | 2             | 91481            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/64  | 1 1/2 | 2             | 93076            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32  | 1 1/2 | 2             | 91487            |
| 7/64             | .1094   | 2.78 | 3/16  | 5/32  | 1 1/2 | 2             | 93075            |
| 7/64             | .1094   | 2.78 | 3/16  | 21/64 | 1 1/2 | 2             | 91486            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/16  | 1 1/2 | 2             | 93080            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/8   | 1 1/2 | 2             | 91492            |
| 9/64             | .1406   | 3.57 | 3/16  | 1/4   | 1 1/2 | 2             | 93079            |
| 9/64             | .1406   | 3.57 | 3/16  | 13/32 | 1 1/2 | 2             | 91491            |
| 5/32             | .1562   | 3.97 | 3/16  | 1/4   | 1 1/2 | 2             | 93084            |
| 5/32             | .1562   | 3.97 | 3/16  | 7/16  | 1 1/2 | 2             | 91497            |
| 11/64            | .1719   | 4.37 | 3/16  | 15/32 | 1 1/2 | 2             | 91496            |
| 3/16             | .1875   | 4.76 | 3/16  | 9/32  | 1 1/2 | 2             | 93086            |
| 3/16             | .1875   | 4.76 | 3/16  | 1/2   | 1 1/2 | 2             | 91500            |

| Cutting Diameter |         |      | Shank |      |       | No. of Flutes | Style 181 Bright |
|------------------|---------|------|-------|------|-------|---------------|------------------|
| Frac             | Decimal | MM   | Dia.  | LOC  | OAL   |               |                  |
| 1/32             | .0312   | 0.79 | 3/16  | 3/64 | 1 1/2 | 2             | 93131            |
| 1/32             | .0312   | 0.79 | 3/16  | 3/32 | 1 1/2 | 2             | 92841            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/32 | 1 1/2 | 2             | 93133            |
| 1/16             | .0625   | 1.59 | 3/16  | 3/16 | 1 1/2 | 2             | 92843            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/64 | 1 1/2 | 2             | 93135            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32 | 1 1/2 | 2             | 92846            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/16 | 1 1/2 | 2             | 93137            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/8  | 1 1/2 | 2             | 92849            |
| 5/32             | .1562   | 3.97 | 3/16  | 7/16 | 1 1/2 | 2             | 92852            |
| 3/16             | .1875   | 4.76 | 3/16  | 9/16 | 1 1/2 | 2             | 92855            |

## Miniature 4-Flute



Style 184 • 4-Flute, Miniature, Non Center Cutting, HSS

### FEATURES

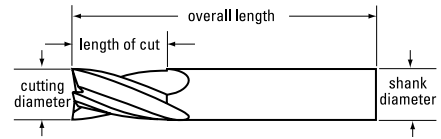
|                 |               |
|-----------------|---------------|
| ANSI SIZES      | HSS SUBSTRATE |
| GENERAL PURPOSE | BRIGHT        |
| 4 FLUTE NCC     |               |

### APPLICATIONS

|              |
|--------------|
| ALLOY STEEL  |
| TOOL STEEL   |
| CARBON STEEL |



Style 184 Bright



| Cutting Diameter |         |      | Shank |      |       | No. of Flutes | Style 184 Bright |
|------------------|---------|------|-------|------|-------|---------------|------------------|
| Frac             | Decimal | MM   | Dia.  | LOC  | OAL   |               |                  |
| 1/16             | .0625   | 1.59 | 3/16  | 3/32 | 1 1/2 | 4             | 93043            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/64 | 1 1/2 | 4             | 93045            |
| 3/32             | .0938   | 2.38 | 3/16  | 9/32 | 1 1/2 | 4             | 91101            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/16 | 1 1/2 | 4             | 93047            |
| 1/8              | .1250   | 3.18 | 3/16  | 3/8  | 1 1/2 | 4             | 91104            |
| 5/32             | .1562   | 3.97 | 3/16  | 1/4  | 1 1/2 | 4             | 93049            |
| 5/32             | .1562   | 3.97 | 3/16  | 7/16 | 1 1/2 | 4             | 91107            |
| 3/16             | .1875   | 4.76 | 3/16  | 9/32 | 1 1/2 | 4             | 93051            |
| 3/16             | .1875   | 4.76 | 3/16  | 1/2  | 1 1/2 | 4             | 91110            |



Style 112, 112M • 2-Flute, Center Cutting, HSS  
 Style 212 • 2-Flute, Center Cutting, M42 Cobalt

FEATURES

|                 |                      |
|-----------------|----------------------|
| ANSI SIZES      | HSS SUBSTRATE        |
| GENERAL PURPOSE | M42 COBALT SUBSTRATE |
| 2 FLUTE CC      | BRIGHT               |
| 30°             | TiN                  |

APPLICATIONS

| HSS          | M42 Cobalt      |
|--------------|-----------------|
| ALLOY STEEL  | STAINLESS STEEL |
| TOOL STEEL   | TITANIUM ALLOYS |
| CARBON STEEL | NICKEL ALLOYS   |
| CAST IRON    | COBALT ALLOYS   |



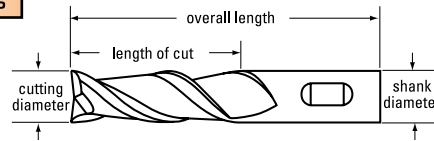
Style 112 HSS Bright



Style 112 HSS TiN



Style 212 M42 Cobalt Bright



| Cutting Diameter<br>Frac | Decimal | MM   | Shank Dia. | LOC   | OAL    | No. of Flutes | HSS              |       | M42 Cobalt       |
|--------------------------|---------|------|------------|-------|--------|---------------|------------------|-------|------------------|
|                          |         |      |            |       |        |               | Style 112 Bright | TiN   | Style 212 Bright |
| 1/8                      | .1250   | 3.18 | 3/8        | 3/16  | 2 1/8  | 2             | 93092            | —     | 94514            |
| 1/8                      | .1250   | 3.18 | 3/8        | 3/8   | 2 5/16 | 2             | 94180            | 96335 | 94675            |
| 1/8                      | .1250   | 3.18 | 3/8        | 3/4   | 2 5/8  | 2             | —                | —     | 94515            |
| 9/64                     | .1406   | 3.57 | 3/8        | 7/16  | 2 3/8  | 2             | 95200            | —     | —                |
| 5/32                     | .1563   | 3.97 | 3/8        | 7/16  | 2 5/16 | 2             | —                | —     | 94516            |
| 5/32                     | .1563   | 3.97 | 3/8        | 7/16  | 2 3/8  | 2             | 95201            | —     | —                |
| 5/32                     | .1563   | 3.97 | 3/8        | 5/8   | 2 3/8  | 2             | —                | —     | 94517            |
| 5/32                     | .1563   | 3.97 | 3/8        | 3/4   | 2 5/8  | 2             | —                | —     | 94518            |
| 11/64                    | .1719   | 4.37 | 3/8        | 7/16  | 2 3/8  | 2             | 95202            | —     | —                |
| 3/16                     | .1875   | 4.76 | 3/8        | 9/32  | 2 3/8  | 2             | 93093            | —     | —                |
| 3/16                     | .1875   | 4.76 | 3/8        | 7/16  | 2 3/8  | 2             | 94181            | 96336 | 94676            |
| 3/16                     | .1875   | 4.76 | 3/8        | 5/8   | 2 3/8  | 2             | —                | —     | 94520            |
| 3/16                     | .1875   | 4.76 | 3/8        | 1 1/4 | 3 1/16 | 2             | —                | —     | 94522            |
| 13/64                    | .2031   | 5.16 | 3/8        | 1/2   | 2 7/16 | 2             | 95203            | —     | —                |
| 7/32                     | .2188   | 5.56 | 3/8        | 1/4   | 2 1/8  | 2             | —                | —     | 94523            |
| 7/32                     | .2188   | 5.56 | 3/8        | 1/2   | 2 3/8  | 2             | —                | —     | 94524            |
| 7/32                     | .2188   | 5.56 | 3/8        | 1/2   | 2 7/16 | 2             | 95204            | —     | —                |
| 7/32                     | .2188   | 5.56 | 3/8        | 7/8   | 2 3/4  | 2             | —                | —     | 94525            |
| 15/64                    | .2344   | 5.95 | 3/8        | 1/2   | 2 7/16 | 2             | 95205            | —     | —                |
| 1/4                      | .2500   | 6.35 | 3/8        | 1/4   | 2 1/16 | 2             | —                | —     | 94527            |
| 1/4                      | .2500   | 6.35 | 3/8        | 3/8   | 2 7/16 | 2             | 93094            | —     | —                |
| 1/4                      | .2500   | 6.35 | 3/8        | 1/2   | 2 7/16 | 2             | 94182            | 96337 | 94677            |
| 1/4                      | .2500   | 6.35 | 3/8        | 3/4   | 2 3/4  | 2             | —                | —     | 94528            |
| 1/4                      | .2500   | 6.35 | 3/8        | 1 1/4 | 3 1/16 | 2             | —                | —     | 94529            |
| 1/4                      | .2500   | 6.35 | 3/8        | 1 3/4 | 3 9/16 | 2             | —                | —     | 94530            |
| 17/64                    | .2656   | 6.75 | 3/8        | 9/16  | 2 1/2  | 2             | 95206            | —     | —                |
| 9/32                     | .2813   | 7.14 | 3/8        | 9/16  | 2 3/8  | 2             | —                | —     | 94531            |
| 9/32                     | .2813   | 7.14 | 3/8        | 9/16  | 2 1/2  | 2             | 95207            | —     | —                |
| 9/32                     | .2813   | 7.14 | 3/8        | 1     | 2 3/4  | 2             | —                | —     | 94532            |
| 9/32                     | .2813   | 7.14 | 3/8        | 1 3/8 | 3 1/8  | 2             | —                | —     | 94533            |
| 19/64                    | .2969   | 7.54 | 3/8        | 9/16  | 2 1/2  | 2             | 95208            | —     | —                |
| 5/16                     | .3125   | 7.94 | 3/8        | 9/16  | 2 1/2  | 2             | 94183            | 96338 | 94678            |
| 5/16                     | .3125   | 7.94 | 3/8        | 1     | 2 3/4  | 2             | —                | —     | 94535            |
| 5/16                     | .3125   | 7.94 | 3/8        | 1 3/8 | 3 1/8  | 2             | —                | —     | 94536            |
| 5/16                     | .3125   | 7.94 | 3/8        | 2     | 3 3/4  | 2             | —                | —     | 94537            |

continued on next page

General-Purpose



Style 112, 112M • 2-Flute, Center Cutting, HSS  
 Style 212 • 2-Flute, Center Cutting, M42 Cobalt  
 (continued)

| Cutting Diameter |         | Shank Dia. | Shank LOC | OAL    | No. of Flutes | HSS |                  | M42 Cobalt |                  |
|------------------|---------|------------|-----------|--------|---------------|-----|------------------|------------|------------------|
| Frac             | Decimal |            |           |        |               | MM  | Style 112 Bright | TiN        | Style 212 Bright |
| 21/64            | .3281   | 8.33       | 3/8       | 9/16   | 2 1/2         | 2   | 95209            | —          | —                |
| 11/32            | .3438   | 8.73       | 3/8       | 9/16   | 2 3/8         | 2   | —                | —          | 94538            |
| 11/32            | .3438   | 8.73       | 3/8       | 9/16   | 2 1/2         | 2   | 95210            | —          | —                |
| 11/32            | .3438   | 8.73       | 3/8       | 1      | 2 3/4         | 2   | —                | —          | 94539            |
| 23/64            | .3594   | 9.13       | 3/8       | 9/16   | 2 1/2         | 2   | 95211            | —          | —                |
| 3/8              | .3750   | 9.53       | 3/8       | 3/8    | 2 1/8         | 2   | —                | —          | 94541            |
| 3/8              | .3750   | 9.53       | 3/8       | 9/16   | 2 1/2         | 2   | 94184            | 96339      | 94679            |
| 3/8              | .3750   | 9.53       | 3/8       | 1      | 2 3/4         | 2   | 91625            | 96371      | —                |
| 3/8              | .3750   | 9.53       | 3/8       | 1      | 2 3/4         | 2   | —                | —          | 96169            |
| 3/8              | .3750   | 9.53       | 3/8       | 1 1/2  | 3 1/4         | 2   | 91645            | 96376      | 96177            |
| 3/8              | .3750   | 9.53       | 3/8       | 2 1/2  | 4 1/4         | 2   | —                | —          | 94542            |
| 25/64            | .3906   | 9.92       | 3/8       | 13/16  | 2 11/16       | 2   | 95212            | —          | —                |
| 13/32            | .4063   | 10.32      | 3/8       | 13/16  | 2 1/2         | 2   | —                | —          | 94543            |
| 13/32            | .4063   | 10.32      | 3/8       | 13/16  | 2 11/16       | 2   | 95213            | —          | —                |
| 27/64            | .4219   | 10.72      | 3/8       | 13/16  | 2 11/16       | 2   | 95214            | —          | —                |
| 7/16             | .4375   | 11.11      | 3/8       | 13/16  | 2 11/16       | 2   | 94185            | 96340      | 96144            |
| 7/16             | .4375   | 11.11      | 3/8       | 1 1/4  | 3 1/4         | 2   | —                | —          | 94545            |
| 7/16             | .4375   | 11.11      | 3/8       | 2 3/4  | 4 3/4         | 2   | —                | —          | 94548            |
| 29/64            | .4531   | 11.51      | 3/8       | 13/16  | 2 11/16       | 2   | 95215            | —          | —                |
| 15/32            | .4688   | 11.91      | 3/8       | 13/16  | 2 11/16       | 2   | 95216            | —          | —                |
| 15/32            | .4688   | 11.91      | 1/2       | 1      | 3 3/8         | 2   | —                | —          | 94549            |
| 31/64            | .4844   | 12.30      | 3/8       | 13/16  | 2 11/16       | 2   | 95217            | —          | —                |
| 1/2              | .5000   | 12.70      | 3/8       | 13/16  | 2 11/16       | 2   | 94186            | 96341      | 96145            |
| 1/2              | .5000   | 12.70      | 1/2       | 1      | 3 1/4         | 2   | 94187            | 96342      | 94680            |
| 1/2              | .5000   | 12.70      | 1/2       | 1 1/2  | 3 1/2         | 2   | 91626            | 96372      | 96170            |
| 1/2              | .5000   | 12.70      | 1/2       | 2      | 4             | 2   | 91646            | 96377      | 96178            |
| 1/2              | .5000   | 12.70      | 1/2       | 3      | 5             | 2   | —                | —          | 94550            |
| 33/64            | .5156   | 13.10      | 1/2       | 1      | 3 1/4         | 2   | 95218            | —          | —                |
| 17/32            | .5313   | 13.49      | 1/2       | 1 1/8  | 3 3/8         | 2   | 95219            | —          | —                |
| 35/64            | .5469   | 13.89      | 1/2       | 1 1/8  | 3 3/8         | 2   | 95220            | —          | —                |
| 9/16             | .5625   | 14.29      | 1/2       | 1 1/8  | 3 3/8         | 2   | 94188            | 96343      | 96147            |
| 37/64            | .5781   | 14.68      | 1/2       | 1 1/8  | 3 3/8         | 2   | 95221            | —          | —                |
| 19/32            | .5938   | 15.08      | 1/2       | 1 1/8  | 3 3/8         | 2   | 95222            | —          | —                |
| 39/64            | .6094   | 15.48      | 5/8       | 1 5/16 | 3 3/4         | 2   | 95223            | —          | —                |
| 5/8              | .6250   | 15.88      | 1/2       | 5/8    | 2 3/4         | 2   | 91660            | —          | —                |
| 5/8              | .6250   | 15.88      | 1/2       | 1 1/8  | 3 3/8         | 2   | 94189            | 96344      | 96148            |
| 5/8              | .6250   | 15.88      | 5/8       | 1 5/16 | 3 3/4         | 2   | 94190            | 96345      | 94681            |
| 5/8              | .6250   | 15.88      | 5/8       | 1 5/8  | 3 3/4         | 2   | 91627            | 96373      | 96171            |
| 5/8              | .6250   | 15.88      | 5/8       | 2      | 4 1/8         | 2   | 91647            | 96378      | 96179            |
| 5/8              | .6250   | 15.88      | 5/8       | 4      | 6 1/8         | 2   | 91661            | —          | —                |
| 41/64            | .6406   | 16.27      | 5/8       | 1 5/16 | 3 3/4         | 2   | 95224            | —          | —                |
| 21/32            | .6563   | 16.67      | 1/2       | 1 5/16 | 3 5/16        | 2   | 91662            | —          | —                |
| 21/32            | .6563   | 16.67      | 5/8       | 1 5/16 | 3 3/4         | 2   | 95225            | —          | —                |
| 43/64            | .6719   | 17.07      | 5/8       | 1 5/16 | 3 3/4         | 2   | 95226            | —          | —                |
| 11/16            | .6875   | 17.46      | 1/2       | 1 5/16 | 3 5/8         | 2   | 94191            | —          | —                |
| 11/16            | .6875   | 17.46      | 5/8       | 1 5/16 | 3 3/4         | 2   | 94192            | —          | —                |
| 45/64            | .7031   | 17.86      | 3/4       | 1 5/16 | 3 7/8         | 2   | 95227            | —          | —                |

continued on next page





**Style 112, 112M • 2-Flute, Center Cutting, HSS**  
**Style 212 • 2-Flute, Center Cutting, M42 Cobalt**  
 (continued)

| Cutting Diameter |         |       | Shank |        |        | No. of Flutes | HSS              |       | M42 Cobalt       |
|------------------|---------|-------|-------|--------|--------|---------------|------------------|-------|------------------|
| Frac             | Decimal | MM    | Dia.  | LOC    | OAL    |               | Style 112 Bright | TiN   | Style 212 Bright |
| 23/32            | .7188   | 18.26 | 1/2   | 1 5/16 | 3 5/16 | 2             | 91663            | —     | —                |
| 23/32            | .7188   | 18.26 | 3/4   | 1 5/16 | 3 7/8  | 2             | 95228            | —     | —                |
| 47/64            | .7344   | 18.65 | 3/4   | 1 5/16 | 3 7/8  | 2             | 95229            | —     | —                |
| 3/4              | .7500   | 19.05 | 1/2   | 1 5/16 | 3 5/8  | 2             | 94193            | 96346 | 96150            |
| 3/4              | .7500   | 19.05 | 5/8   | 1 5/16 | 3 3/4  | 2             | 94194            | 96347 | 96151            |
| 3/4              | .7500   | 19.05 | 3/4   | 3/4    | 3      | 2             | 91664            | —     | —                |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/16 | 3 7/8  | 2             | 94195            | 96348 | 94682            |
| 3/4              | .7500   | 19.05 | 3/4   | 1 3/4  | 4      | 2             | 91629            | 96374 | 96172            |
| 3/4              | .7500   | 19.05 | 3/4   | 2 1/4  | 4 1/2  | 2             | 91649            | 96379 | 96180            |
| 3/4              | .7500   | 19.05 | 3/4   | 4      | 6 1/4  | 2             | 91666            | —     | —                |
| 49/64            | .7656   | 19.45 | 3/4   | 1 1/2  | 4 1/4  | 2             | 95230            | —     | —                |
| 25/32            | .7813   | 19.84 | 1/2   | 1 1/2  | 3 1/2  | 2             | 91669            | —     | —                |
| 25/32            | .7813   | 19.84 | 3/4   | 1 1/2  | 4 1/4  | 2             | 95231            | —     | —                |
| 51/64            | .7969   | 20.24 | 3/4   | 1 1/2  | 4 1/4  | 2             | 95232            | —     | —                |
| 13/16            | .8125   | 20.64 | 1/2   | 1 1/2  | 3 5/16 | 2             | —                | —     | 94551            |
| 13/16            | .8125   | 20.64 | 5/8   | 1 1/2  | 4      | 2             | 94196            | —     | —                |
| 13/16            | .8125   | 20.64 | 3/4   | 1 1/2  | 3 3/4  | 2             | —                | —     | 94552            |
| 13/16            | .8125   | 20.64 | 3/4   | 1 1/2  | 4 1/8  | 2             | 94197            | —     | —                |
| 53/64            | .8281   | 21.03 | 7/8   | 1      | 4 1/4  | 2             | 95233            | —     | —                |
| 27/32            | .8438   | 21.43 | 7/8   | 1 1/2  | 4 1/4  | 2             | 95234            | —     | —                |
| 55/64            | .8594   | 21.83 | 7/8   | 1 1/2  | 4 1/4  | 2             | 95235            | —     | —                |
| 7/8              | .8750   | 22.23 | 1/2   | 1 1/2  | 3 1/2  | 2             | 91671            | —     | —                |
| 7/8              | .8750   | 22.23 | 5/8   | 1 1/2  | 4      | 2             | 94198            | 96349 | 96153            |
| 7/8              | .8750   | 22.23 | 3/4   | 1 1/2  | 4 1/8  | 2             | 94199            | 96350 | 96154            |
| 7/8              | .8750   | 22.23 | 7/8   | 1 1/2  | 4 1/8  | 2             | 94200            | —     | —                |
| 7/8              | .8750   | 22.23 | 7/8   | 2      | 4 1/4  | 2             | 91628            | —     | —                |
| 7/8              | .8750   | 22.23 | 7/8   | 2 1/2  | 4 3/4  | 2             | 91648            | —     | —                |
| 57/64            | .8906   | 22.62 | 7/8   | 1 1/2  | 4 1/8  | 2             | 95236            | —     | —                |
| 29/32            | .9063   | 23.02 | 7/8   | 1 1/2  | 4 1/8  | 2             | 95237            | —     | —                |
| 59/64            | .9219   | 23.42 | 7/8   | 1 1/2  | 4 1/8  | 2             | 95238            | —     | —                |
| 15/16            | .9375   | 23.81 | 5/8   | 1 1/2  | 4      | 2             | 94201            | —     | —                |
| 15/16            | .9375   | 23.81 | 3/4   | 1 1/2  | 4 1/8  | 2             | 94202            | —     | —                |
| 15/16            | .9375   | 23.81 | 7/8   | 1 1/2  | 4 3/16 | 2             | 94203            | —     | —                |
| 31/32            | .9688   | 24.61 | 1     | 1 5/8  | 4 1/2  | 2             | 95240            | —     | —                |
| 1                | 1.0000  | 25.40 | 1/2   | 1 1/2  | 3 1/2  | 2             | 91673            | —     | —                |
| 1                | 1.0000  | 25.40 | 5/8   | 1 1/2  | 4      | 2             | 94204            | 96351 | 96155            |
| 1                | 1.0000  | 25.40 | 3/4   | 1 1/2  | 4 1/8  | 2             | 94205            | 96352 | 96156            |
| 1                | 1.0000  | 25.40 | 7/8   | 1 1/2  | 4 3/16 | 2             | 94206            | —     | —                |
| 1                | 1.0000  | 25.40 | 1     | 1 5/8  | 4 1/2  | 2             | 94207            | 96353 | 94683            |
| 1                | 1.0000  | 25.40 | 1     | 2 1/4  | 4 3/4  | 2             | 91630            | 96375 | 96173            |
| 1                | 1.0000  | 25.40 | 1     | 3      | 5 1/2  | 2             | 91650            | 96380 | 96181            |
| 1 1/16           | 1.0625  | 26.99 | 3/4   | 3/4    | 3 3/4  | 2             | 91674            | —     | —                |
| 1 1/8            | 1.1250  | 28.58 | 3/4   | 1 1/2  | 3 7/8  | 2             | 91261            | —     | —                |
| 1 1/8            | 1.1250  | 28.58 | 7/8   | 1 5/8  | 4 1/8  | 2             | 94208            | —     | —                |
| 1 1/8            | 1.1250  | 28.58 | 1     | 3      | 5 1/2  | 2             | 91651            | —     | —                |
| 1 1/8            | 1.1250  | 28.58 | 1     | 1 5/8  | 4 1/2  | 2             | 94209            | —     | —                |

continued on next page

General-Purpose



Style 112, 112M • 2-Flute, Center Cutting, HSS  
 Style 212 • 2-Flute, Center Cutting, M42 Cobalt  
 (continued)

| Cutting Diameter |         | Shank Dia. | LOC   | OAL   | No. of Flutes | HSS |                  | M42 Cobalt    |                  |
|------------------|---------|------------|-------|-------|---------------|-----|------------------|---------------|------------------|
| Frac             | Decimal |            |       |       |               | MM  | Style 112 Bright | Style 112 TiN | Style 212 Bright |
| 1 1/4            | 1.2500  | 31.75      | 3/4   | 1 1/2 | 3 3/4         | 2   | —                | 97001         | —                |
| 1 1/4            | 1.2500  | 31.75      | 3/4   | 1 1/2 | 3 7/8         | 2   | 91262            | —             | —                |
| 1 1/4            | 1.2500  | 31.75      | 3/4   | 1 5/8 | 3 7/8         | 2   | —                | —             | 94554            |
| 1 1/4            | 1.2500  | 31.75      | 7/8   | 1 5/8 | 4 5/16        | 2   | 94210            | —             | —                |
| 1 1/4            | 1.2500  | 31.75      | 1     | 1 5/8 | 4 1/2         | 2   | 94211            | —             | —                |
| 1 1/4            | 1.2500  | 31.75      | 1     | 2 1/4 | 4 3/4         | 2   | 91632            | —             | —                |
| 1 1/4            | 1.2500  | 31.75      | 1     | 3     | 5 1/2         | 2   | 91652            | —             | —                |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 1 5/8 | 4 1/2         | 2   | 94212            | —             | 94684            |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 2 1/4 | 4 3/4         | 2   | —                | —             | 96174            |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 3     | 5 1/2         | 2   | 91654            | —             | 96182            |
| 1 3/8            | 1.3750  | 34.93      | 3/4   | 1 1/2 | 3 7/8         | 2   | 91263            | —             | —                |
| 1 3/8            | 1.3750  | 34.93      | 1     | 1 5/8 | 4 1/2         | 2   | 94213            | —             | —                |
| 1 3/8            | 1.3750  | 34.93      | 1     | 2 1/4 | 4 3/4         | 2   | 91633            | —             | —                |
| 1 3/8            | 1.3750  | 34.93      | 1     | 3     | 5 1/2         | 2   | 91653            | —             | —                |
| 1 1/2            | 1.5000  | 38.10      | 3/4   | 1 5/8 | 3 7/8         | 2   | —                | —             | 94555            |
| 1 1/2            | 1.5000  | 38.10      | 1     | 1 5/8 | 4 1/2         | 2   | 94214            | —             | —                |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 1 5/8 | 4 1/2         | 2   | 94215            | —             | 94685            |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 3     | 5 1/2         | 2   | 91655            | —             | —                |
| 1 5/8            | 1.6250  | 41.28      | 1 1/4 | 1 5/8 | 4 1/2         | 2   | 94216            | —             | —                |
| 1 3/4            | 1.7500  | 44.45      | 3/4   | 1 1/2 | 3 7/8         | 2   | 91265            | —             | —                |
| 1 3/4            | 1.7500  | 44.45      | 1 1/4 | 1 5/8 | 4 1/2         | 2   | 94217            | —             | —                |
| 1 7/8            | 1.8750  | 47.63      | 1 1/4 | 1 5/8 | 4 1/2         | 2   | 94218            | —             | —                |
| 2                | 2.0000  | 50.80      | 3/4   | 1 1/2 | 3 7/8         | 2   | 91266            | —             | —                |
| 2                | 2.0000  | 50.80      | 3/4   | 1 5/8 | 4 1/8         | 2   | —                | —             | 94556            |
| 2                | 2.0000  | 50.80      | 1 1/4 | 1 5/8 | 4 1/2         | 2   | 94219            | —             | 96160            |
| 2                | 2.0000  | 50.80      | 1 1/4 | 2 1/4 | 4 3/4         | 2   | 91639            | —             | —                |
| 2                | 2.0000  | 50.80      | 1 1/4 | 3     | 5 1/2         | 2   | 91659            | —             | —                |

| Cutting Diameter |          | Shank Dia. | LOC   | OAL    | No. of Flutes | HSS   |
|------------------|----------|------------|-------|--------|---------------|-------|
| MM               | Dec. In. |            |       |        |               | MM    |
| 3                | .1181    | 9.52       | 9.52  | 58.74  | 2             | 95420 |
| 4                | .1575    | 9.52       | 11.11 | 60.32  | 2             | 95421 |
| 5                | .1969    | 9.52       | 12.70 | 61.91  | 2             | 95422 |
| 6                | .2362    | 9.52       | 12.70 | 61.91  | 2             | 95423 |
| 7                | .2756    | 9.52       | 14.29 | 63.50  | 2             | 95424 |
| 8                | .3150    | 9.52       | 14.29 | 63.50  | 2             | 95425 |
| 9                | .3543    | 9.52       | 14.29 | 63.50  | 2             | 95426 |
| 10               | .3937    | 9.52       | 20.64 | 68.26  | 2             | 95427 |
| 11               | .4331    | 9.52       | 20.64 | 68.26  | 2             | 95428 |
| 12               | .4724    | 12.70      | 20.64 | 82.55  | 2             | 95429 |
| 13               | .5118    | 12.70      | 28.57 | 85.72  | 2             | 95430 |
| 14               | .5512    | 12.70      | 28.57 | 85.72  | 2             | 95431 |
| 15               | .5906    | 12.70      | 28.57 | 85.72  | 2             | 95432 |
| 16               | .6299    | 15.88      | 33.34 | 95.25  | 2             | 95433 |
| 17               | .6693    | 15.88      | 33.34 | 95.25  | 2             | 95434 |
| 18               | .7087    | 15.88      | 33.34 | 95.25  | 2             | 95435 |
| 19               | .7480    | 19.05      | 33.34 | 98.42  | 2             | 95436 |
| 20               | .7874    | 15.88      | 38.10 | 101.60 | 2             | 95437 |
| 24               | .9449    | 25.40      | 41.27 | 114.30 | 2             | 95441 |
| 25               | .9843    | 25.40      | 41.27 | 114.30 | 2             | 95442 |



Style 111 • 2-Flute, Ball Nose, HSS  
 Style 211 • 2-Flute, Ball Nose, M42 Cobalt

FEATURES

|                 |                      |
|-----------------|----------------------|
| ANSI SIZES      | HSS SUBSTRATE        |
| GENERAL PURPOSE | M42 COBALT SUBSTRATE |
| 2 FLUTE BALL CO | BRIGHT               |
| 30°             |                      |

APPLICATIONS

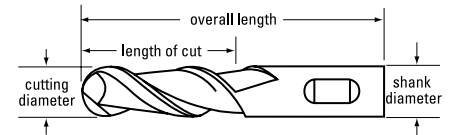
| HSS          | M42 Cobalt      |
|--------------|-----------------|
| ALLOY STEEL  | STAINLESS STEEL |
| TOOL STEEL   | TITANIUM ALLOYS |
| CARBON STEEL | NICKEL ALLOYS   |
| CAST IRON    | COBALT ALLOYS   |



Style 111 HSS Bright



Style 211 M42 Cobalt Bright



| Cutting Diameter |         |       | Shank |        |        | No. of Flutes | HSS              | M42 Cobalt       |
|------------------|---------|-------|-------|--------|--------|---------------|------------------|------------------|
| Frac             | Decimal | MM    | Dia.  | LOC    | OAL    |               | Style 111 Bright | Style 211 Bright |
| 1/8              | .1250   | 3.18  | 3/8   | 3/8    | 2 5/16 | 2             | 94320            | 94690            |
| 5/32             | .1563   | 3.97  | 3/8   | 7/16   | 2 5/16 | 2             | —                | 94696            |
| 3/16             | .1875   | 4.76  | 3/8   | 1/2    | 2 3/8  | 2             | 94321            | 94691            |
| 7/32             | .2188   | 5.56  | 3/8   | 1/2    | 2 3/8  | 2             | —                | 94697            |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8    | 2 7/16 | 2             | 94322            | 94692            |
| 9/32             | .2813   | 7.14  | 3/8   | 9/16   | 2 3/8  | 2             | —                | 94698            |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4    | 2 1/2  | 2             | 94323            | 94693            |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4    | 2 1/2  | 2             | 94324            | 94694            |
| 7/16             | .4375   | 11.11 | 1/2   | 1      | 3      | 2             | 94325            | 96004            |
| 1/2              | .5000   | 12.70 | 1/2   | 1      | 3      | 2             | 94326            | 94695            |
| 9/16             | .5625   | 14.29 | 1/2   | 1 1/8  | 3 1/8  | 2             | 94327            | —                |
| 5/8              | .6250   | 15.88 | 1/2   | 1 1/8  | 3 3/8  | 2             | 94328            | —                |
| 5/8              | .6250   | 15.88 | 5/8   | 1 3/8  | 3 1/2  | 2             | 94329            | 96005            |
| 3/4              | .7500   | 19.05 | 1/2   | 1 5/16 | 3 5/8  | 2             | 94330            | —                |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8  | 3 7/8  | 2             | 94331            | 96006            |
| 13/16            | .8125   | 20.64 | 3/4   | 2      | 4 1/4  | 2             | 94332            | —                |
| 7/8              | .8750   | 22.23 | 3/4   | 2      | 4 1/4  | 2             | 94333            | 96007            |
| 7/8              | .8750   | 22.23 | 7/8   | 2      | 4 1/4  | 2             | 94334            | —                |
| 15/16            | .9375   | 23.81 | 3/4   | 2 1/4  | 4 1/2  | 2             | 94335            | —                |
| 1                | 1.0000  | 25.40 | 3/4   | 2 1/4  | 4 1/2  | 2             | 94336            | —                |
| 1                | 1.0000  | 25.40 | 1     | 2 1/4  | 4 3/4  | 2             | 94337            | 96008            |
| 1 1/8            | 1.1250  | 28.58 | 3/4   | 1 1/2  | 3 7/8  | 2             | 91271            | —                |
| 1 1/8            | 1.1250  | 28.58 | 1     | 2 1/4  | 4 3/4  | 2             | 94338            | —                |
| 1 1/4            | 1.2500  | 31.75 | 3/4   | 1 1/2  | 3 7/8  | 2             | 91272            | —                |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 2 1/2  | 5      | 2             | 94339            | —                |
| 1 3/8            | 1.3750  | 34.93 | 3/4   | 1 1/2  | 3 7/8  | 2             | 91273            | —                |
| 1 3/8            | 1.3750  | 34.93 | 1 1/4 | 2 1/2  | 5 1/16 | 2             | 94340            | —                |
| 1 1/2            | 1.5000  | 38.10 | 3/4   | 1 1/2  | 3 7/8  | 2             | 91274            | —                |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 2 1/2  | 5      | 2             | 94341            | —                |

## General-Purpose



- Style 112N • 2-Flute with Extended Neck, Center Cutting, HSS
- Style 212N • 2-Flute with Extended Neck, Center Cutting, M42 Cobalt
- Style 111N • 2-Flute, Ball Nose with Extended Neck, HSS
- Style 211N • 2-Flute, Ball Nose with Extended Neck, M42 Cobalt

### FEATURES

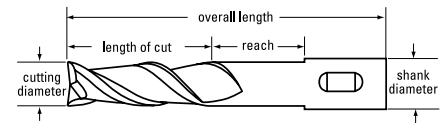
|                 |                      |
|-----------------|----------------------|
| ANSI SIZES      | HSS SUBSTRATE        |
| GENERAL PURPOSE | M42 COBALT SUBSTRATE |
| 2 FLUTE CC      | BRIGHT               |
| 2 FLUTE BALL CC | NECKED               |
| 30°             |                      |

### APPLICATIONS

| HSS         |                 | M42 Cobalt      |               |
|-------------|-----------------|-----------------|---------------|
| ALLOY STEEL | STAINLESS STEEL | TITANIUM ALLOYS | NICKEL ALLOYS |
| TOOL STEEL  | CARBON STEEL    | COBALT ALLOYS   |               |
| CAST IRON   |                 |                 |               |



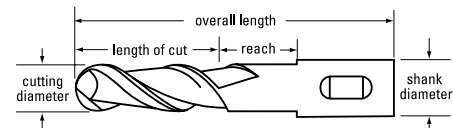
Style 112N HSS Bright



| Cutting Diameter |         |       | Shank |       |         | No. of Flutes | HSS               | M42 Cobalt        |
|------------------|---------|-------|-------|-------|---------|---------------|-------------------|-------------------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL     |               | Style 112N Bright | Style 212N Bright |
| 1/8              | .1250   | 3.18  | 3/8   | 3/8   | 2 3/8   | 2             | 94305             | 96161             |
| 3/16             | .1875   | 4.76  | 3/8   | 1/2   | 2 11/16 | 2             | 94306             | 96162             |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 3 1/16  | 2             | 94307             | 96163             |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 3 5/16  | 2             | 94308             | 96164             |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 3 5/16  | 2             | 94309             | 96165             |
| 1/2              | .5000   | 12.70 | 1/2   | 1     | 4       | 2             | 94310             | 96166             |
| 5/8              | .6250   | 15.88 | 5/8   | 1 3/8 | 4 5/8   | 2             | 94311             | —                 |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 5 1/4   | 2             | —                 | 96167             |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 5 3/8   | 2             | 94312             | —                 |
| 7/8              | .8750   | 22.23 | 7/8   | 2     | 6       | 2             | 94313             | —                 |
| 1                | 1.0000  | 25.40 | 1     | 2 1/2 | 7 1/4   | 2             | 94314             | 96168             |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 3     | 7 1/4   | 2             | 94315             | —                 |



Style 111N HSS Bright



| Cutting Diameter |         |       | Shank |       |         | No. of Flutes | HSS               | M42 Cobalt        |
|------------------|---------|-------|-------|-------|---------|---------------|-------------------|-------------------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL     |               | Style 111N Bright | Style 211N Bright |
| 1/8              | .1250   | 3.18  | 3/8   | 3/8   | 2 3/8   | 2             | 92950             | 96014             |
| 3/16             | .1875   | 4.76  | 3/8   | 1/2   | 2 11/16 | 2             | 92951             | 96015             |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 3 1/16  | 2             | 92952             | 96016             |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 3 5/16  | 2             | 92953             | 96017             |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 3 5/16  | 2             | 92954             | 96018             |
| 7/16             | .4375   | 11.11 | 1/2   | 1     | 3 3/4   | 2             | 92955             | —                 |
| 1/2              | .5000   | 12.70 | 1/2   | 1     | 4       | 2             | 92956             | 96019             |
| 5/8              | .6250   | 15.88 | 5/8   | 1 3/8 | 4 5/8   | 2             | 92957             | —                 |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 5 3/8   | 2             | 92958             | 96020             |
| 1                | 1.0000  | 25.40 | 1     | 2 1/2 | 7 1/4   | 2             | 92960             | 96021             |





# Single End Finishing End Mills For Aluminum

## Style 132 • 2-Flute, Center Cutting, Hi-Helix for Aluminum, HSS

### FEATURES

|                 |               |
|-----------------|---------------|
| ANSI SIZES      | HSS SUBSTRATE |
| GENERAL PURPOSE | BRIGHT        |
| 2 FLUTE CC      | TiN           |
| HI-HELIX        |               |

### APPLICATIONS

|                       |
|-----------------------|
| ALUMINUM              |
| COPPER ALLOYS         |
| NON-FERROUS MATERIALS |
| MAGNESIUM             |



Style 132 HSS Bright



Style 132 HSS TiN

| Cutting Diameter |         |       | Shank |       |         | No. of Flutes | Style 132 |       |
|------------------|---------|-------|-------|-------|---------|---------------|-----------|-------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL     |               | Bright    | TiN   |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 2 7/16  | 2             | 93950     | 91325 |
| 1/4              | .2500   | 6.35  | 3/8   | 1 1/4 | 3 1/16  | 2             | 93970     | —     |
| 1/4              | .2500   | 6.35  | 3/8   | 1 3/4 | 3 9/16  | 2             | 93985     | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 2 1/2   | 2             | 93951     | 91326 |
| 5/16             | .3125   | 7.94  | 3/8   | 1 3/8 | 3 1/8   | 2             | 93971     | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 2     | 3 3/4   | 2             | 93986     | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 2 1/2   | 2             | 93952     | 91327 |
| 3/8              | .3750   | 9.53  | 3/8   | 1 1/2 | 3 1/4   | 2             | 93972     | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 2 1/2 | 4 1/4   | 2             | 93987     | —     |
| 7/16             | .4375   | 11.11 | 3/8   | 1     | 2 11/16 | 2             | 93953     | 91328 |
| 7/16             | .4375   | 11.11 | 1/2   | 1 3/4 | 3 3/4   | 2             | 93973     | —     |
| 7/16             | .4375   | 11.11 | 1/2   | 2 3/4 | 4 3/4   | 2             | 93988     | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4   | 2             | 93954     | 91329 |
| 1/2              | .5000   | 12.70 | 1/2   | 2     | 4       | 2             | 93974     | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 3     | 5       | 2             | 93989     | —     |
| 5/8              | .6250   | 15.88 | 1/2   | 1 3/8 | 3 3/8   | 2             | 93955     | 91330 |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4   | 2             | 93956     | 91332 |
| 5/8              | .6250   | 15.88 | 5/8   | 2 1/2 | 4 5/8   | 2             | 93975     | —     |
| 5/8              | .6250   | 15.88 | 5/8   | 4     | 6 1/8   | 2             | 93990     | —     |
| 3/4              | .7500   | 19.05 | 1/2   | 1 5/8 | 3 5/8   | 2             | 93957     | 91331 |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 3 7/8   | 2             | 93958     | 91333 |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4   | 2             | 93976     | —     |
| 3/4              | .7500   | 19.05 | 3/4   | 4     | 6 1/4   | 2             | 93991     | —     |
| 7/8              | .8750   | 22.23 | 3/4   | 1 7/8 | 4 1/8   | 2             | 93959     | —     |
| 7/8              | .8750   | 22.23 | 7/8   | 1 7/8 | 4 1/8   | 2             | 93960     | 91334 |
| 7/8              | .8750   | 22.23 | 7/8   | 3 1/2 | 5 3/4   | 2             | 93977     | —     |
| 7/8              | .8750   | 22.23 | 7/8   | 5     | 7 1/4   | 2             | 93992     | —     |
| 1                | 1.0000  | 25.40 | 3/4   | 1 7/8 | 4 1/8   | 2             | 93961     | —     |
| 1                | 1.0000  | 25.40 | 1     | 2     | 4 1/2   | 2             | 93962     | 91335 |
| 1                | 1.0000  | 25.40 | 1     | 4     | 6 1/2   | 2             | 93978     | —     |
| 1                | 1.0000  | 25.40 | 1     | 6     | 8 1/2   | 2             | 93993     | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 2     | 4 1/2   | 2             | 93963     | 91338 |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 4     | 6 1/2   | 2             | 93979     | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 6     | 8 1/2   | 2             | 93994     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 2     | 4 1/2   | 2             | 93964     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 4     | 6 1/2   | 2             | 93980     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 8     | 10 1/2  | 2             | 93995     | —     |
| 1 3/4            | 1.7500  | 44.45 | 1 1/4 | 2     | 4 1/2   | 2             | 93965     | —     |
| 2                | 2.0000  | 50.80 | 1 1/4 | 2     | 4 1/2   | 2             | 93982     | —     |

# Single End Finishing End Mills For Aluminum



## Style 131 • 2-Flute, Ball Nose, Hi-Helix for Aluminum HSS

### FEATURES



### APPLICATIONS



Style 131 HSS Bright



Style 131 HSS TiN

| Cutting Diameter |         |       | Shank |       |        | No. of Flutes | Style 131 |       |
|------------------|---------|-------|-------|-------|--------|---------------|-----------|-------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL    |               | Bright    | TiN   |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 2 7/16 | 2             | 91400     | 96394 |
| 1/4              | .2500   | 6.35  | 3/8   | 1 1/4 | 3 1/8  | 2             | 91418     | —     |
| 1/4              | .2500   | 6.35  | 3/8   | 1 3/4 | 3 9/16 | 2             | 91417     | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 2 1/2  | 2             | 91401     | 96395 |
| 5/16             | .3125   | 7.94  | 3/8   | 1 3/8 | 3 1/8  | 2             | 91420     | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 2 1/2  | 2             | 91402     | 96396 |
| 3/8              | .3750   | 9.53  | 3/8   | 1 1/2 | 3 1/4  | 2             | 91422     | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 2 1/2 | 4 1/4  | 2             | 91421     | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4  | 2             | 91404     | 96398 |
| 1/2              | .5000   | 12.70 | 1/2   | 2     | 4      | 2             | 91426     | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 3     | 5      | 2             | 91425     | —     |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4  | 2             | 91407     | 96399 |
| 5/8              | .6250   | 15.88 | 5/8   | 2 1/2 | 4 5/8  | 2             | 91428     | —     |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 3 7/8  | 2             | 91408     | 96400 |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4  | 2             | 91430     | —     |
| 3/4              | .7500   | 19.05 | 3/4   | 4     | 6 1/4  | 2             | 91429     | —     |
| 1                | 1.0000  | 25.40 | 1     | 4     | 6 1/2  | 2             | 91434     | —     |



Style 112K • 2-Flute, Keyway, Center Cutting, HSS  
 Style 112KS • 2-Flute, Keyway, Straight Flutes, Center Cutting, HSS

FEATURES

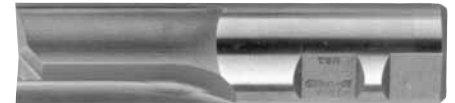
|                 |               |
|-----------------|---------------|
| KEYWAY SIZES    | HSS SUBSTRATE |
| GENERAL PURPOSE | BRIGHT        |
| 2 FLUTE CC      |               |
| STRAIGHT FLUTE  |               |

APPLICATIONS

|               |
|---------------|
| ALLOY STEEL   |
| COPPER ALLOYS |
| CAST IRON     |
| MAGNESIUM     |



Style 112K Bright



Style 112KS Bright

| Cutting Diameter |       | Shank |        | LOC    | OAL   | Key Slot Width | No. of Flutes | Style 112K | Style 112KS |
|------------------|-------|-------|--------|--------|-------|----------------|---------------|------------|-------------|
| Decimal          | MM    | Dia.  |        |        |       |                |               | Bright     | Bright      |
| .1220            | 3.10  | 3/8   | 3/8    | 2 5/16 | 1/8   | 2              | 92417         | 92447      |             |
| .1230            | 3.12  | 3/8   | 3/8    | 2 5/16 | 1/8   | 2              | 92285         | 92300      |             |
| .1240            | 3.15  | 3/8   | 3/8    | 2 5/16 | 1/8   | 2              | 92405         | 92435      |             |
| .1845            | 4.69  | 3/8   | 3/8    | 2 3/8  | 3/16  | 2              | 92418         | 92448      |             |
| .1855            | 4.71  | 3/8   | 3/8    | 2 3/8  | 3/16  | 2              | 92286         | 92301      |             |
| .1865            | 4.74  | 3/8   | 3/8    | 2 3/8  | 3/16  | 2              | 92406         | 92436      |             |
| .2470            | 6.27  | 3/8   | 1/2    | 2 7/16 | 1/4   | 2              | 92419         | 92449      |             |
| .2480            | 6.30  | 3/8   | 1/2    | 2 7/16 | 1/4   | 2              | 92287         | 92302      |             |
| .2490            | 6.32  | 3/8   | 1/2    | 2 7/16 | 1/4   | 2              | 92402         | 92437      |             |
| .3095            | 7.86  | 3/8   | 9/16   | 2 1/2  | 5/16  | 2              | 92420         | 92450      |             |
| .3105            | 7.89  | 3/8   | 9/16   | 2 1/2  | 5/16  | 2              | 92288         | 92303      |             |
| .3115            | 7.91  | 3/8   | 9/16   | 2 1/2  | 5/16  | 2              | 92408         | 92438      |             |
| .3720            | 9.45  | 3/8   | 9/16   | 2 1/2  | 3/8   | 2              | 92421         | 92451      |             |
| .3730            | 9.47  | 3/8   | 9/16   | 2 1/2  | 3/8   | 2              | 92289         | 92304      |             |
| .3740            | 9.50  | 3/8   | 9/16   | 2 1/2  | 3/8   | 2              | 92409         | 92439      |             |
| .4970            | 12.62 | 1/2   | 1      | 3 1/4  | 1/2   | 2              | 92422         | 92452      |             |
| .4980            | 12.65 | 1/2   | 1      | 3 1/4  | 1/2   | 2              | 92290         | 92305      |             |
| .4990            | 12.67 | 1/2   | 1      | 3 1/4  | 1/2   | 2              | 92410         | 92440      |             |
| .6220            | 15.80 | 5/8   | 1 5/16 | 3 3/4  | 5/8   | 2              | 92423         | 92453      |             |
| .6230            | 15.82 | 5/8   | 1 5/16 | 3 3/4  | 5/8   | 2              | 92291         | 92306      |             |
| .6240            | 15.85 | 5/8   | 1 5/16 | 3 3/4  | 5/8   | 2              | 92411         | 92441      |             |
| .7470            | 18.97 | 3/4   | 1 5/16 | 3 7/8  | 3/4   | 2              | 92425         | 92455      |             |
| .7480            | 19.00 | 3/4   | 1 5/16 | 3 7/8  | 3/4   | 2              | 92293         | 92308      |             |
| .7490            | 19.02 | 3/4   | 1 5/16 | 3 7/8  | 3/4   | 2              | 92413         | 92443      |             |
| .8720            | 22.15 | 7/8   | 1 1/2  | 4 1/8  | 7/8   | 2              | 92424         | 92454      |             |
| .8730            | 22.17 | 7/8   | 1 1/2  | 4 1/8  | 7/8   | 2              | 92292         | 92307      |             |
| .8740            | 22.20 | 7/8   | 1 1/2  | 4 1/8  | 7/8   | 2              | 92412         | 92442      |             |
| .9970            | 25.32 | 1     | 1 5/8  | 4 1/2  | 1     | 2              | 92426         | 92456      |             |
| .9980            | 25.35 | 1     | 1 5/8  | 4 1/2  | 1     | 2              | 92294         | 92309      |             |
| .9990            | 25.37 | 1     | 1 5/8  | 4 1/2  | 1     | 2              | 92414         | 92444      |             |
| 1.2470           | 31.67 | 1 1/4 | 1 5/8  | 4 1/2  | 1 1/4 | 2              | 92427         | 92457      |             |
| 1.2480           | 31.70 | 1 1/4 | 1 5/8  | 4 1/2  | 1 1/4 | 2              | 92295         | —          |             |
| 1.2490           | 31.72 | 1 1/4 | 1 5/8  | 4 1/2  | 1 1/4 | 2              | 92415         | 92445      |             |
| 1.4970           | 38.02 | 1 1/4 | 1 5/8  | 4 1/2  | 1 1/2 | 2              | 92428         | 92458      |             |
| 1.4980           | 38.05 | 1 1/4 | 1 5/8  | 4 1/2  | 1 1/2 | 2              | 92296         | —          |             |
| 1.4990           | 38.07 | 1 1/4 | 1 5/8  | 4 1/2  | 1 1/2 | 2              | 92416         | 92446      |             |



### Style 113 • 3-Flute, Center Cutting, HSS

#### FEATURES

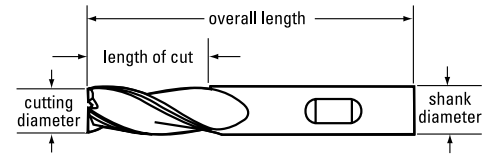
|                 |                      |
|-----------------|----------------------|
| ANSI SIZES      | HSS SUBSTRATE        |
| GENERAL PURPOSE | M42 COBALT SUBSTRATE |
| 2 FLUTE CC      | BRIGHT               |
| 30°             | TiN                  |

#### APPLICATIONS

|               |
|---------------|
| ALLOY STEEL   |
| COPPER ALLOYS |
| CAST IRON     |
| MAGNESIUM     |



Style 113 HSS Bright



| Cutting Diameter |          | Shank   |        |        |         |   | No. of Flutes | Style 113 Bright |
|------------------|----------|---------|--------|--------|---------|---|---------------|------------------|
| MM               | Dec. In. | Dia. MM | LOC MM | OAL MM |         |   |               |                  |
| 1/8              | .1250    | 3.18    | 3/8    | 3/8    | 2 5/16  | 3 | 92977         |                  |
| 3/16             | .1875    | 4.76    | 3/8    | 1/2    | 2 3/8   | 3 | 92978         |                  |
| 1/4              | .2500    | 6.35    | 3/8    | 5/8    | 2 7/16  | 3 | 92979         |                  |
| 1/4              | .2500    | 6.35    | 3/8    | 1 1/4  | 3 1/16  | 3 | 93005         |                  |
| 5/16             | .3125    | 7.94    | 3/8    | 3/4    | 2 1/2   | 3 | 92980         |                  |
| 5/16             | .3125    | 7.94    | 3/8    | 1 3/8  | 3 1/8   | 3 | 93006         |                  |
| 3/8              | .3750    | 9.53    | 3/8    | 3/4    | 2 1/2   | 3 | 92981         |                  |
| 3/8              | .3750    | 9.53    | 3/8    | 1 1/2  | 3 1/4   | 3 | 93007         |                  |
| 7/16             | .4375    | 11.11   | 3/8    | 1      | 2 11/16 | 3 | 92982         |                  |
| 7/16             | .4375    | 11.11   | 1/2    | 1 3/4  | 3 3/4   | 3 | 93008         |                  |
| 1/2              | .5000    | 12.70   | 3/8    | 1      | 2 11/16 | 3 | 92983         |                  |
| 1/2              | .5000    | 12.70   | 1/2    | 1 1/4  | 3 1/4   | 3 | 92984         |                  |
| 1/2              | .5000    | 12.70   | 1/2    | 2      | 4       | 3 | 93009         |                  |
| 9/16             | .5625    | 14.29   | 1/2    | 1 3/8  | 3 3/8   | 3 | 92985         |                  |
| 5/8              | .6250    | 15.88   | 1/2    | 1 3/8  | 3 3/8   | 3 | 92986         |                  |
| 5/8              | .6250    | 15.88   | 5/8    | 1 5/8  | 3 3/4   | 3 | 92988         |                  |
| 5/8              | .6250    | 15.88   | 5/8    | 2 1/2  | 4 5/8   | 3 | 93010         |                  |
| 3/4              | .7500    | 19.05   | 1/2    | 1 5/8  | 3 5/8   | 3 | 92987         |                  |
| 3/4              | .7500    | 19.05   | 5/8    | 1 5/8  | 3 3/4   | 3 | 92989         |                  |
| 3/4              | .7500    | 19.05   | 3/4    | 1 5/8  | 3 7/8   | 3 | 92994         |                  |
| 3/4              | .7500    | 19.05   | 3/4    | 3      | 5 1/4   | 3 | 93011         |                  |
| 7/8              | .8750    | 22.23   | 5/8    | 1 7/8  | 4       | 3 | 92990         |                  |
| 7/8              | .8750    | 22.23   | 3/4    | 1 7/8  | 4 1/8   | 3 | 92996         |                  |
| 7/8              | .8750    | 22.23   | 7/8    | 1 7/8  | 4 1/8   | 3 | 92992         |                  |
| 7/8              | .8750    | 22.23   | 7/8    | 3 1/2  | 5 3/4   | 3 | 93012         |                  |
| 1                | 1.0000   | 25.40   | 5/8    | 1 7/8  | 4       | 3 | 92991         |                  |
| 1                | 1.0000   | 25.40   | 3/4    | 1 7/8  | 4 1/8   | 3 | 92999         |                  |
| 1                | 1.0000   | 25.40   | 1      | 2      | 4 1/2   | 3 | 92995         |                  |
| 1                | 1.0000   | 25.40   | 1      | 4      | 6 1/2   | 3 | 93013         |                  |
| 1 1/8            | 1.1250   | 28.58   | 1      | 2      | 4 1/2   | 3 | 92997         |                  |
| 1 1/4            | 1.2500   | 31.75   | 1      | 2      | 4 1/2   | 3 | 92998         |                  |
| 1 1/4            | 1.2500   | 31.75   | 1 1/4  | 4      | 6 1/2   | 3 | 93014         |                  |
| 1 1/2            | 1.5000   | 38.10   | 1      | 2      | 4 1/2   | 3 | 93000         |                  |
| 2                | 2.0000   | 50.80   | 2      | 8      | 11 3/4  | 3 | 94381*        |                  |

\* Indicates positive-lok (dual combination shank)



Style 114, 114M • 4-Flute, Non-Center Cutting, HSS  
 Style 115 • 4-Flute, Center Cutting, HSS  
 Style 214 • 4-Flute, Non-Center Cutting, M42 Cobalt  
 Style 215 • 4-Flute, Center Cutting, M42 Cobalt

FEATURES

|                 |                      |
|-----------------|----------------------|
| ANSI SIZES      | HSS SUBSTRATE        |
| GENERAL PURPOSE | M42 COBALT SUBSTRATE |
| 4 FLUTE NCC     | BRIGHT               |
| 4 FLUTE CC      | TiN                  |
| 30°             |                      |

APPLICATIONS

| HSS         |                 | M42 Cobalt    |                 |
|-------------|-----------------|---------------|-----------------|
| ALLOY STEEL | TITANIUM ALLOYS | TOOL STEEL    | NICKEL ALLOYS   |
| CAST IRON   | COBALT ALLOYS   | COPPER ALLOYS | STAINLESS STEEL |



Style 114 HSS Bright



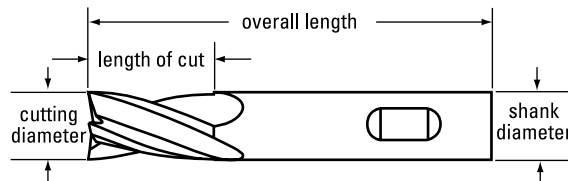
Style 115 HSS Bright



Style 215 M42 Cobalt Bright



Style 215 M42 Cobalt TiN



| Cutting Diameter |         |      | Shank Dia. | LOC   | OAL     | No. of Flutes | HSS              |       |              |       | M42 Cobalt       |              |       |
|------------------|---------|------|------------|-------|---------|---------------|------------------|-------|--------------|-------|------------------|--------------|-------|
| Frac             | Decimal | MM   |            |       |         |               | Non CC Style 114 |       | CC Style 115 |       | Non CC Style 214 | CC Style 215 |       |
|                  |         |      |            |       |         |               | Bright           | TiN   | Bright       | TiN   | Bright           | Bright       | TiN   |
| 1/8              | .1250   | 3.18 | 3/8        | 3/16  | 2 1/8   | 4             | —                | —     | —            | —     | —                | 94774        | —     |
| 1/8              | .1250   | 3.18 | 3/8        | 3/8   | 2 5/16  | 4             | 94225            | 96420 | 94061        | 96455 | 96039            | 94620        | —     |
| 1/8              | .1250   | 3.18 | 3/8        | 3/4   | 2 5/8   | 4             | —                | —     | —            | —     | —                | 94775        | —     |
| 9/64             | .1406   | 3.57 | 3/8        | 1/2   | 2 3/8   | 4             | 95300            | —     | —            | —     | —                | —            | —     |
| 5/32             | .1563   | 3.97 | 3/8        | 7/16  | 2 3/8   | 4             | —                | —     | —            | —     | —                | 94776        | —     |
| 5/32             | .1563   | 3.97 | 3/8        | 1/2   | 2 3/8   | 4             | 95301            | —     | —            | —     | —                | —            | —     |
| 5/32             | .1563   | 3.97 | 3/8        | 3/4   | 2 5/8   | 4             | —                | —     | —            | —     | —                | 94777        | —     |
| 11/64            | .1719   | 4.37 | 3/8        | 1/2   | 2 3/8   | 4             | 95302            | —     | —            | —     | —                | —            | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 3/16  | 2 1/16  | 4             | —                | —     | —            | —     | —                | 94778        | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 9/32  | 2 3/16  | 4             | 93058            | —     | —            | —     | —                | —            | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 1/2   | 2 3/8   | 4             | 94226            | 96421 | —            | —     | 96040            | 94621        | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 5/8   | 2 1/2   | 4             | —                | —     | —            | —     | —                | 94779        | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 3/4   | 2 5/8   | 4             | —                | —     | —            | —     | —                | 94780        | —     |
| 3/16             | .1875   | 4.76 | 3/8        | 1 1/4 | 3 1/16  | 4             | —                | —     | —            | —     | —                | 94781        | —     |
| 13/64            | .2031   | 5.16 | 3/8        | 1/2   | 2 3/8   | 4             | 95303            | —     | 94062        | 96456 | —                | —            | —     |
| 7/32             | .2188   | 5.56 | 3/8        | 5/8   | 2 7/16  | 4             | 95304            | —     | —            | —     | —                | 94782        | —     |
| 7/32             | .2188   | 5.56 | 3/8        | 7/8   | 2 3/4   | 4             | —                | —     | —            | —     | —                | 94783        | —     |
| 7/32             | .2188   | 5.56 | 3/8        | 1 1/4 | 3 1/16  | 4             | —                | —     | —            | —     | —                | 94784        | —     |
| 15/64            | .2344   | 5.95 | 3/8        | 5/8   | 2 7/16  | 4             | 95305            | —     | —            | —     | —                | —            | —     |
| 1/4              | .2500   | 6.35 | 3/8        | 1/4   | 2 1/16  | 4             | —                | —     | —            | —     | —                | 94785        | —     |
| 1/4              | .2500   | 6.35 | 3/8        | 3/8   | 2 1/4   | 4             | 93059            | —     | —            | —     | —                | —            | —     |
| 1/4              | .2500   | 6.35 | 3/8        | 5/8   | 2 7/16  | 4             | 94227            | 96422 | 94063        | 96457 | 96041            | 94622        | 96302 |
| 1/4              | .2500   | 6.35 | 3/8        | 7/8   | 2 11/16 | 4             | —                | —     | —            | —     | —                | 94786        | —     |
| 1/4              | .2500   | 6.35 | 3/8        | 1 1/4 | 3 1/16  | 4             | 94271            | 96446 | 94077        | 96465 | 96070            | 96113        | —     |
| 1/4              | .2500   | 6.35 | 3/8        | 1 3/4 | 3 9/16  | 4             | 94288            | 96438 | 94089        | 96473 | 96060            | 96105        | —     |
| 17/64            | .2656   | 6.75 | 3/8        | 5/8   | 2 7/16  | 4             | 95306            | —     | —            | —     | —                | —            | —     |
| 9/32             | .2813   | 7.14 | 3/8        | 5/8   | 2 7/16  | 4             | 95307            | —     | —            | —     | —                | 94787        | —     |
| 9/32             | .2813   | 7.14 | 3/8        | 1     | 2 3/4   | 4             | —                | —     | —            | —     | —                | 94788        | —     |
| 19/64            | .2969   | 7.54 | 3/8        | 3/4   | 2 1/2   | 4             | 95308            | —     | —            | —     | —                | —            | —     |

continued on next page

General-Purpose



Style 114, 114M • 4-Flute, Non-Center Cutting, HSS  
 Style 115 • 4-Flute, Center Cutting, HSS  
 Style 214 • 4-Flute, Non-Center Cutting, M42 Cobalt  
 Style 215 • 4-Flute, Center Cutting, M42 Cobalt

(continued)

|                  |         |       |       |       |               |                  | HSS    |              |        |                  | M42 Cobalt   |        |       |
|------------------|---------|-------|-------|-------|---------------|------------------|--------|--------------|--------|------------------|--------------|--------|-------|
| Cutting Diameter |         |       | Shank |       | No. of Flutes | Non CC Style 114 |        | CC Style 115 |        | Non CC Style 214 | CC Style 215 |        |       |
| Frac             | Decimal | MM    | Dia.  | LOC   |               | OAL              | Bright | TiN          | Bright | TiN              | Bright       | Bright | TiN   |
| 5/16             | .3125   | 7.94  | 3/8   | 5/8   | 2 1/16        | 4                | —      | —            | —      | —                | —            | 94789  | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 2 1/2         | 4                | 94228  | 96423        | 94064  | 96458            | 96042        | 94623  | 96303 |
| 5/16             | .3125   | 7.94  | 3/8   | 1     | 2 3/4         | 4                | —      | —            | —      | —                | —            | 94790  | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 1 3/8 | 3 1/8         | 4                | 94272  | 96447        | 94078  | 96466            | 96071        | 96114  | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 2     | 3 3/4         | 4                | 94289  | 96439        | 94090  | 96474            | 96061        | 96106  | —     |
| 21/64            | .3281   | 8.33  | 3/8   | 3/4   | 2 1/2         | 4                | 95309  | —            | —      | —                | —            | —      | —     |
| 11/32            | .3438   | 8.73  | 3/8   | 3/4   | 2 1/2         | 4                | 95310  | —            | —      | —                | —            | —      | —     |
| 23/64            | .3594   | 9.13  | 3/8   | 3/4   | 2 1/2         | 4                | 95311  | —            | —      | —                | —            | —      | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 2 1/2         | 4                | 94229  | 96424        | 94065  | 96459            | 96043        | 94624  | 96304 |
| 3/8              | .3750   | 9.53  | 3/8   | 1     | 2 3/4         | 4                | —      | —            | —      | —                | —            | 94791  | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 1 1/2 | 3 1/4         | 4                | 94273  | 96448        | 94079  | 96467            | 96072        | 94645  | 96318 |
| 3/8              | .3750   | 9.53  | 3/8   | 2 1/2 | 4 1/4         | 4                | 94290  | 96440        | 94091  | 96475            | 96062        | 94660  | —     |
| 25/64            | .3906   | 9.92  | 3/8   | 1     | 2 11/16       | 4                | 95312  | —            | —      | —                | —            | —      | —     |
| 13/32            | .4063   | 10.32 | 3/8   | 1     | 2 11/16       | 4                | 95313  | —            | —      | —                | —            | 94792  | —     |
| 27/64            | .4219   | 10.72 | 3/8   | 1     | 2 11/16       | 4                | 95314  | —            | —      | —                | —            | —      | —     |
| 7/16             | .4375   | 11.11 | 3/8   | 7/16  | 2 7/16        | 4                | —      | —            | —      | —                | —            | 94793  | —     |
| 7/16             | .4375   | 11.11 | 3/8   | 1     | 2 11/16       | 4                | 94230  | 96425        | —      | —                | 96044        | 94794  | —     |
| 7/16             | .4375   | 11.11 | 1/2   | 1 1/4 | 3 1/4         | 4                | —      | —            | —      | —                | —            | 94795  | —     |
| 7/16             | .4375   | 11.11 | 1/2   | 1 3/4 | 3 3/4         | 4                | 94274  | 96449        | —      | —                | 96073        | 94796  | —     |
| 7/16             | .4375   | 11.11 | 1/2   | 2 3/4 | 4 3/4         | 4                | —      | —            | —      | —                | —            | 94797  | —     |
| 29/64            | .4531   | 11.51 | 3/8   | 1     | 2 11/16       | 4                | 95315  | —            | —      | —                | —            | —      | —     |
| 15/32            | .4688   | 11.91 | 3/8   | 1     | 2 11/16       | 4                | 95316  | —            | —      | —                | —            | —      | —     |
| 15/32            | .4688   | 11.91 | 1/2   | 1 1/4 | 3 1/8         | 4                | —      | —            | 94798  | —                | —            | —      | —     |
| 31/64            | .4844   | 12.30 | 3/8   | 1     | 2 11/16       | 4                | 95317  | —            | —      | —                | —            | —      | —     |
| 1/2              | .5000   | 12.70 | 3/8   | 1     | 2 11/16       | 4                | 94231  | 96426        | —      | —                | 96045        | 94800  | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 1/2   | 2 1/2         | 4                | —      | —            | —      | —                | —            | 94799  | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4         | 4                | 94232  | 96427        | 94066  | 96460            | 96046        | 94625  | 96305 |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4         | 6                | —      | —            | —      | —                | —            | 94626  | 96306 |
| 1/2              | .5000   | 12.70 | 1/2   | 1 5/8 | 3 5/8         | 4                | —      | —            | —      | —                | —            | 94801  | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 2     | 4             | 4                | 94275  | 96450        | 94080  | 96468            | 96074        | 94646  | 96319 |
| 1/2              | .5000   | 12.70 | 1/2   | 3     | 5             | 4                | 94291  | 96441        | 94092  | 96476            | 96063        | 94661  | 96314 |
| 33/64            | .5156   | 13.10 | 1/2   | 1 1/4 | 3 1/4         | 4                | 95318  | —            | —      | —                | —            | —      | —     |
| 17/32            | .5313   | 13.49 | 1/2   | 1 3/8 | 3 3/8         | 4                | 95319  | —            | —      | —                | —            | —      | —     |
| 35/64            | .5469   | 13.89 | 1/2   | 1 3/8 | 3 3/8         | 4                | 95320  | —            | —      | —                | —            | —      | —     |
| 9/16             | .5625   | 14.29 | 1/2   | 1 3/8 | 3 3/8         | 4                | 94233  | 96428        | —      | —                | 96047        | 94802  | —     |
| 37/64            | .5781   | 14.68 | 1/2   | 1 3/8 | 3 3/8         | 4                | 95321  | —            | —      | —                | —            | —      | —     |
| 19/32            | .5938   | 15.08 | 1/2   | 1 3/8 | 3 3/8         | 4                | 95322  | —            | —      | —                | —            | —      | —     |
| 39/64            | .6094   | 15.48 | 5/8   | 1 5/8 | 3 3/4         | 4                | 95323  | —            | —      | —                | —            | —      | —     |
| 5/8              | .6250   | 15.88 | 1/2   | 1 3/8 | 3 3/8         | 4                | 94234  | 96429        | —      | —                | 96048        | —      | —     |
| 5/8              | .6250   | 15.88 | 5/8   | 5/8   | 2 3/8         | 4                | —      | —            | 94056  | —                | —            | —      | —     |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4         | 4                | 94235  | 96430        | 94067  | 96461            | 96049        | 94627  | 96307 |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4         | 6                | —      | —            | —      | —                | —            | 94628  | 96308 |
| 5/8              | .6250   | 15.88 | 5/8   | 2 1/2 | 4 5/8         | 4                | 94276  | 96451        | 94081  | 96469            | 96075        | 94647  | —     |
| 5/8              | .6250   | 15.88 | 5/8   | 4     | 6 1/8         | 4                | 94292  | 96442        | 94093  | 96477            | 96064        | 94662  | 96315 |
| 41/64            | .6406   | 16.27 | 5/8   | 1 5/8 | 3 3/4         | 4                | 95324  | —            | —      | —                | —            | —      | —     |
| 21/32            | .6563   | 16.67 | 5/8   | 1 5/8 | 3 3/4         | 4                | 95325  | —            | —      | —                | —            | —      | —     |
| 43/64            | .6719   | 17.07 | 5/8   | 1 5/8 | 3 3/4         | 4                | 95326  | —            | —      | —                | —            | —      | —     |

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Style 114, 114M • 4-Flute, Non-Center Cutting, HSS  
 Style 115 • 4-Flute, Center Cutting, HSS  
 Style 214 • 4-Flute, Non-Center Cutting, M42 Cobalt  
 Style 215 • 4-Flute, Center Cutting, M42 Cobalt  
 (continued)

|                  |         |       |       |       |               |                     | HSS    |                 |        |                     | M42 Cobalt      |             |     |
|------------------|---------|-------|-------|-------|---------------|---------------------|--------|-----------------|--------|---------------------|-----------------|-------------|-----|
| Cutting Diameter |         |       | Shank |       | No. of Flutes | Non CC<br>Style 114 |        | CC<br>Style 115 |        | Non CC<br>Style 214 | CC<br>Style 215 |             |     |
| Frac             | Decimal | MM    | Dia.  | LOC   |               | OAL                 | Bright | TiN             | Bright | TiN                 | Bright          | Bright      | TiN |
| 11/16            | .6875   | 17.46 | 1/2   | 1 5/8 | 3 5/8         | 4                   | 94236  | —               | —      | —                   | —               | —           |     |
| 11/16            | .6875   | 17.46 | 5/8   | 1 5/8 | 3 3/4         | 4                   | 94237  | —               | 94057  | —                   | 94803           | —           |     |
| 45/64            | .7031   | 17.86 | 3/4   | 1 5/8 | 3 7/8         | 4                   | 95327  | —               | —      | —                   | —               | —           |     |
| 23/32            | .7188   | 18.26 | 3/4   | 1 5/8 | 3 7/8         | 4                   | 95328  | —               | —      | —                   | —               | —           |     |
| 47/64            | .7344   | 18.65 | 3/4   | 1 5/8 | 3 7/8         | 4                   | 95329  | —               | —      | —                   | —               | —           |     |
| 3/4              | .7500   | 19.05 | 1/2   | 1 5/8 | 3 5/8         | 4                   | 94238  | 96431           | —      | —                   | 96050           | —           |     |
| 3/4              | .7500   | 19.05 | 5/8   | 1     | 1 5/8         | 4                   | —      | —               | —      | —                   | 94804           | —           |     |
| 3/4              | .7500   | 19.05 | 5/8   | 1 5/8 | 3 3/4         | 4                   | 94239  | 96432           | —      | —                   | 96051           | —           |     |
| 3/4              | .7500   | 19.05 | 3/4   | 3/4   | 3             | 4                   | —      | —               | 94058  | —                   | —               | —           |     |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 3 7/8         | 4                   | 94240  | 96433           | 94069  | 96462               | 96052           | 94629 96309 |     |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 3 7/8         | 6                   | —      | —               | —      | —                   | —               | 94630 96310 |     |
| 3/4              | .7500   | 19.05 | 3/4   | 2     | 4 1/4         | 4                   | —      | —               | 94099  | —                   | —               | —           |     |
| 3/4              | .7500   | 19.05 | 3/4   | 2     | 4 1/4         | 6                   | —      | —               | —      | —                   | —               | 94637       |     |
| 3/4              | .7500   | 19.05 | 3/4   | 2 1/4 | 4 1/2         | 4                   | —      | —               | 94059  | —                   | —               | 94805       |     |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4         | 4                   | 94277  | 96452           | 94082  | 96470               | 96076           | 94648 96321 |     |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4         | 6                   | —      | —               | —      | —                   | —               | 94649       |     |
| 3/4              | .7500   | 19.05 | 3/4   | 4     | 6 1/4         | 4                   | 94293  | 96443           | 94094  | 96478               | 96065           | 94663 96316 |     |
| 3/4              | .7500   | 19.05 | 3/4   | 4     | 6 1/4         | 6                   | —      | —               | —      | —                   | —               | 94664 96317 |     |
| 49/64            | .7656   | 19.45 | 3/4   | 1 7/8 | 4 1/4         | 4                   | 95330  | —               | —      | —                   | —               | —           |     |
| 25/32            | .7813   | 19.84 | 1/2   | 1 5/8 | 3 5/8         | 4                   | 95360  | —               | —      | —                   | —               | —           |     |
| 25/32            | .7813   | 19.84 | 3/4   | 1 7/8 | 4 1/4         | 4                   | 95331  | —               | —      | —                   | —               | —           |     |
| 51/64            | .7969   | 20.24 | 3/4   | 1 7/8 | 4 1/4         | 4                   | 95332  | —               | —      | —                   | —               | —           |     |
| 13/16            | .8125   | 20.64 | 5/8   | 1 7/8 | 4             | 6                   | 94241  | —               | —      | —                   | —               | —           |     |
| 13/16            | .8125   | 20.64 | 3/4   | 1 7/8 | 4 1/8         | 4                   | 94242  | —               | —      | —                   | 94806           | —           |     |
| 55/64            | .8594   | 21.83 | 7/8   | 1 7/8 | 4 1/4         | 4                   | 95335  | —               | —      | —                   | —               | —           |     |
| 7/8              | .8750   | 22.23 | 1/2   | 1 5/8 | 3 5/8         | 4                   | 95361  | —               | —      | —                   | —               | —           |     |
| 7/8              | .8750   | 22.23 | 1/2   | 1 7/8 | 4             | 4                   | —      | —               | —      | —                   | 94807           | —           |     |
| 7/8              | .8750   | 22.23 | 5/8   | 1 7/8 | 4             | 6                   | 94243  | —               | —      | —                   | —               | —           |     |
| 7/8              | .8750   | 22.23 | 3/4   | 1 7/8 | 4 1/8         | 4                   | 94244  | 96434           | —      | —                   | 96053           | 94808       |     |
| 7/8              | .8750   | 22.23 | 7/8   | 1 7/8 | 4 1/8         | 4                   | 94245  | —               | 94070  | 96463               | —               | 96100       |     |
| 7/8              | .8750   | 22.23 | 7/8   | 3 1/2 | 5 3/4         | 4                   | 94278  | 96453           | 94083  | 96471               | 96077           | —           |     |
| 7/8              | .8750   | 22.23 | 7/8   | 5     | 7 1/4         | 4                   | 94294  | 96444           | 94095  | 96479               | 96066           | —           |     |
| 59/64            | .9219   | 23.42 | 7/8   | 1 7/8 | 4 1/8         | 4                   | 95338  | —               | —      | —                   | —               | —           |     |
| 15/16            | .9375   | 23.81 | 5/8   | 1 7/8 | 4             | 6                   | 94246  | —               | —      | —                   | —               | —           |     |
| 15/16            | .9375   | 23.81 | 3/4   | 1 7/8 | 4 1/8         | 4                   | 94247  | —               | —      | —                   | —               | —           |     |
| 15/16            | .9375   | 23.81 | 7/8   | 1 7/8 | 4 3/16        | 4                   | 94248  | —               | —      | —                   | 94809           | —           |     |
| 31/32            | .9688   | 24.61 | 1     | 2     | 4 1/2         | 4                   | 95340  | —               | —      | —                   | —               | —           |     |
| 63/64            | .9844   | 25.00 | 1     | 2     | 4 1/2         | 4                   | 95341  | —               | —      | —                   | —               | —           |     |
| 1                | 1.0000  | 25.40 | 1/2   | 1 7/8 | 4 1/8         | 4                   | —      | —               | —      | —                   | 94825           | —           |     |
| 1                | 1.0000  | 25.40 | 5/8   | 1 7/8 | 4             | 6                   | 94249  | 96435           | —      | —                   | 96054           | —           |     |
| 1                | 1.0000  | 25.40 | 3/4   | 1 7/8 | 4 1/8         | 4                   | 94250  | 96436           | —      | —                   | 96055           | 94826       |     |
| 1                | 1.0000  | 25.40 | 7/8   | 1 7/8 | 4 3/16        | 4                   | 94251  | —               | —      | —                   | —               | —           |     |
| 1                | 1.0000  | 25.40 | 1     | 2     | 4 1/2         | 4                   | 94252  | 96437           | 94071  | 96464               | 96056           | 94631 96311 |     |
| 1                | 1.0000  | 25.40 | 1     | 2     | 4 1/2         | 6                   | —      | —               | —      | —                   | —               | 94632 96312 |     |
| 1                | 1.0000  | 25.40 | 1     | 3     | 5 1/2         | 4                   | 91319  | —               | 91175  | —                   | —               | 94827       |     |
| 1                | 1.0000  | 25.40 | 1     | 3     | 5 1/2         | 6                   | —      | —               | 94100  | —                   | —               | 94638       |     |

1-inch and larger sizes continued on next page

General-Purpose



Style 114, 114M • 4-Flute, Non-Center Cutting, HSS  
 Style 115 • 4-Flute, Center Cutting, HSS  
 Style 214 • 4-Flute, Non-Center Cutting, M42 Cobalt  
 Style 215 • 4-Flute, Center Cutting, M42 Cobalt

(continued)

|                  |         |       |            |       |        |               | HSS       |           |           |           | M42 Cobalt |       |        |
|------------------|---------|-------|------------|-------|--------|---------------|-----------|-----------|-----------|-----------|------------|-------|--------|
| Cutting Diameter |         |       | Shank Dia. | LOC   | OAL    | No. of Flutes | Non CC    |           | CC        |           | Non CC     | CC    |        |
| Frac             | Decimal | MM    |            |       |        |               | Style 114 | Style 115 | Style 214 | Style 215 | TIN        | TIN   | Bright |
| 1                | 1.0000  | 25.40 | 1          | 4     | 6 1/2  | 4             | 94279     | 96454     | 94084     | 96472     | 96078      | 94650 | 96323  |
| 1                | 1.0000  | 25.40 | 1          | 4     | 6 1/2  | 6             | —         | —         | —         | —         | —          | 94651 | 96324  |
| 1                | 1.0000  | 25.40 | 1          | 6     | 8 1/2  | 4             | 94295     | 96445     | 94096     | 96480     | 96067      | 94665 | —      |
| 1                | 1.0000  | 25.40 | 1          | 6     | 8 1/2  | 6             | —         | —         | —         | —         | —          | 94666 | —      |
| 1 1/16           | 1.0625  | 26.99 | 3/4        | 1 1/2 | 3 7/8  | 6             | —         | —         | —         | —         | —          | 94639 | —      |
| 1 1/16           | 1.0625  | 26.99 | 3/4        | 2     | 4 1/4  | 6             | 94265     | —         | —         | —         | —          | —     | —      |
| 1 1/8            | 1.1250  | 28.58 | 3/4        | 1 1/2 | 3 7/8  | 6             | 91251     | —         | —         | —         | —          | 94641 | —      |
| 1 1/8            | 1.1250  | 28.58 | 7/8        | 2     | 4 5/16 | 6             | 94253     | —         | —         | —         | —          | —     | —      |
| 1 1/8            | 1.1250  | 28.58 | 1          | 2     | 4 1/2  | 4             | —         | —         | 94072     | —         | —          | —     | —      |
| 1 1/8            | 1.1250  | 28.58 | 1          | 2     | 4 1/2  | 6             | 94254     | —         | —         | —         | —          | —     | —      |
| 1 1/8            | 1.1250  | 28.58 | 1          | 4     | 6 1/2  | 6             | 94280     | —         | —         | —         | —          | —     | —      |
| 1 3/16           | 1.1875  | 30.16 | 3/4        | 1 1/2 | 3 7/8  | 6             | —         | —         | —         | —         | —          | 94642 | —      |
| 1 3/16           | 1.1875  | 30.16 | 3/4        | 2     | 4 1/4  | 6             | 94266     | —         | —         | —         | —          | —     | —      |
| 1 1/4            | 1.2500  | 31.75 | 3/4        | 1 1/2 | 3 7/8  | 6             | 91252     | —         | —         | —         | —          | 94643 | —      |
| 1 1/4            | 1.2500  | 31.75 | 7/8        | 2     | 4 5/16 | 6             | 94255     | —         | —         | —         | —          | —     | —      |
| 1 1/4            | 1.2500  | 31.75 | 1          | 2     | 4 1/2  | 6             | 94256     | —         | —         | —         | —          | 94644 | —      |
| 1 1/4            | 1.2500  | 31.75 | 1          | 4     | 6 1/2  | 6             | 94281     | —         | —         | —         | —          | —     | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 2     | 4 1/2  | 4             | 91238     | —         | 94073     | —         | —          | 94633 | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 2     | 4 1/2  | 6             | 94257     | —         | —         | —         | 96057      | 94634 | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 3     | 5 1/2  | 4             | 91320     | —         | 91176     | —         | —          | —     | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 4     | 6 1/2  | 4             | 91243     | —         | 94085     | —         | —          | 94652 | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 4     | 6 1/2  | 6             | 94282     | —         | —         | —         | 96079      | 94653 | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 6     | 8 1/2  | 4             | —         | —         | 94097     | —         | —          | 94667 | —      |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 6     | 8 1/2  | 6             | 94296     | —         | —         | —         | 96068      | 94668 | —      |
| 1 3/8            | 1.3750  | 34.93 | 3/4        | 1 1/2 | 3 7/8  | 6             | 91253     | —         | —         | —         | —          | —     | —      |
| 1 3/8            | 1.3750  | 34.93 | 3/4        | 2     | 4 3/8  | 6             | —         | —         | —         | —         | —          | 94654 | —      |
| 1 3/8            | 1.3750  | 34.93 | 1          | 2     | 4 1/2  | 6             | 94258     | —         | —         | —         | —          | —     | —      |
| 1 3/8            | 1.3750  | 34.93 | 1          | 4     | 6 1/2  | 6             | 94283     | —         | —         | —         | —          | —     | —      |
| 1 1/2            | 1.5000  | 38.10 | 3/4        | 1 1/2 | 3 7/8  | 6             | 91254     | —         | —         | —         | —          | —     | —      |
| 1 1/2            | 1.5000  | 38.10 | 3/4        | 2     | 4 3/8  | 6             | —         | —         | —         | —         | —          | 94655 | —      |
| 1 1/2            | 1.5000  | 38.10 | 1          | 2     | 4 1/2  | 6             | 94259     | —         | —         | —         | —          | —     | —      |
| 1 1/2            | 1.5000  | 38.10 | 1          | 4     | 6 1/2  | 6             | 94284     | —         | —         | —         | —          | —     | —      |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2     | 4 1/2  | 4             | 91239     | —         | 94074     | —         | —          | 94635 | —      |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2     | 4 1/2  | 6             | 94260     | —         | —         | —         | 96058      | 94636 | —      |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 3     | 5 1/2  | 4             | 91321     | —         | 91177     | —         | —          | —     | —      |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 4     | 6 1/2  | 4             | 91244     | —         | 94086     | —         | —          | 96121 | —      |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 4     | 6 1/2  | 6             | 94285     | —         | —         | —         | 96080      | —     | —      |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 8     | 10 1/2 | 6             | 94297     | —         | 94098     | —         | 96069      | —     | —      |
| 1 5/8            | 1.6250  | 41.28 | 3/4        | 2     | 4 3/8  | 6             | —         | —         | —         | —         | —          | 94656 | —      |
| 1 5/8            | 1.6250  | 41.28 | 3/4        | 2     | 4 1/2  | 4             | 94267     | —         | —         | —         | —          | —     | —      |
| 1 5/8            | 1.6250  | 41.28 | 1 1/4      | 2     | 4 1/2  | 6             | 94261     | —         | —         | —         | —          | —     | —      |
| 1 3/4            | 1.7500  | 44.45 | 3/4        | 1 1/2 | 3 7/8  | 6             | 91255     | —         | —         | —         | —          | —     | —      |
| 1 3/4            | 1.7500  | 44.45 | 3/4        | 2     | 4 3/8  | 6             | —         | —         | —         | —         | —          | 94657 | —      |
| 1 3/4            | 1.7500  | 44.45 | 1 1/4      | 2     | 4 1/2  | 4             | 91240     | —         | —         | —         | —          | —     | —      |
| 1 3/4            | 1.7500  | 44.45 | 1 1/4      | 2     | 4 1/2  | 6             | 94262     | —         | 94075     | —         | —          | 96103 | —      |
| 1 3/4            | 1.7500  | 44.45 | 1 1/4      | 4     | 6 1/2  | 6             | 94286     | —         | 94087     | —         | 96081      | —     | —      |

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Style 114, 114M • 4-Flute, Non-Center Cutting, HSS  
 Style 115 • 4-Flute, Center Cutting, HSS  
 Style 214 • 4-Flute, Non-Center Cutting, M42 Cobalt  
 Style 215 • 4-Flute, Center Cutting, M42 Cobalt  
 (continued)

|                  |         |       |       |       |        |        | HSS    |                     |        |                 | M42 Cobalt |                     |        |                 |  |
|------------------|---------|-------|-------|-------|--------|--------|--------|---------------------|--------|-----------------|------------|---------------------|--------|-----------------|--|
| Cutting Diameter |         |       | Shank |       |        |        | No. of | Non CC<br>Style 114 |        | CC<br>Style 115 |            | Non CC<br>Style 214 |        | CC<br>Style 215 |  |
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL    | Flutes | Bright | TiN                 | Bright | TiN             | Bright     | TiN                 | Bright | TiN             |  |
| 1 7/8            | 1.8750  | 47.63 | 3/4   | 2     | 4 1/2  | 4      | 94268  | —                   | —      | —               | —          | —                   | —      | —               |  |
| 1 7/8            | 1.8750  | 47.63 | 3/4   | 2     | 4 3/8  | 6      | —      | —                   | —      | —               | —          | —                   | 94658  | —               |  |
| 1 7/8            | 1.8750  | 47.63 | 1 1/4 | 2     | 4 1/2  | 8      | 94263  | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 3/4   | 1 1/2 | 3 7/8  | 8      | 91256  | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 3/4   | 2     | 4 1/2  | 6      | —      | —                   | —      | —               | —          | —                   | 94659  | —               |  |
| 2                | 2.0000  | 50.80 | 1 1/4 | 2     | 4 1/2  | 4      | 91242  | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 1 1/4 | 2     | 4 1/2  | 6      | 91241  | —                   | 94076  | —               | —          | —                   | 96104  | —               |  |
| 2                | 2.0000  | 50.80 | 1 1/4 | 2     | 4 1/2  | 8      | 94264  | —                   | —      | —               | 96059      | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 1 1/4 | 3     | 5 1/2  | 6      | 91323  | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 1 1/4 | 4     | 6 1/2  | 6      | 91245  | —                   | 94088  | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 1 1/4 | 4     | 6 1/2  | 8      | 94287  | —                   | —      | —               | 96082      | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 3     | 6 3/4  | 6      | 94420* | —                   | —      | —               | —          | —                   | 96000* | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 4     | 7 3/4  | 6      | 94421* | —                   | 91150* | —               | —          | —                   | 94640* | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 5     | 8 3/4  | 6      | 94422* | —                   | —      | —               | —          | —                   | 96001* | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 6     | 9 3/4  | 4      | —      | —                   | 91126* | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 6     | 9 3/4  | 6      | 94423* | —                   | 91151* | —               | —          | —                   | 96002* | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 8     | 11 3/4 | 6      | 94424* | —                   | —      | —               | —          | —                   | 96003* | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 10    | 13 3/4 | 6      | 94425* | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2                | 2.0000  | 50.80 | 2     | 12    | 15 3/4 | 6      | 94426* | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2 1/2            | 2.5000  | 63.50 | 2     | 5     | 8 3/4  | 6      | 94428* | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2 1/2            | 2.5000  | 63.50 | 2     | 6     | 9 3/4  | 6      | 94429* | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2 1/2            | 2.5000  | 63.50 | 2 1/2 | 6     | 10     | 6      | 94433* | —                   | —      | —               | —          | —                   | —      | —               |  |
| 2 1/2            | 2.5000  | 63.50 | 2     | 8     | 11 3/4 | 6      | 94430* | —                   | —      | —               | —          | —                   | —      | —               |  |

\* Indicates positive-lok (dual combination shank)

| Cutting Diameter |          | Shank      |           | HSS<br>Non CC |                  |                      |
|------------------|----------|------------|-----------|---------------|------------------|----------------------|
| MM               | Dec. In. | Dia.<br>MM | LOC<br>MM | OAL<br>MM     | No. of<br>Flutes | Style 114M<br>Bright |
| 3                | .1181    | 9.52       | 9.52      | 58.74         | 4                | 95443                |
| 4                | .1575    | 9.52       | 12.70     | 60.32         | 4                | 95444                |
| 5                | .1969    | 9.52       | 15.88     | 61.91         | 4                | 95445                |
| 6                | .2362    | 9.52       | 15.88     | 61.91         | 4                | 95446                |
| 7                | .2756    | 9.52       | 19.05     | 63.50         | 4                | 95447                |
| 8                | .3150    | 9.52       | 19.05     | 63.50         | 4                | 95448                |
| 9                | .3543    | 9.52       | 19.05     | 63.50         | 4                | 95449                |
| 10               | .3937    | 9.52       | 25.40     | 68.26         | 4                | 95450                |
| 11               | .4331    | 9.52       | 25.40     | 68.26         | 4                | 95451                |
| 12               | .4724    | 12.70      | 31.75     | 82.55         | 4                | 95452                |
| 13               | .5118    | 12.70      | 34.92     | 85.72         | 4                | 95453                |
| 14               | .5512    | 12.70      | 34.92     | 85.72         | 4                | 95454                |

| Cutting Diameter |          | Shank      |           | HSS<br>Non CC |                  |                      |
|------------------|----------|------------|-----------|---------------|------------------|----------------------|
| MM               | Dec. In. | Dia.<br>MM | LOC<br>MM | OAL<br>MM     | No. of<br>Flutes | Style 114M<br>Bright |
| 15               | .5906    | 12.70      | 34.92     | 85.72         | 4                | 95455                |
| 16               | .6299    | 15.88      | 41.27     | 95.25         | 4                | 95456                |
| 17               | .6693    | 15.88      | 41.27     | 95.25         | 4                | 95457                |
| 18               | .7087    | 15.88      | 41.27     | 95.25         | 4                | 95458                |
| 19               | .7480    | 19.05      | 41.27     | 98.42         | 4                | 95459                |
| 20               | .7874    | 15.88      | 47.63     | 101.60        | 4                | 95460                |
| 21               | .8268    | 15.88      | 47.63     | 101.60        | 4                | 95461                |
| 22               | .8661    | 22.23      | 47.63     | 104.78        | 4                | 95462                |
| 23               | .9055    | 22.23      | 47.63     | 104.78        | 4                | 95463                |
| 24               | .9449    | 25.40      | 50.80     | 114.30        | 4                | 95464                |
| 25               | .9843    | 25.40      | 50.80     | 114.30        | 4                | 95465                |

## General-Purpose

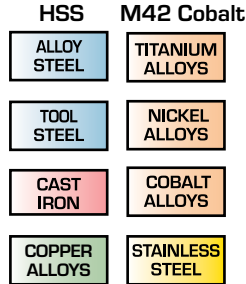


**Style 115B • 4-Flute, Center Cutting, HSS**  
**Style 215B • 4-Flute, Ball Nose, M42 Cobalt**

### FEATURES



### APPLICATION



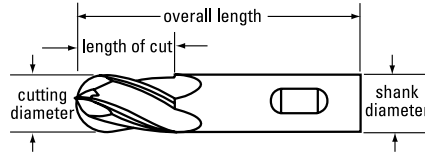
Style 115B HSS Bright



Style 115B HSS TiN



Style 215B M42 Cobalt Bright



| Cutting Diameter<br>Frac | Decimal | MM    | Shank<br>Dia. | HSS   |         | No. of<br>Flutes | HSS                  |       | M42 Cobalt           |
|--------------------------|---------|-------|---------------|-------|---------|------------------|----------------------|-------|----------------------|
|                          |         |       |               | LOC   | OAL     |                  | Style 115B<br>Bright | TiN   | Style 215B<br>Bright |
| 1/8                      | .1250   | 3.18  | 3/8           | 3/8   | 2 5/16  | 4                | —                    | —     | 94600                |
| 3/16                     | .1875   | 4.76  | 3/8           | 1/2   | 2 3/8   | 4                | —                    | —     | 94601                |
| 1/4                      | .2500   | 6.35  | 3/8           | 5/8   | 2 7/16  | 4                | —                    | —     | 94602                |
| 1/4                      | .2500   | 6.35  | 3/8           | 3/4   | 2 7/16  | 4                | 94010                | —     | 94597                |
| 1/4                      | .2500   | 6.35  | 3/8           | 1     | 2 13/16 | 4                | 94011                | 96481 | —                    |
| 1/4                      | .2500   | 6.35  | 3/8           | 1     | 3 1/16  | 4                | —                    | —     | 96009                |
| 1/4                      | .2500   | 6.35  | 3/8           | 1 1/4 | 3 1/16  | 4                | 94012                | —     | 94598                |
| 1/4                      | .2500   | 6.35  | 3/8           | 1 1/2 | 3 9/16  | 4                | 94013                | —     | —                    |
| 1/4                      | .2500   | 6.35  | 3/8           | 1 3/4 | 3 9/16  | 4                | —                    | —     | 94599                |
| 5/16                     | .3125   | 7.94  | 3/8           | 3/4   | 2 1/2   | 4                | —                    | —     | 94603                |
| 5/16                     | .3125   | 7.94  | 3/8           | 1     | 2 1/2   | 4                | 94014                | —     | —                    |
| 5/16                     | .3125   | 7.94  | 3/8           | 1 1/2 | 3 1/8   | 4                | 94015                | —     | —                    |
| 3/8                      | .3750   | 9.53  | 3/8           | 3/4   | 2 1/2   | 4                | —                    | —     | 94604                |
| 3/8                      | .3750   | 9.53  | 3/8           | 1     | 2 1/2   | 4                | 94016                | 96482 | —                    |
| 3/8                      | .3750   | 9.53  | 3/8           | 1     | 2 3/4   | 4                | —                    | —     | 94608                |
| 3/8                      | .3750   | 9.53  | 3/8           | 1 1/2 | 3 1/4   | 4                | 94017                | —     | 96010                |
| 3/8                      | .3750   | 9.53  | 3/8           | 2     | 3 3/4   | 4                | 94018                | 96483 | —                    |
| 3/8                      | .3750   | 9.53  | 3/8           | 2 1/2 | 4 1/4   | 4                | 94019                | —     | 94610                |
| 1/2                      | .5000   | 12.70 | 1/2           | 1     | 3       | 4                | 94020                | 96484 | —                    |
| 1/2                      | .5000   | 12.70 | 1/2           | 1 1/4 | 3 1/4   | 4                | —                    | —     | 94605                |
| 1/2                      | .5000   | 12.70 | 1/2           | 1 1/2 | 3 1/2   | 4                | 94021                | —     | —                    |
| 1/2                      | .5000   | 12.70 | 1/2           | 2     | 4       | 4                | 94042                | 96485 | 96011                |
| 1/2                      | .5000   | 12.70 | 1/2           | 2 1/2 | 4 1/2   | 4                | 94022                | —     | 94610                |
| 1/2                      | .5000   | 12.70 | 1/2           | 3     | 5       | 4                | 94023                | —     | 94615                |
| 5/8                      | .6250   | 15.88 | 5/8           | 1 1/4 | 3 3/8   | 4                | 94024                | —     | —                    |
| 5/8                      | .6250   | 15.88 | 5/8           | 1 5/8 | 3 3/4   | 4                | —                    | —     | 94606                |
| 5/8                      | .6250   | 15.88 | 5/8           | 1 3/4 | 3 7/8   | 4                | 94025                | —     | —                    |
| 5/8                      | .6250   | 15.88 | 5/8           | 2 1/2 | 4 5/8   | 4                | 94043                | —     | —                    |
| 5/8                      | .6250   | 15.88 | 5/8           | 3     | 5 1/8   | 4                | 94026                | —     | —                    |
| 3/4                      | .7500   | 19.05 | 3/4           | 1 1/2 | 3 3/4   | 4                | 94028                | 96487 | —                    |
| 3/4                      | .7500   | 19.05 | 3/4           | 1 5/8 | 3 7/8   | 4                | —                    | —     | 94607                |
| 3/4                      | .7500   | 19.05 | 3/4           | 2 1/4 | 4 1/2   | 4                | 94029                | —     | —                    |
| 3/4                      | .7500   | 19.05 | 3/4           | 3     | 5 1/4   | 4                | 94044                | 96488 | 96012                |
| 3/4                      | .7500   | 19.05 | 3/4           | 3 3/4 | 6       | 4                | 94030                | —     | —                    |
| 3/4                      | .7500   | 19.05 | 3/4           | 4     | 6 1/8   | 4                | 94616                | —     | —                    |
| 3/4                      | .7500   | 19.05 | 3/4           | 4 1/2 | 6 3/4   | 4                | 94031                | —     | —                    |
| 7/8                      | .8750   | 22.23 | 7/8           | 1 7/8 | 4 1/8   | 4                | —                    | —     | 94617                |

continued on next page



**Style 115B • 4-Flute, Ball Nose, HSS**  
**Style 215B • 4-Flute, Ball Nose, M42 Cobalt**  
 (continued)

| Cutting Diameter |         | Shank Dia. | LOC   | OAL   | No. of Flutes | HSS |                   | M42 Cobalt     |                   |
|------------------|---------|------------|-------|-------|---------------|-----|-------------------|----------------|-------------------|
| Frac             | Decimal |            |       |       |               | MM  | Style 115B Bright | Style 115B TiN | Style 215B Bright |
| 1                | 1.0000  | 25.40      | 1     | 2     | 4 1/2         | 4   | 94033             | 96489          | 94609             |
| 1                | 1.0000  | 25.40      | 1     | 3     | 5 1/2         | 4   | 94034             | —              | 96013             |
| 1                | 1.0000  | 25.40      | 1     | 4     | 6 1/2         | 4   | 94045             | —              | 94618             |
| 1                | 1.0000  | 25.40      | 1     | 6     | 8 1/2         | 4   | 94036             | —              | 94619             |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 2     | 4 1/2         | 4   | 94037             | —              | 94611             |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 2     | 4 1/2         | 6   | —                 | —              | 94612             |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 4 1/2 | 7             | 4   | 94046             | —              | —                 |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 2     | 4 1/2         | 4   | 94040             | —              | 94613             |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 2     | 4 1/2         | 6   | —                 | —              | 94614             |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 6     | 8 1/2         | 4   | 94041             | —              | —                 |
| 1 1/2            | 1.5000  | 38.10      | 1 1/2 | 6     | 9 1/4         | 6   | 94472*            | —              | —                 |
| 2                | 2.0000  | 50.80      | 1 1/2 | 3     | 5 7/8         | 6   | 94474*            | —              | —                 |

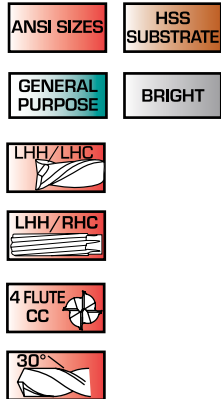
\* Indicates positive-lok (dual combination shank)

## General-Purpose

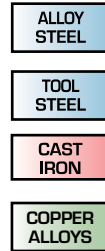


**Style 104 • 4-Flute, Left-Hand Helix, Left-Hand Cut, HSS**  
**Style 104R • 4-Flute, Left-Hand Helix, Right-Hand Cut, HSS**

### FEATURES



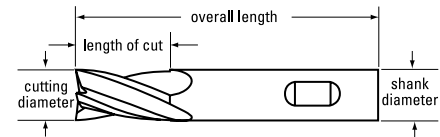
### APPLICATIONS



Style 104 HSS Bright



Style 104R HSS Bright



### HSS

| Cutting Diameter |         |       | Shank |       |         | No. of Flutes | Style 104 Bright | Style 104R Bright |
|------------------|---------|-------|-------|-------|---------|---------------|------------------|-------------------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL     |               |                  |                   |
| 3/16             | .1875   | 4.76  | 3/8   | 1/2   | 2 3/8   | 4             | 94766            | —                 |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 2 7/16  | 4             | 94767            | 93105             |
| 1/4              | .2500   | 6.35  | 3/8   | 1 1/4 | 3 1/16  | 4             | —                | 92315             |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 2 1/2   | 4             | 94768            | 93106             |
| 5/16             | .3125   | 7.94  | 3/8   | 1 3/8 | 3 1/8   | 4             | —                | 92316             |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 2 1/2   | 4             | 94769            | 93107             |
| 3/8              | .3750   | 9.53  | 3/8   | 1 1/2 | 3 1/4   | 4             | —                | 92317             |
| 7/16             | .4375   | 11.11 | 3/8   | 1     | 2 11/16 | 4             | —                | 93108             |
| 7/16             | .4375   | 11.11 | 1/2   | 1 3/4 | 3 3/4   | 4             | —                | 92318             |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4   | 4             | 94771            | 93109             |
| 1/2              | .5000   | 12.70 | 1/2   | 2     | 4       | 4             | —                | 92319             |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4   | 4             | 94772            | 93110             |
| 5/8              | .6250   | 15.88 | 5/8   | 2 1/2 | 4 5/8   | 4             | —                | 92320             |
| 3/4              | .7500   | 19.05 | 3/4   | 1 3/4 | 4       | 4             | —                | 93111             |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4   | 4             | —                | 92321             |
| 1                | 1.0000  | 25.40 | 1     | 2     | 4 1/2   | 4             | —                | 93113             |
| 1                | 1.0000  | 25.40 | 1     | 4     | 6 1/2   | 4             | —                | 92323             |
| 1 1/4            | 1.2500  | 31.75 | 1     | 2     | 4 1/2   | 6             | —                | 93115             |
| 1 1/2            | 1.5000  | 38.10 | 1     | 2     | 4 1/2   | 6             | —                | 93117             |
| 2                | 2.0000  | 50.80 | 1 1/4 | 2     | 4 1/2   | 8             | —                | 93123             |

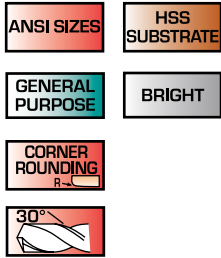




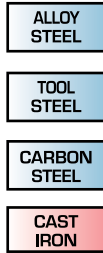
# Single End Finishing End Mills General-Purpose

## Style CRE Corner Rounding, Single End

### FEATURES



### APPLICATIONS



Style CRE Bright

| Cutting Diameter |          |       | Radius | Shank |     |         | No. of Flutes | Style CRE Bright |
|------------------|----------|-------|--------|-------|-----|---------|---------------|------------------|
| Frac.            | Dec. In. | MM    |        | Dia.  | LOC | OAL     |               |                  |
| 7/16             | .4375    | 11.11 | 1/16   | 3/8   | 3/8 | 2 1/2   | 4             | 91675            |
| 1/2              | .5000    | 12.70 | 3/32   | 3/8   | 1   | 2 1/2   | 4             | 91676            |
| 5/8              | .6250    | 15.88 | 1/8    | 1/2   | 1/2 | 3       | 4             | 91677            |
| 3/4              | .7500    | 19.05 | 5/32   | 1/2   | 3/4 | 3       | 4             | 91678            |
| 7/8              | .8750    | 22.23 | 3/16   | 1/2   | 1/2 | 2 15/16 | 4             | 91685            |
| 7/8              | .8750    | 22.23 | 3/16   | 3/4   | 1/2 | 3 1/8   | 4             | 91679            |
| 1                | 1.0000   | 25.40 | 1/4    | 1/2   | 3/4 | 3       | 4             | 91686            |
| 1                | 1.0000   | 25.40 | 1/4    | 3/4   | 3/8 | 3 1/4   | 4             | 91680            |
| 1 1/8            | 1.1250   | 28.58 | 5/16   | 1/2   | 1/2 | 3 1/4   | 4             | 91687            |
| 1 1/8            | 1.1250   | 28.58 | 5/16   | 7/8   | 3/4 | 3 1/2   | 4             | 91681            |
| 1 1/4            | 1.2500   | 31.75 | 3/8    | 1/2   | 1/2 | 3 1/2   | 4             | 91688            |
| 1 1/4            | 1.2500   | 31.75 | 3/8    | 7/8   | 3/4 | 3 3/4   | 4             | 91682            |
| 1 3/8            | 1.3750   | 34.93 | 7/16   | 1     | 1/2 | 4       | 4             | 91683            |
| 1 1/2            | 1.5000   | 38.10 | 1/2    | 1     | 1   | 4 1/8   | 4             | 91684            |



Style M12 Mach IV 2-Flute, Center Cutting, Single End  
 Style M15 Mach IV 4-Flute, Center Cutting, Single End  
 Style M10 Mach IV 4-Flute, Ball Nose, Single End

### FEATURES

|                  |                |
|------------------|----------------|
| ANSI SIZES       | T-15 SUBSTRATE |
| HIGH PERFORMANCE | BRIGHT         |
| 2 FLUTE CC       | 30°            |
| 4+ FLUTE CC      |                |
| 4 FLUTE BALL CC  |                |

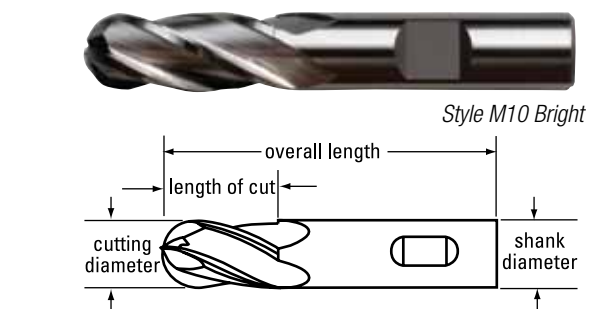
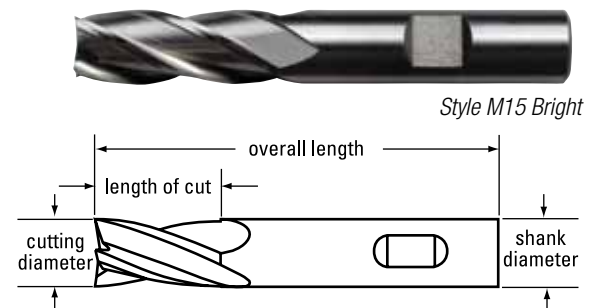
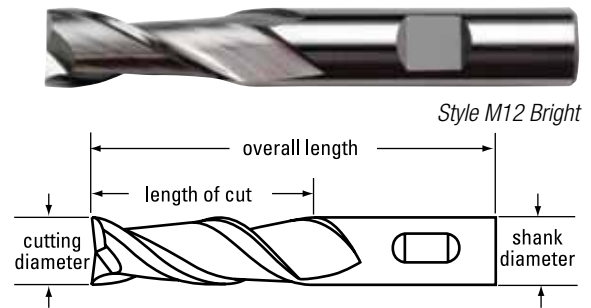
### APPLICATIONS

|               |
|---------------|
| HITEMP ALLOYS |
| INCONEL       |
| HASTELLOY     |
| WASPALLOY     |
| NICKEL ALLOYS |

| Cutting Diameter |          |       | Shank |        | OAL    | No. of Flutes | Style M12 Bright |
|------------------|----------|-------|-------|--------|--------|---------------|------------------|
| Fract.           | Dec. In. | MM    | Dia.  | LOC    |        |               |                  |
| 1/8              | .1250    | 3.18  | 3/8   | 3/8    | 2 5/16 | 2             | 94730            |
| 3/16             | .1875    | 4.76  | 3/8   | 3/8    | 2 3/8  | 2             | 94731            |
| 5/16             | .3125    | 7.94  | 3/8   | 9/16   | 2 1/2  | 2             | 94733            |
| 3/8              | .3750    | 9.53  | 3/8   | 9/16   | 2 1/2  | 2             | 94734            |
| 5/8              | .6250    | 15.88 | 5/8   | 1 5/16 | 3 3/4  | 2             | 94737            |
| 7/8              | .8750    | 22.23 | 7/8   | 1 1/2  | 4 1/8  | 2             | 94739            |

| Cutting Diameter |          |       | Shank |       | OAL     | No. of Flutes | Style M15 Bright |
|------------------|----------|-------|-------|-------|---------|---------------|------------------|
| Fract.           | Dec. In. | MM    | Dia.  | LOC   |         |               |                  |
| 1/8              | .1250    | 3.18  | 3/8   | 3/8   | 2 5/16  | 4             | 94710            |
| 3/16             | .1875    | 4.76  | 3/8   | 1/2   | 2 3/8   | 4             | 94711            |
| 1/4              | .2500    | 6.35  | 3/8   | 5/8   | 2 7/16  | 4             | 94712            |
| 5/16             | .3125    | 7.94  | 3/8   | 3/4   | 2 1/2   | 4             | 94713            |
| 3/8              | .3750    | 9.53  | 3/8   | 3/4   | 2 1/2   | 4             | 94714            |
| 7/16             | .4375    | 11.11 | 3/8   | 1     | 2 11/16 | 4             | 94715            |
| 1/2              | .5000    | 12.70 | 1/2   | 1 1/4 | 3 1/4   | 4             | 94716            |
| 5/8              | .6250    | 15.88 | 5/8   | 1 5/8 | 3 3/4   | 6             | 94717            |
| 3/4              | .7500    | 19.05 | 3/4   | 1 5/8 | 3 7/8   | 6             | 94718            |
| 7/8              | .8750    | 22.23 | 7/8   | 1 7/8 | 4 1/8   | 6             | 94719            |
| 1                | 1.0000   | 25.40 | 1     | 2     | 4 1/2   | 6             | 94720            |

| Cutting Diameter |          |       | Shank |     | OAL     | No. of Flutes | Style M10 Bright |
|------------------|----------|-------|-------|-----|---------|---------------|------------------|
| Fract.           | Dec. In. | MM    | Dia.  | LOC |         |               |                  |
| 3/16             | .1875    | 4.76  | 3/8   | 1/2 | 2 3/8   | 4             | 94750            |
| 1/4              | .2500    | 6.35  | 3/8   | 5/8 | 2 7/16  | 4             | 94751            |
| 3/8              | .3750    | 9.53  | 3/8   | 3/4 | 2 1/2   | 4             | 94753            |
| 7/16             | .4375    | 11.11 | 3/8   | 1   | 2 11/16 | 4             | 94754            |
| 1/2              | .5000    | 12.70 | 1/2   | 1   | 3       | 4             | 94755            |
| 1                | 1.0000   | 25.40 | 1     | 2   | 4 1/2   | 4             | 94758            |





# Multi-Flute Coarse Profile

**Style 267 • Non-Center Cutting, Coarse Profile, M42 Cobalt Rougher**

**Style 268 • Center Cutting, Coarse Profile, M42 Cobalt Rougher**

**FEATURES**

|                |                      |
|----------------|----------------------|
| ANSI SIZES     | M42 COBALT SUBSTRATE |
| HEAVY DUTY     | BRIGHT               |
| COARSE PROFILE | TiN                  |
| 30°            | TiCN                 |
| 4+ FLUTE - NCC | TiAlN                |
| 4+ FLUTE - CC  |                      |

**APPLICATIONS**

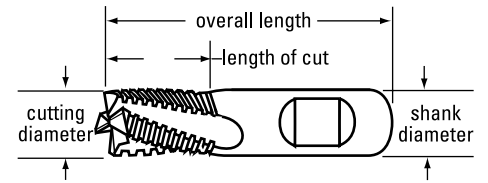
|                     |                  |
|---------------------|------------------|
| FREE-MACH STAINLESS | ALLOY STEEL      |
| MED CARBON STEEL    | LOW CARBON STEEL |



Style 267 Non-Center Cutting TiN



Style 268 Center Cutting TiCN



| Cutting Diameter |         |       | Shank |       | No. of Flutes | NON-CENTER CUTTING<br>Style 267 |       |       |       | CENTER CUTTING<br>Style 268 |       |       |       |       |
|------------------|---------|-------|-------|-------|---------------|---------------------------------|-------|-------|-------|-----------------------------|-------|-------|-------|-------|
| Frac             | Decimal | MM    | Dia.  | LOC   |               | Bright                          | TiN   | TiCN  | TiAlN | Bright                      | TiN   | TiCN  | TiAlN |       |
| 1/4              | .2500   | 6.35  | 3/8   | 1/4   | 2 1/16        | 4                               | —     | —     | —     | —                           | 97737 | 97838 | 97937 | —     |
| 1/4              | .2500   | 6.35  | 3/8   | 5/8   | 2 7/16        | 4                               | 97101 | 97169 | 97669 | —                           | 97738 | 97839 | 97938 | —     |
| 1/4              | .2500   | 6.35  | 3/8   | 1 1/4 | 3 1/8         | 4                               | 97074 | —     | 97614 | —                           | 97739 | —     | —     | —     |
| 5/16             | .3125   | 7.94  | 3/8   | 3/4   | 2 1/2         | 4                               | 97075 | 97005 | 97615 | —                           | 97740 | 97840 | 97940 | —     |
| 3/8              | .3750   | 9.53  | 3/8   | 3/8   | 2 5/32        | 4                               | —     | —     | —     | —                           | 97741 | 97841 | 97941 | 97531 |
| 3/8              | .3750   | 9.53  | 3/8   | 3/4   | 2 1/2         | 4                               | 97102 | 97170 | 97670 | —                           | 97742 | 97842 | 97942 | 97542 |
| 3/8              | .3750   | 9.53  | 3/8   | 1 1/2 | 3 1/4         | 4                               | 97076 | —     | 97616 | —                           | 97743 | 97843 | 97943 | —     |
| 7/16             | .4375   | 11.11 | 1/2   | 1 1/4 | 3 1/4         | 4                               | 97077 | 97007 | —     | —                           | —     | —     | —     | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 1/2   | 2 1/2         | 4                               | —     | —     | —     | —                           | 97745 | 97845 | 97945 | 97545 |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4         | 4                               | 97103 | 97171 | 97671 | —                           | 97746 | 97846 | 97946 | 97546 |
| 1/2              | .5000   | 12.70 | 1/2   | 2     | 4             | 4                               | 97104 | 97172 | 97672 | —                           | 97747 | 97847 | 97947 | —     |
| 1/2              | .5000   | 12.70 | 1/2   | 3     | 5             | 4                               | 97078 | —     | —     | —                           | —     | —     | —     | —     |
| 9/16             | .5625   | 14.29 | 1/2   | 1 3/8 | 3 3/8         | 4                               | 97079 | 97009 | 97613 | —                           | —     | —     | —     | —     |
| 5/8              | .6250   | 15.88 | 5/8   | 5/8   | 2 3/4         | 4                               | —     | —     | —     | —                           | 97748 | 97848 | 97948 | 97548 |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4         | 4                               | 97105 | 97173 | 97673 | —                           | 97749 | 97849 | 97949 | 97549 |
| 5/8              | .6250   | 15.88 | 5/8   | 2 1/2 | 4 5/8         | 4                               | 97106 | 97174 | 97674 | —                           | 97756 | 97856 | 97956 | —     |
| 3/4              | .7500   | 19.05 | 3/4   | 3/4   | 2 7/8         | 4                               | —     | —     | —     | —                           | 97759 | 97859 | 97959 | 97559 |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 3 7/8         | 4                               | 97107 | 97175 | 97675 | 97575                       | 97760 | 97860 | 97960 | 97560 |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4         | 4                               | 97108 | 97176 | 97676 | —                           | 97761 | 97861 | 97961 | —     |
| 3/4              | .7500   | 19.05 | 3/4   | 4     | 6 1/4         | 4                               | 97080 | 97010 | 97620 | —                           | —     | —     | —     | —     |
| 7/8              | .8750   | 22.23 | 3/4   | 1 7/8 | 4 1/8         | 5                               | 97111 | 97011 | 97611 | —                           | —     | —     | —     | —     |
| 7/8              | .8750   | 22.23 | 7/8   | 1 7/8 | 4 1/8         | 5                               | 97109 | 97177 | 97677 | —                           | —     | —     | —     | —     |
| 7/8              | .8750   | 22.23 | 7/8   | 3 1/2 | 5 3/4         | 5                               | 97110 | 97178 | 97678 | —                           | —     | —     | —     | —     |
| 1                | 1.0000  | 25.40 | 3/4   | 2     | 4 1/4         | 5                               | 97114 | 97182 | —     | —                           | —     | —     | —     | —     |
| 1                | 1.0000  | 25.40 | 1     | 1     | 3 1/2         | 5                               | —     | —     | —     | —                           | 97773 | 97873 | 97973 | 97553 |
| 1                | 1.0000  | 25.40 | 1     | 2     | 4 1/2         | 5                               | 97112 | 97180 | 97680 | 97580                       | 97763 | 97863 | 97963 | 97563 |
| 1                | 1.0000  | 25.40 | 1     | 3     | 5 1/2         | 5                               | 97081 | 97021 | 97621 | —                           | 97764 | 97864 | 97964 | —     |
| 1                | 1.0000  | 25.40 | 1     | 4     | 6 1/2         | 5                               | 97113 | 97181 | 97681 | 97581                       | 97768 | 97698 | 97968 | —     |
| 1                | 1.0000  | 25.40 | 1     | 6     | 8 1/2         | 5                               | 97082 | 97012 | 97612 | —                           | —     | —     | —     | —     |
| 1 1/8            | 1.1250  | 28.58 | 3/4   | 2     | 4 1/4         | 6                               | 97083 | —     | —     | —                           | —     | —     | —     | —     |
| 1 1/4            | 1.2500  | 31.75 | 3/4   | 2     | 4 1/4         | 6                               | 97117 | 97185 | —     | —                           | —     | —     | —     | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 2     | 4 1/2         | 5                               | 97115 | 97183 | 97683 | 97583                       | 97777 | 97877 | 97977 | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 3     | 5 1/2         | 6                               | 97084 | 97014 | 97634 | —                           | 97779 | 97879 | 97979 | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 4     | 6 1/2         | 6                               | 97116 | 97184 | 97684 | 97584                       | 97780 | —     | —     | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4 | 6     | 8 1/2         | 6                               | 97085 | 97015 | 97635 | —                           | —     | —     | —     | —     |

continued on next page

Multi-Flute Coarse Profile



Style 267 • Non-Center Cutting, Coarse Profile, M42 Cobalt Rougher

Style 268 • Center Cutting, Coarse Profile, M42 Cobalt Rougher

(continued)

| Cutting Diameter |         |       | Shank Dia. | LOC | OAL    | No. of Flutes | NON-CENTER CUTTING<br>Style 267 |       |       |       | CENTER CUTTING<br>Style 268 |       |       |       |
|------------------|---------|-------|------------|-----|--------|---------------|---------------------------------|-------|-------|-------|-----------------------------|-------|-------|-------|
| Frac             | Decimal | MM    |            |     |        |               | Bright                          | TiN   | TiCN  | TiAlN | Bright                      | TiN   | TiCN  | TiAlN |
| 1 1/2            | 1.5000  | 38.10 | 3/4        | 2   | 4 1/4  | 6             | 97120                           | —     | —     | —     | —                           | —     | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2   | 4 1/2  | 6             | 97118                           | 97186 | 97686 | —     | —                           | —     | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 3   | 5 1/2  | 6             | 97086                           | —     | —     | —     | 97781                       | 97881 | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 4   | 6 1/2  | 6             | 97119                           | 97187 | 97687 | —     | —                           | —     | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 6   | 8 1/2  | 6             | 97087                           | 97017 | 97617 | —     | —                           | —     | —     | —     |
| 1 3/4            | 1.7500  | 44.45 | 1 1/4      | 2   | 4 1/2  | 6             | 97088                           | —     | —     | —     | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 3/4        | 2   | 4 1/4  | 8             | 97123                           | —     | —     | —     | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 1 1/4      | 2   | 4 1/2  | 8             | 97121                           | 97189 | 97631 | —     | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 1 1/4      | 4   | 6 1/2  | 8             | 97122                           | 97190 | 97690 | —     | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 2          | 2   | 5 3/4  | 8             | 97089                           | 97198 | 97618 | —     | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 2          | 3   | 6 3/4  | 8             | 97090                           | 97199 | 97619 | —     | 97782                       | —     | 97982 | —     |
| 2                | 2.0000  | 50.80 | 2          | 4   | 7 3/4  | 8             | 97124                           | 97192 | —     | 97592 | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 2          | 6   | 9 3/4  | 8             | 97125                           | 97193 | 97693 | —     | 97784                       | —     | 97984 | —     |
| 2                | 2.0000  | 50.80 | 2          | 8   | 11 3/4 | 8             | 97126                           | 97194 | 97694 | —     | —                           | —     | —     | —     |
| 2                | 2.0000  | 50.80 | 2          | 10  | 13 3/4 | 8             | 97091                           | —     | —     | —     | —                           | —     | —     | —     |
| 2 1/2            | 2.5000  | 63.50 | 2          | 8   | 11 3/4 | 8             | 97128                           | —     | —     | —     | —                           | —     | —     | —     |
| 2 1/2            | 2.5000  | 63.50 | 2          | 10  | 13 3/4 | 8             | 97129                           | —     | —     | —     | —                           | —     | —     | —     |

Style 267N • Non-Center Cutting, Coarse Profile, M42 Cobalt Rougher with Extended Neck

| Cutting Diameter |         |       | Shank Dia. | LOC   | OAL    | No. of Flutes | NON CENTER CUTTING<br>Style 267N |
|------------------|---------|-------|------------|-------|--------|---------------|----------------------------------|
| Frac             | Decimal | MM    |            |       |        |               | Bright                           |
| 3/4              | .7500   | 19.05 | 3/4        | 7/8   | 4 5/8  | 4             | 97248                            |
| 1                | 1.0000  | 25.40 | 1          | 2 1/2 | 6 1/2  | 5             | 97250                            |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 2 1/2 | 6 1/2  | 6             | 97252                            |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2 1/2 | 6 1/2  | 6             | 97255                            |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2 1/2 | 7 1/2  | 6             | 97256                            |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2 1/2 | 10 1/2 | 6             | 97257                            |
| 2                | 2.0000  | 50.80 | 1 1/4      | 2 1/2 | 7 3/4  | 8             | 97258                            |
| 2                | 2.0000  | 50.80 | 1 1/4      | 2 1/2 | 9 3/4  | 8             | 97259                            |
| 2                | 2.0000  | 50.80 | 2          | 2 1/2 | 11 3/4 | 8             | 97260                            |



Style 267N Non-Center Cutting Bright

Style 264 • Ball Nose, Coarse Profile, M42 Cobalt Rougher

| Cutting Diameter |         |       | Shank Dia. | LOC   | OAL   | No. of Flutes | CENTER CUTTING<br>Style 264 |       |       |
|------------------|---------|-------|------------|-------|-------|---------------|-----------------------------|-------|-------|
| Frac             | Decimal | MM    |            |       |       |               | Bright                      | TiN   | TiCN  |
| 1/2              | .5000   | 12.70 | 1/2        | 1 1/4 | 3 1/4 | 4             | 97277                       | 97377 | 97477 |
| 5/8              | .6250   | 15.88 | 5/8        | 1 5/8 | 3 3/4 | 4             | 97278                       | —     | —     |
| 3/4              | .7500   | 19.05 | 3/4        | 1 5/8 | 3 7/8 | 4             | 97279                       | 97379 | 97479 |
| 3/4              | .7500   | 19.05 | 3/4        | 3     | 5 1/4 | 4             | 97291                       | —     | 97491 |
| 1                | 1.0000  | 25.40 | 1          | 2     | 4 1/2 | 5             | 97280                       | 97380 | 97480 |
| 1                | 1.0000  | 25.40 | 1          | 4     | 6 1/2 | 5             | 97292                       | —     | 97492 |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 4     | 6 1/2 | 6             | 97283                       | —     | —     |



Style 264 Ball Nose TiCN



# Multi-Flute Flat Profile Semi-Roughing

## Style 260 • Non-Center Cutting, Flat Profile, M42 Cobalt Semi-Roughing End Mill

### FEATURES

|              |                      |
|--------------|----------------------|
| ANSI SIZES   | M42 COBALT SUBSTRATE |
| HEAVY DUTY   | BRIGHT               |
| FLAT PROFILE | TiCN                 |
| 30°          |                      |
| 3+ FLUTE NCC |                      |

### APPLICATIONS

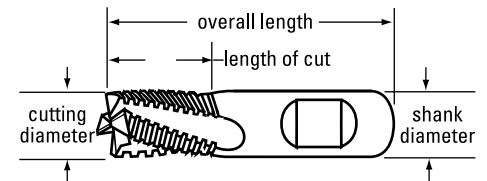
|                     |  |
|---------------------|--|
| FREE-MACH STAINLESS |  |
| ALLOY STEEL         |  |
| MED CARBON STEEL    |  |
| LOW CARBON STEEL    |  |



Style 260 Non-Center Cutting Bright



Style 260 Non-Center Cutting TiCN



### NON CENTER CUTTING

| Cutting Diameter |         | Shank Dia. | LOC   | OAL   | No. of Flutes | Style 260 |       |       |
|------------------|---------|------------|-------|-------|---------------|-----------|-------|-------|
| Frac             | Decimal |            |       |       |               | Bright    | TiCN  |       |
| 1/4              | .2500   | 6.35       | 3/8   | 5/8   | 2 7/16        | 3         | 92251 | 92151 |
| 3/8              | .3750   | 9.53       | 3/8   | 3/4   | 2 1/2         | 4         | 92252 | —     |
| 1/2              | .5000   | 12.70      | 1/2   | 1 1/4 | 3 1/4         | 4         | 92253 | —     |
| 1/2              | .5000   | 12.70      | 1/2   | 2     | 4             | 4         | 92254 | 92154 |
| 5/8              | .6250   | 15.88      | 5/8   | 1 5/8 | 3 3/4         | 4         | 92255 | 92155 |
| 5/8              | .6250   | 15.88      | 5/8   | 2 1/2 | 4 5/8         | 4         | 92256 | 92156 |
| 3/4              | .7500   | 19.05      | 3/4   | 1 5/8 | 3 7/8         | 4         | 92257 | 92157 |
| 3/4              | .7500   | 19.05      | 3/4   | 3     | 5 1/4         | 4         | 92258 | 92158 |
| 7/8              | .8750   | 22.23      | 3/4   | 1 3/4 | 4             | 5         | 92259 | 92159 |
| 1                | 1.0000  | 25.40      | 3/4   | 1 1/2 | 3 3/4         | 5         | 92260 | —     |
| 1                | 1.0000  | 25.40      | 1     | 2     | 4 1/2         | 5         | 92261 | 92161 |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 2     | 4 1/2         | 6         | 92264 | —     |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 4     | 6 1/2         | 6         | 92265 | 92165 |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 2     | 4 1/2         | 6         | 92266 | —     |
| 1 1/2            | 1.5000  | 38.10      | 1 1/4 | 4     | 6 1/2         | 6         | 92267 | —     |
| 2                | 2.0000  | 50.80      | 1 1/4 | 2     | 4 1/2         | 8         | 92268 | —     |
| 2                | 2.0000  | 50.80      | 1 1/4 | 4     | 6 1/2         | 8         | 92269 | —     |
| 2                | 2.0000  | 50.80      | 2     | 6     | 9 3/4         | 8         | 92271 | 92171 |

Multi-Flute Fine Profile



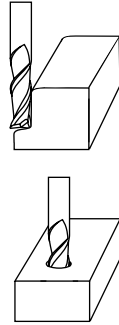
Style 265 • Non-Center Cutting, Fine Profile, M42 Cobalt Rougher  
 Style 266, 261(MM) • Center Cutting, Fine Profile, M42 Cobalt Rougher

FEATURES

|              |                      |
|--------------|----------------------|
| ANSI SIZES   | M42 COBALT SUBSTRATE |
| HEAVY DUTY   | BRIGHT               |
| FINE PROFILE | TiN                  |
| 30°          | TiCN                 |
| 4+ FLUTE NCC | TiAlN                |
| 4+ FLUTE CC  |                      |

APPLICATIONS

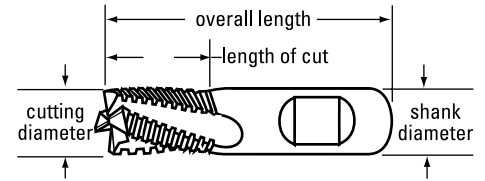
|                 |
|-----------------|
| STAINLESS STEEL |
| TITANIUM ALLOYS |
| NICKEL ALLOYS   |
| COBALT ALLOYS   |



Style 265 Non-Center Cutting TiAlN



Style 266 Center Cutting TiN



| Cutting Diameter |         | Shank Dia. | LOC   | OAL   | No. of Flutes | NON CENTER CUTTING |           |       |       | CENTER CUTTING |           |       |       |       |
|------------------|---------|------------|-------|-------|---------------|--------------------|-----------|-------|-------|----------------|-----------|-------|-------|-------|
| Frac             | Decimal |            |       |       |               | MM                 | Style 265 |       |       |                | Style 266 |       |       |       |
|                  |         |            |       |       |               | Bright             | TiN       | TiCN  | TiAlN | Bright         | TiN       | TiCN  | TiAlN |       |
| 3/16             | .1875   | 4.76       | 3/8   | 1/2   | 2 3/8         | 4                  | 97700     | 97800 | —     | —              | —         | —     | —     |       |
| 1/4              | .2500   | 6.35       | 3/8   | 1/4   | 2 1/16        | 4                  | —         | —     | —     | —              | 97720     | 97820 | 97920 | —     |
| 1/4              | .2500   | 6.35       | 3/8   | 5/8   | 2 7/16        | 4                  | 97701     | 97801 | —     | —              | 97201     | —     | 97401 | —     |
| 1/4              | .2500   | 6.35       | 3/8   | 1 1/4 | 3 1/8         | 4                  | 97702     | 97802 | —     | —              | 97202     | —     | —     | —     |
| 5/16             | .3125   | 7.94       | 3/8   | 3/4   | 2 1/2         | 4                  | 97703     | 97803 | —     | —              | 97203     | —     | 97403 | —     |
| 3/8              | .3750   | 9.53       | 3/8   | 3/8   | 2 5/32        | 4                  | —         | —     | —     | —              | 97721     | 97821 | 97921 | 97521 |
| 3/8              | .3750   | 9.53       | 3/8   | 3/4   | 2 1/2         | 4                  | 97704     | 97804 | 97904 | —              | 97205     | 97305 | 97405 | 97505 |
| 3/8              | .3750   | 9.53       | 3/8   | 1 1/2 | 3 1/4         | 4                  | 97705     | 97805 | —     | —              | 97206     | 97306 | 97406 | —     |
| 7/16             | .4375   | 11.11      | 1/2   | 1 1/4 | 3 1/4         | 4                  | 97706     | 97806 | —     | —              | —         | —     | —     | —     |
| 1/2              | .5000   | 12.70      | 1/2   | 1/2   | 2 1/2         | 4                  | —         | —     | —     | —              | 97722     | 97822 | 97922 | 97512 |
| 1/2              | .5000   | 12.70      | 1/2   | 1 1/4 | 3 1/4         | 4                  | 97707     | 97807 | 97907 | —              | 97208     | 97308 | 97408 | 97508 |
| 1/2              | .5000   | 12.70      | 1/2   | 2     | 4             | 4                  | 97708     | 97808 | 97908 | —              | 97209     | 97309 | 97409 | —     |
| 1/2              | .5000   | 12.70      | 1/2   | 3     | 5             | 4                  | 97709     | —     | —     | —              | —         | —     | —     | —     |
| 9/16             | .5625   | 14.29      | 1/2   | 1 3/8 | 3 3/8         | 4                  | 97710     | 97810 | —     | —              | —         | —     | —     | —     |
| 5/8              | .6250   | 15.88      | 5/8   | 5/8   | 2 3/4         | 4                  | —         | —     | —     | —              | 97723     | 97823 | 97923 | 97503 |
| 5/8              | .6250   | 15.88      | 5/8   | 1 5/8 | 3 3/4         | 4                  | 97711     | 97811 | 97911 | —              | 97211     | 97311 | 97411 | —     |
| 5/8              | .6250   | 15.88      | 5/8   | 2 1/2 | 4 5/8         | 4                  | 97712     | 97812 | 97912 | —              | 97212     | 97312 | 97412 | —     |
| 3/4              | .7500   | 19.05      | 3/4   | 3/4   | 2 7/8         | 4                  | —         | —     | —     | —              | 97215     | 97315 | 97415 | 97515 |
| 3/4              | .7500   | 19.05      | 3/4   | 1 5/8 | 3 7/8         | 4                  | 97713     | 97813 | 97913 | —              | 97213     | 97313 | 97413 | 97513 |
| 3/4              | .7500   | 19.05      | 3/4   | 3     | 5 1/4         | 4                  | 97714     | 97814 | 97914 | —              | 97214     | 97314 | 97414 | —     |
| 3/4              | .7500   | 19.05      | 3/4   | 4     | 6 1/4         | 4                  | 97715     | 97815 | 97915 | —              | —         | —     | —     | —     |
| 7/8              | .8750   | 22.23      | 3/4   | 1 7/8 | 4 1/8         | 5                  | 97293     | 97393 | 97493 | —              | —         | —     | —     | —     |
| 7/8              | .8750   | 22.23      | 7/8   | 7/8   | 3 1/8         | 5                  | —         | —     | —     | —              | 97726     | 97826 | 97926 | —     |
| 7/8              | .8750   | 22.23      | 7/8   | 1 7/8 | 4 1/8         | 5                  | 97294     | 97394 | 97494 | —              | 97727     | —     | 97927 | —     |
| 1                | 1.0000  | 25.40      | 3/4   | 2     | 4 1/4         | 5                  | 97295     | 97395 | 97425 | —              | —         | —     | —     | —     |
| 1                | 1.0000  | 25.40      | 1     | 1     | 3 1/2         | 5                  | —         | —     | —     | —              | 97728     | 97828 | 97928 | 97528 |
| 1                | 1.0000  | 25.40      | 1     | 2     | 4 1/2         | 5                  | 97296     | 97396 | 97496 | 97596          | 97216     | 97316 | 97416 | 97516 |
| 1                | 1.0000  | 25.40      | 1     | 3     | 5 1/2         | 5                  | 97297     | 97397 | 97497 | —              | 97217     | 97317 | 97417 | —     |
| 1                | 1.0000  | 25.40      | 1     | 4     | 6 1/2         | 5                  | 97298     | 97398 | 97498 | 97598          | 97218     | 97318 | 97418 | —     |
| 1                | 1.0000  | 25.40      | 1     | 6     | 8 1/2         | 5                  | 97299     | 97399 | 97499 | —              | —         | —     | —     | —     |
| 1 1/4            | 1.2500  | 31.75      | 3/4   | 2     | 4 1/4         | 6                  | 97228     | 97328 | —     | —              | —         | —     | —     | —     |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 2     | 4 1/2         | 6                  | 97222     | 97322 | 97422 | 97522          | 97730     | 97830 | 97930 | 97530 |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 3     | 5 1/2         | 6                  | 97223     | 97323 | 97423 | —              | 97731     | 97831 | 97931 | —     |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 4     | 6 1/2         | 6                  | 97226     | 97326 | 97426 | 97526          | 97732     | 97832 | 97932 | —     |
| 1 1/4            | 1.2500  | 31.75      | 1 1/4 | 6     | 8 1/2         | 6                  | 97227     | 97327 | 97427 | —              | —         | —     | —     | —     |

continued on next page



# Multi-Flute Fine Profile

**Style 265 • Non-Center Cutting, Fine Profile, M42 Cobalt Rougher**  
**Style 266, 261(MM) • Center Cutting, Fine Profile, M42 Cobalt Rougher**  
 (continued)

| Cutting Diameter |         |       | Shank |     |        | No. of Flutes | NON CENTER CUTTING<br>Style 265 |       |       |       | CENTER CUTTING<br>Style 266 |     |       |       |
|------------------|---------|-------|-------|-----|--------|---------------|---------------------------------|-------|-------|-------|-----------------------------|-----|-------|-------|
| Frac             | Decimal | MM    | Dia.  | LOC | OAL    |               | Bright                          | TiN   | TiCN  | TiAlN | Bright                      | TiN | TiCN  | TiAlN |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 2   | 4 1/2  | 6             | 97231                           | 97331 | 97431 | —     | —                           | —   | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 3   | 5 1/2  | 6             | 97232                           | 97332 | 97432 | —     | —                           | —   | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 4   | 6 1/2  | 6             | 97233                           | 97333 | 97433 | —     | —                           | —   | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4 | 6   | 8 1/2  | 6             | 97235                           | —     | 97435 | —     | —                           | —   | —     | —     |
| 1 3/4            | 1.7500  | 44.45 | 1 1/4 | 2   | 4 1/2  | 6             | 97253                           | —     | —     | —     | —                           | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 1 1/4 | 2   | 4 1/2  | 8             | 97236                           | 97336 | 97436 | —     | —                           | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 1 1/4 | 4   | 6 1/2  | 8             | 97237                           | 97337 | 97437 | —     | —                           | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 2     | 2   | 5 3/4  | 8             | 97238                           | —     | —     | —     | —                           | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 2     | 3   | 6 3/4  | 6             | —                               | —     | —     | —     | 97734                       | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 2     | 4   | 7 3/4  | 8             | 97240                           | 97340 | —     | —     | 97735                       | —   | 97935 | —     |
| 2                | 2.0000  | 50.80 | 2     | 6   | 9 3/4  | 8             | 97241                           | 97341 | —     | 97541 | —                           | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 2     | 8   | 11 3/4 | 8             | 97224                           | 97353 | 97424 | —     | —                           | —   | —     | —     |
| 2                | 2.0000  | 50.80 | 2     | 10  | 13 3/4 | 8             | 97225                           | —     | —     | —     | —                           | —   | —     | —     |

| Cutting Diameter |          | Shank   |        |        | No. of Flutes | CENTER CUTTING<br>Style 261 |       |
|------------------|----------|---------|--------|--------|---------------|-----------------------------|-------|
| MM               | Dec. In. | Dia. MM | LOC MM | OAL MM |               | Bright                      | TiCN  |
| 6                | .2362    | 6       | 13     | 57     | 3             | 92178                       | —     |
| 8                | .3150    | 10      | 19     | 69     | 3             | 92179                       | —     |
| 10               | .3937    | 10      | 22     | 72     | 4             | 92180                       | 92380 |
| 10               | .3937    | 10      | 45     | 95     | 4             | 92181                       | 92381 |
| 12               | .4724    | 12      | 26     | 83     | 4             | 92182                       | 92382 |
| 12               | .4724    | 12      | 53     | 110    | 4             | 92183                       | 92383 |
| 14               | .5512    | 12      | 26     | 83     | 4             | 92184                       | —     |
| 16               | .6299    | 16      | 32     | 92     | 4             | 92185                       | 92385 |
| 16               | .6299    | 16      | 63     | 123    | 4             | 92186                       | —     |
| 18               | .7087    | 16      | 32     | 92     | 4             | 92187                       | 92387 |
| 20               | .7874    | 20      | 38     | 104    | 4             | 92188                       | —     |
| 20               | .7874    | 20      | 75     | 141    | 4             | 92189                       | —     |
| 30               | 1.1811   | 25      | 90     | 166    | 6             | 92192                       | —     |

## Style 263 • Ball Nose, Fine Profile, M42 Cobalt Rougher

| Cutting Diameter |         |       | Shank |       |       | No. of Flutes | CENTER CUTTING<br>Style 263 |       |       |
|------------------|---------|-------|-------|-------|-------|---------------|-----------------------------|-------|-------|
| Frac             | Decimal | MM    | Dia.  | LOC   | OAL   |               | Bright                      | TiN   | TiCN  |
| 1/2              | .5000   | 12.70 | 1/2   | 1 1/4 | 3 1/4 | 4             | 97242                       | 97342 | 97442 |
| 5/8              | .6250   | 15.88 | 5/8   | 1 5/8 | 3 3/4 | 4             | 97243                       | —     | —     |
| 3/4              | .7500   | 19.05 | 3/4   | 1 5/8 | 3 7/8 | 4             | 97244                       | 97344 | 97444 |
| 3/4              | .7500   | 19.05 | 3/4   | 3     | 5 1/4 | 4             | 97286                       | —     | 97486 |
| 1                | 1.0000  | 25.40 | 1     | 2     | 4 1/2 | 5             | 97245                       | —     | 97445 |
| 1                | 1.0000  | 25.40 | 1     | 4     | 6 1/2 | 5             | 97287                       | —     | 97487 |
| 2                | 2.0000  | 50.80 | 2     | 6     | 9 3/4 | 6             | 97290                       | —     | —     |



Style 263 Ball Nose TiN



# 3-Flute Extra Coarse for Aluminum



Style 269 • Center Cutting, Extra Coarse Profile, for Aluminum, M42 Cobalt Rougher

**FEATURES**

|                |                      |
|----------------|----------------------|
| ANSI SIZES     | M42 COBALT SUBSTRATE |
| HEAVY DUTY     | BRIGHT               |
| COARSE PROFILE | TiN                  |
| 30°            | TiCN                 |
| 3 FLUTE CC     |                      |
| 45° CHAMFER    |                      |

**APPLICATIONS**

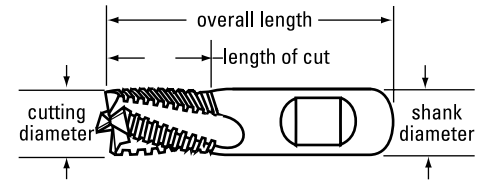
|                       |  |
|-----------------------|--|
| ALUMINUM              |  |
| NON-FERROUS MATERIALS |  |



Style 269 for Aluminum Bright



Style 269 for Aluminum TiCN



**CENTER CUTTING**

| Cutting Diameter |         | MM    | Shank Dia. | No. of |         |        | Style 269 |       |       |
|------------------|---------|-------|------------|--------|---------|--------|-----------|-------|-------|
| Frac             | Decimal |       |            | LOC    | OAL     | Flutes | Bright    | TiN   | TiCN  |
| 3/16             | .1875   | 4.76  | 3/8        | 1/2    | 2 3/8   | 3      | 97053     | —     | —     |
| 1/4              | .2500   | 6.35  | 3/8        | 5/8    | 2 7/16  | 3      | 97055     | —     | —     |
| 1/4              | .2500   | 6.35  | 3/8        | 1 1/8  | 2 15/16 | 3      | 97057     | —     | —     |
| 5/16             | .3125   | 7.94  | 3/8        | 3/4    | 2 1/2   | 3      | 97058     | —     | —     |
| 3/8              | .3750   | 9.53  | 3/8        | 3/4    | 2 1/2   | 3      | 97130     | —     | 97657 |
| 3/8              | .3750   | 9.53  | 3/8        | 1 1/2  | 3 1/4   | 3      | 97059     | —     | —     |
| 1/2              | .5000   | 12.70 | 1/2        | 1 1/4  | 3 1/4   | 3      | 97131     | 97636 | 97658 |
| 1/2              | .5000   | 12.70 | 1/2        | 2      | 4       | 3      | 97132     | 97638 | 97659 |
| 1/2              | .5000   | 12.70 | 1/2        | 3      | 5       | 3      | 97060     | 97639 | —     |
| 5/8              | .6250   | 15.88 | 5/8        | 1 5/8  | 3 3/4   | 3      | 97133     | —     | 97660 |
| 5/8              | .6250   | 15.88 | 5/8        | 2 1/2  | 4 5/8   | 3      | 97134     | —     | 97661 |
| 3/4              | .7500   | 19.05 | 3/4        | 1 5/8  | 3 7/8   | 3      | 97135     | 97637 | 97662 |
| 3/4              | .7500   | 19.05 | 3/4        | 2 1/4  | 4 1/2   | 3      | 97136     | 97640 | 97663 |
| 3/4              | .7500   | 19.05 | 3/4        | 3      | 5 1/4   | 3      | 97061     | —     | 97641 |
| 3/4              | .7500   | 19.05 | 3/4        | 4      | 6 1/4   | 3      | 97062     | —     | 97642 |
| 7/8              | .8750   | 22.23 | 3/4        | 1 1/2  | 3 3/4   | 3      | 97138     | —     | —     |
| 7/8              | .8750   | 22.23 | 7/8        | 1 7/8  | 4 1/8   | 3      | 97137     | —     | —     |
| 1                | 1.0000  | 25.40 | 3/4        | 1 1/2  | 3 3/4   | 3      | 97141     | —     | —     |
| 1                | 1.0000  | 25.40 | 1          | 2      | 4 1/2   | 3      | 97139     | —     | 97666 |
| 1                | 1.0000  | 25.40 | 1          | 3      | 5 1/2   | 3      | 97140     | —     | 97667 |
| 1                | 1.0000  | 25.40 | 1          | 4      | 6 1/2   | 3      | 97064     | —     | 97644 |
| 1                | 1.0000  | 25.40 | 1          | 6      | 8 1/2   | 3      | 97065     | —     | 97645 |
| 1 1/4            | 1.2500  | 31.75 | 3/4        | 1 1/2  | 3 3/4   | 3      | 97144     | —     | —     |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 3      | 5 1/2   | 3      | 97143     | —     | 97603 |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 4      | 6 1/2   | 3      | 97066     | —     | 97646 |
| 1 1/4            | 1.2500  | 31.75 | 1 1/4      | 6      | 8 1/2   | 3      | 97067     | —     | 97647 |
| 1 1/2            | 1.5000  | 38.10 | 3/4        | 1 1/2  | 3 3/4   | 3      | 97147     | —     | —     |
| 1 1/2            | 1.5000  | 38.10 | 3/4        | 2      | 4 1/2   | 3      | —         | 97648 | —     |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 2      | 4 1/2   | 3      | 97145     | —     | 97605 |
| 1 1/2            | 1.5000  | 38.10 | 1 1/4      | 4      | 6 1/2   | 3      | 97068     | —     | —     |
| 2                | 2.0000  | 50.80 | 3/4        | 3/4    | 3       | 3      | 97150     | —     | —     |
| 2                | 2.0000  | 50.80 | 1 1/4      | 4      | 6 1/2   | 3      | 97069     | —     | —     |
| 2                | 2.0000  | 50.80 | 2          | 6      | 9 3/4   | 3      | 97072     | —     | —     |



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| 91101.    | 184       | 13       | 91417.    | 131       | 20       | 91674.    | 112       | 15       | 92271.    | 260       | 35       | 92416.    | 112K      | 21       |
| 91104.    | 184       | 13       | 91418.    | 131       | 20       | 91675.    | CRE       | 31       | 92285.    | 112K      | 21       | 92417.    | 112K      | 21       |
| 91107.    | 184       | 13       | 91420.    | 131       | 20       | 91676.    | CRE       | 31       | 92286.    | 112K      | 21       | 92418.    | 112K      | 21       |
| 91110.    | 184       | 13       | 91421.    | 131       | 20       | 91677.    | CRE       | 31       | 92287.    | 112K      | 21       | 92419.    | 112K      | 21       |
| 91126.    | 115       | 27       | 91422.    | 131       | 20       | 91678.    | CRE       | 31       | 92288.    | 112K      | 21       | 92420.    | 112K      | 21       |
| 91150.    | 115       | 27       | 91425.    | 131       | 20       | 91679.    | CRE       | 31       | 92289.    | 112K      | 21       | 92421.    | 112K      | 21       |
| 91151.    | 115       | 27       | 91426.    | 131       | 20       | 91680.    | CRE       | 31       | 92290.    | 112K      | 21       | 92422.    | 112K      | 21       |
| 91175.    | 115       | 25       | 91428.    | 131       | 20       | 91681.    | CRE       | 31       | 92291.    | 112K      | 21       | 92423.    | 112K      | 21       |
| 91176.    | 115       | 26       | 91429.    | 131       | 20       | 91682.    | CRE       | 31       | 92292.    | 112K      | 21       | 92424.    | 112K      | 21       |
| 91177.    | 115       | 26       | 91430.    | 131       | 20       | 91683.    | CRE       | 31       | 92293.    | 112K      | 21       | 92425.    | 112K      | 21       |
| 91238.    | 114       | 26       | 91434.    | 131       | 20       | 91684.    | CRE       | 31       | 92294.    | 112K      | 21       | 92426.    | 112K      | 21       |
| 91239.    | 114       | 26       | 91477.    | 182       | 11       | 91685.    | CRE       | 31       | 92295.    | 112K      | 21       | 92427.    | 112K      | 21       |
| 91240.    | 114       | 26       | 91478.    | 182       | 11       | 91686.    | CRE       | 31       | 92296.    | 112K      | 21       | 92428.    | 112K      | 21       |
| 91241.    | 114       | 27       | 91481.    | 182       | 11       | 91687.    | CRE       | 31       | 92300.    | 112KS     | 21       | 92435.    | 112KS     | 21       |
| 91242.    | 114       | 27       | 91482.    | 182       | 11       | 91688.    | CRE       | 31       | 92301.    | 112KS     | 21       | 92436.    | 112KS     | 21       |
| 91243.    | 114       | 26       | 91486.    | 182       | 11       | 92151.    | 260       | 35       | 92302.    | 112KS     | 21       | 92437.    | 112KS     | 21       |
| 91244.    | 114       | 26       | 91487.    | 182       | 11       | 92154.    | 260       | 35       | 92303.    | 112KS     | 21       | 92438.    | 112KS     | 21       |
| 91245.    | 114       | 27       | 91491.    | 182       | 11       | 92155.    | 260       | 35       | 92304.    | 112KS     | 21       | 92439.    | 112KS     | 21       |
| 91251.    | 114       | 26       | 91492.    | 182       | 11       | 92156.    | 260       | 35       | 92305.    | 112KS     | 21       | 92440.    | 112KS     | 21       |
| 91252.    | 114       | 26       | 91496.    | 182       | 11       | 92157.    | 260       | 35       | 92306.    | 112KS     | 21       | 92441.    | 112KS     | 21       |
| 91253.    | 114       | 26       | 91497.    | 182       | 11       | 92158.    | 260       | 35       | 92307.    | 112KS     | 21       | 92442.    | 112KS     | 21       |
| 91254.    | 114       | 26       | 91500.    | 182       | 11       | 92159.    | 260       | 35       | 92308.    | 112KS     | 21       | 92443.    | 112KS     | 21       |
| 91255.    | 114       | 26       | 91610.    | 442       | 6        | 92161.    | 260       | 35       | 92309.    | 112KS     | 21       | 92444.    | 112KS     | 21       |
| 91256.    | 114       | 27       | 91611.    | 442       | 6        | 92165.    | 260       | 35       | 92315.    | 104R      | 30       | 92445.    | 112KS     | 21       |
| 91261.    | 112       | 15       | 91612.    | 442       | 6        | 92171.    | 260       | 35       | 92316.    | 104R      | 30       | 92446.    | 112KS     | 21       |
| 91262.    | 112       | 15       | 91625.    | 112       | 14       | 92178.    | 261       | 37       | 92317.    | 104R      | 30       | 92447.    | 112KS     | 21       |
| 91263.    | 112       | 16       | 91626.    | 112       | 14       | 92179.    | 261       | 37       | 92318.    | 104R      | 30       | 92448.    | 112KS     | 21       |
| 91265.    | 112       | 16       | 91627.    | 112       | 14       | 92180.    | 261       | 37       | 92319.    | 104R      | 30       | 92449.    | 112KS     | 21       |
| 91266.    | 112       | 16       | 91628.    | 112       | 15       | 92181.    | 261       | 37       | 92320.    | 104R      | 30       | 92450.    | 112KS     | 21       |
| 91271.    | 111       | 17       | 91629.    | 112       | 15       | 92182.    | 261       | 37       | 92321.    | 104R      | 30       | 92451.    | 112KS     | 21       |
| 91272.    | 111       | 17       | 91630.    | 112       | 15       | 92183.    | 261       | 37       | 92323.    | 104R      | 30       | 92452.    | 112KS     | 21       |
| 91273.    | 111       | 17       | 91632.    | 112       | 15       | 92184.    | 261       | 37       | 92350.    | 428       | 8        | 92453.    | 112KS     | 21       |
| 91274.    | 111       | 17       | 91633.    | 112       | 16       | 92185.    | 261       | 37       | 92351.    | 428       | 8        | 92454.    | 112KS     | 21       |
| 91319.    | 114       | 25       | 91639.    | 112       | 16       | 92186.    | 261       | 37       | 92352.    | 428       | 8        | 92455.    | 112KS     | 21       |
| 91320.    | 114       | 26       | 91645.    | 112       | 14       | 92187.    | 261       | 37       | 92353.    | 428       | 8        | 92456.    | 112KS     | 21       |
| 91321.    | 114       | 26       | 91646.    | 112       | 14       | 92188.    | 261       | 37       | 92354.    | 428       | 8        | 92457.    | 112KS     | 21       |
| 91323.    | 114       | 27       | 91647.    | 112       | 14       | 92189.    | 261       | 37       | 92355.    | 428       | 8        | 92458.    | 112KS     | 21       |
| 91325.    | 132       | 19       | 91648.    | 112       | 15       | 92192.    | 261       | 37       | 92356.    | 428       | 8        | 92783.    | 264       | 34       |
| 91326.    | 132       | 19       | 91649.    | 112       | 15       | 92251.    | 260       | 35       | 92380.    | 261       | 37       | 92840.    | 481       | 4        |
| 91327.    | 132       | 19       | 91650.    | 112       | 15       | 92252.    | 260       | 35       | 92381.    | 261       | 37       | 92841.    | 181       | 12       |
| 91328.    | 132       | 19       | 91651.    | 112       | 15       | 92253.    | 260       | 35       | 92382.    | 261       | 37       | 92842.    | 481       | 4        |
| 91329.    | 132       | 19       | 91652.    | 112       | 15       | 92254.    | 260       | 35       | 92383.    | 261       | 37       | 92843.    | 181       | 12       |
| 91330.    | 132       | 19       | 91653.    | 112       | 16       | 92255.    | 260       | 35       | 92385.    | 261       | 37       | 92844.    | 481       | 4        |
| 91331.    | 132       | 19       | 91654.    | 112       | 16       | 92256.    | 260       | 35       | 92387.    | 261       | 37       | 92845.    | 481       | 4        |
| 91332.    | 132       | 19       | 91655.    | 112       | 16       | 92257.    | 260       | 35       | 92402.    | 112K      | 21       | 92846.    | 181       | 12       |
| 91333.    | 132       | 19       | 91659.    | 112       | 16       | 92258.    | 260       | 35       | 92405.    | 112K      | 21       | 92847.    | 481       | 4        |
| 91334.    | 132       | 19       | 91660.    | 112       | 14       | 92259.    | 260       | 35       | 92406.    | 112K      | 21       | 92848.    | 481       | 4        |
| 91335.    | 132       | 19       | 91661.    | 112       | 14       | 92260.    | 260       | 35       | 92408.    | 112K      | 21       | 92849.    | 181       | 12       |
| 91338.    | 132       | 19       | 91662.    | 112       | 14       | 92261.    | 260       | 35       | 92409.    | 112K      | 21       | 92850.    | 481       | 4        |
| 91400.    | 131       | 20       | 91663.    | 112       | 14       | 92264.    | 260       | 35       | 92410.    | 112K      | 21       | 92851.    | 481       | 4        |
| 91401.    | 131       | 20       | 91664.    | 112       | 15       | 92265.    | 260       | 35       | 92411.    | 112K      | 21       | 92852.    | 181       | 12       |
| 91402.    | 131       | 20       | 91666.    | 112       | 15       | 92266.    | 260       | 35       | 92412.    | 112K      | 21       | 92853.    | 481       | 4        |
| 91404.    | 131       | 20       | 91669.    | 112       | 15       | 92267.    | 260       | 35       | 92413.    | 112K      | 21       | 92854.    | 481       | 4        |
| 91407.    | 131       | 20       | 91671.    | 112       | 15       | 92268.    | 260       | 35       | 92414.    | 112K      | 21       | 92855.    | 181       | 12       |
| 91408.    | 131       | 20       | 91673.    | 112       | 15       | 92269.    | 260       | 35       | 92415.    | 112K      | 21       | 92856.    | 481       | 4        |

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| 92857     | 431       | 7        | 92999     | 113       | 22       | 93144     | 431       | 7        | 94025     | 115B      | 28       | 94096     | 115       | 26       |
| 92858     | 431       | 7        | 93000     | 113       | 22       | 93950     | 132       | 19       | 94026     | 115B      | 28       | 94097     | 115       | 26       |
| 92859     | 431       | 7        | 93005     | 113       | 22       | 93951     | 132       | 19       | 94028     | 115B      | 28       | 94098     | 115       | 26       |
| 92860     | 431       | 7        | 93006     | 113       | 22       | 93952     | 132       | 19       | 94029     | 115B      | 28       | 94099     | 115       | 25       |
| 92861     | 431       | 7        | 93007     | 113       | 22       | 93953     | 132       | 19       | 94030     | 115B      | 28       | 94100     | 115       | 25       |
| 92862     | 431       | 7        | 93008     | 113       | 22       | 93954     | 132       | 19       | 94031     | 115B      | 28       | 94180     | 112       | 13       |
| 92863     | 431       | 7        | 93009     | 113       | 22       | 93955     | 132       | 19       | 94033     | 115B      | 29       | 94181     | 112       | 13       |
| 92864     | 431       | 7        | 93010     | 113       | 22       | 93956     | 132       | 19       | 94034     | 115B      | 29       | 94182     | 112       | 13       |
| 92865     | 431       | 7        | 93011     | 113       | 22       | 93957     | 132       | 19       | 94036     | 115B      | 29       | 94183     | 112       | 13       |
| 92866     | 431       | 7        | 93012     | 113       | 22       | 93958     | 132       | 19       | 94037     | 115B      | 29       | 94184     | 112       | 14       |
| 92867     | 431       | 7        | 93013     | 113       | 22       | 93959     | 132       | 19       | 94040     | 115B      | 29       | 94185     | 112       | 14       |
| 92868     | 431       | 7        | 93014     | 113       | 22       | 93960     | 132       | 19       | 94041     | 115B      | 29       | 94186     | 112       | 14       |
| 92869     | 431       | 7        | 93043     | 184       | 13       | 93961     | 132       | 19       | 94042     | 115B      | 28       | 94187     | 112       | 14       |
| 92871     | 431       | 7        | 93045     | 184       | 13       | 93962     | 132       | 19       | 94043     | 115B      | 28       | 94188     | 112       | 14       |
| 92950     | 111N      | 18       | 93047     | 184       | 13       | 93963     | 132       | 19       | 94044     | 115B      | 28       | 94189     | 112       | 14       |
| 92951     | 111N      | 18       | 93049     | 184       | 13       | 93964     | 132       | 19       | 94045     | 115B      | 29       | 94190     | 112       | 14       |
| 92952     | 111N      | 18       | 93051     | 184       | 13       | 93965     | 132       | 19       | 94046     | 115B      | 29       | 94191     | 112       | 14       |
| 92953     | 111N      | 18       | 93058     | 114       | 23       | 93970     | 132       | 19       | 94056     | 115       | 24       | 94192     | 112       | 14       |
| 92954     | 111N      | 18       | 93059     | 114       | 23       | 93971     | 132       | 19       | 94057     | 115       | 25       | 94193     | 112       | 15       |
| 92955     | 111N      | 18       | 93067     | 182       | 11       | 93972     | 132       | 19       | 94058     | 115       | 25       | 94194     | 112       | 15       |
| 92956     | 111N      | 18       | 93068     | 182       | 11       | 93973     | 132       | 19       | 94059     | 115       | 25       | 94195     | 112       | 15       |
| 92957     | 111N      | 18       | 93071     | 182       | 11       | 93974     | 132       | 19       | 94061     | 115       | 23       | 94196     | 112       | 15       |
| 92958     | 111N      | 18       | 93072     | 182       | 11       | 93975     | 132       | 19       | 94062     | 115       | 23       | 94197     | 112       | 15       |
| 92960     | 111N      | 18       | 93075     | 182       | 11       | 93976     | 132       | 19       | 94063     | 115       | 23       | 94198     | 112       | 15       |
| 92965     | 433       | 8        | 93076     | 182       | 11       | 93977     | 132       | 19       | 94064     | 115       | 24       | 94199     | 112       | 15       |
| 92966     | 433       | 8        | 93079     | 182       | 11       | 93978     | 132       | 19       | 94065     | 115       | 24       | 94200     | 112       | 15       |
| 92967     | 433       | 8        | 93080     | 182       | 11       | 93979     | 132       | 19       | 94066     | 115       | 24       | 94201     | 112       | 15       |
| 92968     | 433       | 8        | 93084     | 182       | 11       | 93980     | 132       | 19       | 94067     | 115       | 24       | 94202     | 112       | 15       |
| 92969     | 433       | 8        | 93086     | 182       | 11       | 93982     | 132       | 19       | 94069     | 115       | 25       | 94203     | 112       | 15       |
| 92970     | 433       | 8        | 93092     | 112       | 13       | 93985     | 132       | 19       | 94070     | 115       | 25       | 94204     | 112       | 15       |
| 92971     | 433       | 8        | 93093     | 112       | 13       | 93986     | 132       | 19       | 94071     | 115       | 25       | 94205     | 112       | 15       |
| 92972     | 433       | 8        | 93094     | 112       | 13       | 93987     | 132       | 19       | 94072     | 115       | 26       | 94206     | 112       | 15       |
| 92973     | 433       | 8        | 93105     | 104R      | 30       | 93988     | 132       | 19       | 94073     | 115       | 26       | 94207     | 112       | 15       |
| 92974     | 433       | 8        | 93106     | 104R      | 30       | 93989     | 132       | 19       | 94074     | 115       | 26       | 94208     | 112       | 15       |
| 92977     | 113       | 22       | 93107     | 104R      | 30       | 93990     | 132       | 19       | 94075     | 115       | 26       | 94209     | 112       | 15       |
| 92978     | 113       | 22       | 93108     | 104R      | 30       | 93991     | 132       | 19       | 94076     | 115       | 27       | 94210     | 112       | 15       |
| 92979     | 113       | 22       | 93109     | 104R      | 30       | 93992     | 132       | 19       | 94077     | 115       | 23       | 94211     | 112       | 15       |
| 92980     | 113       | 22       | 93110     | 104R      | 30       | 93993     | 132       | 19       | 94078     | 115       | 24       | 94212     | 112       | 16       |
| 92981     | 113       | 22       | 93111     | 104R      | 30       | 93994     | 132       | 19       | 94079     | 115       | 24       | 94213     | 112       | 16       |
| 92982     | 113       | 22       | 93113     | 104R      | 30       | 93995     | 132       | 19       | 94080     | 115       | 24       | 94214     | 112       | 16       |
| 92983     | 113       | 22       | 93115     | 104R      | 30       | 94010     | 115B      | 28       | 94081     | 115       | 24       | 94215     | 112       | 16       |
| 92984     | 113       | 22       | 93117     | 104R      | 30       | 94011     | 115B      | 28       | 94082     | 115       | 25       | 94216     | 112       | 16       |
| 92985     | 113       | 22       | 93123     | 104R      | 30       | 94012     | 115B      | 28       | 94083     | 115       | 25       | 94217     | 112       | 16       |
| 92986     | 113       | 22       | 93130     | 481       | 4        | 94013     | 115B      | 28       | 94084     | 115       | 26       | 94218     | 112       | 16       |
| 92987     | 113       | 22       | 93131     | 181       | 12       | 94014     | 115B      | 28       | 94085     | 115       | 26       | 94219     | 112       | 16       |
| 92988     | 113       | 22       | 93132     | 481       | 4        | 94015     | 115B      | 28       | 94086     | 115       | 26       | 94225     | 114       | 23       |
| 92989     | 113       | 22       | 93133     | 181       | 12       | 94016     | 115B      | 28       | 94087     | 115       | 26       | 94226     | 114       | 23       |
| 92990     | 113       | 22       | 93134     | 481       | 4        | 94017     | 115B      | 28       | 94088     | 115       | 27       | 94227     | 114       | 23       |
| 92991     | 113       | 22       | 93135     | 181       | 12       | 94018     | 115B      | 28       | 94089     | 115       | 23       | 94228     | 114       | 24       |
| 92992     | 113       | 22       | 93136     | 481       | 4        | 94019     | 115B      | 28       | 94090     | 115       | 24       | 94229     | 114       | 24       |
| 92994     | 113       | 22       | 93137     | 181       | 12       | 94020     | 115B      | 28       | 94091     | 115       | 24       | 94230     | 114       | 24       |
| 92995     | 113       | 22       | 93138     | 481       | 4        | 94021     | 115B      | 28       | 94092     | 115       | 24       | 94231     | 114       | 24       |
| 92996     | 113       | 22       | 93140     | 481       | 4        | 94022     | 115B      | 28       | 94093     | 115       | 24       | 94232     | 114       | 24       |
| 92997     | 113       | 22       | 93142     | 431       | 7        | 94023     | 115B      | 28       | 94094     | 115       | 25       | 94233     | 114       | 24       |
| 92998     | 113       | 22       | 93143     | 431       | 7        | 94024     | 115B      | 28       | 94095     | 115       | 25       | 94234     | 114       | 24       |



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| 94236     | 114       | 25       | 94293     | 114       | 25       | 94517     | 212       | 13       | 94595     | 432       | 6        | 94650     | 215       | 26       |
| 94237     | 114       | 25       | 94294     | 114       | 25       | 94518     | 212       | 13       | 94596     | 432       | 6        | 94651     | 215       | 26       |
| 94238     | 114       | 25       | 94295     | 114       | 26       | 94520     | 212       | 13       | 94597     | 215B      | 28       | 94652     | 215       | 26       |
| 94239     | 114       | 25       | 94296     | 114       | 26       | 94522     | 212       | 13       | 94598     | 215B      | 28       | 94653     | 215       | 26       |
| 94240     | 114       | 25       | 94297     | 114       | 26       | 94523     | 212       | 13       | 94599     | 215B      | 28       | 94654     | 215       | 26       |
| 94241     | 114       | 25       | 94305     | 112N      | 18       | 94524     | 212       | 13       | 94600     | 215B      | 28       | 94655     | 215       | 26       |
| 94242     | 114       | 25       | 94306     | 112N      | 18       | 94525     | 212       | 13       | 94601     | 215B      | 28       | 94656     | 215       | 26       |
| 94243     | 114       | 25       | 94307     | 112N      | 18       | 94527     | 212       | 13       | 94602     | 215B      | 28       | 94657     | 215       | 26       |
| 94244     | 114       | 25       | 94308     | 112N      | 18       | 94528     | 212       | 13       | 94603     | 215B      | 28       | 94658     | 215       | 27       |
| 94245     | 114       | 25       | 94309     | 112N      | 18       | 94529     | 212       | 13       | 94604     | 215B      | 28       | 94659     | 215       | 27       |
| 94246     | 114       | 25       | 94310     | 112N      | 18       | 94530     | 212       | 13       | 94605     | 215B      | 28       | 94660     | 215       | 24       |
| 94247     | 114       | 25       | 94311     | 112N      | 18       | 94531     | 212       | 13       | 94606     | 215B      | 28       | 94661     | 215       | 24       |
| 94248     | 114       | 25       | 94312     | 112N      | 18       | 94532     | 212       | 13       | 94607     | 215B      | 28       | 94662     | 215       | 24       |
| 94249     | 114       | 25       | 94313     | 112N      | 18       | 94533     | 212       | 13       | 94608     | 215B      | 28       | 94663     | 215       | 25       |
| 94250     | 114       | 25       | 94314     | 112N      | 18       | 94535     | 212       | 13       | 94609     | 215B      | 29       | 94664     | 215       | 25       |
| 94251     | 114       | 25       | 94315     | 112N      | 18       | 94536     | 212       | 13       | 94610     | 215B      | 28       | 94665     | 215       | 26       |
| 94252     | 114       | 25       | 94320     | 111       | 17       | 94537     | 212       | 13       | 94611     | 215B      | 29       | 94666     | 215       | 26       |
| 94253     | 114       | 26       | 94321     | 111       | 17       | 94538     | 212       | 14       | 94612     | 215B      | 29       | 94667     | 215       | 26       |
| 94254     | 114       | 26       | 94322     | 111       | 17       | 94539     | 212       | 14       | 94613     | 215B      | 29       | 94668     | 215       | 26       |
| 94255     | 114       | 26       | 94323     | 111       | 17       | 94541     | 212       | 14       | 94614     | 215B      | 29       | 94675     | 212       | 13       |
| 94256     | 114       | 26       | 94324     | 111       | 17       | 94542     | 212       | 14       | 94615     | 215B      | 28       | 94676     | 212       | 13       |
| 94257     | 114       | 26       | 94325     | 111       | 17       | 94543     | 212       | 14       | 94616     | 115B      | 28       | 94677     | 212       | 13       |
| 94258     | 114       | 26       | 94326     | 111       | 17       | 94545     | 212       | 14       | 94617     | 215B      | 29       | 94678     | 212       | 13       |
| 94259     | 114       | 26       | 94327     | 111       | 17       | 94548     | 212       | 14       | 94618     | 215B      | 29       | 94679     | 212       | 14       |
| 94260     | 114       | 26       | 94328     | 111       | 17       | 94549     | 212       | 14       | 94619     | 215B      | 29       | 94680     | 212       | 14       |
| 94261     | 114       | 26       | 94329     | 111       | 17       | 94550     | 212       | 14       | 94620     | 215       | 23       | 94681     | 212       | 14       |
| 94262     | 114       | 26       | 94330     | 111       | 17       | 94551     | 212       | 15       | 94621     | 215       | 23       | 94682     | 212       | 15       |
| 94263     | 114       | 27       | 94331     | 111       | 17       | 94552     | 212       | 15       | 94622     | 215       | 23       | 94683     | 212       | 15       |
| 94264     | 114       | 27       | 94332     | 111       | 17       | 94554     | 212       | 15       | 94623     | 215       | 24       | 94684     | 212       | 16       |
| 94265     | 114       | 26       | 94333     | 111       | 17       | 94555     | 212       | 16       | 94624     | 215       | 24       | 94685     | 212       | 16       |
| 94266     | 114       | 26       | 94334     | 111       | 17       | 94556     | 212       | 16       | 94625     | 215       | 24       | 94690     | 211       | 17       |
| 94267     | 114       | 26       | 94335     | 111       | 17       | 94571     | 434       | 9        | 94626     | 215       | 24       | 94691     | 211       | 17       |
| 94268     | 114       | 27       | 94336     | 111       | 17       | 94572     | 434       | 9        | 94627     | 215       | 24       | 94692     | 211       | 17       |
| 94271     | 114       | 23       | 94337     | 111       | 17       | 94573     | 434       | 9        | 94628     | 215       | 24       | 94693     | 211       | 17       |
| 94272     | 114       | 24       | 94338     | 111       | 17       | 94574     | 434       | 9        | 94629     | 215       | 25       | 94694     | 211       | 17       |
| 94273     | 114       | 24       | 94339     | 111       | 17       | 94575     | 434       | 9        | 94630     | 215       | 25       | 94695     | 211       | 17       |
| 94274     | 114       | 24       | 94340     | 111       | 17       | 94576     | 434       | 9        | 94631     | 215       | 25       | 94696     | 211       | 17       |
| 94275     | 114       | 24       | 94341     | 111       | 17       | 94577     | 434       | 9        | 94632     | 215       | 25       | 94697     | 211       | 17       |
| 94276     | 114       | 24       | 94381     | 113       | 22       | 94578     | 434       | 9        | 94633     | 215       | 26       | 94698     | 211       | 17       |
| 94277     | 114       | 25       | 94420     | 114       | 27       | 94579     | 434       | 9        | 94634     | 215       | 26       | 94710     | M15       | 32       |
| 94278     | 114       | 25       | 94421     | 114       | 27       | 94580     | 434       | 10       | 94635     | 215       | 26       | 94711     | M15       | 32       |
| 94279     | 114       | 26       | 94422     | 114       | 27       | 94581     | 434       | 10       | 94636     | 215       | 26       | 94712     | M15       | 32       |
| 94280     | 114       | 26       | 94423     | 114       | 27       | 94582     | 434       | 10       | 94637     | 215       | 25       | 94713     | M15       | 32       |
| 94281     | 114       | 26       | 94424     | 114       | 27       | 94583     | 434       | 10       | 94638     | 215       | 25       | 94714     | M15       | 32       |
| 94282     | 114       | 26       | 94425     | 114       | 27       | 94584     | 432       | 6        | 94639     | 215       | 26       | 94715     | M15       | 32       |
| 94283     | 114       | 26       | 94426     | 114       | 27       | 94585     | 432       | 6        | 94640     | 215       | 27       | 94716     | M15       | 32       |
| 94284     | 114       | 26       | 94428     | 114       | 27       | 94586     | 432       | 6        | 94641     | 215       | 26       | 94717     | M15       | 32       |
| 94285     | 114       | 26       | 94429     | 114       | 27       | 94587     | 432       | 6        | 94642     | 215       | 26       | 94718     | M15       | 32       |
| 94286     | 114       | 26       | 94430     | 114       | 27       | 94588     | 432       | 6        | 94643     | 215       | 26       | 94719     | M15       | 32       |
| 94287     | 114       | 27       | 94433     | 114       | 27       | 94589     | 432       | 6        | 94644     | 215       | 26       | 94720     | M15       | 32       |
| 94288     | 114       | 23       | 94472     | 115B      | 29       | 94590     | 432       | 6        | 94645     | 215       | 24       | 94730     | M12       | 32       |
| 94289     | 114       | 24       | 94474     | 115B      | 29       | 94591     | 432       | 6        | 94646     | 215       | 24       | 94731     | M12       | 32       |
| 94290     | 114       | 24       | 94514     | 212       | 13       | 94592     | 432       | 6        | 94647     | 215       | 24       | 94733     | M12       | 32       |
| 94291     | 114       | 24       | 94515     | 212       | 13       | 94593     | 432       | 6        | 94648     | 215       | 25       | 94734     | M12       | 32       |

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| 94739     | M12       | 32       | 94821     | 435       | 10       | 94887     | 484       | 5        | 95212     | 112       | 14       | 95327     | 114       | 25       |
| 94750     | M10       | 32       | 94822     | 435       | 10       | 94888     | 484       | 5        | 95213     | 112       | 14       | 95328     | 114       | 25       |
| 94751     | M10       | 32       | 94823     | 435       | 10       | 94889     | 484       | 5        | 95214     | 112       | 14       | 95329     | 114       | 25       |
| 94753     | M10       | 32       | 94824     | 435       | 10       | 94896     | 484       | 5        | 95215     | 112       | 14       | 95330     | 114       | 25       |
| 94754     | M10       | 32       | 94825     | 215       | 25       | 94897     | 484       | 5        | 95216     | 112       | 14       | 95331     | 114       | 25       |
| 94755     | M10       | 32       | 94826     | 215       | 25       | 94898     | 484       | 5        | 95217     | 112       | 14       | 95332     | 114       | 25       |
| 94758     | M10       | 32       | 94827     | 215       | 25       | 94899     | 484       | 5        | 95218     | 112       | 14       | 95335     | 114       | 25       |
| 94766     | 104       | 30       | 94830     | 432       | 6        | 94905     | 482       | 4        | 95219     | 112       | 14       | 95338     | 114       | 25       |
| 94767     | 104       | 30       | 94831     | 432       | 6        | 94906     | 482       | 4        | 95220     | 112       | 14       | 95340     | 114       | 25       |
| 94768     | 104       | 30       | 94832     | 432       | 6        | 94907     | 482       | 4        | 95221     | 112       | 14       | 95341     | 114       | 25       |
| 94769     | 104       | 30       | 94833     | 432       | 6        | 94908     | 482       | 4        | 95222     | 112       | 14       | 95360     | 114       | 25       |
| 94771     | 104       | 30       | 94834     | 432       | 6        | 94909     | 482       | 4        | 95223     | 112       | 14       | 95361     | 114       | 25       |
| 94772     | 104       | 30       | 94835     | 432       | 6        | 94910     | 482       | 4        | 95224     | 112       | 14       | 95400     | 432       | 7        |
| 94774     | 215       | 23       | 94836     | 432       | 6        | 94911     | 482       | 4        | 95225     | 112       | 14       | 95401     | 432       | 7        |
| 94775     | 215       | 23       | 94837     | 432       | 6        | 94912     | 482       | 4        | 95226     | 112       | 14       | 95402     | 432       | 7        |
| 94776     | 215       | 23       | 94838     | 432       | 6        | 94913     | 482       | 4        | 95227     | 112       | 14       | 95403     | 432       | 7        |
| 94777     | 215       | 23       | 94839     | 432       | 6        | 94914     | 482       | 4        | 95228     | 112       | 14       | 95420     | 112M      | 16       |
| 94778     | 215       | 23       | 94840     | 432       | 6        | 94915     | 482       | 4        | 95229     | 112       | 14       | 95421     | 112M      | 16       |
| 94779     | 215       | 23       | 94841     | 432       | 6        | 94918     | 482       | 4        | 95230     | 112       | 15       | 95422     | 112M      | 16       |
| 94780     | 215       | 23       | 94842     | 432       | 6        | 94919     | 482       | 4        | 95231     | 112       | 15       | 95423     | 112M      | 16       |
| 94781     | 215       | 23       | 94843     | 432       | 7        | 94920     | 482       | 4        | 95232     | 112       | 15       | 95424     | 112M      | 16       |
| 94782     | 215       | 23       | 94844     | 432       | 7        | 94921     | 482       | 4        | 95233     | 112       | 15       | 95425     | 112M      | 16       |
| 94783     | 215       | 23       | 94845     | 432       | 7        | 94925     | 482       | 4        | 95234     | 112       | 15       | 95426     | 112M      | 16       |
| 94784     | 215       | 23       | 94846     | 432       | 7        | 94926     | 482       | 4        | 95235     | 112       | 15       | 95427     | 112M      | 16       |
| 94785     | 215       | 23       | 94847     | 432       | 7        | 94927     | 482       | 4        | 95236     | 112       | 15       | 95428     | 112M      | 16       |
| 94786     | 215       | 23       | 94848     | 432       | 7        | 94928     | 482       | 4        | 95237     | 112       | 15       | 95429     | 112M      | 16       |
| 94787     | 215       | 23       | 94849     | 432       | 7        | 94929     | 482       | 4        | 95238     | 112       | 15       | 95430     | 112M      | 16       |
| 94788     | 215       | 23       | 94850     | 432       | 7        | 94930     | 482       | 4        | 95240     | 112       | 15       | 95431     | 112M      | 16       |
| 94789     | 215       | 24       | 94855     | 434       | 9        | 94931     | 482       | 4        | 95300     | 114       | 23       | 95432     | 112M      | 16       |
| 94790     | 215       | 24       | 94856     | 434       | 9        | 94932     | 482       | 4        | 95301     | 114       | 23       | 95433     | 112M      | 16       |
| 94791     | 215       | 24       | 94857     | 434       | 9        | 94933     | 482       | 4        | 95302     | 114       | 23       | 95434     | 112M      | 16       |
| 94792     | 215       | 24       | 94858     | 434       | 9        | 94934     | 482       | 4        | 95303     | 114       | 23       | 95435     | 112M      | 16       |
| 94793     | 215       | 24       | 94859     | 434       | 9        | 94935     | 482       | 4        | 95304     | 114       | 23       | 95436     | 112M      | 16       |
| 94794     | 215       | 24       | 94860     | 434       | 9        | 94940     | 434       | 9        | 95305     | 114       | 23       | 95437     | 112M      | 16       |
| 94795     | 215       | 24       | 94861     | 434       | 9        | 94941     | 434       | 9        | 95306     | 114       | 23       | 95441     | 112M      | 16       |
| 94796     | 215       | 24       | 94862     | 434       | 9        | 94942     | 434       | 9        | 95307     | 114       | 23       | 95442     | 112M      | 16       |
| 94797     | 215       | 24       | 94863     | 434       | 9        | 94943     | 434       | 9        | 95308     | 114       | 23       | 95443     | 114M      | 27       |
| 94798     | 115       | 24       | 94864     | 434       | 10       | 94944     | 434       | 9        | 95309     | 114       | 24       | 95444     | 114M      | 27       |
| 94799     | 215       | 24       | 94865     | 434       | 10       | 94950     | 432       | 6        | 95310     | 114       | 24       | 95445     | 114M      | 27       |
| 94800     | 215       | 24       | 94866     | 434       | 10       | 94951     | 432       | 6        | 95311     | 114       | 24       | 95446     | 114M      | 27       |
| 94801     | 215       | 24       | 94867     | 434       | 10       | 94952     | 432       | 6        | 95312     | 114       | 24       | 95447     | 114M      | 27       |
| 94802     | 215       | 25       | 94868     | 434       | 10       | 94953     | 432       | 6        | 95313     | 114       | 24       | 95448     | 114M      | 27       |
| 94803     | 215       | 25       | 94869     | 434       | 10       | 94954     | 432       | 6        | 95314     | 114       | 24       | 95449     | 114M      | 27       |
| 94804     | 215       | 25       | 94870     | 434       | 10       | 95200     | 112       | 13       | 95315     | 114       | 24       | 95450     | 114M      | 27       |
| 94805     | 215       | 25       | 94871     | 434       | 10       | 95201     | 112       | 13       | 95316     | 114       | 24       | 95451     | 114M      | 27       |
| 94806     | 215       | 25       | 94872     | 434       | 10       | 95202     | 112       | 13       | 95317     | 114       | 24       | 95452     | 114M      | 27       |
| 94807     | 215       | 25       | 94873     | 434       | 10       | 95203     | 112       | 13       | 95318     | 114       | 24       | 95453     | 114M      | 27       |
| 94808     | 215       | 25       | 94874     | 434       | 10       | 95204     | 112       | 13       | 95319     | 114       | 24       | 95454     | 114M      | 27       |
| 94809     | 215       | 25       | 94875     | 434       | 10       | 95205     | 112       | 13       | 95320     | 114       | 24       | 95455     | 114M      | 27       |
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| 94816     | 435       | 9        | 94879     | 484       | 5        | 95207     | 112       | 13       | 95322     | 114       | 24       | 95457     | 114M      | 27       |
| 94817     | 435       | 9        | 94880     | 484       | 5        | 95208     | 112       | 13       | 95323     | 114       | 24       | 95458     | 114M      | 27       |
| 94818     | 435       | 9        | 94881     | 484       | 5        | 95209     | 112       | 13       | 95324     | 114       | 24       | 95459     | 114M      | 27       |
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| 95463.    | 114M      | 27       | 96050.    | 214       | 25       | 96128.    | 442       | 6        | 96316.    | 215       | 25       | 96396.    | 131       | 20       |
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| 96000.    | 215       | 27       | 96055.    | 214       | 25       | 96133.    | 442       | 6        | 96323.    | 215       | 26       | 96404.    | 434       | 9        |
| 96001.    | 215       | 27       | 96056.    | 214       | 25       | 96134.    | 442       | 7        | 96324.    | 215       | 26       | 96405.    | 434       | 9        |
| 96002.    | 215       | 27       | 96057.    | 214       | 26       | 96135.    | 442       | 7        | 96335.    | 112       | 13       | 96406.    | 434       | 9        |
| 96003.    | 215       | 27       | 96058.    | 214       | 26       | 96136.    | 442       | 7        | 96336.    | 112       | 13       | 96407.    | 434       | 9        |
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| 96013.    | 215B      | 29       | 96068.    | 214       | 26       | 96154.    | 212       | 15       | 96346.    | 112       | 15       | 96417.    | 434       | 10       |
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| 97431.    | .265      | .37      | 97611.    | .267      | .33      | 97700.    | .265      | .36      | 97801.    | .265      | .36      | 97923.    | .266      | .36      |
| 97432.    | .265      | .37      | 97612.    | .267      | .33      | 97701.    | .265      | .36      | 97802.    | .265      | .36      | 97926.    | .266      | .36      |
| 97433.    | .265      | .37      | 97613.    | .267      | .33      | 97702.    | .265      | .36      | 97803.    | .265      | .36      | 97927.    | .266      | .36      |
| 97435.    | .265      | .37      | 97614.    | .267      | .33      | 97703.    | .265      | .36      | 97804.    | .265      | .36      | 97928.    | .266      | .36      |
| 97436.    | .265      | .37      | 97615.    | .267      | .33      | 97704.    | .265      | .36      | 97805.    | .265      | .36      | 97930.    | .266      | .36      |
| 97437.    | .265      | .37      | 97616.    | .267      | .33      | 97705.    | .265      | .36      | 97806.    | .265      | .36      | 97931.    | .266      | .36      |
| 97442.    | .263      | .37      | 97617.    | .267      | .34      | 97706.    | .265      | .36      | 97807.    | .265      | .36      | 97932.    | .266      | .36      |
| 97444.    | .263      | .37      | 97618.    | .267      | .34      | 97707.    | .265      | .36      | 97808.    | .265      | .36      | 97935.    | .266      | .37      |
| 97445.    | .263      | .37      | 97619.    | .267      | .34      | 97708.    | .265      | .36      | 97810.    | .265      | .36      | 97937.    | .268      | .33      |
| 97477.    | .264      | .34      | 97620.    | .267      | .33      | 97709.    | .265      | .36      | 97811.    | .265      | .36      | 97938.    | .268      | .33      |
| 97479.    | .264      | .34      | 97621.    | .267      | .33      | 97710.    | .265      | .36      | 97812.    | .265      | .36      | 97940.    | .268      | .33      |
| 97480.    | .264      | .34      | 97631.    | .267      | .34      | 97711.    | .265      | .36      | 97813.    | .265      | .36      | 97941.    | .268      | .33      |
| 97486.    | .263      | .37      | 97634.    | .267      | .33      | 97712.    | .265      | .36      | 97814.    | .265      | .36      | 97942.    | .268      | .33      |
| 97487.    | .263      | .37      | 97635.    | .267      | .33      | 97713.    | .265      | .36      | 97815.    | .265      | .36      | 97943.    | .268      | .33      |
| 97491.    | .264      | .34      | 97636.    | .269      | .37      | 97714.    | .265      | .36      | 97820.    | .266      | .36      | 97945.    | .268      | .33      |
| 97492.    | .264      | .34      | 97637.    | .269      | .37      | 97715.    | .265      | .36      | 97821.    | .266      | .36      | 97946.    | .268      | .33      |
| 97493.    | .265      | .36      | 97638.    | .269      | .37      | 97720.    | .266      | .36      | 97822.    | .266      | .36      | 97947.    | .268      | .33      |
| 97494.    | .265      | .36      | 97639.    | .269      | .37      | 97721.    | .266      | .36      | 97823.    | .266      | .36      | 97948.    | .268      | .33      |
| 97496.    | .265      | .36      | 97640.    | .269      | .37      | 97722.    | .266      | .36      | 97826.    | .266      | .36      | 97949.    | .268      | .33      |
| 97497.    | .265      | .36      | 97641.    | .269      | .37      | 97723.    | .266      | .36      | 97828.    | .266      | .36      | 97956.    | .268      | .33      |
| 97498.    | .265      | .36      | 97642.    | .269      | .37      | 97726.    | .266      | .36      | 97830.    | .266      | .36      | 97959.    | .268      | .33      |
| 97499.    | .265      | .36      | 97644.    | .269      | .37      | 97727.    | .266      | .36      | 97831.    | .266      | .36      | 97960.    | .268      | .33      |
| 97503.    | .266      | .36      | 97645.    | .269      | .37      | 97728.    | .266      | .36      | 97832.    | .266      | .36      | 97961.    | .268      | .33      |
| 97505.    | .266      | .36      | 97646.    | .269      | .37      | 97730.    | .266      | .36      | 97838.    | .268      | .33      | 97963.    | .268      | .33      |
| 97508.    | .266      | .36      | 97647.    | .269      | .37      | 97731.    | .266      | .36      | 97839.    | .268      | .33      | 97964.    | .268      | .33      |
| 97512.    | .266      | .36      | 97648.    | .269      | .37      | 97732.    | .266      | .36      | 97840.    | .268      | .33      | 97968.    | .268      | .33      |
| 97513.    | .266      | .36      | 97657.    | .269      | .37      | 97734.    | .266      | .37      | 97841.    | .268      | .33      | 97973.    | .268      | .33      |
| 97515.    | .266      | .36      | 97658.    | .269      | .37      | 97735.    | .266      | .37      | 97842.    | .268      | .33      | 97977.    | .268      | .33      |
| 97516.    | .266      | .36      | 97659.    | .269      | .37      | 97737.    | .268      | .33      | 97843.    | .268      | .33      | 97979.    | .268      | .33      |
| 97521.    | .266      | .36      | 97660.    | .269      | .37      | 97738.    | .268      | .33      | 97845.    | .268      | .33      | 97982.    | .268      | .34      |
| 97522.    | .265      | .36      | 97661.    | .269      | .37      | 97739.    | .268      | .33      | 97846.    | .268      | .33      | 97984.    | .268      | .34      |
| 97526.    | .265      | .36      | 97662.    | .269      | .37      | 97740.    | .268      | .33      | 97847.    | .268      | .33      |           |           |          |
| 97528.    | .266      | .36      | 97663.    | .269      | .37      | 97741.    | .268      | .33      | 97848.    | .268      | .33      |           |           |          |
| 97530.    | .266      | .36      | 97666.    | .269      | .37      | 97742.    | .268      | .33      | 97849.    | .268      | .33      |           |           |          |
| 97531.    | .268      | .33      | 97667.    | .269      | .37      | 97743.    | .268      | .33      | 97856.    | .268      | .33      |           |           |          |
| 97541.    | .265      | .37      | 97669.    | .267      | .33      | 97745.    | .268      | .33      | 97859.    | .268      | .33      |           |           |          |
| 97542.    | .268      | .33      | 97670.    | .267      | .33      | 97746.    | .268      | .33      | 97860.    | .268      | .33      |           |           |          |
| 97545.    | .268      | .33      | 97671.    | .267      | .33      | 97747.    | .268      | .33      | 97861.    | .268      | .33      |           |           |          |
| 97546.    | .268      | .33      | 97672.    | .267      | .33      | 97748.    | .268      | .33      | 97863.    | .268      | .33      |           |           |          |
| 97548.    | .268      | .33      | 97673.    | .267      | .33      | 97749.    | .268      | .33      | 97864.    | .268      | .33      |           |           |          |
| 97549.    | .268      | .33      | 97674.    | .267      | .33      | 97756.    | .268      | .33      | 97873.    | .268      | .33      |           |           |          |
| 97553.    | .268      | .33      | 97675.    | .267      | .33      | 97759.    | .268      | .33      | 97877.    | .268      | .33      |           |           |          |
| 97559.    | .268      | .33      | 97676.    | .267      | .33      | 97760.    | .268      | .33      | 97879.    | .268      | .33      |           |           |          |
| 97560.    | .268      | .33      | 97677.    | .267      | .33      | 97761.    | .268      | .33      | 97881.    | .268      | .34      |           |           |          |
| 97563.    | .268      | .33      | 97678.    | .267      | .33      | 97763.    | .268      | .33      | 97904.    | .265      | .36      |           |           |          |
| 97575.    | .267      | .33      | 97680.    | .267      | .33      | 97764.    | .268      | .33      | 97907.    | .265      | .36      |           |           |          |
| 97580.    | .267      | .33      | 97681.    | .267      | .33      | 97768.    | .268      | .33      | 97908.    | .265      | .36      |           |           |          |
| 97581.    | .267      | .33      | 97683.    | .267      | .33      | 97773.    | .268      | .33      | 97911.    | .265      | .36      |           |           |          |
| 97583.    | .267      | .33      | 97684.    | .267      | .33      | 97777.    | .268      | .33      | 97912.    | .265      | .36      |           |           |          |







# Decimal Equivalents

FRACTIONAL - RED • WIRE GAGE - PURPLE • LETTER - BLUE • METRIC - GREEN

| DRILL SIZE | DECIMAL INCHES | DRILL SIZE | DECIMAL INCHES | DRILL SIZE | DECIMAL INCHES | DRILL SIZE | DECIMAL INCHES | DRILL SIZE | DECIMAL INCHES | DRILL SIZE | DECIMAL INCHES |
|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|
| 0.30mm     | .0118          | 1.40mm     | .0551          | 3.20mm     | .1260          | 7/32       | .2188          | 8.60mm     | .3386          | 37/64      | .5781          |
| 0.32mm     | .0126          | 1.45mm     | .0571          | 30         | .1285          | 5.60mm     | .2205          | R          | .3390          | 14.75mm    | .5807          |
| 80         | .0135          | 1.50mm     | .0591          | 3.30mm     | .1299          | 2          | .2210          | 8.70mm     | .3425          | 15.00mm    | .5906          |
| 0.35mm     | .0138          | 53         | .0595          | 3.40mm     | .1339          | 5.70mm     | .2244          | 11/32      | .3438          | 19/32      | .5938          |
| 79         | .0145          | 1.55mm     | .0610          | 29         | .1360          | 1          | .2280          | 8.80mm     | .3465          | 15.25mm    | .6004          |
| 0.38mm     | .0150          | 1/16       | .0625          | 3.50mm     | .1378          | 5.80mm     | .2283          | S          | .3480          | 39/64      | .6094          |
| 1/64       | .0156          | 1.60mm     | .0630          | 28         | .1405          | 5.90mm     | .2323          | 8.90mm     | .3504          | 15.50mm    | .6102          |
| 0.40mm     | .0157          | 52         | .0635          | 9/64       | .1406          | A          | .2340          | 9.00mm     | .3543          | 15.75mm    | .6201          |
| 78         | .0160          | 1.65mm     | .0650          | 3.60mm     | .1417          | 15/64      | .2344          | T          | .3580          | 5/8        | .6250          |
| 0.42mm     | .0165          | 1.70mm     | .0669          | 27         | .1440          | 6.00mm     | .2362          | 9.10mm     | .3583          | 16.00mm    | .6299          |
| 0.45mm     | .0177          | 51         | .0670          | 3.70mm     | .1457          | B          | .2380          | 23/64      | .3594          | 16.25mm    | .6398          |
| 77         | .0180          | 1.75mm     | .0689          | 26         | .1470          | 6.10mm     | .2402          | 9.20mm     | .3622          | 41/64      | .6406          |
| 0.48mm     | .0189          | 50         | .0700          | 25         | .1495          | C          | .2420          | 9.30mm     | .3661          | 16.50mm    | .6496          |
| 0.50mm     | .0197          | 1.80mm     | .0709          | 3.80mm     | .1496          | 6.20mm     | .2441          | U          | .3680          | 21/32      | .6562          |
| 76         | .0200          | 1.85mm     | .0728          | 24         | .1520          | D          | .2460          | 9.40mm     | .3701          | 16.75mm    | .6594          |
| 75         | .0210          | 49         | .0730          | 3.90mm     | .1535          | 6.30mm     | .2480          | 9.50mm     | .3740          | 17.00mm    | .6693          |
| 0.55mm     | .0217          | 1.90mm     | .0748          | 23         | .1540          | 1/4        | .2500          | 3/8        | .3750          | 43/64      | .6719          |
| 74         | .0225          | 48         | .0760          | 5/32       | .1562          | E          | .2500          | V          | .3770          | 17.25mm    | .6791          |
| 0.60mm     | .0236          | 1.95mm     | .0768          | 22         | .1570          | 6.40mm     | .2520          | 9.60mm     | .3780          | 11/16      | .6875          |
| 73         | .0240          | 5/64       | .0781          | 4.00mm     | .1575          | 6.50mm     | .2559          | 9.70mm     | .3819          | 17.50mm    | .6890          |
| 0.62mm     | .0244          | 47         | .0785          | 21         | .1590          | F          | .2570          | 9.80mm     | .3858          | 45/64      | .7031          |
| 72         | .0250          | 2.00mm     | .0787          | 20         | .1610          | 6.60mm     | .2598          | W          | .3860          | 18.00mm    | .7087          |
| 0.65mm     | .0256          | 2.05mm     | .0807          | 4.10mm     | .1614          | G          | .2610          | 9.90mm     | .3898          | 23/32      | .7188          |
| 71         | .0260          | 46         | .0810          | 4.20mm     | .1654          | 6.70mm     | .2638          | 25/64      | .3906          | 18.50mm    | .7283          |
| 0.70mm     | .0276          | 45         | .0820          | 19         | .1660          | 17/64      | .2656          | 1.00mm     | .3937          | 47/64      | .7344          |
| 70         | .0280          | 2.10mm     | .0827          | 4.30mm     | .1693          | H          | .2660          | X          | .3970          | 19.00mm    | .7480          |
| 69         | .0292          | 2.15mm     | .0846          | 18         | .1695          | 6.80mm     | .2677          | 1.20mm     | .4016          | 3/4        | .7500          |
| 0.75mm     | .0295          | 44         | .0860          | 11/64      | .1719          | 6.90mm     | .2717          | Y          | .4040          | 49/64      | .7656          |
| 68         | .0310          | 2.20mm     | .0866          | 17         | .1730          | I          | .2720          | 13/32      | .4062          | 19.50mm    | .7677          |
| 1/32       | .0312          | 2.25mm     | .0886          | 4.40mm     | .1732          | 7.00mm     | .2756          | Z          | .4130          | 25/32      | .7812          |
| 0.80mm     | .0315          | 43         | .0890          | 16         | .1770          | J          | .2770          | 10.50mm    | .4134          | 20.00mm    | .7874          |
| 67         | .0320          | 2.30mm     | .0906          | 4.50mm     | .1772          | 7.10mm     | .2795          | 27/64      | .4219          | 51/64      | .7969          |
| 66         | .0330          | 2.35mm     | .0925          | 15         | .1800          | K          | .2810          | 10.80mm    | .4252          | 20.50mm    | .8071          |
| 0.85mm     | .0335          | 42         | .0935          | 4.60mm     | .1811          | 9/32       | .2812          | 11.00mm    | .4331          | 13/16      | .8125          |
| 65         | .0350          | 3/32       | .0938          | 14         | .1820          | 7.20mm     | .2835          | 7/16       | .4375          | 21.00mm    | .8268          |
| 0.90mm     | .0354          | 2.40mm     | .0945          | 4.70mm     | .1850          | 7.30mm     | .2874          | 11.20mm    | .4409          | 53/64      | .8281          |
| 64         | .0360          | 41         | .0960          | 13         | .1850          | L          | .2900          | 11.50mm    | .4528          | 27/32      | .8438          |
| 63         | .0370          | 2.45mm     | .0965          | 3/16       | .1875          | 7.40mm     | .2913          | 29/64      | .4531          | 21.50mm    | .8465          |
| 0.95mm     | .0374          | 40         | .0980          | 12         | .1890          | M          | .2950          | 11.80mm    | .4646          | 55/64      | .8594          |
| 62         | .0380          | 2.50mm     | .0984          | 4.8mm      | .1890          | 7.50mm     | .2953          | 15/32      | .4688          | 22.00mm    | .8661          |
| 61         | .0390          | 39         | .0995          | 11         | .1910          | 19/64      | .2969          | 12.00mm    | .4724          | 7/8        | .8750          |
| 1.00mm     | .0394          | 38         | .1015          | 4.90mm     | .1929          | 7.60mm     | .2992          | 12.20mm    | .4803          | 22.50mm    | .8858          |
| 60         | .0400          | 2.60mm     | .1024          | 10         | .1935          | N          | .3020          | 31/64      | .4844          | 57/64      | .8906          |
| 59         | .0410          | 37         | .1040          | 9          | .1960          | 7.70mm     | .3031          | 12.50mm    | .4921          | 23.00mm    | .9055          |
| 1.05mm     | .0413          | 2.70mm     | .1063          | 5.00mm     | .1969          | 7.80mm     | .3071          | 1/2        | .5000          | 29/32      | .9062          |
| 58         | .0420          | 36         | .1065          | 8          | .1990          | 7.90mm     | .3110          | 12.80mm    | .5039          | 59/64      | .9219          |
| 57         | .0430          | 7/64       | .1094          | 5.10mm     | .2008          | 5/16       | .3125          | 13.00mm    | .5118          | 23.50mm    | .9252          |
| 1.10mm     | .0433          | 35         | .1100          | 7          | .2010          | 8.00mm     | .3150          | 33/64      | .5156          | 15/16      | .9375          |
| 1.15mm     | .0453          | 2.80mm     | .1102          | 13/64      | .2031          | O          | .3160          | 13.20mm    | .5197          | 24.00mm    | .9449          |
| 56         | .0465          | 34         | .1110          | 6          | .2040          | 8.10mm     | .3189          | 17/32      | .5312          | 61/64      | .9531          |
| 3/64       | .0469          | 33         | .1130          | 5.20mm     | .2047          | 8.20mm     | .3228          | 13.50mm    | .5315          | 24.50mm    | .9646          |
| 1.20mm     | .0472          | 2.90mm     | .1142          | 5          | .2055          | P          | .3230          | 13.80mm    | .5433          | 31/32      | .9688          |
| 1.25mm     | .0492          | 32         | .1160          | 5.30mm     | .2087          | 8.30mm     | .3268          | 35/64      | .5469          | 25.00mm    | .9843          |
| 1.30mm     | .0512          | 3.00mm     | .1181          | 4          | .2090          | 21/64      | .3281          | 14.00mm    | .5512          | 63/64      | .9844          |
| 55         | .0520          | 31         | .1200          | 5.40mm     | .2126          | 8.40mm     | .3307          | 14.25mm    | .5610          | 1          | 1.0000         |
| 1.35mm     | .0531          | 3.10mm     | .1220          | 3          | .2130          | Q          | .3320          | 9/16       | .5625          |            |                |
| 54         | .0550          | 1/8        | .1250          | 5.50mm     | .2165          | 8.50mm     | .3346          | 14.50mm    | .5709          |            |                |





A MEMBER OF THE TDC GROUP

## Greenfield Industries Inc.

2501 Davis Creek Road, Seneca, SC 29678

### Contact Us:

telephone USA and Canada – 800.348.2885  
International – 706.650.4196  
Technical Support – 800.892.4281

fax USA – 800.892.4290  
Canada – 800.387.6649  
International – 706.854.4054

email USA – [standard.distributors@gfii.com](mailto:standard.distributors@gfii.com)  
National Accounts – [national.distributors@gfii.com](mailto:national.distributors@gfii.com)  
Canada – [canada.distributors@gfii.com](mailto:canada.distributors@gfii.com)  
International – [international.distributors@gfii.com](mailto:international.distributors@gfii.com)  
Technical Support – [greenfield.information@gfii.com](mailto:greenfield.information@gfii.com)



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