

# Rotary Tool Blanks



Cemented carbide blanks  
for drills and end mills



**HYPERION**  
Materials & Technologies

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# HYPERION ROTARY TOOL BLANKS

## EXCEEDING INDUSTRY STANDARDS WITH ADVANCED SPECIFICATION TECHNOLOGY

Hyperion rotary tool blanks bring to the metal cutting market an exclusive combination of superior grades and dimensional precision that provides to our customers the features and benefits required for demanding machining.

### RELIABILITY AND CONSISTENCY

Hyperion is proud of its unique position in which we maintain full control and complete traceability of our products from the mining of raw materials to delivering finished rotary tool blanks. During this fully integrated process, we maintain strict and robust statistical process controls (SPC) with the objective of targeting a process capability index (Cpk)  $\geq 1.3$ . The Cpk can be defined as the ability of a process to produce output within specification limits. As an example, a Cpk of 0.67 indicates the statistical probability of a batch containing 30.9% of parts that do not meet specification. Hyperion's target is a Cpk of 1.3, which indicates a 0.62% probability of delivering parts out of specification.

| SIGMA | Cpk  | % GOOD PARTS | % BAD PARTS |
|-------|------|--------------|-------------|
| 2     | 0.67 | 69.10        | 30.90       |
| 3     | 1    | 93.32        | 6.68        |
| 4     | 1.33 | 99.38        | 0.62        |
| 5     | 1.67 | 99.98        | 0.02        |
| 6     | 2    | 99.999       | 0.00034     |

This capability directly drives the performance of our customers' finished products. The use of Hyperion rotary tool blanks means secured consistency, performance, and reliability.

## ADVANTAGES OF HYPERION AS YOUR ROTARY TOOL BLANK SUPPLIER

- Batch-to-batch consistency
- Long tool life
- Best tolerances in the market
- Reliable premium substrates
- Ability to predict tool life
- Ability to absorb process variances and work piece imperfections
- Cpk > 1.3
- From 3 to 6 Sigma
- Minimum standard deviation
- Robust process SPC.

# HYPERION ROTARY TOOL BLANKS

## EXCEEDING INDUSTRY STANDARDS WITH ADVANCED SPECIFICATION TECHNOLOGY

Hyperion is proud to set the industry standard for geometric tolerances. The precision that we deliver directly influences runout, a key feature in the finished tool performance.

### RUNOUT

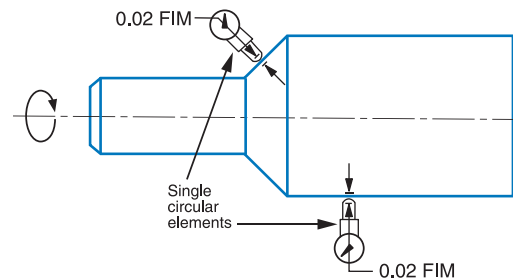
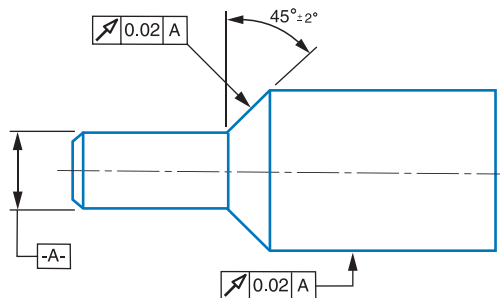
Runout can be defined as the summary of errors in dimensional tolerances when manufacturing a rotary tool blank. The following description from AMSE/ANSI Y14.5M-1982 further describes this critical tolerance.

“At any measuring position, each circular element of these surfaces must be within the specified runout tolerance (0.02 full indicator movement) when the part is rotated 360° about the axis with the indicator fixed in a position normal to the true geometric shape. (This controls only the circular elements of the surfaces, not the total surfaces.)”

Hyperion's industry leading rotary tool blank runout tolerances are consistent from batch-to-batch as shown in the following table:

| ROTARY TOOL BLANK LENGTH (in) | RUNOUT MAXIMUM (in) |
|-------------------------------|---------------------|
| 1.5 to 1.5                    | 0.0002              |
| >2.5 to 3.5                   | 0.0003              |
| >3.5 to 11.5                  | 0.0004              |

## SPECIFYING CIRCULAR RUNOUT



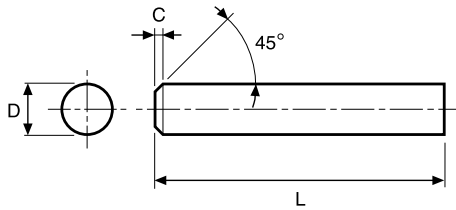
FIM = Full Indicator Movement



# SOLID BLANKS

END MILL BLANKS WITH CHAMFER, GROUND TO HYPERION NEW TOLERANCE WITH A POLISHED FINISH, FIXED LENGTHS (inch)

RU GI



**DIAMETER (in):**  
 1/8 to < 3/4  
 ≥ 3/4 to < 1-1/8  
 ≥ 1-1/8 to 2

**TOLERANCE (in):**  
 -0.00010 to -0.00030  
 -0.00010 to -0.00035  
 -0.00010 to -0.00040

**LENGTH (in):**  
 ≤ 2.005  
 ≥ 2.255 to ≤ 2.755  
 ≥ 3.005

**TOLERANCE (in):**  
 -0 / +0.031  
 -0 / +0.050  
 -0 / +0.060

**SURFACE FINISH:**  
 < 0.4375 in 0.05 Ra  
 ≥ 0.4375 in 0.10 Ra

## RUNOUT TOLERANCE

| RTB Length (in) | Runout Maximum (in) |
|-----------------|---------------------|
| 1.5 to 2.5      | 0.0002              |
| >2.5 to 3.5     | 0.0003              |
| >3.5 to 11.5    | 0.0004              |

Standard in Grade H10F. Additional grades are available upon request.

## ORDERING EXAMPLE:

To order a 1/2 in (D) x 5 in (L) rod in Grade H10F  
 RU GI 0500 05005 6UH10F

To order a 1/2 in (D) x 5 in (L) rod in Grade H12F  
 RU GI 0500 05005 6UH12F

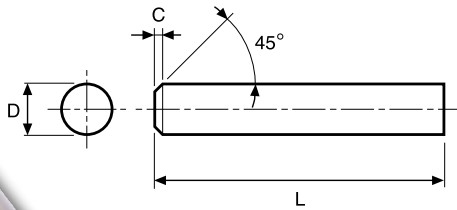
All product supply is subject to local minimum order criteria.

| DIMENSIONS |        |                   | HYPERION CODE      |
|------------|--------|-------------------|--------------------|
| D (in)     | L (in) | Chamfer Size (in) |                    |
| 0.1250     | 1.505  | 0.011             | RU GI 012501505 6S |
| 0.1250     | 2.005  | 0.011             | RU GI 012502005 6S |
| 0.1250     | 3.005  | 0.011             | RU GI 012503005 6U |
| 0.1875     | 1.505  | 0.011             | RU GI 018751505 6S |
| 0.1875     | 2.005  | 0.011             | RU GI 018752005 6S |
| 0.1875     | 2.505  | 0.011             | RU GI 018752505 6T |
| 0.1875     | 3.005  | 0.011             | RU GI 018753005 6U |
| 0.1875     | 4.005  | 0.011             | RU GI 018754005 6U |
| 0.2500     | 2.005  | 0.011             | RU GI 025002005 6S |
| 0.2500     | 2.505  | 0.011             | RU GI 025002505 6T |
| 0.2500     | 3.005  | 0.011             | RU GI 025003005 6U |
| 0.2500     | 4.005  | 0.011             | RU GI 025004005 6U |
| 0.3125     | 2.005  | 0.011             | RU GI 031252005 6S |
| 0.3125     | 2.505  | 0.011             | RU GI 031252505 6T |
| 0.3125     | 3.005  | 0.011             | RU GI 031253005 6U |
| 0.3125     | 3.505  | 0.011             | RU GI 031253505 6U |
| 0.3125     | 4.005  | 0.011             | RU GI 031254005 6U |
| 0.3750     | 2.005  | 0.011             | RU GI 037502005 6S |
| 0.3750     | 2.505  | 0.011             | RU GI 037502505 6T |
| 0.3750     | 3.005  | 0.011             | RU GI 037503005 6U |
| 0.3750     | 3.505  | 0.011             | RU GI 037503505 6U |
| 0.3750     | 4.005  | 0.011             | RU GI 037504005 6U |
| 0.4375     | 2.505  | 0.023             | RU GI 043752505 6T |
| 0.4375     | 2.755  | 0.023             | RU GI 043752755 6U |
| 0.4375     | 3.005  | 0.023             | RU GI 043753005 6U |
| 0.4375     | 4.005  | 0.023             | RU GI 043754005 6U |
| 0.4375     | 4.505  | 0.023             | RU GI 043754505 6U |
| 0.5000     | 2.505  | 0.023             | RU GI 050002505 6T |
| 0.5000     | 3.005  | 0.023             | RU GI 050003005 6U |
| 0.5000     | 3.505  | 0.023             | RU GI 050003505 6U |
| 0.5000     | 4.005  | 0.023             | RU GI 050004005 6U |
| 0.5000     | 4.505  | 0.023             | RU GI 050004505 6U |
| 0.5000     | 5.005  | 0.023             | RU GI 050005005 6U |
| 0.5000     | 6.005  | 0.023             | RU GI 050006005 6U |
| 0.5625     | 3.505  | 0.023             | RU GI 056253505 6U |
| 0.6250     | 3.005  | 0.023             | RU GI 062503005 6U |
| 0.6250     | 3.505  | 0.023             | RU GI 062503505 6U |
| 0.6250     | 4.005  | 0.023             | RU GI 062504005 6U |
| 0.6250     | 5.005  | 0.023             | RU GI 062505005 6U |
| 0.6250     | 6.005  | 0.023             | RU GI 062506005 6U |
| 0.7500     | 3.005  | 0.023             | RU GI 075003005 6U |
| 0.7500     | 4.005  | 0.023             | RU GI 075004005 6U |
| 0.7500     | 5.005  | 0.023             | RU GI 075005005 6U |
| 0.7500     | 6.005  | 0.023             | RU GI 075006005 6U |
| 0.8750     | 4.005  | 0.023             | RU GI 087504005 6U |
| 1.0000     | 3.005  | 0.031             | RU GI 100003005 6U |
| 1.0000     | 4.005  | 0.031             | RU GI 100004005 6U |
| 1.0000     | 5.005  | 0.031             | RU GI 100005005 6U |
| 1.0000     | 6.005  | 0.031             | RU GI 100006005 6U |
| 1.0000     | 7.005  | 0.031             | RU GI 100007005 6U |

# SOLID BLANKS

END MILL BLANKS WITH CHAMFER, GROUND TO ISO h6 TOLERANCE  
WITH A POLISHED FINISH, SUPPORTING DIN STANDARDS 6527 & 6528

## RU DM



### DIAMETER:

All

### LENGTH:

All

### TOLERANCE:

ISO h6

### TOLERANCE:

-0 / +1%

All sizes are in mm  
unless otherwise stated.

### SURFACE FINISH:

< 10 mm 0.05 Ra

≥ 10 mm 0.10 Ra

Standard in Grade H10F.  
Additional grades are  
available upon request.

| DIMENSIONS |        |                   | HYPERION CODE      |
|------------|--------|-------------------|--------------------|
| D (mm)     | L (mm) | Chamfer Size (mm) |                    |
| 3.00       | 39     | 0.30              | RU DM 0300 0390 6L |
| 4.00       | 51     | 0.40              | RU DM 0400 0510 6L |
| 5.00       | 51     | 0.40              | RU DM 0500 0510 6L |
| 6.00       | 50     | 0.40              | RU DM 0600 0500 6L |
| 6.00       | 51     | 0.40              | RU DM 0600 0510 6L |
| 6.00       | 55     | 0.40              | RU DM 0600 0550 6L |
| 6.00       | 58     | 0.40              | RU DM 0600 0580 6L |
| 7.00       | 61     | 0.60              | RU DM 0700 0610 6L |
| 8.00       | 59     | 0.60              | RU DM 0800 0590 6L |
| 8.00       | 64     | 0.60              | RU DM 0800 0640 6L |
| 8.00       | 80     | 0.60              | RU DM 0800 0800 6L |
| 10.00      | 67     | 0.60              | RU DM 1000 0670 6L |
| 10.00      | 70     | 0.60              | RU DM 1000 0700 6L |
| 10.00      | 73     | 0.60              | RU DM 1000 0730 6L |
| 10.00      | 89     | 0.60              | RU DM 1000 0890 6L |
| 11.00      | 84     | 0.80              | RU DM 1100 0840 6L |
| 12.00      | 74     | 0.80              | RU DM 1200 0740 6L |
| 12.00      | 80     | 0.80              | RU DM 1200 0800 6L |
| 12.00      | 84     | 0.80              | RU DM 1200 0840 6L |
| 12.00      | 94     | 0.80              | RU DM 1200 0940 6L |
| 12.00      | 100    | 0.80              | RU DM 1200 1000 6L |
| 12.00      | 150    | 0.80              | RU DM 1200 1500 6L |
| 14.00      | 76     | 0.80              | RU DM 1400 0760 6L |
| 14.00      | 84     | 0.80              | RU DM 1400 0840 6L |
| 14.00      | 89     | 0.80              | RU DM 1400 0890 6L |
| 16.00      | 83     | 0.80              | RU DM 1600 0830 6L |
| 16.00      | 90     | 0.80              | RU DM 1600 0900 6L |
| 16.00      | 93     | 0.80              | RU DM 1600 0930 6L |
| 16.00      | 100    | 0.80              | RU DM 1600 1000 6L |
| 16.00      | 109    | 0.80              | RU DM 1600 1090 6L |
| 16.00      | 115    | 0.80              | RU DM 1600 1150 6L |
| 16.00      | 125    | 0.80              | RU DM 1600 1250 6L |
| 16.00      | 150    | 0.80              | RU DM 1600 1500 6L |
| 18.00      | 85     | 1.00              | RU DM 1800 0850 6L |
| 18.00      | 93     | 1.00              | RU DM 1800 0930 6L |
| 20.00      | 93     | 1.00              | RU DM 2000 0930 6L |
| 20.00      | 105    | 1.00              | RU DM 2000 1050 6L |
| 20.00      | 125    | 1.00              | RU DM 2000 1250 6L |
| 20.00      | 127    | 1.00              | RU DM 2000 1270 6L |
| 20.00      | 150    | 1.00              | RU DM 2000 1500 6L |
| 25.00      | 189.2  | 1.00              | RU DM 2500 1892 6L |

### ORDERING EXAMPLE:

To order a 6 mm (D) x 58 mm (L) blank in Grade H10F

RU DM 0600 0580 6LH10F

To order a 6 mm (D) x 58 mm (L) blank in Grade H12F

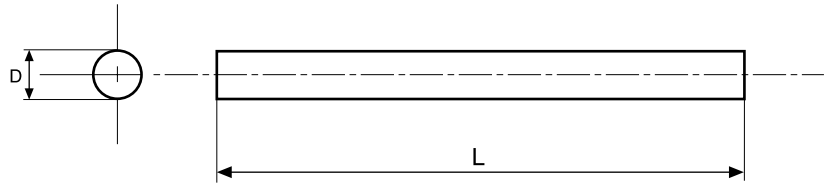
RU DM 0600 0580 6LH12F

All product supply is subject to local minimum order criteria.

## SOLID BLANKS

END MILL BLANKS, GROUND TO ISO h6 TOLERANCE WITH A POLISHED FINISH,  
100 mm LENGTH

RD GM



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 3.00       | 100    | RD GM 0300 1000 6L |
| 4.00       | 100    | RD GM 0400 1000 6L |
| 5.00       | 100    | RD GM 0500 1000 6L |
| 6.00       | 100    | RD GM 0600 1000 6L |
| 7.00       | 100    | RD GM 0700 1000 6L |
| 8.00       | 100    | RD GM 0800 1000 6L |
| 9.00       | 100    | RD GM 0900 1000 6L |
| 10.00      | 100    | RD GM 1000 1000 6L |
| 12.00      | 100    | RD GM 1200 1000 6L |
| 13.00      | 100    | RD GM 1300 1000 6L |
| 14.00      | 100    | RD GM 1400 1000 6L |
| 16.00      | 100    | RD GM 1600 1000 6L |
| 18.00      | 100    | RD GM 1800 1000 6L |
| 20.00      | 100    | RD GM 2000 1000 6L |

**DIAMETER:**  
All

**TOLERANCE:**  
ISO h6

**LENGTH:**  
All

**TOLERANCE:**  
-0 / +1%

All sizes are in mm unless otherwise stated.

### SURFACE FINISH:

< 10 mm 0.05 Ra

≥ 10 mm 0.10 Ra

Standard in Grade H10F. Additional  
grades are available upon request.

### ORDERING EXAMPLE:

To order an 8 mm (D) x 100 mm (L) blank in Grade H10F

RD GM 0800 1000 6LH10F

To order an 8 mm (D) x 100 mm (L) blank in Grade H12F

RD GM 0800 1000 6LH12F

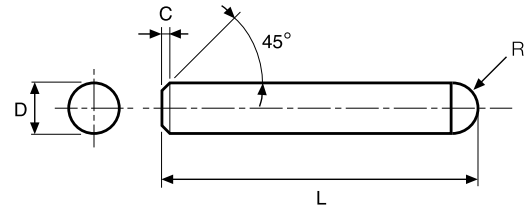
All product supply is subject to local minimum order criteria.



## SOLID BLANKS

**BALLNOSE BLANKS WITH CHAMFER, GROUND TO ISO h6 TOLERANCE  
WITH A POLISHED FINISH, FIXED LENGTHS (inch)**

**RY GI**



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (in)     | L (in) |                    |
| 0.2500     | 2.005  | RY GI 025002005 6S |
| 0.2500     | 2.505  | RY GI 025002505 6T |
| 0.3125     | 2.005  | RY GI 031252005 6S |
| 0.3125     | 2.505  | RY GI 031252505 6T |
| 0.3750     | 2.505  | RY GI 037502505 6T |
| 0.3750     | 3.005  | RY GI 037503005 6U |
| 0.3750     | 4.005  | RY GI 037504005 6U |
| 0.4375     | 2.755  | RY GI 043752755 6U |
| 0.5000     | 3.005  | RY GI 050003005 6U |
| 0.5000     | 4.005  | RY GI 050004005 6U |
| 0.6250     | 3.505  | RY GI 062503505 6U |
| 0.7500     | 4.005  | RY GI 075004005 6U |
| 1.0000     | 4.005  | RY GI 100004005 6U |

### DIAMETER:

All

### TOLERANCE:

ISO h6

### LENGTH (in):

≤ 2.005

≥ 2.255 to ≤ 2.755

≥ 3.005

### TOLERANCE (in):

-0 / +0.031

-0 / +0.050

-0 / +0.060

### SURFACE FINISH:

< 0.4375 in 0.05 Ra

≥ 0.4375 in 0.10 Ra

Standard in Grade H10F. Additional grades are available upon request.

### ORDERING EXAMPLE:

To order a 1/2 in (D) x 4 in (L) rod in Grade H10F

RU GI 050004005 6UH10F

To order a 1/2 in (D) x 4 in (L) rod in Grade DM80

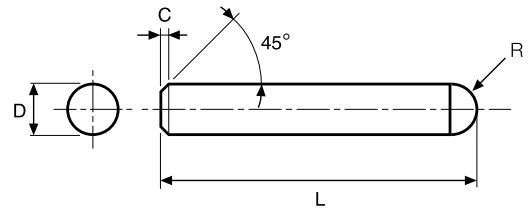
RU GI 0500 04005 6UDM80

All product supply is subject to local minimum order criteria.

# SOLID BLANKS

**BALLNOSE BLANKS WITH CHAMFER, GROUND TO ISO h6 TOLERANCE  
WITH A POLISHED FINISH, FIXED LENGTHS**

**RY DM**



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 6.00       | 58     | RY DM 0600 0580 6L |
| 8.00       | 64     | RY DM 0800 0640 6L |
| 10.00      | 73     | RY DM 1000 0730 6L |
| 12.00      | 84     | RY DM 1200 0840 6L |
| 14.00      | 84     | RY DM 1400 0840 6L |
| 16.00      | 93     | RY DM 1600 0930 6L |
| 18.00      | 93     | RY DM 1800 0930 6L |
| 20.00      | 105    | RY DM 2000 1050 6L |

**DIAMETER:**  
All

**TOLERANCE:**  
ISO h6

**LENGTH:**  
All

**TOLERANCE:**  
-0 / +1%

All sizes are in mm unless otherwise stated.

## **SURFACE FINISH:**

< 10 mm 0.05 Ra

≥ 10 mm 0.10 Ra

Standard in Grade H10F. Additional  
grades are available upon request.

## **ORDERING EXAMPLE:**

To order a 6 mm (D) x 58 mm (L) blank in Grade H10F

RY DM 0600 0580 6LH10F

To order a 6 mm (D) x 58 mm (L) blank in Grade DM80

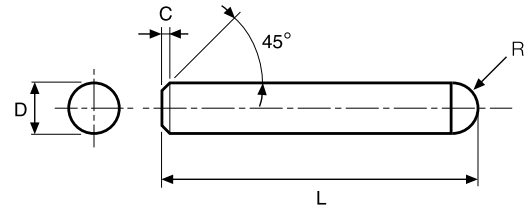
RY DM 0600 0580 6LDM80

All product supply is subject to local minimum order criteria.

## SOLID BLANKS

BALLNOSE BLANKS WITH CHAMFER, GROUND TO ISO h6 TOLERANCE  
WITH A POLISHED FINISH, 100 mm LENGTH

RY GM



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 6.00       | 100    | RY GM 0600 1000 6L |
| 8.00       | 100    | RY GM 0800 1000 6L |
| 10.00      | 100    | RY GM 1000 1000 6L |
| 12.00      | 100    | RY GM 1200 1000 6L |
| 14.00      | 100    | RY GM 1400 1000 6L |
| 16.00      | 100    | RY GM 1600 1000 6L |
| 25.00      | 100    | RY GM 2500 1000 6L |

**DIAMETER:**  
All

**TOLERANCE:**  
ISO h6

**LENGTH:**  
All

**TOLERANCE:**  
-0 / +1%

All sizes are in mm unless otherwise stated.

### SURFACE FINISH:

< 10 mm 0.05 Ra

≥ 10 mm 0.10 Ra

Standard in Grade H10F. Additional  
grades are available upon request.

### ORDERING EXAMPLE:

To order a 6 mm (D) x 58 mm (L) blank in Grade H10F

RY DM 0600 0580 6LH10F

To order a 6 mm (D) x 58 mm (L) blank in Grade DM80

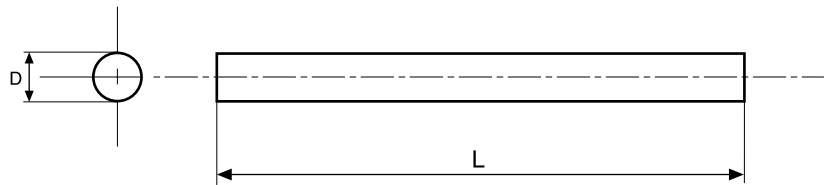
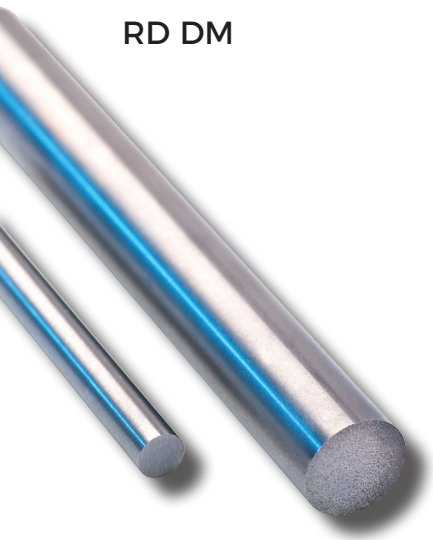
RY DM 0600 0580 6LDM80

All product supply is subject to local minimum order criteria.

# SOLID BLANKS

END MILL BLANKS, OPEN TOLERANCE GROUND,  
SUPPORTING DIN STANDARDS 6527 & 6528

RD DM



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 3.10       | 39     | RD DM 0310 0390 HL |
| 4.10       | 51     | RD DM 0410 0510 HL |
| 5.10       | 51     | RD DM 0510 0510 HL |
| 6.10       | 51     | RD DM 0610 0510 HL |
| 6.10       | 55     | RD DM 0610 0550 HL |
| 6.10       | 58     | RD DM 0610 0580 HL |
| 8.10       | 64     | RD DM 0810 0640 HL |
| 9.10       | 68     | RD DM 0910 0680 HL |
| 10.10      | 67     | RD DM 1010 0670 HL |
| 10.10      | 73     | RD DM 1010 0730 HL |
| 12.10      | 74     | RD DM 1210 0740 HL |
| 12.10      | 84     | RD DM 1210 0840 HL |
| 14.10      | 84     | RD DM 1410 0840 HL |
| 16.10      | 93     | RD DM 1610 0930 HL |
| 18.10      | 93     | RD DM 1810 0930 HL |
| 20.10      | 105    | RD DM 2010 1050 HL |

**DIAMETER:**  
All

**TOLERANCE (mm):**  
-0 / +0.1

**LENGTH:**  
All

**TOLERANCE:**  
-0 / +1 %

All sizes are in mm unless otherwise stated.

Standard in Grade H10F. Additional  
grades are available upon request.

## ORDERING EXAMPLE:

To order a 6.1 mm (D) x 58 mm (L) blank in Grade H10F  
RD DM 0610 0580 6LH10F

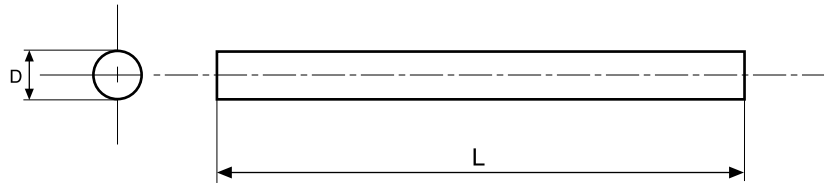
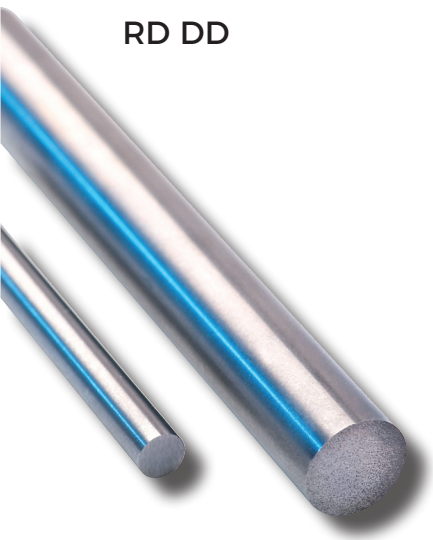
To order a 6.1 mm (D) x 58 mm (L) blank in Grade H12F  
RD DM 0610 0580 6LH12F

All product supply is subject to local minimum order criteria.

# SOLID BLANKS

DRILL BLANKS, OPEN TOLERANCE GROUND,  
SUPPORTING DIN STANDARD 6539

RD DD



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 3.10       | 46     | RD DD 0310 0460 HL |
| 3.10       | 61     | RD DD 0310 0610 HL |
| 3.40       | 49     | RD DD 0340 0490 HL |
| 3.40       | 65     | RD DD 0340 0650 HL |
| 3.80       | 52     | RD DD 0380 0520 HL |
| 4.10       | 55     | RD DD 0410 0550 HL |
| 4.10       | 75     | RD DD 0410 0750 HL |
| 4.30       | 55     | RD DD 0430 0550 HL |
| 4.60       | 58     | RD DD 0460 0580 HL |
| 4.60       | 80     | RD DD 0460 0800 HL |
| 4.80       | 58     | RD DD 0480 0580 HL |
| 4.80       | 80     | RD DD 0480 0800 HL |
| 5.10       | 62     | RD DD 0510 0620 HL |
| 5.40       | 62     | RD DD 0540 0620 HL |
| 5.70       | 66     | RD DD 0570 0660 HL |
| 6.10       | 66     | RD DD 0610 0660 HL |
| 6.40       | 70     | RD DD 0640 0700 HL |
| 6.40       | 101    | RD DD 0640 1010 HL |
| 6.60       | 70     | RD DD 0660 0700 HL |
| 6.60       | 101    | RD DD 0660 1010 HL |
| 6.80       | 70     | RD DD 0680 0700 HL |
| 7.10       | 74     | RD DD 0710 0740 HL |
| 7.60       | 74     | RD DD 0760 0740 HL |
| 8.10       | 79     | RD DD 0810 0790 HL |
| 8.60       | 79     | RD DD 0860 0790 HL |
| 9.10       | 84     | RD DD 0910 0840 HL |
| 9.60       | 84     | RD DD 0960 0840 HL |
| 10.10      | 89     | RD DD 1010 0890 HL |
| 10.30      | 89     | RD DD 1030 0890 HL |
| 11.10      | 95     | RD DD 1110 0950 HL |
| 11.60      | 95     | RD DD 1160 0950 HL |
| 11.90      | 95     | RD DD 1190 0950 HL |
| 12.30      | 102    | RD DD 1230 1020 HL |
| 12.70      | 102    | RD DD 1270 1020 HL |
| 13.30      | 102    | RD DD 1330 1020 HL |
| 13.60      | 107    | RD DD 1360 1070 HL |
| 14.10      | 107    | RD DD 1410 1070 HL |
| 14.60      | 111    | RD DD 1460 1110 HL |
| 15.10      | 111    | RD DD 1510 1110 HL |
| 15.60      | 115    | RD DD 1560 1150 HL |
| 16.10      | 115    | RD DD 1610 1150 HL |

**DIAMETER:** All  
**TOLERANCE (mm):** -0 / +0.1

**LENGTH:** All  
**TOLERANCE:** -0 / +1%

All sizes are in mm unless otherwise stated.

Standard in Grade H10F.  
Additional grades are  
available upon request.

## ORDERING EXAMPLE:

To order a 6.1 mm (D) x 66 mm (L)  
blank in Grade H10F

RD DD 0610 0660 6LH10F

To order a 6.1 mm (D) x 66 mm (L)  
blank in Grade H12F

RD DD 0610 0660 6LH12F

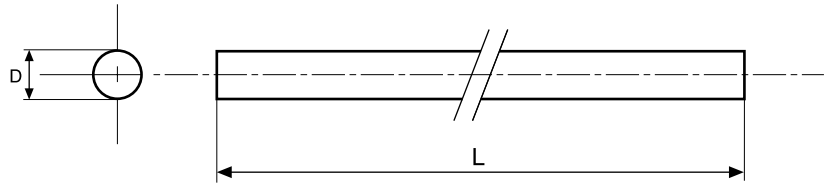
All product supply is subject to local minimum order criteria.



# SOLID BLANKS

LONG RODS, GROUND TO ISO h6 TOLERANCE WITH A POLISHED FINISH,  
320 mm LENGTH

RD SR



**DIAMETER:**  
All

**TOLERANCE:**  
ISO h6

**LENGTH:**  
All

**TOLERANCE (mm):**  
-0 / +6

All sizes are in mm unless otherwise stated.

**SURFACE FINISH:**  
< 10 mm 0.05 Ra  
≥ 10 mm 0.10 Ra

## RUNOUT TOLERANCE

| RTB Diameter (mm) | Runout Maximum (mm) |
|-------------------|---------------------|
| 3 to 5            | 0.07                |
| 6 to 10           | 0.05                |
| >10               | 0.03                |

Standard in Grade H10F. Additional grades are available upon request.

## ORDERING EXAMPLE:

To order a 3 mm (D) x 320 mm (L) rod in Grade H10F  
RD SR 0300 3200 6WH10F

To order a 3 mm (D) x 320 mm (L) rod in Grade DM80  
RD SR 0300 3200 6WDM80

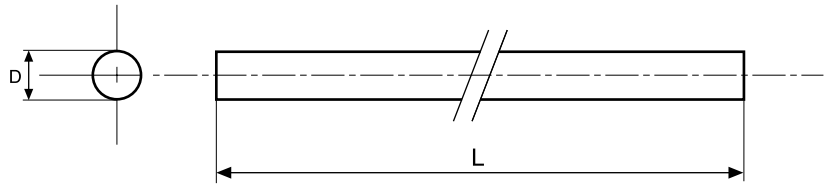
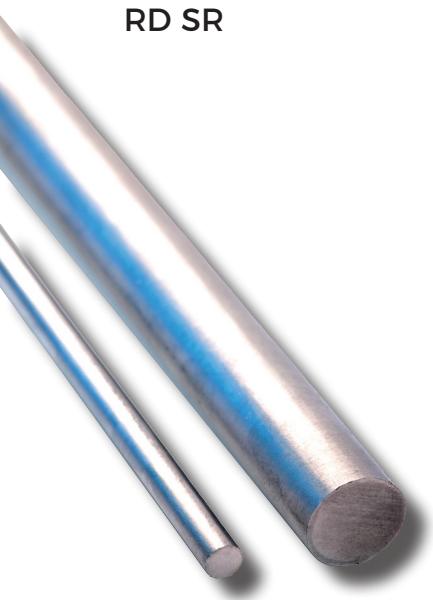
All product supply is subject to local minimum order criteria.

| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 3.00       | 320    | RD SR 0300 3200 6W |
| 4.00       | 320    | RD SR 0400 3200 6W |
| 5.00       | 320    | RD SR 0500 3200 6W |
| 6.00       | 320    | RD SR 0600 3200 6W |
| 6.50       | 320    | RD SR 0650 3200 6W |
| 7.00       | 320    | RD SR 0700 3200 6W |
| 7.50       | 320    | RD SR 0750 3200 6W |
| 8.00       | 320    | RD SR 0800 3200 6W |
| 9.00       | 320    | RD SR 0900 3200 6W |
| 10.00      | 320    | RD SR 1000 3200 6W |
| 11.00      | 320    | RD SR 1100 3200 6W |
| 12.00      | 320    | RD SR 1200 3200 6W |
| 13.00      | 320    | RD SR 1300 3200 6W |
| 14.00      | 320    | RD SR 1400 3200 6W |
| 15.00      | 320    | RD SR 1500 3200 6W |
| 16.00      | 320    | RD SR 1600 3200 6W |
| 18.00      | 320    | RD SR 1800 3200 6W |
| 20.00      | 320    | RD SR 2000 3200 6W |
| 21.00      | 320    | RD SR 2100 3200 6W |
| 22.00      | 320    | RD SR 2200 3200 6W |
| 23.00      | 320    | RD SR 2300 3200 6W |
| 24.00      | 320    | RD SR 2400 3200 6W |
| 25.00      | 320    | RD SR 2500 3200 6W |
| 26.00      | 320    | RD SR 2600 3200 6W |
| 27.00      | 320    | RD SR 2700 3200 6W |
| 29.00      | 320    | RD SR 2900 3200 6W |
| 30.00      | 320    | RD SR 3000 3200 6W |
| 32.00      | 320    | RD SR 3200 3200 6W |

# SOLID BLANKS

## LONG RODS, OPEN TOLERANCE, 320 mm LENGTH

RD SR



**DIAMETER (mm):**    **TOLERANCE (mm):**  
1.1 to 5.8            -0 / +0.15  
6.2 to 8.2            -0 / +0.20  
8.8 to 38.5           -0 / +0.40

**LENGTH:**            **TOLERANCE (mm):**  
All                      -0 / +6

All sizes are in mm unless otherwise stated.

Standard in Grade H10F. Additional grades are available upon request.

### ORDERING EXAMPLE:

To order a 3.2 mm (D) x 320 mm (L) rod in Grade H10F  
RD SR 0320 3200 EWH10F

To order a 3.2 mm (D) x 320 mm (L) rod in Grade DM80  
RD SR 0320 3200 EWD80

All product supply is subject to local minimum order criteria.

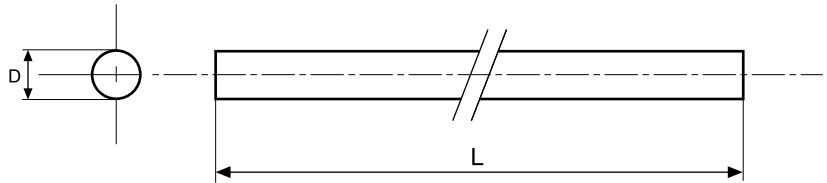
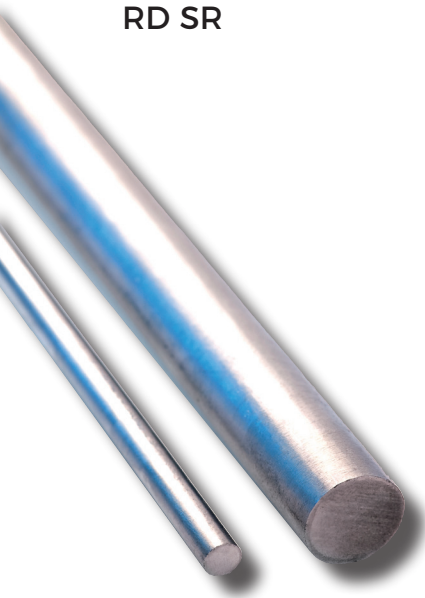
| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 1.10       | 320    | RD SR 0110 3200 EW |
| 1.30       | 320    | RD SR 0130 3200 EW |
| 1.70       | 320    | RD SR 0170 3200 EW |
| 2.20       | 320    | RD SR 0220 3200 EW |
| 2.50       | 320    | RD SR 0250 3200 EW |
| 2.70       | 320    | RD SR 0270 3200 EW |
| 3.20       | 320    | RD SR 0320 3200 EW |
| 3.40       | 320    | RD SR 0340 3200 EW |
| 3.70       | 320    | RD SR 0370 3200 EW |
| 4.20       | 320    | RD SR 0420 3200 EW |
| 4.70       | 320    | RD SR 0470 3200 EW |
| 5.20       | 320    | RD SR 0520 3200 EW |
| 5.70       | 320    | RD SR 0570 3200 EW |
| 6.20       | 320    | RD SR 0620 3200 DW |
| 6.55       | 320    | RD SR 0655 3200 DW |
| 6.70       | 320    | RD SR 0670 3200 DW |
| 7.20       | 320    | RD SR 0720 3200 DW |
| 7.70       | 320    | RD SR 0770 3200 DW |
| 8.20       | 320    | RD SR 0820 3200 DW |
| 8.80       | 320    | RD SR 0880 3200 CW |
| 9.05       | 320    | RD SR 0905 3200 CW |
| 9.30       | 320    | RD SR 0930 3200 CW |
| 9.80       | 320    | RD SR 0980 3200 CW |
| 10.30      | 320    | RD SR 1030 3200 CW |
| 10.80      | 320    | RD SR 1080 3200 CW |
| 11.30      | 320    | RD SR 1130 3200 CW |
| 11.50      | 320    | RD SR 1150 3200 CW |
| 11.80      | 320    | RD SR 1180 3200 CW |
| 12.30      | 320    | RD SR 1230 3200 CW |
| 12.80      | 320    | RD SR 1280 3200 CW |

To be continued on the next page →

# SOLID BLANKS

## LONG RODS, OPEN TOLERANCE, 320 mm LENGTH

RD SR



| DIMENSIONS |        | HYPERION CODE      |
|------------|--------|--------------------|
| D (mm)     | L (mm) |                    |
| 13.10      | 320    | RD SR 1310 3200 CW |
| 13.80      | 320    | RD SR 1380 3200 CW |
| 14.30      | 320    | RD SR 1430 3200 CW |
| 14.60      | 320    | RD SR 1460 3200 CW |
| 14.80      | 320    | RD SR 1480 3200 CW |
| 15.30      | 320    | RD SR 1530 3200 CW |
| 15.80      | 320    | RD SR 1580 3200 CW |
| 16.30      | 320    | RD SR 1630 3200 CW |
| 16.80      | 320    | RD SR 1680 3200 CW |
| 17.30      | 320    | RD SR 1730 3200 CW |
| 17.80      | 320    | RD SR 1780 3200 CW |
| 18.30      | 320    | RD SR 1830 3200 CW |
| 19.30      | 320    | RD SR 1930 3200 CW |
| 20.30      | 320    | RD SR 2030 3200 CW |
| 21.00      | 320    | RD SR 2100 3200 CW |
| 21.30      | 320    | RD SR 2130 3200 CW |
| 22.30      | 320    | RD SR 2230 3200 CW |
| 22.50      | 320    | RD SR 2250 3200 CW |
| 23.30      | 320    | RD SR 2330 3200 CW |
| 24.30      | 320    | RD SR 2430 3200 CW |
| 25.30      | 320    | RD SR 2530 3200 CW |
| 25.80      | 320    | RD SR 2580 3200 CW |
| 26.30      | 320    | RD SR 2630 3200 CW |
| 27.30      | 320    | RD SR 2730 3200 CW |
| 28.30      | 320    | RD SR 2830 3200 CW |
| 29.30      | 320    | RD SR 2930 3200 CW |
| 30.30      | 320    | RD SR 3030 3200 CW |
| 32.30      | 320    | RD SR 3230 3200 CW |
| 38.50      | 320    | RD SR 3850 3200 CW |

**DIAMETER (mm):** **TOLERANCE (mm):**  
 1.1 to 5.8 -0 / +0.15  
 6.2 to 8.2 -0 / +0.20  
 8.8 to 38.5 -0 / +0.40

**LENGTH:** **TOLERANCE (mm):**  
 All -0 / +6

All sizes are in mm unless otherwise stated.

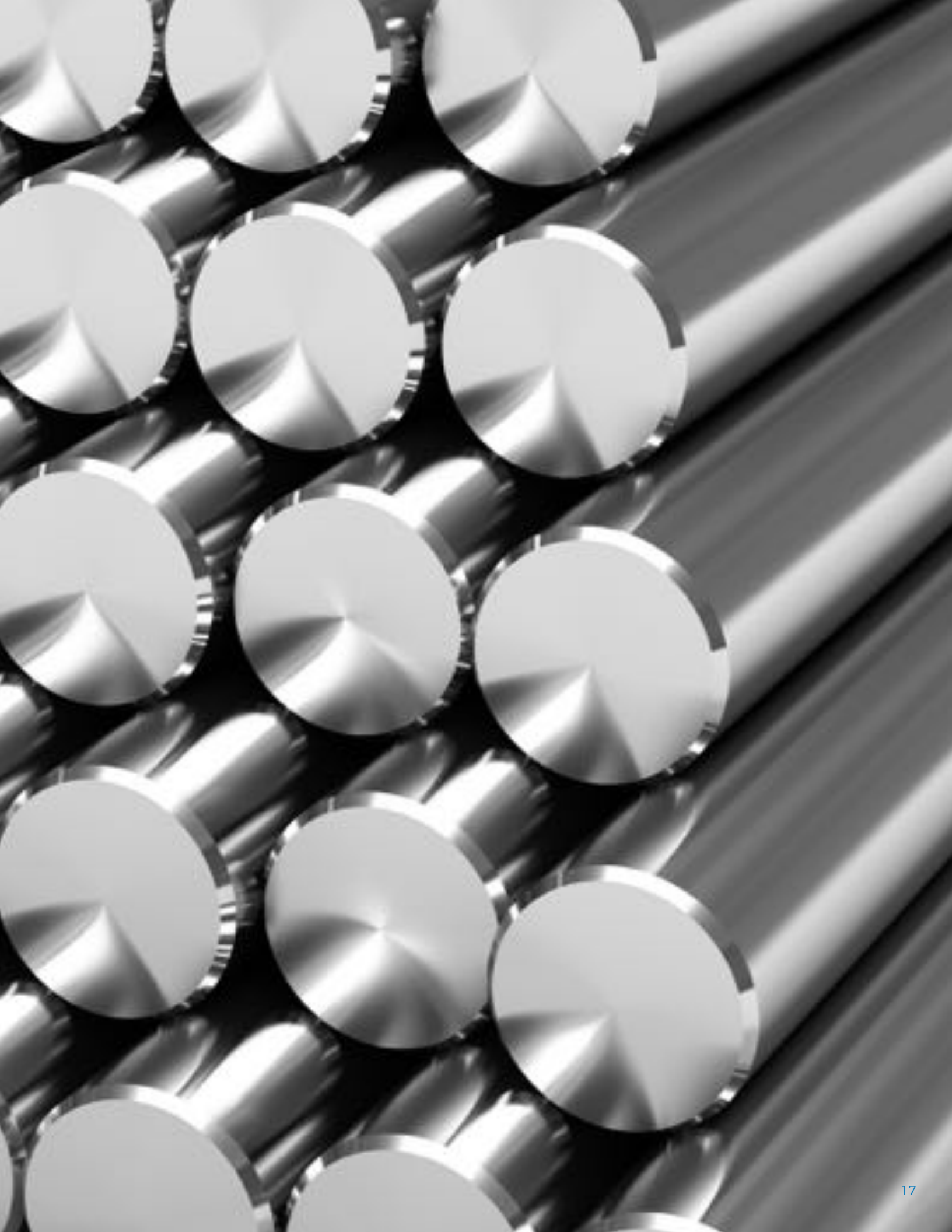
Standard in Grade H10F.  
 Additional grades are  
 available upon request.

### ORDERING EXAMPLE:

To order a 3.2 mm (D) x 320 mm (L) rod in Grade H10F  
 RD SR 0320 3200 EWH10F

To order a 3.2 mm (D) x 320 mm (L) rod in Grade DM80  
 RD SR 0320 3200 EWDM80

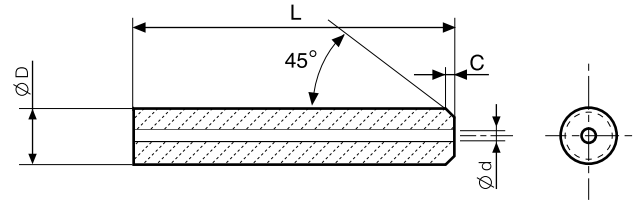
All product supply is subject to local minimum order criteria.



# COOLANT BLANKS

COOLANT CHANNEL BLANKS WITH CHAMFER, SINGLE STRAIGHT HOLE,  
GROUND TO ISO h6 TOLERANCE WITH A POLISHED FINISH, FIXED LENGTHS

RM U1



| DIMENSIONS |           |                      |                               |                                    | HYPERION CODE        |
|------------|-----------|----------------------|-------------------------------|------------------------------------|----------------------|
| D<br>(mm)  | L<br>(mm) | Chamfer<br>Size (mm) | Coolant Hole<br>Diameter (mm) | Coolant Hole<br>Tolerance (+/- mm) |                      |
| 6.00       | 55.2      | 0.40                 | 1.00                          | 0.15                               | RMU1M-0600-0552S--6L |
| 6.00       | 58.2      | 0.40                 | 1.00                          | 0.15                               | RMU1M-0600-0582S--6L |
| 8.00       | 59.2      | 0.60                 | 1.30                          | 0.15                               | RMU1M-0800-0592S--6L |
| 8.00       | 64.2      | 0.60                 | 1.30                          | 0.15                               | RMU1M-0800-0642S--6L |
| 10.00      | 67.2      | 0.60                 | 1.50                          | 0.20                               | RMU1M-1000-0672S--6L |
| 10.00      | 73.2      | 0.60                 | 1.50                          | 0.20                               | RMU1M-1000-0732S--6L |
| 12.00      | 74        | 0.80                 | 2.00                          | 0.25                               | RMU1M-1200-0740S--6L |
| 12.00      | 84        | 0.80                 | 2.00                          | 0.25                               | RMU1M-1200-0840S--6L |
| 14.00      | 76        | 0.80                 | 2.00                          | 0.25                               | RMU1M-1400-0760S--6L |
| 14.00      | 84        | 0.80                 | 2.00                          | 0.25                               | RMU1M-1400-0840S--6L |
| 16.00      | 83        | 0.80                 | 2.50                          | 0.25                               | RMU1M-1600-0830S--6L |
| 16.00      | 93        | 0.80                 | 2.50                          | 0.25                               | RMU1M-1600-0930S--6L |
| 18.00      | 85        | 1.00                 | 3.00                          | 0.25                               | RMU1M-1800-0850S--6L |
| 18.00      | 93        | 1.00                 | 3.00                          | 0.25                               | RMU1M-1800-0930S--6L |
| 20.00      | 93        | 1.00                 | 3.00                          | 0.25                               | RMU1M-2000-0930S--6L |
| 20.00      | 105       | 1.00                 | 3.00                          | 0.25                               | RMU1M-2000-1050S--6L |
| 25.00      | 122.2     | 1.00                 | 3.00                          | 0.25                               | RMU1M-2500-1222S--6L |

## DIAMETER:

All

## TOLERANCE:

ISO h6

## LENGTH:

All

## TOLERANCE:

-0 / +1%

All sizes are in mm unless otherwise stated.

Standard in Grade H10F. Additional  
grades are available upon request.

## ORDERING EXAMPLE:

To order a 10 mm (D) x 73 mm (L) blank in Grade H10F

RMU1M-1000-0732S--6LH10F

To order a 10 mm (D) x 73 mm (L) blank in Grade H12F

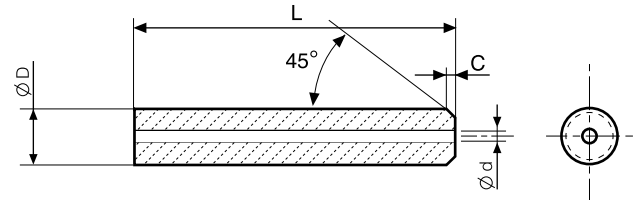
RMU1M-1000-0732S--6LH12F

All product supply is subject to local minimum order criteria.

## COOLANT BLANKS

COOLANT CHANNEL BLANKS WITH CHAMFER, SINGLE STRAIGHT HOLE,  
GROUND TO ISO h6 TOLERANCE WITH POLISHED FINISH, FIXED LENGTHS (inch)

RD U1



| DIMENSIONS |        |                   |                            |                                 | HYPERION CODE       |
|------------|--------|-------------------|----------------------------|---------------------------------|---------------------|
| D (in)     | L (in) | Chamfer Size (in) | Coolant Hole Diameter (in) | Coolant Hole Tolerance (+/- mm) |                     |
| 0.375      | 2.500  | 0.011             | 0.060                      | 0.008                           | RDU1 03750 02505 6L |
| 0.500      | 3.000  | 0.023             | 0.079                      | 0.010                           | RDU1 05000 03005 6L |
| 0.500      | 4.000  | 0.023             | 0.079                      | 0.010                           | RDU1 05000 04005 6L |
| 0.500      | 6.000  | 0.023             | 0.079                      | 0.010                           | RDU1 05000 06005 6L |
| 0.750      | 4.000  | 0.023             | 0.118                      | 0.010                           | RDU1 07500 04005 6L |
| 0.750      | 5.000  | 0.023             | 0.118                      | 0.010                           | RDU1 07500 05005 6L |
| 0.750      | 6.000  | 0.023             | 0.118                      | 0.010                           | RDU1 07500 06005 6L |
| 1.000      | 4.000  | 0.031             | 0.118                      | 0.010                           | RDU1 10000 04005 6L |
| 1.000      | 5.000  | 0.031             | 0.118                      | 0.010                           | RDU1 10000 05005 6L |
| 1.000      | 6.000  | 0.031             | 0.118                      | 0.010                           | RDU1 10000 06005 6L |

### DIAMETER:

All

### TOLERANCE:

ISO h6

### LENGTH (in):

≤ 2.000

≥ 2.250 to ≤ 2.750

≥ 3.000

### TOLERANCE (in)

-0 / +0.031

-0 / +0.050

-0 / +0.060

### SURFACE FINISH:

< 0.4375 in 0.05 Ra

≥ 0.4375 in 0.10 Ra

Standard in Grade H10F. Additional grades are available upon request.

### ORDERING EXAMPLE:

To order a 1/2 in (D) x 4 in (L) blank in Grade H10F

RDU1 05000 04005 6L H10F

All product supply is subject to local minimum order criteria.







# ISO MATERIAL CLASSIFICATION

## ISO MATERIAL CLASSIFICATION

| ISO        | CMC No. | MATERIAL                                    |                                    | SPECIFIC CUTTING FORCE $K_c$ 0.4 | HARDNESS BRINELL HB |
|------------|---------|---------------------------------------------|------------------------------------|----------------------------------|---------------------|
| P<br>STEEL |         |                                             |                                    | N/MM <sup>2</sup>                | HB                  |
|            | 01.1    | UNALLOYED STEEL                             | C = 0.1-0.25%                      | 2000                             | 125                 |
|            | 01.2    |                                             | C = 0.25-0.55%                     | 2100                             | 150                 |
|            | 01.3    |                                             | C = 0.55-0.80%                     | 2200                             | 170                 |
|            | 02.1    | LOW-ALLOY STEEL<br>(alloying elements ≤5%)  | Non-hardened                       | 2150                             | 180                 |
|            | 02.12   |                                             | Ball bearing steel                 | 2300                             | 210                 |
|            | 02.2    |                                             | Hardened and tempered              | 2550                             | 275                 |
|            | 02.2    |                                             | Hardened and tempered              | 2850                             | 350                 |
|            | 03.11   | HIGH-ALLOY STEEL<br>(alloying elements >5%) | Annealed                           | 2500                             | 200                 |
|            | 03.21   |                                             | Hardened tool steel                | 3900                             | 325                 |
|            |         |                                             |                                    |                                  |                     |
|            | 06.1    | STEEL CASTING                               | Unalloyed                          | 2000                             | 180                 |
|            | 06.2    |                                             | Low-alloy (alloying elements ≤5%)  | 2100                             | 200                 |
|            | 06.3    |                                             | High-alloy (alloying elements >5%) | 2650                             | 225                 |

| ISO                     | CMC No. | MATERIAL               |                  | SPECIFIC CUTTING FORCE K <sub>c</sub> 0.4 | HARDNESS BRINELL HB |     |
|-------------------------|---------|------------------------|------------------|-------------------------------------------|---------------------|-----|
| M<br>STAINLESS<br>STEEL |         |                        |                  | N/MM <sup>2</sup>                         | HB                  |     |
|                         | 05.11   | STAINLESS STEEL        | Non-hardened     | 2300                                      | 200                 |     |
|                         | 05.12   | -Bars/forged           | PH-hardened      | 3550                                      | 330                 |     |
|                         | 05.13   | Ferritic/martensitic   | Hardened         | 2850                                      | 330                 |     |
|                         |         |                        |                  |                                           |                     |     |
|                         | 05.21   | STAINLESS STEEL        | Austenitic       | 2300                                      | 180                 |     |
|                         | 05.22   | -Bars/forged           | PH-hardened      | 3550                                      | 330                 |     |
|                         | 05.23   | Austenitic             | Super austenitic | 2950                                      | 200                 |     |
|                         |         |                        |                  |                                           |                     |     |
|                         | 05.51   | STAINLESS STEEL        | Non-weldable     | ≥ 0.05% C                                 | 2550                | 230 |
|                         | 05.52   | -Bars/forged           | Weldable         | < 0.05% C                                 | 3050                | 260 |
|                         |         | Austenitic-ferritic    |                  |                                           |                     |     |
|                         |         | (Duplex)               |                  |                                           |                     |     |
|                         | 15.11   | Stainless steel - Cast | Non-hardened     | 2100                                      | 200                 |     |
|                         | 15.12   | Ferritic/martensitic   | PH-hardened      | 3150                                      | 330                 |     |
|                         | 15.13   |                        | Hardened         | 2650                                      | 330                 |     |
|                         | 15.21   | Stainless steel - Cast | Austenitic       | 2200                                      | 180                 |     |
|                         | 15.22   | Austenitic             | PH-hardened      | 3150                                      | 330                 |     |
|                         | 15.23   |                        | Super austenitic | 2700                                      | 200                 |     |
|                         | 15.51   | Stainless steel - Cast | Non-weldable     | ≥ 0.05% C                                 | 2250                | 230 |
|                         | 15.52   | Austenitic-ferritic    | Weldable         | < 0.05% C                                 | 2750                | 260 |
|                         |         | (Duplex)               |                  |                                           |                     |     |

# ISO MATERIAL CLASSIFICATION

| ISO                   | CMC No. | MATERIAL            |                           | SPECIFIC CUTTING FORCE K <sub>c</sub> 0.4 | HARDNESS BRINELL HB |
|-----------------------|---------|---------------------|---------------------------|-------------------------------------------|---------------------|
| <b>K</b><br>CAST IRON |         |                     |                           | N/MM <sup>2</sup>                         | HB                  |
|                       | 07.1    | MALLEABLE CAST IRON | Ferritic (short chipping) | 940                                       | 130                 |
|                       | 07.2    |                     | Pearlitic (long chipping) | 1100                                      | 230                 |
|                       | 08.1    | GREY CAST IRON      | Low tensile strength      | 1100                                      | 180                 |
|                       | 08.2    |                     | High tensile strength     | 1150                                      | 220                 |
|                       | 09.1    | NODULAR SG IRON     | Ferritic                  | 1050                                      | 160                 |
|                       | 09.2    |                     | Pearlitic                 | 1750                                      | 250                 |
|                       | 09.3    |                     | Martensitic               | 2700                                      | 380                 |

| ISO                            | CMC No. | MATERIAL                 |                                  | SPECIFIC CUTTING FORCE K <sub>c</sub> 0.4 | HARDNESS BRINELL HB |
|--------------------------------|---------|--------------------------|----------------------------------|-------------------------------------------|---------------------|
| <b>N</b><br>NON-FERROUS METALS |         |                          |                                  | N/MM <sup>2</sup>                         | HB                  |
|                                | 30.11   | ALUMINUM ALLOYS          | Wrought and coldworked           | 500                                       | 60                  |
|                                | 30.12   |                          | Non-aging                        | 800                                       | 100                 |
|                                |         |                          | Wrought or wrought and aged      |                                           |                     |
|                                | 30.21   | ALUMINUM ALLOYS          | Cast, non-aging                  | 750                                       | 75                  |
|                                | 30.22   |                          | Cast or cast and aged            | 900                                       | 90                  |
|                                | 30.41   | ALUMINUM ALLOYS          | Cast, 13-15% Si                  | 950                                       | 130                 |
|                                | 30.42   |                          | Cast, 16-22% Si                  | 950                                       | 130                 |
|                                | 33.1    | COPPER AND COPPER ALLOYS | Free cutting alloys, ≥ 1% Pb     | 700                                       | 110                 |
|                                | 33.2    |                          | Brass, leaded bronzes, ≤ 1% Pb   | 700                                       | 90                  |
|                                | 33.3    |                          | Bronze and non-lead copper incl. | 1750                                      | 100                 |
|                                |         |                          | Electrolytic copper              |                                           |                     |

| ISO                                 | CMC No. | MATERIAL                                             |                                   | SPECIFIC CUTTING FORCE K <sub>c</sub> 0.4 | HARDNESS BRINELL HB           |
|-------------------------------------|---------|------------------------------------------------------|-----------------------------------|-------------------------------------------|-------------------------------|
| <b>S</b><br>HEAT RESISTANT MATERIAL |         | HEAT RESISTANT SUPER ALLOYS                          |                                   | N/MM <sup>2</sup>                         | HB                            |
|                                     | 20.11   | IRON BASE                                            | Annealed or solution treated      | 3000                                      | 200                           |
|                                     | 20.12   |                                                      | Aged or solution treated and aged | 3050                                      | 280                           |
|                                     | 20.21   | NICKEL BASE                                          | Annealed or solution treated      | 3300                                      | 250                           |
|                                     | 20.22   |                                                      | Aged or solution treated and aged | 3600                                      | 350                           |
|                                     | 20.24   |                                                      | Cast or cast and aged             | 3700                                      | 320                           |
|                                     | 20.31   | COBALT BASE                                          | Annealed or solution treated      | 3300                                      | 200                           |
|                                     | 20.32   |                                                      | Aged or solution treated and aged | 3700                                      | 300                           |
|                                     | 20.33   |                                                      | Cast or cast and aged             | 3800                                      | 320                           |
|                                     |         | TITANIUM ALLOYS <sup>(1)</sup>                       |                                   |                                           | R <sub>m</sub> <sup>(2)</sup> |
|                                     | 23.10   | Commercial pure (99.5% Ti)                           |                                   | 1500                                      | 400                           |
|                                     | 23.21   | α, near α, and α+β alloys, annealed                  |                                   | 1700                                      | 950                           |
|                                     | 23.22   | α+β alloys in aged cond., β alloys, annealed or aged |                                   | 1700                                      | 1050                          |

(1) 45-60° entering angle, positive cutting geometry, and coolant should be used. (2) R<sub>m</sub> = ultimate tensile strength measured in MPa.

| ISO                           | CMC No. | MATERIAL          |                       | SPECIFIC CUTTING FORCE K <sub>c</sub> 0.4 | HARDNESS BRINELL HB |
|-------------------------------|---------|-------------------|-----------------------|-------------------------------------------|---------------------|
| <b>H</b><br>HARDENED MATERIAL |         |                   |                       | N/MM <sup>2</sup>                         | HB                  |
|                               | 04.1    | HARD STEEL        | Hardened and tempered | 3250                                      | 45 HRC              |
|                               |         |                   | Extra hard steel      | 5550                                      | 60 HRC              |
|                               | 10.1    | CHILLED CAST IRON | Cast or cast and aged | 2800                                      | 400                 |

# WEAR BEHAVIOR OF CARBIDE TOOLING

## ISO P 85-450 HB

All type of steels unalloyed, alloyed, and cast steel with exception of steel with austenitic structure.

### MACHINABILITY CHARACTERISTIC

Chip control is relatively easy and exhibits good machinability.

Built up edges (BUE), material smearing tendency, and heat zone increases with medium and high alloys (>10%).

### WEAR PROCESS

All materials in this group have typical crater and flank wear.

Generally thermal, chemical, and mechanical wear processes are equally balanced.

Cutting edge needs to withstand plastic deformation for low alloyed and higher alloys steels.

\*The machinability of materials varies, depending on alloying elements, heat treatment, and manufacturing process.

## ISO M 120-450 HB

Stainless steel austenitic, austenitic-ferrite steel, and cast steel (Duplex).

### MACHINABILITY CHARACTERISTIC

Machinability decreases with increase in alloying elements and exhibits high cutting forces and BUE.

Work hardening of material can result in strong adhesion and BUE.

### WEAR PROCESS

Cutting edges are exposed to a great deal of heat, notch wear, and BUE are common.

Plastic deformation, followed by crater and abrasive wear.

\*The machinability of materials varies, depending on alloying elements, heat treatment, and manufacturing process.

## ISO K 150-480 HB

Grey cast iron (GCI), cast iron with spheroidal graphite, malleable cast iron (MCI), nodular cast iron (NCI), compacted graphite iron (CGI), and austempered ductile iron (ADI).

### MACHINABILITY CHARACTERISTIC

Cast iron is, contrary to steel, a short-chipping type of material and low cutting forces.

GCI and MCI are quite easy to machine, while NCI, CGI, and ADI are more difficult.

### WEAR PROCESS

Thermal and mechanical loads from segmented chips induce crater and abrasive wear.

BUE can be problem with nodular types which can lead to tool edge problem.

\*The machinability of materials varies, depending on alloying elements, heat treatment, and manufacturing process.

# WEAR BEHAVIOR OF CARBIDE TOOLING

## ISO N 15-430 HB

Aluminum and other non-ferrous metals (copper, brass, bronze).

### MACHINABILITY CHARACTERISTIC

Non-ferrous metals are softer metals, such as aluminum, copper, brass etc., relatively easy chip control if alloyed.

Abrasive machining with increase in Si-content.

Generally low cutting forces and high cutting speeds, long tool life can be expected for inserts with sharp edges.

### WEAR PROCESS

Mechanical wear dominates over chemical wear.

Attrition, fracture, and micro chipping of tool edges occur.

Higher silicon content aluminum materials experience BUE while machining.

\*The machinability of materials varies, depending on alloying elements, heat treatment, and manufacturing process.

## ISO S 85-745 HB

Heat resistant super alloys (iron, nickel, and cobalt based), titanium, and titanium alloys.

### MACHINABILITY CHARACTERISTIC

They are sticky, create built-up edge, work harden, and generate heat.

They are very similar to the ISO M area but are much more difficult to machine and reduce the tool life of the tool edges.

### WEAR PROCESS

Plastic deformation, followed by crater and abrasive wear.

Severe mechanical and chemical wear processes occur.

High temperatures result in material smearing and poor chip formation cause severe problems.

\*The machinability of materials varies, depending on alloying elements, heat treatment, and manufacturing process.

## ISO H 45-75 HRC

Hardened steel and hardened cast iron and chilled cast iron.

### MACHINABILITY CHARACTERISTIC

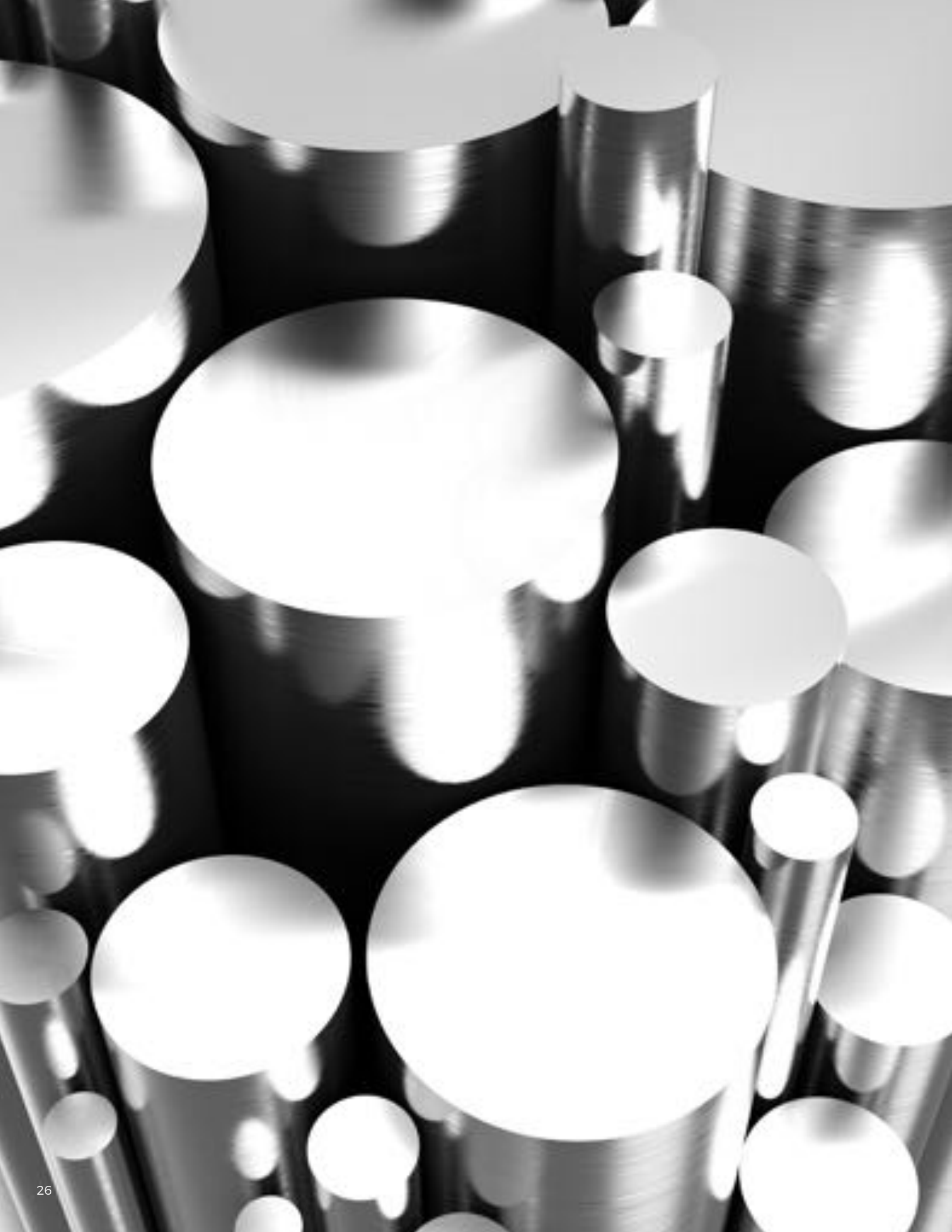
The hardness makes them difficult to machine with high cutting forces.

The materials generate heat during cutting and are very abrasive for the cutting edge.

### WEAR PROCESS

High thermal and mechanical loads form fractures and deformation occurs.

\*The machinability of materials varies, depending on alloying elements, heat treatment, and manufacturing process.





# GRADES

## GRADE APPLICATION MATRIX

### GENERAL GRADE RECOMMENDATION FOR COMMON APPLICATION AREAS

#### DRILLING

| ISO MATERIAL CLASSIFICATION | P       |              | M       |              | K       |              | N       |              | S       |              | H       |              |
|-----------------------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|
|                             | GENERAL | HIGH PERFORM | GENERAL | HIGH PERFORM | GENERAL | HIGH PERFORM | GENERAL | HIGH PERFORM | GENERAL | HIGH PERFORM | GENERAL | HIGH PERFORM |
| H10F                        | ★       |              | ★       |              | ★       |              | ★       |              | ★       |              |         |              |
| AM70                        |         | ★            |         | ●            |         |              |         |              |         | ★            |         |              |
| PN90                        |         |              |         |              |         |              |         |              |         |              | ★       |              |
| AM50                        |         |              |         |              |         |              |         | ●            |         |              | ●       |              |
| AM60                        |         |              |         |              |         |              |         | ▲            |         |              |         |              |
| H6N                         |         |              |         |              |         |              |         | ●            |         |              |         |              |

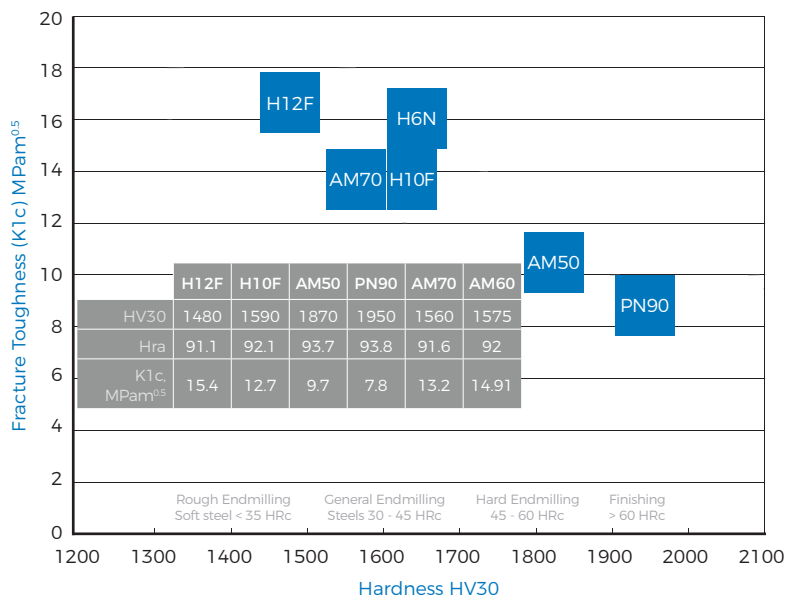
#### MILLING

| ISO MATERIAL CLASSIFICATION | P        |           | M        |           | K        |           | N        |           | S        |           | H        |           |
|-----------------------------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
|                             | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING | ROUGHING | FINISHING |
| H10F                        | ★        | ★         | ★        | ●         | ●        |           | ★        |           | ●        | ●         |          |           |
| AM70                        |          |           |          | ★         |          |           |          |           |          | ★         |          |           |
| PN90                        |          |           |          |           |          |           |          |           |          |           |          | ★         |
| AM50                        |          |           |          |           |          |           |          |           | ★        |           | ★        |           |
| AM60                        |          |           |          |           |          |           |          | ▲         |          |           |          |           |
| H12F                        | ●        |           | ●        |           |          |           |          |           |          |           |          |           |
| H6N                         |          |           |          |           |          |           |          | ●         |          |           |          |           |

★ First choice   ● Depends on drill's geometry   ▲ Grade required with Diamond Coating

## GRADE PROPERTIES

### Indentation Fracture Toughness (K1c- Anstis) vs Vickers Hardness





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