

**sutton**<sup>®</sup>



# REAMING

• Hand • Machine (Morse Taper & Chucking) • Bridge • Taper Pin

AVAILABLE IN MULTIPLE LANGUAGES



L100 V3EN



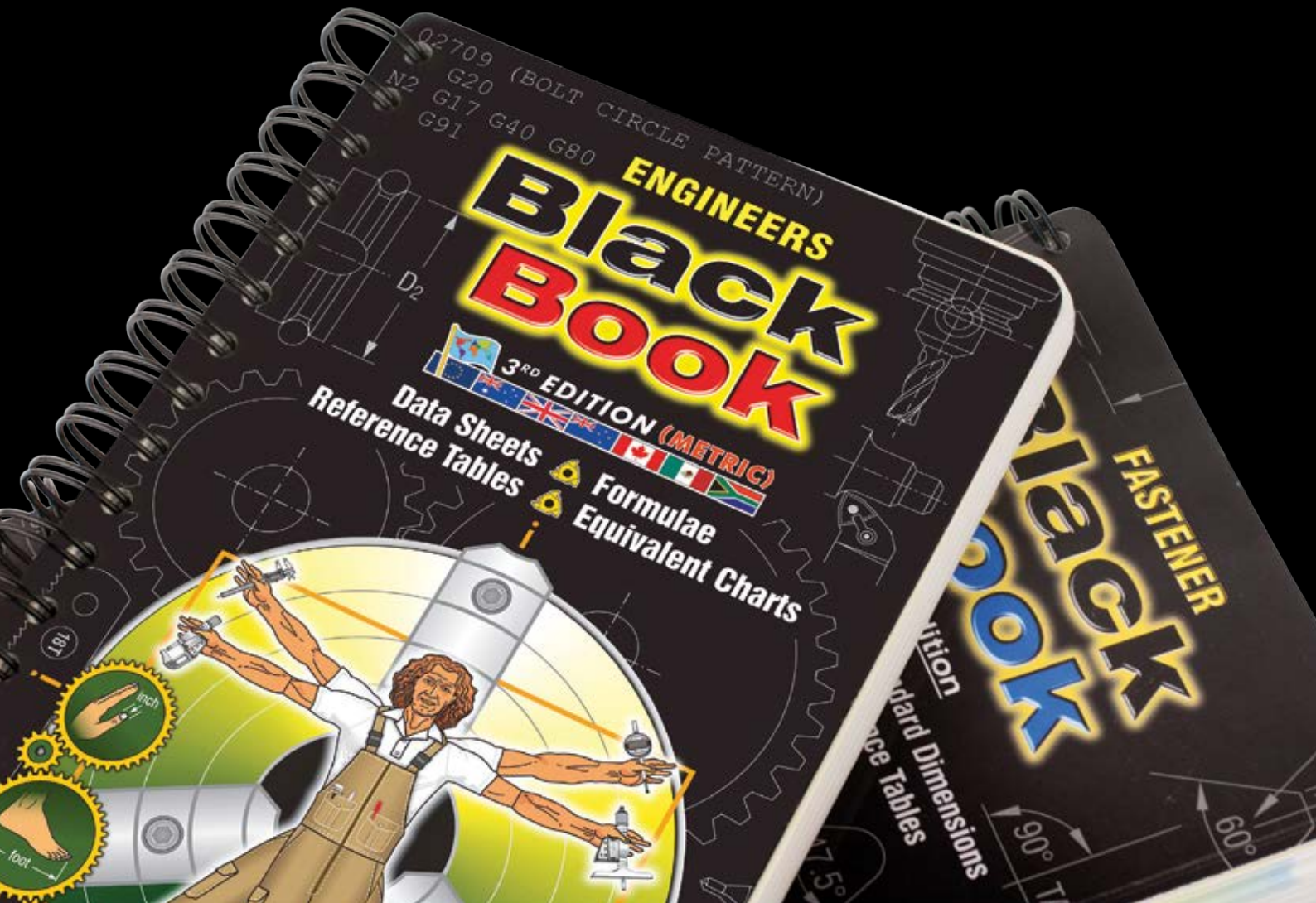
L100 V2NL



L100 V2FR



L100 V2DE



## ***Engineers Black Book The Ultimate Reference Book is here...***

The easy to use pocket-size reference tools containing a wealth of detailed and updated information for the industry and trade.

The Black Book series includes the Engineer and Fastener editions. The high quality matt laminated grease proof page ensures long life and glare-free reading. It is wire bound to ensure the book stays flat on workbench when you are reading.

The book also comes with a FREE set of bookmarking tabs (Engineer), and thread pitch identification gauge (Fastener).

Black Books are the ultimate reference books for engineers, trades people, apprentices, machine shops, tool rooms, technical colleges and purchasing officers.

- Tables
- Standards
- Illustrations
- Conversion factors
- Lubricants-coolants
- Tolerances
- Weights of metal
- Geometrical construction
- Formulae
- Engineering drawing standards
- Tapping drill sizes
- Speeds & feeds
- Equivalent charts
- Sharpening information

| ISO      | VDI | Material Group                           | Sutton       | Page      |
|----------|-----|--|--------------|-----------|
| <b>P</b> | A   | Steel                                    | <b>N</b>     | <b>IM</b> |
| <b>M</b> | R   | Stainless Steel                          | <b>VA</b>    |           |
| <b>K</b> | F   | Cast Iron                                | <b>GG</b>    |           |
| <b>N</b> | N   | Non-Ferrous Metals, Aluminiums & Coppers | <b>Al W</b>  |           |
| <b>S</b> | S   | Titaniums & Super Alloys                 | <b>Ti Ni</b> |           |
| <b>H</b> | H   | Hard Materials (> 45 HRC)                | <b>H</b>     |           |

^ VDI 3323 material groups can also be determined by referring to the material cross reference listing in the application guide at the back of this catalogue.

| Page | 390               | 393         | 397               | 399         | 400         | 400         | 401          |
|------|-------------------|-------------|-------------------|-------------|-------------|-------------|--------------|
|      |                   |             |                   |             |             |             |              |
|      | <b>R100</b>       | <b>R101</b> | <b>R102</b>       | <b>R105</b> | <b>R106</b> | <b>R107</b> | <b>R108</b>  |
|      | <b>HSS</b>        | <b>HSS</b>  | <b>HSS Co</b>     | <b>HSS</b>  | <b>HSS</b>  | <b>HSS</b>  | <b>HSS</b>   |
|      | <b>Brt</b>        | <b>Brt</b>  | <b>Brt</b>        | <b>Brt</b>  | <b>Brt</b>  | <b>Brt</b>  | <b>Brt</b>   |
|      | N                 | N           | N                 | N           | Roughing    | Finishing   | Tapered Pipe |
|      | DIN 206 / ISO 236 | DIN 208     | DIN 212 / ISO 521 | -           | -           | -           | -            |
|      | <b>L10</b>        | <b>L10</b>  | <b>L10</b>        | <b>L7</b>   | <b>L7</b>   | <b>L7</b>   | <b>L15</b>   |

Catalogue Code  
Material  
Surface Finish  
Sutton Designation  
Standard  
Geometry

| ISO      | VDI <sup>3323</sup>                   | Material   | Condition                    | HB                 | N/mm <sup>2</sup> |      |     |   |   |   |   |   |
|----------|---------------------------------------|--|------------------------------|--------------------|-------------------|------|-----|---|---|---|---|---|
| <b>P</b> | 1                                     | Steel - Non-alloy, cast & free cutting                   | -0.15 %C                     | A                  | 125               | 440  | ●   | ● | ● | ● | ● | ● |
|          | 2                                     |  | -0.45 %C                     | A                  | 190               | 640  | ●   | ● | ● | ● | ● | ● |
|          | 3                                     |  | -0.75 %C                     | QT                 | 250               | 840  | ●   | ● | ● | ● | ● | ● |
|          | 4                                     |  |                              | A                  | 270               | 910  | ●   | ● | ● | ● | ● | ● |
|          | 5                                     |  |                              | QT                 | 300               | 1010 | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 6                                     | Steel - Low alloy & cast < 5% of alloying elements       | A                            | 180                | 610               | ●    | ●   | ● | ● | ● | ● |   |
|          | 7                                     |  | QT                           | 275                | 930               | ○    | ○   | ○ | ○ | ○ | ○ |   |
|          | 8                                     |  | QT                           | 300                | 1010              | ○    | ○   | ○ | ○ | ○ | ○ |   |
|          | 9                                     |  | QT                           | 350                | 1180              | ○    | ○   | ○ | ○ | ○ | ○ |   |
|          | 10                                    | Steel - High alloy, cast & tool                          | A                            | 200                | 680               | ○    | ○   | ○ | ○ | ○ | ○ |   |
|          | 11                                    |  | HT                           | 325                | 1100              | ○    | ○   | ○ | ○ | ○ | ○ |   |
| 12       | Steel - Corrosion resistant & cast    | Ferritic / Martensitic                                   | A                            | 200                | 680               | ○    | ○   | ○ | ○ | ○ | ○ |   |
| 13       |                                       | Martensitic  | QT                           | 240                | 810               | ○    | ○   | ○ | ○ | ○ | ○ |   |
| <b>M</b> | 14.1                                  | Stainless Steel  | Austenitic                   | AH                 | 180               | 610  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 14.2                                  |  | Duplex                       |                    | 230               | 780  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 14.3                                  |  | Precipitation Hardening      |                    | 300               | 780  | ○   | ○ | ○ | ○ | ○ | ○ |
| <b>K</b> | 15                                    | Cast Iron - Grey (GG)                                    | Ferritic / Pearlitic         |                    | 180               | 610  | ●   | ● | ● | ● | ● | ● |
|          | 16                                    |  | Pearlitic                    |                    | 260               | 880  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 17                                    | Cast Iron - Nodular (GGG)                                | Ferritic                     |                    | 160               | 570  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 18                                    |  | Pearlitic                    |                    | 250               | 840  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 19                                    |  | Ferritic                     |                    | 130               | 460  | ○   | ○ | ○ | ○ | ○ | ○ |
| 20       | Cast Iron - Malleable                 | Pearlitic  |                              | 230                | 780               | ○    | ○   | ○ | ○ | ○ | ○ |   |
| <b>N</b> | 21                                    | Aluminum & Magnesium - wrought alloy                     | Non Heat Treatable           |                    | 60                | 210  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 22                                    |  | Heat Treatable               | AH                 | 100               | 360  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 23                                    | Aluminum & Magnesium - cast alloy <12% Si                | Non Heat Treatable           |                    | 75                | 270  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 24                                    |  | Heat Treatable               | AH                 | 90                | 320  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 25                                    |  | Al & Mg - cast alloy >12% Si | Non Heat Treatable |                   | 130  | 460 | ○ | ○ | ○ | ○ | ○ |
|          | 26                                    | Copper & Cu alloys (Brass/Bronze)                        | Free cutting, Pb > 1%        |                    | 110               | 390  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 27                                    |  | Brass (CuZn, CuSnZn)         |                    | 90                | 320  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 28                                    |  | Bronze (CuSn)                |                    | 100               | 360  | ○   | ○ | ○ | ○ | ○ | ○ |
|          | 29                                    | Non-metallic - Thermosetting & fiber-reinforced plastics |                              |                    |                   |      |     |   |   |   |   |   |
| 30       | Non-metallic - Hard rubber, wood etc. |  |                              |                    |                   |      |     |   |   |   |   |   |
| <b>S</b> | 31                                    | High temp. alloys  | Fe based                     | A                  | 200               | 680  |     |   |   |   |   |   |
|          | 32                                    |  |                              | AH                 | 280               | 950  |     |   |   |   |   |   |
|          | 33                                    |  | Ni / Co based                | A                  | 250               | 840  |     |   |   |   |   |   |
|          | 34                                    |  |                              | AH                 | 350               | 1180 |     |   |   |   |   |   |
|          | 35                                    |  |                              | C                  | 320               | 1080 |     |   |   |   |   |   |
|          | 36                                    | Titanium & Ti alloys                                     | CP Titanium                  |                    | 400 MPa           |      |     |   |   |   |   |   |
|          | 37.1                                  |  | Alpha alloys                 |                    | 860 MPa           |      |     |   |   |   |   |   |
|          | 37.2                                  |  | Alpha / Beta alloys          | A                  | 960 MPa           |      |     |   |   |   |   |   |
|          | 37.3                                  |  |                              | AH                 | 1170 MPa          |      |     |   |   |   |   |   |
|          | 37.4                                  |  | Beta alloys                  | A                  | 830 MPa           |      |     |   |   |   |   |   |
| 37.5     | AH                                    |  |                              | 1400 MPa           |                   |      |     |   |   |   |   |   |
| <b>H</b> | 38.1                                  | Hardened steel   |                              | HT                 | 45 HRC            |      |     |   |   |   |   |   |
|          | 38.2                                  |  |                              | HT                 | 55 HRC            |      |     |   |   |   |   |   |
|          | 39.1                                  |  |                              | HT                 | 58 HRC            |      |     |   |   |   |   |   |
|          | 39.2                                  |  |                              | HT                 | 62 HRC            |      |     |   |   |   |   |   |
|          | 40                                    | Cast Iron  | Chilled                      | C                  | 400               | 1350 | ○   | ○ | ○ | ○ | ○ | ○ |
| 41       | HT                                    |  |                              | 55 HRC             |                   |      |     |   |   |   |   |   |

Condition: A (Annealed), AH (Age Hardened), C (Cast), HT (Hardened & Tempered), QT (Quenched & Tempered)

● Optimal ○ Effective









- Machine use
- Suitable for tool rooms & workshop use
- Produces clean, accurate holes, to a H7 tolerance



### Alésoirs machine cône morse

- Pour utilisation universelle sur machines
- Tolérance H7



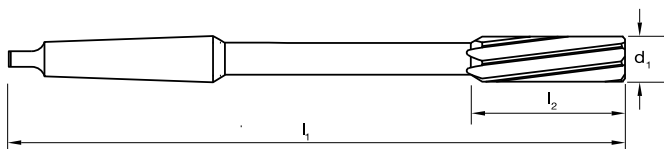
### Alesatori Macchina

- Adatto a operazioni su macchine CN
- Ideale per uso in Tool rooms & reparto produttivo
- Produce fori puliti e precisi, a una tolleranza H7



### Escariadores Cono Morse

- Para usar a máquina
- Adecuado para mantenimiento y uso en talleres
- Produce agujeros de precisión, hasta tolerancia H7



|                    |             |
|--------------------|-------------|
| Catalogue Code     | <b>R101</b> |
| Discount Group     | B0302       |
| Material           | <b>HSS</b>  |
| Surface Finish     | <b>Brt</b>  |
| Sutton Designation | <b>N</b>    |
| Geometry           | L10         |

| Size Ref. | d <sub>1</sub> | l <sub>1</sub> | l <sub>2</sub> | l <sub>3</sub> | d <sub>2</sub> | z | MT # | Item #    |
|-----------|----------------|----------------|----------------|----------------|----------------|---|------|-----------|
| 0600      | 6.000          | 138            | 26             | -              | -              | 6 | 1    | R101 0600 |
| 0635      | 6.350          | 1/4            | 144            | 28             | -              | 6 | 1    | R101 0635 |
| 0650      | 6.500          | 144            | 28             | -              | -              | 6 | 1    | R101 0650 |
| 0675      | 6.747          | 17/64          | 144            | 28             | -              | 6 | 1    | R101 0675 |
| 0700      | 7.000          | 150            | 31             | -              | -              | 6 | 1    | R101 0700 |
| 0714      | 7.144          | 9/32           | 150            | 31             | -              | 6 | 1    | R101 0714 |
| 0750      | 7.500          | 150            | 31             | -              | -              | 6 | 1    | R101 0750 |
| 0754      | 7.541          | 19/64          | 150            | 31             | -              | 6 | 1    | R101 0754 |
| 0794      | 7.938          | 5/16           | 156            | 33             | -              | 6 | 1    | R101 0794 |
| 0800      | 8.000          | 156            | 33             | -              | -              | 6 | 1    | R101 0800 |
| 0833      | 8.334          | 21/64          | 156            | 33             | -              | 6 | 1    | R101 0833 |
| 0850      | 8.500          | 156            | 33             | -              | -              | 6 | 1    | R101 0850 |
| 0873      | 8.731          | 11/32          | 162            | 36             | -              | 6 | 1    | R101 0873 |
| 0900      | 9.000          | 162            | 36             | -              | -              | 6 | 1    | R101 0900 |
| 0913      | 9.128          | 23/64          | 162            | 36             | -              | 6 | 1    | R101 0913 |
| 0950      | 9.500          | 162            | 36             | -              | -              | 6 | 1    | R101 0950 |
| 0953      | 9.525          | 3/8            | 162            | 36             | -              | 6 | 1    | R101 0953 |
| 0992      | 9.922          | 25/64          | 168            | 38             | -              | 6 | 1    | R101 0992 |
| 1000      | 10.000         | 168            | 38             | -              | -              | 6 | 1    | R101 1000 |
| 1032      | 10.319         | 13/32          | 168            | 38             | -              | 6 | 1    | R101 1032 |
| 1050      | 10.500         | 168            | 38             | -              | -              | 6 | 1    | R101 1050 |
| 1072      | 10.716         | 27/64          | 175            | 41             | -              | 6 | 1    | R101 1072 |
| 1100      | 11.000         | 175            | 41             | -              | -              | 6 | 1    | R101 1100 |
| 1111      | 11.112         | 7/16           | 175            | 41             | -              | 6 | 1    | R101 1111 |
| 1150      | 11.500         | 175            | 41             | -              | -              | 6 | 1    | R101 1150 |
| 1151      | 11.509         | 29/64          | 175            | 41             | -              | 6 | 1    | R101 1151 |
| 1191      | 11.906         | 15/32          | 175            | 41             | -              | 6 | 1    | R101 1191 |
| 1200      | 12.000         | 182            | 44             | -              | -              | 6 | 1    | R101 1200 |

| ISO      | P |   |   |   |   |   |   |   |   |    | M  |    |    |      |      | K    |    |    |    |    | N  |    |    |    |    | S  |    |    |    |    | H  |    |    |    |    |    |    |    |      |      |      |      |      |      |      |      |      |    |    |   |
|----------|---|---|---|---|---|---|---|---|---|----|----|----|----|------|------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|------|------|------|------|------|------|------|------|----|----|---|
| VDI 3323 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14.1 | 14.2 | 14.3 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37.1 | 37.2 | 37.3 | 37.4 | 37.5 | 38.1 | 38.2 | 39.1 | 39.2 | 40 | 41 |   |
| R101     | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○  | ○  | ○  | ○  | ○    | ○    | ○    | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○  | ○  | ○ |

**P** Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous Metals **S** Titanium & Super Alloys **H** Hard Materials

● Optimal ○ Effective











- Machine use
- Suitable for tool rooms & workshop use
- Produces clean, accurate holes, to a H7 tolerance



### Alésoirs à machine queue cylindrique

- Pour utilisation universelle sur machines
- Tolérance H7



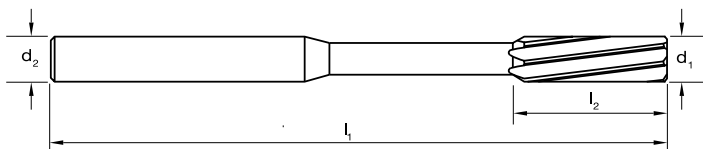
### Alesatori Mandrino

- Adatto a operazioni su macchine CN
- Ideale per uso in Tool rooms & reparto produttivo
- Produce fori puliti e precisi, a una tolleranza H7



### Escaradores Máquina

- Para usar a máquina
- Adecuado para mantenimiento y uso en talleres
- Produce agujeros de precisión, hasta tolerancia H7



|                    |               |
|--------------------|---------------|
| Catalogue Code     | <b>R102</b>   |
| Discount Group     | B0302         |
| Material           | <b>HSS Co</b> |
| Surface Finish     | <b>Brt</b>    |
| Sutton Designation | <b>N</b>      |
| Geometry           | L10           |

| Size Ref.   | d <sub>1</sub> | l <sub>1</sub> | l <sub>2</sub> | l <sub>3</sub> | d <sub>2</sub> | z    | Item #    |           |
|-------------|----------------|----------------|----------------|----------------|----------------|------|-----------|-----------|
| <b>0200</b> | <b>2.000</b>   | 49             | 11             | -              | 2.0            | 3    | R102 0200 |           |
| <b>0250</b> | <b>2.500</b>   | 57             | 14             | -              | 2.5            | 5    | R102 0250 |           |
| <b>0300</b> | <b>3.000</b>   | 61             | 15             | -              | 3.0            | 5    | R102 0300 |           |
| <b>0318</b> | 3.175          | <b>1/8</b>     | 65             | 16             | -              | 3.2  | 5         | R102 0318 |
| <b>0350</b> | <b>3.500</b>   | 70             | 18             | -              | 3.5            | 5    | R102 0350 |           |
| <b>0357</b> | 3.572          | <b>9/64</b>    | 70             | 18             | -              | 3.6  | 5         | R102 0357 |
| <b>0397</b> | 3.969          | <b>5/32</b>    | 75             | 19             | -              | 4.0  | 6         | R102 0397 |
| <b>0400</b> | <b>4.000</b>   | 75             | 19             | -              | 4.0            | 6    | R102 0400 |           |
| <b>0450</b> | <b>4.500</b>   | 80             | 21             | -              | 4.5            | 6    | R102 0450 |           |
| <b>0476</b> | 4.762          | <b>3/16</b>    | 86             | 23             | -              | 5.0  | 6         | R102 0476 |
| <b>0500</b> | <b>5.000</b>   | 86             | 23             | -              | 5.0            | 6    | R102 0500 |           |
| <b>0516</b> | 5.159          | <b>13/64</b>   | 86             | 23             | -              | 5.0  | 6         | R102 0516 |
| <b>0550</b> | <b>5.500</b>   | 93             | 26             | -              | 5.6            | 6    | R102 0550 |           |
| <b>0595</b> | 5.953          | <b>15/64</b>   | 93             | 26             | -              | 5.6  | 6         | R102 0595 |
| <b>0600</b> | <b>6.000</b>   | 93             | 26             | -              | 5.6            | 6    | R102 0600 |           |
| <b>0635</b> | 6.350          | <b>1/4</b>     | 101            | 28             | -              | 6.3  | 6         | R102 0635 |
| <b>0650</b> | <b>6.500</b>   | 101            | 28             | -              | 6.3            | 6    | R102 0650 |           |
| <b>0700</b> | <b>7.000</b>   | 109            | 31             | -              | 7.1            | 6    | R102 0700 |           |
| <b>0750</b> | <b>7.500</b>   | 109            | 31             | -              | 7.1            | 6    | R102 0750 |           |
| <b>0794</b> | 7.938          | <b>5/16</b>    | 117            | 31             | -              | 8.0  | 6         | R102 0794 |
| <b>0800</b> | <b>8.000</b>   | 117            | 33             | -              | 8.0            | 6    | R102 0800 |           |
| <b>0850</b> | <b>8.500</b>   | 117            | 33             | -              | 8.0            | 6    | R102 0850 |           |
| <b>0900</b> | <b>9.000</b>   | 125            | 36             | -              | 9.0            | 6    | R102 0900 |           |
| <b>0950</b> | <b>9.500</b>   | 125            | 36             | -              | 9.0            | 6    | R102 0950 |           |
| <b>0953</b> | 9.525          | <b>3/8</b>     | 133            | 38             | -              | 10.0 | 6         | R102 0953 |
| <b>1000</b> | <b>10.000</b>  | 133            | 38             | -              | 10.0           | 6    | R102 1000 |           |
| <b>1050</b> | <b>10.500</b>  | 133            | 38             | -              | 10.0           | 6    | R102 1050 |           |
| <b>1100</b> | <b>11.000</b>  | 142            | 41             | -              | 10.0           | 6    | R102 1100 |           |

| ISO         | P |   |   |   |   |   |   |   |   |    | M  |    |    |      |      | K    |    |    |    |    | N  |    |    |    |    |    |    |    |    |    | S  |    |    |    |    |    |    |    |      |      | H    |      |      |      |      |      |      |    |    |   |
|-------------|---|---|---|---|---|---|---|---|---|----|----|----|----|------|------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|------|------|------|------|------|------|------|------|----|----|---|
| VDI 3323    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14.1 | 14.2 | 14.3 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37.1 | 37.2 | 37.3 | 37.4 | 37.5 | 38.1 | 38.2 | 39.1 | 39.2 | 40 | 41 |   |
| <b>R102</b> | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○  | ○  | ○  | ○  | ○    | ○    | ○    | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○  | ○  | ○ |

**P** Steel **M** Stainless Steel **K** Cast Iron **N** Non-Ferrous Metals **S** Titanium & Super Alloys **H** Hard Materials

● Optimal ○ Effective



- Machine use
- Suitable for tool rooms & workshop use
- Produces clean, accurate holes, to a H7 tolerance



### Alésoirs à machine queue cylindrique

- Pour utilisation universelle sur machines
- Tolérance H7



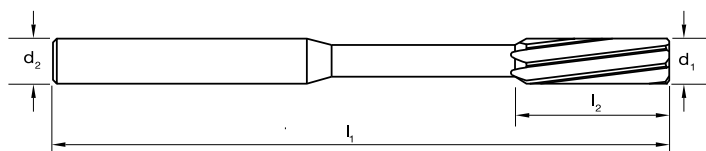
### Alesatori Mandrino

- Adatto a operazioni su macchine CN
- Ideale per uso in Tool rooms & reparto produttivo
- Produce fori puliti e precisi, a una tolleranza H7



### Escaradores Máquina

- Para usar a máquina
- Adecuado para mantenimiento y uso en talleres
- Produce agujeros de precisión, hasta tolerancia H7



|                    |               |
|--------------------|---------------|
| Catalogue Code     | <b>R102</b>   |
| Discount Group     | B0302         |
| Material           | <b>HSS Co</b> |
| Surface Finish     | <b>Brt</b>    |
| Sutton Designation | <b>N</b>      |
| Geometry           | L10           |

| Size Ref.   | d <sub>1</sub> |             | l <sub>1</sub> | l <sub>2</sub> | l <sub>3</sub> | d <sub>2</sub> | z | Item #    |
|-------------|----------------|-------------|----------------|----------------|----------------|----------------|---|-----------|
| <b>1111</b> | 11.112         | <b>7/16</b> | 142            | 41             | -              | 10.0           | 6 | R102 1111 |
| <b>1150</b> | <b>11.500</b>  |             | 142            | 41             | -              | 10.0           | 6 | R102 1150 |
| <b>1200</b> | <b>12.000</b>  |             | 151            | 44             | -              | 10.0           | 6 | R102 1200 |
| <b>1250</b> | <b>12.500</b>  |             | 151            | 44             | -              | 10.0           | 6 | R102 1250 |
| <b>1270</b> | 12.700         | <b>1/2</b>  | 151            | 44             | -              | 10.0           | 6 | R102 1270 |
| <b>1300</b> | <b>13.000</b>  |             | 151            | 44             | -              | 10.0           | 6 | R102 1300 |
| <b>1350</b> | <b>13.500</b>  |             | 160            | 47             | -              | 12.5           | 6 | R102 1350 |
| <b>1400</b> | <b>14.000</b>  |             | 160            | 47             | -              | 12.5           | 8 | R102 1400 |
| <b>1429</b> | 14.288         | <b>9/16</b> | 162            | 50             | -              | 12.5           | 8 | R102 1429 |
| <b>1450</b> | <b>14.500</b>  |             | 162            | 50             | -              | 12.5           | 8 | R102 1450 |
| <b>1500</b> | <b>15.000</b>  |             | 162            | 50             | -              | 12.5           | 8 | R102 1500 |
| <b>1550</b> | <b>15.500</b>  |             | 170            | 52             | -              | 12.5           | 8 | R102 1550 |
| <b>1588</b> | 15.875         | <b>5/8</b>  | 170            | 52             | -              | 12.5           | 8 | R102 1588 |
| <b>1600</b> | <b>16.000</b>  |             | 170            | 52             | -              | 12.5           | 8 | R102 1600 |

| ISO         | P |   |   |   |   |   |   |   |   |    | M  |    |    | K    |      |      |    |    | N  |    |    |    |    |    |    |    |    |    | S  |    |    |    |    |    |    |    |    |    | H    |      |      |      |      |      |      |      |      |    |    |
|-------------|---|---|---|---|---|---|---|---|---|----|----|----|----|------|------|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|------|------|------|------|------|------|------|------|----|----|
| VDI 3323    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14.1 | 14.2 | 14.3 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37.1 | 37.2 | 37.3 | 37.4 | 37.5 | 38.1 | 38.2 | 39.1 | 39.2 | 40 | 41 |
| <b>R102</b> | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ○  | ○  | ○  | ○  | ○    | ○    | ○    | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○  | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○    | ○  | ○  |

P Steel 
 M Stainless Steel 
 K Cast Iron 
 N Non-Ferrous Metals 
 S Titanium & Super Alloys 
 H Hard Materials 
 ● Optimal ○ Effective







