



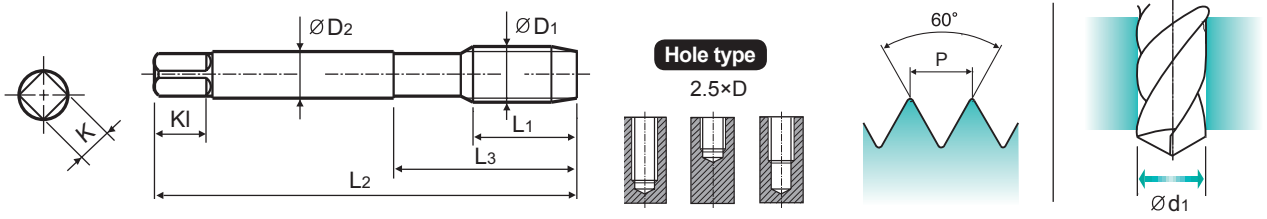
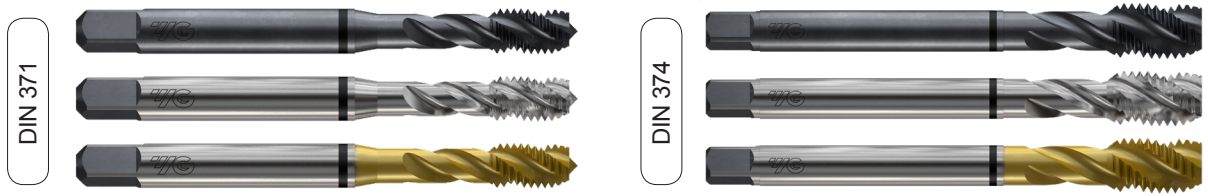
|        |                     |
|--------|---------------------|
| Vap    | <b>TB864</b> SERIES |
| Bright | <b>TC864</b> SERIES |
| TiN    | <b>TD864</b> SERIES |

# UNF Unified fine threads

● Unified Grobgewinde  
● UNF  
● Unificato passo fine

► For using multi-purpose and correct thread profiles & long tool life due to special tap geometry. YG-1 company has a patent.

► Für vielfältigen Einsatz, genaue Gewindeprofile und lange Standzeitendank einer besonderen Schneidengeometrie. Von YG-1 patentiert.



Material groups **MU** HSS-E DIN 371/374 2B 60° C Vap Bright TiN R40

Machine taps  
Maschinengewindebohrer

Recommended Cutting Page : P.114

Unit : mm

| SIZE | TPI    | EDP No.  |          |          | Thread Length | Overall Length | Neck Length | Shank Diameter | Square Size | Square Length | No. of Flute | Tapping Drill Diameter |
|------|--------|----------|----------|----------|---------------|----------------|-------------|----------------|-------------|---------------|--------------|------------------------|
|      |        | Vap      | Bright   | TiN      |               |                |             |                |             |               |              |                        |
| ØD1  |        | L1       | L2       | L3       | ØD2           | K              | KI          | Z              | Ød1         |               |              |                        |
| #4   | -48UNF | TB864182 | TC864182 | TD864182 | 6             | 56             | 18          | 3.5            | 2.7         | 6             | 3            | 2.4                    |
| #5   | -44UNF | TB864222 | TC864222 | TD864222 | 7             | 56             | 18          | 3.5            | 2.7         | 6             | 3            | 2.7                    |
| #6   | -40UNF | TB864262 | TC864262 | TD864262 | 7             | 56             | 20          | 4              | 3           | 6             | 3            | 3                      |
| #8   | -36UNF | TB864302 | TC864302 | TD864302 | 8             | 63             | 21          | 4.5            | 3.4         | 6             | 3            | 3.5                    |
| #10  | -32UNF | TB864342 | TC864342 | TD864342 | 10            | 70             | 25          | 6              | 4.9         | 8             | 3            | 4.1                    |
| #12  | -28UNF | TB864382 | TC864382 | TD864382 | 10            | 80             | 30          | 6              | 4.9         | 8             | 3            | 4.7                    |
| 1/4  | -28UNF | TB864422 | TC864422 | TD864422 | 10            | 80             | 30          | 7              | 5.5         | 8             | 3            | 5.5                    |
| 5/16 | -24UNF | TB864462 | TC864462 | TD864462 | 10            | 90             | 35          | 8              | 6.2         | 9             | 3            | 6.9                    |
| 3/8  | -24UNF | TB864502 | TC864502 | TD864502 | 10            | 100            | 39          | 9              | 7           | 10            | 3            | 8.5                    |
| 7/16 | -20UNF | TB864542 | TC864542 | TD864542 | 13            | 100            | 40          | 8              | 6.2         | 9             | 3            | 9.9                    |
| 1/2  | -20UNF | TB864582 | TC864582 | TD864582 | 13            | 100            | 40          | 9              | 7           | 10            | 3            | 11.5                   |
| 9/16 | -18UNF | TB864622 | TC864622 | TD864622 | 15            | 100            | 40          | 11             | 9           | 12            | 3            | 12.9                   |
| 5/8  | -18UNF | TB864662 | TC864662 | TD864662 | 15            | 100            | 40          | 12             | 9           | 12            | 3            | 14.5                   |
| 3/4  | -16UNF | TB864722 | TC864722 | TD864722 | 17            | 110            | 44          | 14             | 11          | 14            | 4            | 17.5                   |
| 7/8  | -14UNF | TB864762 | TC864762 | TD864762 | 17            | 125            | 50          | 18             | 14.5        | 17            | 4            | 20.5                   |
| 1    | -12UNF | TB864802 | TC864802 | TD864802 | 20            | 140            | 54          | 20             | 16          | 19            | 4            | 23.25                  |

►DIN 371(#4~3/8) and DIN 374(7/16~1)

\* The other coating(TiCN or TiAlN) is available on your request.

◎ : Excellent ○ : Good

| ISO         | P               |     |     |     |     |                 |     |     |     |     | M                                  |     |                 |     | K              |     |                   |     |                     |     |
|-------------|-----------------|-----|-----|-----|-----|-----------------|-----|-----|-----|-----|------------------------------------|-----|-----------------|-----|----------------|-----|-------------------|-----|---------------------|-----|
|             | Non-alloy steel |     |     |     |     | Low alloy steel |     |     |     |     | High alloyed steel, and tool steel |     | Stainless steel |     | Grey cast iron |     | Nodular cast iron |     | Malleable cast iron |     |
| VDI 3323    | 1               | 2   | 3   | 4   | 5   | 6               | 7   | 8   | 9   | 10  | 11                                 | 12  | 13              | 14  | 15             | 16  | 17                | 18  | 19                  | 20  |
| HRc         |                 | 13  | 25  | 28  | 32  | 10              | 29  | 32  | 38  | 15  | 35                                 | 15  | 23              | 10  | 10             | 26  | 3                 | 25  |                     | 21  |
| HB          | 125             | 190 | 250 | 270 | 300 | 180             | 275 | 300 | 350 | 200 | 325                                | 200 | 240             | 180 | 180            | 260 | 160               | 250 | 130                 | 230 |
| Recommended | ○               | ◎   | ◎   | ◎   | ◎   | ◎               | ◎   | ◎   | ◎   | ○   | ○                                  | ◎   | ◎               | ◎   | ◎              | ◎   | ◎                 | ◎   |                     |     |

| ISO         | N                      |     |                        |    |     | S   |    |     |                        |    |                             |     |     |     |     | H               |        |                |                   |                    |     |
|-------------|------------------------|-----|------------------------|----|-----|---|----|-----|------------------------|----|-----------------------------|-----|-----|-----|-----|-----------------|--------|----------------|-------------------|--------------------|-----|
|             | Aluminum-wrought alloy |     | Aluminum-cast, alloyed |    |     | Copper and Copper Alloys (Bronze / Brass) |    |     | Non Metallic Materials |    | Heat Resistant Super Alloys |     |     |     |     | Titanium Alloys |        | Hardened steel | Chilled Cast Iron | Hardened Cast Iron |     |
| VDI 3323    | 21                     | 22  | 23                     | 24 | 25  | 26  | 27 | 28  | 29                     | 30 | 31                          | 32  | 33  | 34  | 35  | 36              | 37     | 38             | 39                | 40                 | 41  |
| HRc         |                        |     |                        |    |     |   |    |     |                        |    | 15                          | 30  | 25  | 38  | 34  |                 |        | 55             | 60                | 42                 | 55  |
| HB          | 60                     | 100 | 75                     | 90 | 130 | 110                                       | 90 | 100 |                        |    | 200                         | 280 | 250 | 350 | 320 | 400Rm           | 1050Rm | 550            | 630               | 400                | 550 |
| Recommended |                        |     | ◎                      |    |     | ◎   | ◎  | ◎   |                        |    |                             |     |     |     |     |                 |        |                |                   |                    |     |



# COMBO TAPS

## RECOMMENDED CUTTING CONDITIONS EMPFOHLENE SCHNEIDKONDITIONEN

| THREAD MILLS     | SYNCHRO TAPS        | COMBO TAPS | ISO                                       | VDI 3323                           | Material Description | HB    | HRc   | TC804      | TD804 | TB804 | TCE05 | TDE05 | TBE05 | TCE06 | TDE06 |  |
|------------------|---------------------|------------|---|------------------------------------|----------------------|-------|-------|------------|-------|-------|-------|-------|-------|-------|-------|--|
|                  |                     |            |   |                                    |                      |       |       | TC844      | TD844 | TB844 | TCE09 | TDE09 |       |       |       |  |
|                  |                     |            |   |                                    |                      |       |       | TC824      | TD824 | TB824 | TCE01 | TDE01 |       |       |       |  |
|                  |                     |            |   |                                    |                      |       |       | TC864      | TD864 | TB864 | TCE02 | TDE02 |       |       |       |  |
|                  |                     |            |   |                                    |                      |       |       | Vc (m/min) |       |       |       |       |       |       |       |  |
| YG TAP GENERAL   | P                   | 1          | Non-alloy steel                           | 125                                |                      | 15-20 | 20-25 | 15-20      | 15-20 | 20-25 | 15-20 | 15-20 | 20-25 | 15-20 | 20-25 |  |
|                  |                     | 2          |   | 190                                | 13                   | 15-20 | 20-25 | 15-20      | 15-20 | 20-25 | 15-20 | 15-20 | 20-25 |       |       |  |
|                  |                     | 3          |   | 250                                | 25                   | 12-18 | 18-24 | 12-18      | 12-18 | 18-24 | 12-18 | 12-18 | 18-24 |       |       |  |
|                  |                     | 4          |   | 270                                | 28                   | 10-15 | 15-20 | 10-15      | 10-15 | 15-20 | 10-15 | 10-15 | 15-20 |       |       |  |
|                  |                     | 5          |   | 300                                | 32                   | 6-10  | 10-14 | 6-10       | 6-10  | 10-14 | 6-10  | 6-10  | 10-14 |       |       |  |
|                  |                     | 6          | Low alloy steel                           | 180                                | 10                   | 10-15 | 15-20 | 10-15      | 10-15 | 15-20 | 10-15 | 10-15 | 15-20 |       |       |  |
|                  |                     | 7          |   | 275                                | 29                   | 10-15 | 15-20 | 10-15      | 10-15 | 15-20 | 10-15 | 10-15 | 15-20 |       |       |  |
|                  |                     | 8          |   | 300                                | 32                   | 6-10  | 10-14 | 6-10       | 6-10  | 10-14 | 6-10  | 6-10  | 10-14 |       |       |  |
|                  |                     | 9          |   | 350                                | 38                   | 3-5   | 5-7   | 3-5        | 3-5   | 5-7   | 3-5   | 3-5   | 5-7   |       |       |  |
|                  |                     | 10         |   | High alloyed steel, and tool steel | 200                  | 15    | 3-5   | 5-7        | 3-5   | 3-5   | 5-7   | 3-5   | 3-5   | 5-7   |       |  |
|                  |                     | 11         |   |                                    | 325                  | 35    |       |            |       |       |       |       |       |       |       |  |
| YG TAP CAST IRON | M                   | 12         | Stainless steel                           | 200                                | 15                   | 7-10  | 10-15 | 7-10       | 7-10  | 10-15 | 7-10  | 7-10  | 10-15 |       |       |  |
|                  |                     | 13         |   | 240                                | 23                   | 5-8   | 8-11  | 5-8        | 5-8   | 8-11  | 5-8   | 5-8   | 8-11  |       |       |  |
|                  |                     | 14         |   | 180                                | 10                   | 4-6   | 6-8   | 4-6        | 4-6   | 6-8   | 4-6   | 4-6   | 6-8   |       |       |  |
| YG TAP ALU       | K                   | 15         | Grey cast iron                            | 180                                | 10                   | 10-15 | 15-20 | 10-15      | 10-15 | 15-20 | 10-15 | 10-15 | 15-20 |       |       |  |
|                  |                     | 16         |   | 260                                | 26                   | 5-8   | 8-11  | 5-8        | 5-8   | 8-11  | 5-8   | 5-8   | 8-11  |       |       |  |
|                  |                     | 17         | Nodular cast iron                         | 160                                | 3                    | 10-15 | 15-20 | 10-15      | 10-15 | 15-20 | 10-15 | 10-15 | 15-20 |       |       |  |
|                  |                     | 18         |   | 250                                | 25                   | 5-8   | 8-11  | 5-8        | 5-8   | 8-11  | 5-8   | 5-8   | 8-11  |       |       |  |
|                  |                     | 19         |   | 130                                |                      |       |       |            |       |       |       |       |       |       |       |  |
| 20               | Malleable cast iron | 230        | 21  |                                    |                      |       |       |            |       |       |       |       |       |       |       |  |
| NUT TAPS         | N                   | 21         | Aluminum-wrought alloy                    | 60                                 |                      |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 22         |   | 100                                |                      |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 23         | Aluminum-cast, alloyed                    | 75                                 |                      | 15-20 | 20-25 | 15-20      | 15-20 | 20-25 | 15-20 | 15-20 | 20-25 |       |       |  |
|                  |                     | 24         |   | 90                                 |                      |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 25         |   | 130                                |                      |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 26         | Copper and Copper Alloys (Bronze / Brass) | 110                                |                      | 25-35 | 35-40 | 25-35      | 25-35 | 35-40 | 25-35 | 25-35 | 35-40 |       |       |  |
|                  |                     | 27         |   | 90                                 |                      | 8-12  | 12-17 | 8-12       | 8-12  | 12-17 | 8-12  | 8-12  | 12-17 |       |       |  |
|                  |                     | 28         |   | 100                                |                      | 15-20 | 20-25 | 15-20      | 15-20 | 20-25 | 15-20 | 15-20 | 20-25 |       |       |  |
|                  |                     | 29         | Non Metallic Materials                    |                                    |                      |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 30         |   |                                    |                      |       |       |            |       |       |       |       |       |       |       |  |
| PIPE TAPS        | S                   | 31         | Heat Resistant Super Alloys               | 200                                | 15                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 32         |   | 280                                | 30                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 33         |   | 250                                | 25                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 34         |   | 350                                | 38                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 35         |   | 320                                | 34                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 36         | Titanium Alloys                           | 400 Rm                             |                      |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 37         |   | 1050 Rm                            |                      |       |       |            |       |       |       |       |       |       |       |  |
| TECHNICAL DATA   | H                   | 38         | Hardened steel                            | 550                                | 55                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 39         |   | 630                                | 60                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 40         | Chilled Cast Iron                         | 400                                | 42                   |       |       |            |       |       |       |       |       |       |       |  |
|                  |                     | 41         | Hardened Cast Iron                        | 550                                | 55                   |       |       |            |       |       |       |       |       |       |       |  |

# SURFACE TREATMENT AND COATING

The applied High Speed Steels holds a grant of good wear resistance and toughness. Therefore YG-1 normally delivers taps with bright and unfinished surface. For certain materials, various surface treatments provide higher advantage in machining.

## STEAM TEMPERED - Vap

Steam Tempered is a Fe<sub>3</sub>O<sub>4</sub>-oxyd-coating which reduces friction between the tool and workpiece, also preventing cold welding.

## NITRIDING - NI

Recommend surface treatment for machining materials that affect wear abrasion, such as grey cast iron, alu-alloys with high Si-percentages (more than 10%).

Below are the various surface treatments for excellent finish surfaces suitable for many applications. The surface treatments are produced and developed within the company.

## TiN-COATING

TiN-coating yields a hardness of approx. 2,300 HV and also a heat resistant up to approx. 600°C. The current coating is an excellent all-round coating for normal applications.

Colour : Golden Coefficient of friction against steel : 0.4

## TiCN-COATING

TiCN takes place of TiN when the conditions require the coating to have a different hardness and toughness.

The TiCN brings advantages for machining very difficult steels or cutting interrupted bores.

The TiCN-coating has a hardness of approx. 3,000 HV, but is heat resistance only holds up to approx. 400°C, meaning that the TiCN needs an excellent cooling system for a long service life.

Colour : Blue-Grey Coefficient of friction against steel : 0.4

## TiAlN-COATING

A special coating for machining abrasive materials such as grey cast iron, alu-alloys with silicon, fiber reinforced plastics, etc., or machining at high temperatures with insufficient cooling, or at high speeds  $\geq 600$ m/min. TiAlN has a hardness of approx. 3,000 HV and is heat resistant up to approx. 800°C.

Colour : Violet-Grey Coefficient of friction against steel : 0.4

## Hardslick-COATING

Hardslick combines the advantages of an extremely hard, thermally stable TiAlN-coating with the sliding and lubricating properties of an outer WC/C(Tungsten carbide/carbon)-coating in a novel way. The Hardslick coating has a hardness of approx. 3,000 HV and is temperature-resistant up to approx. 800°C.

Colour : Violet-Grey Coefficient of friction against steel : 0.2

SELECTION GUIDE



# HSS-E & HSS-PM COMBO TAPS

For Multi Purpose Tapping  
YG-1's Patent

| HOLE TYPE                    |            | Max. 2.5xD<br>Blind Hole |                 |                 |                 |                 |                 |                 |
|------------------------------|------------|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| TOOL MATERIAL                |            | HSS-E                    |                 |                 |                 |                 |                 |                 |
| CHAMFER LEAD ACC. TO DIN2197 |            | C                        | C               | C               | C               | C               | C               |                 |
| FLUTE TYPE                   |            | Spiral Flute             | Spiral Flute    | Spiral Flute    | Spiral Flute    | Spiral Flute    | Spiral Flute    |                 |
| SPIRAL FLUTE ANGLE           |            | R40                      | R40             | R40             | R40             | R40             | R40             |                 |
| SERIES                       | M          | DIN371/376               | TC804<br>(P.76) | TD804<br>(P.76) | TB804<br>(P.76) | TCE05<br>(P.77) | TDE05<br>(P.77) | TBE05<br>(P.77) |
|                              |            | DIN352                   |                 |                 |                 |                 |                 |                 |
|                              |            | DIN357/LONG              |                 |                 |                 |                 |                 |                 |
|                              | MF         | DIN374                   | TC844<br>(P.81) | TD844<br>(P.81) | TB844<br>(P.81) | TCE09<br>(P.83) | TDE09<br>(P.83) |                 |
|                              |            | DIN2181                  |                 |                 |                 |                 |                 |                 |
|                              | UNC        | DIN371/376               | TC824<br>(P.91) | TD824<br>(P.91) | TB824<br>(P.91) | TCE01<br>(P.92) | TDE01<br>(P.92) |                 |
|                              |            | DIN351                   |                 |                 |                 |                 |                 |                 |
|                              | UNF        | DIN371/374               | TC864<br>(P.93) | TD864<br>(P.93) | TB864<br>(P.93) | TCE02<br>(P.94) | TDE02<br>(P.94) |                 |
|                              |            | DIN2181                  |                 |                 |                 |                 |                 |                 |
|                              | BSW        | DIN2182/2183             |                 |                 |                 |                 |                 |                 |
|                              |            | DIN351                   |                 |                 |                 |                 |                 |                 |
|                              | G(BSP)     | DIN5156/5157             |                 |                 |                 |                 |                 |                 |
|                              | EG-M       | DIN371/376               |                 |                 |                 |                 |                 |                 |
|                              | EG-UNC     | DIN371/376               |                 |                 |                 |                 |                 |                 |
| EG-UNF                       | DIN371/374 |                          |                 |                 |                 |                 |                 |                 |
| SURFACE TREATMENT            |            | Bright                   | TiN             | VAP             | Bright          | TiN             | VAP             |                 |
| MODEL                        |            |                          |                 |                 |                 |                 |                 |                 |



Please visit  
[globalyg1.com/mat](http://globalyg1.com/mat)  
for material search

◎ : Excellent ○ : Good

Recommended cutting conditions : P.114

| ISO | VDI 3323            | Material Description                      | Composition / Structure / Heat Treatment | HB   | HRC                 | Bright  | TiN | VAP | Bright | TiN | VAP |   |
|-----|---------------------|---|--|--|---------------------|---------|-----|-----|--------|-----|-----|---|
| P   | 1                   | Non-alloy steel                           | About 0.15% C                            | Annealed                                       | 125                 | ○       | ○   | ○   | ○      | ○   | ○   |   |
|     | 2                   |   | About 0.45% C                            | Annealed                                       | 190                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 3                   |   | About 0.45% C                            | Quenched & Tempered                            | 250                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | YG TAP Ti Ni        | 4   | Low alloy steel                          | About 0.75% C                                  | Annealed            | 270     | ◎   | ◎   | ◎      | ◎   | ◎   | ◎ |
|     |                     | 5   |  | About 0.75% C                                  | Quenched & Tempered | 300     | ◎   | ◎   | ◎      | ◎   | ◎   | ◎ |
|     | YG TAP FORMING      | 6   | High alloyed steel, and tool steel       |  | Annealed            | 180     | ◎   | ◎   | ◎      | ◎   | ◎   | ◎ |
|     |                     | 7   |  |  | Quenched & Tempered | 275     | ◎   | ◎   | ◎      | ◎   | ◎   | ◎ |
|     |                     | 8   |  |  | Quenched & Tempered | 300     | ◎   | ◎   | ◎      | ◎   | ◎   | ◎ |
|     |                     | 9   |  |  | Quenched & Tempered | 350     | ◎   | ◎   | ◎      | ◎   | ◎   | ◎ |
|     | NUT TAPS            | 10  |  |  | Annealed            | 200     | ○   | ○   | ○      | ○   | ○   | ○ |
|     |                     | 11  |  |  | Quenched & Tempered | 325     |     |     |        |     |     |   |
| M   | 12                  | Stainless steel                           | Ferritic / Martensitic                   | Annealed                                       | 200                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 13                  |   | Martensitic                              | Quenched & Tempered                            | 240                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 14                  |   | Austenitic                               |  | 180                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
| K   | 15                  | Grey cast iron                            | Pearlitic / ferritic                     |  | 180                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 16                  |   | Pearlitic (Martensitic)                  |  | 260                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 17                  | Nodular cast iron                         | Ferritic                                 |  | 160                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 18                  |   | Pearlitic                                |  | 250                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 19                  |   | Ferritic                                 |  | 130                 |         |     |     |        |     |     |   |
| 20  | Malleable cast iron | Pearlitic                                 |  | 230  |                     |         |     |     |        |     |     |   |
| N   | 21                  | Aluminum-wrought alloy                    |  | Not Curable                                    | 60                  |         |     |     |        |     |     |   |
|     | 22                  |   |  | Curable  | 100                 |         |     |     |        |     |     |   |
|     | 23                  | Aluminum-cast, alloyed                    |  | ≤ 12% Si, Not Curable                          | 75                  | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 24                  |   |  | ≤ 12% Si, Curable                              | 90                  |         |     |     |        |     |     |   |
|     | 25                  |   |  | > 12% Si, Not Curable                          | 130                 |         |     |     |        |     |     |   |
|     | 26                  | Copper and Copper Alloys (Bronze / Brass) |  | Cutting Alloys, PB>1%                          | 110                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 27                  |   |  | CuZn, CuSnZn (Brass)                           | 90                  | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 28                  |   |  | CuSn, lead-free copper and electrolytic copper | 100                 | ◎       | ◎   | ◎   | ◎      | ◎   | ◎   |   |
|     | 29                  | Non Metallic Materials                    |  | Duroplastic, Fiber Reinforced Plastic          |                     |         |     |     |        |     |     |   |
|     | 30                  |   |  | Rubber, Wood, etc.                             |                     |         |     |     |        |     |     |   |
| S   | 31                  | Heat Resistant Super Alloys               | Fe Based                                 | Annealed                                       | 200                 |         |     |     |        |     |     |   |
|     | 32                  |   |  | Cured  | 280                 |         |     |     |        |     |     |   |
|     | 33                  |   | Annealed                                 | 250  |                     |         |     |     |        |     |     |   |
|     | 34                  |   | Cured                                    | 350  |                     |         |     |     |        |     |     |   |
|     | 35                  | Titanium Alloys                           | Ni or Co Based                           | Cast   | 320                 |         |     |     |        |     |     |   |
|     | 36                  |   |  | Pure Titanium                                  | 400 Rm              |         |     |     |        |     |     |   |
|     | 37                  |   |  | Alpha + Beta Alloys                            | Hardened            | 1050 Rm |     |     |        |     |     |   |
| H   | 38                  | Hardened steel                            |  | Hardened                                       | 550                 |         |     |     |        |     |     |   |
|     | 39                  |   |  | Hardened                                       | 630                 |         |     |     |        |     |     |   |
|     | 40                  | Hardened Cast Iron                        |  | Cast   | 400                 |         |     |     |        |     |     |   |
|     | 41                  |   |  | Hardened                                       | 550                 |         |     |     |        |     |     |   |