

DIMPLE BAR

**Una cabeza ligera y rígida a la vez,
previene las vibraciones para una
mejor superficie de acabado.
Expansión del recubrimiento
"MIRACLE" con placas
calidad "VP15TF"**

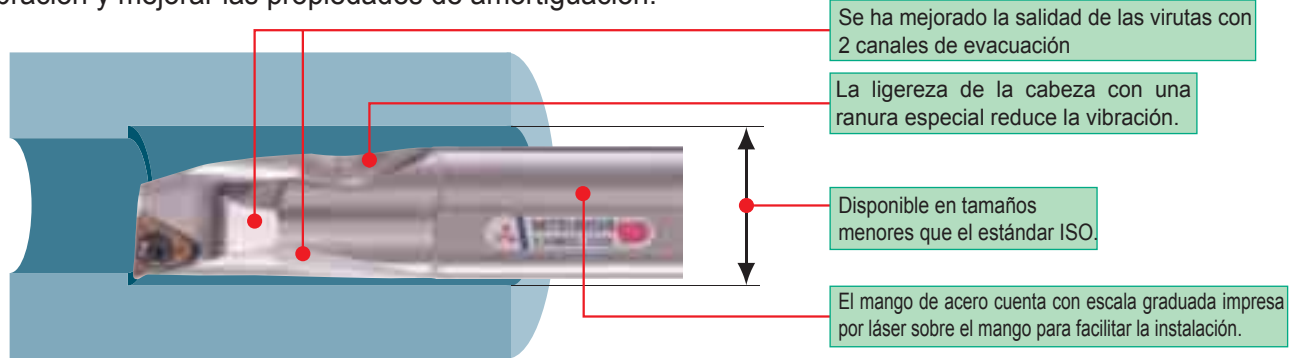


Barra de mandrinar anti-vibratoria

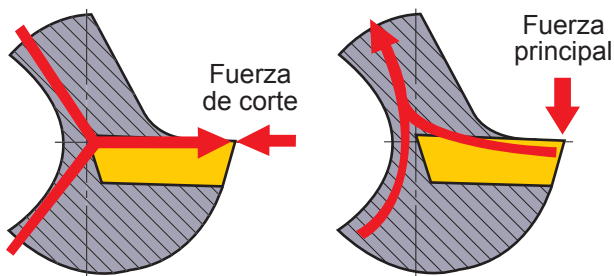
DIMPLE BAR

Características

Utilizando una simulación por ordenador se ha diseñado una barra de mucha rigidez y una cabeza muy ligera para reducir la vibración y mejorar las propiedades de amortiguación.



Resistencia a la desviación



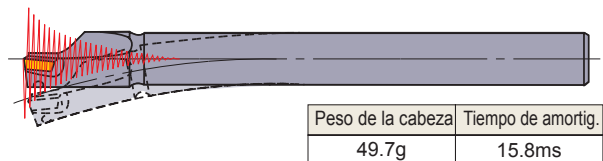
El diseño de la Dimple Bar equilibra las fuerzas y reduce la deflexión en un 17%.

| Barras de perforación | Desviación |
|-----------------------|------------|
| Dimple bar | 28.3µm |
| Barra convencional | 34µm |

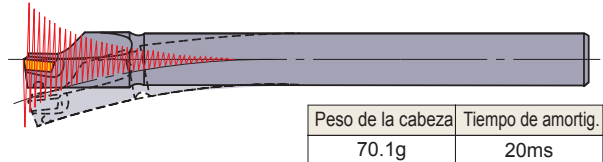
Nota: Los datos anteriores se obtuvieron cuando utilizamos la herramienta FSCLP1816R-09S según las siguientes condiciones de corte: $l/d=5$, Profundidad de corte = 0,5 mm, Avance = 0,05 mm/rev.

Resistencia a la vibración

Dimple Bar



Barra convencional



Reduciendo el peso de la cabeza, aumentan las propiedades de amortiguación

Tipo mango de Metal Duro

La Dimple Bar de metal duro utiliza agujeros de refrigeración.

Un suministro de refrigerante estable al punto de corte es posible incluso cuando se perforan agujeros profundos.

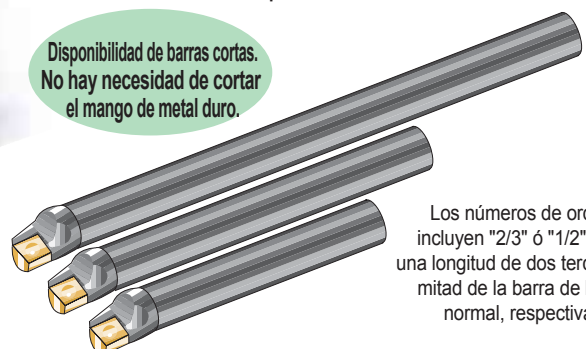
Con agujero de refrigeración.



Tres diferentes longitudes de barra de mandrinar. (Serie de mango corto)

Selección de la barra de longitud más adecuada, de acuerdo con la aplicación.

Disponibilidad de barras cortas. No hay necesidad de cortar el mango de metal duro.



Los números de orden que incluyen "2/3" ó "1/2" indican una longitud de dos tercios o la mitad de la barra de longitud normal, respectivamente.

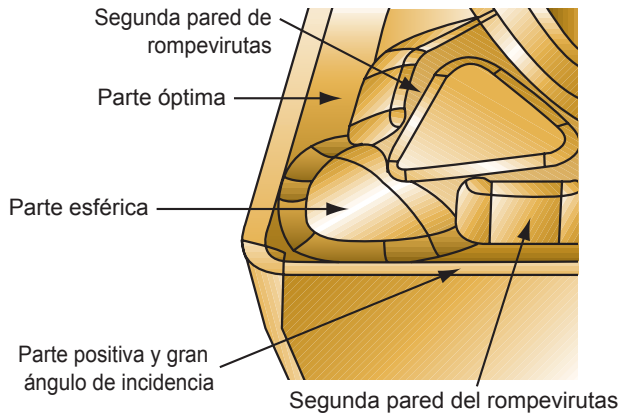
■ Características Rompevirutas *MV* · *SV*

Nuevo concepto de rompevirutas directamente de prensa para Dimple Bar.

Control de virutas estable y buen desprendimiento para una amplia área de aplicaciones.

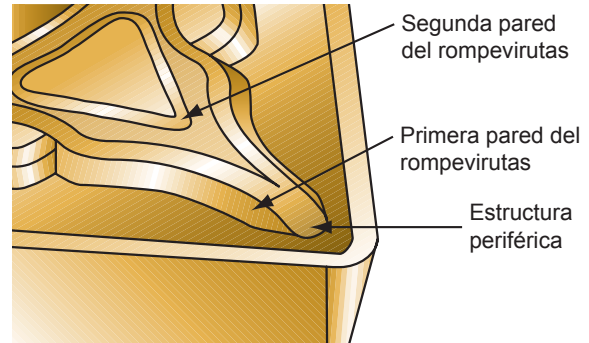
● Rompevirutas *MV* para corte medio.

Una combinación entre la parte esférica del rompevirutas y las dos paredes a ambos lados mejoran el control de las virutas para profundidades de corte entre 0.8mm-2 mm.



● Rompevirutas *SV* para corte ligero.

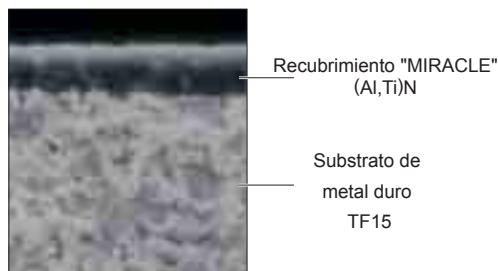
Una combinación entre la estructura periférica del rompevirutas y las dos paredes del rompevirutas nos asegura el control de las virutas incluso en profundidades por debajo de 1 mm.



El ángulo de incidencia asegura un corte con buen desprendimiento para prevenir las vibraciones y asegurar un excelente superficie de acabado.

■ Características de calidades

● Calidad *VP15TF* de recubrimiento MIRACLE.



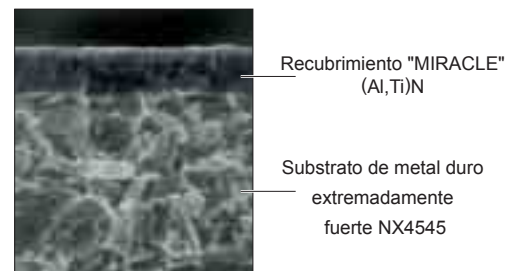
(Al, Ti)N Recubrimiento "MIRACLE "

Resistencia al calor y resistencia de adhesión han aumentado sustancialmente, comparado con los recubrimientos convencionales permitiendo una vida de herramientas más larga.

Substrato de metal duro micro-grano TF15

El metal duro de micro grano con buen equilibrio de desgaste y resistencia a las roturas.

● Calidad *VP45N* cermet recubierto MIRACLE.



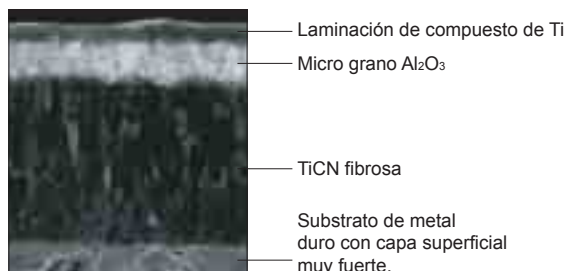
(Al, Ti)N Recubrimiento "MIRACLE "

Resistencia al calor y resistencia de adhesión han aumentado sustancialmente, comparado con los recubrimientos convencionales permitiendo una vida de herramientas más larga.

Substrato de metal duro extremadamente fuerte NX4545

Se aumenta la tenacidad al compararla con otras calidades cermet para un mecanizado más estable.

● Calidad *UE6020*, con recubrimiento CVD



Tecnología de "Recubrimiento Uniforme"

Una estructura laminada muy suave y estable de un compuesto de titanio especial que tiene alta resistencia a las roturas.

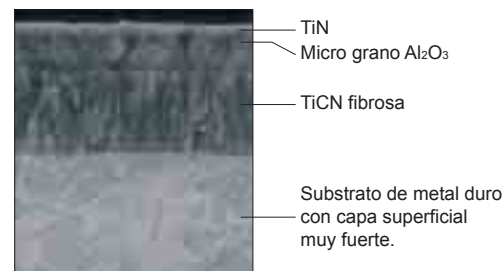
Estructura de recubrimiento de capa triple.

Las capas externas son de compuesto Ti laminado sobre una capa suave de óxido de aluminio (Al₂O₃). Esto provee la alta resistencia necesaria para un mecanizado de alta velocidad. La capa interna es de titanio cristalino fibroso, que tiene un buen equilibrio de desgaste y resistencia a las fracturas.

Substrato de metal duro especial.

El sustrato tiene un núcleo duro combinado con una capa de superficie dura.

● Calidad *US7020*, con recubrimiento CVD



Capa de recubrimiento de TiCN fibrosa + Micro grano Al₂O₃

Una capa de recubrimiento fina con alta resistencia a la adhesión es menos susceptible al desgaste que otras calidades, para el corte del acero.

El sustrato de metal duro tiene un núcleo duro y una superficie más tenaz que las calidades existentes. Esto reduce la deformación plástica y las roturas del filo de corte cuando mecanizamos aceros inoxidables a alta velocidad.

Diseño de un pequeño honing

El diseño de este pequeño honing permite realizar un corte más agudo que otras calidades para prevenir las soldaduras en la punta.

PLACAS TORNEADO

Barra de mandrinar anti-vibratoria

DIMPLE BAR

Resultados de corte

| l/d | Velocidad de corte | DIMPLE BAR | Barra de mandrinar competidores (utilizando una calidad cermet) |
|---------------------------------|--------------------|---------------------------------|---|
| Prof. agujero = 5 Mango dia. | 80m/min | Excelente superficie de acabado | Superficie de acabado pobre |
| Prof. agujero = 4 Mango dia. | 160m/min | Excelente superficie de acabado | Se ven las marcas de la vibración |

Mango de acero





Condiciones de corte
Material : ISO 42CrMo4 (185HB)
Prof. de corte: 0.5mm
Avance : 0.1mm/rev
Corte refrigerado

DIMPLE BAR
Herramienta: FSCLP1816R-09S
Placa : CPMH090304-MV
Calidad : NX2525

Mango de Metal Duro

Condiciones de corte
Material : ISO 42CrMo4 (185HB)
Velocidad de corte: 80m/min
Prof. de corte: 0.5mm
Avance : 0.1mm/rev
Voladizo : 96mm (l/d=8)
Corte refrigerado

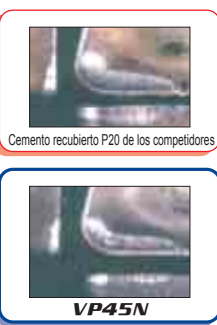
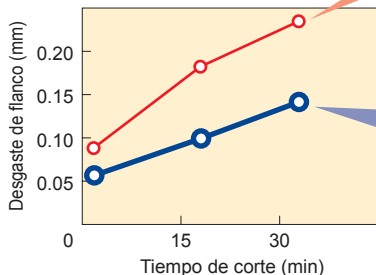
DIMPLE BAR
Herramienta: FSTUP1412R-09E
Placa : TPMH090204-MV
Calidad : NX2525

| | | |
|--|--|---|
| DIMPLE BAR Mango de Metal Duro |  |  Excelente superficie de acabado |
| Barra de perforación de metal duro de los competidores |  |  Se ven las marcas de la vibración |

Resultados de corte de las calidades VP15TF VP45N UE6020 US7020

VP45N

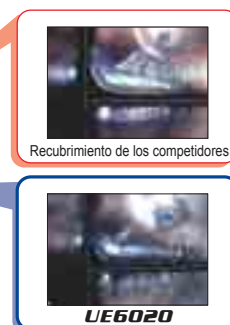
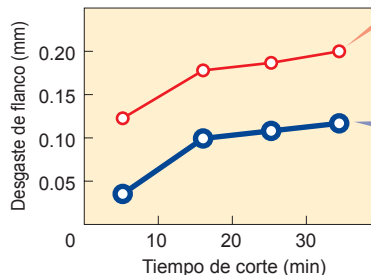
VP45N, resistencia al desgaste superior para corte de acero dulce.



Herramienta : FSCLP1816L-09S Material : JIS SCM440
Placa : CPMH090304-MV Mandrinado
Velocidad de corte: 160m/min Voladizo : 64mm (l/d=4)
Avance : 0.1mm/rev Corte refrigerado
Prof. de corte: 1mm

UE6020

UE6020, resistencia al desgaste superior para corte de acero general.



Herramienta : FSCLP2220L-09E Material : JIS SCM440
Placa : CPMH090304-MV Mandrinado
Velocidad de corte: 180m/min Voladizo : 48mm (l/d=3)
Avance : 0.15mm/rev Corte refrigerado
Prof. de corte: 1.0mm

VP15TF

VP15TF muestra una excelente resistencia a las roturas.

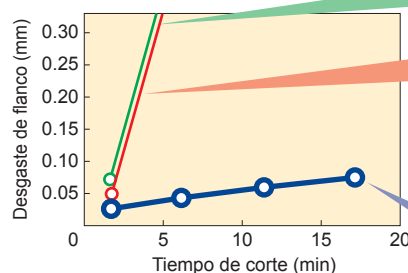
| Avance (mm/rev) | 0.08 | 0.10 | 0.20 | 0.30 |
|---|------|------|------|------|
| VP15TF | ○ | ○ | ○ | ○ |
| Recubrimiento de los competidores | ○ | × | × | × |
| Metal Duro recubierto P20 de los competidores | ○ | × | × | × |



Herramienta : FSCLP1816R-09E Material : ISO 42CrMo4
Placa : CPMH090304-MV Corte interrumpido
Velocidad de corte : 120m/min Voladizo : 48mm (l/d=3)
Avance : Var mm/rev Corte refrigerado
Prof. de corte : 1.0mm

US7020

US7020, ideal para corte de acero inoxidable.

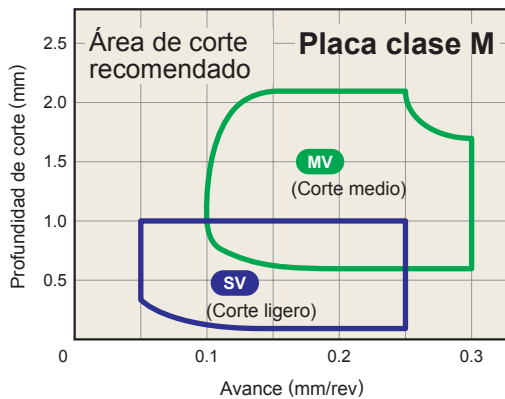


Herramienta : FSCLP1816L-09E Material : 304 Acero inoxidable
Placa : CPMH090304-MV Perforación
Velocidad de corte: 160m/min Voladizo : 48mm (l/d=3)
Avance : 0.15mm/rev Corte refrigerado
Prof. de corte: 0.1mm

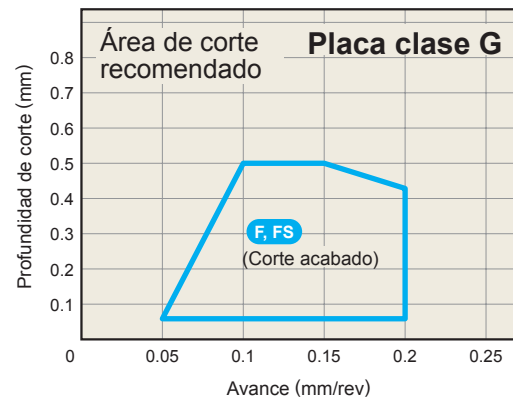
Herramienta recomendada

| Tipo de placa | Página | Herramienta | Ángulo guía | Material del mango | Económico | Resistencia del borde de corte | Copiado | Caras curvas Caras profundas | Refrigerante interno |
|---------------|--------|-------------|-------------|--------------------|-----------|--------------------------------|---------|------------------------------|----------------------|
| 80° rómbico | 34 | FSCLC/P...S | 95° | Acero | | ⊙ | | | |
| | | FSCLC/P...E | 95° | Metal duro | | ⊙ | | | ⊙ |
| Triangular | 36 | FSTUP...S | 93° | Acero | ⊙ | | | | |
| | | FSTUP...E | 93° | Metal duro | ⊙ | | | | ⊙ |
| 55° rómbico | 38 | FSDUC...S | 93° | Acero | | | ⊙ | | |
| | | FSDUC...E | 93° | Metal duro | | | ⊙ | | ⊙ |
| | 40 | FSDQC...S | 107° 30' | Acero | | | ⊙ | | |
| | | FSDQC...E | 107° 30' | Metal duro | | | ⊙ | | ⊙ |
| Trigonal | 42 | FSWUB/P...S | 93° | Acero | ⊙ | ⊙ | | | |
| | | FSWUB/P...E | 93° | Metal duro | ⊙ | ⊙ | | | ⊙ |
| 35° rómbico | 44 | FSVUB/C...S | 93° | Metal duro | | | ⊙ | | |
| | | FSVPB/C...S | 117° 30' | Metal duro | | | ⊙ | | |
| | 45 | FSVJB/C...S | 142° | Metal duro | | | | ⊙ | |

Rompevirutas recomendados



Condiciones de corte
 Placa : CPMH090304-MV, SV Material : DIN 20Cr4
 Velocidad de corte : 150m/min Corte refrigerado



Condiciones de corte
 Placa : CPMH090304L-F Material : ISO 42CrMo4
 Velocidad de corte : 150m/min Corte refrigerado

Condiciones de corte recomendadas

| Material | Modo de corte | Rompevirutas | Recomendación | Calidad | Velocidad de corte (m/min) | LD < 3 (Mango de acero), LD < 6 inferior (Mango de Metal Duro) | | LD = 4 - 5 (Mango de acero), LD = 7 - 8 (Mango de Metal Duro) | |
|--|---------------|------------------|---------------|--------------|----------------------------|--|---------------------|---|---------------------|
| | | | | | | Avance (mm/rev) | Prof. de corte (mm) | Avance (mm/rev) | Prof. de corte (mm) |
| P Acero dulce < 180HB | Acabado | F/FS | ① | NX2525 | 170 (120-220) | 0.10 (0.05-0.15) | -0.5 | 0.10 (0.05-0.15) | -0.5 |
| | | | ② | VP45N | 140 (90-190) | 0.20 (0.10-0.25) | -1.0 | 0.15 (0.05-0.20) | -1.0 |
| | Ligero | SV | ① | VP15TF | 180 (130-230) | 0.20 (0.10-0.25) | -1.0 | 0.15 (0.05-0.20) | -1.0 |
| | | | ② | VP15TF | 160 (110-210) | 0.25 (0.15-0.35) | -2.0 | 0.20 (0.15-0.25) | -1.5 |
| | Medio | MV | ① | VP45N | 130 (80-180) | 0.25 (0.15-0.35) | -2.0 | 0.20 (0.15-0.25) | -1.5 |
| | | | ② | VP15TF | 160 (110-210) | 0.25 (0.15-0.35) | -2.0 | 0.20 (0.15-0.25) | -1.5 |
| Ac. Carbono, Ac. aleado 180 - 280HB | Acabado | F/FS | ① | VP15TF | 140 (90-190) | 0.10 (0.05-0.15) | -0.5 | 0.10 (0.05-0.15) | -0.5 |
| | | | ② | NX2525 | 130 (80-180) | 0.10 (0.05-0.15) | -0.5 | 0.10 (0.05-0.15) | -0.5 |
| | Ligero | SV | ① | VP15TF | 130 (80-180) | 0.20 (0.10-0.25) | -1.0 | 0.15 (0.05-0.20) | -1.0 |
| | | | ② | UE6020 | 140 (90-190) | 0.20 (0.10-0.25) | -1.0 | 0.15 (0.05-0.20) | -1.0 |
| | Medio | MV | ① | VP15TF | 120 (70-170) | 0.25 (0.15-0.35) | -2.0 | 0.20 (0.15-0.25) | -1.5 |
| | | | ② | UE6020 | 130 (80-180) | 0.25 (0.15-0.35) | -2.0 | 0.20 (0.15-0.25) | -1.5 |
| M Acero inoxidable 180 - 280HB | Acabado | F/FS | ① | VP15TF | 150 (110-190) | 0.10 (0.05-0.15) | -0.5 | 0.10 (0.05-0.15) | -0.5 |
| | | | ② | US7020 | 150 (110-190) | 0.20 (0.10-0.25) | -1.0 | 0.15 (0.05-0.20) | -1.0 |
| | Ligero | SV | ① | VP15TF | 130 (90-170) | 0.20 (0.10-0.25) | -1.0 | 0.15 (0.05-0.20) | -1.0 |
| | | | ② | US7020 | 140 (100-180) | 0.20 (0.15-0.25) | -2.0 | 0.20 (0.15-0.25) | -1.0 |
| Medio | MV | ① | VP15TF | 120 (80-160) | 0.20 (0.15-0.25) | -2.0 | 0.20 (0.15-0.25) | -1.0 | |
| | | ② | VP15TF | 120 (80-160) | 0.20 (0.15-0.25) | -2.0 | 0.20 (0.15-0.25) | -1.0 | |
| K Fundición Resistencia a la tensión < 350N/mm² | Acabado | F/FS | ① | HTi10 | 130 (90-160) | 0.15 (0.10-0.20) | -0.5 | 0.15 (0.10-0.20) | -0.5 |
| | Medio | MV | ① | US7020 | 90 (60-120) | 0.20 (0.15-0.25) | -2.0 | 0.20 (0.15-0.25) | -1.5 |
| H Acero tratado 35 - 65HRC | Acabado | sin rompevirutas | ① | MB825 | 100 (80-200) | 0.10 (0.05-0.15) | -0.15 | 0.10 (0.05-0.15) | -0.1 |
| N Aleación de aluminio | Acabado | sin rompevirutas | ① | HTi10 | 300 (200-400) | 0.10 (0.05-0.15) | -0.5 | 0.10 (0.05-0.15) | -0.5 |
| | | | ① | MD220 | 200 (150-250) | 0.10 (0.05-0.15) | -2.0 | 0.10 (0.05-0.15) | -1.0 |

* Si ocurren vibraciones, reduce la velocidad de corte en 30%.

PLACAS TORNEADO

Barra de mandrinar anti-vibratoria

DIMPLE BAR

Herramienta

| Referencia | | Stock | Referencia placa | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte | Radio estándar | Relación l/d recomendada | Acabado | Ligero | | | | | | | | | | | | | | |
|--|------------|-------|------------------------------|------------------|----|-----|------|----|------|-----|--------------------------|----------------|--------------------------|---------|--------|-------|----|--|--|------------|------------|-------|-----|----|--|--|--|------------|------------|
| R | L | | | D4 | L1 | L2 | F1 | H1 | RR° | D1 | Re | | Tornillo | Llave | | | | | | | | | | | | | | | |
| FSCLC/P con agujero de refrigeración Placas CC \odot , Placas CP \odot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Muestra de herramienta a mano derecha. <table border="1" style="float: right; margin-top: 10px;"> <tr> <td>R/L-F</td> <td>SV</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>(06,08,09)</td> <td>(06,08,09)</td> </tr> <tr> <td>Medio</td> <td>CBN</td> </tr> <tr> <td>MV</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>(06,08,09)</td> <td>(06,08,09)</td> </tr> </table> | | | | | | | | | | | | | | | | R/L-F | SV | | | (06,08,09) | (06,08,09) | Medio | CBN | MV | | | | (06,08,09) | (06,08,09) |
| R/L-F | SV | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (06,08,09) | (06,08,09) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Medio | CBN | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (06,08,09) | (06,08,09) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FSCLC1008R/L-06A | ●● | ●● | CCG/MH NP-CCMH NP-CCMB | 0602 \odot | 8 | 125 | 18 | 5 | 7.2 | 12 | 10 | 0.4 | -3 | TS253 | TKY08F | | | | | | | | | | | | | | |
| FSCLP1210R/L-08A | ●● | ●● | CPMH NP-CPMH NP-CPMB | 0802 \odot | 10 | 150 | 22.5 | 6 | 9 | 5 | 12 | 0.4 | -3.5 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1412R/L-08A | ●● | ●● | | 0802 \odot | 12 | 150 | 27 | 7 | 11 | 4 | 14 | 0.4 | -4 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1816R/L-09A | ●● | ●● | | 0903 \odot | 16 | 180 | 36 | 9 | 15 | 3.5 | 18 | 0.4 | -5 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 2220R/L-09A | ●● | ●● | | 0903 \odot | 20 | 220 | 45 | 11 | 19 | 2 | 22 | 0.4 | -5 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 3025R/L-09A | ●● | ●● | | 0903 \odot | 25 | 250 | 56.3 | 15 | 23.4 | 0 | 30 | 0.4 | -5 | TS4D | TKY15F | | | | | | | | | | | | | | |

| Referencia | | Stock | Referencia placa | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte | Radio estándar | Relación l/d recomendada | Acabado | Ligero | | | | | | | | | | | | | | |
|--|------------|-------|------------------------------------|------------------|----|-----|------|----|-----|-----|--------------------------|----------------|--------------------------|---------|--------|-------|----|--|--|------------|------------|-------|-----|----|--|--|--|------------|------------|
| R | L | | | D4 | L1 | L2 | F1 | H1 | RR° | D1 | Re | | Tornillo | Llave | | | | | | | | | | | | | | | |
| FSCLC/P.E Mango de metal duro con agujero de refrigeración Placas CC \odot , Placas CP \odot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Muestra de herramienta a mano derecha. <table border="1" style="float: right; margin-top: 10px;"> <tr> <td>R/L-F</td> <td>SV</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>(06,08,09)</td> <td>(06,08,09)</td> </tr> <tr> <td>Medio</td> <td>CBN</td> </tr> <tr> <td>MV</td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td>(06,08,09)</td> <td>(06,08,09)</td> </tr> </table> | | | | | | | | | | | | | | | | R/L-F | SV | | | (06,08,09) | (06,08,09) | Medio | CBN | MV | | | | (06,08,09) | (06,08,09) |
| R/L-F | SV | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (06,08,09) | (06,08,09) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Medio | CBN | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MV | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| (06,08,09) | (06,08,09) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| FSCLC1008R/L-06E | ●● | ●● | CCGH CCMH NP-CCMH NP-CCMB | 0602 \odot | 8 | 140 | 13.8 | 5 | 7.2 | 12 | 10 | 0.4 | -7 | TS253 | TKY08F | | | | | | | | | | | | | | |
| 1008R-06E-2/3 | ●● | ●● | | 0602 \odot | 8 | 90 | 13.8 | 5 | 7.2 | 12 | 10 | 0.4 | -7 | TS253 | TKY08F | | | | | | | | | | | | | | |
| 1008R-06E-1/2 | ●● | ●● | | 0602 \odot | 8 | 70 | 13.8 | 5 | 7.2 | 12 | 10 | 0.4 | -7 | TS253 | TKY08F | | | | | | | | | | | | | | |
| FSCLP1210R/L-08E | ●● | ●● | CPMH NP-CPMH NP-CPMB | 0802 \odot | 10 | 160 | 16.0 | 6 | 9 | 5 | 12 | 0.4 | -7.5 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1210R-08E-2/3 | ●● | ●● | | 0802 \odot | 10 | 105 | 16.0 | 6 | 9 | 5 | 12 | 0.4 | -7.5 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1210R-08E-1/2 | ●● | ●● | | 0802 \odot | 10 | 80 | 16.0 | 6 | 9 | 5 | 12 | 0.4 | -7.5 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1412R/L-08E | ●● | ●● | | 0802 \odot | 12 | 180 | 17.8 | 7 | 11 | 4 | 14 | 0.4 | -8 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1412R-08E-2/3 | ●● | ●● | | 0802 \odot | 12 | 120 | 17.8 | 7 | 11 | 4 | 14 | 0.4 | -8 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1412R-08E-1/2 | ●● | ●● | | 0802 \odot | 12 | 90 | 17.8 | 7 | 11 | 4 | 14 | 0.4 | -8 | TS3D | TKY10F | | | | | | | | | | | | | | |
| 1816R/L-09E | ●● | ●● | | 0903 \odot | 16 | 220 | 21.8 | 9 | 15 | 3.5 | 18 | 0.4 | -8 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 1816R-09E-2/3 | ●● | ●● | | 0903 \odot | 16 | 145 | 21.8 | 9 | 15 | 3.5 | 18 | 0.4 | -8 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 1816R-09E-1/2 | ●● | ●● | | 0903 \odot | 16 | 110 | 21.8 | 9 | 15 | 3.5 | 18 | 0.4 | -8 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 2220R/L-09E | ●● | ●● | | 0903 \odot | 20 | 250 | 24.0 | 11 | 19 | 2 | 22 | 0.4 | -8 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 2220R-09E-2/3 | ●● | ●● | | 0903 \odot | 20 | 165 | 24.0 | 11 | 19 | 2 | 22 | 0.4 | -8 | TS4D | TKY15F | | | | | | | | | | | | | | |
| 2220R-09E-1/2 | ●● | ●● | | 0903 \odot | 20 | 125 | 24.0 | 11 | 19 | 2 | 22 | 0.4 | -8 | TS4D | TKY15F | | | | | | | | | | | | | | |

* El l/d recomendado es para un tipo de mango más largo. Al usar un mango más corto, ponga atención para asegurar que la herramienta que queda sobresaliente es suficiente.

Quando use placas con rompevirutas de mano derecha e izquierda, use rompevirutas de mano derecha con una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

- : Stock
- ★ : Stock en Japón
- : A fabricar según demanda
- ▲ : Existencia en Europa. Será reemplazado por nuevos productos.

Placas

| Aplicación | Referencia | Clase | Recubrimiento | | Calidad | Cermet | Calidad | Metal | CBN | | | | | PCD | Dimensiones (mm) | | | | Geometría | | | | | | |
|--|------------|-------|----------------|--------|---------|--------|---------|--------|-------|--------|-------|-------|--------|-------|------------------|-------|----------------|-------|-----------|-------|-------|------|---|----|----|
| | | | MIRACLE | | MIRACLE | cermet | Duro | | | | | | | D1 | S1 | Re | α° | | | | | | | | |
| | | | UE6005 | UE6010 | UE6020 | US7020 | US735 | VP15TF | VP45N | NX2525 | AP25N | HT110 | MB8025 | MB810 | MB820 | MB825 | MB835 | MB710 | | MB730 | MD220 | | | | |
| Rompevirutas directo de prensa | Ligero | M | CCMH060202-SV | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 6.35 | 2.38 | 0.2 | 7 | | |
| | | | 060204-SV | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | 7 |
| | | | CPMH080202-SV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 7.94 | 2.38 | 0.2 | | 11 |
| | | | 080204-SV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 7.94 | 2.38 | 0.4 | | 11 |
| | | | 090302-SV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 9.525 | 3.18 | 0.2 | | 11 |
| | | | 090304-SV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 9.525 | 3.18 | 0.4 | | 11 |
| | 090308-SV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 9.525 | 3.18 | 0.8 | 11 | | | |
| | Medio | M | CCMH060202-MV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 6.35 | 2.38 | 0.2 | 7 | |
| | | | 060204-MV | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | 6.35 | 2.38 | 0.4 | 7 | |
| | | | CPMH080204-MV | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | 7.94 | 2.38 | 0.4 | 11 | |
| | | | 080208-MV | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | 7.94 | 2.38 | 0.8 | 11 | |
| | | | 090304-MV | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | 9.525 | 3.18 | 0.4 | 11 | |
| 090308-MV | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | 9.525 | 3.18 | 0.8 | 11 | | |
| Rompevirutas directo de prensa / rectificado | Acabado | G | CCGH060202R-F | | | ● | ★ | □ | ★ | | | | | | | | | | 6.35 | 2.38 | 0.2 | 7 | <p>Muestra a mano izquierda</p> | | |
| | | | 060202L-F | | | ● | ★ | ★ | ★ | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | 7 | |
| | | | 060204R-F | | | ● | ★ | □ | ★ | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | 7 | |
| | | M | CPMH080204R-F | | | ● | ● | □ | ★ | | | | | | | | | | | 7.94 | 2.38 | 0.4 | | 11 | |
| | | | 080204L-F | | | ● | ● | ● | ★ | | | | | | | | | | | 7.94 | 2.38 | 0.4 | | 11 | |
| | | | 090304R-F | | | ● | ● | □ | ★ | | | | | | | | | | | 9.525 | 3.18 | 0.4 | | 11 | |
| | | | 090304L-F | | | ● | ● | ● | ★ | | | | | | | | | | | 9.525 | 3.18 | 0.4 | | 11 | |
| CBN (sin rompevirutas) | Acabado | M | NP-CCMB060204G | | | | | | | | | | ▲ | | | | | | 6.35 | 2.38 | 0.4 | 7 | <p>Última letra del número de placa G: Para uso general</p> | | |
| | | | NP-CPMB080204G | | | | | | | | | | | ▲ | | | | | 7.94 | 2.38 | 0.4 | 11 | | | |
| | | | 090304G | | | | | | | | | | | ▲ | | | | | 9.525 | 3.18 | 0.4 | 11 | | | |
| PCD (con rompevirutas) | Acabado | M | NP-CCMH060202 | | | | | | | | | | | | | | ★ | 6.35 | 2.38 | 0.2 | 7 | | | | |
| | | | 060204 | | | | | | | | | | | | | | ★ | 6.35 | 2.38 | 0.4 | 7 | | | | |
| | | | NP-CPMH080202 | | | | | | | | | | | | | | | ★ | 7.94 | 2.38 | 0.2 | | 11 | | |
| | | | 080204 | | | | | | | | | | | | | | | ★ | 7.94 | 2.38 | 0.4 | | 11 | | |
| | | | 090302 | | | | | | | | | | | | | | | ★ | 9.525 | 3.18 | 0.2 | | 11 | | |
| | | | 090304 | | | | | | | | | | | | | | | ★ | 9.525 | 3.18 | 0.4 | | 11 | | |



PLACAS TORNEADO

Herramienta

| Referencia | | Stock | | Referencia placa | | Dimensiones (mm) | | | | | Placas TP | | Acabado | Ligero | Medio | | |
|------------------|--|-------|--|------------------------------------|--|--|----|-----|------|----|-----------|-----|--------------------------|-------------------|-------------------|-------|--------|
| | | | | | | | | | | | PCD | CBN | R/L-FS | SV | MV | | |
| FSTUP | | | | | | con agujero de refrigeración | | | | | Placas TP | | R/L-FS | SV | MV | | |
| | | | | | | | | | | | | | (08,09,11,16) | (08,09,11,16) | (08,09,11,16) | | |
| | | | | | | Muestra de herramienta a mano derecha. | | | | | R/L-F | | | | | | |
| | | | | | | | | | | | D1 | Re | Relación l/d recomendada | Tornillo | Llave | | |
| FSTUP1008R/L-08A | | ● ● | | TPGH TPMH NP-TPMB NP-TPMH | | 0802 | 8 | 125 | 18 | 5 | 7.2 | 10 | 10 | 0.4 | -3 | TS2D | TKY06F |
| 1210R/L-09A | | ● ● | | | | 0902 | 10 | 150 | 22.5 | 6 | 9 | 8 | 12 | 0.4 | -3.5 | TS25D | TKY08F |
| 1412R/L-09A | | ● ● | | | | 0902 | 12 | 150 | 27 | 7 | 11 | 7 | 14 | 0.4 | -4 | TS25D | TKY08F |
| 1816R/L-11A | | ● ● | | | | 1103 | 16 | 180 | 36 | 9 | 15 | 4 | 18 | 0.4 | -5 | TS31D | TKY10F |
| 2220R/L-11A | | ● ● | | | | 1103 | 20 | 220 | 45 | 11 | 19 | 0 | 22 | 0.4 | -5 | TS31D | TKY10F |
| 3225R/L-16A | | ● ● | | | | 1603 | 25 | 270 | 56.3 | 16 | 23.4 | 0 | 32 | 0.8 | -5 | TS4D | TKY15F |

| Referencia | | Stock | | Referencia placa | | Dimensiones (mm) | | | | | Placas TP | | Acabado | Ligero | Medio | | |
|------------------|--|-------|--|------------------------------------|--|--|----|-----|------|----|-----------|-----|--------------------------|-------------------|-------------------|-------|--------|
| | | | | | | | | | | | PCD | CBN | R/L-FS | SV | MV | | |
| FSTUP_E | | | | | | Mango de metal duro con agujero de refrigeración | | | | | Placas TP | | R/L-FS | SV | MV | | |
| | | | | | | | | | | | | | (08,09,11,16) | (08,09,11,16) | (08,09,11,16) | | |
| | | | | | | Muestra de herramienta a mano derecha. | | | | | R/L-F | | | | | | |
| | | | | | | | | | | | D1 | Re | Relación l/d recomendada | Tornillo | Llave | | |
| FSTUP1008R/L-08E | | ● ● | | TPGH TPMH NP-TPMB NP-TPMH | | 0802 | 8 | 140 | 13.8 | 5 | 7.2 | 10 | 10 | 0.4 | -7 | TS2D | TKY06F |
| 1008R-08E-2/3 | | ● | | | | 0802 | 8 | 90 | 13.8 | 5 | 7.2 | 10 | 10 | 0.4 | -7 | TS2D | TKY06F |
| 1008R-08E-1/2 | | ● | | | | 0802 | 8 | 70 | 13.8 | 5 | 7.2 | 10 | 10 | 0.4 | -7 | TS2D | TKY06F |
| 1210R/L-09E | | ● ● | | | | 0902 | 10 | 160 | 16.0 | 6 | 9 | 8 | 12 | 0.4 | -7.5 | TS25D | TKY08F |
| 1210R-09E-2/3 | | ● | | | | 0902 | 10 | 105 | 16.0 | 6 | 9 | 8 | 12 | 0.4 | -7.5 | TS25D | TKY08F |
| 1210R-09E-1/2 | | ● | | | | 0902 | 10 | 80 | 16.0 | 6 | 9 | 8 | 12 | 0.4 | -7.5 | TS25D | TKY08F |
| 1412R/L-09E | | ● ● | | | | 0902 | 12 | 180 | 17.8 | 7 | 11 | 7 | 14 | 0.4 | -8 | TS25D | TKY08F |
| 1412R-09E-2/3 | | ● | | | | 0902 | 12 | 120 | 17.8 | 7 | 11 | 7 | 14 | 0.4 | -8 | TS25D | TKY08F |
| 1412R-09E-1/2 | | ● | | | | 0902 | 12 | 90 | 17.8 | 7 | 11 | 7 | 14 | 0.4 | -8 | TS25D | TKY08F |
| 1816R/L-11E | | ● ● | | | | 1103 | 16 | 220 | 21.8 | 9 | 15 | 4 | 18 | 0.4 | -8 | TS31D | TKY10F |
| 1816R-11E-2/3 | | ● | | | | 1103 | 16 | 145 | 21.8 | 9 | 15 | 4 | 18 | 0.4 | -8 | TS31D | TKY10F |
| 1816R-11E-1/2 | | ● | | | | 1103 | 16 | 110 | 21.8 | 9 | 15 | 4 | 18 | 0.4 | -8 | TS31D | TKY10F |
| 2220R/L-11E | | ● ● | | | | 1103 | 20 | 250 | 24.0 | 11 | 19 | 0 | 22 | 0.4 | -8 | TS31D | TKY10F |
| 2220R-11E-2/3 | | ● | | | | 1103 | 20 | 165 | 24.0 | 11 | 19 | 0 | 22 | 0.4 | -8 | TS31D | TKY10F |
| 2220R-11E-1/2 | | ● | | | | 1103 | 20 | 125 | 24.0 | 11 | 19 | 0 | 22 | 0.4 | -8 | TS31D | TKY10F |

* El l/d recomendado es para un tipo de mango más largo. Al usar un mango más corto, ponga atención para asegurar que la herramienta que queda sobresaliente es suficiente.
 Cuando use placas con rompevirutas de mano derecha e izquierda, use rompevirutas de mano derecha con una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

- : Stock
- ★ : Stock en Japón
- : A fabricar según demanda
- ▲ : Existencia en Europa. Será reemplazado por nuevos productos.

Placas

| Aplicación | Referencia | Clase | Recubrimiento | | Calidad | Cermet | Calidad | Metal | CBN | | | | | | | PCD | Dimensiones (mm) | | | Geometría | | | | | | | | |
|--------------------------------|------------|-------|------------------------|---------|---------|----------------|---------|--------|-------|--------|-------|-------|--------|-------|-------|-------|------------------|-------|-------|-----------|-------|-------|-------|--|--|------|------|--|
| | | | UE6005 | UE6010 | UE6020 | US7020 | US735 | VP15TF | VP45N | NX2525 | AP25N | HT110 | MB8025 | MB810 | MB820 | MB825 | MB835 | MB710 | MB730 | | MD220 | D1 | S1 | Re | | | | |
| | | | MIRACLE | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rompevirutas directo de prensa | Ligero | M | TPMH080202-SV | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.2 | <p>TPMH...-SV</p> | | | | |
| | | | 080204-SV | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | | 0.4 | | | |
| | | | 090202-SV | | | | | | | | | | | | | | | | | | | 5.56 | 2.38 | | 0.2 | | | |
| | | | 090204-SV | | | | | | | | | | | | | | | | | | | 5.56 | 2.38 | | 0.4 | | | |
| | | | 110302-SV | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | | 0.2 | | | |
| | | | 110304-SV | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | | 0.4 | | | |
| | | | 110308-SV | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | | 0.8 | | | |
| | | | 160302-SV | | | | | | | | | | | | | | | | | | | 9.525 | 3.18 | | 0.2 | | | |
| | | | 160304-SV | | | | | | | | | | | | | | | | | | | 9.525 | 3.18 | | 0.4 | | | |
| | 160308-SV | | | | | | | | | | | | | | | | | | | 9.525 | 3.18 | 0.8 | | | | | | |
| | Medio | M | TPMH080202-MV | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.2 | <p>TPMH...-MV</p> | | | |
| | | | 080204-MV | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.4 | | | | |
| | | | 090202-MV | | | | | | | | | | | | | | | | | | | 5.56 | 2.38 | 0.2 | | | | |
| | | | 090204-MV | | | | | | | | | | | | | | | | | | | 5.56 | 2.38 | 0.4 | | | | |
| | | | 110302-MV | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.2 | | | | |
| | | | 110304-MV | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.4 | | | | |
| | | | 110308-MV | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.8 | | | | |
| | | | 160304-MV | | | | | | | | | | | | | | | | | | | 9.525 | 3.18 | 0.4 | | | | |
| 160308-MV | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.18 | 0.8 | | | | | |
| Rompevirutas rectificadas | Acabado | G | TPGH080202R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | 4.76 | 2.38 | 0.2 | <p>TPGH...R/L-FS</p> <p>Muestra a mano izquierda</p> | | | | |
| | | | 080202L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 4.76 | 2.38 | | 0.2 | | | |
| | | | 080204R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | | 4.76 | 2.38 | | 0.4 | | | |
| | | | 080204L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 4.76 | 2.38 | | 0.4 | | | |
| | | | 090202R-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 5.56 | 2.38 | | 0.2 | | | |
| | | | 090202L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 5.56 | 2.38 | | 0.2 | | | |
| | | | 090204R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | | 5.56 | 2.38 | | 0.4 | | | |
| | | | 090204L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 5.56 | 2.38 | | 0.4 | | | |
| | | | 110302R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | | 6.35 | 3.18 | | 0.2 | | | |
| | | | 110302L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 6.35 | 3.18 | | 0.2 | | | |
| | | | 110304R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | | 6.35 | 3.18 | | 0.4 | | | |
| | | | 110304L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 6.35 | 3.18 | | 0.4 | | | |
| | | | 160304R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | | 9.525 | 3.18 | | 0.4 | | | |
| | | | 160304L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 9.525 | 3.18 | | 0.4 | | | |
| | | | 160308R-FS | | | | | ★ | □ | ★ | | | | | | | | | | | | 9.525 | 3.18 | | 0.8 | | | |
| | | | 160308L-FS | | | | | ★ | ● | ★ | | | | | | | | | | | | 9.525 | 3.18 | | 0.8 | | | |
| | | | CBN (sin rompevirutas) | Acabado | M | NP-TPMB080204G | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.4 | <p>NP-TPMB...G</p> <p>Última letra del número de placa G: Para uso general</p> |
| | | | | | | 090204G | | | | | | | | | | | | | | | | | | | | 5.56 | 2.38 | |
| 110304G | | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.4 | | | | |
| 160304G | | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.18 | 0.4 | | | | |
| PCD (con rompevirutas) | Acabado | M | NP-TPMH080202R-F | | | | | | | | | | | | | | | | | | ★ | 4.76 | 2.38 | 0.2 | <p>NP-TPMH...R/L-F</p> <p>Muestra a mano izquierda</p> | | | |
| | | | 080202L-F | | | | | | | | | | | | | | | | | | | ★ | 4.76 | 2.38 | | 0.2 | | |
| | | | 080204R-F | | | | | | | | | | | | | | | | | | | ★ | 4.76 | 2.38 | | 0.4 | | |
| | | | 080204L-F | | | | | | | | | | | | | | | | | | | ★ | 4.76 | 2.38 | | 0.4 | | |
| | | | 090202R-F | | | | | | | | | | | | | | | | | | | ★ | 5.56 | 2.38 | | 0.2 | | |
| | | | 090202L-F | | | | | | | | | | | | | | | | | | | ★ | 5.56 | 2.38 | | 0.2 | | |
| | | | 090204R-F | | | | | | | | | | | | | | | | | | | ★ | 5.56 | 2.38 | | 0.4 | | |
| | | | 090204L-F | | | | | | | | | | | | | | | | | | | ★ | 5.56 | 2.38 | | 0.4 | | |
| | | | 110302R-F | | | | | | | | | | | | | | | | | | | ★ | 6.35 | 3.18 | | 0.2 | | |
| | | | 110302L-F | | | | | | | | | | | | | | | | | | | ★ | 6.35 | 3.18 | | 0.2 | | |
| | | | 110304R-F | | | | | | | | | | | | | | | | | | | ★ | 6.35 | 3.18 | | 0.4 | | |
| | | | 110304L-F | | | | | | | | | | | | | | | | | | | ★ | 6.35 | 3.18 | | 0.4 | | |
| | | | 160302R-F | | | | | | | | | | | | | | | | | | | ★ | 9.525 | 3.18 | | 0.2 | | |
| | | | 160302L-F | | | | | | | | | | | | | | | | | | | ★ | 9.525 | 3.18 | | 0.2 | | |
| 160304R-F | | | | | | | | | | | | | | | | | | | ★ | 9.525 | 3.18 | 0.4 | | | | | | |
| 160304L-F | | | | | | | | | | | | | | | | | | | ★ | 9.525 | 3.18 | 0.4 | | | | | | |



PLACAS TORNEADO

Herramienta

| Referencia | | Stock | | Referencia placa | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación l/d recomendada | Acabado | | Ligero | | Medio | |
|-------------------------|--|-------|---|------------------------------------|------------------|----|-----|------|------|-----|-----|--------------------------------|----------------------|--------------------------|---------|------|--------|-------|-------|-----|
| | | R | L | | D4 | L1 | L2 | F1 | F2 | H1 | RR° | | | | FV | SV | MV | Medio | PCD | CBN |
| FSDUC1410R/L-07A | | ● | ● | DCMT DCGT NP-DCMT NP-DCMW | 0702 | 10 | 150 | 18 | 8.3 | 3.3 | 9 | 7.5 | 14 | 0.4 | -3.5 | TS25 | TKY08F | | | |
| 1612R/L-07A | | ● | ● | | 0702 | 12 | 150 | 20 | 9.3 | 3.3 | 11 | 6 | 16 | 0.4 | -4 | TS25 | TKY08F | | | |
| 2016R/L-07A | | ● | ● | | 0702 | 16 | 180 | 20 | 11.3 | 3.3 | 15 | 5 | 20 | 0.4 | -5 | TS25 | TKY08F | | | |
| 3220R/L-11A | | ● | ● | | 11T3 | 20 | 180 | 22.5 | 16.1 | 6.1 | 19 | 5 | 32 | 0.8 | -5 | TS43 | TKY15F | | | |

| Referencia | | Stock | | Referencia placa | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación l/d recomendada | Acabado | | Ligero | | Medio | |
|-------------------------|--|-------|---|------------------------------------|------------------|----|-----|------|------|-----|-----|--------------------------------|----------------------|--------------------------|---------|------|--------|-------|-------|-----|
| | | R | L | | D4 | L1 | L2 | F1 | F2 | H1 | RR° | | | | FV | SV | MV | Medio | PCD | CBN |
| FSDUC1410R/L-07E | | ★ | ★ | DCMT DCGT NP-DCMT NP-DCMW | 0702 | 10 | 160 | 16.0 | 8.3 | 3.3 | 9 | 7.5 | 14 | 0.4 | -7.5 | TS25 | TKY08F | | | |
| 1612R/L-07E | | ★ | ★ | | 0702 | 12 | 180 | 17.8 | 9.3 | 3.3 | 11 | 6.0 | 16 | 0.4 | -8 | TS25 | TKY08F | | | |
| 2016R/L-07E | | ★ | ★ | | 0702 | 16 | 220 | 21.8 | 11.3 | 3.3 | 16 | 5.0 | 20 | 0.4 | -8 | TS25 | TKY08F | | | |
| 3220R/L-11E | | ● | ★ | | 11T3 | 20 | 250 | 24.0 | 16.1 | 6.1 | 19 | 5.0 | 32 | 0.8 | -8 | TS43 | TKY15F | | | |

* Cuando use placa con rompevirutas de mano derecha e izquierda, use un rompevirutas de mano derecha una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

- : Stock
- ★ : Stock en Japón
- : A fabricar según demanda
- ▲ : Existencia en Europa. Será reemplazado por nuevos productos.
- △ : A fabricar según demanda. Será reemplazado por nuevos productos.

Placas

| Aplicación | Referencia | Clase | Recubrimiento | | | Calidad MIRACLE | Cermet | Calidad cermet | Metal Duro | CBN | | | | | | PCD | Dimensiones (mm) | | | Geometría | | | | | | |
|--|---|---------------|---------------|--------|--------|-----------------|--------|----------------|------------|--------|-------|-------|--------|-------|-------|-------|------------------|-------|-------|-----------|-------|-------|-------------------------|----------------------------|-----------------------|-----|
| | | | UE6005 | UE6010 | UE6020 | US7020 | US735 | VP15TF | VP45N | NX2525 | AP25N | HT110 | MB8025 | MB810 | MB820 | MB825 | MB835 | MB710 | MB730 | | MD220 | D1 | S1 | Re | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rompevirutas directo de prensa Ligero | DCMT070202-SV | M | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | DCMT...-SV | | |
| | 070204-SV | | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | | 0.4 | |
| | 070208-SV | | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | | 0.8 | |
| | 11T302-SV | | ● | ● | ● | ● | ★ | ● | ● | | | | | | | | | | | | | 9.525 | 3.97 | | 0.2 | |
| | 11T304-SV | | ● | ● | ● | ● | ★ | ● | ● | | | | | | | | | | | | | 9.525 | 3.97 | | 0.4 | |
| | 11T308-SV | | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 9.525 | 3.97 | | 0.8 | |
| | Rompevirutas directo de prensa Medio | DCMT070202-MV | M | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | DCMT...-MV | |
| | | 070204-MV | | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | | 070208-MV | | ● | ● | ● | ● | ★ | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | | 0.8 |
| | | 11T302-MV | | ● | ● | ● | ● | ★ | ● | ● | | | | | | | | | | | | | 9.525 | 3.97 | | 0.2 |
| 11T304-MV | | ● | | ● | ● | ● | ★ | ● | ● | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| 11T308-MV | | ● | | ● | ● | ● | ★ | ● | ● | | | | | | | | | | | | | 9.525 | 3.97 | 0.8 | | |
| Rompevirutas rectificado Acabado | DCGT070202R-F | G | | | | ● | ● | □ | ★ | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | DCGT...R/L-F | | |
| | 070202L-F | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | | 6.35 | 2.38 | | 0.2 | |
| | 070204R-F | | | | | ● | ● | □ | ★ | | | | | | | | | | | | | 6.35 | 2.38 | | 0.4 | |
| | 070204L-F | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | | 6.35 | 2.38 | | 0.4 | |
| | 11T302R-F | | | | | ● | ● | □ | ★ | | | | | | | | | | | | | 9.525 | 3.97 | | 0.2 | |
| | 11T302L-F | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | | 9.525 | 3.97 | | 0.2 | |
| | 11T304R-F | | | | | ● | ● | □ | ★ | | | | | | | | | | | | | 9.525 | 3.97 | | 0.4 | |
| | 11T304L-F | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | | 9.525 | 3.97 | | 0.8 | |
| Rompevirutas Acabado | NP-DCMW070204G | M | | | | | | | | | | | | | ★ | | | | | | 6.35 | 2.38 | 0.4 | NP-DCMW...G | | |
| | 11T304G | | | | | | | | | | | | | | ★ | | | | | | 9.525 | 3.97 | 0.4 | | | |
| | 11T308 | | | | | | | | | | | ▲ | ▲ | | | | | | | | 9.525 | 3.97 | 0.8 | | | |
| | NP-DCGW070202F | G | | | | | | | | | | ▲ | | | | | | | | | 6.35 | 2.38 | 0.2 | NP-DCGW...G/F/T | | |
| | 070202G | | | | | | | | | | ▲ | | ▲ | | | | | | | | 6.35 | 2.38 | 0.2 | | | |
| | 070202T | | | | | | | | | | | ▲ | | ▲ | | | | | | | 6.35 | 2.38 | 0.2 | | | |
| | 070204F | | | | | | | | | | | ▲ | | | | | | | | | 6.35 | 2.38 | 0.4 | | | |
| | 070204G | | | | | | | | | | | ▲ | | ▲ | | | | | | | 6.35 | 2.38 | 0.4 | | | |
| | 070204T | | | | | | | | | | | | | ▲ | | | | | | | 6.35 | 2.38 | 0.4 | | | |
| | 070208G | | | | | | | | | | | ▲ | | ▲ | | | | | | | 6.35 | 2.38 | 0.8 | | | |
| | 11T302F | | | | | | | | | | | ▲ | | | | | | | | | 9.525 | 3.97 | 0.2 | | | |
| | 11T302G | | | | | | | | | | | ▲ | | ▲ | | | | | | | 9.525 | 3.97 | 0.2 | | | |
| | 11T302GS | | | | | | | | | | | | | | | ★ | ★ | | | | 9.525 | 3.97 | 0.2 | | | |
| | 11T302T | | | | | | | | | | | | | | ▲ | | | | | | 9.525 | 3.97 | 0.2 | | | |
| | 11T304F | | | | | | | | | | △ | ▲ | | | △ | △ | | | | | 9.525 | 3.97 | 0.4 | | | |
| | 11T304G | | | | | | | | | | | ▲ | | ▲ | | | | | | | 9.525 | 3.97 | 0.4 | | | |
| | 11T304GS | | | | | | | | | | | | | | | | ★ | | | | 9.525 | 3.97 | 0.4 | | | |
| | 11T304T | | | | | | | | | | △ | | ▲ | | | | | | | 9.525 | 3.97 | 0.4 | | | | |
| | 11T308F | | | | | | | | | | △ | ▲ | | | | | | | | 9.525 | 3.97 | 0.8 | | | | |
| | 11T308G | | | | | | | | | | ▲ | | ▲ | | | | | | | 9.525 | 3.97 | 0.8 | | | | |
| 11T308T | | | | | | | | | | △ | | ▲ | | | | | | | 9.525 | 3.97 | 0.8 | | | | | |
| NP-DCGW070204G2 | G | | | | | | | | | | ▲ | | | | | | | | | 6.35 | 2.38 | 0.4 | NP-DCGW...G2 | | | |
| 11T304G2 | | | | | | | | | | | ▲ | | | | | | | | | 9.525 | 3.97 | 0.4 | | | | |
| 11T308G2 | | | | | | | | | | | | ▲ | | | | | | | | 9.525 | 3.97 | 0.8 | | | | |
| Rompevirutas Acabado | NP-DCMT070202R-F | M | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | NP-DCMT...R/L-F | | |
| | 070202L-F | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | | |
| | 070204R-F | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | | |
| | 070204L-F | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | | |
| | 11T302R-F | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | | |
| | 11T302L-F | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | | |
| | 11T304R-F | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | | |
| 11T304L-F | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | | | | |



PLACAS TORNEADO

Herramienta

| Referencia | | Stock | | Referencia placa | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación l/d recomendada | Acabado | | Ligero | | Medio | |
|-------------------------|--|-------|---|------------------------------------|------------------|----|-----|------|------|-----|-----|--------------------------------|----------------------|--------------------------|---------|------|--------|-------|-------|-----|
| | | | | | D4 | L1 | L2 | F1 | F2 | H1 | RR° | | | | FV | SV | MV | Medio | PCD | CBN |
| FSDQC1310R/L-07A | | ● | ● | DCMT DCGT NP-DCMT NP-DCMW | 0702 | 10 | 150 | 20.5 | 7.6 | 2.6 | 9 | 8 | 13 | 0.4 | -3.5 | TS25 | TKY08F | | | |
| 1612R/L-07A | | ● | ● | | 0702 | 12 | 150 | 22.5 | 8.6 | 2.6 | 11 | 6 | 16 | 0.4 | -4 | TS25 | TKY08F | | | |
| 2016R/L-07A | | ● | ● | | 0702 | 16 | 180 | 22.5 | 10.6 | 2.6 | 15 | 5 | 20 | 0.4 | -5 | TS25 | TKY08F | | | |
| 2520R/L-11A | | ● | ● | | 11T3 | 20 | 180 | 26 | 13.7 | 3.7 | 19 | 7 | 25 | 0.8 | -5 | TS43 | TKY15F | | | |

| Referencia | | Stock | | Referencia placa | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación l/d recomendada | Acabado | | Ligero | | Medio | |
|-------------------------|--|-------|---|------------------------------------|------------------|----|-----|------|------|-----|-----|--------------------------------|----------------------|--------------------------|---------|------|--------|-------|-------|-----|
| | | | | | D4 | L1 | L2 | F1 | F2 | H1 | RR° | | | | FV | SV | MV | Medio | PCD | CBN |
| FSDQC1310R/L-07E | | ★ | ★ | DCMT DCGT NP-DCMT NP-DCMW | 0702 | 10 | 162 | 18.4 | 7.6 | 2.6 | 9 | 8 | 13 | 0.4 | -7.5 | TS25 | TKY08F | | | |
| 1612R/L-07E | | ★ | ★ | | 0702 | 12 | 182 | 20.2 | 8.6 | 2.6 | 11 | 6 | 16 | 0.4 | -8 | TS25 | TKY08F | | | |
| 2016R/L-07E | | ★ | ★ | | 0702 | 16 | 222 | 24.2 | 10.6 | 2.6 | 15 | 5 | 20 | 0.4 | -8 | TS25 | TKY08F | | | |
| 2520R/L-11E | | ● | ● | | 11T3 | 20 | 254 | 28.0 | 13.7 | 3.7 | 19 | 7 | 25 | 0.8 | -8 | TS43 | TKY15F | | | |

* Cuando use placa con rompevirutas de mano derecha e izquierda, use un rompevirutas de mano derecha una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

- : Stock
- ★ : Stock en Japón
- : A fabricar según demanda
- ▲ : Existencia en Europa. Será reemplazado por nuevos productos.
- △ : A fabricar según demanda. Será reemplazado por nuevos productos.

Placas

| Aplicación | Referencia | Clase | Recubrimiento | | | | Calidad MIRACLE | Cermet | Calidad cermet | Metal Duro | CBN | | | | | | | PCD | Dimensiones (mm) | | | Geometría | | | | |
|--|---|---------------|---------------|--------|--------|--------|-----------------|--------|----------------|------------|-------|-------|--------|-------|-------|-------|-------|-------|------------------|-------|-------|-----------|-------|------|-----|--|
| | | | UE6005 | UE6010 | UE6020 | US7020 | US735 | VP15TF | VP45N | NX2525 | AP25N | HT110 | MB8025 | MB810 | MB820 | MB825 | MB835 | MB710 | MB730 | MD220 | D1 | | S1 | Re | | |
| Rompevirutas directo de prensa Ligero | DCMT070202-SV | M | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | | |
| | 070204-SV | | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | 6.35 | 2.38 | | 0.4 | |
| | 070208-SV | | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | 6.35 | 2.38 | | 0.8 | |
| | 11T302-SV | | ● | ● | ● | ● | ★ | ● | | | | | | | | | | | | | | 9.525 | 3.97 | | 0.2 | |
| | 11T304-SV | | ● | ● | ● | ● | ★ | ● | | | | | | | | | | | | | | 9.525 | 3.97 | | 0.4 | |
| | 11T308-SV | | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | 9.525 | 3.97 | | 0.8 | |
| | Rompevirutas directo de prensa Medio | DCMT070202-MV | M | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | |
| | | 070204-MV | | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | |
| | | 070208-MV | | ● | ● | ● | ● | ★ | ● | | | | | | | | | | | | | | 6.35 | 2.38 | 0.8 | |
| | | 11T302-MV | | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | |
| 11T304-MV | | ● | | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| 11T308-MV | | ● | | ● | ● | ● | ★ | ● | ● | ● | | | | | | | | | | | | 9.525 | 3.97 | 0.8 | | |
| Rompevirutas rectificado Acabado | DCGT070202R-F | G | | | | | ● | ● | □ | ★ | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070202L-F | | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070204R-F | | | | | | ● | ● | □ | ★ | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 070204L-F | | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 11T302R-F | | | | | | ● | ● | □ | ★ | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T302L-F | | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T304R-F | | | | | | ● | ● | □ | ★ | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| | 11T304L-F | | | | | | ● | ● | ★ | ★ | | | | | | | | | | | | 9.525 | 3.97 | 0.8 | | |
| Rompevirutas Acabado | NP-DCMW070204G | M | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 11T304G | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| | 11T308 | | | | | | | | | | | ▲ | ▲ | | | | | | | | | 9.525 | 3.97 | 0.8 | | |
| | NP-DCGW070202F | G | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070202G | | | | | | | | | | | ▲ | | ▲ | | | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070202T | | | | | | | | | | | | | | | ▲ | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070204F | | | | | | | | | | | | | | | ▲ | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 070204G | | | | | | | | | | | | | | | ▲ | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 070204T | | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 070208G | | | | | | | | | | | | | | | ▲ | | | | | | 6.35 | 2.38 | 0.8 | | |
| | 11T302F | | | | | | | | | | | | | | | ▲ | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T302G | | | | | | | | | | | | | | | ▲ | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T302GS | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T302T | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T304F | | | | | | | | | | | | ▲ | ▲ | | | ▲ | ▲ | | | | 9.525 | 3.97 | 0.4 | | |
| | 11T304G | | | | | | | | | | | | | | | ▲ | | | | | | 9.525 | 3.97 | 0.4 | | |
| | 11T304GS | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| | 11T304T | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| | 11T308F | | | | | | | | | | | | | | | ▲ | | | | | | 9.525 | 3.97 | 0.8 | | |
| | 11T308G | | | | | | | | | | | | | | | ▲ | ▲ | | | | | 9.525 | 3.97 | 0.8 | | |
| 11T308T | | | | | | | | | | | | | | ▲ | | | | | | 9.525 | 3.97 | 0.8 | | | | |
| NP-DCGW070204G2 | G | | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| 11T304G2 | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | | |
| 11T308G2 | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.8 | | | |
| PCD (con rompevirutas) Acabado | NP-DCMT070202R-F | M | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070202L-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | |
| | 070204R-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 070204L-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | |
| | 11T302R-F | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T302L-F | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.2 | | |
| | 11T304R-F | | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | |
| 11T304L-F | | | | | | | | | | | | | | | | | | | | 9.525 | 3.97 | 0.4 | | | | |

PLACAS TORNEADO

Herramienta

| FSWUB/P | | con agujero de refrigeración | | Placas WB $\odot\odot$, Placas WP $\odot\odot$ | | | | | | | | | Acabado | | |
|-------------------------|-------|------------------------------|------------------|---|----|-----|------|----|------|---------------------------------------|-----------------------------|--------------------------|---|-------|----------|
| | | | | | | | | | | | | | R/L-F-FS (L3,04,06) Medio MV (L3,04,06) | | |
| Referencia | Stock | | Referencia placa | Dimensiones (mm) | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación l/d recomendada | | | |
| | R | L | | D4 | L1 | L2 | F1 | H1 | RR° | | | | | | Tornillo |
| FSWUB1008R/L-L3A | ● | ● | WBMT WBGT | L302 $\odot\odot$ | 8 | 125 | 18 | 5 | 7.2 | 14 | 10 | 0.2 | -3 | TS2 | TKY06F |
| 1210R/L-L3A | ● | ● | | L302 $\odot\odot$ | 10 | 150 | 22.5 | 6 | 9 | 11 | 12 | 0.2 | -3.5 | TS2 | TKY06F |
| FSWUP1412R/L-04A | ● | ● | WPMT WPGT | 0402 $\odot\odot$ | 12 | 150 | 27 | 7 | 11 | 4 | 14 | 0.4 | -4 | TS253 | TKY08F |
| 1816R/L-04A | ● | ● | | 0402 $\odot\odot$ | 16 | 180 | 36 | 9 | 15 | 1 | 18 | 0.4 | -5 | TS253 | TKY08F |
| 2220R/L-06A | ● | ● | | 0603 $\odot\odot$ | 20 | 220 | 45 | 11 | 19 | 2 | 22 | 0.8 | -5 | TS4 | TKY15F |
| 3025R/L-06A | ● | ● | | 0603 $\odot\odot$ | 25 | 250 | 56.3 | 15 | 23.4 | 0 | 30 | 0.8 | -5 | TS4 | TKY15F |

| FSWUB/P.E | | Mango de metal duro con agujero de refrigeración | | Placas WB $\odot\odot$, Placas WP $\odot\odot$ | | | | | | | | | Acabado | | |
|-------------------------|-------|--|------------------|---|----|-----|------|----|-----|---------------------------------------|-----------------------------|--------------------------|---|-------|----------|
| | | | | | | | | | | | | | R/L-F-FS (L3,04,06) Medio MV (L3,04,06) | | |
| Referencia | Stock | | Referencia placa | Dimensiones (mm) | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación l/d recomendada | | | |
| | R | L | | D4 | L1 | L2 | F1 | H1 | RR° | | | | | | Tornillo |
| FSWUB1008R/L-L3E | ● | ● | WBMT WBGT | L302 $\odot\odot$ | 8 | 140 | 13.8 | 5 | 7.2 | 14 | 10 | 0.2 | -7 | TS2 | TKY06F |
| 1008R-L3E-2/3 | ● | | | L302 $\odot\odot$ | 8 | 90 | 13.8 | 5 | 7.2 | 14 | 10 | 0.2 | -7 | TS2 | TKY06F |
| 1008R-L3E-1/2 | ● | | | L302 $\odot\odot$ | 8 | 70 | 13.8 | 5 | 7.2 | 14 | 10 | 0.2 | -7 | TS2 | TKY06F |
| 1210R/L-L3E | ● | ● | | L302 $\odot\odot$ | 10 | 160 | 16.0 | 6 | 9 | 11 | 12 | 0.2 | -7.5 | TS2 | TKY06F |
| 1210R-L3E-2/3 | ● | | | L302 $\odot\odot$ | 10 | 105 | 16.0 | 6 | 9 | 11 | 12 | 0.2 | -7.5 | TS2 | TKY06F |
| 1210R-L3E-1/2 | ● | | | L302 $\odot\odot$ | 10 | 80 | 16.0 | 6 | 9 | 11 | 12 | 0.2 | -7.5 | TS2 | TKY06F |
| FSWUP1412R/L-04E | ● | ● | WPMT WPGT | 0402 $\odot\odot$ | 12 | 180 | 17.8 | 7 | 11 | 4 | 14 | 0.4 | -8 | TS253 | TKY08F |
| 1412R-04E-2/3 | ● | | | 0402 $\odot\odot$ | 12 | 120 | 17.8 | 7 | 11 | 4 | 14 | 0.4 | -8 | TS253 | TKY08F |
| 1412R-04E-1/2 | ● | | | 0402 $\odot\odot$ | 12 | 90 | 17.8 | 7 | 11 | 4 | 14 | 0.4 | -8 | TS253 | TKY08F |
| 1816R/L-04E | ★ | ● | | 0402 $\odot\odot$ | 16 | 220 | 21.8 | 9 | 15 | 1 | 18 | 0.4 | -8 | TS253 | TKY08F |
| 1816R-04E-2/3 | ★ | | | 0402 $\odot\odot$ | 16 | 145 | 21.8 | 9 | 15 | 1 | 18 | 0.4 | -8 | TS253 | TKY08F |
| 1816R-04E-1/2 | ★ | | | 0402 $\odot\odot$ | 16 | 110 | 21.8 | 9 | 15 | 1 | 18 | 0.4 | -8 | TS253 | TKY08F |
| 2220R/L-06E | ● | ● | | 0603 $\odot\odot$ | 20 | 250 | 24.0 | 11 | 19 | 2 | 22 | 0.8 | -8 | TS4 | TKY15F |
| 2220R-06E-2/3 | ★ | | | 0603 $\odot\odot$ | 20 | 165 | 24.0 | 11 | 19 | 2 | 22 | 0.8 | -8 | TS4 | TKY15F |
| 2220R-06E-1/2 | ★ | | | 0603 $\odot\odot$ | 20 | 125 | 24.0 | 11 | 19 | 2 | 22 | 0.8 | -8 | TS4 | TKY15F |

* El l/d recomendado es para un tipo de mango más largo. Al usar un mango más corto, ponga atención para asegurar que la herramienta que queda sobresaliente es suficiente.
 Cuando use placas con rompevirutas de mano derecha e izquierda, use rompevirutas de mano derecha con una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

- : Stock
- ★ : Stock en Japón
- : A fabricar según demanda

Placas

| Aplicación | Referencia | Clase | Recubrimiento | | | | Calidad MIRACLE | Cermet | Calidad cermet | Metal Duro | CBN | | | | | PCD | Dimensiones (mm) | | | | Geometría | | | | |
|---|-----------------------|-------|---------------|--------|--------|--------|-----------------|--------|----------------|------------|-------|-------|--------|-------|-------|-------|------------------|-------|-------|-------|-----------|------|------|--|----|
| | | | UE6005 | UE6010 | UE6020 | US7020 | US735 | VP15TF | VP45N | NX2525 | AP25N | HT110 | MB8025 | MB810 | MB820 | MB825 | MB835 | MB710 | MB730 | MD220 | | D1 | S1 | Re | α° |
| Rompevirutas directo de prensa Medio | | M | | | ● | ● | ● | ● | ● | | | | | | | | | | | 4.76 | 2.38 | 0.2 | 5 | WBMTL...R/L-MV WPMT...-MV | |
| | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | 4.76 | 2.38 | 0.2 | 5 | | |
| | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | 4.76 | 2.38 | 0.4 | | 5 |
| | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | 4.76 | 2.38 | 0.4 | | 5 |
| | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | 6.35 | 2.38 | 0.2 | | 11 |
| | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | 6.35 | 2.38 | 0.4 | | 11 |
| | | | | | | ● | ● | ● | ● | ● | | | | | | | | | | | 9.525 | 3.18 | 0.4 | | 11 |
| Rompevirutas rectificado Acabado | WBGT0201V3L-F | G | | | | | ★ | ● | | | | | | | | | | | | 3.97 | 1.59 | 0.03 | 5 | WBGTL...R/L-F WPGT...R/L-FS Muestra a mano izquierda | |
| | 020101L-F | | | | | | ★ | ● | | | | | | | | | | | | 3.97 | 1.59 | 0.1 | 5 | | |
| | 020102L-F | | | | | | ★ | ● | | | | | | | | | | | | | 3.97 | 1.59 | 0.2 | | 5 |
| | 020104L-F | | | | | | ★ | ● | | | | | | | | | | | | | 3.97 | 1.59 | 0.4 | | 5 |
| | L302V3L-F | | | | | | ● | ● | | | | | | | | | | | | | 4.76 | 2.38 | 0.03 | | 5 |
| | L30201L-F | | | | | | ● | ● | | | | | | | | | | | | | 4.76 | 2.38 | 0.1 | | 5 |
| | L30202R-F | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 4.76 | 2.38 | 0.2 | | 5 |
| | L30202L-F | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 4.76 | 2.38 | 0.2 | | 5 |
| | L30204R-F | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 4.76 | 2.38 | 0.4 | | 5 |
| | L30204L-F | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 4.76 | 2.38 | 0.4 | | 5 |
| | WPGT040202R-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 6.35 | 2.38 | 0.2 | | 11 |
| | 040202L-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 6.35 | 2.38 | 0.2 | | 11 |
| | 040204R-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 6.35 | 2.38 | 0.4 | | 11 |
| | 040204L-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 6.35 | 2.38 | 0.4 | | 11 |
| | 060304R-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 9.525 | 3.18 | 0.4 | | 11 |
| | 060304L-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 9.525 | 3.18 | 0.4 | | 11 |
| | 060308R-FS | | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 9.525 | 3.18 | 0.8 | | 11 |
| 060308L-FS | | | | | ● | ● | ★ | □ | ★ | | | | | | | | | | 9.525 | 3.18 | 0.8 | 11 | | | |



PLACAS TORNEADO

Herramienta

| Referencia | | Stock | | Referencia de placas | | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte | Radio estándar | Relación l/d recomendada | Muestra de herramienta a mano derecha. | | | |
|-------------------------|--|-------|---|----------------------|------|------------------|-----|------|------|-----|------|-----|--------------------------|----------------|--------------------------|--|--------|------------|--------------------|
| | | R | L | | | D4 | L1 | L2 | F1 | F2 | H1 | RR° | | | | D1 | Re | Placa base | Pasador placa base |
| FSVUC1612R/L-08A | | ● | ● | VCMT | 0802 | 12 | 150 | 25 | 11 | 5.5 | 11 | 8 | 16 | 0.4 | -4 | — | — | TS202 | TKY06F |
| FSVUB2016R/L-11A | | ● | ● | VCMT | 1103 | 16 | 180 | 32.5 | 15.5 | 8 | 15 | 8 | 20 | 0.4 | -5 | — | — | TS255 | TKY08F |
| 2520R/L-11A | | ● | ● | VBGT | 1103 | 20 | 200 | 40.5 | 17.5 | 8 | 19 | 7 | 25 | 0.4 | -5 | — | — | TS255 | TKY08F |
| 3425R/L-16A | | ● | ● | VBMT | 1604 | 25 | 220 | 50 | 20.5 | 8.5 | 23.4 | 13 | 34 | 0.8 | -5 | SPSVN32 | BCP141 | TS35D | TKY15F |
| 4032R/L-16A | | ● | ● | NP-VBGW | 1604 | 32 | 250 | 84.0 | 27.5 | 12 | 30.4 | 9 | 40 | 0.8 | -5 | SPSVN32 | BCP141 | TS35D | TKY15F |

| Referencia | | Stock | | Referencia de placas | | Dimensiones (mm) | | | | | | | Mínimo diámetro de corte | Radio estándar | Relación l/d recomendada | Muestra de herramienta a mano derecha. | | | |
|-------------------------|--|-------|---|----------------------|------|------------------|-----|----|------|-----|------|-----|--------------------------|----------------|--------------------------|--|--------|------------|--------------------|
| | | R | L | | | D4 | L1 | L2 | F1 | F2 | H1 | RR° | | | | D1 | Re | Placa base | Pasador placa base |
| FSVPC1610R/L-08A | | ● | ● | VCMT | 0802 | 10 | 150 | 25 | 8 | 3 | 9 | 8 | 16 | 0.4 | -3.5 | — | — | TS202 | TKY06F |
| FSVPB2012R/L-11A | | ● | ● | VCMT | 1103 | 12 | 150 | 28 | 10 | 4.5 | 11 | 8 | 20 | 0.4 | -4 | — | — | TS255 | TKY08F |
| 2516R/L-11A | | ● | ● | VBGT | 1103 | 16 | 180 | 35 | 12.5 | 5 | 15 | 5 | 25 | 0.4 | -5 | — | — | TS255 | TKY08F |
| 3425R/L-16A | | ● | ● | VBMT | 1604 | 25 | 220 | 50 | 17 | 5 | 23.4 | 13 | 34 | 0.8 | -5 | SPSVN32 | BCP141 | TS35D | TKY15F |
| 4032R/L-16A | | ● | ● | NP-VBGW | 1604 | 32 | 250 | 55 | 22 | 6.5 | 30.4 | 9 | 40 | 0.8 | -5 | SPSVN32 | BCP141 | TS35D | TKY15F |

* Cuando use placa con rompevirutas de mano derecha e izquierda, use un rompevirutas de mano derecha una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

- : Stock
- ★ : Stock en Japón
- : A fabricar según demanda

Herramienta

| FSVJB/C | | | | | | | | | | Placas VC$\circ\circ$, VB$\circ\circ$ | | | Acabado | Medio | |
|--|-------|---|----------------------|-------------------|----|-----|------|-----|------|--|-----------------------------|--------------------------|----------|-------|--------|
| | | | | | | | | | | R/L-F | MV | | | | |
| | | | | | | | | | | (08,11) | (08,11) | | | | |
| | | | | | | | | | | Medio | | | | | |
| Muestra de herramienta a mano derecha. | | | | | | | | | | Estándar | | | | | |
| | | | | | | | | | | (11) | | | | | |
| Referencia | Stock | | Referencia de placas | Dimensiones (mm) | | | | | | Mínimo diámetro de corte D1 | Radio estándar Re | Relación I/d recomendada | Tornillo | Llave | |
| | R | L | | D4 | L1 | L3 | F1 | H1 | RR° | | | | | | |
| FSVJC1612R/L-08S | ★ | ★ | VCGT VCMT | 0802 $\circ\circ$ | 12 | 150 | 26 | 2 | 11 | 5 | 16 | 0.4 | -4 | TS202 | TKY06F |
| 2016R/L-08S | ★ | ★ | | 0802 $\circ\circ$ | 16 | 180 | 36 | 2 | 15 | 5 | 20 | 0.4 | -5 | TS202 | TKY06F |
| FSVJB2520R/L-11S | ★ | ★ | VBGT VBMT | 1103 $\circ\circ$ | 20 | 200 | 37.5 | 2 | 19 | 5 | 25 | 0.4 | -5 | TS255 | TKY08F |
| 3025R/L-11S | ★ | ★ | | 1103 $\circ\circ$ | 25 | 250 | 45 | 3.5 | 23.4 | 5 | 30 | 0.4 | -5 | TS255 | TKY08F |

* Cuando use placa con rompevirutas de mano derecha e izquierda, use un rompevirutas de mano derecha una placa de mano izquierda y un rompevirutas de mano izquierda con una placa de mano derecha.

Placas

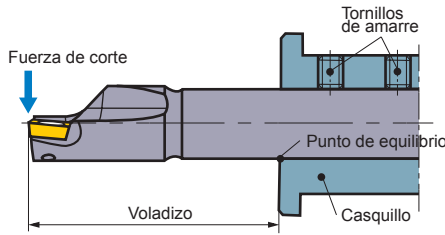
| Aplicación | Referencia | Clase | Recubrimiento | | | | | | | | | | | | Dimensiones (mm) | | Geometría | | | | | | | | | |
|---|-----------------------|-------|---------------|--------|--------|--------|-------|--------|-------|--------|-------|-------|--------|-------|------------------|-------|-----------|-------|-------|-------|-------|-------|------|------|--|------|
| | | | UE6005 | UE6010 | UE6020 | US7020 | US735 | VP15TF | VP45N | NX25Z5 | AP25N | HTi10 | MB8025 | MB810 | MB820 | MB825 | | MB835 | MB710 | MB730 | MD220 | D1 | S1 | Re | α° | |
| Rompevirutas directo de prensa Acabado - Medio | VCMT080202-MV | M | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.2 | 7 | VCMT...-MV VBMT...-MV | |
| | 080204-MV | | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.4 | 7 | | |
| | VBMT110304-MV | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.4 | | 5 |
| | 110308-MV | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.8 | | 5 |
| | 160404-MV | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.4 | | 5 |
| | 160408-MV | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.8 | | 5 |
| Rompevirutas rectificadas Acabado | VCGT080202R-F | G | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.2 | 7 | VCGT...R/L-F VBGT...R/L-F | |
| | 080202L-F | | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.2 | 7 | | |
| | 080204R-F | | | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.4 | | 7 |
| | 080204L-F | | | | | | | | | | | | | | | | | | | | | 4.76 | 2.38 | 0.4 | | 7 |
| | VBGT110302R-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.2 | | 5 |
| | 110302L-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.2 | | 5 |
| | 110304R-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.4 | | 5 |
| | 110304L-F | | | | | | | | | | | | | | | | | | | | | 6.35 | 3.18 | 0.4 | | 5 |
| | 160402R-F | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.2 | | 5 |
| | 160402L-F | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.2 | | 5 |
| 160404R-F | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.4 | 5 | | | |
| 160404L-F | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.4 | 5 | | | |
| CBN (sin rompevirutas) Acabado | NP-VBGW160404F | G | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.4 | 3.81 | NP-VBGW...G | |
| | 160404G | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.4 | 3.81 | | |
| | 160404T | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.4 | | 3.81 |
| | 160408F | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.8 | | 3.81 |
| | 160408G | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.8 | | 3.81 |
| | 160408T | | | | | | | | | | | | | | | | | | | | | 9.525 | 4.76 | 0.8 | | 3.81 |

PLACAS TORNEADO

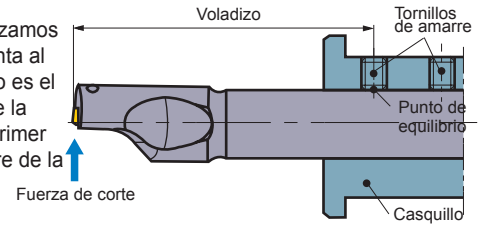
Guía operacional

● Instalación de la DIMPLE BAR

(1) El amarre debe ser rígido, de lo contrario puede surgir roturas y vibraciones. Utilice al menos 2 tornillos, para asegurar que la fuerza de amarre es suficiente.



(2) Cuando mecanizamos con la herramienta al revés el voladizo es el resultante desde la punta hasta el primer tornillo de amarre de la muestra.



● Placas CCG/MT, CPG/MT, CPMX, TPG/MX, TPG/MV

| | Referencia | Tornillo | Comentarios |
|--|---------------------|--------------------------|--|
| Al cambiar el tornillo de abrazadera también es posible usar las placas del listado. | CCG/MT0602 (Ø6.35) | Puede ser usado como es. | Por favor cortar el tornillo si es demasiado largo |
| | CPG/MT0802 (Ø7.94) | Cambia a TS3. | |
| | CPG/MT0903 (Ø9.525) | Cambia a TS4. | |
| | CPMX0802 (Ø7.94) | Puede ser usado como es. | |
| | CPMX0903 (Ø9.525) | Puede ser usado como es. | |
| | TPG/MX0802 (Ø4.76) | Cambia a CS200T. | |
| | TPG/MX0902 (Ø5.56) | Cambia a CS250T. | |
| | TPG/MX1103 (Ø9.525) | Cambia a CS300890T. | |
| | TPG/MV0902 (Ø5.56) | Cambia a TS25. | |
| TPG/MV1103 (Ø9.525) | Cambia a TS3. | | |

Mecanizado de tipo FSVJB/C

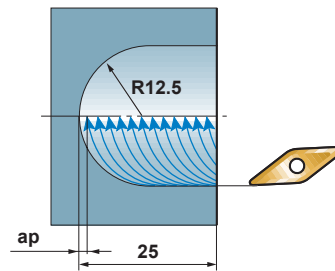
● Caras curvas

Cuando se mecaniza un agujero preparado, el número de pasadas se reduce bastante.

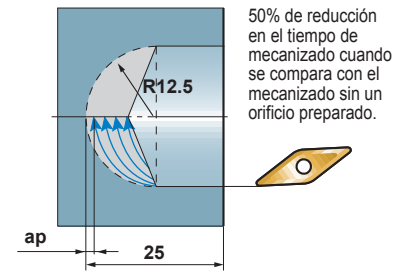
<Condiciones de corte>

Material : Acero aleado
 Herramienta : FSVJB2520R-11S
 Placa : VBMT110304-MV
 Velocidad de corte: 120m/min
 Avance : 0.05mm/rev
 Profundidad de corte: 0.3mm
 Refrigeración : SI

Al mecanizar una pieza de trabajo sin un agujero preparado.



Al mecanizar una pieza de trabajo con un agujero preparado.



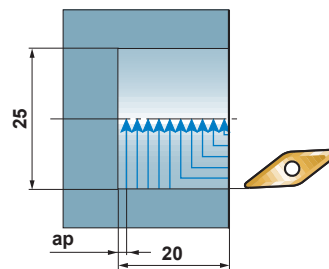
● Caras profundas

Al mecanizar con un agujero preparado previamente, el número de pasadas se reduce bastante.

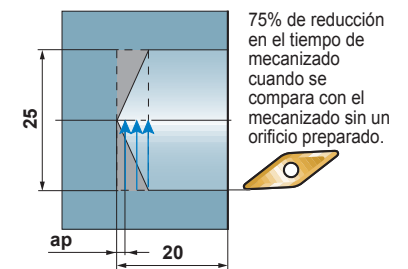
<Condiciones de corte>

Material : Acero aleado
 Herramienta : FSVJB2520R-11S
 Placa : VBMT110304-MV
 Velocidad de corte: 120m/min
 Avance : 0.05mm/rev
 Profundidad de corte: 0.3mm
 Refrigeración : SI

Al mecanizar una pieza de trabajo sin un agujero preparado.

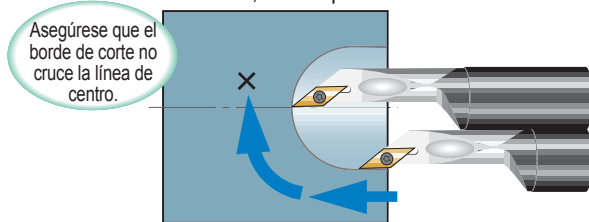


Al mecanizar una pieza de trabajo con un agujero preparado.



Precauciones al usar el tipo FSVJB/C

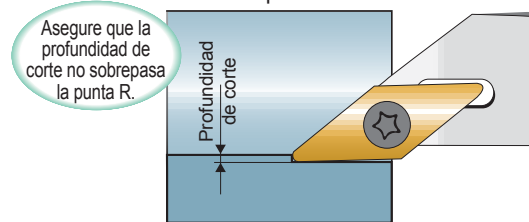
<Caras curvas, Caras profundas>



Asegúrese que el borde de corte no cruce la línea de centro.

Al cruzar la línea de centro se puede afectar la placa.

<Copiado>

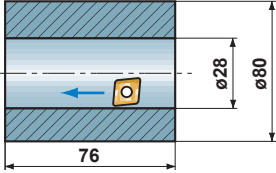
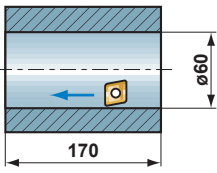
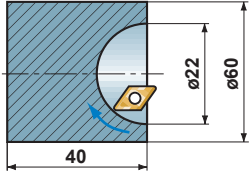


Asegure que la profundidad de corte no sobrepasa la punta R.

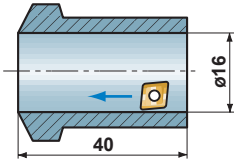
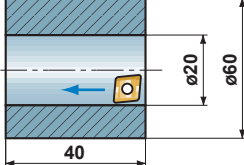
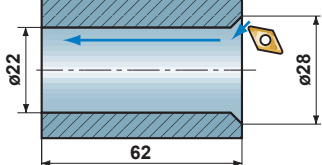

Las profundidades de corte mayores que la punta R, crean rebabas.

■ Ejemplo de aplicación

● Resistencia a las vibraciones

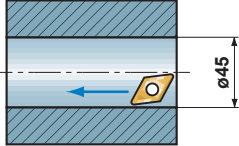
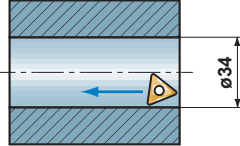
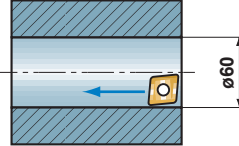
| Herramienta | FSCLP1816R-09S | FSCLP2220R-09E | FSVJC2016R-08S | |
|----------------------|--|---|--|------|
| Placa (Calidad) | CPMH090308-MV (NX2525) | CPMH090304L-F (VP15TF) | VCMT090304-MV (NX2525) | |
| Voladizo | 80mm (l/d=5) | 175mm (l/d=8.75) | 64mm (l/d=4) | |
| Maquina | Maquina NC | Maquina NC | Maquina NC | |
| Material | ISO C45 (200HB)  | ASTM D2 (200HB)  | ISO 42CrMo4 (220HB)  | |
| Condiciones de corte | Velocidad corte (m/min) | 80 | 60 | 80 |
| | Avance (mm/rev) | 0.2 | 0.18 | 0.05 |
| | Profundidad corte (mm) | 0.5 | 0.5 | 0.3 |
| | Refrigeración | SI | SI | SI |
| Resultado | La superficie de acabado es todavía superior con 1,7 veces la longitud del voladizo convencional. | Es posible mecanizar bajo condiciones de corte difíciles con gran protuberancia. | Excelente control de virutas y buena terminación de superficie al compararse con las barras de mandrinar convencionales. | |

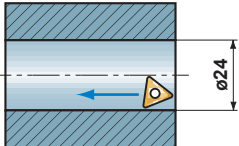
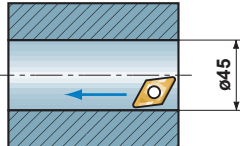
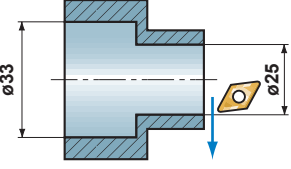
● Capacidad de desprendimiento de viruta.

| Herramienta | FSCLP1412R-08S | FSCLP1816R-09S | FSCLP1816L-09S | |
|----------------------|--|---|---|-----|
| Placa (Calidad) | CPMH080204-MV (US7020) | CPMH090304-MV (VP45N) | CPMH090304-SV (UE6020) | |
| Voladizo | 55mm (l/d=4.58) | 60mm (l/d=3.75) | 70mm (l/d=4.38) | |
| Maquina | Maquina NC | Maquina NC | Maquina NC | |
| Material | 304 Acero Inoxidable (180HB)  | DIN C10 (100HB)  | Acero de herramientas  | |
| Condiciones de corte | Velocidad corte (m/min) | 60 | 140 | 170 |
| | Avance (mm/rev) | 0.15 | 0.15 | 0.1 |
| | Profundidad corte (mm) | 1 | 0.8 | 0.5 |
| | Refrigeración | SI | SI | SI |
| Resultado | Se ha mejorado la superficie de acabado. El rompevirutas MV evita que se acumulen las virutas en la punta de la placa. | Mejor acabado de la superficie debido a la menor vibración y al mejor control de la viruta. |  <p>pieza/esquina 1000 2000</p> <p>Rompevirutas MV UE6020</p> <p>Rompedor de propósitos generales de los competidores P20 recubierto</p> <p>Evite que las virutas se acumulen alrededor del rompevirutas. La vida de la herramienta aumenta tres veces al compararla con la del competidor.</p> | |

PLACAS TORNEADO

Resistencia al desgaste

| Herramienta | FSDUC2016R-07S | FSTUP2220R-11E | FSCLP2220R-09S |
|----------------------|---|--|---|
| Placa (Calidad) | DCMT070204-SV (VP45N) | TPMH110304-SV (VP45N) | CPMH090304-MV (US7020) |
| Voladizo | 72mm (l/d=4.5) | 140mm (l/d=7) | 80mm (l/d=4) |
| Maquina | Maquina NC | Maquina NC | Maquina NC |
| Material | Acero aleado  | Acero aleado  | 304 Acero inoxidable  |
| Condiciones de corte | Velocidad corte (m/min) | 185 | 120 |
| | Avance (mm/rev) | 0.1 | 0.25 |
| | Profundidad corte (mm) | 0.35 | 0.1 |
| Refrigeración | SI | SI | SI |
| Resultado | <p>pieza/punta 500 1000</p> <p>VP45N</p> <p>Recubrimiento de los competidores</p> <p>Vida de la herramienta más larga en 1,8 veces</p> | <p>pieza/punta 250 500</p> <p>VP45N</p> <p>Recubrimiento de los competidores</p> <p>Doble vida de la herramienta y control de virutas mejorada.</p> | <p>pieza/punta 15 30</p> <p>US7020</p> <p>Recubrimiento de los competidores</p> <p>Vida de la herramienta más larga en 1,5 veces</p> |

| Herramienta | FSTUP1816R-11S | FSDUC3220R-11S | FSDUC3220R-11S |
|----------------------|---|---|---|
| Placa (Calidad) | TPMH110308-SV (UE6020) | DCMT11T304-MV (VP15TF) | DCMT11T308-MV (VP15TF) |
| Voladizo | 64mm (l/d=4) | 60mm (l/d=3) | 60mm (l/d=3) |
| Maquina | Maquina NC | Maquina NC | Maquina NC |
| Material | BS 708 M 20  | ISO 42CrMo4  | Acero aleado  |
| Condiciones de corte | Velocidad corte (m/min) | 100 | 170 |
| | Avance (mm/rev) | 0.25 | 0.14 |
| | Profundidad corte (mm) | 0.6 | 0.25 |
| Refrigeración | SI | SI | SI |
| Resultado | <p>pieza/punta 200 400</p> <p>UE6020</p> <p>Recubrimiento de los competidores</p> <p>Vida de la herramienta más larga en 1,4 veces</p> | <p>pieza/punta 500 1500</p> <p>VP15TF</p> <p>Recubrimiento de los competidores</p> <p>No hay desgaste con VP15TF y una vida de la herramienta mucho más larga.</p> | <p>pieza/punta 400 500</p> <p>VP15TF</p> <p>Recubrimiento de los competidores</p> <p>Una combinación de un rompevirutas con desprendimiento y una calidad resistente a la rotura aumenta la vida de la herramienta</p> |

Para su seguridad

- No toque el corte o las virutas sin usar guantes. ● Use herramienta de acuerdo con las condiciones de corte recomendadas y cambie las herramientas antes que se produzca un desgaste excesivo.
- Las virutas se calientan en extremo y se desparrraman. Asegúrese de usar protecciones de seguridad y gafas. ● En caso de usar aceite no soluble en agua, asegúrese que se tomen las precauciones. ● Use la llave que se provee, y que las plaquitas y los repuestos estén sujetados correctamente.