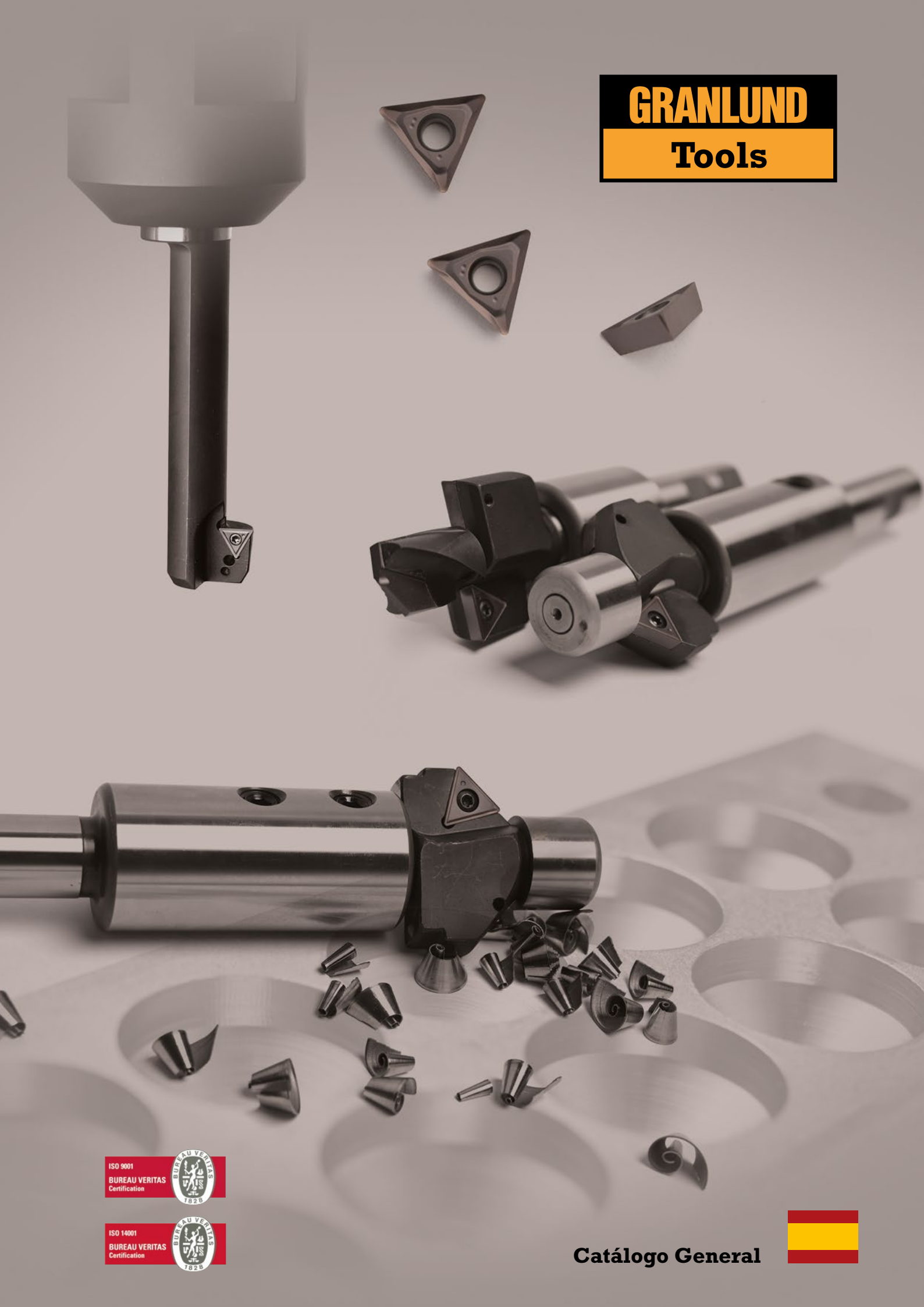


GRANLUND Tools



ISO 9001
BUREAU VERITAS
Certification



ISO 14001
BUREAU VERITAS
Certification



Catálogo General



Portaherramientas para porta-brocas magnéticos tipo MD

Debido a la creciente demanda, Granlund ha desarrollado un portaherramientas estándar con mango Weldon 19,05 (3/4") / 90 grados, que es el soporte más común para taladros magnéticos.

Estos soportes están disponibles en los grupos 0, 1 y 2 del sistema combinable.



Nuevas placas tipo U

Las nuevas placas tipo U (Universales) se fabrican con un moderno revestimiento y un sustrato muy resistente al desgaste para todas las aplicaciones. Además de para mecanizado de aceros, se ha probado con gran éxito en otros materiales tales como Hardox™ e incluso Inoxidable.



Portaherramientas Largos con mango Weldon

Tras el éxito de los portaherramientas 1L-500 y 2L-500 de 500 mm y mango cilíndrico, hemos introducido entre estos y los de mango morse 3 nuevos portaherramientas con una longitud de 250 y mango Weldon, disponibles en los grupos 0, 1 y 2.



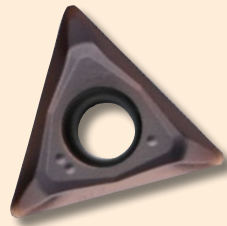
0L-250-W16

1L-250-W20

2L-250-W25

Nuevas placas tipo SA

La nueva placa tipo SA está especialmente desarrollada para mecanizar acero inoxidable y aluminio, disponiendo de un filo especialmente afilado y revestimiento optimizado para mecanizar acero inoxidable.



Nueva familia de avellanadores tipo 405

La familia 405 consta de avellanadores de 3 cortes con paso diferencial. Esto hace que el avellanador trabaje muy suave y que se reduzcan las vibraciones. Se suministra tanto con recubrimiento TIN como sin recubrimiento.



Más información sobre ellos en la página 25.

Nueva broca HSS para el mecanizado de Hardox™

Ya podemos presentar con orgullo las brocas HSS especialmente desarrolladas para el mecanizado de Hardox™, muy solicitadas ya que muchas operaciones sobre Hardox™ se realizan en máquinas que no son aptas para herramientas de metal duro macizo. Están disponibles en un rango de 10-40 mm. Todas estas brocas tienen mango morse.

Más información en la página 35.



Hemos incorporado a nuestros gráficos los colores ISO de los diferentes materiales

Para facilitar la diferenciación entre materiales en nuestras tablas de recomendaciones de datos de corte, hemos incorporado los colores y los símbolos ISO, como P para acero, M para inoxidable, K para fundición, etc.

| HSS Feed mm/rev. | Speed m/min | mm/rev. | Material |
|------------------|-------------|------------|-----------------|
| 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Steel |
| 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Cast Steel |
| 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Stainless Steel |
| 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Cast Iron |
| 0,05 - 0,3 | 20 - 50 | 0,05 - 0,3 | Malleable Iron |
| 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Aluminium Soft |
| 0,05 - 0,3 | 40 - 80 | 0,05 - 0,3 | Copper |
| 0,05 - 0,3 | 40 - 80 | 0,10 - 0,3 | HARDOX |

Toda la información del presente catálogo está sujeta a modificación sin previo aviso.

Todos los gráficos, fotos, información técnica y, en términos genéricos, todos los datos contenidos en este catálogo son válidos, salvo error tipográfico.

GRANLUND TOOLS AB, SWEDEN

La compañía está certificada de acuerdo con la normatiba ISO 9001 e ISO 14001.



Nuestra Historia

Hace muchos años, concretamente a principios de 1945, fueron despedidos de una fábrica de Gävle dos capataces y expertos trabajadores metalúrgicos. La fábrica había quebrado, e hizo un gran esfuerzo final para compensar con un finiquito razonable a sus mejores capataces; estos hombres eran Hilme Granlund y Börje Gyllhamn.

Era momento de pensar cómo continuar. Uno de sus amigos, Johan Nordström, había comprado el edificio de una fábrica en Eskilstuna, y les propuso comenzar un negocio entre los tres. Pues dicho y hecho: se mudaron a Eskilstuna y comenzaron con GNG (Granlund, Nordström y Gyllhamn).

El negocio crecía, debido a la demanda casi infinita de la postguerra incluso necesitaban turnos de 24 horas los 7 días de la semana. Desafortunadamente, tan solo un año después y con 37 años fallecía Granlund. Entonces Gyllhamn compró las acciones de la compañía GNG a la madre de Granlund, y, en su honor, cambiaron el nombre de la compañía a Granlund & Co.

En 1948 Gyllhamn adquirió las acciones de Nordström, (quien un par de años más tarde fundó la empresa Johan Nordström Verktygsmaskiner AB).

En los años siguientes, el negocio de las herramientas se desarrolló rápidamente, y la exportación se aceleró. Hoy la exportación representa más del 70% del negocio.

Desde 1948, la empresa es un negocio totalmente familiar, actualmente gestionado por la tercera generación.

Hoy en día

Actualmente Granlund Tools sigue ubicada en Eskilstuna, Suecia. Granlund es un fabricante líder mundial en herramientas de precisión para refrentar, cajear, avellanar y cajeados inversos. El 95% de la producción se realiza en nuestra fábrica.

Con representación en más de 30 países, Granlund es un proveedor de herramientas con gran experiencia. A lo largo de los años Granlund ha establecido una extensa y eficaz red de distribución, así como una marca comercial única y de gran prestigio. ¡una marca de confianza!

Uno más uno puede ser más que dos

Uno de los productos más conocidos de Granlund Tools es el sistema de herramientas intercambiables. Con solo 1300 componentes consistentes portaherramientas, elementos de corte, guías y brocas, es posible ensamblar combinaciones de herramientas con más de 1500000 variaciones diferentes.

La intercambiabilidad es también aplicable en otras partes del programa de Granlund Tools. Por ejemplo, en el sistema de fresado inverso, que consta de 2 elementos, el sistema Spirabor, con 4 elementos. La idea de intercambiabilidad



De pie desde la izquierda, Johan Nordström y Börje Gyllhamn. Sentado, Hilme Granlund - 1945.

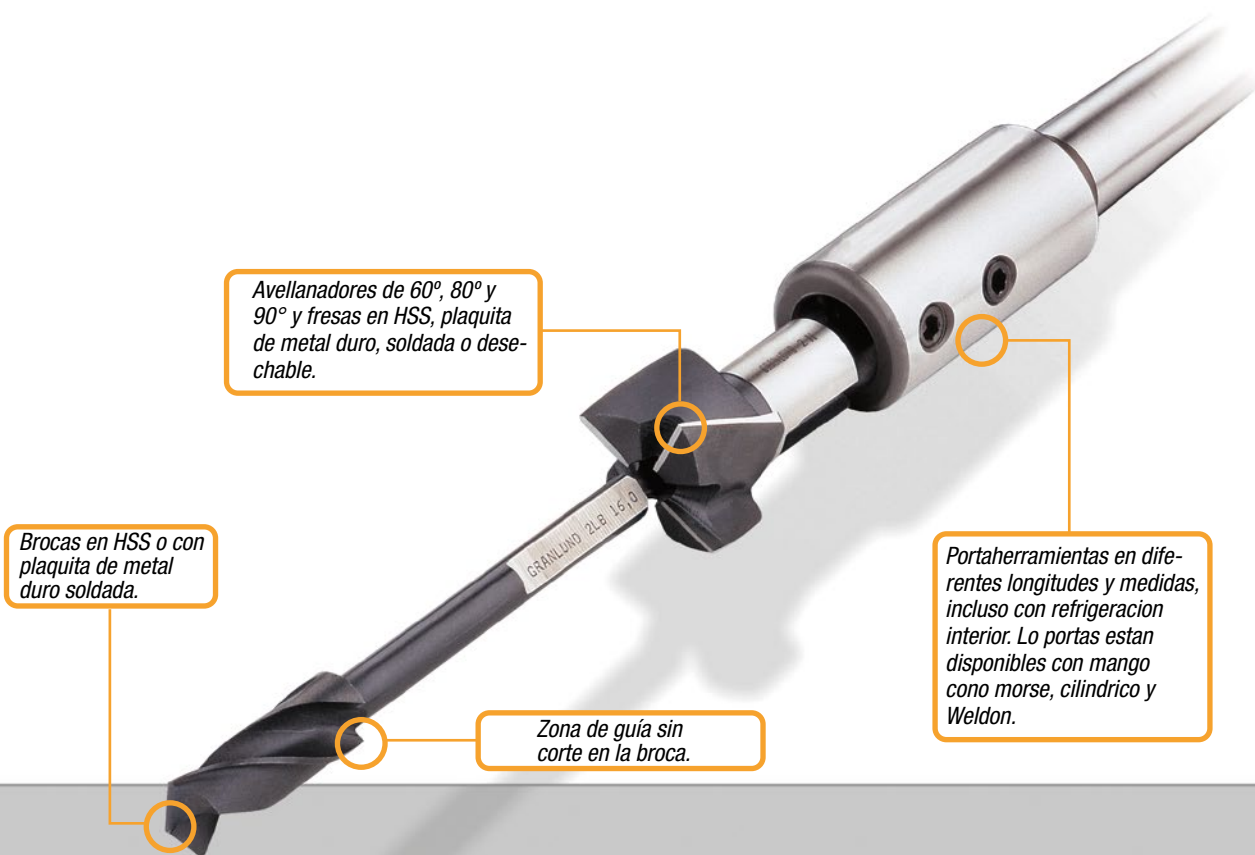


Eric Gyllhamn, tercera generación, director de operaciones.

es también muy importante en el desarrollo de nuevas herramientas. La experiencia nos dice que en numerosas ocasiones uno más uno suma mucho más que dos. El amplio programa de Granlund se adapta tanto a máquinas modernas como a las más antiguas.

Su problema es nuestro desafío

Las herramientas de Granlund se enfrentan a mecanizados problemáticos todos los días. Tenemos una amplia y probada experiencia en mecanizados difíciles, materiales resistentes, perfiles especiales avanzados, etc. Estamos orgullosos de decir que estamos entre los mejores del mundo en lo que hacemos.



El sistema Granlund

El sistema Granlund es único para operaciones de cajeado y avellanado, ayudándole a incrementar su productividad y disminuir sus costes.

Nuestros portaherramientas, fresas, brocas y guías pueden combinarse para adaptarlos a todo tipo de máquinas y aplicaciones.

Usted puede componer fácilmente más de 1500000 de herramientas especiales con solo 1300 piezas.

El sistema consta de 4 grupos de dimensiones:

grupo 01, grupo 0, grupo 1 y grupo 2. Todas las combinaciones tienen que hacerse con elementos que pertenezcan al mismo grupo. Herramientas de distintos grupos no son combinables entre sí.

En las siguientes páginas encontrará tanto los rangos de medidas disponibles en cada grupo, así como recomendaciones para la correcta elección tanto de la herramienta como de los datos de corte.

| | | |
|--|--|--------------------------------|
| | Sistema combinable Granlund 6 | Cajado / Avellanado |
| | Sistema combinable Grupo 01 8 Brocas, guías, fresas, avellanadores, portaherramientas, sets y plaquitas | |
| | Sistema combinable Grupo 0 10 Brocas, guías, fresas, avellanadores, portaherramientas, sets y plaquitas | |
| | Sistema combinable Grupo 1 12 Brocas, guías, fresas, avellanadores, portaherramientas, sets y plaquitas | |
| | Sistema combinable Grupo 2 15 Brocas, guías, fresas, avellanadores, portaherramientas, sets y plaquitas | |
| | Herramientas para CNC 19 Herramientas de mandrinar y achaflanar, de cajeo, herramientas de achaflanar y desbastar | Fresado inverso |
| | Avellanadores 22 Avellanadores tipo 100, 405 y tipo FV | |
| | Herramientas fresado/achaflanado inverso CNC 25 Cajado inverso, achaflanado inverso y frontal/inverso en CNC con plaquita desechable | |
| | NEPTUNE 26 Datos de corte, plaquitas | Escariado |
| | Sistema de fresado inverso 28 | |
| | Escariadores con plaquita desechable tipo RD, RA, RB 30 | Puntos |
| | Escariadores de metal duro, fijos y reajustables 32 Escariadores de metal duro, portaherramientas flotantes y pinzas | |
| | Puntos 34 Puntos de centrar y rectificar, con metal duro, fijos y giratorios | Taladrado |
| | THUNDER 35 Brocas para HARDOX | |
| | Brocas HSS-Co para HARDOX 35 | |
| | Spirabore, Sistema de retaladrado con guía 36 | Equilibrado |
| | Equilibradores 37 | |
| | Datos técnicos 38 Repuestos y datos técnicos | Herramientas especiales |
| | Herramientas especiales 39 Plantilla de solicitud herramienta especial | |

Selección de la Herramienta

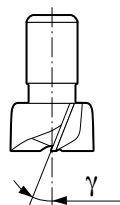
Esta tabla muestra las imágenes de cada tipo de herramienta y su rango de diámetros dentro de cada grupo (01,0,1,2). Haga su combinación de herramientas eligiendo componentes del mismo grupo.

Todas las fresas y brocas de HSS se suministran como standard sin recubrimientos. Consultar precios y plazos para recubrimiento TIN, TICN, FUTURA, HARDLUBE.



Brocas **Guías** **Fresas** **Avellanadores**

| | B Ø mm | LB Ø mm | BH Ø mm | F Ø mm | R Ø mm | N Ø mm | NA Ø mm | W Ø mm | H Ø mm | HA Ø mm | WHV Ø mm | T Ø mm | TH Ø mm | TK Ø mm | KV Ø mm |
|-----------|------------------|-------------------|-------------------|------------------|------------------|------------------|-------------------|------------------|------------------|-------------------|--------------------|------------------|-------------------|-------------------|-------------------|
| 01 | 2,5-3,7 | 2,5-3,7 | | 2,4-8 | | | | 5-16 | | | | 6-10,4 | | | |
| 0 | 4,2-7 | 4,2-7 | 5-6,8 | 4-5,8 | 6-14 | 7-24 | 7-24 | 7-16,5 | 10-24 | 10-24 | 18-24 | 8-16,5 | | | 18-25 |
| 1 | 6,5-12 | 6,5-12 | 6,5-12 | 6-6,8 | 7-24 | 10-38 | 10-38 | 10-25 | 12-38 | 12-38 | 20-38 | 11,5-30 | 20-30 | 16,5-34 | 20-30 |
| 2 | 11-25 | 11-25 | 11-21 | | 10-50 | 16-85 | 16-85 | 16-40 | 18-75 | 18-75 | 34-75 | 20-85 | 40-60 | 30-75 | 32-60 |



Recomendaciones de elección de herramienta para el trabajo con diferentes materiales



| | | N | NA | W | H | HA | WHV | T | TH | TK | KV |
|----------|-------------------------|----------|-----------|----------|----------|-----------|------------|----------|-----------|-----------|-----------|
| | Angulo de hélice (γ) | 24° | 35° | 28° | 5° | 24° | 5° | | | | |
| P | Acero | • | • | • | | | • | • | | • | • |
| M | Acero Inoxidable | • | • | • | | | • | • | | • | • |
| K | Fundición | | | | • | • | • | | • | | • |
| N | Aluminio (Viruta Larga) | | • | • | | | • | • | | • | • |
| | Aluminio (Viruta Corta) | | | | | • | • | | • | | • |
| | Cobre | • | • | • | | | | • | | • | |
| | Bronce / Latón | | | | • | • | • | | • | | • |
| H | HARDOX | | | | | | • | | | | • |
| X | Plásticos Blandos | | • | | | | | • | | • | |
| | Plásticos Duros | | | | • | • | | | • | | |



Portaherramientas

| | A | MD | M | NS | DS | L | S | GS | |
|-----------------|------------|--------|--------|--------|----|------|------|------|-----------|
| Cono Morse | MK 1 | | | | | | MK 1 | | 01 |
| Cilíndrico Ø mm | 6,0 10,0 | | | | 10 | | 10 | | |
| Cono Morse | MK 1-2 | | | | | MK 1 | MK 1 | | 0 |
| Cilíndrico Ø mm | 8,0 10,0 | | | | 10 | | 10 | | |
| Weldon | | W19,05 | | W 16 | | W16 | | | |
| Cono Morse | MK 1-2-3 | | MK 3 | MK 2-3 | | MK 2 | MK 2 | MK 3 | 1 |
| Cilíndrico Ø mm | 10-12 | | | | 10 | 20 | 10 | | |
| Weldon | W 20 | W19,05 | W 25 | W 20 | | W20 | | W 25 | |
| Cono Morse | MK 2-3-4-5 | | MK 3-4 | MK 3 | | MK 3 | MK 3 | MK 3 | 2 |
| Cilíndrico Ø mm | | | | | | 32 | | | |
| Weldon | W 20 | W19,05 | W 32 | W 25 | | W25 | | W 25 | |

Recomendaciones de Corte para fresas y avellanadores



| | N | NA | W | H | HA | WHV | KV* | T | TK | TH | |
|---|------------------------|-----------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|------------------------|-----------------------|-------------------------------|------------------------------|-----------------------|
| Resistencia a tracción N/mm ² Dureza HB | HSS Velocidad m/min | HSS Avance mm/rev. | Metal duro Velocidad m/min | Metal duro Avance mm/rev. | Metal duro Velocidad m/min | Metal duro Avance mm/rev. | HSS Velocidad m/min | HSS Avance mm/rev. | Metal duro Velocidad m/min | Metal duro Avance mm/rev. | Material |
| <450 N/mm ² | 20 - 40 | 0,10 - 0,5 | 60 - 130 | 0,1 - 0,6 | 75 - 130 | 0,1 - 0,6 | 15 - 30 | 0,05 - 0,3 | 20 - 50 | 0,05 - 0,3 | Acero |
| <600 N/mm ² | 15 - 30 | 0,10 - 0,4 | 50 - 110 | 0,1 - 0,5 | 65 - 120 | 0,1 - 0,5 | 10 - 25 | 0,05 - 0,3 | 15 - 45 | 0,05 - 0,3 | Acero |
| <1000 N/mm ² | 10 - 25 | 0,05 - 0,3 | 40 - 110 | 0,1 - 0,3 | 55 - 100 | 0,1 - 0,4 | 10 - 20 | 0,05 - 0,3 | 10 - 40 | 0,05 - 0,3 | Acero |
| >1000 N/mm ² | 5 - 20 | 0,05 - 0,3 | 30 - 90 | 0,1 - 0,2 | 45 - 90 | 0,1 - 0,4 | 5 - 15 | 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Acero |
| <800 N/mm ² | 10 - 25 | 0,05 - 0,3 | 30 - 90 | 0,1 - 0,3 | 45 - 90 | 0,1 - 0,4 | 5 - 15 | 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Acero Fundido |
| | 10 - 20 | 0,10 - 0,3 | 20 - 60 | 0,1 - 0,4 | 30 - 60 | 0,1 - 0,3 | 5 - 15 | 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Acero Inoxidable |
| <180 HB | 20 - 40 | 0,20 - 0,5 | 60 - 120 | 0,2 - 0,5 | 80 - 120 | 0,2 - 0,5 | 10 - 25 | 0,05 - 0,3 | 20 - 50 | 0,05 - 0,3 | Fundición |
| <200 HB | 20 - 35 | 0,20 - 0,4 | 50 - 100 | 0,2 - 0,4 | 80 - 120 | 0,2 - 0,5 | 10 - 20 | 0,05 - 0,3 | 10 - 40 | 0,05 - 0,3 | Fundición |
| <220 HB | 10 - 30 | 0,10 - 0,4 | 40 - 100 | 0,2 - 0,4 | 70 - 110 | 0,1 - 0,4 | 5 - 15 | 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Fundición |
| <180 HB | 20 - 40 | 0,10 - 0,4 | 60 - 120 | 0,2 - 0,5 | 80 - 120 | 0,1 - 0,5 | 15 - 25 | 0,05 - 0,3 | 20 - 45 | 0,05 - 0,3 | Fundición Maleable |
| <200 HB | 15 - 35 | 0,10 - 0,4 | 50 - 110 | 0,2 - 0,5 | 75 - 110 | 0,1 - 0,5 | 10 - 20 | 0,05 - 0,3 | 15 - 40 | 0,05 - 0,3 | Fundición Maleable |
| <220 HB | 10 - 30 | 0,10 - 0,4 | 40 - 100 | 0,2 - 0,5 | 60 - 110 | 0,1 - 0,4 | 5 - 15 | 0,05 - 0,3 | 10 - 35 | 0,05 - 0,3 | Fundición Maleable |
| | 70 - 150 | 0,05 - 0,5 | 100 - 350 | 0,1 - 0,8 | 80 - 150 | 0,2 - 1,0 | 20 - 50 | 0,05 - 0,3 | 40 - 80 | 0,05 - 0,3 | Aluminio Blando |
| | 70 - 120 | 0,05 - 0,5 | 100 - 350 | 0,1 - 0,8 | 100 - 200 | 0,2 - 1,0 | 30 - 70 | 0,05 - 0,3 | 30 - 70 | 0,05 - 0,3 | Aluminio Duro |
| | 70 - 120 | 0,10 - 0,5 | 200 - 350 | 0,1 - 0,5 | 100 - 200 | 0,2 - 1,0 | 30 - 70 | 0,05 - 0,3 | 30 - 70 | 0,05 - 0,3 | Fundición de Aluminio |
| | 30 - 60 | 0,10 - 0,5 | 50 - 150 | 0,1 - 0,8 | 80 - 150 | 0,1 - 0,5 | 20 - 40 | 0,05 - 0,3 | 25 - 80 | 0,05 - 0,3 | Bronce |
| | 40 - 80 | 0,10 - 0,4 | 50 - 150 | 0,1 - 0,4 | 80 - 200 | 0,2 - 0,6 | 20 - 60 | 0,05 - 0,3 | 40 - 100 | 0,05 - 0,3 | Latón |
| | 30 - 60 | 0,10 - 0,4 | 50 - 150 | 0,1 - 0,4 | 50 - 120 | 0,2 - 0,4 | 20 - 50 | 0,05 - 0,3 | 30 - 80 | 0,10 - 0,3 | Cobre |
| | | | | | 30 - 60 | 0,1 - 0,2 | | | | | HARDOX |
| | 50 - 100 | 0,10 - 0,5 | | | | | 40 - 80 | 0,05 - 0,3 | | | Plasticos Blandos |
| | | | 70 - 200 | 0,1 - 0,5 | 90 - 200 | 0,2 - 0,5 | | | 50 - 80 | 0,05 - 0,3 | Plasticos Duros |

*Datos de corte para tipo.



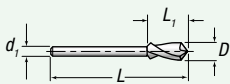
| Ø mm | Brocas | | Guías |
|---------|-------------------------|-------------------------|----------------|
| | B | LB | F |
| | HSS | HSS | |
| | Tol.h8 Espiral 12 mm | Tol.h8 Espiral 17 mm | Tol.c9 |
| | Referencia No. | Referencia No. | Referencia No. |
| 2,4 | | | 01F-02,4 |
| 2,5 | 01B-02,5 | 01LB-02,5 | 01F-02,5 |
| 2,6 | | | 01F-02,6 |
| 2,7 | 01B-02,7 | | 01F-02,7 |
| 2,9 | | | 01F-02,9 |
| 3,0 | 01B-03,0 | 01LB-03,0 | 01F-03,0 |
| 3,2 | 01B-03,2 | 01LB-03,2 | 01F-03,2 |
| 3,3 | 01B-03,3 | 01LB-03,3 | 01F-03,3 |
| 3,4 | 01B-03,4 | | 01F-03,4 |
| 3,5 | 01B-03,5 | 01LB-03,5 | 01F-03,5 |
| 3,6 | 01B-03,6 | | 01F-03,6 |
| 3,7 | 01B-03,7 | 01LB-03,7 | 01F-03,7 |
| 3,9 | | | 01F-03,9 |
| 4,0 | | | 01F-04,0 |
| 4,2 | | | 01F-04,2 |
| 4,5 | | | 01F-04,5 |
| 4,8 | | | 01F-04,8 |
| 5,0 | | | 01F-05,0 |
| 5,3 | | | 01F-05,3 |
| 5,5 | | | 01F-05,5 |
| 6,0 | | | 01F-06,0 |
| 6,4 | | | 01F-06,4 |
| 6,5 | | | 01F-06,5 |
| 6,6 | | | 01F-06,6 |
| 6,8 | | | 01F-06,8 |
| 7,0 | | | 01F-07,0 |
| 7,5 | | | 01F-07,5 |
| 8,0 | | | 01F-08,0 |

| Ø mm | Fresas y Avellanadores | |
|---------|-------------------------|-------------------------|
| | W | T |
| | HSS | HSS |
| | Tol.p8 Espiral 16 mm | Tol.x9 Espiral 16 mm |
| | Referencia No. | Referencia No. |
| 5,0 | 01W-05,0 | |
| 5,5 | 01W-05,5 | |
| 5,9 | 01W-05,9 | |
| 6,0 | 01W-06,0 | 01T9-06,0 |
| 6,3 | 01W-06,3 | 01T9-06,3 |
| 6,4 | 01W-06,4 | |
| 6,5 | 01W-06,5 | |
| 6,7 | 01W-06,7 | 01T9-06,7 |
| 6,8 | 01W-06,8 | |
| 7,0 | 01W-07,0 | 01T9-07,0 |
| 7,3 | | 01T9-07,3 |
| 7,5 | 01W-07,5 | |
| 8,0 | 01W-08,0 | 01T9-08,0 |
| 8,3 | | 01T9-08,3 |
| 8,5 | 01W-08,5 | |
| 8,6 | | 01T9-08,6 |
| 9,0 | 01W-09,0 | |
| 9,4 | | 01T9-09,4 |
| 9,5 | 01W-09,5 | |
| 10,0 | 01W-10,0 | 01T9-10,0 |
| 10,4 | 01W-10,4 | 01T9-10,4 |
| 10,5 | 01W-10,5 | |
| 11,0 | 01W-11,0 | |
| 12,0 | 01W-12,0 | |
| 12,5 | 01W-12,5 | |
| 13,0 | 01W-13,0 | |
| 14,0 | 01W-14,0 | |
| 15,0 | 01W-15,0 | |
| 16,0 | 01W-16,0 | |

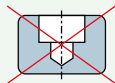
B y LB

Importante!

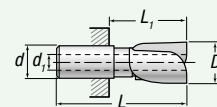
- Al combinar Broca, tener en cuenta que debe taladrar la pieza antes que el segundo corte actúe, y no deben usarse en agujeros ciegos.



| Tipo | d_i | L | L_1 |
|------|-------|------|-------|
| B | 2,4 | 47,0 | 12,0 |
| LB | 2,4 | 52,0 | 17,0 |

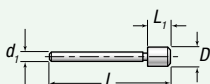


W



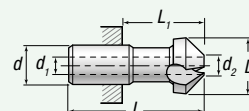
| Tipo | d | d_i | L | L_1 |
|------|-----|-------|------|-------|
| W | 7,0 | 2,4 | 28,0 | 16,0 |

F



| Tipo | d_i | L | L_1 |
|------|-------|------|-------|
| F | 2,4 | 40,0 | 6,0 |

T



| Tipo | d | d_i | d_{2min} | L | L_1 |
|------|-----|-------|------------|------|-------|
| T | 7,0 | 2,4 | 2,7 | 28,0 | 16,0 |

Grupo 01



| Porta Herramientas A | |
|--------------------------------|---------------------------|
| Mango MK1 | Referencia No. 01A-MK1 |
| Ø6 | 01A-06 |
| Ø10 | 01A-10 |



| Porta Herramientas S Con tope de profundización | |
|--|---------------------------|
| Mango MK1 | Referencia No. 01S-MK1 |
| Ø10 | 01S-10 |



| Porta Herramientas DS | |
|---------------------------------|---------------------------|
| Mango Ø10 | Referencia No. 01DS-10 |

| Set Referencia No. 01P / M3-M6 | | |
|-----------------------------------|-----------------------|-------------------|
| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
| 5,0 | 2,4 | 01A-06 mm |
| 5,5 | 2,5 | |
| 6,0 | 3,0 | |
| 6,5 | 3,2 | |
| 7,0 | 3,4 | |
| 7,5 | 3,5 | |
| 8,0 | 3,6 | |
| 8,5 | 4,0 | |
| 9,0 | 4,2 | |
| 9,5 | 4,5 | |
| 10,0 | 5,0 | |
| 10,5 | 5,5 | |
| 11,0 | 6,0 | |
| | 6,5 | |
| | 6,6 | |
| | 7,0 | |

01DS

| Tipo | D Tol. g7 | d | L | L ₁ | Mango |
|---------|-----------|---|----|----------------|-------|
| 01DS-10 | 14 | 7 | 54 | 25 | Ø10 |

01A

| Tipo | D Tol. g7 | d | L | L ₁ | Mango |
|---------|-----------|---|-----|----------------|-------|
| 01A-MK1 | 14 | 7 | 120 | 58 | MK1 |
| 01A-06 | 14 | 7 | 86 | 45 | Ø6 |
| 01A-10 | 14 | 7 | 86 | 45 | Ø10 |

01S

| Tipo | D | d | L | L ₁ | L ₂ | Mango |
|---------|----|---|-----|----------------|----------------|-------|
| 01S-MK1 | 30 | 7 | 120 | 59 | 16 | MK1 |
| 01S-10 | 30 | 7 | 88 | 59 | 16 | Ø10 |

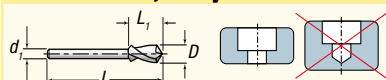
Grupo 0

GRANLUND
Tools



| Ø mm | Brocas | | | Guías | | Fresas y Avellanadores | | | | | | | |
|----------|---|------------------------|------------------------------|----------|-----------|------------------------|----------|----------|------------------------------|------------------------------|-----------------------------|----------|-----------------------------|
| | B | LB | BH | F | R | N | NA | W | H | HA | WHV | T | KV |
| | HSS | HSS | Metal duro K20 Micrograno | Fija | Giratoria | HSS | HSS | HSS | Metal duro K40 Micrograno | Metal duro K10 Micrograno | Para plaquita Desechable | HSS 90° | Para plaquita Desechable |
| | Tol.h8 Helice 15 mm | Tol.h8 Helice 27 mm | Tol.h8 Helice 15 mm | Tol. c9 | Tol. c9 | Tol.p8 | Tol.p8 | Tol.p8 | Tol.p8 | Tol.p8 | Tol.p8 | Tol.±0,1 | Tol.x9 |
| Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. |
| 4,0 | | | | OF-04,0* | | | | | | | | | |
| 4,2 | OB-04,2* | OLB-04,2* | | OF-04,2* | | | | | | | | | |
| 4,3 | OB-04,3* | OLB-04,3* | | OF-04,3* | | | | | | | | | |
| 4,5 | OB-04,5* | OLB-04,5* | | OF-04,5* | | | | | | | | | |
| 4,8 | OB-04,8* | OLB-04,8* | | OF-04,8* | | | | | | | | | |
| 5,0 | OB-05,0* | OLB-05,0* | OBH-05,0* | OF-05,0* | | | | | | | | | |
| 5,1 | OB-05,1* | OLB-05,1* | | | | | | | | | | | |
| 5,3 | OB-05,3* | OLB-05,3* | | OF-05,3* | | | | | | | | | |
| 5,5 | OB-05,5* | OLB-05,5* | | OF-05,5* | | | | | | | | | |
| 5,8 | OB-05,8 | OLB-05,8 | | OF-05,8 | | | | | | | | | |
| 6,0 | OB-06,0 | OLB-06,0 | OBH-06,0 | OF-06,0 | OR-06,0 | | | | | | | | |
| 6,4 | OB-06,4 | OLB-06,4 | | OF-06,4 | OR-06,4 | | | | | | | | |
| 6,5 | OB-06,5 | OLB-06,5 | OBH-06,5 | OF-06,5 | OR-06,5 | | | | | | | | |
| 6,6 | OB-06,6 | OLB-06,6 | | OF-06,6 | OR-06,6 | | | | | | | | |
| 6,8 | OB-06,8 | OLB-06,8 | OBH-06,8 | OF-06,8 | OR-06,8 | | | | | | | | |
| 7,0 | OB-07,0 | OLB-07,0 | | OF-07,0 | OR-07,0 | ON-07,0 | ONA-07,0 | OW-07,0 | | | | | |
| 7,4 | | | | OF-07,4 | | ON-07,4 | ONA-07,4 | | | | | | |
| 7,5 | * No usar con herramientas de Plaquita de M. Duro. | | | OF-07,5 | OR-07,5 | ON-07,5 | ONA-07,5 | OW-07,5 | | | | | |
| 7,6 | | | | OF-07,6 | | | | | | | | | |
| 8,0 | | | | OF-08,0 | OR-08,0 | ON-08,0 | ONA-08,0 | OW-08,0 | | | | OT9-08,0 | |
| 8,3 | | | | OF-08,3 | OR-08,3 | | | | | | | OT9-08,3 | |
| 8,4 | | | | OF-08,4 | OR-08,4 | | | | | | | | |
| 8,5 | | | | OF-08,5 | OR-08,5 | ON-08,5 | ONA-08,5 | OW-08,5 | | | | | |
| 8,6 | | | | | | | | | | | | OT9-08,6 | |
| 9,0 | | | | OF-09,0 | OR-09,0 | ON-09,0 | ONA-09,0 | OW-09,0 | | | | | |
| 9,4 | | | | | | ON-09,4 | | | | | | OT9-09,4 | |
| 9,5 | | | | OF-09,5 | OR-09,5 | ON-09,5 | ONA-09,5 | OW-09,5 | | | | | |
| 10,0 | | | | OF-10,0 | OR-10,0 | ON-10,0 | ONA-10,0 | OW-10,0 | OH-10,0 | | | OT9-10,0 | |
| 10,2 | | | | OF-10,2 | | | | | | | | | |
| 10,4 | | | | | | ON-10,4 | | OW-10,4 | | | | OT9-10,4 | |
| 10,5 | | | | OF-10,5 | OR-10,5 | ON-10,5 | | OW-10,5 | OH-10,5 | OHA-10,5 | | | |
| 11,0 | | | | OF-11,0 | OR-11,0 | ON-11,0 | ONA-11,0 | OW-11,0 | OH-11,0 | OHA-11,0 | | | |
| 11,5 | | | | OF-11,5 | | ON-11,5 | ONA-11,5 | OW-11,5 | OH-11,5 | OHA-11,5 | | OT9-11,5 | |
| 12,0 | | | | OF-12,0 | OR-12,0 | ON-12,0 | ONA-12,0 | OW-12,0 | OH-12,0 | OHA-12,0 | | OT9-12,0 | |
| 12,4 | | | | | | | | | | | | OT9-12,4 | |
| 12,5 | | | | OF-12,5 | OR-12,5 | ON-12,5 | ONA-12,5 | OW-12,5 | OH-12,5 | | | | |
| 13,0 | | | | OF-13,0 | OR-13,0 | ON-13,0 | ONA-13,0 | OW-13,0 | OH-13,0 | OHA-13,0 | | | |
| 13,4 | | | | | | | | | | | | OT9-13,4 | |
| 13,5 | | | | OF-13,5 | OR-13,5 | ON-13,5 | ONA-13,5 | | | | | | |
| 14,0 | | | | OF-14,0 | OR-14,0 | ON-14,0 | ONA-14,0 | OW-14,0 | OH-14,0 | OHA-14,0 | | OT9-14,0 | |
| 14,5 | | | | | | ON-14,5 | ONA-14,5 | | OH-14,5 | | | | |
| 15,0 | | | | | | ON-15,0 | ONA-15,0 | OW-15,0 | OH-15,0 | OHA-15,0 | | OT9-15,0 | |
| 15,5 | | | | | | ON-15,5 | ONA-15,5 | OW-15,5 | | | | | |
| 16,0 | | | | | | ON-16,0 | ONA-16,0 | OW-16,0 | OH-16,0 | OHA-16,0 | | OT9-16,0 | |
| 16,4 | | | | | | | | | | | | OT9-16,4 | |
| 16,5 | | | | | | ON-16,5 | ONA-16,5 | OW-16,5 | | | | OT9-16,5 | |
| 17,0 | | | | | | ON-17,0 | ONA-17,0 | | OH-17,0 | | | | |
| 17,5 | | | | | | ON-17,5 | ONA-17,5 | | | | | | |
| 18,0 | | | | | | ON-18,0 | ONA-18,0 | | OH-18,0 | OHA-18,0 | OWHV-18,0 | | OKV9-18,0 |
| 18,5 | | | | | | ON-18,5 | | | | | | | |
| 19,0 | | | | | | ON-19,0 | ONA-19,0 | | OH-19,0 | | OWHV-19,0 | | OKV9-19,0 |
| 19,5 | | | | | | ON-19,5 | | | | | | | |
| 20,0 | | | | | | ON-20,0 | ONA-20,0 | | OH-20,0 | OHA-20,0 | OWHV-20,0 | | |
| 20,5 | | | | | | ON-20,5 | ONA-20,5 | | | | | | OKV9-20,5 |
| 21,0 | | | | | | ON-21,0 | ONA-21,0 | | OH-21,0 | | OWHV-21,0 | | |
| 21,5 | | | | | | ON-21,5 | ONA-21,5 | | | | | | |
| 22,0 | | | | | | ON-22,0 | ONA-22,0 | | OH-22,0 | OHA-22,0 | OWHV-22,0 | | |
| 22,5 | | | | | | ON-22,5 | ONA-22,5 | | | | | | |
| 23,0 | | | | | | ON-23,0 | ONA-23,0 | | OH-23,0 | | OWHV-23,0 | | |
| 23,5 | | | | | | | ONA-23,5 | | | | | | |
| 24,0 | | | | | | | ONA-24,0 | | OH-24,0 | OHA-24,0 | OWHV-24,0 | | |
| 25,0 | | | | | | | | | | | | | OKV9-25,0 |

B, LB y BH



| Tipo | d ₁ | L | L ₁ |
|-------|----------------|------|----------------|
| B, BH | 4,0 | 70,0 | 15,0 |
| LB | 4,0 | 82,0 | 27,0 |

Importante!

- Si utiliza broca-guia, la broca debe taladrar la pieza antes que empiece el segundo corte.

F y R

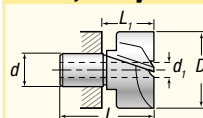


| Tipo | d ₁ | L | L ₁ |
|------|----------------|------|----------------|
| F, R | 4,0 | 64,0 | 9,0 |

Importante!

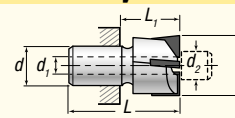
- Trabajando en seco las guías tipo R deban ser lubricadas.

N, NA y W

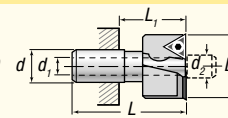


| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|-----------|------|----------------|-------------------|------|----------------|
| N, NA, W | 10,0 | 4,0 | | 40,0 | 22,0 |
| H, HA, WH | 10,0 | 4,0 | 5,8 | 40,0 | 22,0 |
| WHV | 10,0 | 4,0 | 5,2 | 40,0 | 22,0 |

H y HA



WHV



Importante!

- Las fresas tipo WHV deben siempre usarse con guías giratorias Tipo R.



Portaherramientas

A

| Mango | Ref. No. |
|-------|----------|
| MK1 | 0A-MK1 |
| MK2 | 0A-MK2 |
| Ø8 | 0A-08 |
| Ø10 | 0A-10 |

Portaherramientas

NS y DS
Corto

| Mango | Ref. No. |
|--------|----------|
| Weldon | |
| W16 | ONS-W16 |
| Ø10 | ODS-10 |

Portaherramientas

L
Largo

| Mango | Ref. No. |
|--------|------------|
| MK1 | |
| L100 | OL-100-MK1 |
| L150 | OL-150-MK1 |
| L200 | OL-200-MK1 |
| Weldon | OL-250-W25 |

Portaherramientas

S
Con tope de profundidad

| Mango | Ref. No. |
|-------|----------|
| MK1 | OS-MK1 |
| Ø10 | OS-10 |

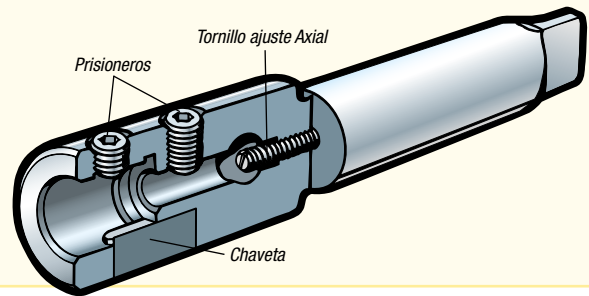
Portaherramientas

MD
Para Portabrocas magnético

| Mango | Ref. No. |
|--------|----------|
| W19,05 | OMD |

Importante!

- Usando corte de metal duro (tipos TH-h y HA) colocar el tornillo de ajuste axial en contacto con la guía o broca insertada.
- Dejar un espacio entre el filo y la guía o broca para prevenir roturas por impacto accidental.
- El tornillo axial también se usa para prolongar la vida de las brocas tras reafilarlas.



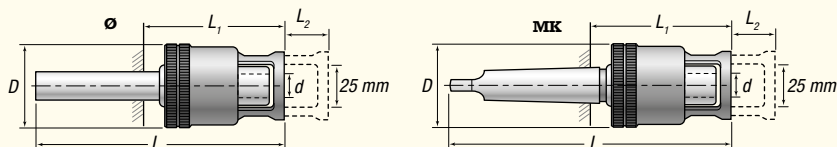
Plaquitas para WHV y KV



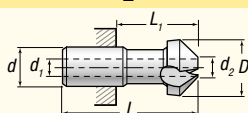
| Tipo de plaquita | Grupos | | Ref. No. | Ref. No. | Radius | Adecuado para | SSK |
|------------------|--------|-----------|----------|----------|------------|---------------|-----|
| WHV 18,0 - 20,0 | 07 | TPMT-07U | TPMR-07U | 0,4 | Universal | 20 | |
| KV 20,0 - 25,0 | 07 | TPMT-07SA | | 0,4 | HARDOX | | |
| | 07 | TPMT-07SA | | 0,4 | Inoxidable | | |
| | 07 | TPMT-07SA | | 0,4 | Aluminio | | |

- Metal duro PK40. Todas las plaquitas tienen recubrimiento multicapa (TiCN-TiC-TiN).
- Las plaquitas GRANLUND disponen de un ángulo especial rompevirutas para un control óptimo de las virutas.

OS

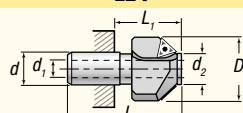


T



| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|------|------|----------------|-------------------|------|----------------|
| T | 10,0 | 4,0 | 4,5 | 40,0 | 22,0 |

KV

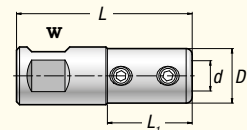


| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|------|------|----------------|-------------------|------|----------------|
| KV | 10,0 | 4,0 | 10,5 | 40,0 | 22,0 |

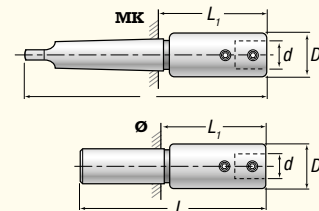
Importante!

- Los avellanadores tipo KV deben siempre combinarse con guía giratorias tipo R.

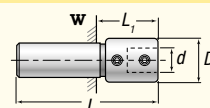
OMD



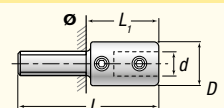
0A



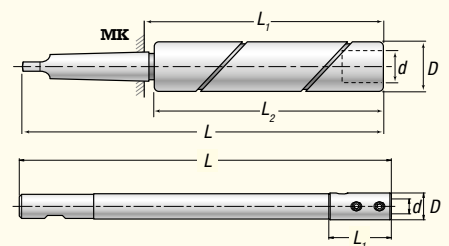
ONS



ODS



OL



| Tipo | D Tol. g7 | d | L | L ₁ | L ₂ | Mango |
|------------|-----------|----|-----|----------------|----------------|--------|
| 0A-MK1 | 18 | 10 | 110 | 48 | | MK1 |
| 0A-MK2 | 18 | 10 | 132 | 57 | | MK2 |
| 0A-08 | 18 | 10 | 92 | 42 | | Ø8 |
| 0A-10 | 18 | 10 | 92 | 42 | | Ø10 |
| OS-MK1 | 37 | 10 | 114 | 53 | 18 | MK1 |
| OS-10 | 37 | 10 | 96 | 53 | 18 | Ø10 |
| OL-100-MK1 | 20 | 10 | 168 | 106 | 100 | MK1 |
| OL-150-MK1 | 20 | 10 | 218 | 156 | 150 | MK1 |
| OL-200-MK1 | 20 | 10 | 268 | 206 | 200 | MK1 |
| OL-250-W16 | 18 | 10 | 250 | 42 | | W16 |
| ONS-W16 | 18 | 10 | 80 | 28 | | W16 |
| ODS-10 | 18 | 10 | 58 | 30 | | Ø10 |
| OMD | 18 | 10 | 58 | 28 | | W19,05 |

Grupo 1

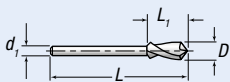
GRANLUND
Tools



| Ø mm | Brocas | | | Guías | |
|----------|--------------------------|--------------------------|---------------------------|----------|-----------|
| | B | LB | BH | F | R/RS** |
| | HSS | HSS | Metal duro K20 Micrograno | Fija | Giratoria |
| | Tol. h8 L.Corte 25 mm | Tol. h8 L.Corte 40 mm | Tol. h8 L.Corte 25 mm | Tol. c9 | Tol. c9 |
| Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | |
| 6,0 | | | | 1F-06,0* | |
| 6,4 | | | | 1F-06,4* | |
| 6,5 | 1B-06,5* | 1LB-06,5* | 1BH-06,5* | 1F-06,5* | |
| 6,6 | 1B-06,6* | 1LB-06,6* | | 1F-06,6* | |
| 6,8 | 1B-06,8* | 1LB-06,8* | 1BH-06,8* | 1F-06,8* | |
| 7,0 | 1B-07,0* | 1LB-07,0* | 1BH-07,0* | 1F-07,0* | 1R-07,0* |
| 7,4 | | | | 1F-07,4* | |
| 7,5 | 1B-07,5* | 1LB-07,5* | | 1F-07,5* | 1R-07,5* |
| 7,6 | 1B-07,6* | 1LB-07,6* | | 1F-07,6* | |
| 7,9 | 1B-07,9* | 1LB-07,9* | | | |
| 8,0 | 1B-08,0 | 1LB-08,0 | 1BH-08,0 | 1F-08,0 | 1R-08,0 |
| 8,2 | 1B-08,2 | 1LB-08,2 | | | |
| 8,3 | | | | 1F-08,3 | 1R-08,3 |
| 8,4 | 1B-08,4 | 1LB-08,4 | | 1F-08,4 | 1R-08,4 |
| 8,5 | 1B-08,5 | 1LB-08,5 | 1BH-08,5 | 1F-08,5 | 1R-08,5 |
| 8,8 | 1B-08,8 | 1LB-08,8 | | | |
| 9,0 | 1B-09,0 | 1LB-09,0 | 1BH-09,0 | 1F-09,0 | 1R-09,0 |
| 9,3 | 1B-09,3 | 1LB-09,3 | | | |
| 9,5 | 1B-09,5 | 1LB-09,5 | | 1F-09,5 | 1R-09,5 |
| 10,0 | 1B-10,0 | 1LB-10,0 | 1BH-10,0 | 1F-10,0 | 1R-10,0 |
| 10,2 | 1B-10,2 | 1LB-10,2 | | 1F-10,2 | 1R-10,2 |
| 10,5 | 1B-10,5 | 1LB-10,5 | 1BH-10,5 | 1F-10,5 | 1R-10,5 |
| 10,7 | 1B-10,7 | | | | |
| 11,0 | 1B-11,0 | 1LB-11,0 | 1BH-11,0 | 1F-11,0 | 1R-11,0 |
| 11,5 | 1B-11,5 | 1LB-11,5 | 1BH-11,5 | 1F-11,5 | 1R-11,5 |
| 11,6 | 1B-11,6 | 1LB-11,6 | | | |
| 12,0 | 1B-12,0 | 1LB-12,0 | 1BH-12,0 | 1F-12,0 | 1R-12,0 |
| 12,5 | | | | 1F-12,5 | 1R-12,5 |
| 13,0 | | | | 1F-13,0 | 1R-13,0 |
| 13,5 | | | | 1F-13,5 | 1R-13,5 |
| 14,0 | | | | 1F-14,0 | 1R-14,0 |
| 14,5 | | | | 1F-14,5 | 1R-14,5 |
| 15,0 | | | | 1F-15,0 | 1R-15,0 |
| 15,5 | | | | 1F-15,5 | 1R-15,5 |
| 16,0 | | | | 1F-16,0 | 1R-16,0 |
| 16,5 | | | | 1F-16,5 | 1R-16,5 |
| 17,0 | | | | 1F-17,0 | 1R-17,0 |
| 17,5 | | | | 1F-17,5 | 1R-17,5 |
| 18,0 | | | | 1F-18,0 | 1R-18,0 |
| 18,5 | | | | 1F-18,5 | 1R-18,5 |
| 19,0 | | | | 1F-19,0 | 1R-19,0 |
| 19,5 | | | | 1F-19,5 | 1R-19,5 |
| 20,0 | | | | 1F-20,0 | 1R-20,0 |
| 20,5 | | | | | 1R-20,5 |
| 21,0 | | | | | 1R-21,0 |
| 21,5 | | | | | 1R-21,5 |
| 22,0 | | | | | 1R-22,0 |
| 22,5 | | | | | 1R-22,5 |
| 23,0 | | | | | 1R-23,0 |
| 24,0 | | | | | 1R-24,0 |

| Ø mm | Fresas | | | | | |
|----------|----------|-----------|----------|---------------------------|---------------------------|--------------------------|
| | N | NA | W | H | HA | WHV |
| | HSS | HSS | HSS | Metal duro K40 Micrograno | Metal duro K10 Micrograno | Para plaquita desechable |
| | Tol. p8 | Tol. p8 | Tol. p8 | Tol. p8 | Tol. p8 | Tol. ± 0,1 |
| Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | |
| 10,0 | 1N-10,0 | 1NA-10,0 | 1W-10,0 | | | |
| 10,4 | | 1NA-10,4 | | | | |
| 10,5 | 1N-10,5 | 1NA-10,5 | 1W-10,5 | | | |
| 11,0 | 1N-11,0 | 1NA-11,0 | 1W-11,0 | | | |
| 11,5 | 1N-11,5 | 1NA-11,5 | 1W-11,5 | | | |
| 12,0 | 1N-12,0 | 1NA-12,0 | 1W-12,0 | 1H-12,0 | 1HA-12,0 | |
| 12,5 | 1N-12,5 | 1NA-12,5 | 1W-12,5 | 1H-12,5 | 1HA-12,5 | |
| 13,0 | 1N-13,0 | 1NA-13,0 | 1W-13,0 | 1H-13,0 | 1HA-13,0 | |
| 13,5 | 1N-13,5 | 1NA-13,5 | 1W-13,5 | 1H-13,5 | 1HA-13,5 | |
| 14,0 | 1N-14,0 | 1NA-14,0 | 1W-14,0 | 1H-14,0 | 1HA-14,0 | |
| 14,5 | 1N-14,5 | 1NA-14,5 | | | 1HA-14,5 | |
| 15,0 | 1N-15,0 | 1NA-15,0 | 1W-15,0 | 1H-15,0 | 1HA-15,0 | |
| 15,5 | 1N-15,5 | 1NA-15,5 | | 1H-15,5 | 1HA-15,5 | |
| 16,0 | 1N-16,0 | 1NA-16,0 | 1W-16,0 | 1H-16,0 | 1HA-16,0 | |
| 16,5 | 1N-16,5 | 1NA-16,5 | 1W-16,5 | 1H-16,5 | 1HA-16,5 | |
| 17,0 | 1N-17,0 | 1NA-17,0 | 1W-17,0 | 1H-17,0 | 1HA-17,0 | |
| 17,5 | 1N-17,5 | 1NA-17,5 | 1W-17,5 | 1H-17,5 | 1HA-17,5 | |
| 18,0 | 1N-18,0 | 1NA-18,0 | 1W-18,0 | 1H-18,0 | 1HA-18,0 | |
| 18,5 | 1N-18,5 | 1NA-18,5 | | 1H-18,5 | 1HA-18,5 | |
| 19,0 | 1N-19,0 | 1NA-19,0 | 1W-19,0 | 1H-19,0 | 1HA-19,0 | |
| 19,5 | 1N-19,5 | 1NA-19,5 | | 1H-19,5 | 1HA-19,5 | |
| 20,0 | 1N-20,0 | 1NA-20,0 | 1W-20,0 | 1H-20,0 | 1HA-20,0 | 1WHV-20,0 |
| 20,5 | 1N-20,5 | 1NA-20,5 | | 1H-20,5 | 1HA-20,5 | 1WHV-20,5 |
| 21,0 | 1N-21,0 | 1NA-21,0 | 1W-21,0 | 1H-21,0 | 1HA-21,0 | 1WHV-21,0 |
| 21,5 | 1N-21,5 | 1NA-21,5 | 1W-21,5 | 1H-21,5 | 1HA-21,5 | 1WHV-21,5 |
| 22,0 | 1N-22,0 | 1NA-22,0 | 1W-22,0 | 1H-22,0 | 1HA-22,0 | 1WHV-22,0 |
| 22,5 | 1N-22,5 | 1NA-22,5 | | 1H-22,5 | 1HA-22,5 | |
| 23,0 | 1N-23,0 | 1NA-23,0 | 1W-23,0 | 1H-23,0 | 1HA-23,0 | 1WHV-23,0 |
| 23,5 | 1N-23,5 | 1NA-23,5 | | 1H-23,5 | 1HA-23,5 | |
| 24,0 | 1N-24,0 | 1NA-24,0 | 1W-24,0 | 1H-24,0 | 1HA-24,0 | 1WHV-24,0 |
| 24,5 | 1N-24,5 | 1NA-24,5 | | 1H-24,5 | 1HA-24,5 | |
| 25,0 | 1N-25,0 | 1NA-25,0 | 1W-25,0 | 1H-25,0 | 1HA-25,0 | 1WHV-25,0 |
| 25,5 | 1N-25,5 | 1NA-25,5 | | 1H-25,5 | 1HA-25,5 | 1WHV-25,5 |
| 26,0 | 1N-26,0 | 1NA-26,0 | | 1H-26,0 | 1HA-26,0 | 1WHV-26,0 |
| 26,5 | 1N-26,5 | 1NA-26,5 | | 1H-26,5 | 1HA-26,5 | |
| 27,0 | 1N-27,0 | 1NA-27,0 | | 1H-27,0 | 1HA-27,0 | 1WHV-27,0 |
| 27,5 | 1N-27,5 | 1NA-27,5 | | 1H-27,5 | 1HA-27,5 | |
| 28,0 | 1N-28,0 | 1NA-28,0 | | 1H-28,0 | 1HA-28,0 | 1WHV-28,0 |
| 28,5 | 1N-28,5 | 1NA-28,5 | | 1H-28,5 | 1HA-28,5 | |
| 29,0 | 1N-29,0 | 1NA-29,0 | | 1H-29,0 | 1HA-29,0 | 1WHV-29,0 |
| 29,5 | 1N-29,5 | 1NA-29,5 | | | | |
| 30,0 | 1N-30,0* | 1NA-30,0* | | 1H-30,0* | 1HA-30,0* | 1WHV-30,0 |
| 30,5 | 1N-30,5* | 1NA-30,5* | | | 1HA-30,5* | 1WHV-30,5 |
| 31,0 | 1N-31,0* | 1NA-31,0* | | | 1HA-31,0* | 1WHV-31,0 |
| 32,0 | 1N-32,0* | 1NA-32,0* | | 1H-32,0* | 1HA-32,0* | 1WHV-32,0 |
| 33,0 | 1N-33,0* | 1NA-33,0* | | 1H-33,0* | 1HA-33,0* | 1WHV-33,0 |
| 34,0 | 1N-34,0* | 1NA-34,0* | | 1H-34,0* | 1HA-34,0* | 1WHV-34,0 |
| 35,0 | 1N-35,0* | 1NA-35,0* | | 1H-35,0* | 1HA-35,0* | 1WHV-35,0 |
| 36,0 | 1N-36,0* | 1NA-36,0* | | 1H-36,0* | 1HA-36,0* | 1WHV-36,0 |
| 37,0 | 1N-37,0* | 1NA-37,0* | | | 1HA-37,0* | 1WHV-37,0 |
| 38,0 | 1N-38,0* | 1NA-38,0* | | 1H-38,0* | 1HA-38,0* | 1WHV-38,0 |

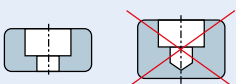
B, LB y BH



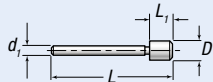
| Tipo | d ₁ | L | L ₁ |
|-------|----------------|-------|----------------|
| B, BH | 6,0 | 95,0 | 25,0 |
| LB | 6,0 | 110,0 | 40,0 |

Importante!

- Si utiliza broca-guia, la broca debe taladrar la pieza antes que empiece el segundo corte. No se pueden usar brocas para agujeros ciegos.



F y R/RS



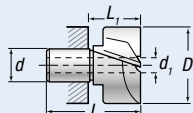
| Tipo | d ₁ | L | L ₁ |
|------|----------------|------|----------------|
| F, R | 6,0 | 80,0 | 14,0 |

* 1R < Ø10 mm, L1=9,0 mm

Importante!

- Trabajando en seco las guías giratorias tipo R deben lubricarse.

N, NA y W

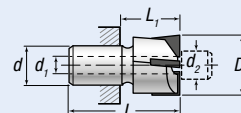


| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|-----------|------|----------------|-------------------|------|----------------|
| N, NA, W | 14,0 | 6,0 | | 48,0 | 28,0 |
| H, HA, WH | 14,0 | 6,0 | 8,0 | 48,0 | 28,0 |

Importante!

- Las fresas tipo N, NA, H y HA iguales o Mayores a diametro 30 mm se fabrican con chaveta de arrastre reforzado. Estas medidas deben usarse con los portaherramientas adecuados Tipo M.

H y HA



| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|------|------|----------------|-------------------|------|----------------|
| WHV | 14,0 | 6,0 | 7,6 | 48,0 | 28,0 |

Importante!

- La fresa Rotatip (WHV) siempre debe combinarse con guías giratorias tipo R o RS. El mango del portaherramientas no debe ser inferior a C.M.2.

Grupo 1



| 1 | Fresas | | | | | |
|------|-------------|-------------|-------------|-----------------|-------------|--------------------|
| | T | T | T | TH | TK | KV |
| | HSS | HSS | HSS | Metal duro K 10 | HSS | Para p. intercamb. |
| Ø | Tol. x9 60° | Tol. x9 80° | Tol. x9 90° | Tol. x9 90° | Tol. x9 90° | Tol. + 0,2-0 90° |
| mm | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. |
| 11,5 | | | 1T9-11,5 | | | |
| 12,0 | | | 1T9-12,0 | | | |
| 12,4 | | | 1T9-12,4 | | | |
| 13,4 | | | 1T9-13,4 | | | |
| 14,0 | 1T6-14,0 | 1T8-14,0 | 1T9-14,0 | | | |
| 15,0 | | | 1T9-15,0 | | | |
| 16,0 | 1T6-16,0 | | 1T9-16,0 | | | |
| 16,4 | | | 1T9-16,4 | | | |
| 16,5 | | | 1T9-16,5 | | 1TK9-16,5 | |
| 18,0 | 1T6-18,0 | | 1T9-18,0 | | | |
| 19,0 | | | 1T9-19,0 | | | |
| 20,0 | 1T6-20,0 | | 1T9-20,0 | 1TH9-20,0 | 1TK9-20,0 | 1KV9-20,0 |
| 20,5 | | | 1T9-20,5 | | | |
| 22,0 | | | 1T9-22,0 | | | |
| 23,0 | | | 1T9-23,0 | | | |
| 25,0 | 1T6-25,0 | 1T8-25,0 | 1T9-25,0 | | 1TK9-25,0 | |
| 26,0 | | | 1T9-26,0 | | | 1KV9-26,0 |
| 28,0 | | | 1T9-28,0 | | | |
| 30,0 | 1T6-30,0 | 1T8-30,0 | 1T9-30,0 | 1TH9-30,0 | 1TK9-30,0 | 1KV9-30,0 |
| 34,0 | | | | | 1TK9-34,0 | |



| Portaherramientas | |
|-------------------|----------|
| A | |
| Mango | Ref. No. |
| MK1 | 1A-MK1 |
| MK2 | 1A-MK2 |
| MK3 | 1A-MK3 |
| Ø10 | 1A-10 |
| Ø12 | 1A-12 |
| Weldon | 1A-W20 |

GRANLUND
Tools



| Portaherramientas | |
|-------------------|----------|
| NS y DS Córto | |
| Mango | Ref. No. |
| MK2 | 1NS-MK2 |
| MK3 | 1NS-MK3 |
| Weldon | 1NS-W20 |
| Ø10 | 1DS-10 |

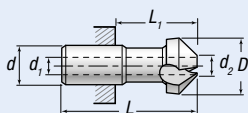
Plaquita para WHV y KV



| Tipo de plaquita | Herramienta D mm | | Radius | Adecuado para | SSK | |
|-----------------------------|------------------|-----------|----------|---------------|------------|----|
| WHV 20,0 - 25,0 KV 20-26 | Grupo 07 | TPMT-07U | TPMR-07U | 0,4 | Universal | 20 |
| | 07 | | TPMR-07U | 0,4 | HARDOX | |
| | 07 | TPMT-07SA | | 0,4 | Inoxidable | |
| | 07 | TPMT-07SA | | 0,4 | Aluminio | |
| WHV 25,5 - 38,0 KV 30,0 | Grupo 10 | TPMT-10U | | 0,4 | Universal | 22 |
| | 10 | TPMT-10U | | 0,4 | HARDOX | |
| | 10 | TPMT-10SA | | 0,4 | Inoxidable | |
| | 10 | TPMT-10SA | | 0,4 | Aluminio | |

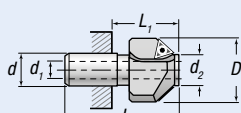
- Metal duro PK40. Todas las plaquitas tienen recubrimiento multicapa (TiCN-TiC-TiN).
- Las plaquitas GRANLUND disponen de un ángulo especial rompevirutas para un control óptimo de las virutas.

T, TH y TK



| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|------|------|----------------|-------------------|------|----------------|
| T | 14,0 | 6,0 | 6,6 | 48,0 | 28,0 |
| TH | 14,0 | 6,0 | 10,0 | 48,0 | 28,0 |
| TK | 14,0 | 6,0 | 4,0 | 48,0 | 28,0 |

KV

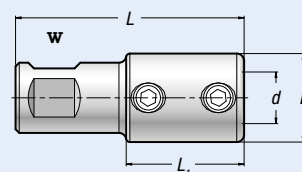


| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|----------|------|----------------|-------------------|------|----------------|
| KV (Ø26) | 14,0 | 6,0 | 13,0 | 48,0 | 28,0 |
| KV (Ø30) | 14,0 | 6,0 | 13,8 | 48,0 | 28,0 |

Importante!

- El avellanador Conotip (tipo KV) tiene que usarse siempre con guías giratorias tipo R o RS. El diámetro mínimo de mango debe ser CM3.

1MD



| Tipo | D Tol. g7 | d | L | L ₁ | Mango |
|------|-----------|----|----|----------------|--------|
| 1MD | 24 | 14 | 62 | 32 | W19,05 |

Grupo 1



Porta-herramientas

L
Largo

| Mango | Ref. No. |
|--------|------------|
| MK2 | 1L-100-MK2 |
| MK2 | 1L-150-MK2 |
| MK2 | 1L-225-MK2 |
| Weldon | 1L-250-W20 |
| Ø20 | 1L-500-20 |

Portaherramientas

GS
Con refrigerion interior

| Mango | Ref. No. |
|--------|----------|
| MK3 | 1GS-MK3 |
| Weldon | 1GS-W25 |

Portaherramientas

S
Con tope de profundidad

| Mango | Ref. No. |
|-------|----------|
| MK2 | 1S-MK2 |
| Ø10 | 1S-10 |

Portaherramientas

M
Con chavetero

| Mango | Ref. No. |
|-------|----------|
| MK3 | 1M-MK3 |
| W25 | 1M-W25 |

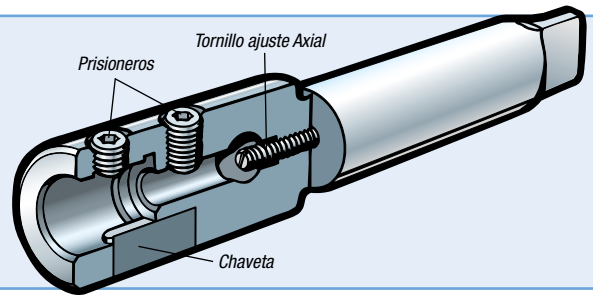
Portaherramientas

MD
Para Portabrocas magnético

| Mango | Ref. No. |
|--------|----------|
| W19,05 | 1MD |

Importante!

- Usando corte de metal duro (tipos TH-h y HA) colocar el tornillo de ajuste axial en contacto con la guía o broca insertada. Dejar un espacio entre el filo y la guía o broca para prevenir roturas por impacto accidental. El tornillo axial tambien se usa para prolongar la vida de las brocas tras reafilariarlas.



1A

1NS

1DS

1L

| Tipo | D Tol. g7 | d | L | L ₁ | L ₂ | Mango |
|------------|-----------|----|-----|----------------|----------------|-------|
| 1A-MK1 | 24 | 14 | 123 | 62 | | MK1 |
| 1A-MK2 | 24 | 14 | 137 | 62 | | MK2 |
| 1A-MK3 | 24 | 14 | 160 | 66 | | MK3 |
| 1A-10 | 24 | 14 | 110 | 55 | | Ø10 |
| 1A-12 | 24 | 14 | 120 | 55 | | Ø12 |
| 1A-W20 | 24 | 14 | 110 | 55 | | W20 |
| 1NS-MK2 | 24 | 14 | 112 | 37 | | MK2 |
| 1NS-MK3 | 24 | 14 | 130 | 37 | | MK3 |
| 1NS-W20 | 24 | 14 | 86 | 32 | | W20 |
| 1DS-10 | 24 | 14 | 62 | 34 | | Ø10 |
| 1L-100-MK2 | 26 | 14 | 183 | 108 | 100 | MK2 |
| 1L-150-MK2 | 26 | 14 | 233 | 158 | 150 | MK2 |
| 1L-250-W20 | 24 | 14 | 250 | 55 | | W20 |
| 1L-225-MK2 | 26 | 14 | 308 | 233 | 225 | MK2 |
| 1L-500-20 | 24 | 14 | 500 | 55 | | Ø20 |

1S

1GS

1M

1M-W25

| Tipo | D Tol. g7 | d | L | L ₁ | L ₂ | Mango |
|---------|-----------|----|-----|----------------|----------------|-------|
| 1S-MK2 | 45 | 14 | 144 | 70 | 20 | MK2 |
| 1S-10 | 45 | 14 | 128 | 70 | 20 | Ø10 |
| 1GS-MK3 | 36 | 14 | 143 | 50 | | MK3 |
| 1GS-W25 | 36 | 14 | 105 | 40 | | W25 |
| 1M-MK3 | 28 | 14 | 166 | 72 | | MK3 |
| 1M-W25 | 28 | 14 | 122 | 66 | | W25 |
| 1AS-W20 | 24 | 14 | 86 | 36 | | W20 |



| Ø mm | Brocas | | | Guías | |
|------|---------------------------------|---------------------------------|---------------------------------|---------------------|---------------------|
| | B | LB | BH | F | R |
| | HSS | HSS | Metal duro K20 Micrograno | Fija | Giratoria |
| | Tol. h8 Corte 30 mm Ref. No. | Tol. h8 Corte 50 mm Ref. No. | Tol. h8 Corte 30 mm Ref. No. | Tol. c9 Ref. No. | Tol. c9 Ref. No. |
| 10,0 | | | | 2F-10,0* | 2R-10,0* |
| 10,2 | | | | 2F-10,2* | 2R-10,2* |
| 10,5 | | | | 2F-10,5* | 2R-10,5* |
| 11,0 | 2B-11,0* | 2LB-11,0* | 2BH-11,0* | 2F-11,0* | 2R-11,0* |
| 11,5 | 2B-11,5* | 2LB-11,5* | 2BH-11,5* | 2F-11,5* | 2R-11,5* |
| 11,6 | 2B-11,6* | | | | |
| 12,0 | 2B-12,0 | 2LB-12,0 | 2BH-12,0 | 2F-12,0 | 2R-12,0 |
| 12,2 | 2B-12,2 | | | | |
| 12,5 | 2B-12,5 | 2LB-12,5 | 2BH-12,5 | 2F-12,5 | 2R-12,5 |
| 13,0 | 2B-13,0 | 2LB-13,0 | 2BH-13,0 | 2F-13,0 | 2R-13,0 |
| 13,5 | 2B-13,5 | 2LB-13,5 | 2BH-13,5 | 2F-13,5 | 2R-13,5 |
| 14,0 | 2B-14,0 | 2LB-14,0 | 2BH-14,0 | 2F-14,0 | 2R-14,0 |
| 14,5 | 2B-14,5 | 2LB-14,5 | 2BH-14,5 | 2F-14,5 | 2R-14,5 |
| 15,0 | 2B-15,0 | 2LB-15,0 | 2BH-15,0 | 2F-15,0 | 2R-15,0 |
| 15,1 | 2B-15,1 | | | | |
| 15,5 | 2B-15,5 | 2LB-15,5 | 2BH-15,5 | 2F-15,5 | 2R-15,5 |
| 16,0 | 2B-16,0 | 2LB-16,0 | 2BH-16,0 | 2F-16,0 | 2R-16,0 |
| 16,5 | 2B-16,5 | 2LB-16,5 | 2BH-16,5 | 2F-16,5 | 2R-16,5 |
| 17,0 | 2B-17,0 | 2LB-17,0 | 2BH-17,0 | 2F-17,0 | 2R-17,0 |
| 17,5 | 2B-17,5 | 2LB-17,5 | | 2F-17,5 | 2R-17,5 |
| 18,0 | 2B-18,0 | 2LB-18,0 | 2BH-18,0 | 2F-18,0 | 2R-18,0 |
| 18,5 | 2B-18,5 | 2LB-18,5 | | 2F-18,5 | 2R-18,5 |
| 19,0 | 2B-19,0 | 2LB-19,0 | 2BH-19,0 | 2F-19,0 | 2R-19,0 |
| 19,5 | 2B-19,5 | | | 2F-19,5 | 2R-19,5 |
| 20,0 | 2B-20,0 | 2LB-20,0 | 2BH-20,0 | 2F-20,0 | 2R-20,0 |
| 20,5 | | | | 2F-20,5 | 2R-20,5 |
| 21,0 | 2B-21,0 | 2LB-21,0 | 2BH-21,0 | 2F-21,0 | 2R-21,0 |
| 21,5 | | | | 2F-21,5 | 2R-21,5 |
| 22,0 | 2B-22,0 | 2LB-22,0 | | 2F-22,0 | 2R-22,0 |
| 22,5 | | | | 2F-22,5 | 2R-22,5 |
| 23,0 | 2B-23,0 | | | 2F-23,0 | 2R-23,0 |
| 23,5 | | | | 2F-23,5 | |
| 24,0 | 2B-24,0 | | | 2F-24,0 | 2R-24,0 |
| 24,5 | | | | 2F-24,5 | 2R-24,5 |
| 25,0 | 2B-25,0 | 2LB-25,0 | | 2F-25,0 | 2R-25,0 |
| 25,5 | | | | 2F-25,5 | 2R-25,5 |
| 26,0 | | | | 2F-26,0 | 2R-26,0 |
| 26,5 | | | | 2F-26,5 | 2R-26,5 |
| 27,0 | | | | 2F-27,0 | 2R-27,0 |
| 27,5 | | | | 2R-27,5 | |
| 28,0 | | | | 2F-28,0 | 2R-28,0 |
| 29,0 | | | | 2F-29,0 | 2R-29,0 |
| 30,0 | | | | 2F-30,0 | 2R-30,0 |
| 30,5 | | | | 2R-30,5 | |
| 31,0 | | | | 2R-31,0 | |
| 32,0 | | | | 2R-32,0 | |
| 33,0 | | | | 2R-33,0 | |
| 34,0 | | | | 2R-34,0 | |
| 35,0 | | | | 2R-35,0 | |
| 36,0 | | | | 2R-36,0 | |
| 37,0 | | | | 2R-37,0 | |
| 38,0 | | | | 2R-38,0 | |
| 39,0 | | | | 2R-39,0 | |
| 40,0 | | | | 2R-40,0 | |
| 42,0 | | | | 2R-42,0 | |
| 44,0 | | | | 2R-44,0 | |
| 45,0 | | | | 2R-45,0 | |
| 46,0 | | | | 2R-46,0 | |
| 48,0 | | | | 2R-48,0 | |
| 50,0 | | | | 2R-50,0 | |

B, LB y BH

| Tipo | d ₁ | L | L ₁ |
|-------|----------------|-------|----------------|
| B, BH | 10,0 | 125,0 | 30,0 |
| LB | 10,0 | 145,0 | 50,0 |

Importante!

- Al combinar Broca, tener en cuenta que debe taladrar la pieza antes que el segundo corte actúe, y no deben usarse en agujeros ciegos.

F y R

Importante!

- Trabajando en seco las guías giratorias tipo R deben lubricarse.

| Tipo | d ₁ | L | L ₁ |
|------|----------------|-------|----------------|
| F, R | 10,0 | 110,0 | 20,0 |

*2R < Ø13 mm, L1=14,0 mm

| Ø mm | Fresas | | | | | |
|------|---------------------|---------------------|---------------------|---------------------------|---------------------------|------------------------|
| | N | NA | W | H | HA | WHV |
| | HSS | HSS | HSS | Metal duro K40 Micrograno | Metal duro K10 Micrograno | Plaquita Desechable |
| | Tol. p8 Ref. No. | Tol. p8 Ref. No. | Tol. p8 Ref. No. | Tol. p8 Ref. No. | Tol. p8 Ref. No. | Tol. ± 0,1 Ref. No. |
| 16,0 | 2N-16,0 | 2NA-16,0 | 2W-16,0 | | | |
| 16,5 | 2N-16,5 | | | | | |
| 17,0 | 2N-17,0 | 2NA-17,0 | | | | |
| 17,5 | 2N-17,5 | | | | | |
| 18,0 | 2N-18,0 | 2NA-18,0 | 2W-18,0 | 2H-18,0 | 2HA-18,0 | |
| 18,5 | 2N-18,5 | | | | | |
| 19,0 | 2N-19,0 | 2NA-19,0 | 2W-19,0 | | | |
| 19,5 | 2N-19,5 | 2NA-19,5 | | | | |
| 20,0 | 2N-20,0 | 2NA-20,0 | 2W-20,0 | 2H-20,0 | 2HA-20,0 | |
| 20,5 | 2N-20,5 | | | | | |
| 21,0 | 2N-21,0 | 2NA-21,0 | | 2H-21,0 | | |
| 21,5 | 2N-21,5 | | | | | |
| 22,0 | 2N-22,0 | 2NA-22,0 | 2W-22,0 | 2H-22,0 | 2HA-22,0 | |
| 22,5 | 2N-22,5 | 2NA-22,5 | | | | |
| 23,0 | 2N-23,0 | 2NA-23,0 | 2W-23,0 | 2H-23,0 | 2HA-23,0 | |
| 23,5 | 2N-23,5 | | | | | |
| 24,0 | 2N-24,0 | 2NA-24,0 | 2W-24,0 | 2H-24,0 | | |
| 24,5 | 2N-24,5 | | | | | |
| 25,0 | 2N-25,0 | 2NA-25,0 | 2W-25,0 | 2H-25,0 | 2HA-25,0 | |
| 25,5 | 2N-25,5 | | | | | |
| 26,0 | 2N-26,0 | 2NA-26,0 | 2W-26,0 | 2H-26,0 | 2HA-26,0 | |
| 26,5 | 2N-26,5 | | | | | |
| 27,0 | 2N-27,0 | 2NA-27,0 | 2W-27,0 | 2H-27,0 | | |
| 27,5 | 2N-27,5 | | | | | |
| 28,0 | 2N-28,0 | 2NA-28,0 | 2W-28,0 | 2H-28,0 | 2HA-28,0 | |
| 28,5 | 2N-28,5 | | | | | |
| 29,0 | 2N-29,0 | 2NA-29,0 | 2W-29,0 | 2H-29,0 | 2HA-29,0 | |
| 29,5 | 2N-29,5 | | | | | |
| 30,0 | 2N-30,0 | 2NA-30,0 | 2W-30,0 | 2H-30,0 | 2HA-30,0 | |
| 30,5 | 2N-30,5 | | | | | |
| 31,0 | 2N-31,0 | 2NA-31,0 | 2W-31,0 | 2H-31,0 | 2HA-31,0 | |
| 32,0 | 2N-32,0 | 2NA-32,0 | 2W-32,0 | 2H-32,0 | 2HA-32,0 | |
| 33,0 | 2N-33,0 | 2NA-33,0 | 2W-33,0 | 2H-33,0 | 2HA-33,0 | |
| 34,0 | 2N-34,0 | 2NA-34,0 | 2W-34,0 | 2H-34,0 | 2HA-34,0 | 2WHV-34,0 |
| 35,0 | 2N-35,0 | 2NA-35,0 | 2W-35,0 | 2H-35,0 | 2HA-35,0 | 2WHV-35,0 |
| 36,0 | 2N-36,0 | 2NA-36,0 | 2W-36,0 | 2H-36,0 | 2HA-36,0 | 2WHV-36,0 |
| 37,0 | 2N-37,0 | 2NA-37,0 | | 2H-37,0 | 2HA-37,0 | 2WHV-37,0 |
| 38,0 | 2N-38,0 | 2NA-38,0 | 2W-38,0 | 2H-38,0 | 2HA-38,0 | 2WHV-38,0 |
| 39,0 | 2N-39,0 | 2NA-39,0 | | 2H-39,0 | | 2WHV-39,0 |
| 40,0 | 2N-40,0 | 2NA-40,0 | 2W-40,0 | 2H-40,0 | 2HA-40,0 | 2WHV-40,0 |
| 41,0 | 2N-41,0 | 2NA-41,0 | | 2H-41,0 | | 2WHV-41,0 |
| 42,0 | 2N-42,0 | 2NA-42,0 | | 2H-42,0 | 2HA-42,0 | 2WHV-42,0 |
| 43,0 | 2N-43,0 | 2NA-43,0 | | 2H-43,0 | | 2WHV-43,0 |
| 44,0 | 2N-44,0 | 2NA-44,0 | | 2H-44,0 | 2HA-44,0 | 2WHV-44,0 |
| 45,0 | 2N-45,0 | 2NA-45,0 | | 2H-45,0 | 2HA-45,0 | 2WHV-45,0 |
| 46,0 | 2N-46,0 | 2NA-46,0 | | 2H-46,0 | 2HA-46,0 | 2WHV-46,0 |
| 47,0 | 2N-47,0 | | | | 2HA-47,0 | 2WHV-47,0 |
| 48,0 | 2N-48,0 | 2NA-48,0 | | 2H-48,0 | 2HA-48,0 | 2WHV-48,0 |
| 48,0 | 2N-49,0 | 2NA-49,0 | | | | 2WHV-49,0 |
| 50,0 | 2N-50,0* | 2NA-50,0* | | 2H-50,0* | 2HA-50,0* | 2WHV-50,0** |
| 51,0 | 2N-51,0* | 2NA-51,0* | | | | 2WHV-51,0** |
| 52,0 | 2N-52,0* | 2NA-52,0* | | 2H-52,0* | 2HA-52,0* | 2WHV-52,0** |
| 53,0 | 2N-53,0* | 2NA-53,0* | | | | 2WHV-53,0** |
| 54,0 | 2N-54,0* | 2NA-54,0* | | | | 2WHV-54,0** |
| 55,0 | 2N-55,0* | 2NA-55,0* | | 2H-55,0* | 2HA-55,0* | 2WHV-55,0** |
| 56,0 | 2N-56,0* | 2NA-56,0* | | 2H-56,0* | 2HA-56,0* | 2WHV-56,0** |
| 57,0 | 2N-57,0* | 2NA-57,0* | | | | |
| 58,0 | 2N-58,0* | 2NA-58,0* | | 2H-58,0* | 2HA-58,0* | 2WHV-58,0** |
| 60,0 | 2N-60,0* | 2NA-60,0* | | 2H-60,0* | 2HA-60,0* | 2WHV-60,0** |
| 62,0 | 2N-62,0* | 2NA-62,0* | | 2H-62,0* | 2HA-62,0* | 2WHV-62,0** |
| 64,0 | 2N-64,0* | 2NA-64,0* | | | 2HA-64,0* | 2WHV-64,0** |
| 65,0 | 2N-65,0* | 2NA-65,0* | | 2H-65,0* | 2HA-65,0* | 2WHV-65,0** |
| 66,0 | 2N-66,0* | 2NA-66,0* | | 2H-66,0* | | |
| 68,0 | | 2NA-68,0* | | | 2HA-68,0* | 2WHV-68,0** |
| 70,0 | 2N-70,0* | 2NA-70,0* | | 2H-70,0* | 2HA-70,0* | 2WHV-70,0** |
| 72,0 | 2N-72,0* | 2NA-72,0* | | 2H-72,0* | 2HA-72,0* | 2WHV-72,0** |
| 74,0 | | 2NA-74,0* | | | 2HA-74,0* | |
| 75,0 | 2N-75,0* | 2NA-75,0* | | 2H-75,0* | 2HA-75,0* | 2WHV-75,0** |
| 76,0 | 2N-76,0* | 2NA-76,0* | | | | |
| 78,0 | | 2NA-78,0* | | | | |
| 80,0 | 2N-80,0* | 2NA-80,0* | | | | |
| 82,0 | 2N-82,0* | | | | | |
| 84,0 | | 2NA-84,0* | | | | |
| 85,0 | 2N-85,0* | 2NA-85,0* | | | | |

* Utilizar portaherramientas tipo M.
** Mango mínimo recomendado: CM3.



| Ø mm | Fresas | | | | | | |
|---------|----------------|----------------|----------------|--------------------|----------------|-----------------------------|-----------------------------|
| | T | T | T | TH | TK | KV | KV |
| | HSS | HSS | HSS | Metal duro K 10 | HSS | Para Plaquita desechable | Para Plaquita desechable |
| | Tol. x9 60° | Tol. x9 80° | Tol. x9 90° | Tol. x9 90° | Tol. x9 90° | Tol. + 0,2-0 60° | Tol. + 0,2-0 90° |
| | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. | Ref. No. |
| 20,0 | 2T6-20,0 | | 2T9-20,0 | | | | |
| 22,0 | | | 2T9-22,0 | | | | |
| 25,0 | 2T6-25,0 | | 2T9-25,0 | | | | |
| 28,0 | | | 2T9-28,0 | | | | |
| 30,0 | 2T6-30,0 | 2T8-30,0 | 2T9-30,0 | | 2TK9-30,0 | | |
| 31,0 | | | 2T9-31,0 | | | | |
| 32,0 | | | | | | | 2KV9-32,0 |
| 32,4 | | | 2T9-32,4 | | | | |
| 34,0 | | | 2T9-34,0 | | | | |
| 35,0 | 2T6-35,0 | | 2T9-35,0 | | | | 2KV9-35,0 |
| 36,0 | | | | | | | |
| 37,0 | | | 2T9-37,0 | | 2TK9-37,0 | | |
| 38,0 | | | | | | | 2KV9-38,0 |
| 39,0 | | | | | | | |
| 40,0 | 2T6-40,0 | 2T8-40,0 | 2T9-40,0 | 2TH9-40,0 | 2TK9-40,0 | | 2KV9-40,0 |
| 41,0 | | | | | | 2KV6-41,0 | |
| 42,0 | | | | | | | |
| 43,0 | | | | | | | |
| 44,0 | | | | | | | |
| 45,0 | | | 2T9-45,0 | | 2TK9-45,0 | | 2KV9-45,0 |
| 46,0 | | | | | | | |
| 47,0 | | | | | | | |
| 48,0 | | | | | | | |
| 48,0 | | | | | | | |
| 50,0 | 2T6-50,0 | | 2T9-50,0 | 2TH9-50,0 | 2TK9-50,0 | 2KV6-50,0 | 2KV9-50,0 |
| 51,0 | | | | | | | |
| 52,0 | | | | | | | |
| 53,0 | | | | | | | |
| 55,0 | | | | | | | |
| 56,0 | | | | | | | |
| 58,0 | | | | | | | |
| 60,0 | 2T6-60,0 | | 2T9-60,0 | 2TH9-60,0 | 2TK9-60,0 | 2KV6-60,0 | 2KV9-60,0 |
| 62,0 | | | | | | | |
| 64,0 | | | | | | | |
| 65,0 | | | | | | | |
| 68,0 | | | | | | | |
| 70,0 | | | | | | | |
| 72,0 | | | | | | | |
| 75,0 | | | 2T9-75,0 | | 2TK9-75,0 | | |
| 85,0 | | | 2T9-85,0 | | | | |

2A

2NS

2L

| Tipo | D Tol. g7 | d | L | L ₁ | L ₂ | Shank |
|-------------|-----------|----|-----|----------------|----------------|--------|
| 2A-MK2 | 36 | 22 | 160 | 85 | | MK2 |
| 2A-MK3 | 36 | 22 | 180 | 87 | | MK3 |
| 2A-MK4 | 36 | 22 | 206 | 89 | | MK4 |
| 2A-MK5 | 36 | 22 | 240 | 91 | | MK5 |
| 2A-W20 | 36 | 22 | 140 | 71 | | W20 |
| 2NS-MK3 | 36 | 22 | 145 | 51 | | MK3 |
| 2NS-W25 | 36 | 22 | 105 | 45 | | W25 |
| 2L-L250-MK3 | 40 | 22 | 355 | 261 | 250 | MK3 |
| 2L-L250-W25 | 40 | 22 | 250 | 75 | | Weldon |
| 2L-500-32 | 36 | 22 | 500 | 51 | | Ø32 |

Cajeado / Avellanado

T, TH y TK

| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|-------------|------|----------------|-------------------|------|----------------|
| T (-Ø50) | 22,0 | 10,0 | 10,8 | 61,0 | 33,0 |
| T (Ø60) | 22,0 | 10,0 | 22,0 | 61,0 | 33,0 |
| T (-Ø70) | 22,0 | 10,0 | 37,0 | 61,0 | 33,0 |
| T (Ø85) | 22,0 | 10,0 | 44,0 | 61,0 | 33,0 |
| TH (Ø40) | 22,0 | 10,0 | 14,0 | 61,0 | 33,0 |
| TH (Ø50) | 22,0 | 10,0 | 14,0 | 61,0 | 33,0 |
| TH (Ø60) | 22,0 | 10,0 | 22,0 | 61,0 | 33,0 |
| TK (Ø30,37) | 22,0 | | 5,0 | 61,0 | 33,0 |
| TK (Ø40,45) | 22,0 | | 8,0 | 61,0 | 33,0 |
| TK (Ø50-) | 22,0 | | 10,0 | 61,5 | 33,0 |
| TK (Ø60) | 22,0 | | 13,0 | 65,0 | 33,0 |
| TK (-Ø75) | 22,0 | | 25,0 | 67,0 | 33,0 |

Importante!

- Los avellanadores TH, TK, T ≥ Ø 50 mm y superiores, van provistos de un tetón de arrastre para poder usarlos con portaherramientas tipo M.

KV

| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|--------------|------|----------------|-------------------|------|----------------|
| KV (Ø32) | 22,0 | 10,0 | 17,0 | 61,0 | 33,0 |
| KV (Ø35) | 22,0 | 10,0 | 18,0 | 61,0 | 33,0 |
| KV (Ø38) | 22,0 | 10,0 | 18,0 | 61,0 | 33,0 |
| KV (Ø40) | 22,0 | 10,0 | 18,0 | 61,0 | 33,0 |
| KV (Ø41) | 22,0 | 10,0 | 24,0 | 61,0 | 33,0 |
| KV9 (Ø50,60) | 22,0 | 10,0 | 22,0 | 61,0 | 33,0 |
| KV6 (Ø50) | 22,0 | 10,0 | 29,0 | 61,0 | 33,0 |
| KV6 (Ø60) | 22,0 | 10,0 | 33,0 | 61,0 | 33,0 |

Importante!

- El avellanador Conotip (tipo KV) tiene que usarse siempre con guías giratorias tipo R o RS. El tamaño mínimo de mango debe ser CM3.

N, NA y W H y HA

Importante!

- Las fresas tipo N, NA, H y HA iguales o Mayores a diametro 50 mm se fabrican conchaveta de arrastre reforzado. Estas medidas deben usarse con los portaherramientas adecuados Tipo M.

| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|-----------|------|----------------|-------------------|------|----------------|
| N, NA, W | 22,0 | 10,0 | | 61,0 | 33,0 |
| H, HA, WH | 22,0 | 10,0 | 12,0 | 61,0 | 33,0 |

WHV

Importante!

- La fresa Rotatip (WHV) siempre debe combinarse con guías giratorias tipo R o RS. El mango del portaherramientas no debe ser inferior a CM2.

| Tipo | d | d ₁ | d _{2min} | L | L ₁ |
|-----------|------|----------------|-------------------|------|----------------|
| WHV 34-45 | 22,0 | 10,0 | 14,8* | 61,0 | 33,0 |
| WHV 46-75 | 22,0 | 10,0 | 15,5* | 61,0 | 33,0 |
| WHV 75 | 22,0 | 10,0 | 17,0* | 61,0 | 33,0 |

Grupo 2



Portaherramientas

A

| | |
|--------|----------|
| Mango | Ref. No. |
| MK2 | 2A-MK2 |
| MK3 | 2A-MK3 |
| MK4 | 2A-MK4 |
| MK5 | 2A-MK5 |
| Weldon | 2A-W20 |

Portaherramientas

NS
Corto

| | |
|--------|----------|
| Mango | Ref. No. |
| MK3 | 2NS-MK3 |
| Weldon | 2NS-W25 |

Portaherramientas

L
Largo

| | |
|--------|------------|
| Mango | Ref. No. |
| MK3 | 2L-250-MK3 |
| Weldon | 2L-250-W25 |
| Ø32 | 2L-500-32 |

Portaherramientas

GS
Con refrigeracion interior

| | |
|--------|----------|
| Mango | Ref. No. |
| MK3 | 2GS-MK3 |
| Weldon | 2GS-W25 |

Portaherramientas

S
Con tope de profundidad

| | |
|-------|----------|
| Mango | Ref. No. |
| MK3 | 2S-MK3 |

Plaquita para WHV y KV

| Herramienta D mm | Grupo | Ref. No. | Ref. No. | Radius | Adecuado para | SSK |
|------------------------|-------|-----------|----------|--------|---------------|-----|
| KV 32,0-41,0 | 10 | TPMT-10U | | 0,4 | Universal | 22 |
| | 10 | TPMR-10U | | 0,4 | HARDOX | |
| | 10 | TPMT-10SA | | 0,4 | Inoxidable | |
| | 10 | TPMT-10SA | | 0,4 | Aluminio | |
| WHV 34,0-45,0 KV 45 | 12 | TPMT-12U | | 0,8 | Universal | 25 |
| | 12 | TPMT-12U | | 0,8 | HARDOX | |
| | 12 | TPMT-12M | | 0,8 | Inoxidable | |
| | 12 | TPMT-12K | | 0,8 | Aluminio | |
| WHV 46,0- KV 50- | 17 | TPMT-17U | | 0,8 | Universal | 40 |
| | 17 | TPMT-17U | | 0,8 | HARDOX | |
| | 17 | TPMT-17M | | 0,8 | Inoxidable | |
| | 17 | TPMT-17K | | 0,8 | Aluminio | |

- Metal duro PK40. Todas las plaquitas tienen recubrimiento multicapa (TiCN-TiC-TiN).
- Las plaquitas GRANLUND disponen de un ángulo especial rompevirutas para un control óptimo de las virutas.

Portaherramientas

M
Con chavetero

| | |
|-------|----------|
| Mango | Ref. No. |
| MK3 | 2M-MK3 |
| MK4 | 2M-MK4 |
| W32 | 2M-W32 |

Portaherramientas

MD
Para portabrocas magnético

| | |
|--------|----------|
| Mango | Ref. No. |
| W19,05 | 2MD |

2S

2GS

2M

2M-W32

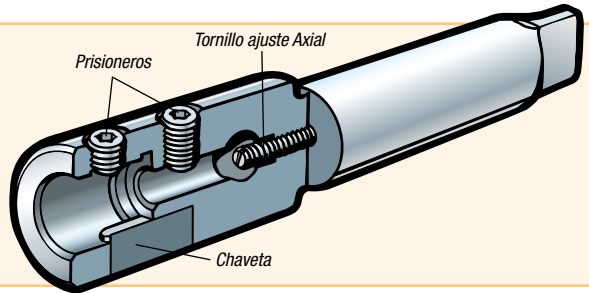
| Tipo | D Tol. g7 | d | L | L ₁ | L ₂ | Mango |
|---------|-----------|----|-----|----------------|----------------|-------|
| 2S-MK3 | 63 | 22 | 187 | 94 | 25 | MK3 |
| 2GS-MK3 | 44 | 22 | 154 | 61 | | MK3 |
| 2GS-W25 | 44 | 22 | 115 | 51 | | W25 |
| 2M-MK3 | 48 | 22 | 187 | 93 | | MK3 |
| 2M-MK4 | 48 | 22 | 212 | 95 | | MK4 |
| 2M-W32 | 48 | 22 | 148 | 88 | | W32 |

2MD

| Type | D Tol. g7 | d | L | L ₁ | Mango |
|------|-----------|----|----|----------------|--------|
| 2MD | 36 | 22 | 80 | 45 | W19,05 |

Importante!

- Usando corte de metal duro (tipos TH-h y HA) colocar el tornillo de ajuste axial en contacto con la guía o broca insertada. Dejar un espacio entre el filo y la guía o broca para prevenir roturas por impacto accidental. El tornillo axial tambien se usa para prolongar la vida de las brocas tras reafilarlas.



Conjuntos de fresas y guías



Set

Referencia No. 0P / M4-M8

| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
|-----------------------|-----------------------|-------------------|
| 8,0 | 4,5 | 0A-MK2 |
| 9,0 | 5,0 | |
| 10,0 | 5,5 | |
| 11,0 | 6,0 | |
| 12,0 | 6,5 | |
| 13,0 | 6,6 | |
| 14,0 | 7,0 | |
| 15,0 | 7,5 | |
| | 8,0 | |
| | 8,5 | |
| | 9,0 | |
| | 10,0 | |



Set

Referencia No. 0D / M4-M12

| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
|-----------------------|-----------------------|-------------------|
| 8,0 | 4,3 | 0A-MK2 |
| 10,0 | 4,5 | |
| 11,0 | 5,3 | |
| 15,0 | 5,5 | |
| 18,0 | 6,4 | |
| 20,0 | 6,6 | |
| | 8,4 | |
| | 9,0 | |
| | 10,5 | |
| | 11,0 | |
| | 13,0 | |
| | 13,5 | |

De acuerdo con DIN 74, Forma 1, 2, 3.



Set

Referencia No. 1P / M8-M14

| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
|-----------------------|-----------------------|-------------------|
| 14,0 | 8,0 | 1A-MK2 |
| 15,0 | 8,5 | |
| 16,0 | 9,0 | |
| 18,0 | 9,5 | |
| 20,0 | 10,0 | |
| 22,0 | 10,5 | |
| 24,0 | 11,0 | |
| | 11,5 | |
| | 12,0 | |
| | 12,5 | |
| | 13,0 | |
| | 13,5 | |
| | 14,0 | |
| | 14,5 | |
| | 15,0 | |
| | 15,5 | |
| | 16,0 | |



Set

Referencia No. 1D / M8-M16

| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
|-----------------------|-----------------------|-------------------|
| 15,0 | 8,4 | 1A-MK2 |
| 18,0 | 9,0 | |
| 20,0 | 10,5 | |
| 24,0 | 11,0 | |
| 26,0 | 13,0 | |
| | 13,5 | |
| | 15,0 | |
| | 15,5 | |
| | 17,0 | |
| | 17,5 | |

De acuerdo con DIN 74, Forma 1, 2, 3.

Importante!

* El juego 01P se puede encontrar en la página 9 de este catálogo.



Set

Referencia No. 2P / M14-M24

| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
|-----------------------|-----------------------|-------------------|
| 24,0 | 13,0 | 2A-MK3 |
| 26,0 | 14,0 | |
| 28,0 | 15,0 | |
| 30,0 | 16,0 | |
| 32,0 | 17,0 | |
| 33,0 | 18,0 | |
| 34,0 | 19,0 | |
| 36,0 | 20,0 | |
| 40,0 | 21,0 | |
| | 22,0 | |
| | 23,0 | |
| | 24,0 | |
| | 25,0 | |
| | 26,0 | |

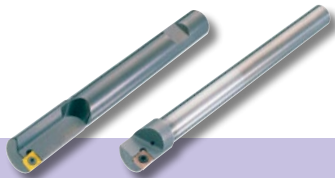


Set

Referencia No. 2D / M14-M24

| Ø mm Fresas tipo W | Guías Tipo F, Ø mm | Portaherramientas |
|-----------------------|-----------------------|-------------------|
| 24,0 | 15,0 | 2A-MK3 |
| 26,0 | 15,5 | |
| 30,0 | 17,0 | |
| 33,0 | 17,5 | |
| 36,0 | 19,0 | |
| 40,0 | 20,0 | |
| | 21,0 | |
| | 22,0 | |
| | 23,0 | |
| | 24,0 | |
| | 25,0 | |
| | 26,0 | |

De acuerdo con DIN 74, Forma 1, 2, 3.



FA, FAH
Herramientas de mandrinar

| D mm | Ref. No. | d ₁ | L | L ₁ | d | No. de placas dimension |
|------|----------|----------------|-----|----------------|----|-------------------------|
| 9,8 | FA-09,8 | 9,3 | 85 | 20 | 8 | 1x06 |
| 10,8 | FA-10,8 | 10,3 | 95 | 20 | 10 | 1x06 |
| 11,8 | FA-11,8 | 11,3 | 100 | 25 | 10 | 1x06 |
| 12,8 | FA-12,8 | 12,3 | 105 | 30 | 10 | 1x06 |
| 13,8 | FA-13,8 | 13,3 | 110 | 35 | 10 | 1x06 |
| 14,8 | FA-14,8 | 14,3 | 120 | 30 | 12 | 1x06 |
| 15,8 | FA-15,8 | 15,3 | 125 | 35 | 12 | 1x06 |
| 16,8 | FA-16,8 | 15,8 | 133 | 30 | 16 | 1x06 |
| 17,8 | FA-17,8 | 16,8 | 138 | 35 | 16 | 1x06 |
| 18,8 | FA-18,8 | 17,8 | 143 | 40 | 16 | 1x06 |
| 19,8 | FA-19,8 | 18,8 | 148 | 45 | 16 | 1x06 |
| 20,8 | FA-20,8 | 19,8 | 153 | 50 | 16 | 1x06 |
| 21,8 | FA-21,8 | 20,8 | 158 | 55 | 16 | 1x06 |
| 22,8 | FA-22,8 | 21,0 | 165 | 41 | 20 | 1x06 |
| 23,8 | FA-23,8 | 22,0 | 170 | 46 | 20 | 1x06 |
| 24,8 | FA-24,8 | 23,0 | 175 | 51 | 20 | 1x06 |
| 25,8 | FA-25,8 | 24,0 | 180 | 56 | 20 | 1x06 |
| 26,8 | FA-26,8 | 25,0 | 185 | 41 | 20 | 1x06 |
| 27,8 | FA-27,8 | 26,0 | 190 | 46 | 20 | 1x06 |
| 28,8 | FA-28,8 | 27,0 | 195 | 51 | 20 | 1x06 |
| 29,8 | FA-29,8 | 28,0 | 195 | 51 | 20 | 1x06 |
| 30,8 | FA-30,8 | 29,0 | 195 | 51 | 20 | 1x06 |
| 31,8 | FA-31,8 | 30,0 | 195 | 51 | 20 | 1x06 |
| 9,8 | FAH-09,8 | 9,3 | 105 | 20 | 8 | 1x06 |
| 10,8 | FAH-10,8 | 10,3 | 105 | 20 | 8 | 1x06 |
| 11,8 | FAH-11,8 | 11,3 | 125 | 20 | 10 | 1x06 |
| 12,8 | FAH-12,8 | 12,3 | 125 | 20 | 10 | 1x06 |
| 13,8 | FAH-13,8 | 13,3 | 125 | 20 | 10 | 1x06 |
| 14,8 | FAH-14,8 | 14,3 | 140 | 20 | 12 | 1x06 |
| 15,8 | FAH-15,8 | 15,3 | 140 | 20 | 12 | 1x06 |
| 16,8 | FAH-16,8 | 16,3 | 150 | 30 | 12 | 1x06 |
| 17,8 | FAH-17,8 | 16,8 | 160 | 40 | 16 | 1x06 |
| 18,8 | FAH-18,8 | 17,8 | 160 | 40 | 16 | 1x06 |
| 19,8 | FAH-19,8 | 18,8 | 180 | 40 | 16 | 1x06 |
| 20,8 | FAH-20,8 | 19,8 | 180 | 40 | 16 | 1x06 |
| 21,8 | FAH-21,8 | 20,8 | 180 | 40 | 16 | 1x06 |
| 22,8 | FAH-22,8 | 21,0 | 195 | 40 | 20 | 1x06 |
| 23,8 | FAH-23,8 | 22,0 | 195 | 40 | 20 | 1x06 |
| 24,8 | FAH-24,8 | 23,0 | 210 | 40 | 20 | 1x06 |
| 25,8 | FAH-25,8 | 24,0 | 210 | 40 | 20 | 1x06 |
| 26,8 | FAH-26,8 | 25,0 | 210 | 40 | 20 | 1x06 |
| 27,8 | FAH-27,8 | 26,0 | 225 | 40 | 20 | 1x06 |
| 28,8 | FAH-28,8 | 27,0 | 225 | 40 | 20 | 1x06 |
| 29,8 | FAH-29,8 | 28,0 | 225 | 40 | 20 | 1x06 |
| 30,8 | FAH-30,8 | 29,0 | 225 | 40 | 20 | 1x06 |
| 31,8 | FAH-31,8 | 30,0 | 225 | 40 | 20 | 1x06 |



FAE
Herramientas de mandrinar y achaflanar

| D mm | Ref. No. | d ₁ | L | L ₁ | F _{max} | d | No. de placas dimension |
|------|----------|----------------|-----|----------------|------------------|----|-------------------------|
| 9,8 | FAE-09,8 | 9,3 | 105 | 20 | 0,6 | 8 | 1x06 |
| 10,8 | FAE-10,8 | 10,3 | 105 | 20 | 1,1 | 8 | 1x06 |
| 11,8 | FAE-11,8 | 11,3 | 125 | 20 | 0,6 | 10 | 1x06 |
| 12,8 | FAE-12,8 | 12,3 | 125 | 20 | 1,1 | 10 | 1x06 |
| 13,8 | FAE-13,8 | 13,3 | 125 | 20 | 1,6 | 10 | 1x06 |
| 14,8 | FAE-14,8 | 14,3 | 140 | 20 | 1,1 | 12 | 1x06 |
| 15,8 | FAE-15,8 | 15,3 | 140 | 20 | 1,6 | 12 | 1x06 |
| 16,8 | FAE-16,8 | 16,3 | 150 | 30 | 2,1 | 12 | 1x06 |
| 17,8 | FAE-17,8 | 16,8 | 160 | 40 | 0,6 | 16 | 1x06 |
| 18,8 | FAE-18,8 | 17,8 | 160 | 40 | 1,1 | 16 | 1x06 |
| 19,8 | FAE-19,8 | 18,8 | 180 | 40 | 1,6 | 16 | 1x06 |
| 20,8 | FAE-20,8 | 19,8 | 180 | 40 | 2,1 | 16 | 1x06 |
| 21,8 | FAE-21,8 | 20,8 | 180 | 40 | 2,1 | 16 | 1x06 |
| 22,8 | FAE-22,8 | 21,0 | 195 | 40 | 1,1 | 20 | 1x06 |
| 23,8 | FAE-23,8 | 22,0 | 195 | 40 | 1,6 | 20 | 1x06 |
| 24,8 | FAE-24,8 | 23,0 | 210 | 40 | 2,1 | 20 | 1x06 |
| 25,8 | FAE-25,8 | 24,0 | 210 | 40 | 2,1 | 20 | 1x06 |
| 26,8 | FAE-26,8 | 25,0 | 210 | 40 | 2,1 | 20 | 1x06 |
| 27,8 | FAE-27,8 | 26,0 | 225 | 40 | 2,1 | 20 | 1x06 |
| 28,8 | FAE-28,8 | 27,0 | 225 | 40 | 2,1 | 20 | 1x06 |
| 29,8 | FAE-29,8 | 28,0 | 225 | 40 | 2,1 | 20 | 1x06 |
| 30,8 | FAE-30,8 | 29,0 | 225 | 40 | 2,1 | 20 | 1x06 |
| 31,8 | FAE-31,8 | 30,0 | 225 | 40 | 2,1 | 20 | 1x06 |



FM
Fresa de cajear

| D mm | Ref. No. | d ₁ | L | L ₁ | L ₂ | Weldon | No. de placas dimension |
|------|----------|----------------|-----|----------------|----------------|--------|-------------------------|
| 10,0 | FM-10 | 4,0 | 80 | 23 | 45 | 12 | 1x06 |
| 11,0 | FM-11 | 4,0 | 80 | 23 | 45 | 12 | 1x06 |
| 12,0 | FM-12 | 4,0 | 80 | 26 | 45 | 12 | 1x06 |
| 13,0 | FM-13 | 5,0 | 80 | 26 | 45 | 12 | 1x06 |
| 14,0 | FM-14 | 5,0 | 80 | 26 | 45 | 12 | 1x06 |
| 15,0 | FM-15 | 5,0 | 80 | 26 | 45 | 12 | 1x06 |
| 16,0 | FM-16 | 5,0 | 90 | 31 | 48 | 16 | 1x06 |
| 17,0 | FM-17 | 6,0 | 90 | 31 | 48 | 16 | 1x06 |
| 18,0 | FM-18 | 8,0 | 90 | 31 | 48 | 16 | 1x06 |
| 19,0 | FM-19 | 8,0 | 90 | 31 | 48 | 16 | 1x06 |
| 20,0 | FM-20 | 5,0 | 100 | 36 | 50 | 20 | 1x09 |
| 21,0 | FM-21 | 5,0 | 100 | 36 | 50 | 20 | 1x09 |
| 22,0 | FM-22 | 6,0 | 100 | 36 | 50 | 20 | 1x09 |
| 23,0 | FM-23 | 6,0 | 100 | 36 | 50 | 20 | 1x09 |
| 24,0 | FM-24 | 8,0 | 100 | 36 | 50 | 20 | 1x09 |
| 25,0 | FM-25 | 8,0 | 120 | 43 | 56 | 25 | 1x09 |
| 26,0 | FM-26 | 10,0 | 120 | 43 | 56 | 25 | 1x09 |



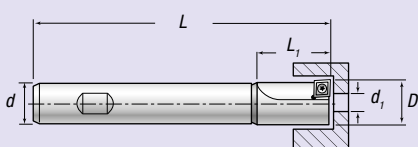
ES
Pinza

| D mm | Ref. No. | d | L | L ₁ | D ₁ | h |
|------|----------|----|----|----------------|----------------|----|
| 25,0 | ES-25-08 | 8 | 61 | 56 | 29 | 23 |
| 25,0 | ES-25-10 | 10 | 61 | 56 | 29 | 23 |
| 25,0 | ES-25-12 | 12 | 61 | 56 | 29 | 23 |
| 25,0 | ES-25-16 | 16 | 61 | 56 | 29 | 23 |
| 32,0 | ES-32-08 | 8 | 65 | 60 | 36 | 30 |
| 32,0 | ES-32-10 | 10 | 65 | 60 | 36 | 30 |
| 32,0 | ES-32-12 | 12 | 65 | 60 | 36 | 30 |
| 32,0 | ES-32-16 | 16 | 65 | 60 | 36 | 30 |
| 32,0 | ES-32-20 | 20 | 65 | 60 | 36 | 30 |
| 32,0 | ES-32-25 | 25 | 65 | 60 | 36 | 30 |

Con la pinza ES puede ajustarse el diametro de FA, FAH y FAE eb ±0,5 mm.

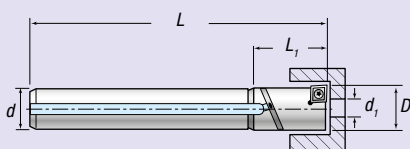
FA

Herramienta mandrinar con mango de acero. DIN1835B.



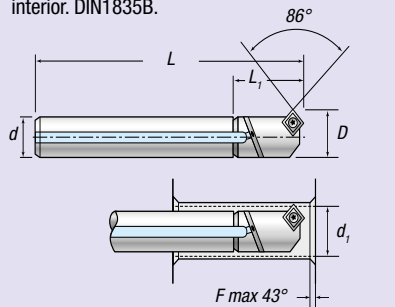
FAH

Herramienta de mandrinar con mango de metal duro y refrigeracion interior.



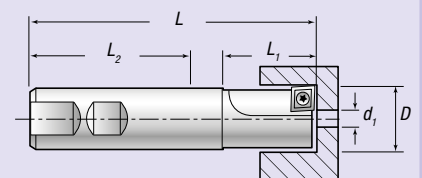
FAE

Herramienta mandrinar y achaflanar con mango de metal duro y refrigeracion interior. DIN1835B.



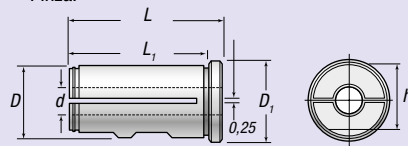
FM

Fresa mono con mango de acero. DIN1835B.



ES

Pinza.





| FMK Fresa | | | | | | | |
|---------------------|----------|----------------|-----|----------------|----------------|--------|-------------------------|
| D mm | Ref. No. | d ₁ | L | L ₁ | L ₂ | Weldon | No. de placas dimension |
| 10,0 | FMK-10 | 4,0 | 80 | 23 | 45,0 | 12 | 1x06 |
| 11,0 | FMK-11 | 4,0 | 80 | 23 | 45,0 | 12 | 1x06 |
| 12,0 | FMK-12 | 4,0 | 80 | 26 | 45,0 | 12 | 1x06 |
| 13,0 | FMK-13 | 5,0 | 80 | 26 | 45,0 | 12 | 1x06 |
| 14,0 | FMK-14 | 5,0 | 80 | 26 | 45,0 | 12 | 1x06 |
| 15,0 | FMK-15 | 5,0 | 80 | 26 | 45,0 | 12 | 1x06 |
| 16,0 | FMK-16 | 5,0 | 90 | 31 | 48,0 | 16 | 1x06 |
| 17,0 | FMK-17 | 6,0 | 90 | 31 | 48,0 | 16 | 1x06 |
| 18,0 | FMK-18 | 8,0 | 90 | 31 | 48,0 | 16 | 1x06 |
| 19,0 | FMK-19 | 8,0 | 90 | 31 | 48,0 | 16 | 1x06 |
| 20,0 | FMK-20 | 5,0 | 100 | 36 | 50,0 | 20 | 1x09 |
| 21,0 | FMK-21 | 5,0 | 100 | 36 | 50,0 | 20 | 1x09 |
| 22,0 | FMK-22 | 6,0 | 100 | 36 | 50,0 | 20 | 1x09 |
| 23,0 | FMK-23 | 6,0 | 100 | 36 | 50,0 | 20 | 1x09 |
| 24,0 | FMK-24 | 8,0 | 120 | 36 | 50,0 | 20 | 1x09 |
| 25,0 | FMK-25 | 8,0 | 120 | 43 | 56,0 | 20 | 1x09 |
| 26,0 | FMK-26 | 10,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 27,0 | FMK-27 | 10,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 28,0 | FMK-28 | 12,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 29,0 | FMK-29 | 12,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 30,0 | FMK-30 | 14,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 31,0 | FMK-31 | 14,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 32,0 | FMK-32 | 16,0 | 120 | 43 | 56,0 | 25 | 1x09 |
| 33,0 | FMK-33 | 16,0 | 120 | 43 | 56,0 | 25 | 1x09 |



| FMU Fresa | | | | | | | |
|---------------------|----------|----------------|-----|----------------|----------------|--------|-------------------------|
| D mm | Ref. No. | d ₁ | L | L ₁ | L ₂ | Weldon | No. de placas dimension |
| 15,0 | FMU-15 | 4,0 | 100 | 40 | 30,0 | 20 | 2x06 |
| 18,0 | FMU-18 | 6,0 | 100 | 40 | 30,0 | 20 | 2x06 |
| 20,0 | FMU-20 | 8,0 | 100 | 40 | 30,0 | 20 | 2x06 |
| 22,0 | FMU-22 | 10,0 | 100 | 40 | 30,0 | 20 | 2x06 |
| 24,0 | FMU-24 | 6,0 | 136 | 68 | 50,0 | 25 | 2x09 |
| 26,0 | FMU-26 | 8,0 | 136 | 68 | 50,0 | 25 | 2x09 |
| 28,0 | FMU-28 | 10,0 | 136 | 68 | 50,0 | 25 | 2x09 |
| 30,0 | FMU-30 | 12,0 | 136 | 66 | 50,0 | 32 | 3x09 |
| 33,0 | FMU-33 | 15,0 | 136 | 66 | 50,0 | 32 | 3x09 |
| 36,0 | FMU-36 | 18,0 | 136 | 66 | 50,0 | 32 | 3x09 |
| 40,0 | FMU-40 | 16,0 | 136 | 66 | 50,0 | 32 | 3x12 |
| 43,0 | FMU-43 | 19,0 | 136 | 66 | 50,0 | 32 | 3x12 |
| 48,0 | FMU-48 | 24,0 | 146 | 81 | 60,0 | 32 | 3x12 |
| 53,0 | FMU-53 | 29,0 | 146 | 81 | 60,0 | 32 | 3x12 |
| 57,0 | FMU-57 | 33,0 | 146 | 81 | 60,0 | 32 | 3x12 |



| PK 15°, 30°, 45°, 60°, 75° Herramienta de achaflanar y planear | | | | | | | |
|--|----------|----------------|-----|----------------|----------------|--------|-------------------------|
| D mm | Ref. No. | d ₁ | L | L ₁ | L ₂ | Weldon | No. de placas dimension |
| 19,0 | PK15-19 | 16,0 | 90 | 19 | 6,0 | 16 | 2x06 |
| 40,0 | PK15-40 | 34,0 | 120 | 30 | 11,0 | 25 | 2x12 |
| 19,0 | PK30-19 | 13,0 | 90 | 19 | 5,0 | 16 | 2x06 |
| 40,0 | PK30-40 | 28,0 | 120 | 30 | 10,0 | 25 | 2x12 |
| 13,0 | PK45-13 | 6,0 | 80 | 12 | 4,0 | 10 | 1x06 |
| 19,0 | PK45-19 | 11,0 | 90 | 19 | 4,0 | 16 | 2x06 |
| 26,0 | PK45-26 | 15,0 | 100 | 26 | 6,0 | 20 | 2x09 |
| 40,0 | PK45-40 | 25,0 | 120 | 30 | 8,0 | 25 | 2x12 |
| 32,0 | PK60-32 | 17,5 | 100 | 26 | 4,0 | 20 | 2x09 |
| 32,0 | PK75-32 | 15,5 | 100 | 26 | 2,0 | 20 | 2x09 |



| FF Achaflanador 2 cortes | | | | | | | |
|------------------------------------|----------|----------------|-----|----------------|----------------|--------|---------------------------|
| D mm | Ref. No. | d ₁ | L | L ₁ | L ₂ | Weldon | B No. de placas dimension |
| 30,0 | FF-30 | 20,0 | 120 | 20 | 5,0 | 20 | 20 2x09 |
| 40,0 | FF-40 | 30,0 | 150 | 20 | 5,0 | 25 | 25 2x09 |

FMK

Fresa "mono" con mango de acero y refrigeracion interior. DIN1835B. →

FMU

Fresa "multi" con mango de acero y refrigeracion interior. DIN1835B. →

PK

Achaflanador y aplanador. ↻↑

FF

Achaflanador 2 cortes 2x45°. DIN1835B. ↻↑

Datos para herramientas para CNC



| FM - FMK - FMU - PK ● = Optimo ○ = Bueno m/min fz=0,05-0,15 | | | | | | | | | | | | |
|---|----------|---------------|--------|-------|---------------------|----------------------|----------------------|---------------------|---|-----------------------|---------------------|------------|
| Ref. No. | Plaquita | | | | Aceros | Aceros Aleados | Aceros alta aleacion | Acero Inoxidable | Acero y aleaciones resistentes a altas temperaturas | Aleaciones al Titanio | Fundicion Gris | Aluminio |
| | Tamaño | Rompe virutas | Grade | Grado | HB 175-225 <800N/mm | HB 200-300 <1000N/mm | HB 200-300 <1000N/mm | HB 175-245 <700N/mm | HB 200-400 <1200N/mm | HB 215-500 <1000N/mm | HB 175-225 <800N/mm | HB <160 |
| MPHT-N12-D | 06 | N12 | DX6 | 0,2 | ● 90-140 | ● 90-140 | ● 50-100 | ● 70-120 | | | | |
| MPHT-N12-P | 06 | N12 | PMK92* | 0,2 | ● 160-300 | ● 140-220 | ● 90-150 | ● 50-180 | | | | |
| MPHT-N13-C | 06 | N13 | CH1 | 0,2 | | | | | | ○ 40-60 | ● 160-200 | ● 300-1000 |
| MPHT-N13-K | 06 | N13 | KM22* | 0,2 | | | | | ○ 15-70 | ○ 40-70 | ● 180-300 | ● 300-600 |
| MPHT-N14-D | 06 | N14 | DX6 | 0,2 | ● 90-140 | | | ● 70-120 | ○ 15-20 | ○ 40-60 | | |
| MPHT-N14-P | 06 | N14 | PMK92* | 0,2 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | | | | |
| MPHT-N14-P | 06 | N15 | CT50** | 0,2 | ● 250-400 | ● 200-350 | ● 180-250 | ● 150-240 | ○ 15-70 | | ● 250-400 | ● 300-1000 |
| MPMT-N12-C | 06 | N12 | CH1 | 0,4 | | | | | | ○ 40-60 | ● 160-200 | ● 300-1000 |
| MPMT-N12-D | 06 | N12 | DX6 | 0,4 | ● 90-140 | ● 80-140 | ● 50-100 | ● 70-120 | | | | |
| MPMT-N12-P | 06 | N12 | PMK92* | 0,4 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | | | | |
| MPMT-N12-K | 06 | N12 | KM22* | 0,4 | | | | | ○ 15-70 | ○ 40-70 | ● 180-300 | |
| MCHT-N12-D | 09 | N12 | DX6 | 0,4 | ● 90-140 | | | | | | | |
| MCHT-N12-P | 09 | N12 | PMK92* | 0,4 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | | | | |
| MCHT-N13-C | 09 | N13 | CH1 | 0,4 | | | | | | ○ 40-60 | ● 160-300 | ● 300-1000 |
| MCHT-N13-K | 09 | N13 | KM22* | 0,4 | | | | ● 150-300 | ○ 15-70 | ○ 40-70 | | ● 300-600 |
| MCHT-N14-D | 09 | N14 | DX6 | 0,4 | ● 90-140 | ● 90-140 | ● 50-100 | ● 70-120 | | | | |
| MCHT-N14-P | 09 | N14 | PMK92* | 0,4 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | | | | |
| MCHW-N15-C | 09 | N15 | CT50** | 0,4 | ● 250-400 | ● 200-350 | ● 180-250 | ● 150-240 | | | ● 250-400 | |
| MCMT-N12-C | 09 | N12 | CH1 | 0,8 | | | | | ○ 15-70 | ○ 40-70 | ● 160-200 | ● 300-1000 |
| MCMT-N12-P | 09 | N12 | PMK92* | 0,8 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | | | | |
| MCMT-N12-K | 09 | N12 | KM22* | 0,8 | | | | | ○ 15-70 | ○ 40-70 | ● 180-300 | |
| MBHT-N12-P | 12 | N12 | PMK92* | 0,4 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | ○ 20-60 | | ● 160-200 | ● 300-1000 |
| MBHT-N13-C | 12 | N13 | CH1 | 0,4 | | | | | | ○ 40-60 | ● 160-200 | ● 300-1000 |
| MBHT-N13-K | 12 | N13 | KM22* | 0,4 | | | | ● 150-300 | ○ 15-70 | ○ 40-70 | | ● 300-600 |
| MBHT-N14-P | 12 | N14 | PMK92* | 0,4 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | | | | |
| MBMT-N12-D | 12 | N12 | DX6 | 0,8 | ● 90-140 | ● 90-140 | ● 50-100 | ● 70-120 | | | | |
| MBMT-N12-P | 12 | N12 | PMK92* | 0,8 | ● 160-300 | ● 140-220 | ● 90-150 | ● 90-180 | ○ 20-60 | | | |

*=(TiAlN), **=(Cermet)



| FA - FAH - FAE ● = Optimo ○ = Bueno m/min fz=0,03-0,1 | | | | | | | | | | | | |
|---|----------|---------------|--------|-------|---------------------|----------------------|----------------------|----------------------|---|-----------------------|---------------------|------------|
| Ref. No. | Plaquita | | | | Aceros | Aceros Aleados | Aceros alta aleacion | Acero Inoxidable | Acero y aleaciones resistentes a altas temperaturas | Aleaciones al Titanio | Fundicion Gris | Aluminio |
| | Tamaño | Rompe virutas | Grade | Grado | HB 175-225 <800N/mm | HB 200-300 <1000N/mm | HB 200-300 <1000N/mm | HB 215-500 <1000N/mm | HB 175-245 <700N/mm | HB 200-400 <1200N/mm | HB 175-225 <800N/mm | HB <160 |
| MPHT-N12-D | 06 | N12 | DX6 | 0,2 | ● 90-140 | ● 90-140 | ● 50-100 | ● 70-120 | | | | |
| MPHT-N12-P | 06 | N12 | PMK92* | 0,2 | ● 160-300 | ● 140-220 | ● 90-150 | ● 50-180 | | | | |
| MPHT-N13-C | 06 | N13 | CH1 | 0,2 | | | | | ○ 15-60 | ○ 40-60 | ● 160-200 | ● 150-190 |
| MPHT-N13-K | 06 | N13 | KM22* | 0,2 | | | | | ○ 15-70 | ○ 40-70 | ● 180-300 | ● 170-270 |
| MPHT-N14-D | 06 | N14 | DX6 | 0,2 | ● 100-150 | ● 80-180 | ● 50-100 | ● 70-120 | | | | |
| MPHT-N14-P | 06 | N14 | PMK92* | 0,2 | ● 180-300 | ● 160-300 | ● 90-150 | ● 80-160 | | | | |
| MPHW-N15-C | 06 | N15 | CT50** | 0,2 | ● 250-400 | ● 250-400 | ● 180-250 | | | ○ 15-70 | ● 250-400 | ● 300-1000 |
| MPHX-R16-C | 06 | R16 | CT50** | 0,4 | ● 00-500 | ● 250-400 | ● 180-250 | | | ○ 15-70 | ● 250-400 | ● 300-1000 |

*=(TiAlN), **=(Cermet)



| FF ● = Optimo ○ = Bueno m/min fz=0,05-0,3 | | | | | | | | | | | | |
|---|----------|---------------|----------|-------|---------------------|----------------------|----------------------|----------------------|---|-----------------------|---------------------|------------|
| Ref. No. | Plaquita | | | | Aceros | Aceros Aleados | Aceros alta aleacion | Acero Inoxidable | Acero y aleaciones resistentes a altas temperaturas | Aleaciones al Titanio | Fundicion Gris | Aluminio |
| | Tamaño | Rompe virutas | Grade | Grado | HB 175-225 <800N/mm | HB 200-300 <1000N/mm | HB 200-300 <1000N/mm | HB 215-500 <1000N/mm | HB 175-245 <700N/mm | HB 200-400 <1200N/mm | HB 175-225 <800N/mm | HB <160 |
| SDHT-N17-C | 09 | N17 | CH1 | | | | | | ○ 15-60 | | ● 160-200 | ● 300-1000 |
| SDLT-N19-P | 09 | N19 | PMK63*** | | ● 150-250 | ● 200-250 | ● 90-180 | ○ 90-150 | ○ 40-60 | ● 100-200 | | |

***=(TiN)

06 = Tornillo SSK-06 M2,5x4,5 Torx TN-8. 09 = Tornillo SSK-09 M4x7,5 Torx TN-15. 12 = Tornillo SSK-12 M4x9,5 Torx TN-15. Tornillo sin FF SSK-08 M3,5x8,5 Torx TN-15.

Avellanadores tipo 100, con mango cilindrico

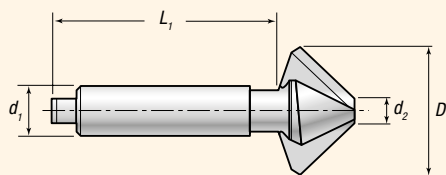
GRANLUND
Tools



| Ø mm | 100T | | | | 100TT | | | 100TA | | |
|---------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | HSS | | | | HSS TIN | | | HSS ALDURA PRO | | |
| | Tol.x9 60° Ref. No. | Tol.x9 80° Ref. No. | Tol.x9 90° Ref. No. | Tol.x9 120° Ref. No. | Tol.x9 60° Ref. No. | Tol.x9 80° Ref. No. | Tol.x9 90° Ref. No. | Tol.x9 60° Ref. No. | Tol.x9 80° Ref. No. | Tol.x9 90° Ref. No. |
| 4,3 | | | 100T9-04,3 | | | | | | | |
| 5,0 | | | 100T9-05,0 | | | | | | | |
| 6,0 | | | 100T9-06,0 | | | | 100TT9-06,0 | | | 100TA9-06,0 |
| 6,3 | | | 100T9-06,3 | | | | 100TT9-06,3 | | | 100TA9-06,3 |
| 6,5 | | 100T8-06,5 | 100T9-06,5 | | | | | | | |
| 7,0 | | | 100T9-07,0 | | | | | | | |
| 7,3 | | | 100T9-07,3 | | | | | | | |
| 8,0 | 100T6-08,0 | 100T8-08,0 | 100T9-08,0 | | | | 100TT9-08,0 | | | 100TA9-08,0 |
| 8,3 | | | 100T9-08,3 | | | | 100TT9-08,3 | | | 100TA9-08,3 |
| 8,6 | | | 100T9-08,6 | | | | | | | |
| 9,4 | | | 100T9-09,4 | | | | | | | |
| 10,0 | 100T6-10,0 | 100T8-10,0 | 100T9-10,0 | | 100TT6-10,0 | 100TT8-10,0 | 100TT9-10,0 | 100TA6-10,0 | 100TA8-10,0 | 100TA9-10,0 |
| 10,4 | | 100T8-10,4 | 100T9-10,4 | 100T12-10,4 | | | 100TT9-10,4 | | | 100TA9-10,4 |
| 11,5 | | | 100T9-11,5 | | | | | | | |
| 12,0 | 100T6-12,0 | 100T8-12,0 | 100T9-12,0 | | 100TT6-12,0 | | 100TT9-12,0 | 100TA6-12,0 | | 100TA9-12,0 |
| 12,4 | | 100T8-12,4 | 100T9-12,4 | 100T12-12,4 | | | 100TT9-12,4 | | | 100TA9-12,4 |
| 13,4 | | | 100T9-13,4 | | | | | | | |
| 15,0 | | | 100T9-15,0 | | | | 100TT9-15,0 | | | 100TA9-15,0 |
| 16,0 | 100T6-16,0 | 100T8-16,0 | 100T9-16,0 | | 100TT6-16,0 | | 100TT9-16,0 | 100TA6-16,0 | | 100TA9-16,0 |
| 16,4 | | | 100T9-16,4 | | | | | | | |
| 16,5 | | | 100T9-16,5 | 100T12-16,5 | | | 100TT9-16,5 | | | 100TA9-16,5 |
| 18,0 | | | 100T9-18,0 | | | | | | | |
| 19,0 | | | 100T9-19,0 | | | | | | | |
| 20,0 | 100T6-20,0 | 100T8-20,0 | 100T9-20,0 | | 100TT6-20,0 | 100TT8-20,0 | 100TT9-20,0 | 100TA6-20,0 | 100TA8-20,0 | 100TA9-20,0 |
| 20,5 | | | 100T9-20,5 | 100T12-20,5 | | | 100TT9-20,5 | | | 100TA9-20,5 |
| 22,0 | | | 100T9-22,0 | | | | | | | |
| 23,0 | | | 100T9-23,0 | | | | | | | |
| 25,0 | 100T6-25,0 | 100T8-25,0 | 100T9-25,0 | 100T12-25,0 | 100TT6-25,0 | 100TT8-25,0 | 100TT9-25,0 | 100TA6-25,0 | 100TA8-25,0 | 100TA9-25,0 |
| 26,0 | | | 100T9-26,0 | | | | | | | |
| 28,0 | | | 100T9-28,0 | | | | | | | |
| 30,0 | 100T6-30,0 | 100T8-30,0 | 100T9-30,0 | | 100TT6-30,0 | 100TT8-30,0 | 100TT9-30,0 | 100TA6-30,0 | 100TA8-30,0 | 100TA9-30,0 |
| 31,0 | | | 100T9-31,0 | 100T12-31,0 | | | | | | |
| 34,0 | | | 100T9-34,0 | | | | | | | |
| 35,0 | | | 100T9-35,0 | | | | 100TT9-35,0 | | | 100TA9-35,0 |
| 37,0 | | | 100T9-37,0 | | | | | | | |
| 40,0 | 100T6-40,0 | 100T8-40,0 | 100T9-40,0 | | | | 100TT9-40,0 | | | 100TA9-40,0 |

Cajeado / Avellanado

Tabla de dimensiones



| Tipo 100 60°, 80°, 90° | D x9 | d ₁ | d ₂ | L ₁ |
|---------------------------|-------------|----------------|----------------|----------------|
| T, TT, TA | 4,3 - 8,3 | 6,0 | 1,5 | 40 |
| TR, TRHL | 8,6 - 13,4 | 6,0 | 2,0 | 40 |
| THS | 15,0 - 19,0 | 10,0* | 3,0 | 45 |
| | 20,0 - 31,0 | 10,0* | 4,0 | 45 |
| | 34,0 - 40,0 | 16,0 | 8,0 | 50 |
| 100TL | 12,0 | 10,0* | 2,0 | 104 |
| | 16,0 | 10,0* | 3,0 | 106 |
| | 20,0 - 30,0 | 10,0* | 4,0 | 106 |
| 100TH | 12,0 - 15,0 | 6,0 | 4,0 | 40 |
| | 16,0 - 30,0 | 10,0* | 4,0 | 45 |
| | 40,0 | 16,0 | 8,0 | 50 |
| 100E | 8,0 - 20,0 | 6,0 | 1,0 | 30 |
| | 25,0 - 30,0 | 10,0* | 2,0 | 45 |
| 100T12 | 10,4 - 12,4 | 6,0 | 2,0 | 48 |
| | 16,5 - 25,0 | 10,0 | 2,0 | 48 |
| | 31,0 | 12,0 | 2,5 | 50 |

* Mango cilindrico con tres planos.

| Dim | P | M | K | N | mm/rev |
|-------------|-------------|-------------|-------------|-------------|--------|
| Vc | 15 - 27 | 8 - 20 | 20 - 50 | 25 - 75 | |
| 4,3 - 9,4 | 0,05 - 0,08 | 0,05 - 0,08 | | 0,05 - 0,09 | |
| 10,0 - 15,0 | 0,06 - 0,14 | 0,06 - 0,14 | | 0,06 - 0,14 | |
| 16 - 23 | 0,10 - 0,25 | 0,10 - 0,20 | 0,05 - 0,30 | 0,15 - 0,28 | |
| 25 - 40 | 0,20 - 0,30 | 0,15 - 0,30 | 0,05 - 0,30 | 0,15 - 0,30 | |

Avellanadores tipo 100, con mango cilíndrico



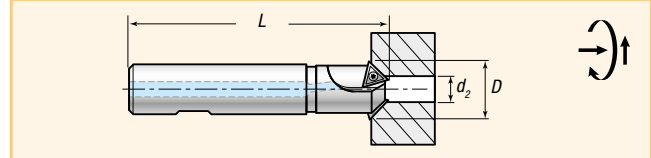
| | 100TR para acero inoxidable | 100TRHL para acero inoxidable | 100TH | | 100TL Extra largo | 100E Un corte | 100TG Desbarbador manual |
|------|---------------------------------------|---|----------------------|----------------------|-----------------------------|-------------------------|------------------------------------|
| | HSS | HSS HARDLUBE | Plaquita soldada K10 | Plaquita soldada K10 | HSS | HSS | HSS |
| | Tol.x9 90° | Tol.x9 90° | Tol.x9 60° | Tol.x9 90° | Tol.x9 90° | Tol.x9 90° | Tol.x9 90° |
| Ø mm | Referencia No. | Referencia No. | Referencia No. | Referencia No. | Referencia No. | Referencia No. | Referencia No. |
| 6,3 | | | | | | | |
| 8,0 | 100TR9-08,0 | 100TRHL9-08,0 | | | | 100E9-08,0 | |
| 8,3 | 100TR9-08,3 | 100TRHL9-08,3 | | | | | |
| 10,0 | 100TR9-10,0 | 100TRHL9-10,0 | | | | 100E9-10,0 | |
| 10,4 | 100TR9-10,4 | 100TRHL9-10,4 | | | | | |
| 12,0 | 100TR9-12,0 | 100TRHL9-12,0 | | 100TH9-12,0 | 100TL9-12,0 | 100E9-12,0 | 100TG9-12,0 |
| 12,4 | 100TR9-12,4 | 100TRHL9-12,4 | | | | | |
| 15,0 | 100TR9-15,0 | 100TRHL9-15,0 | | | | | |
| 16,0 | 100TR9-16,0 | 100TRHL9-16,0 | 100TH6-16,0 | 100TH9-16,0 | 100TL9-16,0 | 100E9-16,0 | |
| 16,5 | 100TR9-16,5 | 100TRHL9-16,5 | | | | | |
| 20,0 | 100TR9-20,0 | 100TRHL9-20,0 | 100TH6-20,0 | 100TH9-20,0 | 100TL9-20,0 | 100E9-20,0 | 100TG9-20,0 |
| 20,5 | 100TR9-20,5 | 100TRHL9-20,5 | | | | | |
| 25,0 | 100TR9-25,0 | 100TRHL9-25,0 | 100TH6-25,0 | 100TH9-25,0 | 100TL9-25,0 | 100E9-25,0 | |
| 30,0 | 100TR9-30,0 | 100TRHL9-30,0 | 100TH6-30,0 | 100TH9-30,0 | 100TL9-30,0 | 100E9-30,0 | 100TG9-30,0 |
| 35,0 | 100TR9-35,0 | 100TRHL9-35,0 | | | | | |
| 40,0 | 100TR9-40,0 | 100TRHL9-40,0 | | 100TH9-40,0 | | | 100TG9-40,0 |

FV 90°, herramienta de achaflanar y planear

| D mm | Ref. No. | Weldon diametro mm | d _{min} mm | L mm | Max. profundidad de avellanado | No. de placas |
|------|----------|--------------------|---------------------|------|--------------------------------|---------------|
| 12,0 | FV9-12,0 | 16 | 6,0 | 90 | 5,0 | 1 |
| 12,4 | FV9-12,4 | 16 | 6,0 | 90 | 5,0 | 1 |
| 16,0 | FV9-16,0 | 16 | 8,0 | 90 | 7,5 | 1 |
| 16,5 | FV9-16,5 | 16 | 8,0 | 90 | 7,5 | 1 |
| 20,0 | FV9-20,0 | 20 | 8,5 | 100 | 10,0 | 2 |
| 20,5 | FV9-20,5 | 20 | 8,5 | 100 | 10,0 | 2 |
| 25,0 | FV9-25,0 | 20 | 13,0 | 100 | 12,0 | 2 |
| 30,0 | FV9-30,0 | 20 | 18,0 | 100 | 12,0 | 2 |

Plaquitas para FV

| Herramienta D mm | Grupo | Ref. No. | Ref. No. | Radius | Adecuado para | SSK |
|------------------------------|-------|-----------|----------|--------|---------------|-----|
| FV9 12,0-16,5 Transformaster | 07 | TPMT-07U | TPMR-07U | 0,4 | Universal | 20 |
| | 07 | | TPMR-07U | 0,4 | HARDOX | |
| | 07 | TPMT-07SA | | 0,4 | Inoxidable | |
| | 07 | TPMT-07SA | | 0,4 | Aluminio | |
| FV 20,0 - 30,0 | 10 | TPMT-10U | | 0,4 | Universal | 22 |
| | 10 | TPMT-10U | | 0,4 | HARDOX | |
| | 10 | TPMT-10SA | | 0,4 | Inoxidable | |
| | 10 | TPMT-10SA | | 0,4 | Aluminio | |



- Metal duro PK40. Todas las plaquitas tienen recubrimiento multicapa TiCN-TiC-TiN).
- Las plaquitas Granlund disponen de un ángulo especial rompevirutas para un control óptimo de las virutas.

Datos de corte para achaflanar

| Material | Velocidad | Avance | Material | Velocidad | Avance |
|-------------------------------|----------------|-------------------|-----------------------|----------------|-----------------|
| Acero <450 N/mm ² | 75 - 120 m/min | 0,1 - 0,5 mm/rev. | Fundicion | 80 - 110 m/min | 0,1-0,5 mm/rev. |
| Acero <600 N/mm ² | 65 - 110 m/min | 0,1 - 0,4 mm/rev. | Fundicion de aluminio | 80 - 150 m/min | 0,1-1,0 mm/rev. |
| Acero <1000 N/mm ² | 55 - 100 m/min | 0,1 - 0,3 mm/rev. | | | |

Datos para planear = 1,5 x datos para achaflanar.



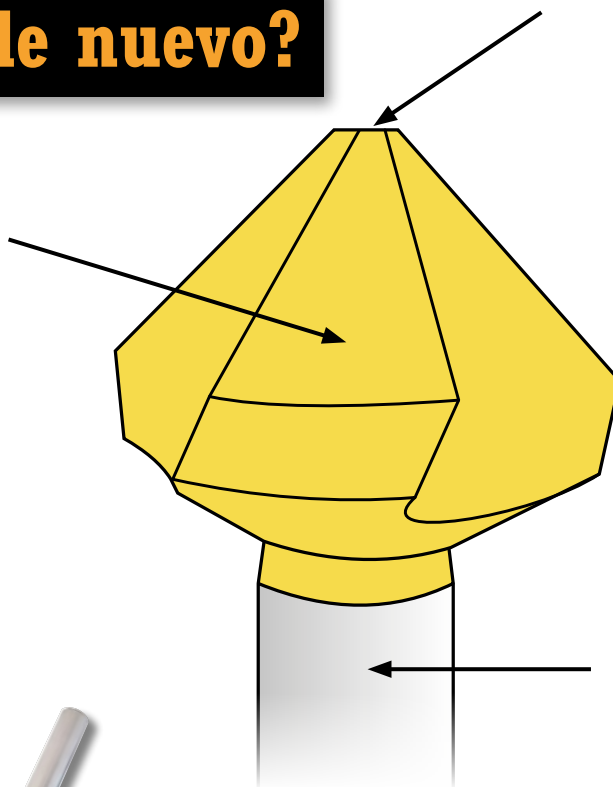
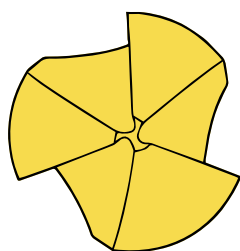
| 100TSK/100TRSK* | | 100TB | | | | | | | 100TTSK** | |
|-----------------|-----------------------|--|------|------|------|------|------|------|----------------|---------|
| Tipo de set | Tipo de avellanadores | Composicion: avellanadores tipo 100 90° HSS - Ø mm | | | | | | | Referencia No. | |
| 100TSK | 100T | 10,0 | 16,0 | 20,0 | 25,0 | 30,0 | | | | 100TSK |
| 100TB** | 100T | 6,3 | 8,3 | 10,4 | 12,4 | 16,5 | 20,5 | 25,0 | | 100TB |
| 100TRSK* | 100TR | 10,0 | 16,0 | 20,0 | 25,0 | 30,0 | | | | 100TRSK |
| 100TTSK | 100TT (TiN) | 10,0 | 16,0 | 20,0 | 25,0 | 30,0 | | | | 100TTSK |

*Para Inox. **Deacuerdo DIN 74, Form B fine.

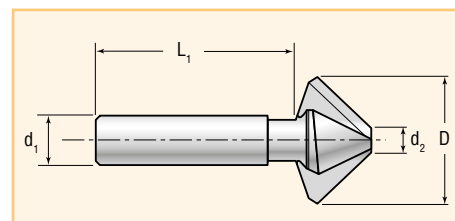
¿qué tiene de nuevo?

Todas las medidas de acuerdo con DIN 335C

Nuevo diseño con paso diferencial extremo, elimina vibraciones y reduce fuerzas axiales y radiales. Mejora resultado del avellanado.



Como siempre en Granlund los avellanadores vienen con tres planos en el mango para facilitar su uso en portabrocas. Disponibles en diámetros 8, 10 y 12 mm.



| D Ø mm | 405T9 | 405TT9 | L | d ₁ | d ₂ |
|-----------|------------------|-----------------------|----|----------------|----------------|
| | Paso diferencial | Paso diferencial | | | |
| | HSS-E | HSS-E TIN | | | |
| | Sin recubrir 90° | Recubrimiento TIN 90° | mm | mm | mm |
| | Part No. | Part No. | | | |
| 4,3 | 405T9-04,3 | 405TT9-04,3 | 40 | 4 | 1,5 |
| 5,3 | 405T9-05,3 | 405TT9-05,3 | 40 | 4 | 1,5 |
| 6,0 | 405T9-06,0 | 405TT9-06,0 | 45 | 5 | 1,5 |
| 6,3 | 405T9-06,3 | 405TT9-06,3 | 45 | 5 | 1,5 |
| 8,0 | 405T9-08,0 | 405TT9-08,0 | 50 | 6 | 2,0 |
| 8,3 | 405T9-08,3 | 405TT9-08,3 | 50 | 6 | 2,0 |
| 9,4 | 405T9-09,4 | 405TT9-09,4 | 50 | 6 | 2,2 |
| 10,0 | 405T9-10,0 | 405TT9-10,0 | 50 | 6 | 2,5 |
| 10,4 | 405T9-10,4 | 405TT9-10,4 | 50 | 6 | 2,5 |
| 11,5 | 405T9-11,5 | 405TT9-11,5 | 56 | 8* | 2,8 |
| 12,0 | 405T9-12,0 | 405TT9-12,0 | 56 | 8* | 2,8 |
| 12,4 | 405T9-12,4 | 405TT9-12,4 | 56 | 8* | 2,8 |
| 15,0 | 405T9-15,0 | 405TT9-15,0 | 60 | 10* | 3,2 |
| 16,5 | 405T9-16,5 | 405TT9-16,5 | 60 | 10* | 3,2 |
| 20,5 | 405T9-20,5 | 405TT9-20,5 | 63 | 10* | 3,5 |
| 25,0 | 405T9-25,0 | 405TT9-25,0 | 67 | 10* | 3,8 |
| 28,0 | 405T9-28,0 | 405TT9-28,0 | 71 | 12* | 4,0 |
| 30,0 | 405T9-30,0 | 405TT9-30,0 | 71 | 12* | 4,2 |
| 31,0 | 405T9-31,0 | 405TT9-31,0 | 71 | 12* | 4,2 |

* Mango cilíndrico con 3 planos.

| | Material | Recomendado para |
|----------|-----------------------|------------------|
| P | Acero <500 | ● |
| | Acero <850 | ● |
| | Acero <1200 | ○ |
| M | Acero Inoxidable <600 | ● |
| | Acero Inoxidable <850 | ○ |
| K | Fundición | ● |
| N | Aluminio <10% Si | ● |

| Juegos | | | | | | |
|----------------|---------------------|-------------------|------|------|------|------|
| Referencia No. | Tipo de Avellanador | Medidas Incluidas | | | | |
| 405T9 | 405T | 6,3 | 10,4 | 16,5 | 20,5 | 25,0 |
| 405TT9 | 405TT (TiN) | 6,3 | 10,4 | 16,5 | 20,5 | 25,0 |



Juego 405TT9

Herramientas para cajeado y achaflanado inverso



BV
Cajeado Inverso

| Mango Weldon | | | | | | |
|--------------|------------|----------------|--------------|-------------------|-------------------|-------|
| D mm | d, min. mm | Referencia No. | Mango Weldon | L ₁ mm | L ₂ mm | E* mm |
| 18,0 | 10,5 | BV-18,0/10,5 | 16 | 35 | 13 | 4,10 |
| 20,0 | 13,0 | BV-20,0/13,0 | 16 | 40 | 13 | 3,85 |
| 24,0 | 15,0 | BV-24,0/15,0 | 20 | 50 | 13 | 4,65 |
| 26,0 | 17,0 | BV-26,0/17,0 | 20 | 50 | 13 | 4,85 |
| 30,0 | 19,0 | BV-30,0/19,0 | 25 | 60 | 16 | 5,65 |
| 33,0 | 21,0 | BV-33,0/21,0 | 25 | 70 | 16 | 6,40 |
| 36,0 | 23,0 | BV-36,0/23,0 | 25 | 70 | 16 | 6,65 |
| 40,0 | 25,0 | BV-40,0/25,0 | 25 | 80 | 16 | 7,90 |
| 43,0 | 30,0 | BV-43,0/30,0 | 32 | 90 | 16 | 7,00 |
| 46,0 | 30,0 | BV-46,0/30,0 | 32 | 90 | 16 | 8,50 |
| 48,0 | 31,0 | BV-48,0/31,0 | 32 | 90 | 16 | 8,90 |
| 50,0 | 33,0 | BV-50,0/33,0 | 32 | 105 | 16 | 9,00 |

*=Diferencia eje corte/eje herramienta.



BFV 90°
Achaflanado Inverso

| Mango Weldon | | | | | | |
|--------------|------------|----------------|--------------|-------------------|-------------------|-------|
| D mm | d, min. mm | Referencia No. | Mango Weldon | L ₁ mm | L ₂ mm | E* mm |
| 15,0 | 10,0 | BFV-15,0/10,0 | 16 | 35 | 13 | 2,70 |
| 20,0 | 14,0 | BFV-20,0/14,0 | 16 | 40 | 13 | 3,20 |
| 23,0 | 17,0 | BFV-23,0/17,0 | 20 | 50 | 13 | 3,20 |
| 27,0 | 21,0 | BFV-27,0/21,0 | 25 | 70 | 13 | 3,20 |
| 31,0 | 24,0 | BFV-31,0/24,0 | 25 | 80 | 13 | 3,70 |

*=Diferencia eje corte/eje herramienta.

Medidas especiales bajo pedido.



DFV 90°
Achaflanado frontal/inverso

| Mango Weldon | | | | | | |
|--------------|------------|----------------|--------------|-------------------|-------------------|-------|
| D mm | d, min. mm | Referencia No. | Mango Weldon | L ₁ mm | L ₂ mm | E* mm |
| 15,0 | 10,0 | DFV-15,0/10,0 | 16 | 35 | 13 | 2,70 |
| 20,0 | 14,0 | DFV-20,0/14,0 | 16 | 40 | 13 | 3,20 |
| 23,0 | 17,0 | DFV-23,0/17,0 | 25 | 50 | 13 | 3,20 |
| 27,0 | 21,0 | DFV-27,0/21,0 | 32 | 70 | 13 | 3,20 |
| 31,0 | 24,0 | DFV-31,0/24,0 | 32 | 80 | 13 | 3,70 |

*=Diferencia eje corte/eje herramienta.

Plaquitas para BV, BFV, DFV y FV

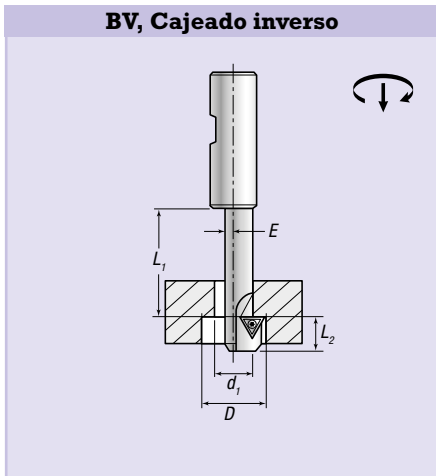
| Tipo de herramienta D mm | Grupo | Ref. No. | Ref. No. | Radius | Adecuado para | SSK |
|--|-------|-----------|----------|--------|---------------|-----|
| BV 18,0 - 27,0 DFV 15,0 - 31,0 BFV 15,0 - 31,0 | 07 | TPMT-07U | TPMR-07U | 0,4 | Universal | 20 |
| | 07 | TPMT-07SA | TPMR-07U | 0,4 | HARDOX | |
| | 07 | TPMT-07SA | | 0,4 | Inoxidable | |
| | 07 | TPMT-07SA | | 0,4 | Aluminio | |
| BV >27,0 - 48,0 | 10 | TPMT-10U | | 0,4 | Universal | 22 |
| | 10 | TPMT-10U | | 0,4 | HARDOX | |
| | 10 | TPMT-10M | | 0,4 | Inoxidable | |
| | 10 | TPMT-10K | | 0,4 | Aluminio | |

- Metal duro PK40. Las plaquitas disponen de recubrimiento multicapa (TiCN-TiC-TiN).
- Las plaquitas GRANLUND disponen de un ángulo especial de rompevirutas para el óptimo control de la viruta.

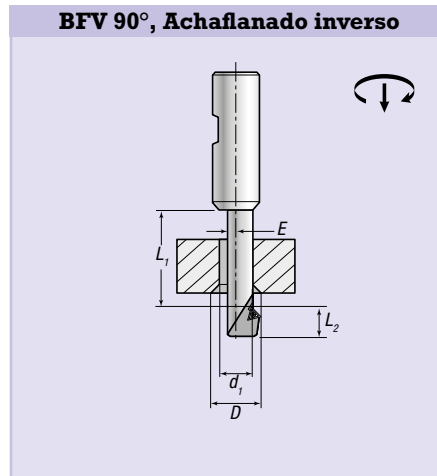
Datos de Corte para los tipos BV, BFV y DFV

| Material | Velocidad | Avance | Material | Velocidad | Avance |
|-------------------------------|----------------|---------------------|-----------------------|----------------|---------------------|
| Acero <450 N/mm ² | 80 - 120 m/min | 0,05 - 0,15 mm/rev. | Fundicion | 80 - 110 m/min | 0,05 - 0,15 mm/rev. |
| Acero <600 N/mm ² | 60 - 110 m/min | 0,05 - 0,15 mm/rev. | Fundicion de aluminio | 80 - 150 m/min | 0,05 - 0,15 mm/rev. |
| Acero <1000 N/mm ² | 50 - 100 m/min | 0,05 - 0,15 mm/rev. | | | |

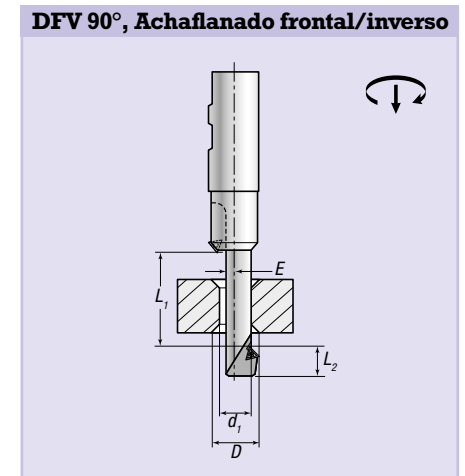
BV, Cajeado inverso



BFV 90°, Achaflanado inverso



DFV 90°, Achaflanado frontal/inverso





powered by water



Sistema de cajeado inverso accionado por liquido desarrollado por Granlund

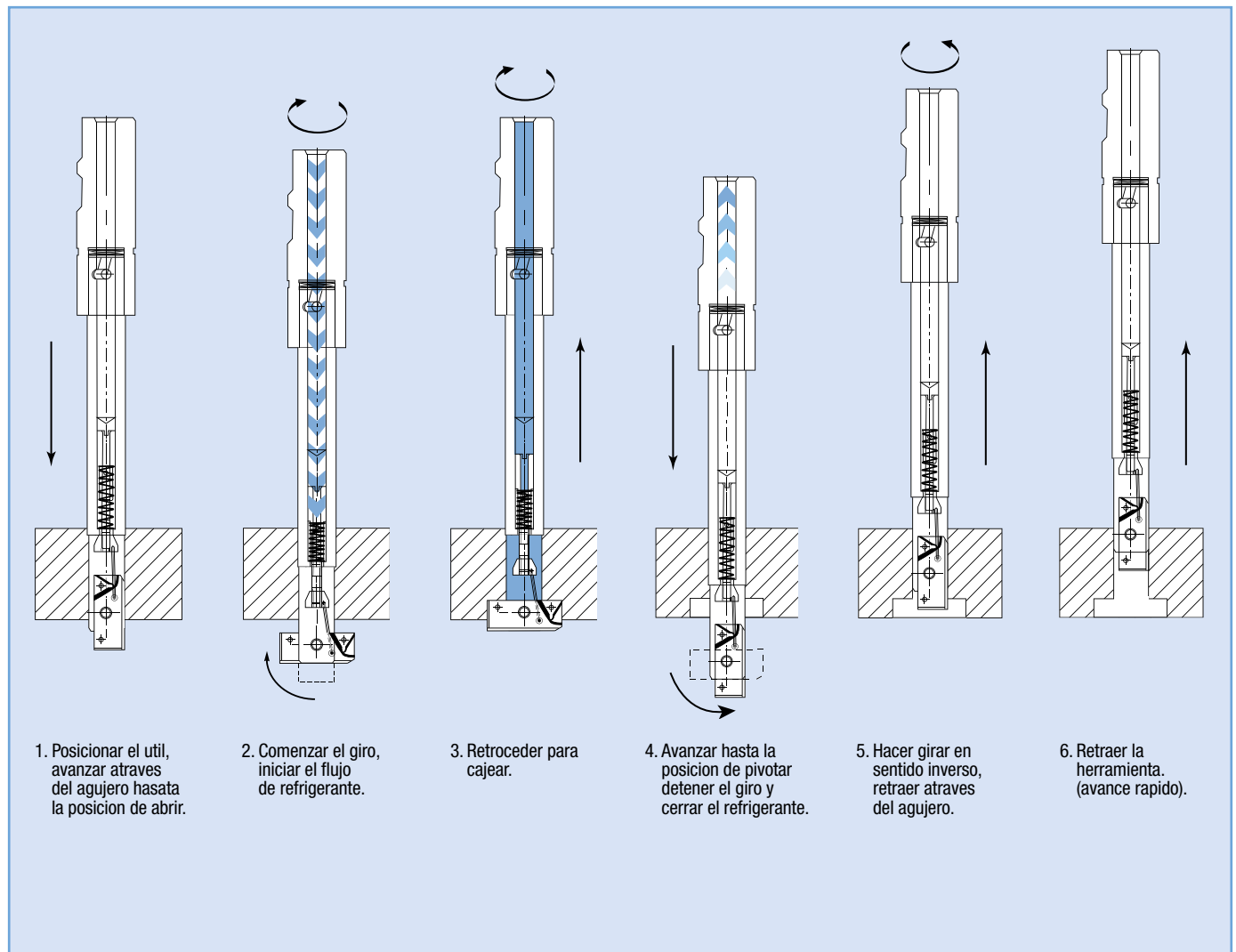
Con la fresa inversa Neptune se pueden hacer cajeras de hasta dos veces el diametro del agujero. Como herramienta especial se pueden fabricar con una amplitud mayor.

Neptune esta basado en la presion del refrigerante a través del mango, que acciona un pistón en el mango para abrir el soporte de las plaquitas.

Neptune es una herramienta combinable, donde se puede desmontar y limpiar componentes, cambiar el soporte de las plaquitas por otro diametro, etc.

La herramienta dispone tambien de una funcion de emergencia. El mango se separa del soporte en caso de que este soporte de las plaquitas no se haya coultado convenientemente. El giro debe invertirse durante la retraccion tras el cajeado para asegurarse que la funcion de emergencia opera.

Todas las zonas sometidas a friccion tienen un recubrimiento especial de bajo rozamiento para asegurar el funcionamiento de la herramienta.



Datos de Corte para Fresa Inversa Tipo NE

| Material | Velocidad | Avance |
|-----------------------|--------------|-------------------|
| Acero <450 N/mm | 50-100 m/min | 0,05-0,15 mm/rev. |
| Acero <600 N/mm | 60-110 m/min | 0,05-0,15 mm/rev. |
| Acero <1000 N/mm | 50-100 m/min | 0,05-0,15 mm/rev. |
| Fundición | 80-100 m/min | 0,10-0,15 mm/rev. |
| Fundición de Aluminio | 80-150 m/min | 0,05-0,15 mm/rev. |

Operacion de reversion durante la retraccion

| Velocidad | Avance |
|-----------|------------|
| 400 rpm | 500 mm/min |

N240 G73 Z600 M5
 N250 G73 X710
 N260 M6
 N270 G57 H901
 N280 G43 Z100. H3 S770
 N290 X0 Y0
 N300 Z50.
 N310 G1 Z-50. F500
 N320 M50
 N330 M3
 N340 G1 Z-33. F200
 N350 G1 Z-27. F77
 N360 G0 Z-50. M9
 N370 G4 P5
 N380 S400 M4
 N390 G1 Z50. F500
 N400 G73 Z600 M5
 N410 M60
 N420 G53
 N430 M30
 %

Ejemplo de aplicación

Herramienta:
NE-17,0/33,0

Material:
SS 1672 t=33 mm

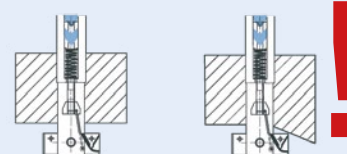
Profundidad: 3 mm

Kit de Piezas

| Typ | 1 set contiene: | |
|---------|-----------------|------------------|
| NESK-13 | 2 x Enlace | 1 x Distribuidor |
| NESK-15 | | |
| NESK-17 | | |
| NESK-19 | | |
| NESK-21 | 1 x Muelle | 1 x Tomillo |
| NESK-23 | | |
| NESK-25 | | |
| NESK-33 | 2 x Eje | 4 x Tuerca |

¡CUIDADO!

No trabajar sobre un solo corte.
Si trabaja sobre un solo lado, el avance debe reducirse como mínimo un 50%.

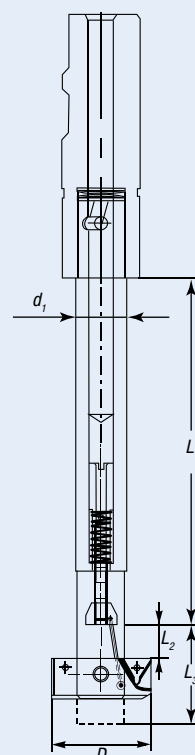


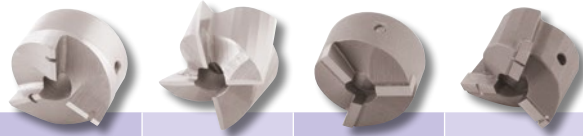
NEPTUNE

| Referencia No. | Plaquita | Tornillo | d_1 | D | L_1 | L_2 | L_3 | Mango Weldon |
|----------------|----------|----------|-------|-----|-------|-------|-------|--------------|
| NE-13,0/26,0 | TPMT-07U | SSK-20-S | 13 | 26 | 90 | 10 | 26 | 25 |
| NE-15,0/30,0 | | SSK-20-S | 15 | 30 | 90 | 10 | 30 | 25 |
| NE-17,0/26,0 | | SSK-20 | 17 | 26 | 110 | 10 | 26 | 25 |
| NE-17,0/33,0 | TPMT-10U | SSK-22-S | 17 | 33 | 110 | 10 | 33 | 25 |
| NE-19,0/36,0 | | SSK-22-S | 19 | 36 | 110 | 10 | 36 | 25 |
| NE-21,0/33,0 | | SSK-22 | 21 | 33 | 110 | 10 | 33 | 25 |
| NE-21,0/40,0 | | SSK-22 | 21 | 40 | 110 | 10 | 40 | 25 |
| NE-23,0/43,0 | | SSK-22 | 23 | 43 | 110 | 10 | 43 | 32 |
| NE-25,0/40,0 | | SSK-22 | 25 | 40 | 125 | 15 | 40 | 32 |
| NE-25,0/48,0 | TPMT-17U | SSK-40 | 25 | 48 | 125 | 15 | 48 | 32 |
| NE-33,0/61,0 | | SSK-40 | 33 | 61 | 140 | 30 | 61 | 40 |

¡Importante!

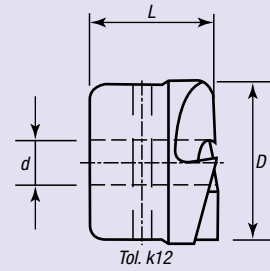
- Se requiere refrigerante interior para trabajar con esta herramienta. Para trabajar con fiabilidad la presión debe ser ≥ 3 bares y el caudal ≥ 30 l/min. Antes de utilizar la herramienta comprobar que la cabeza pivota libre, limpiar y lubricar si es necesario.



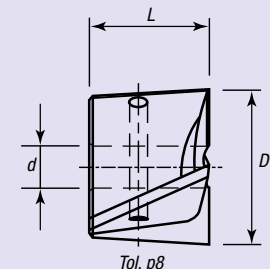


| Acoplamiento d mm | | | U | UD | UH | UDH |
|-------------------------|----------------|---------|-----------------|----------------|----------------------------|---------------------------|
| | D mm | L mm | HSS Tol. k12 | HSS Tol. p8 | Metal duro K40 Tol. k12 | Metal duro K40 Tol. p8 |
| | Referencia No. | | Referencia No. | Referencia No. | Referencia No. | Referencia No. |
| 6 | 12,0 | 17 | U-06/12 | UD-06/12 | UH-06/12 | UDH-06/12 |
| | 13,0 | 17 | U-06/13 | UD-06/13 | UH-06/13 | UDH-06/13 |
| | 13,5 | 17 | U-06/13,5 | | UH-06/13,5 | |
| | 14,0 | 17 | U-06/14 | UD-06/14 | UH-06/14 | UDH-06/14 |
| | 14,5 | 17 | U-06/14,5 | UD-06/14,5 | | UDH-06/14,5 |
| | 15,0 | 17 | U-06/15 | | UH-06/15 | UDH-06/15 |
| | 16,0 | 17 | U-06/16 | UD-06/16 | UH-06/16 | UDH-06/16 |
| | 17,0 | 17 | U-06/17 | UD-06/17 | UH-06/17 | UDH-06/17 |
| | 18,0 | 17 | U-06/18 | UD-06/18 | UH-06/18 | UDH-06/18 |
| | 19,0 | 17 | U-06/19 | | UH-06/19 | |
| | 20,0 | 17 | U-06/20 | UD-06/20 | UH-06/20 | UDH-06/20 |
| | 22,0 | 17 | U-06/22 | UD-06/22 | UH-06/22 | UDH-06/22 |
| | 24,0 | 17 | U-06/24 | | | |
| | 26,0 | 17 | U-06/26 | | | |
| 9 | 16,0 | 21 | U-09/16 | | UH-09/16 | |
| | 17,0 | 21 | U-09/17 | | UH-09/17 | |
| | 17,5 | 21 | | UD-09/17,5 | | UDH-09/17,5 |
| | 18,0 | 21 | U-09/18 | UD-09/18 | UH-09/18 | UDH-09/18 |
| | 19,0 | 21 | U-09/19 | UD-09/19 | UH-09/19 | UDH-09/19 |
| | 20,0 | 21 | U-09/20 | UD-09/20 | UH-09/20 | UDH-09/20 |
| | 21,0 | 21 | U-09/21 | UD-09/21 | UH-09/21 | UDH-09/21 |
| | 22,0 | 21 | U-09/22 | UD-09/22 | UH-09/22 | UDH-09/22 |
| | 23,0 | 21 | U-09/23 | UD-09/23 | UH-09/23 | UDH-09/23 |
| | 24,0 | 21 | U-09/24 | UD-09/24 | UH-09/24 | UDH-09/24 |
| | 25,0 | 21 | U-09/25 | UD-09/25 | UH-09/25 | UDH-09/25 |
| | 26,0 | 21 | U-09/26 | UD-09/26 | UH-09/26 | UDH-09/26 |
| | 28,0 | 21 | U-09/28 | UD-09/28 | UH-09/28 | UDH-09/28 |
| | 30,0 | 21 | U-09/30 | UD-09/30 | UH-09/30 | UDH-09/30 |
| 32,0 | 21 | U-09/32 | UD-09/32 | UH-09/32 | UDH-09/32 | |
| 33,0 | 21 | U-09/33 | | | | |
| 34,0 | 21 | U-09/34 | UD-09/34 | UH-09/34 | UDH-09/34 | |
| 14 | 24,0 | 27 | U-14/24 | UD-14/24 | UH-14/24 | UDH-14/24 |
| | 25,0 | 27 | U-14/25 | UD-14/25 | | UDH-14/25 |
| | 26,0 | 27 | U-14/26 | UD-14/26 | UH-14/26 | UDH-14/26 |
| | 27,0 | 27 | U-14/27 | | UH-14/27 | |
| | 28,0 | 27 | U-14/28 | UD-14/28 | UH-14/28 | UDH-14/28 |
| | 30,0 | 27 | U-14/30 | UD-14/30 | UH-14/30 | UDH-14/30 |
| | 32,0 | 27 | U-14/32 | UD-14/32 | UH-14/32 | UDH-14/32 |
| | 33,0 | 27 | U-14/33 | UD-14/33 | UH-14/33 | UDH-14/33 |
| | 34,0 | 27 | U-14/34 | UD-14/34 | UH-14/34 | UDH-14/34 |
| | 35,0 | 27 | U-14/35 | UD-14/35 | UH-14/35 | UDH-14/35 |
| | 36,0 | 27 | U-14/36 | UD-14/36 | UH-14/36 | UDH-14/36 |
| | 38,0 | 27 | U-14/38 | UD-14/38 | UH-14/38 | UDH-14/38 |
| | 40,0 | 27 | U-14/40 | UD-14/40 | UH-14/40 | UDH-14/40 |
| | 41,0 | 27 | U-14/41 | UD-14/41 | UH-14/41 | UDH-14/41 |
| 20 | 32,0 | 31 | U-20/32 | | UH-20/32 | |
| | 32,0 | 31 | U-20/33 | | UH-20/33 | |
| | 34,0 | 31 | U-20/34 | | UH-20/34 | |
| | 35,0 | 31 | U-20/35 | UD-20/35 | UH-20/35 | UDH-20/35 |
| | 36,0 | 31 | U-20/36 | UD-20/36 | UH-20/36 | UDH-20/36 |
| | 38,0 | 31 | U-20/38 | UD-20/38 | UH-20/38 | UDH-20/38 |
| | 40,0 | 31 | U-20/40 | UD-20/40 | UH-20/40 | UDH-20/40 |
| | 42,0 | 31 | U-20/42 | UD-20/42 | UH-20/42 | UDH-20/42 |
| | 43,0 | 31 | U-20/43 | | | |
| | 44,0 | 31 | U-20/44 | UD-20/44 | | UDH-20/44 |
| | 45,0 | 31 | U-20/45 | UD-20/45 | UH-20/45 | UDH-20/45 |
| | 46,0 | 31 | U-20/46 | UD-20/46 | UH-20/46 | UDH-20/46 |
| | 48,0 | 31 | U-20/48 | UD-20/48 | UH-20/48 | UDH-20/48 |
| | 50,0 | 31 | U-20/50 | UD-20/50 | UH-20/50 | UDH-20/50 |
| 52,0 | 31 | U-20/52 | UD-20/52 | UH-20/52 | UDH-20/52 | |
| 55,0 | 31 | U-20/55 | UD-20/55 | UH-20/55 | UDH-20/55 | |
| 57,0 | 31 | U-20/57 | UD-20/57 | UH-20/57 | UDH-20/57 | |
| 30 | 60,0 | 38 | U-30/60 | UD-30/60 | UH-30/60 | UDH-30/60 |
| | 62,0 | 38 | U-30/62 | UD-30/62 | UH-30/62 | UDH-30/62 |
| | 64,0 | 38 | U-30/64 | UD-30/64 | | UDH-30/64 |
| | 65,0 | 38 | U-30/65 | UD-30/65 | UH-30/65 | UDH-30/65 |
| | 68,0 | 38 | U-30/68 | UD-30/68 | UH-30/68 | UDH-30/68 |
| | 70,0 | 38 | U-30/70 | UD-30/70 | UH-30/70 | UDH-30/70 |
| | 71,0 | 38 | U-30/71 | | | |
| | 72,0 | 38 | U-30/72 | UD-30/72 | UH-30/72 | UDH-30/72 |
| | 75,0 | 38 | U-30/75 | UD-30/75 | UH-30/75 | UDH-30/75 |
| | 76,0 | 38 | | UD-30/76 | UH-30/76 | UDH-30/76 |
| | 80,0 | 38 | U-30/80 | UD-30/80 | UH-30/80 | UDH-30/80 |
| | 82,0 | 38 | U-30/82 | | | |
| | 83,0 | 38 | U-30/83 | | | |

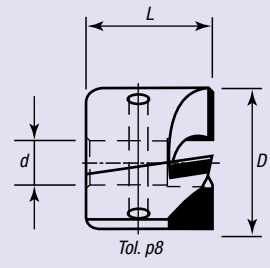
Tipo U, UD, UH y UDH



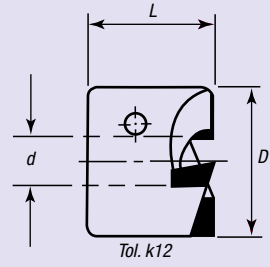
Tipo U



Tipo UD



Tipo UDH



Tipo UH

Medidas mayores e intermedias bajo pedido.

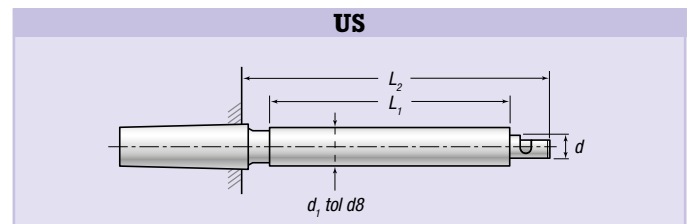


| Acoplamiento d mm | US CM | | | | |
|-------------------|-------------------|-------------------|-------------------|----------------|----------------|
| | d ₁ mm | L ₁ mm | L ₂ mm | Mango | Tipo US |
| | Referencia No. | | | | |
| 6 | 6,0* | 55 | 92 | MK1 | US-06/06,0-MK1 |
| | 6,5* | 55 | 92 | MK1 | US-06/06,5-MK1 |
| | 7,0* | 55 | 92 | MK1 | US-06/07,0-MK1 |
| | 7,5 | 55 | 92 | MK1 | US-06/07,5-MK1 |
| | 8,0 | 55 | 92 | MK1 | US-06/08,0-MK1 |
| | 8,5 | 55 | 92 | MK1 | US-06/08,5-MK1 |
| | 9,0 | 55 | 92 | MK1 | US-06/09,0-MK1 |
| | 9,5 | 55 | 92 | MK1 | US-06/09,5-MK1 |
| | 10,0 | 55 | 92 | MK1 | US-06/10,0-MK1 |
| | 9 | 9,0* | 75 | 116 | MK2 |
| 9,5* | | 75 | 116 | MK2 | US-09/09,5-MK2 |
| 10,0* | | 75 | 116 | MK2 | US-09/10,0-MK2 |
| 10,5 | | 75 | 116 | MK2 | US-09/10,5-MK2 |
| 11,0 | | 75 | 116 | MK2 | US-09/11,0-MK2 |
| 11,5 | | 75 | 116 | MK2 | US-09/11,5-MK2 |
| 12,0 | | 75 | 116 | MK2 | US-09/12,0-MK2 |
| 12,5 | | 75 | 116 | MK2 | US-09/12,5-MK2 |
| 13,0 | | 75 | 116 | MK2 | US-09/13,0-MK2 |
| 13,5 | | 75 | 116 | MK2 | US-09/13,5-MK2 |
| 14,0 | | 75 | 116 | MK2 | US-09/14,0-MK2 |
| 14,5 | | 75 | 116 | MK2 | US-09/14,5-MK2 |
| 15,0 | | 75 | 116 | MK2 | US-09/15,0-MK2 |
| 14 | | 14,0* | 90 | 143 | MK3 |
| | 14,5* | 90 | 143 | MK3 | US-14/14,5-MK3 |
| | 15,0* | 90 | 143 | MK3 | US-14/15,0-MK3 |
| | 16,0 | 90 | 143 | MK3 | US-14/16,0-MK3 |
| | 17,0 | 90 | 143 | MK3 | US-14/17,0-MK3 |
| | 18,0 | 90 | 143 | MK3 | US-14/18,0-MK3 |
| | 19,0 | 90 | 143 | MK3 | US-14/19,0-MK3 |
| | 20,0 | 90 | 143 | MK3 | US-14/20,0-MK3 |
| | 21,0 | 90 | 143 | MK3 | US-14/21,0-MK3 |
| | 22,0 | 90 | 143 | MK3 | US-14/22,0-MK3 |
| 20 | 20,0* | 90 | 147 | MK3 | US-20/20,0-MK3 |
| | 21,0* | 90 | 147 | MK3 | US-20/21,0-MK3 |
| | 22,0 | 90 | 147 | MK3 | US-20/22,0-MK3 |
| | 23,0 | 90 | 147 | MK3 | US-20/23,0-MK3 |
| | 24,0 | 90 | 147 | MK3 | US-20/24,0-MK3 |
| | 25,0 | 110 | 169 | MK4 | US-20/25,0-MK4 |
| | 26,0 | 110 | 169 | MK4 | US-20/26,0-MK4 |
| | 27,0 | 110 | 169 | MK4 | US-20/27,0-MK4 |
| | 28,0 | 110 | 169 | MK4 | US-20/28,0-MK4 |
| | 30,0 | 110 | 169 | MK4 | US-20/30,0-MK4 |
| 30 | 30,0* | 130 | 205 | MK4 | US-30/30,0-MK4 |
| | 32,0 | 130 | 205 | MK4 | US-30/32,0-MK4 |
| | 33,0 | 130 | 205 | MK4 | US-30/33,0-MK4 |
| | 34,0 | 130 | 205 | MK4 | US-30/34,0-MK4 |
| | 35,0 | 130 | 205 | MK4 | US-30/35,0-MK4 |
| | 36,0 | 130 | 205 | MK4 | US-30/36,0-MK4 |
| | 38,0 | 130 | 205 | MK4 | US-30/38,0-MK4 |
| | 39,0 | 130 | 205 | MK4 | US-30/39,0-MK4 |
| | 40,0 | 130 | 205 | MK4 | US-30/40,0-MK4 |
| | 43,0 | 130 | 205 | MK4 | US-30/42,0-MK4 |
| 45,0 | 130 | 205 | MK4 | US-30/45,0-MK4 | |

| Acoplamiento d mm | US Weldon | | | | | |
|-------------------|-------------------|-------------------|-------------------|----------------|----------------|----------------|
| | d ₁ mm | L ₁ mm | L ₂ mm | Mango | Tipo US | |
| | Referencia No. | | | | | |
| 6 | 6,0* | 55 | 89 | Weldon 12 | US-06/06,0-W12 | |
| | 6,5* | 55 | 89 | Weldon 12 | US-06/06,5-W12 | |
| | 7,0* | 55 | 89 | Weldon 12 | US-06/07,0-W12 | |
| | 8,0 | 55 | 89 | Weldon 12 | US-06/08,0-W12 | |
| | 8,5 | 55 | 89 | Weldon 12 | US-06/08,5-W12 | |
| | 9,0 | 55 | 89 | Weldon 12 | US-06/09,0-W12 | |
| | 9,5 | 55 | 89 | Weldon 12 | US-06/09,5-W12 | |
| | 10,0 | 55 | 89 | Weldon 12 | US-06/10,0-W12 | |
| | 9 | 9,0* | 75 | 113 | Weldon 16 | US-09/09,0-W16 |
| | | 9,5* | 75 | 113 | Weldon 16 | US-09/09,5-W16 |
| 10,0* | | 75 | 113 | Weldon 16 | US-09/10,0-W16 | |
| 10,5 | | 75 | 113 | Weldon 16 | US-09/10,5-W16 | |
| 11,0 | | 75 | 113 | Weldon 16 | US-09/11,0-W16 | |
| 11,5 | | 75 | 113 | Weldon 16 | US-09/11,5-W16 | |
| 12,0 | | 75 | 113 | Weldon 16 | US-09/12,0-W16 | |
| 12,5 | | 75 | 113 | Weldon 16 | US-09/12,5-W16 | |
| 13,0 | | 75 | 113 | Weldon 16 | US-09/13,0-W16 | |
| 14,0 | | 75 | 113 | Weldon 16 | US-09/14,0-W16 | |
| 15,0 | | 75 | 113 | Weldon 16 | US-09/15,0-W16 | |
| 14 | | 14,0* | 90 | 139 | Weldon 20 | US-14/14,0-W20 |
| | | 14,5* | 90 | 139 | Weldon 20 | US-14/14,5-W20 |
| | | 15,0* | 90 | 139 | Weldon 20 | US-14/15,0-W20 |
| | 16,0 | 90 | 139 | Weldon 20 | US-14/16,0-W20 | |
| | 17,0 | 90 | 139 | Weldon 20 | US-14/17,0-W20 | |
| | 18,0 | 90 | 139 | Weldon 20 | US-14/18,0-W20 | |
| | 19,0 | 90 | 139 | Weldon 20 | US-14/19,0-W20 | |
| | 20,0 | 90 | 139 | Weldon 20 | US-14/20,0-W20 | |
| | 21,0 | 90 | 139 | Weldon 20 | US-14/21,0-W20 | |
| | 22,0 | 90 | 139 | Weldon 20 | US-14/22,0-W20 | |
| 20 | 20,0* | 110 | 163 | Weldon 20 | US-20/20,0-W20 | |
| | 21,0* | 110 | 163 | Weldon 20 | US-20/21,0-W20 | |
| | 22,0 | 110 | 163 | Weldon 20 | US-20/22,0-W20 | |
| | 23,0 | 110 | 163 | Weldon 20 | US-20/23,0-W20 | |
| | 24,0 | 110 | 163 | Weldon 20 | US-20/24,0-W20 | |
| | 25,0 | 110 | 163 | Weldon 20 | US-20/25,0-W20 | |
| | 26,0 | 110 | 163 | Weldon 20 | US-20/26,0-W20 | |
| | 27,0 | 110 | 163 | Weldon 20 | US-20/27,0-W20 | |
| | 28,0 | 110 | 163 | Weldon 20 | US-20/28,0-W20 | |
| | 30,0 | 110 | 163 | Weldon 20 | US-20/30,0-W20 | |
| 30 | 30,0* | 130 | 195 | Weldon 25 | US-30/30,0-W25 | |
| | 32,0 | 130 | 195 | Weldon 25 | US-30/32,0-W25 | |
| | 33,0 | 130 | 195 | Weldon 25 | US-30/33,0-W25 | |
| | 34,0 | 130 | 195 | Weldon 25 | US-30/34,0-W25 | |
| | 35,0 | 130 | 195 | Weldon 25 | US-30/35,0-W25 | |
| | 36,0 | 130 | 195 | Weldon 25 | US-30/36,0-W25 | |
| | 38,0 | 130 | 195 | Weldon 25 | US-30/38,0-W25 | |
| | 39,0 | 130 | 195 | Weldon 25 | US-30/39,0-W25 | |
| | 40,0 | 130 | 195 | Weldon 25 | US-30/40,0-W25 | |
| | 42,0 | 130 | 195 | Weldon 25 | US-30/42,0-W25 | |
| 45,0 | 130 | 195 | Weldon 25 | US-30/45,0-W25 | | |

* No usar combinando con fresas de metal duro.

| | Resistencia a tracción N/mm ² | HSS | HSS | M.Duro | M.Duro |
|----------|--|-------|----------|--------|---------|
| | Dureza HB | Vc | f | Vc | f |
| P | <600 N/mm ² | 15-30 | 0,1-0,5 | 30-70 | 0,1-0,5 |
| | >600 N/mm ² | 5-20 | 0,05-0,3 | 20-50 | 0,1-0,3 |
| M | Acero Inoxidable | 8-15 | 0,1-0,3 | 30-70 | 0,1-0,3 |
| K | <220 HB | 10-35 | 0,1-0,4 | 50-90 | 0,1-0,4 |
| N | Aluminio | 40-90 | 0,1-0,5 | 50-120 | 0,1-0,5 |



Tetón postizo (recambio)

| Para Mango | Rosca | Ref. No. |
|------------|-------|-------------|
| MK3 | M12 | GR1801-12-2 |
| MK4 | M16 | GR1801-12-1 |



| Ø D mm | | | | | RD | RA | RB |
|--------|--------------|-------------------|-------------------|----------------|---------------------------------|------------------------|----------------------|
| | Tol. h6 d mm | L ₁ mm | L ₂ mm | Plaquita grupo | Para agujeros ciegos y pasantes | Para agujeros pasantes | Para agujeros ciegos |
| | | | | | Referencia No. | Referencia No. | Referencia No. |
| 10 | 16 | 85 | 48 | 04 | RD-10,0* | | |
| 11 | 16 | 85 | 48 | 04 | RD-11,0* | | |
| 12 | 16 | 120 | 48 | 04 | RD-12,0 | | |
| 13 | 16 | 120 | 48 | 04 | RD-13,0 | | |
| 14 | 16 | 120 | 48 | 04 | RD-14,0 | | |
| 15 | 20 | 120 | 50 | 04 | RD-15,0 | | |
| 16 | 20 | 120 | 50 | 08 | | RA-16,0 | RB-16,0 |
| 17 | 20 | 120 | 50 | 08 | | RA-17,0 | RB-17,0 |
| 18 | 20 | 120 | 50 | 08 | | RA-18,0 | RB-18,0 |
| 19 | 20 | 120 | 50 | 08 | | RA-19,0 | RB-19,0 |
| 20 | 20 | 120 | 50 | 08 | | RA-20,0 | RB-20,0 |
| 21 | 20 | 120 | 50 | 11 | | RA-21,0 | RB-21,0 |
| 22 | 20 | 120 | 50 | 11 | | RA-22,0 | RB-22,0 |
| 23 | 20 | 120 | 50 | 11 | | RA-23,0 | RB-23,0 |
| 24 | 20 | 120 | 50 | 11 | | RA-24,0 | RB-24,0 |
| 25 | 20 | 120 | 50 | 11 | | RA-25,0 | RB-25,0 |
| 26 | 20 | 120 | 50 | 11 | | RA-26,0 | RB-26,0 |
| 27 | 20 | 120 | 50 | 11 | | RA-27,0 | RB-27,0 |
| 28 | 20 | 120 | 50 | 11 | | RA-28,0 | RB-28,0 |
| 29 | 20 | 120 | 50 | 11 | | RA-29,0 | RB-29,0 |
| 30 | 20 | 120 | 50 | 11 | | RA-30,0 | RB-30,0 |
| 31 | 20 | 120 | 50 | 11 | | RA-31,0 | RB-31,0 |
| 32 | 20 | 120 | 50 | 11 | | RA-32,0 | RB-32,0 |
| 33 | 20 | 120 | 50 | 11 | | RA-33,0 | RB-33,0 |
| 34 | 20 | 120 | 50 | 11 | | RA-34,0 | RB-34,0 |
| 35 | 20 | 120 | 50 | 11 | | RA-35,0 | RB-35,0 |
| 36 | 20 | 120 | 50 | 11 | | RA-36,0 | RB-36,0 |
| 37 | 20 | 120 | 50 | 11 | | RA-37,0 | RB-37,0 |
| 38 | 25 | 120 | 56 | 11 | | RA-38,0 | RB-38,0 |
| 39 | 25 | 120 | 56 | 11 | | RA-39,0 | RB-39,0 |
| 40 | 25 | 120 | 56 | 11 | | RA-40,0 | RB-40,0 |
| 41 | 25 | 120 | 56 | 11 | | RA-41,0 | RB-41,0 |
| 42 | 25 | 120 | 56 | 11 | | RA-42,0 | RB-42,0 |
| 43 | 25 | 120 | 56 | 11 | | RA-43,0 | RB-43,0 |
| 44 | 25 | 120 | 56 | 11 | | RA-44,0 | RB-44,0 |
| 45 | 25 | 120 | 56 | 11 | | RA-45,0 | RB-45,0 |
| 46 | 25 | 120 | 56 | 11 | | RA-46,0 | RB-46,0 |
| 47 | 25 | 120 | 56 | 11 | | RA-47,0 | RB-47,0 |
| 48 | 25 | 120 | 56 | 11 | | RA-48,0 | RB-48,0 |
| 49 | 25 | 120 | 56 | 11 | | RA-49,0 | RB-49,0 |
| 50 | 25 | 120 | 56 | 11 | | RA-50,0 | RB-50,0 |

RD rango de ajuste -0 +0,03. RA, RB rango de ajuste -0 +0,05. *= Ref.int.como standard excepto RD Ø 10, 11.

Escariado

Guia rapida para la seleccion de escariador

Seleccionar diametro y tolerancia

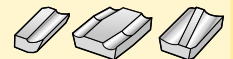
Las medidas standard se envian preajustadas a +0,008 mm del diametro de tolerancia H7 con una plaquita sin recubrimiento. Las medidas standard producen agujeros de acuerdo con el nominal del diametro y la tolerancia H7.

La ajustabilidad del escariador puede usarse para incrementar la banda de tolerancia o para ajuste fino dentro de cierta tolerancia.

Diametros intermedios se fabrican y preajustan de acuerdo a sus necesidades.

Guia rapida para la seleccion de plaquita

Sin recubrimiento DC, BC, AC Aleaciones no ferricas. Cuando se requiere un filo puro.



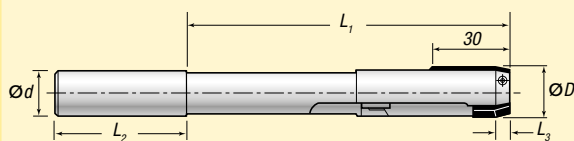
Recubrimiento TIN DCT, BCT, ACT Altas velocidades. larga duracion de herramienta. No adecuado para aluminio.



Cermet DCC, BCC, ACC Para acero y fundicion gris. Alta velocidad de corte. Durabilidad. resistente al uso. Otros recubrimientos se ofertan bajo demanda.



RD, RA y RB



| Plaquita | Para tipo | ØD Rango | Diagrama |
|---------------------------|-----------|---------------|----------|
| DC-04 DCT-04 DCC-04 | RD | 09,90 - 15,90 | |
| BC-08 BCT-08 BCC-08 | RB | 15,91 - 21,60 | |
| BC-11 BCT-11 BCC-11 | RB | 21,61 - 120,0 | |
| AC-08 ACT-08 ACC-08 | RA | 15,91 - 21,60 | |
| AC-11 ACT-11 ACC-11 | RA | 21,61 - 120,0 | |

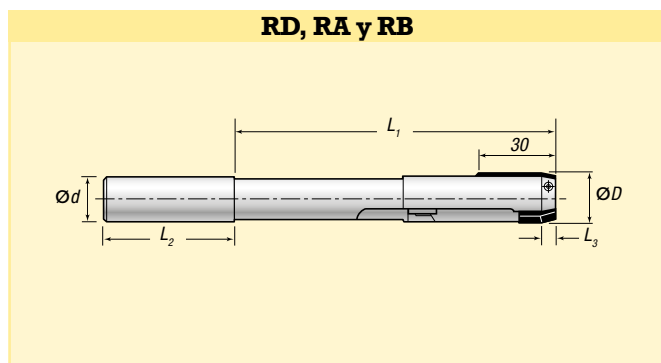
| Material | | Datos de corte para escariadores de plaquita desechable | | | | | | |
|----------|------------------|---|--------------------------------|---------|--------------------------------|---------|---------------------|-----------|
| | | Avance | Sin recubrimiento refrigerante | | Recubrimiento TiN refrigerante | | Cermet Refrigerante | |
| | | | mm/rev. | Interno | Externo | Interno | Externo | Interno |
| P | Acero | <700N/mm ² | 0,1 - 0,4 | 20 - 60 | 12 - 25 | 25 - 70 | 15 - 30 | 100 - 300 |
| | Acero | <1000 N/mm ² | 0,1 - 0,4 | 15 - 40 | 10 - 18 | 25 - 45 | 15 - 25 | 100 - 200 |
| | Acero | >1000 N/mm ² | 0,1 - 0,4 | 20 - 40 | 8 - 15 | 25 - 45 | 10 - 20 | 100 - 130 |
| | Acero Fund | >800 N/mm ² | 0,1 - 0,4 | 20 - 50 | 10 - 20 | 25 - 60 | 10 - 25 | - |
| M | Acero Inoxidable | | 0,1 - 0,3 | 15 - 30 | 7 - 15 | 10 - 30 | 7 - 15 | - |
| | Inconel | | 0,1 - 0,3 | 10 - 20 | 5 - 15 | 10 - 20 | 5 - 15 | - |
| K | Fundición | <210 HB | 0,15 - 0,4 | 30 - 70 | 15 - 35 | 20 - 70 | 15 - 35 | 100 - 300 |
| | Fundición | >210 HB | 0,15 - 0,4 | 30 - 50 | 15 - 35 | 20 - 50 | 15 - 35 | 100 - 250 |
| | Fund. Maleable | | 0,1 - 0,3 | 30 - 50 | 12 - 25 | 15 - 50 | 12 - 25 | - |
| N | Aluminio | Viruta Corta | 0,1 - 0,3 | 30 - 70 | 12 - 30 | - | - | - |
| | Aluminio | Viruta Larga | 0,1 - 0,3 | 20 - 70 | 12 - 30 | - | - | - |
| | Broce | Duro | 0,1 - 0,3 | 15 - 50 | 6 - 20 | 15 - 50 | 6 - 20 | - |
| | Broce | Blando | 0,1 - 0,3 | 15 - 50 | 10 - 20 | 15 - 50 | 10 - 20 | - |
| | Latón | Viruta Corta | 0,1 - 0,4 | 25 - 70 | 10 - 50 | 25 - 70 | 10 - 50 | - |
| | Latón | Viruta Larga | 0,1 - 0,3 | 20 - 45 | 8 - 25 | 20 - 45 | 10 - 25 | - |
| | Cobre | Duro | 0,1 - 0,4 | 20 - 60 | 10 - 30 | 20 - 60 | 10 - 30 | - |
| | Cobre | Blando | 0,1 - 0,3 | 20 - 50 | 10 - 20 | 20 - 60 | 10 - 20 | - |
| X | Plástico | | 0,1 - 0,4 | 30 - 70 | 10 - 30 | 30 - 70 | 10 - 30 | - |

Se recomienda emulsion con una concentracion minima del 6%.

| Recambios para escariadores tipo RA, RB, RD | | | | | | |
|---|---------------------|--------------------|------|--------|------------------|---------------------|
| Gama diam. mm | Tornillo excéntrico | Tornillo de ajuste | Cuña | Pivote | Llave exagonal | Juego de accesorios |
| 9,90-12,90 | ES-3 | AS-3 | W-1 | F-04 | SN-1,5 SN-2,0 | RSB-01 |
| 12,91-15,90 | ES-3 | AS-3 | W-2 | F-04 | SN-1,5 SN-2,0 | RSB-02 |
| 15,91-17,90 | ES-3 | AS-3 | W-2 | F-08 | SN-1,5 SN-2,5 | RSB-02 |
| 17,91-21,60 | ES-4 | AS-5 | W-3 | F-08 | SN-2,5 | RSB-04 |
| 21,61-23,60 | ES-4 | AS-5 | W-3 | F-11 | SN-2,5 | RSB-05 |
| 23,61-30,60 | ES-4 | AS-5 | W-4 | F-11 | SN-2,5 | RSB-06 |
| 30,61-34,60 | ES-4 | AS-5 | W-5 | F-11 | SN-2,5 | RSB-07 |
| 34,61-50,00 | ES-4 | AS-5 | W-6 | F-11 | SN-2,5 | RSB-08 |

| | | Especial | | | |
|--------------------------------------|----------------|-------------------------|---------|--------------------------|---------|
| | | No refrigerante interno | | Con refrigerante interno | |
| | | MIN. mm | MAX. mm | MIN. mm | MAX. mm |
| Ls = Longitud del patin guia | Ls | 30,0 | 120 | 30 | 120 |
| L ₁ = Longitud de trabajo | L ₁ | 60,0 | 1000 | 60 | 1000 |
| D = Diametro del escariador | D* | 9,9 | 120 | 12 | 120 |
| d = Diametro del mango | d | 10,0 | 50 | 16 | 50 |

*Standard mango cilindrico, puede fabricarse mango Weldon bajo pedido.



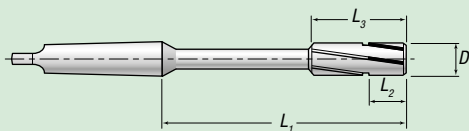
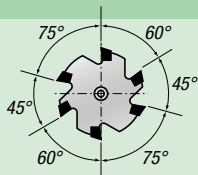
Escariadores metal duro, fijos y reajustables

GRANLUND
Tools

| H7 D mm | 507 | | | | | 507C | | | | | 509 | | | 509C | | | | 509CC | | | | | | | | |
|---------------|----------------|----------------|----------------|-------------|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|-----|----------------|----------------|----------------|----------|-----|----------------|----------------|----------------|----------|--|
| | Metal duro K10 | | | | | Metal duro K10 | | | | | Metal duro K10 | | | Metal duro K10 | | | | Cermet | | | | | | | | |
| | L ₁ | L ₂ | L ₃ | Mango CM | Ref. No. | L | L ₁ | L ₂ | L ₃ | Mango Cil d | Ref. No. | L ₁ | L ₂ | Mango CM | Ref. No. | L | L ₁ | L ₂ | Mango Cil d | Ref. No. | L | L ₁ | L ₂ | Mango Cil d | Ref. No. | |
| 6,0 | 73 | 32 | | 1 | 507-06 | 102 | 57 | 32 | | 10 | 507C-06 | | | | | | | | | | | | | | | |
| 7,0 | 85 | 32 | | 1 | 507-07 | 114 | 69 | 32 | | 10 | 507C-07 | | | | | | | | | | | | | | | |
| 8,0 | 91 | 32 | | 1 | 507-08 | 122 | 75 | 32 | | 10 | 507C-08 | 91 | 16 | 1 | 509-08 | 122 | 75 | 16 | 10 | 509C-08 | | | | | | |
| 9,0 | 97 | 36 | | 1 | 507-09 | 130 | 81 | 36 | | 10 | 507C-09 | 97 | 20 | 1 | 509-09 | 130 | 81 | 20 | 10 | 509C-09 | | | | | | |
| 10,0 | 103 | 40 | | 1 | 507-10 | 140 | 87 | 40 | | 10 | 507C-10 | 103 | 20 | 1 | 509-10 | 140 | 87 | 20 | 10 | 509C-10 | | | | | | |
| 11,0 | 110 | 40 | | 1 | 507-11 | 149 | 96 | 40 | | 10 | 507C-11 | 110 | 20 | 1 | 509-11 | 149 | 96 | 20 | 10 | 509C-11 | | | | | | |
| 12,0 | 117 | 20 | 45 | 1 | 507-12 | 158 | 105 | 20 | 45 | 10 | 507C-12 | 117 | 20 | 1 | 509-12 | 158 | 105 | 20 | 10 | 509C-12 | 158 | 105 | 20 | 10 | 509CC-12 | |
| 13,0 | 117 | 20 | 45 | 1 | 507-13 | 158 | 105 | 20 | 45 | 10 | 507C-13 | 117 | 20 | 1 | 509-13 | 158 | 105 | 20 | 10 | 509C-13 | 158 | 105 | 20 | 10 | 509CC-13 | |
| 14,0 | 124 | 20 | 45 | 1 | 507-14 | 166 | 110 | 20 | 45 | 16 | 507C-14 | 124 | 20 | 2 | 509-14 | 166 | 110 | 20 | 16 | 509C-14 | 166 | 110 | 20 | 16 | 509CC-14 | |
| 15,0 | 124 | 20 | 50 | 2 | 507-15 | 182 | 112 | 20 | 50 | 20 | 507C-15 | 124 | 30 | 2 | 509-15 | 182 | 112 | 30 | 20 | 509C-15 | 182 | 112 | 30 | 20 | 509CC-15 | |
| 16,0 | 130 | 20 | 50 | 2 | 507-16 | 190 | 120 | 20 | 50 | 20 | 507C-16 | 130 | 30 | 2 | 509-16 | 190 | 120 | 30 | 20 | 509C-16 | 190 | 120 | 30 | 20 | 509CC-16 | |
| 17,0 | 134 | 20 | 50 | 2 | 507-17 | 193 | 123 | 20 | 50 | 20 | 507C-17 | 134 | 30 | 2 | 509-17 | 193 | 123 | 30 | 20 | 509C-17 | 193 | 123 | 30 | 20 | 509CC-17 | |
| 18,0 | 139 | 20 | 56 | 2 | 507-18 | 200 | 130 | 20 | 56 | 20 | 507C-18 | 139 | 30 | 2 | 509-18 | 200 | 130 | 30 | 20 | 509C-18 | 200 | 130 | 30 | 20 | 509CC-18 | |
| 19,0 | 143 | 20 | 56 | 2 | 507-19 | 201 | 131 | 20 | 56 | 20 | 507C-19 | 143 | 30 | 2 | 509-19 | 201 | 131 | 30 | 20 | 509C-19 | 201 | 131 | 30 | 20 | 509CC-19 | |
| 20,0 | 148 | 20 | 60 | 2 | 507-20 | 207 | 137 | 20 | 60 | 20 | 507C-20 | 148 | 30 | 2 | 509-20 | 207 | 137 | 30 | 20 | 509C-20 | 207 | 137 | 30 | 20 | 509CC-20 | |
| 22,0 | 157 | 20 | 64 | 2 | 507-22 | | | | | | | 157 | 30 | 2 | 509-22 | 227 | 157 | 30 | 20 | 509C-22 | | | | | | |
| 23,0 | 161 | 20 | 64 | 2 | 507-23 | | | | | | | 161 | 30 | 2 | 509-23 | 231 | 161 | 30 | 20 | 509C-23 | | | | | | |
| 24,0 | 169 | 20 | 70 | 3 | 507-24 | | | | | | | 169 | 30 | 3 | 509-24 | 239 | 169 | 30 | 20 | 509C-24 | | | | | | |
| 25,0 | 169 | 20 | 70 | 3 | 507-25 | | | | | | | 169 | 30 | 3 | 509-25 | 239 | 169 | 30 | 20 | 509C-25 | | | | | | |
| 26,0 | 174 | 20 | 70 | 3 | 507-26 | | | | | | | 174 | 30 | 3 | 509-26 | 244 | 174 | 30 | 20 | 509C-26 | | | | | | |
| 28,0 | 178 | 30 | 70 | 3 | 507-28 | | | | | | | 178 | 30 | 3 | 509-28 | 248 | 178 | 30 | 25 | 509C-26 | | | | | | |
| 30,0 | 182 | 30 | 70 | 3 | 507-30 | | | | | | | 182 | 30 | 3 | 509-30 | 252 | 182 | 30 | 25 | 509C-30 | | | | | | |
| 35,0 | 197 | 30 | 78 | 4 | 507-35 | | | | | | | | | | | | | | | | | | | | | |
| 40,0 | 205 | 30 | 78 | 4 | 507-40 | | | | | | | | | | | | | | | | | | | | | |

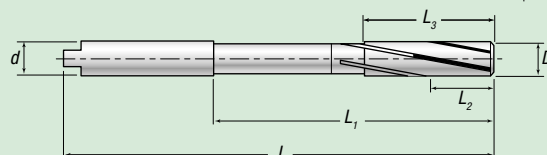
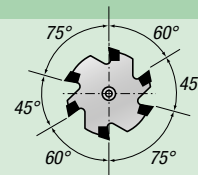
Tipo 507

Escariador fijo, helice a izquierdas 8-10°, paso diferencial metal duro integral Dim 6-11 mm, plaquita soldada Ø 12-40 mm. Grado ISO K10. DIN8094 Form B.



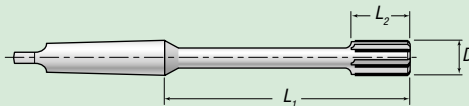
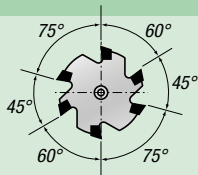
Tipo 507C

Escariador fijo helice izquierdas 8-10°, paso diferencial metal duro integral Dim 6-11 mm, plaquita soldada Ø 12-40 mm. Grado ISO K10.



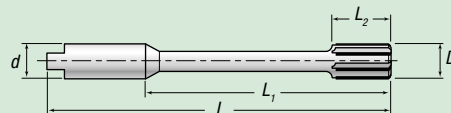
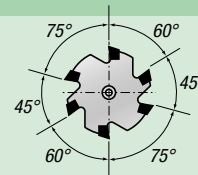
Tipo 509

Escariador fijo, estrias rectas, paso diferencial grado ISO K10. DIN 8051 Form A.



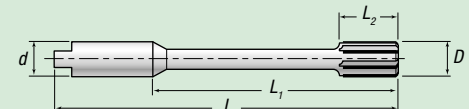
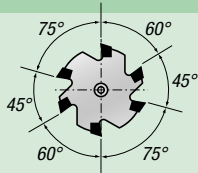
Tipo 509C

Escariador fijo estrias rectas, paso diferencial grado ISO K10.



Tipo 509CC

Escariador fijo, estrias rectos, paso diferencial Cermet: alta velocidad de corte y durabilidad en aplicaciones sobre acero y fundición. Solución óptima cuando las condiciones de corte son estables.



Características comunes:

- Los escariadores se fabrican en tolerancia H7, y también semiacabados para una rápida adaptación a los requerimientos del usuario.
- Paso diferencial para conseguir agujeros más perfectos y eliminar la vibración.
- Cortes lapeados, para obtener un mejor acabado.

Portaherramientas flotantes para escariadores

GRANLUND
Tools

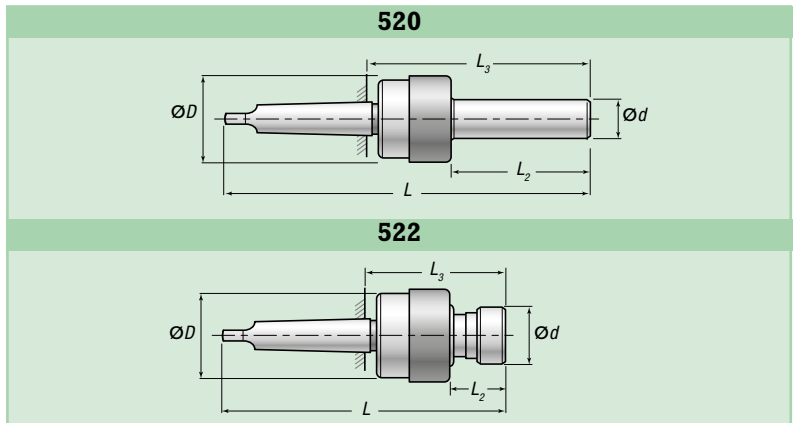


| H7 D mm | 510C | | | | 511 (Reajustable) | | | | |
|---------------|----------------|----------------|--------------|----------|-------------------|----------------|----------------|----------|----------|
| | Metal duro K10 | | | | Metal duro K10 | | | | |
| | L ₁ | L ₂ | Mango cyl. d | Ref. No. | L ₁ | L ₂ | No. de dientes | Mango CM | Ref. No. |
| 4,0 | 90 | 16 | 4,0 | 510C-04 | | | | | |
| 5,0 | 90 | 16 | 5,0 | 510C-05 | | | | | |
| 6,0 | 110 | 16 | 5,0 | 510C-06 | | | | | |
| 7,0 | 120 | 16 | 6,0 | 510C-07 | | | | | |
| 8,0 | 120 | 16 | 7,0 | 510C-08 | 100 | 20 | 4 | 1 | 511-08 |
| 9,0 | 120 | 20 | 8,0 | 510C-09 | 100 | 20 | 4 | 1 | 511-09 |
| 10,0 | 130 | 20 | 9,0 | 510C-10 | 100 | 20 | 4 | 1 | 511-10 |
| 11,0 | 130 | 20 | 10,0 | 510C-11 | 100 | 20 | 4 | 1 | 511-11 |
| 12,0 | 130 | 20 | 11,0 | 510C-12 | 100 | 20 | 4 | 1 | 511-12 |
| 13,0 | 140 | 30 | 12,0 | 510C-13 | 115 | 20 | 6 | 1 | 511-13 |
| 14,0 | 140 | 30 | 12,0 | 510C-14 | 115 | 20 | 6 | 1 | 511-14 |
| 15,0 | | | | | 116 | 20 | 6 | 2 | 511-15 |
| 16,0 | | | | | 116 | 30 | 6 | 2 | 511-16 |
| 17,0 | | | | | 116 | 30 | 6 | 2 | 511-17 |
| 18,0 | | | | | 116 | 30 | 6 | 2 | 511-18 |
| 19,0 | | | | | 136 | 30 | 6 | 2 | 511-19 |
| 20,0 | | | | | 136 | 30 | 6 | 2 | 511-20 |
| 22,0 | | | | | 156 | 30 | 6 | 2 | 511-22 |
| 24,0 | | | | | 162 | 30 | 6 | 3 | 511-24 |
| 25,0 | | | | | 162 | 30 | 6 | 3 | 511-25 |
| 26,0 | | | | | 162 | 30 | 8 | 3 | 511-26 |
| 28,0 | | | | | 162 | 30 | 8 | 3 | 511-28 |
| 30,0 | | | | | 182 | 30 | 8 | 3 | 511-30 |



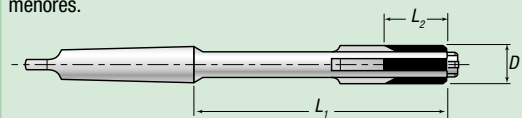
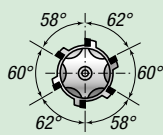
| Tipo | Mango | Alojamiento Herramienta | d | D | L | L ₂ | L ₃ | S | α° | Ref. No. |
|------|-------|-------------------------|----|----|-----|----------------|----------------|-----|-----|------------|
| 520 | MK2 | MK1 | 18 | 51 | 200 | 74 | 123 | 3,0 | 1,5 | 520-MK2/1 |
| | MK2 | MK2 | 23 | 51 | 210 | 87 | 136 | 3,0 | 1,5 | 520-MK2/2 |
| | MK3 | MK2 | 23 | 51 | 232 | 87 | 137 | 3,0 | 1,5 | 520-MK3/2 |
| | MK3 | MK3 | 33 | 57 | 258 | 107 | 162 | 2,0 | 1,0 | 520-MK3/3 |
| | MK4 | MK3 | 33 | 57 | 280 | 107 | 164 | 2,0 | 1,0 | 520-MK4/3 |
| | MK4 | MK4 | 41 | 75 | 321 | 132 | 202 | 2,4 | 1,0 | 520-MK4/4 |
| 522* | MK2 | ∅ 2,8-13 mm | 37 | 57 | 166 | 36 | 92 | 2,0 | 1,0 | 522-MK2/13 |

* El porta se entrega con pinza 440.



Tipo 511

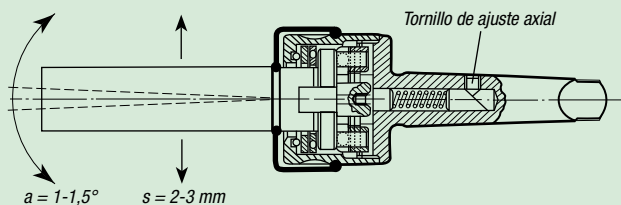
Escariador reajutable, estrias rectas paso diferencial, para agujeros pasantes. El escariador expansible puede reajustarse introduciendo el cono de expansión en el escariador. Se puede hacer normalmente 2-3 veces con el reafilado. Cada milímetro de penetración del cono incrementa el diámetro en 0,033 mm. (Max. 1 % diámetro.)
NOTA: nunca puede ajustarse a diámetros menores.



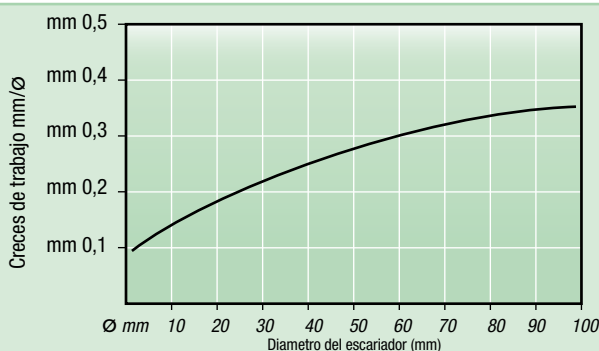
Portaherramientas flotantes para escariadores

Han sido diseñados para compensar las diferencias de alineación y ángulo entre el escariador y la pieza a escariar. De esta forma, el acabado superficial es mejor, y la vida del escariador se alarga.

La rigidez puede ser ajustada mediante un tornillo, obteniendo un perfecto equilibrio para compensar la carga del escariador. Esto es de máxima importancia cuando el eje de la máquina trabaja horizontal.



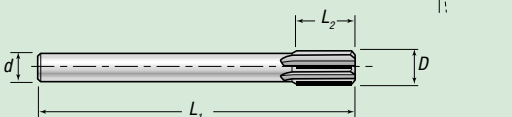
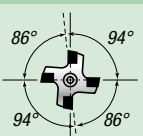
Creces de trabajo



| Material | Datos de corte para escariadores con plaquita soldada | | |
|---------------------------|---|------------------|----------------|
| | Resistencia a tracción N/mm ² Dureza HB | Velocidad m/min. | Avance mm/rev. |
| P Acero | < 600 | 10,0 - 15,0 | 0,20 - 0,50 |
| Acero | < 1000 | 5,0 - 12,0 | 0,10 - 0,40 |
| M Acero inoxidable | > 1000 | 5,0 - 10,0 | 0,10 - 0,25 |
| Acero fundido | < 500 | 15,0 - 20,0 | 0,20 - 0,50 |
| Acero fundido | > 500 | 10,0 | 0,15 - 0,40 |
| K Fundición | < 200 HB | 20,0 - 30,0 | 0,30 - 0,80 |
| Fundición | > 200 HB | 15,0 - 20,0 | 0,20 - 0,40 |
| N Latón | | 30,0 - 40,0 | 0,20 - 0,80 |
| Aleación de aluminio | | 60,0 - 80,0 | 0,40 - 0,80 |
| X Plástico duro | | 20,0 | 0,20 - 0,40 |

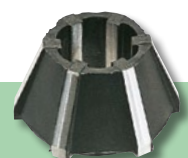
Tipo 510C mago cilíndrico

Escariador fijo, estrias rectas, paso diferencial. Grade ISO K10. Metal duro tip 4-8 mm, plaquita soldado 9-14 mm.



Pinza

| Tipo | Rango mm | Jacobs | |
|--------|------------|-----------------------------|----------------|
| | | Para portaherramientas tipo | Referencia No. |
| Jacobs | 2,8 - 7,0 | 522 | 443 |
| Jacobs | 7,0 - 13,0 | 522 | 440 |



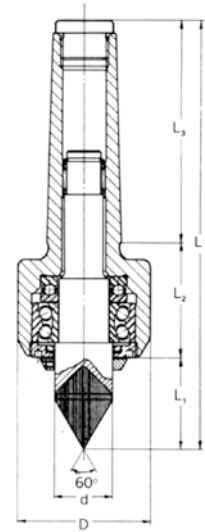
Puntos giratorios y fijos de precisión – metal duro



Punto Giratorio Tipo 609

El punto de centrar rotativo tipo 609 es excelente cuando se requiere un trabajo duro y constante, con un mínimo de calentamiento. Granlund Tools tiene una larga experiencia en la fabricación del 609 de alta calidad y resistencia. Utilizamos este punto giratorio en nuestra propia producción.

- Redondez de 0,002 mm.
- Punta extralarga que permite más espacio para el mecanizado
- Cuerpo rectificado y mango de acero endurecido
- Rodamientos a bolas de alta precisión
- Resistente al fluido



| Ref. No. | Mango CM | D mm | d mm | L mm | L1 mm | L2 mm | L3 mm |
|----------|----------|------|------|------|-------|-------|-------|
| 609-MK2 | 2 | 46 | 19 | 145 | 35 | 45 | 65 |
| 609-MK3 | 3 | 60 | 25 | 183 | 45 | 55 | 83 |
| 609-MK4 | 4 | 68 | 27 | 216 | 50 | 60 | 106 |
| 609-MK5 | 5 | 80 | 34 | 260 | 55 | 70 | 135 |

| Tabla de cargas para tipo 609 | | | | | | | |
|-------------------------------|---------------------|-------|-----|-----|------|------|------|
| Mango CM | Presión axial - Kg. | r/min | | | | | |
| | | 40 | 200 | 400 | 1000 | 2000 | 4000 |
| Carga radial -Kg. | | | | | | | |
| 2 | 600 | 240 | 160 | 120 | 90 | 70 | 50 |
| 3 | 950 | 500 | 340 | 270 | 200 | 160 | 130 |
| 4 | 1300 | 1000 | 600 | 480 | 350 | 280 | 220 |
| 5 | 1700 | 1400 | 800 | 640 | 470 | 380 | 300 |

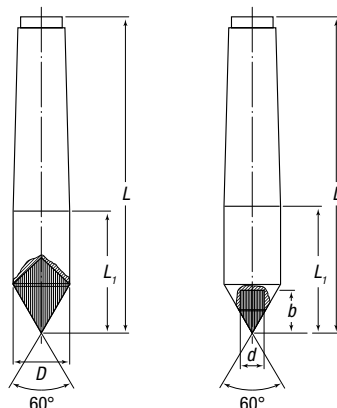
Los valores de carga han sido calculados con un alto factor de seguridad y un tiempo de rotación de 2500 horas. Para un tiempo de rotación inferior, estos valores pueden aumentarse. Por favor contacte con su distribuidor GRANLUND si necesita más información.

Puntos fijos para centrar y rectificar. Tipos 610 A y 611 – metal duro



| Ref. No. | Ref. No. | Mango CM | Tipo 610-611 d mm | Tipo 610-611 b mm | L mm | L1 mm | Tipo 611 K mm | Tipo 611 K mm |
|----------|----------|----------|-------------------|-------------------|------|-------|---------------|---------------|
| 610A-MK2 | 611-MK2 | 2 | 8 | 16 | 110 | 41 | 3,2 | 18,0 |
| 610A-MK3 | 611-MK3 | 3 | 10 | 20 | 130 | 44,5 | 4 | 24,0 |
| 610A-MK4 | 611-MK4 | 4 | 12 | 22 | 160 | 51,5 | 5 | 31,5 |
| 610A-MK5 | 611-MK5 | 5 | 14 | 25 | 200 | 62 | 6 | *44,4 |

*Metal duro 35 mm. diámetro



Tipo 610 A
Punto para tornear con punta de metal duro.

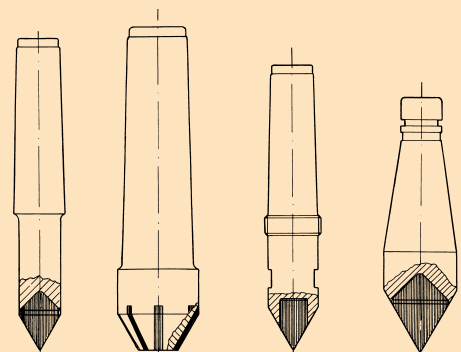
Tipo 611
Punto para rectificar con punta de metal duro.

Tipo 610 A

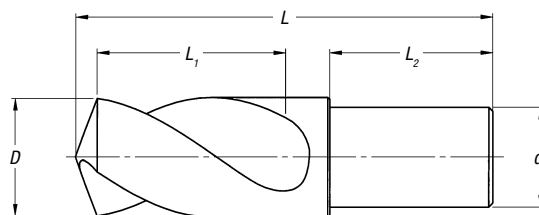
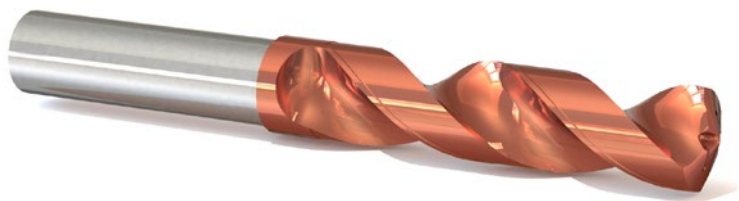
Tipo 611

Centros especiales

GRANLUND TOOLS fabrica puntos especiales sobre pedido. Por favor, contacte con su distribuidor GRANLUND para cotización.



Broca THUNDER para HARDOX™



T80 es una broca de metal duro integral, con refrigeración interior, desarrollada especialmente para taladrar HARDOX™. T80 tiene también un recubrimiento especial, optimizada para éste tipo de mecanización. T80 se mantiene como velocidad máxima recomendada para Hardox™ 500 (80 m/min).

Junto con T80, Granlund Tools también ofrece una gama completa de posibilidades para taladrado y cajeado ó avellanado en Hardox. Esto es posible utilizando las plaquitas "H" montadas en nuestras fresas y avellanadores WHV y KV.



WHV
Fresa



KV
Avellanador

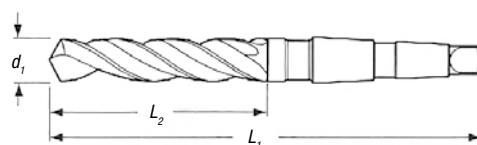
| Ref. No. | D | d | L ₁ (longitud de corte) | L ₂ | L |
|-----------|------|------|---------------------------------------|----------------|-------|
| T80-10,0 | 10,0 | 10,0 | 36,0 | 41,0 | 82,0 |
| T80-12,0 | 12,0 | 12,0 | 36,0 | 41,0 | 82,0 |
| T80-13,5 | 13,5 | 12,0 | 36,0 | 41,0 | 82,0 |
| T80-14,0 | 14,0 | 14,0 | 36,0 | 41,0 | 82,0 |
| T80-15,5 | 15,5 | 14,0 | 36,0 | 41,0 | 82,0 |
| T80-17,5 | 17,5 | 16,0 | 55,0 | 41,0 | 103,0 |
| T80-18,0 | 18,0 | 16,0 | 60,0 | 41,0 | 110,0 |
| T80-20,0 | 20,0 | 20,0 | 57,0 | 41,0 | 110,0 |
| T80-22,0 | 22,0 | 20,0 | 55,0 | 41,0 | 110,0 |
| T80-24,0 | 24,0 | 20,0 | 55,0 | 41,0 | 110,0 |
| T80-26,0 | 26,0 | 25,0 | 55,0 | 41,0 | 110,0 |
| T80-28,0* | 28,0 | 25,0 | 55,0 | 41,0 | 110,0 |
| T80-30,0* | 30,0 | 25,0 | 55,0 | 41,0 | 110,0 |

* No Standard en stock

Condiciones de corte recomendadas

| Material: | Hardox 400 | Hardox 500 | Hardox 600 |
|------------------|-------------|-------------|-------------|
| Velocidad m/min: | 30 - 80 | 30 - 80 | 25 - 70 |
| Avance mm/rev: | 0,10 - 0,25 | 0,05 - 0,15 | 0,04 - 0,12 |

Broca HSS-Co para HARDOX™



| Ref. no. | d ₁ | L ₁ | L ₂ | MT |
|----------|----------------|----------------|----------------|-----|
| HD-10,0 | 10 | 154 | 56 | MT2 |
| HD-10,5 | 10,5 | 154 | 56 | MT2 |
| HD-11,0 | 11 | 154 | 56 | MT2 |
| HD-11,5 | 11,5 | 159 | 61 | MT2 |
| HD-12,0 | 12 | 164 | 66 | MT2 |
| HD-12,5 | 12,5 | 164 | 66 | MT2 |
| HD-13,0 | 13 | 164 | 66 | MT2 |
| HD-13,5 | 13,5 | 168 | 70 | MT2 |
| HD-14,0 | 14 | 168 | 70 | MT2 |
| HD-14,5 | 14,5 | 171 | 73 | MT2 |
| HD-15,0 | 15 | 171 | 73 | MT2 |
| HD-15,5 | 15,5 | 175 | 77 | MT2 |
| HD-16,0 | 16 | 175 | 77 | MT2 |
| HD-16,5 | 16,5 | 178 | 80 | MT2 |
| HD-17,0 | 17 | 178 | 80 | MT2 |
| HD-17,5 | 17,5 | 182 | 84 | MT2 |
| HD-18,0 | 18 | 182 | 84 | MT2 |
| HD-18,5 | 18,5 | 203 | 86 | MT3 |
| HD-19,0 | 19 | 203 | 86 | MT3 |
| HD-19,5 | 19,5 | 207 | 90 | MT3 |
| HD-20,0 | 20 | 207 | 90 | MT3 |

| Ref. no. | d ₁ | L ₁ | L ₂ | MT |
|----------|----------------|----------------|----------------|-----|
| HD-21,0 | 21 | 210 | 93 | MT3 |
| HD-22,0 | 22 | 213 | 96 | MT3 |
| HD-23,0 | 23 | 217 | 100 | MT3 |
| HD-24,0 | 24 | 219 | 102 | MT3 |
| HD-25,0 | 25 | 219 | 102 | MT3 |
| HD-26,0 | 26 | 222 | 105 | MT3 |
| HD-27,0 | 27 | 265 | 120 | MT4 |
| HD-28,0 | 28 | 265 | 120 | MT4 |
| HD-29,0 | 29 | 265 | 120 | MT4 |
| HD-30,0 | 30 | 265 | 120 | MT4 |
| HD-31,0 | 31 | 265 | 120 | MT4 |
| HD-32,0 | 32 | 265 | 120 | MT4 |
| HD-33,0 | 33 | 265 | 120 | MT4 |
| HD-34,0 | 34 | 265 | 120 | MT4 |
| HD-35,0 | 35 | 265 | 120 | MT4 |
| HD-36,0 | 36 | 265 | 120 | MT4 |
| HD-37,0 | 37 | 265 | 120 | MT4 |
| HD-38,0 | 38 | 265 | 120 | MT4 |
| HD-39,0 | 39 | 265 | 120 | MT4 |
| HD-40,0 | 40 | 265 | 120 | MT4 |

Spirabor

Intercambiables, dentro del mismo grupo

GRANLUND
Tools

Spirabor de Granlund es un flexible y muy eficaz sistema de herramientas para retaladrar largas longitudes en diferentes metales como acero, fundición o acero fundido.

Un Spirabor completo consta de un portaherramientas, una cabeza de corte, un casquillo guía y una espiga de retención.

El programa standard de cabezas de corte esta entre 31-100 mm y bajo pedido hasta 200 mm.

El rango de diametros esta dividido en siete grupos, lo que supone que cada portaherramientas puede utilizarse con todas las cabezas de corte de su mismo grupo.

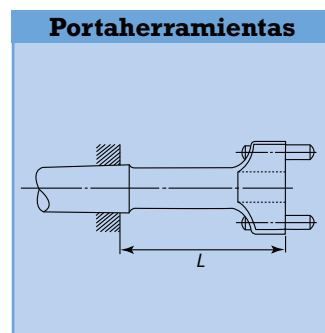
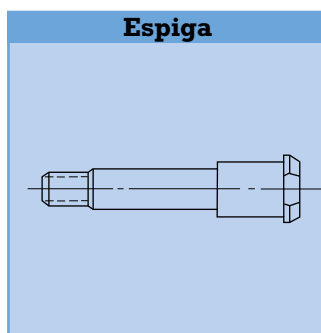
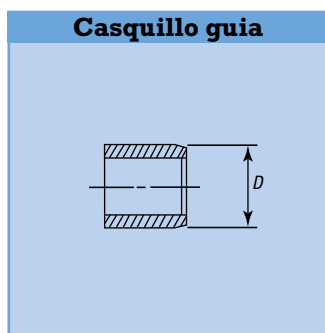
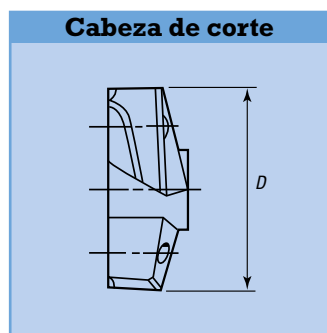


| Tamaño | Cabeza de corte Tipo B | | Casquillo guía Tipo R | | Espiga Tipo RT | Portaherramientas Tipo A | | |
|--------|---------------------------|----------|--------------------------|-----------|-------------------|-----------------------------|----|-------------|
| | D mm tol. h10 | Ref. No. | D mm Tol. c9 | Ref. No. | Ref. No. | L mm | CM | Ref. No. |
| 11 | 32 | 11B-32 | 14 | 11R-14 | 11RT | 65 | 3 | 11A-065-MK3 |
| | 34 | 11B-34 | 15 | 11R-15 | | 65 | 4 | 11A-065-MK4 |
| | 35 | 11B-35 | 18 | 11R-18 | | 180 | 3 | 11A-180-MK3 |
| | 36 | 11B-36 | 20 | 11R-20 | | 180 | 4 | 11A-180-MK4 |
| 12 | 38 | 12B-38 | 20 | 12/13R-20 | 12/13RT | 80 | 3 | 12A-080-MK3 |
| | 39 | 12B-39 | 22 | 12/13R-22 | | 80 | 4 | 12A-080-MK4 |
| | | | 24 | 12/13R-24 | | 200 | 3 | 12A-200-MK3 |
| | | | 25 | 12/13R-25 | | 200 | 4 | 12A-200-MK4 |
| | | | | | | | | |
| 13 | 40 | 13B-40 | 20 | 12/13R-20 | 12/13RT | 80 | 3 | 13A-080-MK3 |
| | 41 | 13B-41 | 22 | 12/13R-22 | | 80 | 4 | 13A-080-MK4 |
| | 42 | 13B-42 | 24 | 12/13R-24 | | 200 | 3 | 13A-200-MK3 |
| | 43 | 13B-43 | 25 | 12/13R-25 | | 200 | 4 | 13A-200-MK4 |
| | 44 | 13B-44 | | | | | | |
| | 45 | 13B-45 | | | | | | |
| 14 | 46 | 14B-46 | 24 | 14R-24 | 14RT | 90 | 3 | 14A-090-MK3 |
| | 47 | 14B-47 | 25 | 14R-25 | | 90 | 4 | 14A-090-MK4 |
| | 48 | 14B-48 | 26 | 14R-26 | | 225 | 3 | 14A-225-MK3 |
| | 49 | 14B-49 | 28 | 14R-28 | | 225 | 4 | 14A-225-MK4 |
| | 50 | 14B-50 | 30 | 14R-30 | | | | |
| | 51 | 14B-51 | | | | | | |
| | 52 | 14B-52 | | | | | | |
| 15 | 53 | 15B-53 | 28 | 15R-28 | 15RT | 100 | 4 | 15A-100-MK4 |
| | 54 | 15B-54 | 30 | 15R-30 | | 100 | 5 | 15A-100-MK5 |
| | 55 | 15B-55 | 32 | 15R-32 | | 250 | 4 | 15A-250-MK4 |
| | 56 | 15B-56 | 35 | 15R-35 | | 250 | 5 | 15A-250-MK5 |
| | 57 | 15B-57 | 40 | 15R-40 | | | | |
| | 58 | 15B-58 | | | | | | |
| | 59 | 15B-59 | | | | | | |
| | 60 | 15B-60 | | | | | | |
| | 61 | 15B-61 | | | | | | |
| | 62 | 15B-62 | | | | | | |
| | 63 | 15B-63 | | | | | | |
| | 64 | 15B-64 | | | | | | |
| | 65 | 15B-65 | | | | | | |
| 16 | 66 | 16B-66 | 32 | 16R-32 | 16RT | 110 | 4 | 16A-110-MK4 |
| | 68 | 16B-68 | 34 | 16R-34 | | 110 | 5 | 16A-110-MK5 |
| | 69 | 16B-69 | 35 | 16R-35 | | 260 | 4 | 16A-260-MK4 |
| | 70 | 16B-70 | 38 | 16R-38 | | 260 | 5 | 16A-260-MK5 |
| | 71 | 16B-71 | 40 | 16R-40 | | | | |
| | 72 | 16B-72 | 50 | 16R-50 | | | | |
| | 74 | 16B-74 | | | | | | |
| | 75 | 16B-75 | | | | | | |
| | 76 | 16B-76 | | | | | | |
| | 77 | 16B-77 | | | | | | |
| 17 | 82 | 17B-82 | 38 | 17R-38 | 17RT | 130 | 4 | 17A-130-MK4 |
| | 84 | 17B-84 | 40 | 17R-40 | | 130 | 5 | 17A-130-MK5 |
| | 85 | 17B-85 | 42 | 17R-42 | | 280 | 4 | 17A-280-MK4 |
| | 86 | 17B-86 | 45 | 17R-45 | | 280 | 5 | 17A-280-MK5 |
| | 88 | 17B-88 | 50 | 17R-50 | | | | |
| | 90 | 17B-90 | 55 | 17R-55 | | | | |
| | 92 | 17B-92 | 60 | 17R-60 | | | | |
| | 94 | 17B-94 | 65 | 17R-65 | | | | |
| | 95 | 17B-95 | 70 | 17R-70 | | | | |
| | 96 | 17B-96 | 80 | 17R-80 | | | | |
| | 98 | 17B-98 | | | | | | |
| | 100 | 17B-100 | | | | | | |

Dimensiones especiales bajo pedido.

| Datos de corte | | | |
|----------------|-----------------------------|--------------------|---------|
| Velocidad | | | |
| Material | Dureza N/mm ² | Velocidad m/min | |
| P | Acero | < 500 | 15 - 20 |
| | Acero | 500-900 | 10 - 15 |
| K | Fundición Acero | < 800 | 5 - 12 |
| | Fundición | < 220 HB | 10 - 15 |
| M | Acero Inoxidable | | 5 - 15 |

| Avance | |
|-----------------------|----------------|
| Rango de diametros mm | Avance mm/rev. |
| 32 - 45 | 0,2 - 0,3 |
| 46 - 65 | 0,3 - 0,4 |
| 66 - 100 | 0,4 - 0,6 |





Equilibradores GRANLUND TOOLS para equilibrar muelas. Nuestros equilibradores son también excelentes para equilibrar ejes, hélices, etc.

Los equilibradores se fabrican para la mayor precisión y exactitud en el equilibrado.

Un buen equilibrado de la muela, dá como resultado, un mejor acabado de la superficie, un menor desgaste de la máquina y una vida más larga de la muela.

- Las bolas de los discos, están endurecidas y rectificadas.
- Indicado para el equilibrado estático de muelas, ejes y otros elementos rotativos de las máquinas.

| Ref. No. | Diametro máximo de la muela rectificadora con eje Ø 25 mm | Máxima y mínima longitud a equilibrar* | Rango de cargas |
|----------|---|--|-----------------|
| 500 | 540 mm | 80 - 500 mm | 0,3 - 500 kg |
| 800 | 810 mm | 100 - 800 mm | 0,3 - 700 kg |

Piezas mas largas pueden equilibrarse con guías más largas.

Instrucciones para el equilibrado de muelas

General

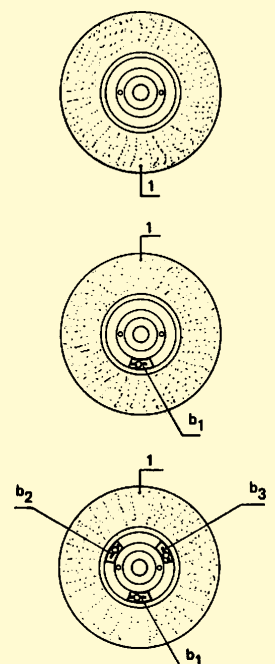
Las muelas utilizadas para equilibrado fino, deben ser equilibradas. Si la muela no está equilibrada, se producen vibraciones que se traducen en un acabado defectuoso de la superficie. Los cojinetes de la máquina rectificadora, también se verán afectados y en el peor de los casos, deteriorados.

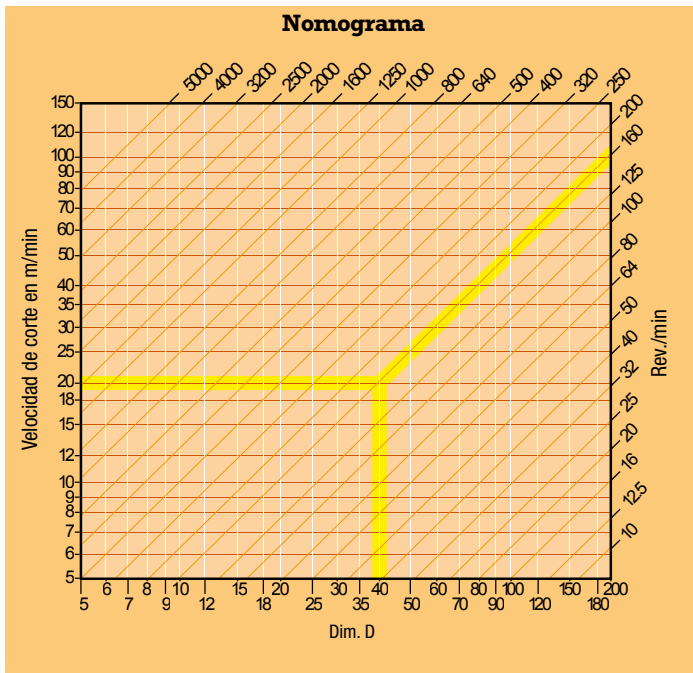
Control de la muela

Compruebe si la muela está intacta y con aspecto uniforme. Con un golpe en una zona no apoyada de la muela si escuchamos un tono "limpio", la muela debe estar intacta.

Equilibrado

1. Eliminar los pesos de equilibrio del centro de la muela.
2. Poner el eje en la muela y situarla en el equilibrador.
3. Dejar girar la muela atrás y adelante hasta que se detenga. Marcar la parte inferior de la muela con una tiza (1).
4. Coloque uno de los pesos (b1) en el lugar opuesto a la marca, la muela girará 180 grados.
5. Después, distribuya los pesos (b2) y (b3) hasta que la muela quede oscilando. Ahora la muela, está equilibrada.





| Tipo de herramientas D mm | Accesorios | | | | | |
|---|----------------|------------------|----------------|----------------|----------------|-------|
| | Placa | Fijación central | | Placa Enteriza | | |
| | | Tornillo | Llave | Brida | Tornillo | llave |
| Grupo | Referencia No. | Referencia No. | Referencia No. | Referencia No. | Referencia No. | |
| WHV 18,0 - 25,0 KV 18,0 - 25,0 BV 18,0 - 26,0 FV 12,0 - 16,5 DFV 15,0 - 31,0 BFV 15,0 - 31,0 NE 13,0/26,0 - 17,0/26,0 | 07 | SSK-20 | TN-6 | SK-3 | SSK-3 | TN-9 |
| WHV 25,5 - 38,0 KV 26,0 - 30,0 BV 30,0 - 50,0 FV 20,0 - 30,0 NE 17,0/33,0 - 25,0/40,0 | 10 | SSK-22 | TN-7 | SK-3 | SSK-3 | TN-9 |
| WHV 34,0 - 45,0 KV 45,0 | 12 | SSK-25 | TN-7 | | | |
| WHV 46,0 - KV 50,0 - NE 25,0/48,0 - | 17 | SSK-40 | TN-15 | | | |

Problemas y causas

| | | | | | |
|--|---------------------------------------|---|--|------------------------------------|---|
| | 1 Ovalización | Escariador descentrado ó descolocación de la pieza de trabajo, debido a un amarre insuficiente. | | 6 Marcas de retracción | Cono demasiado grande ó escariador descentrado. |
| | 2 Agujero deformado | Demasiado avance en piezas con paredes finas ó amarre insuficiente de la pieza. | | 7 Diámetro demasiado grande | Ajuste de diámetro demasiado grande, amarre insuficiente de la pieza. |
| | 3 Agujero curvado | Desalineación axial del corte. | | 8 Vibraciones a la entrada | Avance demasiado bajo. |
| | 4 Marcas por vibración | Avance demasiado bajo ó cono de amarre demasiado pequeño. | | 9 Agujero cónico | Escariador descentrado cono demasiado pequeño. |
| | 5 Mal acabado de la superficie | Velocidad de corte demasiado alta, escasa presión del refrigerante, refrigerante no adecuado, ó mala fijación de la cuchilla. | | 10 Refrigerante no adecuado | Refrigerante no adecuado ó mezcla pobre. |

| Aplicación | |
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GRANLUND

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ES-2022

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