

**Phantom** 

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TOOLS**

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**CHECK OUR INNOVATIONS ON PAGE 6**

■ Bij uitstek geschikt - Très approprié - Muy adecuado - Ideal geeignet  
 □ Beperkt geschikt - Approprié - Adecuado - Eingeschränkt geeignet

ISO	ISO	NL	FR	ES	DE
		<b>Ongelegerd en gelegeerd staal <math>\leq 600</math> N/mm<sup>2</sup></b> 1.0037 (St37), 1.0038 (S235JR G2), 1.00402 (C22), 1.1178 (C30E)	<b>Aciers non-alliés ou faiblement alliés <math>\leq 600</math> N/mm<sup>2</sup></b> 1.0037 (A37), 1.0038 (E 24-2 Ne), 1.00402 (1C20), 1.1178 (1C30)	<b>Acero no aleado <math>\leq 600</math> N/mm<sup>2</sup></b> 1.0037 (S235JR), 1.0038 (S235JR G2), 1.0402 (F.112), 1.1178 (C30E)	<b>Unlegierter und legierter Stahl <math>\leq 600</math> N/mm<sup>2</sup></b> 1.0037 (St37), 1.0038 (S235JR G2), 1.00402 (C22), 1.1178 (C30E)
		<b>Ongelegerd en gelegeerd staal 600 - 850 N/mm<sup>2</sup></b> 1.0050 (St50-2), 1.0070 (St70-2), 1.0301 (C10), 1.0503 (C45), 1.1121 (Ck10), 1.1191 (C45E), 1.0718 (11SMnPb30), 1.0736 (11SMn37)	<b>Aciers non-alliés ou faiblement alliés 600 - 850 N/mm<sup>2</sup></b> 1.0050 (A50-2), 1.0070 (A70-2), 1.0301 (1C10), 1.0503 (1C45), 1.1121 (XC10), 1.1191 (2C45), 1.0718 (S250PB), 1.0736 (S300PB)	<b>Acero no aleado 600 - 850 N/mm<sup>2</sup></b> 1.0050 (Fe490-2), 1.0070 (Fe690-2), 1.0301 (F.1151), 1.0503 (F.114), 1.1121 (F.1510-C10K), 1.1191 (C45K), 1.0718 (F.2112-11SMnPb28), 1.0736 (F.2113-11SMn37)	<b>Unlegierter und legierter Stahl 600 - 850 N/mm<sup>2</sup></b> 1.0050 (St50-2), 1.0070 (St70-2), 1.0301 (C10), 1.0503 (C45), 1.1121 (Ck10), 1.1191 (C45E), 1.0718 (11SMnPb30), 1.0736 (11SMn37)
		<b>Gelegeerd staal 850 - 1000 N/mm<sup>2</sup></b> 1.0727 (46S20), 1.0728 (60S20), 1.0757 (46SPb20), 1.2080 (X210Cr12), 1.2083 (X42Cr13), 1.2767 (X45NiCrMo4), 1.5131 (50MnSi4), 1.7003 (38Cr2), 1.7030 (28Cr4), 1.7043 (38Cr4)	<b>Aciers alliés 850 - 1000 N/mm<sup>2</sup></b> 1.0727 (45Mf4), 1.0728 (60S20), 1.0757 (46SPb20), 1.2080 (Z200C12), 1.2083 (Z40C14), 1.2767 (Y35NCD16), 1.5131 (50MnSi4), 1.7003 (38Cr2), 1.7030 (28Cr4), 1.7043 (38Cr4)	<b>Acero aleado 850 - 1000 N/mm<sup>2</sup></b> 1.0727 (46S20), 1.0728 (60S20), 1.0757 (46SPb20), 1.2080 (F.5212-X210Cr12), 1.2083 (X42Cr13), 1.2767 (X45NiCrMo4), 1.5131 (50MnSi4), 1.7003 (38Cr2), 1.7030 (28Cr4), 1.7043 (38Cr4)	<b>Legierter Stahl 850 - 1000 N/mm<sup>2</sup></b> 1.0727 (46S20), 1.0728 (60S20), 1.0757 (46SPb20), 1.2080 (X210Cr12), 1.2083 (X42Cr13), 1.2767 (X45NiCrMo4), 1.5131 (50MnSi4), 1.7003 (38Cr2), 1.7030 (28Cr4), 1.7043 (38Cr4)
		<b>Gelegeerd staal 1000 - 1400 N/mm<sup>2</sup></b> 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)	<b>Aciers alliés 1000 - 1400 N/mm<sup>2</sup></b> 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)	<b>Acero aleado 1000 - 1400 N/mm<sup>2</sup></b> 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)	<b>Legierter Stahl 1000 - 1400 N/mm<sup>2</sup></b> 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)
		<b>Gehard en inzetgehard staal 50 - 60 HRC</b> 1.2344 (X40CrMoV5), 1.2767 (X45NiCrMo4), 1.2379 (X155CrVMo12-1), 1.2080 (X210Cr12), 1.3343 (S6-5-2)	<b>Aciers trempés et Aciers de cémentation alliés 50 - 60 HRC</b> 1.2344 (Z 40 CDV 5), 1.2767 (X45NiCrMo4), 1.2379 (D2), 1.2080 (Z200C12), 1.3343 (Z85WDCV)	<b>Acero templado 50 - 60 HRC</b> 1.2344 (X40CrMoV5), 1.2767 (X45NiCrMo4), 1.2379 (X155CrVMo12-1), 1.2080 (X210Cr12), 1.3343 (S6-5-2)	<b>Gehärteter und einsatzgehärteter Stahl, 50-60 HRC</b> 1.2344 (X40CrMoV5), 1.2767 (X45NiCrMo4), 1.2379 (X155CrVMo12-1), 1.2080 (X210Cr12), 1.3343 (S6-5-2)
		<b>Roestvaststaal, INOX <math>\leq 850</math> N/mm<sup>2</sup></b> 1.4005 (X12CrS13), 1.4104 (X14CrMos17), 1.4105 (X6CrMoS17), 1.4301 (XCrNi18-10)(304), 1.4305 (X8CrNiS18-9)(303)	<b>Aciers inoxydables <math>\leq 850</math> N/mm<sup>2</sup></b> 1.4005 (Z11CF13), 1.4104 (Z13CF17), 1.4105 (Z8CF17), 1.4301 (XCrNi18-10)(304), 1.4305 (X8CrNiS18-9)(303)	<b>Acero inoxidable <math>\leq 850</math> N/mm<sup>2</sup></b> 1.4006 (F.3401-X10Cr13), 1.4104 (F.3117-X10Cr17), 1.4301 (F.3504-X5CrNi18-10)(304), 1.4305 (F.3508-X10CrNiS18-09)(303)	<b>Rostfreier Stahl, INOX <math>\leq 850</math> N/mm<sup>2</sup></b> 1.4005 (X12CrS13), 1.4104 (X14CrMos17), 1.4105 (X6CrMoS17), 1.4301 (XCrNi18-10)(304), 1.4305 (X8CrNiS18-9)(303)
		<b>Roestvaststaal, INOX <math>&gt; 850</math> N/mm<sup>2</sup></b> 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (X6CrNiMoTi17-12-2)(316Ti)	<b>Aciers inoxydables <math>&gt; 850</math> N/mm<sup>2</sup></b> 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (X6CrNiMoTi17-12-2)(316Ti)	<b>Acero inoxidable <math>&gt; 850</math> N/mm<sup>2</sup></b> 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (F.3535-X6CrNiMoTi17-12-2)(316Ti)	<b>Rostfreier Stahl, INOX <math>&gt; 850</math> N/mm<sup>2</sup></b> 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (X6CrNiMoTi17-12-2)(316Ti)
		<b>Grijs gietijzer GG <math>&lt; 260</math> HB30</b> 0.6015 (GG 15), 0.6025 (GG 25), 0.6040 (GG 40)	<b>Fontes <math>&lt; 260</math> HB30</b> 0.6015 (GG 15), 0.6025 (GG 25), 0.6040 (GG 40)	<b>Fundición gris con grafito laminado GG <math>&lt; 260</math> HB30</b> 0.6015 (FG15), 0.6025 (FG25), 0.6040 (FG40)	<b>Grauguss GG <math>&lt; 260</math> HB30</b> 0.6015 (GG 15), 0.6025 (GG 25), 0.6040 (GG 40)
		<b>Smeedbaar en Nodulair gietijzer <math>&lt; 260</math> HB30</b> 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)	<b>Fontes à graphites et malléables <math>&lt; 260</math> HB30</b> 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)	<b>Fundición gris con grafito esferoidal <math>&lt; 260</math> HB30</b> 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)	<b>Formbar und dehnbares Gusseisen <math>&lt; 260</math> HB30</b> 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)
		<b>Aluminium en Aluminiumlegeringen</b> 3.0255 (Al99.5), 3.2315 (AlMgSi1), 3.3515 (AlMg1)	<b>Aluminium et Alliages d'Aluminium</b> 3.0255 (A59050C), 3.2315 (AlMgSi1), 3.3515 (AlMg1)	<b>Aluminio y aleaciones de Aluminio</b> 3.0255 (Al99.5), 3.2315 (AlMgSi1), 3.3515 (AlMg1)	<b>Aluminium und Aluminiumlegerungen</b> 3.0255 (Al99.5), 3.2315 (AlMgSi1), 3.3515 (AlMg1)
		<b>Gietaluminium Si 10 - 24%</b> 3.2131 (G-AISi5Cu1), 3.2153 (G-AISi7Cu3), (3.2573 G-AISi9), 3.2581 (G-AISi12), 3.2583 (G-AISi12Cu)	<b>Alliages d'Aluminium Si 10 - 24%</b> 3.2131 (G-AISi5Cu1), 3.2153 (G-AISi7Cu3), (3.2573 G-AISi9), 3.2581 (G-AISi12), 3.2583 (G-AISi12Cu)	<b>Fundición de Aluminio aleada Si 10 - 24%</b> 3.2131 (G-AISi5Cu1), 3.2153 (G-AISi7Cu3), (3.2573 G-AISi9), 3.2581 (L-2520,21), 3.2583 (L2530)	<b>Druckguss Si 10 - 24%</b> 3.2131 (G-AISi5Cu1), 3.2153 (G-AISi7Cu3), (3.2573 G-AISi9), 3.2581 (G-AISi12), 3.2583 (G-AISi12Cu)
		<b>Magnesiumlegeringen</b> 3.5200 (MgMn2), 3.5812 (G-MgAl8Zn1), 3.5612 (G-MgAl6Zn1)	<b>Alliages de Magnésium</b> 3.5200 (MgMn2), 3.5812 (AZ81hp), 3.5612 (AZ61)	<b>Aleaciones de Magnesio</b> 3.5200 (MgMn2), 3.5812 (AZ81hp), 3.5612 (AZ61)	<b>Magnesiumlegerungen</b> 3.5200 (MgMn2), 3.5812 (G-MgAl8Zn1), 3.5612 (G-MgAl6Zn1)
		<b>Koper en Koperlegeringen</b> 2.0070 (SE-Cu), 2.1020 (CuSn6), 2.1096 (G-CuSn5ZnPB), 2.0380 (CuZn39Pb2), 2.0401 (CuZn39Pb3), 2.0250 (CuZn20), 2.0280 (CuZn33), 2.0332 (CuZn37Pb0,5)	<b>Cuivres et Alliages de cuivres</b> 2.0070 (SE-Cu), 2.1020 (CuSn6), 2.1096 (G-CuSn5ZnPB), 2.0380 (CuZn40), 2.0401 (CuZn39Pb3), 2.0250 (CuZn20), 2.0280 (CuZn33), 2.0332 (CuZn37Pb0,5)	<b>Cobre y aleaciones de cobre</b> 2.0070 (SE-Cu), 2.1020 (CuSn6), 2.1096 (G-CuSn5ZnPB), 2.0380 (CuZn39Pb2), 2.0401 (CuZn39Pb3), 2.0250 (CuZn20), 2.0280 (CuZn33), 2.0332 (CuZn37Pb0,5)	<b>Kupfer und Kupferlegerungen</b> 2.0070 (SE-Cu), 2.1020 (CuSn6), 2.1096 (G-CuSn5ZnPB), 2.0380 (CuZn39Pb2), 2.0401 (CuZn39Pb3), 2.0250 (CuZn20), 2.0280 (CuZn33), 2.0332 (CuZn37Pb0,5)
		<b>Koper- en Aluminiumlegering</b> 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (CuBe2) AMPCO® 8, AMPCO® 8 15, AMPCO® 18	<b>Cuivre et Alliages d'Aluminium</b> 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (CuBe1.9) AMPCO® 8, AMPCO® 8 15, AMPCO® 18	<b>Cobre y aleaciones de Aluminio</b> 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (CuBe2) AMPCO® 8, AMPCO® 8 15, AMPCO® 18	<b>Kupfer- und Aluminiumlegerungen</b> 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (Cu-Be2) AMPCO® 8, AMPCO® 8 15, AMPCO® 18
		<b>Duroplastic en Thermoplastic</b> PMMA, PVC, PE, PP, PTFE	<b>Duroplastiques et Thermoplastiques</b> PMMA, PVC, PE, PP, PTFE	<b>Duroplásticos en Termoplásticos</b> PMMA, PVC, PE, PP, PTFE	<b>Duroplaste und Thermoplaste</b> PMMA, PVC, PE, PP, PTFE
		<b>Versterkte kunststoffen</b> GFK, CFK	<b>Plastiques réinforcés</b> GFK, CFK	<b>Plásticos reforzados</b> GFK, CFK	<b>Verstärkte Kunststoffe</b> GFK, CFK
		<b>Nikkel- en Cobaltlegeringen</b> Hastelloy, Inconel, Nimonic, Jetalloy	<b>Alliages de Nickel et de Cobalt</b> Hastelloy, Inconel, Nimonic, Jetalloy	<b>Aleaciones de Níquel y Cobalto</b> Hastelloy, Inconel, Nimonic, Jetalloy	<b>Nickel und Kobaltlegerungen</b> Hastelloy, Inconel, Nimonic, Jetalloy
		<b>Titaniumlegeringen</b> 3.7024 (Ti99.5), 3.7114 (TiAl5Sn2.5), 3.7124 (TiCu2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)	<b>Alliages de Titane</b> 3.7024 (T35), 3.7114 (TiAl5Sn2.5), 3.7124 (T-U2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)	<b>Titanio aleado</b> 3.7024 (Ti99.5), 3.7114 (TiAl5Sn2.5), 3.7124 (TiCu2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)	<b>Titanlegerungen</b> 3.7024 (Ti99.5), 3.7114 (TiAl5Sn2.5), 3.7124 (TiCu2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)

**Phantom**

**INTERNATIONAL  
TOOLS**



**COMMITTED, DEDICATED SPECIALISTS  
WITH MORE THAN 67 YEARS  
OF EXPERIENCE**

› **SINCE 1952**    › **PASSIONATE PEOPLE**    › **99,9% ERROR FREE**



# Phantom

## RELIABLE, INNOVATIVE, SUPERIOR QUALITY

Phantom is the leading brand of cutting tools of the highest quality for use in metalworking. With no less than 20,000 general metalworking and modern precision-engineering tools to choose from, the extensive range contains machining tools of all types and sizes, including models. At Phantom, not only is the highest quality guaranteed, your options are also limitless. With precision and a long service life assured, we can safely say that, at Phantom, we can handle any cutting task.

## BETROUWBAAR, INNOVATIEF EN A-KWALITEIT

Phantom is het A-merk van absolute topkwaliteit voor verspanende gereedschappen ten behoeve van metaalbewerking. U heeft keuze uit maar liefst 20.000 gereedschappen voor algemene metaalbewerking en moderne precisietechniek.

Het assortiment is zeer compleet en bestaat uit verspanend gereedschap in alle soorten en maten, ook de meest bijzondere. Met Phantom heeft u topkwaliteit in handen en zijn uw mogelijkheden werkelijk onbegrensd. U bent verzekerd van precisie en hoge standtijden. Daardoor kunnen wij gerust stellen dat u met Phantom werkelijk ieder verspaningsvraagstuk aan kunt.



## UN PRODUIT D'EXCELLENTE QUALITÉ

Les produits de la marque Phantom sont des produits à haute valeur ajoutée technique pour l'usinage des métaux. Notre gamme comporte plus de 20.000 références qui vous permettront de réaliser quasiment toutes les opérations d'usinage avec des produits bénéficiant des dernières avancées technologiques.

Notre catalogue dispose d'un choix d'outils extrêmement large, de toutes les formes, de toutes les dimensions et pour toutes les applications. Vous avez donc accès à des produits d'excellente qualité qui vous offrent des possibilités sans limites. Pour cette raison, nous pouvons en toute sécurité vous assurer que vous serez en mesure, avec les produits Phantom, de maîtriser et de répondre à l'ensemble de vos opérations d'usinage, des plus simples aux plus complexes.

## INTERNATIONAL TOOLS

### EXTENSIVE AND COMPETITIVELY PRICED

With its extensive, highly competitive range, International Tools offers an attractive array of drills, taps and countersinks in standard sizes. For universal use, available from stock.



### UITGEBREID EN PRIJSCONCURREEREND

Met een uitgebreid en zeer prijsconcurrerend assortiment biedt International Tools u een aantrekkelijk aanbod boren, tappen en verzinkfrezen in gangbare maten. Universeel inzetbaar en ook nog eens uit voorraad leverbaar.

### UNE LARGE GAMME A PRIX COMPETITIF

Avec International Tools vous accédez à une large gamme de forets, tarauds et fraise à chanfreiner dans les dimensions les plus courantes pour une utilisation universelle, le tout disponible sur stock.

# THERE'S NO END TO WHAT YOU CAN DO.



## UNA PRESTIGIOSA MARCA DE PRIMERA CALIDAD

Phantom es una prestigiosa marca de herramientas de mecanizado para el procesamiento de metal de alta calidad. Puede elegir entre nada menos que 20.000 herramientas para el procesamiento general de metal y una moderna técnica de precisión.

El surtido es muy completo y consta de herramientas de mecanizado de todo tipo y tamaño. Con Phantom tiene garantizada la calidad y unas posibilidades de trabajo verdaderamente ilimitadas. Precisión y larga vida útil garantizadas. Las ilimitadas se miden en fábrica y se prueban con equipos de última tecnología. Esto nos permite asegurarle que con Phantom es posible mecanizar todo aquello que necesita.

## ZUVERLÄSSIG, INNOVATIV UND HÖCHSTER QUALITÄT

Phantom ist die A-Marke für zerspanende Werkzeuge, die für die Metallbearbeitung geeignet sind. Sie können von bis zu 20.000 Werkzeugen wählen für den allgemeinen Maschinenbau und moderne Feinmechanik.

Der Bereich ist sehr komplett und umfasst Bearbeitungswerkzeuge aller Formen und Größen, auch die besonderen. Phantom hat eine Top Qualität, mit grenzenlosen Möglichkeiten und Optionen. Hier ist Präzision und eine lange Lebensdauer gewährleistet. Sie sind Präzision gewährleistet und lange Lebensdauer. Daher können wir Ihnen versprechen, dass unsere Marke Phantom, für alle Ihre Probleme eine Lösung findet.

**ECO**

- › **LOWEST PRICE**  
LAAGSTE PRIJS  
PRIX TRÈS COMPÉTITIF  
PRECIO MÁS BAJO  
NIEDRIGSTER PREIS

**ECO  
PRO**

- › **INDUSTRIAL QUALITY**  
INDUSTRIE KWALITEIT  
QUALITÉ INDUSTRIELLE  
CALIDAD INDUSTRIAL  
INDUSTRIEQUALITÄT

- › **Basic quality**

Basis kwaliteit  
Qualité STANDARD  
Calidad básica  
Grundlegende Qualität

- › **Suitable for a wide range of materials**

Geschikt voor vele materialen  
Adaptée à différents types de matières  
Adecuado para muchos materiales  
Geeignet für viele Materialien

- › **Professional use**

Professioneel gebruik  
Usage professionnel  
Uso profesional  
Professioneller Einsatz

- › **Favourably priced**

Gunstige prijs  
Le meilleur rapport qualité prix  
Precio favorable  
Günstiger Preis

- › **Suitable for a wide range of materials and stainless steel**

Geschikt voor vele materialen en RVS  
Adaptée à différents types de matières ainsi que les inox  
Adecuado para muchos materiales y acero inoxidable  
Geeignet für viele Materialien und Edelstahl

- › **Professional and industrial use**

Professioneel en industrieel gebruik  
Usage professionnel et industriel  
Uso profesional e industrial  
Professioneller und industrieller Einsatz

## UNA AMPLIA GAMA A PRECIOS COMPETITIVOS

El amplio catálogo con precios competitivos de International Tools le ofrece una selección atractiva de brocas, machos y avellanadores de tamaños habituales. Para uso universal y disponibles en stock.

## BREIT & PREISBEWUSST

Mit seinem breiten und sehr preisbewussten Programm verfügt International Tools über ein attraktives Angebot universell einsetzbarer Bohrer und Gewindebohrer in gängigen Maßen, die ab Lager lieferbar sind.



## ICONEN

## ICONES

## ICONOS

## PIKTOGRAMME

	NL	FR	ES	DE
	2 snijkanten, centrumsnijdend	2 dents, coupe au centre	2 dientes, corte con centro	2 Schneiden, Zentrumschneidend
	2 snijkanten, volradius	2 dents, à rayon complet	2 dientes, con radio completo	2 Schneiden, Vollradius
	3 snijkanten, centrumsnijdend	3 dents, coupe au centre	3 dientes, corte con centro	3 Schneiden, Zentrumschneidend
	4 snijkanten, centrumsnijdend	4 dents, coupe au centre	4 dientes, con corte centro	4 Schneiden, Zentrumschneidend
	4 snijkanten, niet centrumsnijdend	4 dents, pas de coupe au centre	4 dientes, corte sin centro	4 Schneiden, Nicht Zentrumschneidend
	4 snijkanten, centrum-snijdend, volradius	4 dents, coupe au centre, à rayon complet	4 dientes, corte al centro, con radio completo	4 Schneiden, Zentrumschneidend
	5 snijkanten, met ongelijke tandverdeling	5 dents, avec denture à pas différentiel	5 dientes, con paso irregular	5 Schneiden, mit ungleicher Zahnteilung
	6 snijkanten, centrumsnijdend	6 dents, coupe au centre	6 dientes, corte con centro	6 Schneiden, Zentrumschneidend
<b>HSS-E 8%</b>	HSS-E (8% Cobalt)	HSS-E (8% Cobalt)	HSS-E (8% Cobalto)	HSS-E (8% Cobalt)
<b>HSS-E PM</b>	PM HSS-E	Acier rapide fritté de haute qualité	Acero rápido pulvimetalúrgico con	PM HSS-E
<b>TiCN</b>	TiCN gecoat	Revêtement TiCN	Recubrimiento TiCN	TiCN Beschichtung
<b>TiAlN</b>	TiAlN gecoat	Revêtement TiAlN	Recubrimiento TiAlN	TiAlN Beschichtung
<b>DIN 844-B</b>	DIN norm	Norme DIN	Norma DIN	DIN Norm
<b>NORM</b>	Fabriek standaard	Standard usine	Estándar de la fábrica	Werksnorm

	NL	FR	ES	DE
	Spiraalhoek	Angle d'Hélice	Angulo de hélice	Spiralwinkel
<b>HR</b>	Ronde tand, fijn	Profil rond, pas fin	Perfil redondo, paso fino	Feiner Verzahnung
<b>HRf</b>	Ronde tand, extra fijn	Profil rond, pas extra fin	Perfil redondo, paso extra fino	Extra feiner Verzahnung
<b>NR</b>	Ronde tand, grof (NR)	Runder Verzahnung (NR)	Perfil redondo (NR)	Runder Verzahnung (NR)
	Cilindrische schacht	Queue cylindrique	Mango cilíndrico	Zylinderschaft
<b>h6</b>	Cilindrische schacht h6	Queue cylindrique h6	Mango cilíndrico h6	Zylinderschaft h6
<b>DIN 1835-B</b>	Cilindrische schacht met Weldon vlak	Queue cylindrique avec méplat type Weldon	Mango cilíndrico con plano de arrastre tipo Weldon	Zylinderschaft mit Mitnahmefläche Tyo Weldon
	Cilindrische schacht met aantrekdraad	Queue cylindrique filetée	Mango cilíndrico roscado	Zylinderschaft mit Anzugsgewinde
	Met langsspiebaan	Avec rainure de clavette	Con ranura longitudinal	Mit Längsnut
	Met langs- en dwarspiebaan	Avec rainure de clavette et tenons	Con ranura longitudinal y transversal	Mit Längs- und Quernut
<b>d1 +0,00 -0,03</b>	Tolerantie diameter	Tolérance diamètre	Tolerancia diámetro	Toleranz Durchmesser
<b>UNI</b>	Universeel	Universel	Universal	Universal

NL HSS-E Frezen  
FR Fraises HSS-E  
ES Fresas HSS-E  
DE HSS-E Fräser

**P** **K** Bij uitstek geschikt  
**H** **N** Très approprié  
**M** **S** Muy adecuado  
**M** **S** Ideal geeignet

**P** **K** Beperkt geschikt  
**H** **N** Appropriate  
**M** **S** Adecuado  
**M** **S** Eingeschränkt geeignet

> 32.200	<b>Phantom</b>		DIN 327-D	<b>P</b>	<b>N</b>			P. 4		
> 32.204	<b>Phantom</b>		DIN 327-D	<b>P</b>	<b>M</b>	<b>N</b>		P. 4		
> 32.220	<b>Phantom</b>		DIN 327-B	<b>P</b>	<b>N</b>			P. 4		
> 32.224	<b>Phantom</b>		DIN 327-B	<b>P</b>	<b>M</b>	<b>N</b>		P. 5		
> 32.228	<b>Phantom</b>		DIN 327-B HSS-E PM	<b>P</b>	<b>M</b>	<b>K</b>	<b>N</b>		P. 5	
> 32.260	<b>Phantom</b>		NORM	<b>P</b>	<b>N</b>			P. 5		
> 32.320	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 6		
> 32.500	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 6		
> 32.520	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 7		
> 33.200	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 7		
> 33.220	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 7		
> 33.224	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>M</b>	<b>N</b>		P. 8		
> 33.228	<b>Phantom</b>		DIN 844-B HSS-E PM	<b>P</b>	<b>M</b>	<b>K</b>	<b>N</b>	<b>NEW</b>	P. 8	
> 33.360	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 8		
> 33.520	<b>Phantom</b>		NORM	<b>P</b>				P. 9		
> 34.200	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 10		
> 34.204	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>M</b>	<b>N</b>		P. 10		
> 34.220	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 10		
> 34.224	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>M</b>	<b>N</b>		P. 11		
> 34.228	<b>Phantom</b>		DIN 844-B HSS-E PM	<b>P</b>	<b>M</b>	<b>K</b>	<b>N</b>	<b>S</b>	<b>NEW</b>	P. 11
> 34.238	<b>Phantom</b>		DIN 844-B HSS-E PM	<b>P</b>	<b>M</b>	<b>K</b>	<b>N</b>	<b>S</b>	<b>NEW</b>	P. 11
> 34.350	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 12		
> 34.355	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 12		
> 34.370	<b>Phantom</b>		NORM	<b>P</b>	<b>N</b>			P. 12		
> 35.024	<b>Phantom</b>		DIN 327-B	<b>P</b>	<b>M</b>			P. 13		
> 35.100	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 13		
> 35.104	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 13		
> 35.120	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 14		
> 35.124	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 14		
> 35.126	<b>Phantom</b>		DIN 844-B HSS-E PM	<b>P</b>	<b>M</b>	<b>K</b>	<b>N</b>	<b>NEW</b>	P. 14	
> 35.200	<b>Phantom</b>		DIN 844-D	<b>P</b>	<b>N</b>			P. 15		
> 35.220	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>N</b>			P. 15		
> 35.224	<b>Phantom</b>		DIN 844-B	<b>P</b>	<b>M</b>	<b>N</b>		P. 15		















SC 1  
HSS-E-1  
2  
SC 3  
HSS-E-3





> 35.226	Phantom		DIN 844-B	HSS-E PM	P M K N		NEW P. 16
> 35.228	Phantom		DIN 844-B	HSS-E PM	P M K		P. 16
> 35.324	Phantom		DIN 844-B		P M N		P. 16
> 35.720	Phantom		DIN 844-B		P N		P. 17
> 35.726	Phantom		DIN 844-B	HSS-E PM	P M K N		NEW P. 17
> 35.766	Phantom		DIN 844-B	HSS-E PM	P M K N		NEW P. 17
> 36.100	Phantom			ALU	N		P. 18
> 36.120	Phantom				P N		P. 18
> 36.200	Phantom		DIN 327-D		P N		P. 18
> 36.220	Phantom		DIN 327-B		P N		P. 19
> 36.228	Phantom		DIN 844-B	HSS-E PM	P M K		P. 19
> 36.324	Phantom		DIN 844-B		P N		P. 19
> 36.410	Phantom		DIN 6518-B		P N		P. 20
> 36.510	Phantom		DIN 850-D		P N		P. 20
> 36.560	Phantom		DIN 851-AB		P N		P. 21
> 36.620	Phantom		DIN 1833-C		P N		P. 21
> 36.650	Phantom		DIN 1833-C		P N		P. 21
> 36.720	Phantom		DIN 1833-D		P N		P. 22
> 36.750	Phantom		DIN 1833-D		P N		P. 22
> 37.260	Phantom		DIN 841		P M K		P. 23
> 37.270	Phantom		DIN 841		P K		P. 23
> 37.350	Phantom		DIN 1880		P N		P. 23
> 37.360	Phantom		DIN 1880		P M K		P. 24
> 37.370	Phantom		DIN 1880		P K		P. 24
> 37.500	Phantom		DIN 841		P N		P. 24
> 37.580	Phantom		DIN 841		P N		P. 24
> 37.600	Phantom		DIN 1880		P N		P. 25
> 37.604	Phantom		DIN 1880		P		P. 25



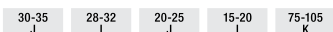
> 37.680	<b>Phantom</b>	DIN 1880	P N		 P. 25
> 38.210	<b>Phantom</b>	DIN 885-A	P M K N		 P. 26
> 38.300	<b>Phantom</b>	DIN 856	P M K N		 P. 26
> 38.350	<b>Phantom</b>	DIN 855	P M K N		 P. 27
> 38.400	<b>Phantom</b>	DIN 842	P M K N		 P. 27
> 38.450	<b>Phantom</b>	DIN 847	P M K N		 P. 27
> 38.500	<b>Phantom</b>	DIN 3972	P M K N		 P. 28
> 39.100	<b>Phantom</b>				 P. 30
> 39.200	<b>Phantom</b>	 DIN 327-B	P N		 P. 30
> 39.300	<b>Phantom</b>	 DIN 844-B	P N		 P. 30
> 39.400	<b>Phantom</b>	 DIN 844-B	P N		 P. 31

SC 1  
HSS-E 1  
2  
SC 3  
HSS-E 3



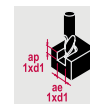
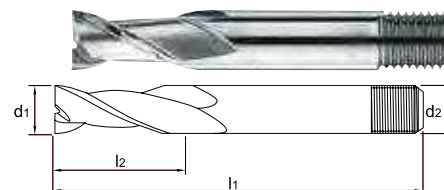
## > 32.200 Phantom

NL HSS-E Schachtfrees, 2-snijder  
FR Fraise à rainurer 2 dents HSS-E  
ES Fresa de ranurar de 2 labios HSS-E  
DE HSS-E Langlochfräser (2-Schneider)



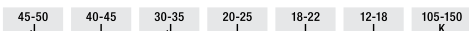
Ref.	d1	d2	l1	l2	z
32.200.0200	2	6	48	4	2
32.200.0300	3	6	49	5	2
32.200.0400	4	6	51	7	2
32.200.0500	5	6	52	8	2
32.200.0600	6	6	52	8	2
32.200.0700	7	10	60	10	2
32.200.0800	8	10	61	11	2
32.200.0900	9	10	61	11	2
32.200.1000	10	10	63	13	2

Ref.	d1	d2	l1	l2	z
32.200.1200	12	12	73	16	2
32.200.1400	14	12	73	16	2
32.200.1500	15	12	73	16	2
32.200.1600	16	16	79	19	2
32.200.1800	18	16	79	19	2
32.200.2000	20	20	88	22	2
32.200.2200	22	20	88	22	2
32.200.2400	24	25	102	26	2
32.200.2500	25	25	102	26	2



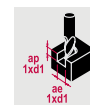
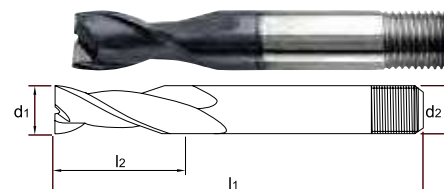
## > 32.204 Phantom

NL HSS-E Schachtfrees, 2-snijder TiAIN  
FR Fraise à rainurer 2 dents HSS-E TiAIN  
ES Fresa de ranurar de 2 labios HSS-E TiAIN  
DE HSS-E Langlochfräser (2-Schneider) TiAIN



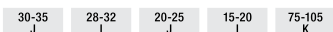
Ref.	d1	d2	l1	l2	z
32.204.0300	3	6	49	5	2
32.204.0400	4	6	51	7	2
32.204.0500	5	6	52	8	2
32.204.0600	6	6	52	8	2

Ref.	d1	d2	l1	l2	z
32.204.0800	8	10	61	11	2
32.204.1000	10	10	63	13	2
32.204.1200	12	12	73	16	2
32.204.1400	14	12	73	16	2



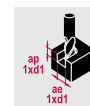
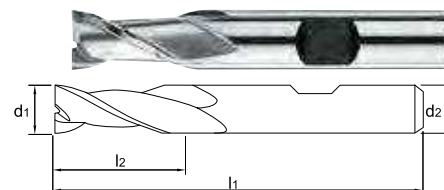
## > 32.220 Phantom

NL HSS-E Schachtfrees, 2-snijder  
FR Fraise à rainurer 2 dents HSS-E  
ES Fresa de ranurar de 2 labios HSS-E  
DE HSS-E Langlochfräser (2-Schneider)



Ref.	d1	d2	l1	l2	z
32.220.0200	2	6	48	4	2
32.220.0250	2.5	6	49	5	2
32.220.0300	3	6	49	5	2
32.220.0350	3.5	6	50	6	2
32.220.0400	4	6	51	7	2
32.220.0450	4.5	6	51	7	2
32.220.0500	5	6	52	8	2
32.220.0550	5.5	6	52	8	2
32.220.0600	6	6	52	8	2
32.220.0650	6.5	10	60	10	2
32.220.0700	7	10	60	10	2
32.220.0750	7.5	10	60	10	2
32.220.0800	8	10	61	11	2
32.220.0850	8.5	10	61	11	2

Ref.	d1	d2	l1	l2	z
32.220.0900	9	10	61	11	2
32.220.0950	9.5	10	61	11	2
32.220.1000	10	10	63	13	2
32.220.1050	10.5	12	70	13	2
32.220.1100	11	12	70	13	2
32.220.1200	12	12	73	16	2
32.220.1250	12.5	12	73	16	2
32.220.1300	13	12	73	16	2
32.220.1400	14	12	73	16	2
32.220.1500	15	12	73	16	2
32.220.1600	16	16	79	19	2
32.220.1700	17	16	79	19	2
32.220.1800	18	16	79	19	2
32.220.1900	19	16	79	19	2



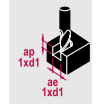
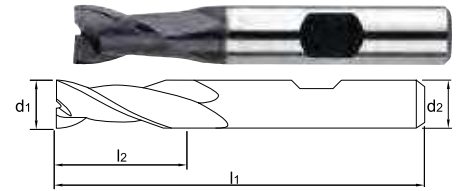
> **32.224 Phantom**

NL HSS-E Schachtfrees, 2-snijder TiAlN  
 FR Fraise à rainurer 2 dents HSS-E TiAlN  
 ES Fresa de ranurar de 2 labios HSS-E TiAlN  
 DE HSS-E Langlochfräser (2-Schneider) TiAlN

45-50 J    40-45 J    30-35 J    20-25 J    18-22 J    12-18 J    105-150 K

Ref.	d1	d2	l1	l2	z
32.224.0200	2	6	48	4	2
32.224.0300	3	6	49	5	2
32.224.0400	4	6	51	7	2
32.224.0500	5	6	52	8	2
32.224.0600	6	6	52	8	2
32.224.0700	7	10	60	10	2

Ref.	d1	d2	l1	l2	z
32.224.0800	8	10	61	11	2
32.224.0900	9	10	61	11	2
32.224.1000	10	10	63	13	2
32.224.1200	12	12	73	16	2
32.224.1400	14	12	73	16	2
32.224.1500	15	12	73	16	2



Ref.	d1	d2	l1	l2	z
32.224.1600	16	16	79	19	2
32.224.1800	18	16	79	19	2
32.224.2000	20	20	82	22	2
32.224.2500	25	25	102	26	2
32.224.3000	30	25	102	26	2

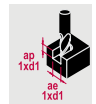
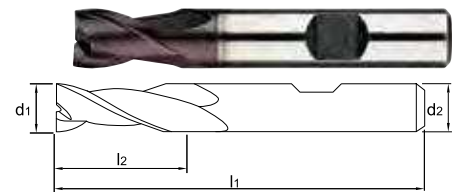
> **32.228 Phantom**

NL HSS-E PM Schachtfrees, 2-snijder TiAlN  
 FR Fraise à rainurer 2 dents HSS-E PM TiAlN  
 ES Fresa de ranurar de 2 labios HSS-E PM TiAlN  
 DE HSS-E PM Langlochfräser (2-Schneider) TiAlN

45-70 J    35-50 J    30-40 J    20-30 J    20-25 J    15-20 J    35-45 J    35-45 J    50-70 J    15-30 H

Ref.	d1	d2	l1	l2	z
32.228.0200	2	6	48	4	2
32.228.0300	3	6	49	5	2
32.228.0400	4	6	51	7	2
32.228.0500	5	6	52	8	2
32.228.0600	6	6	52	8	2

Ref.	d1	d2	l1	l2	z
32.228.0800	8	10	61	11	2
32.228.1000	10	10	63	13	2
32.228.1200	12	12	73	16	2
32.228.1400	14	12	73	16	2
32.228.1600	16	16	79	19	2



Ref.	d1	d2	l1	l2	z
32.228.1800	18	16	79	19	2
32.228.2000	20	20	82	22	2
32.228.2200	22	20	88	22	2
32.228.2500	25	25	102	26	2

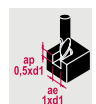
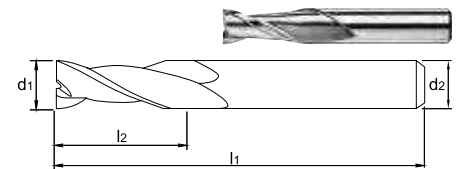
> **32.260 Phantom**

NL HSS-E Precisie Schachtfrees, 2-snijder  
 FR Fraise de précision 2 dents HSS-E  
 ES Fresa de precisión HSS-E  
 DE HSS-E Präzision Fräser (2-Schneider)

30-35 B    28-32 A    20-25 B    15-20 A    75-105 C

Ref.	d1	d2	l1	l2	z
32.260.0040	0.4	3	37	1	2
32.260.0050	0.5	3	37	1.5	2
32.260.0060	0.6	3	37	1.5	2
32.260.0070	0.7	4	37	2	2
32.260.0080	0.8	4	37	2	2
32.260.0090	0.9	4	37	2.5	2
32.260.0100	1	4	37	3	2
32.260.0110	1.1	4	37	3	2
32.260.0120	1.2	4	37	4	2
32.260.0130	1.3	4	37	4	2
32.260.0140	1.4	4	37	4	2
32.260.0150	1.5	4	37	4	2
32.260.0160	1.6	4	37	4	2
32.260.0170	1.7	4	37	5	2
32.260.0180	1.8	4	37	5	2
32.260.0190	1.9	4	37	5	2
32.260.0200	2	4	37	5	2
32.260.0210	2.1	4	37	5	2
32.260.0220	2.2	4	37	5	2

Ref.	d1	d2	l1	l2	z
32.260.0230	2.3	4	40	7	2
32.260.0240	2.4	4	40	7	2
32.260.0250	2.5	4	40	7	2
32.260.0260	2.6	4	40	7	2
32.260.0270	2.7	4	40	7	2
32.260.0280	2.8	5	44	8	2
32.260.0290	2.9	5	44	8	2
32.260.0300	3	5	44	8	2
32.260.0310	3.1	5	44	8	2
32.260.0320	3.2	5	44	8	2
32.260.0330	3.3	5	44	10	2
32.260.0340	3.4	5	44	10	2
32.260.0350	3.5	5	44	10	2
32.260.0360	3.6	5	44	10	2
32.260.0370	3.7	5	44	10	2
32.260.0380	3.8	6	51	12	2
32.260.0390	3.9	6	51	12	2
32.260.0400	4	6	51	12	2
32.260.0410	4.1	6	51	12	2



Ref.	d1	d2	l1	l2	z
32.260.0420	4.2	6	51	12	2
32.260.0430	4.3	6	51	12	2
32.260.0440	4.4	6	51	12	2
32.260.0450	4.5	6	51	12	2
32.260.0460	4.6	6	51	12	2
32.260.0470	4.7	6	51	12	2
32.260.0480	4.8	6	52	14	2
32.260.0490	4.9	6	52	14	2
32.260.0500	5	6	52	14	2
32.260.0510	5.1	6	52	14	2
32.260.0520	5.2	6	52	14	2
32.260.0530	5.3	6	52	14	2
32.260.0540	5.4	6	52	14	2
32.260.0550	5.5	6	52	14	2
32.260.0560	5.6	6	52	14	2
32.260.0570	5.7	6	52	14	2
32.260.0580	5.8	8	60	16	2
32.260.0590	5.9	8	60	16	2
32.260.0600	6	8	60	16	2



## > 32.260 Phantom

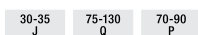
Ref.	d1	d2	l1	l2	z
32.260.0610	6.1	8	60	16	2
32.260.0620	6.2	8	60	16	2
32.260.0630	6.3	8	60	16	2
32.260.0640	6.4	8	60	16	2
32.260.0650	6.5	8	60	16	2
32.260.0660	6.6	8	60	16	2
32.260.0670	6.7	8	60	16	2
32.260.0680	6.8	8	60	16	2
32.260.0690	6.9	8	60	16	2
32.260.0700	7	8	60	16	2
32.260.0710	7.1	8	60	16	2
32.260.0720	7.2	8	60	16	2
32.260.0730	7.3	8	60	16	2
32.260.0740	7.4	8	60	16	2

Ref.	d1	d2	l1	l2	z
32.260.0750	7.5	8	60	16	2
32.260.0760	7.6	8	60	16	2
32.260.0770	7.7	8	60	16	2
32.260.0780	7.8	8	61	18	2
32.260.0790	7.9	8	61	18	2
32.260.0800	8	8	61	18	2
32.260.0810	8.1	10	69	18	2
32.260.0820	8.2	10	69	18	2
32.260.0830	8.3	10	69	18	2
32.260.0840	8.4	10	69	18	2
32.260.0850	8.5	10	69	18	2
32.260.0860	8.6	10	69	18	2
32.260.0870	8.7	10	69	18	2
32.260.0880	8.8	10	69	18	2

Ref.	d1	d2	l1	l2	z
32.260.0890	8.9	10	69	18	2
32.260.0900	9	10	69	18	2
32.260.0910	9.1	10	69	18	2
32.260.0920	9.2	10	69	18	2
32.260.0930	9.3	10	69	18	2
32.260.0940	9.4	10	69	18	2
32.260.0950	9.5	10	69	18	2
32.260.0960	9.6	10	69	18	2
32.260.0970	9.7	10	69	18	2
32.260.0980	9.8	10	69	20	2
32.260.0990	9.9	10	69	20	2
32.260.1000	10	10	69	20	2

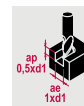
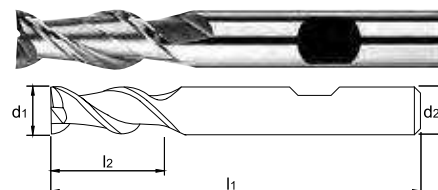
## > 32.320 Phantom

NL HSS-E Schachtfrees, 2-snijder Aluminium  
 FR Fraise à rainurer 2 dents HSS-E Aluminium  
 ES Fresa de ranurar de 2 labios HSS-E Aluminio  
 DE HSS-E Langlochfräser (2-Schneider) Aluminium



Ref.	d1	d2	l1	l2	z
32.320.0200	2	6	51	7	2
32.320.0300	3	6	52	8	2
32.320.0400	4	6	55	11	2
32.320.0500	5	6	57	13	2
32.320.0600	6	6	57	13	2
32.320.0700	7	10	66	16	2

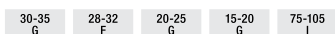
Ref.	d1	d2	l1	l2	z
32.320.0800	8	10	69	19	2
32.320.0900	9	10	69	19	2
32.320.1000	10	10	72	22	2
32.320.1100	11	12	79	22	2
32.320.1200	12	12	83	26	2
32.320.1300	13	12	83	26	2



Ref.	d1	d2	l1	l2	z
32.320.1400	14	12	83	26	2
32.320.1500	15	12	83	26	2
32.320.1600	16	16	92	32	2
32.320.1800	18	16	92	32	2
32.320.2000	20	20	104	38	2

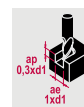
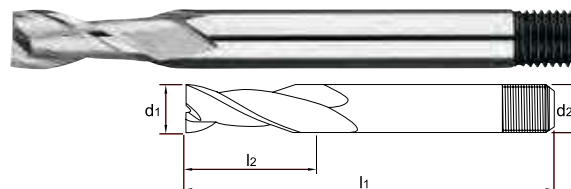
## > 32.500 Phantom

NL HSS-E Schachtfrees, 2-snijder lang  
 FR Fraise à rainurer 2 dents HSS-E version longue  
 ES Fresa de ranurar de 2 labios HSS-E larga  
 DE HSS-E Langlochfräser (2-Schneider) lang



Ref.	d1	d2	l1	l2	z
32.500.0600	6	6	68	13	2
32.500.0800	8	10	88	19	2

Ref.	d1	d2	l1	l2	z
32.500.1000	10	10	95	22	2
32.500.1200	12	12	110	26	2

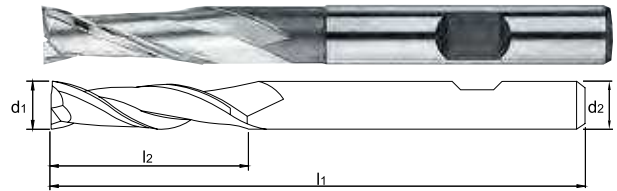


Ref.	d1	d2	l1	l2	z
32.500.1600	16	16	123	32	2
32.500.2000	20	20	141	38	2



> **32.520** **Phantom**

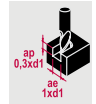
NL **HSS-E Schachtfrees, 2-snijder lang**  
 FR **Fraise à rainurer 2 dents HSS-E version longue**  
 ES **Fresa de ranurar de 2 labios HSS-E larga**  
 DE **HSS-E Langlochfräser (2-Schneider) lang**



Ref.	d1	d2	l1	l2	z
32.520.0300	3	6	56	8	2
32.520.0400	4	6	63	11	2
32.520.0500	5	6	68	13	2
32.520.0600	6	6	68	13	2
32.520.0800	8	10	88	19	2

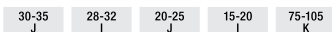
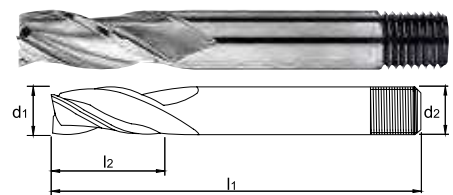
Ref.	d1	d2	l1	l2	z
32.520.1000	10	10	95	22	2
32.520.1200	12	12	110	26	2
32.520.1400	14	12	110	26	2
32.520.1600	16	16	123	32	2
32.520.1800	18	16	123	32	2

Ref.	d1	d2	l1	l2	z
32.520.2000	20	20	141	38	2
32.520.2400	24	25	166	45	2
32.520.2500	25	25	166	45	2



> **33.200** **Phantom**

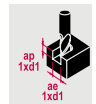
NL **HSS-E Schachtfrees, 3-snijder**  
 FR **Fraise universelle 3 dents HSS-E**  
 ES **Fresa frontal de 3 labios HSS-E**  
 DE **HSS-E Universalfräser**



Ref.	d1	d2	l1	l2	z
33.200.0400	4	6	55	11	3
33.200.0500	5	6	57	13	3
33.200.0600	6	6	57	13	3
33.200.0700	7	10	66	16	3
33.200.0800	8	10	69	19	3

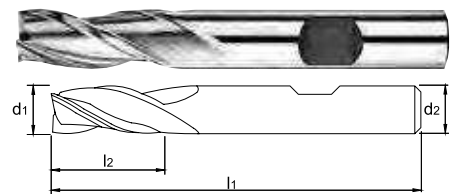
Ref.	d1	d2	l1	l2	z
33.200.0900	9	10	69	19	3
33.200.1000	10	10	72	22	3
33.200.1200	12	12	83	26	3
33.200.1400	14	12	83	26	3
33.200.1500	15	12	83	26	3

Ref.	d1	d2	l1	l2	z
33.200.1600	16	16	92	32	3
33.200.1800	18	16	92	32	3
33.200.2000	20	20	104	38	3



> **33.220** **Phantom**

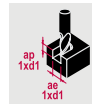
NL **HSS-E Schachtfrees, 3-snijder**  
 FR **Fraise universelle 3 dents HSS-E**  
 ES **Fresa frontal de 3 labios HSS-E**  
 DE **HSS-E Universalfräser**



Ref.	d1	d2	l1	l2	z
33.220.0100	1	6	47	3	3
33.220.0150	1.5	6	51	7	3
33.220.0200	2	6	51	7	3
33.220.0250	2.5	6	52	8	3
33.220.0300	3	6	52	8	3
33.220.0350	3.5	6	54	10	3
33.220.0400	4	6	55	11	3
33.220.0450	4.5	6	55	11	3
33.220.0500	5	6	57	13	3

Ref.	d1	d2	l1	l2	z
33.220.0550	5.5	6	57	13	3
33.220.0600	6	6	57	13	3
33.220.0650	6.5	10	66	16	3
33.220.0700	7	10	66	16	3
33.220.0800	8	10	69	19	3
33.220.0900	9	10	69	19	3
33.220.1000	10	10	72	22	3
33.220.1200	12	12	83	26	3
33.220.1400	14	12	83	26	3

Ref.	d1	d2	l1	l2	z
33.220.1500	15	12	83	26	3
33.220.1600	16	16	92	32	3
33.220.1800	18	16	92	32	3
33.220.2000	20	20	104	38	3
33.220.2200	22	20	104	38	3
33.220.2400	24	25	121	45	3
33.220.2500	25	25	121	45	3





### > 33.224 Phantom

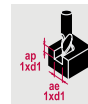
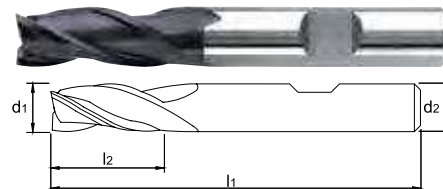
NL HSS-E Schachtfrees, 3-snijder TiAIN  
 FR Fraise universelle 3 dents HSS-E TiAIN  
 ES Fresa frontal de 3 labios HSS-E TiAIN  
 DE HSS-E Universalfräser TiAIN



45-50 J	40-45 I	30-35 J	20-25 I	18-22 I	12-18 I	105-150 K
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Ref.	d1	d2	l1	l2	z
33.224.0150	1.5	6	51	7	3
33.224.0200	2	6	51	7	3
33.224.0250	2.5	6	52	8	3
33.224.0300	3	6	52	8	3
33.224.0400	4	6	55	11	3

Ref.	d1	d2	l1	l2	z
33.224.0500	5	6	57	13	3
33.224.0600	6	6	57	13	3
33.224.0800	8	10	69	19	3
33.224.1000	10	10	72	22	3
33.224.1200	12	12	83	26	3



### > 33.228 Phantom

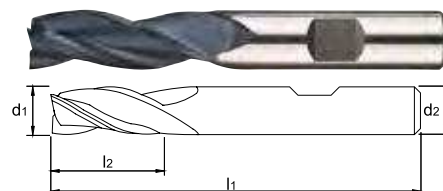
NL HSS-E PM Schachtfrees, 3-snijder AITiN-X  
 FR Fraise universelle 3 dents HSS-E PM AITiN-X  
 ES Fresa frontal de 3 labios HSS-E PM AITiN-X  
 DE HSS-E PM Universalfräser AITiN-X



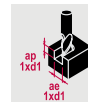
45-70 J	35-50 J	30-40 J	20-30 J	20-25 I	15-20 I	35-45 J	35-45 J	50-70 J	15-30 H
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Ref.	d1	d2	l1	l2	z
33.228.0200	2	6	51	7	3
33.228.0300	3	6	52	8	3
33.228.0400	4	6	55	11	3
33.228.0500	5	6	57	13	3

Ref.	d1	d2	l1	l2	z
33.228.0600	6	6	57	13	3
33.228.0800	8	10	69	19	3
33.228.1000	10	10	72	22	3
33.228.1200	12	12	83	26	3

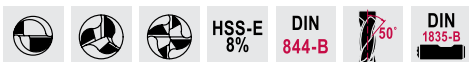


**NIEUW / NOUVEAU / NUEVO / NEU**



### > 33.360 Phantom

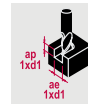
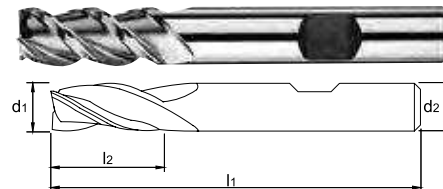
NL HSS-E Schachtfrees, 3-snijder spiraalhoek 50°  
 FR Fraise universelle 3 dents HSS-E hélice 50°  
 ES Fresa frontal de 3 labios HSS-E ángulo de hélice 50°  
 DE HSS-E Universalfräser Spiralwinkel 50°



30-35 J	28-32 I	20-25 J	15-20 I	75-105 K
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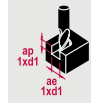
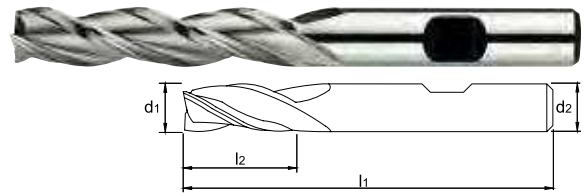
Ref.	d1	d2	l1	l2	z
33.360.0200	2	6	51	7	2
33.360.0300	3	6	52	8	2
33.360.0400	4	6	55	11	2
33.360.0500	5	6	57	13	2

Ref.	d1	d2	l1	l2	z
33.360.0600	6	6	57	13	3
33.360.0800	8	10	69	19	3
33.360.0900	9	10	69	19	3
33.360.1000	10	10	72	22	3



» **33.520** **Phantom**

NL **HSS-E Schachtfrees, 3-snijder lang**  
 FR **Fraise universelle 3 dents HSS-E version longue**  
 ES **Fresa frontal de 3 labios HSS-E larga**  
 DE **HSS-E Universalfräser lang**



Ref.	d1	d2	l1	l2	z
33.520.0300	3	6	56	12	3
33.520.0400	4	6	63	19	3
33.520.0500	5	6	68	24	3
33.520.0600	6	6	68	24	3
33.520.0700	7	10	80	30	3
33.520.0800	8	10	88	38	3

Ref.	d1	d2	l1	l2	z
33.520.0900	9	10	88	38	3
33.520.1000	10	10	95	45	3
33.520.1100	11	12	102	45	3
33.520.1200	12	12	110	53	3
33.520.1300	13	12	110	53	3
33.520.1400	14	12	110	53	3

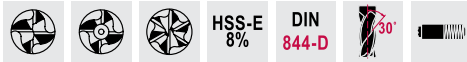
Ref.	d1	d2	l1	l2	z
33.520.1500	15	12	110	53	3
33.520.1600	16	16	123	63	3
33.520.1800	18	16	123	63	3
33.520.2000	20	20	141	75	3





## > 34.200 Phantom

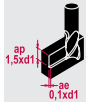
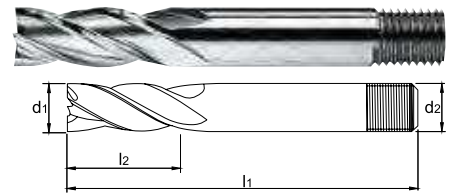
NL HSS-E Schachtfrees, meersnijder  
FR Fraise standard HSS-E  
ES Fresa frontal de varios labios HSS-E  
DE HSS-E Mehrschneiden-Schaftfräser



30-35 J 28-32 I 20-25 J 15-20 I 75-105 K

Ref.	d1	d2	l1	l2	z
34.200.0200	2	6	51	7	4
34.200.0300	3	6	52	8	4
34.200.0400	4	6	55	11	4
34.200.0500	5	6	57	13	4
34.200.0600	6	6	57	13	4
34.200.0700	7	10	66	16	4
34.200.0800	8	10	69	19	4
34.200.0900	9	10	69	19	4
34.200.1000	10	10	72	22	4

Ref.	d1	d2	l1	l2	z
34.200.1100	11	12	79	22	4
34.200.1200	12	12	83	26	4
34.200.1300	13	12	83	26	4
34.200.1400	14	12	83	26	4
34.200.1500	15	12	83	26	4
34.200.1600	16	16	92	32	4
34.200.1700	17	16	92	32	4
34.200.1800	18	16	92	32	4
34.200.1900	19	16	92	32	4



## > 34.204 Phantom

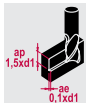
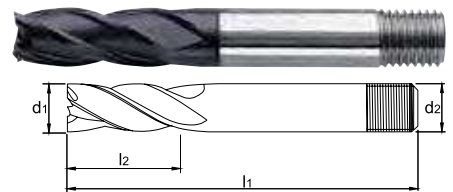
NL HSS-E Schachtfrees, meersnijder TiAIN  
FR Fraise standard HSS-E TiAIN  
ES Fresa frontal de varios labios HSS-E TiAIN  
DE HSS-E Mehrschneiden-Schaftfräser TiAIN



45-50 J 40-45 I 30-35 J 20-25 I 22-28 I 18-24 G 105-150 K

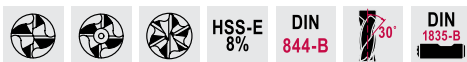
Ref.	d1	d2	l1	l2	z
34.204.0300	3	6	52	8	4
34.204.0400	4	6	55	11	4
34.204.0500	5	6	57	13	4
34.204.0600	6	6	57	13	4

Ref.	d1	d2	l1	l2	z
34.204.0800	8	10	69	19	4
34.204.1000	10	10	72	22	4
34.204.1200	12	12	83	26	4
34.204.1400	14	12	83	26	4



## > 34.220 Phantom

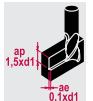
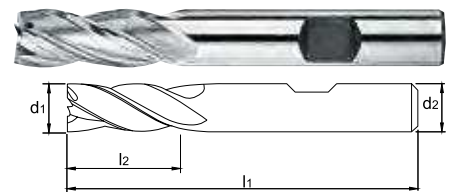
NL HSS-E Schachtfrees, meersnijder  
FR Fraise standard HSS-E  
ES Fresa frontal de varios labios HSS-E  
DE HSS-E Mehrschneiden-Schaftfräser



30-35 J 28-32 I 20-25 J 15-20 I 75-105 K

Ref.	d1	d2	l1	l2	z
34.220.0200	2	6	51	7	4
34.220.0300	3	6	52	8	4
34.220.0400	4	6	55	11	4
34.220.0500	5	6	57	13	4
34.220.0600	6	6	57	13	4
34.220.0700	7	10	66	16	4
34.220.0800	8	10	69	19	4
34.220.0900	9	10	69	19	4
34.220.1000	10	10	72	22	4
34.220.1100	11	12	79	22	4
34.220.1200	12	12	83	26	4

Ref.	d1	d2	l1	l2	z
34.220.1300	13	12	83	26	4
34.220.1400	14	12	83	26	4
34.220.1500	15	12	83	26	4
34.220.1600	16	16	92	32	4
34.220.1700	17	16	92	32	4
34.220.1800	18	16	92	32	4
34.220.1900	19	16	92	32	4
34.220.2000	20	20	104	38	4
34.220.2200	22	20	104	38	6
34.220.2400	24	25	121	45	6
34.220.2500	25	25	121	45	6

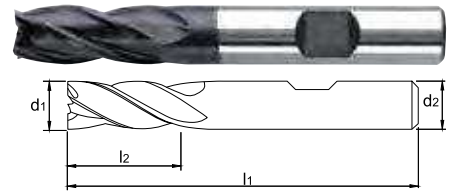


Ref.	d1	d2	l1	l2	z
34.220.2600	26	25	121	45	6
34.220.2800	28	25	121	45	6
34.220.3000	30	25	121	45	6
34.220.3200	32	32	133	53	6
34.220.3400	34	32	133	53	6
34.220.3500	35	32	133	53	6
34.220.3600	36	32	133	53	6
34.220.3800	38	32	143	63	6
34.220.4000	40	32	143	63	6

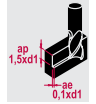


> **34.224 Phantom**

NL **HSS-E Schachtfrees, meersnijder TiAIN**  
 FR **Fraise standard HSS-E TiAIN**  
 ES **Fresa frontal de varios labios HSS-E TiAIN**  
 DE **HSS-E Mehrschneiden-Schafffräser TiAIN**



<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>N 41</b> Alu
45-50 J	40-45 I	30-35 J	20-25 J	22-28 I	18-24 G	105-150 K



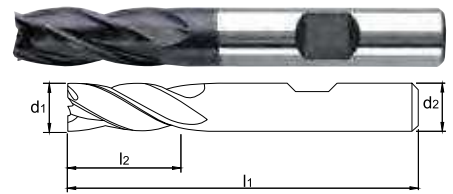
Ref.	d1	d2	l1	l2	z
34.224.0200	2	6	51	7	4
34.224.0300	3	6	52	8	4
34.224.0400	4	6	55	11	4
34.224.0500	5	6	57	13	4
34.224.0600	6	6	57	13	4

Ref.	d1	d2	l1	l2	z
34.224.0800	8	10	69	19	4
34.224.1000	10	10	72	22	4
34.224.1200	12	12	83	26	4
34.224.1400	14	12	83	26	4
34.224.1600	16	16	92	32	4

Ref.	d1	d2	l1	l2	z
34.224.1800	18	16	92	32	4
34.224.2000	20	20	104	38	4
34.224.2500	25	25	121	45	4
34.224.3000	30	25	121	45	6
34.224.3200	32	32	133	53	6

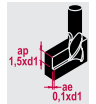
> **34.228 Phantom**

NL **HSS-E PM Schachtfrees, meersnijder AlTiN-X**  
 FR **Fraise standard HSS-E PM AlTiN-X**  
 ES **Fresa frontal de varios labios HSS-E PM AlTiN-X**  
 DE **HSS-E PM Mehrschneiden-Schafffräser AlTiN-X**



**NIEUW NOUVEAU NUEVO NEU**

<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 51</b> Cu	<b>N 52</b> CuAlFe
45-70 J	35-50 J	30-40 J	20-30 J	20-25 I	15-20 I	35-45 J	35-45 J	50-70 J	15-30 H



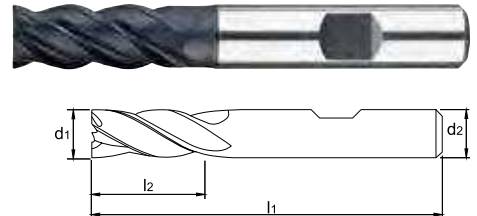
Ref.	d1	d2	l1	l2	z
34.228.0300	3	6	52	8	4
34.228.0400	4	6	55	11	4
34.228.0500	5	6	57	13	4
34.228.0600	6	6	57	13	4

Ref.	d1	d2	l1	l2	z
34.228.0800	8	10	69	19	4
34.228.1000	10	10	72	22	4
34.228.1200	12	12	83	26	4
34.228.1400	14	12	83	26	4

Ref.	d1	d2	l1	l2	z
34.228.1600	16	16	92	32	4
34.228.1800	18	16	92	32	4
34.228.2000	20	20	104	38	4

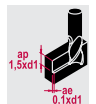
> **34.238 Phantom**

NL **HSS-E PM Vari-frees, 4-snijder AlTiN-X**  
 FR **Fraise Vari 4 dents HSS-E PM AlTiN-X**  
 ES **Fresa Vari HSS-E PM AlTiN-X**  
 DE **HSS-E PM Fräser mit ungleicher Drillsteigung AlTiN-X**



**NIEUW NOUVEAU NUEVO NEU**

<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 51</b> Cu	<b>N 52</b> CuAlFe
45-70 J	35-50 J	30-40 J	20-30 J	20-25 I	15-20 I	35-45 J	35-45 J	50-70 J	15-30 H



Ref.	d1	d2	l1	l2	z
34.238.0600	6	6	57	13	4
34.238.0800	8	10	69	19	4

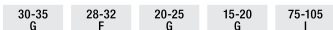
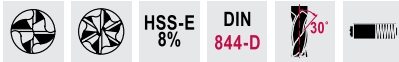
Ref.	d1	d2	l1	l2	z
34.238.1000	10	10	72	22	4
34.238.1200	12	12	83	26	4

Ref.	d1	d2	l1	l2	z
34.238.1600	16	16	92	32	4
34.238.2000	20	20	104	38	4



## > 34.350 Phantom

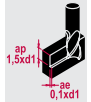
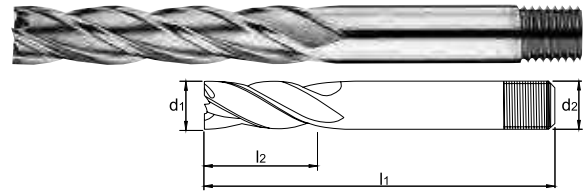
NL HSS-E Schachtfrees, meersnijder lang  
 FR Fraise standard HSS-E version longue  
 ES Fresa frontal de varios labios HSS-E larga  
 DE HSS-E Mehrschneiden-Schafffräser lang



Ref.	d1	d2	l1	l2	z
34.350.0300	3	6	56	12	4
34.350.0400	4	6	63	19	4
34.350.0500	5	6	68	24	4
34.350.0600	6	6	68	24	4
34.350.0800	8	10	88	38	4
34.350.1000	10	10	95	45	4
34.350.1200	12	12	110	53	4

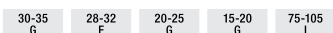
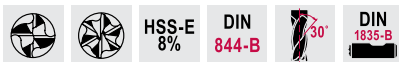
Ref.	d1	d2	l1	l2	z
34.350.1400	14	12	110	53	4
34.350.1500	15	12	110	53	4
34.350.1600	16	16	123	63	4
34.350.1800	18	16	123	63	4
34.350.2000	20	20	141	75	4
34.350.2200	22	20	141	75	6
34.350.2400	24	25	166	90	6

Ref.	d1	d2	l1	l2	z
34.350.2500	25	25	166	90	6
34.350.2600	26	25	166	90	6
34.350.2800	28	25	166	90	6
34.350.3000	30	25	166	90	6
34.350.3200	32	32	186	106	6
34.350.3600	36	32	186	106	6



## > 34.355 Phantom

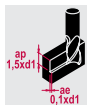
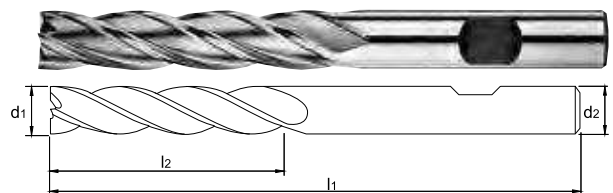
NL HSS-E Schachtfrees, meersnijder lang  
 FR Fraise standard HSS-E version longue  
 ES Fresa frontal de varios labios HSS-E larga  
 DE HSS-E Mehrschneiden-Schafffräser lang



Ref.	d1	d2	l1	l2	z
34.355.0200	2	6	54	10	4
34.355.0300	3	6	56	12	4
34.355.0400	4	6	63	19	4
34.355.0500	5	6	68	24	4
34.355.0600	6	6	68	24	4
34.355.0700	7	10	80	30	4
34.355.0800	8	10	88	38	4
34.355.1000	10	10	95	45	4
34.355.1100	11	12	102	45	4

Ref.	d1	d2	l1	l2	z
34.355.1200	12	12	110	53	4
34.355.1400	14	12	110	53	4
34.355.1500	15	12	110	53	4
34.355.1600	16	16	123	63	4
34.355.1700	17	16	123	63	4
34.355.1800	18	16	123	63	4
34.355.1900	19	16	123	63	4
34.355.2000	20	20	141	75	4
34.355.2200	22	20	141	75	6

Ref.	d1	d2	l1	l2	z
34.355.2400	24	25	166	90	6
34.355.2500	25	25	166	90	6
34.355.2600	26	25	166	90	6
34.355.3000	30	25	166	90	6
34.355.3200	32	32	186	106	6
34.355.3600	36	32	186	106	6
34.355.4000	40	40	217	125	6



## > 34.370 Phantom

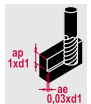
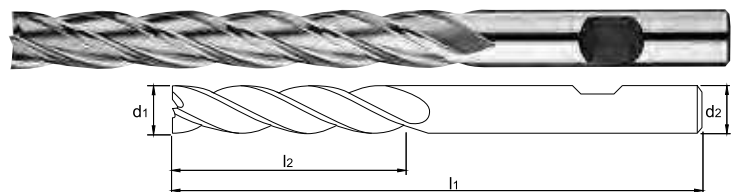
NL HSS-E Schachtfrees, 4-snijder extra lang  
 FR Fraise standard 4 dents HSS-E extra long  
 ES Fresa frontal de varios labios HSS-E extra larga  
 DE HSS-E 4 Schneiden-Schafffräser extra lang



Ref.	d1	d2	l1	l2
34.370.0600	6	6	100	56
34.370.0800	8	10	113	63
34.370.1000	10	10	120	70

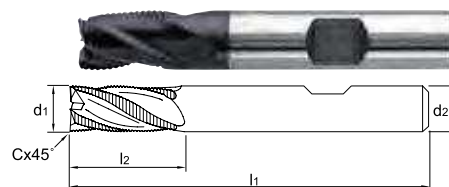
Ref.	d1	d2	l1	l2
34.370.1200	12	12	137	80
34.370.1400	14	12	137	80
34.370.1600	16	16	150	90

Ref.	d1	d2	l1	l2
34.370.1800	18	16	160	100
34.370.2000	20	20	176	110
34.370.2500	25	25	186	110



> **35.024** **Phantom**

NL **HSS-E Ruwfrees kort, TiAIN, fijn**  
 FR **Fraise d'ébauche HSS-E courte, TiAIN, pas fin**  
 ES **Fresa de desbaste HSS-E corta, TiAIN, paso fino**  
 DE **HSS-E Schruppfräser kurz, TiAIN, fein**



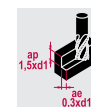
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850 N/mm <sup>2</sup>	<b>M 22</b> INOX >850 N/mm <sup>2</sup>
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45-50 I	35-40 H	30-35 I	18-24 H	22-28 I	18-24 G
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Ref.	d1	d2	l1	l2	c	z
35.024.0600	6	6	52	8	0,2	3
35.024.0800	8	10	61	11	0,2	4

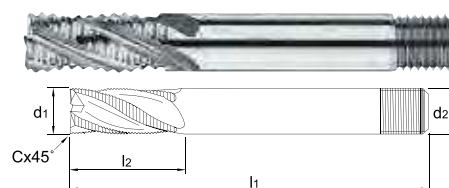
Ref.	d1	d2	l1	l2	c	z
35.024.1000	10	10	63	13	0,2	4
35.024.1200	12	12	73	16	0,2	4

Ref.	d1	d2	l1	l2	c	z
35.024.1600	16	16	79	19	0,25	4
35.024.2000	20	20	82	22	0,25	4



> **35.100** **Phantom**

NL **HSS-E Ruwfrees rond**  
 FR **Fraise d'ébauche HSS-E ronde**  
 ES **Fresa de desbaste HSS-E redondo**  
 DE **HSS-E Schruppfräser rund**



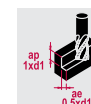
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>N 41</b> Alu
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30-35 L	25-30 K	20-25 L	15-20 J	75-85 L
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Ref.	d1	d2	l1	l2	c	z
35.100.0600	6	6	57	13	0,25	3
35.100.0700	7	10	66	16	0,25	3
35.100.0800	8	10	69	19	0,25	3
35.100.0900	9	10	69	19	0,35	3
35.100.1000	10	10	72	22	0,35	4

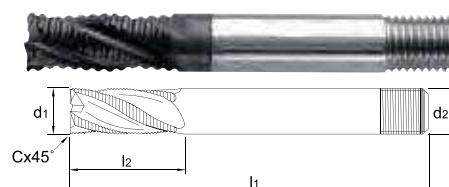
Ref.	d1	d2	l1	l2	c	z
35.100.1100	11	12	79	22	0,5	4
35.100.1200	12	12	83	26	0,5	4
35.100.1300	13	12	83	26	0,5	4
35.100.1400	14	12	83	26	0,55	4
35.100.1500	15	12	83	26	0,55	4

Ref.	d1	d2	l1	l2	c	z
35.100.1600	16	16	92	32	0,55	4
35.100.1800	18	16	92	32	0,55	4
35.100.2000	20	20	104	38	0,55	4



> **35.104** **Phantom**

NL **HSS-E Ruwfrees TiAIN, rond**  
 FR **Fraise d'ébauche HSS-E TiAIN, ronde**  
 ES **Fresa de desbaste HSS-E TiAIN, redondo**  
 DE **HSS-E Schruppfräser TiAIN, rund**



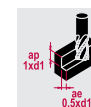
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>N 41</b> Alu
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45-50 L	35-40 K	25-30 L	15-20 J	105-120 L
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Ref.	d1	d2	l1	l2	c	z
35.104.0600	6	6	57	13	0,25	3
35.104.0800	8	10	69	19	0,25	3
35.104.1000	10	10	72	22	0,35	4

Ref.	d1	d2	l1	l2	c	z
35.104.1200	12	12	83	26	0,5	4
35.104.1400	14	12	83	26	0,55	4
35.104.1600	16	16	92	32	0,55	4

Ref.	d1	d2	l1	l2	c	z
35.104.1800	18	16	92	32	0,55	4
35.104.2000	20	20	104	38	0,55	4





**> 35.120 Phantom**

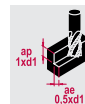
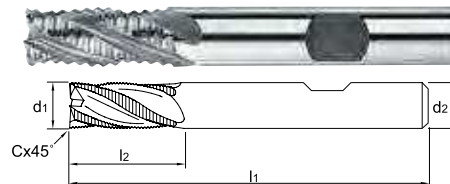
NL HSS-E Ruwfree rond  
 FR Fraise d'ébauche HSS-E ronde  
 ES Fresa de desbaste HSS-E redondo  
 DE HSS-E Schruppfräser rund



30-35 L	25-30 K	20-25 L	15-20 J	75-85 L
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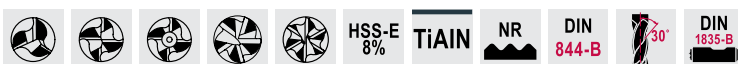
Ref.	d1	d2	l1	l2	c	z
35.120.0600	6	6	57	13	0,25	3
35.120.0700	7	10	66	16	0,25	3
35.120.0800	8	10	69	19	0,25	3
35.120.0900	9	10	69	19	0,35	3
35.120.1000	10	10	72	22	0,35	4
35.120.1100	11	12	79	22	0,5	4
35.120.1200	12	12	83	26	0,5	4

Ref.	d1	d2	l1	l2	c	z
35.120.1300	13	12	83	26	0,5	4
35.120.1400	14	12	83	26	0,55	4
35.120.1500	15	12	83	26	0,55	4
35.120.1600	16	16	92	32	0,55	4
35.120.1800	18	16	92	32	0,55	4
35.120.2000	20	20	104	38	0,55	4
35.120.2200	22	20	104	38	0,55	5



**> 35.124 Phantom**

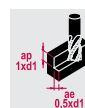
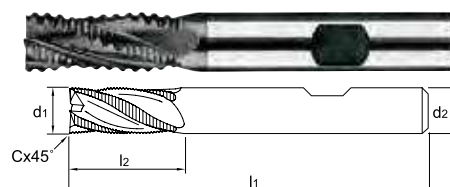
NL HSS-E Ruwfree TiAlN, rond  
 FR Fraise d'ébauche HSS-E TiAlN, ronde  
 ES Fresa de desbaste HSS-E TiAlN, redondo  
 DE HSS-E Schruppfräser TiAlN, rund



45-50 L	35-40 K	25-30 L	15-20 J	105-120 L
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Ref.	d1	d2	l1	l2	c	z
35.124.0600	6	6	57	13	0,25	3
35.124.0800	8	10	69	19	0,25	3
35.124.1000	10	10	72	22	0,35	4
35.124.1200	12	12	83	26	0,5	4
35.124.1400	14	12	83	26	0,55	4

Ref.	d1	d2	l1	l2	c	z
35.124.1600	16	16	92	32	0,55	4
35.124.1800	18	16	92	32	0,55	4
35.124.2000	20	20	104	38	0,55	4
35.124.2500	25	25	121	45	0,55	5
35.124.2800	28	25	121	45	0,7	6



**> 35.126 Phantom**

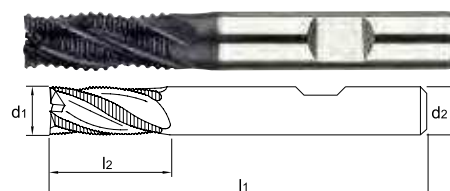
NL HSS-E PM Ruwfree AlTiN-X, rond  
 FR Fraise d'ébauche HSS-E PM AlTiN-X, ronde  
 ES Fresa de desbaste HSS-E PM AlTiN-X, redondo  
 DE HSS-E PM Schruppfräser AlTiN-X, rund



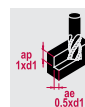
55-60 L	40-50 K	30-35 L	25-30 J	30-35 I	25-30 G	40-45 I	40-50 I	105-120 L
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Ref.	d1	d2	l1	l2	z
35.126.0600	6	6	57	13	4
35.126.0800	8	10	69	19	4
35.126.1000	10	10	72	22	4
35.126.1200	12	12	83	26	4
35.126.1400	14	12	83	26	4

Ref.	d1	d2	l1	l2	z
35.126.1600	16	16	92	32	4
35.126.1800	18	16	92	32	4
35.126.2000	20	20	104	38	4
35.126.2200	22	20	104	38	5
35.126.2500	25	25	121	45	5



**NIUW / NOUVEAU / NUEVO / NEU**





> **35.200** **Phantom**

NL HSS-E Ruwfreest fijn  
 FR Fraise d'ébauche HSS-E pas fin  
 ES Fresa de desbaste HSS-E paso fino  
 DE HSS-E Schruppfräser fein

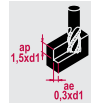
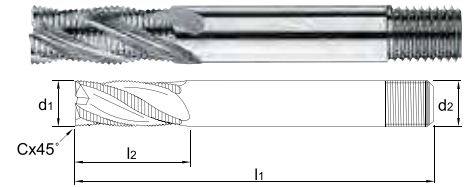


<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>N 41</b> Alu
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30-35 L	25-30 K	20-25 L	15-20 J	75-85 L
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Ref.	d1	d2	l1	l2	c	z
35.200.0600	6	6	57	13	0,2	3
35.200.0800	8	10	69	19	0,2	3
35.200.1000	10	10	72	22	0,2	4

Ref.	d1	d2	l1	l2	c	z
35.200.1200	12	12	83	26	0,2	4
35.200.1400	14	12	83	26	0,25	4
35.200.1600	16	16	92	32	0,25	4



> **35.220** **Phantom**

NL HSS-E Ruwfreest fijn  
 FR Fraise d'ébauche HSS-E pas fin  
 ES Fresa de desbaste HSS-E paso fino  
 DE HSS-E Schruppfräser fein

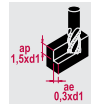
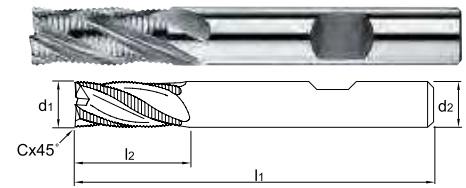


<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>N 41</b> Alu
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30-35 L	25-30 K	20-25 L	15-20 J	75-85 L
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Ref.	d1	d2	l1	l2	c	z
35.220.0600	6	6	57	13	0,2	3
35.220.0700	7	10	66	16	0,2	3
35.220.0800	8	10	69	19	0,2	3

Ref.	d1	d2	l1	l2	c	z
35.220.1000	10	10	72	22	0,2	4
35.220.1200	12	12	83	26	0,2	4
35.220.1400	14	12	83	26	0,25	4



> **35.224** **Phantom**

NL HSS-E Ruwfreest TiAlN, fijn  
 FR Fraise d'ébauche HSS-E TiAlN, pas fin  
 ES Fresa de desbaste HSS-E TiAlN, paso fino  
 DE HSS-E Schruppfräser TiAlN, fein

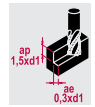
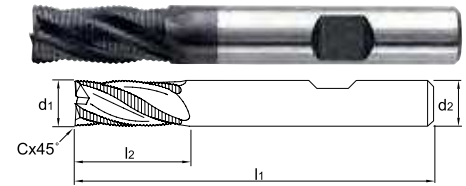


<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>N 41</b> Alu
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45-50 L	35-40 K	25-30 L	15-20 J	22-28 I	18-24 G	105-120 L
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Ref.	d1	d2	l1	l2	c	z
35.224.0600	6	6	57	13	0,2	3
35.224.0800	8	10	69	19	0,2	3
35.224.1000	10	10	72	22	0,2	4

Ref.	d1	d2	l1	l2	c	z
35.224.1200	12	12	83	26	0,2	4
35.224.1400	14	12	83	26	0,25	4
35.224.1600	16	16	92	32	0,25	4



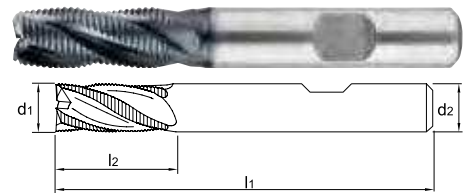
Ref.	d1	d2	l1	l2	c	z
35.224.1800	18	16	92	32	0,25	4
35.224.2000	20	20	104	38	0,25	4



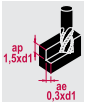
**> 35.226 Phantom**

NL HSS-E PM Ruwfrees AlTiN-X, fijn  
 FR Fraise d'ébauche HSS-E PM AlTiN-X, pas fin  
 ES Fresa de desbaste HSS-E PM AlTiN-X, paso fino  
 DE HSS-E PM Schruppfräser AlTiN-X, fein

HSS-E PM **AlTiN X** HR **DIN 844-B** **DIN 1835-B**  
**P 11** **P 12** **P 13** **P 14** **M 21** **M 22** **K 31** **K 32** **N 41**  
≤500 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> INOX ≤850N/mm<sup>2</sup> INOX >850N/mm<sup>2</sup> GG GGG GTS-GTW Alu  
 55-60 L 40-50 K 30-35 L 25-30 J 30-35 I 25-30 G 40-45 I 40-50 I 105-120 L



**NIEUW NOUVEAU NUEVO NEU**



Ref.	d1	d2	l1	l2	z
35.226.0600	6	6	57	13	4
35.226.0800	8	10	69	19	4
35.226.1000	10	10	72	22	4
35.226.1200	12	12	83	26	4

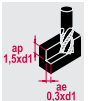
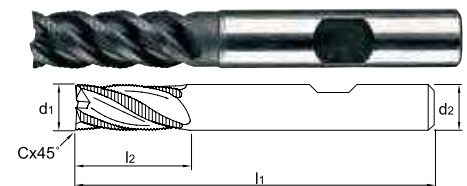
Ref.	d1	d2	l1	l2	z
35.226.1400	14	12	83	26	4
35.226.1600	16	16	92	32	4
35.226.1800	18	16	92	32	4
35.226.2000	20	20	104	38	4

Ref.	d1	d2	l1	l2	z
35.226.2500	25	25	121	45	5
35.226.3000	30	25	121	45	5
35.226.3200	32	32	133	53	6

**> 35.228 Phantom**

NL HSS-E PM Ruwfrees TiAlN, fijn  
 FR Fraise d'ébauche HSS-E PM TiAlN, pas fin  
 ES Fresa de desbaste HSS-E PM TiAlN, paso fino  
 DE HSS-E PM Schruppfräser TiAlN, fein

HSS-E PM **TiAlN** HR **DIN 844-B** **DIN 1835-B**  
**P 11** **P 12** **P 13** **P 14** **M 21** **M 22** **K 31** **K 32**  
≤500 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> INOX ≤850N/mm<sup>2</sup> INOX >850N/mm<sup>2</sup> GG GGG GTS-GTW  
 55-60 J 40-50 J 30-35 I 25-30 J 30-35 H 25-30 H 40-45 I 40-50 I



Ref.	d1	d2	l1	l2	c	z
35.228.0400	4	6	55	11	0,1	3
35.228.0500	5	6	57	13	0,15	4
35.228.0600	6	6	57	13	0,15	4
35.228.0700	7	10	66	16	0,15	4
35.228.0800	8	10	69	19	0,2	4

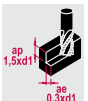
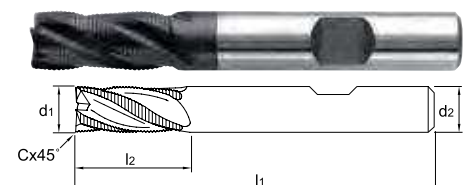
Ref.	d1	d2	l1	l2	c	z
35.228.0900	9	10	69	19	0,2	4
35.228.1000	10	10	72	22	0,2	4
35.228.1200	12	12	83	26	0,2	4
35.228.1400	14	12	83	26	0,2	5
35.228.1600	16	16	92	32	0,2	5

Ref.	d1	d2	l1	l2	c	z
35.228.1800	18	16	92	32	0,2	6
35.228.2000	20	20	104	38	0,2	6
35.228.2500	25	25	121	45	0,2	6

**> 35.324 Phantom**

NL HSS-E Ruwfrees TiAlN, extra-fijn  
 FR Fraise d'ébauche HSS-E TiAlN, pas extra fin  
 ES Fresa de desbaste HSS-E TiAlN, paso extra fino  
 DE HSS-E Schruppfräser TiAlN, extra feinen

HSS-E **8%** **TiAlN** HRf **DIN 844-B** **DIN 1835-B**  
**P 11** **P 12** **P 13** **P 14** **M 21** **M 22** **N 41**  
≤600 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> INOX ≤850N/mm<sup>2</sup> INOX >850N/mm<sup>2</sup> Alu  
 45-50 L 35-40 K 25-30 L 15-20 J 22-28 I 18-24 G 105-120 L



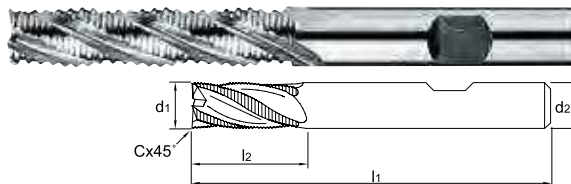
Ref.	d1	d2	l1	l2	c	z
35.324.0600	6	6	57	13	0,3	3
35.324.0800	8	10	69	19	0,3	3
35.324.1000	10	10	72	22	0,3	4
35.324.1200	12	12	83	26	0,35	4

Ref.	d1	d2	l1	l2	c	z
35.324.1400	14	12	83	26	0,35	4
35.324.1600	16	16	92	32	0,35	4
35.324.1800	18	16	92	32	0,45	4
35.324.2000	20	20	104	38	0,45	4

Ref.	d1	d2	l1	l2	c	z
35.324.2200	22	20	104	38	0,45	5
35.324.2500	25	25	121	45	0,45	5

> **35.720** **Phantom**

NL HSS-E Ruwfree, rond, lang  
 FR Fraise d'ébauche HSS-E, rond, version longue  
 ES Fresa de desbaste HSS-E, redondo, larg  
 DE HSS-E Schruppfräser, rund, lang



<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>N 41</b> Alu
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30-35 G	28-32 F	20-25 G	15-20 G	75-105 I
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Ref.	d1	d2	l1	l2	c	z
35.720.0600	6	6	68	24	0,25	3
35.720.0800	8	10	88	38	0,25	3
35.720.1000	10	10	95	45	0,35	4
35.720.1200	12	12	110	53	0,5	4
35.720.1600	16	16	123	63	0,55	4

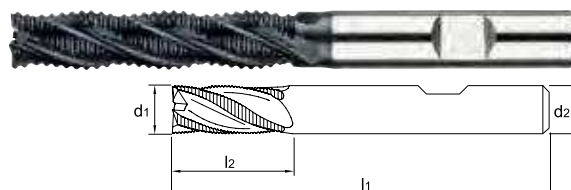
Ref.	d1	d2	l1	l2	c	z
35.720.1800	18	16	123	63	0,55	4
35.720.2000	20	20	141	75	0,55	4
35.720.2200	22	20	141	75	0,55	5
35.720.2500	25	25	166	90	0,55	5
35.720.2800	28	25	166	90	0,7	6

Ref.	d1	d2	l1	l2	c	z
35.720.3000	30	25	166	90	0,7	6
35.720.3200	32	32	186	106	0,7	6
35.720.3600	36	32	186	106	0,7	6
35.720.4000	40	32	217	125	0,9	6



> **35.726** **Phantom**

NL HSS-E PM Ruwfree AITiN-X, rond, lang  
 FR Fraise d'ébauche HSS-E PM AITiN-X, ronde, version longue  
 ES Fresa de desbaste HSS-E PM AITiN-X, redondo, larga  
 DE HSS-E PM Schruppfräser AITiN-X, rund, lang



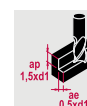
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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55-60 G	40-50 F	30-35 G	25-30 G	30-35 G	25-30 F	40-45 G	40-50 G	105-120 I
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Ref.	d1	d2	l1	l2	z
35.726.0600	6	6	68	24	4
35.726.0800	8	10	88	38	4
35.726.1000	10	10	95	45	4
35.726.1200	12	12	110	53	4

Ref.	d1	d2	l1	l2	z
35.726.1400	14	12	110	53	4
35.726.1600	16	16	123	63	4
35.726.1800	18	16	123	63	4
35.726.2000	20	20	141	75	4

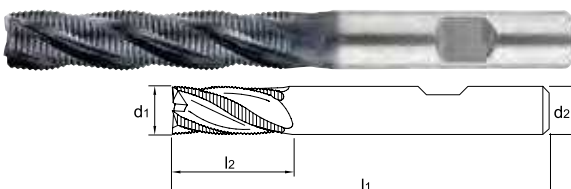
Ref.	d1	d2	l1	l2	z
35.726.2500	25	25	166	90	5
35.726.3200	32	32	186	106	6



**NIEUW / NOUVEAU / NUEVO / NEU**

> **35.766** **Phantom**

NL HSS-E PM Ruwfree AITiN-X, fijn, lang  
 FR Fraise d'ébauche HSS-E PM AITiN-X, pas fin, version longue  
 ES Fresa de desbaste HSS-E PM AITiN-X, paso fino, larga  
 DE HSS-E PM Schruppfräser AITiN-X, fein, lang



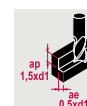
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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55-60 G	40-50 F	30-35 G	25-30 G	30-35 G	25-30 F	40-45 G	40-50 G	105-120 I
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Ref.	d1	d2	l1	l2	z
35.766.0600	6	6	68	24	4
35.766.0800	8	10	88	38	4
35.766.1000	10	10	95	45	4

Ref.	d1	d2	l1	l2	z
35.766.1200	12	12	110	53	4
35.766.1400	14	12	110	53	4
35.766.1600	16	16	123	63	4

Ref.	d1	d2	l1	l2	z
35.766.1800	18	16	123	63	4
35.766.2000	20	20	141	75	4



**NIEUW / NOUVEAU / NUEVO / NEU**



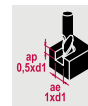
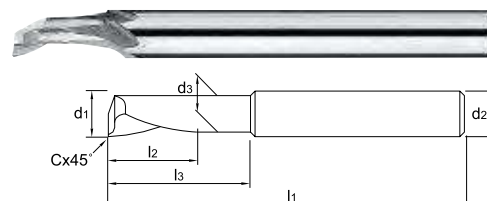
### > 36.100 Phantom

NL HSS-E Eensnijderfrees Aluminium  
 FR Fraise à 1 dent HSS-E Aluminium  
 ES Fresa frontal de 1 labio HSS-E Aluminio  
 DE HSS-E Einzahnfräser Aluminium



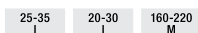
Ref.	d1	d2	d3	l1	l2	l3	c	z
36.100.0300	3	8		60	12		0,15	1
36.100.0400	4	8		60	12		0,15	1
36.100.0500	5	8		60	14		0,15	1
36.100.0501	5	8	4.8	80	18	35	0,15	1
36.100.0502	5	8		100	40		0,15	1
36.100.0600	6	8		60	14		0,15	1

Ref.	d1	d2	d3	l1	l2	l3	c	z
36.100.0700	7	8		60	14		0,15	1
36.100.0800	8	8		80	14		0,25	1
36.100.0801	8	8	7.5	120	14	68	0,25	1
36.100.0900	9	8		80	14		0,25	1
36.100.1000	10	8		80	14		0,25	1



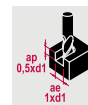
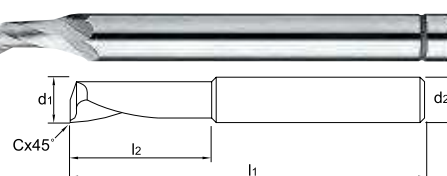
### > 36.120 Phantom

NL HSS-E Eensnijderfrees staal  
 FR Fraise à 1 dent HSS-E acier  
 ES Fresa frontal de 1 labio HSS-E acero  
 DE HSS-E Einzahnfräser Stahl



Ref.	d1	d2	l1	l2	c	z
36.120.0300	3	8	60	12	0,15	1
36.120.0400	4	8	60	12	0,15	1

Ref.	d1	d2	l1	l2	c	z
36.120.0500	5	8	60	12	0,15	1
36.120.0600	6	8	60	14	0,15	1



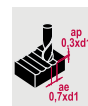
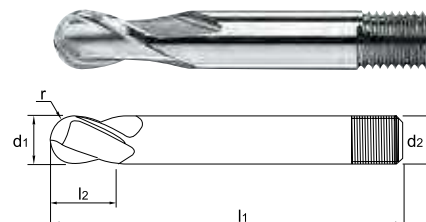
### > 36.200 Phantom

NL HSS-E Radiusfrees, 2-snijder  
 FR Fraise à rayon 2 dents HSS-E  
 ES Fresa de punta esférica HSS-E  
 DE HSS-E 2 Schneiden Radiusfräser



Ref.	d1	d2	l1	l2	r	z
36.200.0300	3	6	49	5	1,5	2
36.200.0400	4	6	51	7	2	2
36.200.0500	5	6	52	8	2,5	2
36.200.0600	6	6	52	8	3	2

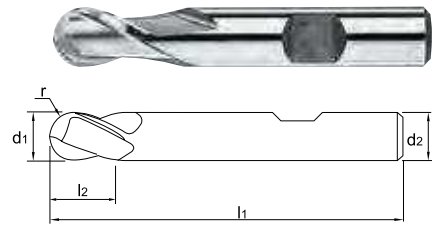
Ref.	d1	d2	l1	l2	r	z
36.200.0800	8	10	61	11	4	2
36.200.1000	10	10	63	13	5	2
36.200.1200	12	12	73	16	6	2
36.200.1400	14	12	73	16	7	2



Ref.	d1	d2	l1	l2	r	z
36.200.1500	15	12	73	16	7,5	2
36.200.1600	16	16	79	19	8	2
36.200.1800	18	16	79	19	9	2
36.200.2000	20	20	88	22	10	2

> **36.220** **Phantom**

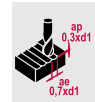
NL **HSS-E Radiusrees, 2-snijder**  
 FR **Fraise à rayon 2 dents HSS-E**  
 ES **Fresa de punta esférica HSS-E**  
 DE **HSS-E 2 Schneiden Radiusfräser**



**HSS-E 8%** **DIN 327-B** **DIN 1835-B**

**P 11** ≤600 N/mm<sup>2</sup> **P 12** ≤850 N/mm<sup>2</sup> **P 13** ≤1000 N/mm<sup>2</sup> **P 14** ≤1400 N/mm<sup>2</sup> **N 41** Alu

35-40 K 25-30 J 20-25 K 15-20 I 95-105 K



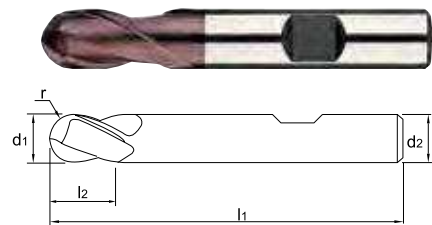
Ref.	d1	d2	l1	l2	r	z
36.220.0200	2	6	48	4	1	2
36.220.0300	3	6	49	5	1.5	2
36.220.0400	4	6	51	7	2	2
36.220.0500	5	6	52	8	2.5	2
36.220.0600	6	6	52	8	3	2
36.220.0700	7	10	60	10	3.5	2
36.220.0800	8	10	61	11	4	2

Ref.	d1	d2	l1	l2	r	z
36.220.0900	9	10	61	11	4.5	2
36.220.1000	10	10	63	13	5	2
36.220.1100	11	12	70	13	5.5	2
36.220.1200	12	12	73	16	6	2
36.220.1300	13	12	73	16	6.5	2
36.220.1400	14	12	73	16	7	2
36.220.1500	15	12	73	16	7.5	2

Ref.	d1	d2	l1	l2	r	z
36.220.1600	16	16	79	19	8	2
36.220.1800	18	16	79	19	9	2
36.220.2000	20	20	82	22	10	2
36.220.2200	22	20	88	22	11	2
36.220.2400	24	25	102	26	12	2
36.220.2500	25	25	102	26	12.5	2

> **36.228** **Phantom**

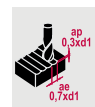
NL **HSS-E PM Radiusrees, 2-snijder TiAIN**  
 FR **Fraise à rayon 2 dents HSS-E PM TiAIN**  
 ES **Fresa de punta esférica HSS-E PM TiAIN**  
 DE **HSS-E PM 2 Schneiden Radiusfräser TiAIN**



**HSS-E PM** **TiAIN** **DIN 844-B** **DIN 1835-B**

**P 11** ≤600 N/mm<sup>2</sup> **P 12** ≤850 N/mm<sup>2</sup> **P 13** ≤1000 N/mm<sup>2</sup> **P 14** ≤1400 N/mm<sup>2</sup> **M 21** INOX ≤850N/mm<sup>2</sup> **M 22** INOX >850N/mm<sup>2</sup> **K 31** GG **K 32** GGG GTS-GTW

70-85 M 55-70 L 35-40 K 20-25 K 25-30 K 20-25 K 55-60 L 65-70 L



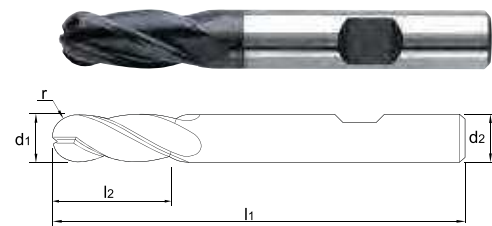
Ref.	d1	d2	l1	l2	r	z
36.228.0300	3	6	49	5	1.5	2
36.228.0400	4	6	51	7	2	2
36.228.0500	5	6	52	8	2.5	2

Ref.	d1	d2	l1	l2	r	z
36.228.0600	6	6	52	8	3	2
36.228.0800	8	10	61	11	4	2
36.228.1000	10	10	63	13	5	2

Ref.	d1	d2	l1	l2	r	z
36.228.1200	12	12	73	16	6	2
36.228.1600	16	16	79	19	8	2
36.228.2000	20	20	82	22	10	2

> **36.324** **Phantom**

NL **HSS-E Radiusrees, 4-snijder TiAIN**  
 FR **Fraise à rayon HSS-E TiAIN**  
 ES **Fresa de punta esférica HSS-E TiAIN**  
 DE **HSS-E 4 Schneiden Radiusfräser TiAIN**



**HSS-E 8%** **TiAIN** **DIN 844-B** **DIN 1835-B**

**P 11** ≤600 N/mm<sup>2</sup> **P 12** ≤850 N/mm<sup>2</sup> **P 13** ≤1000 N/mm<sup>2</sup> **P 14** ≤1400 N/mm<sup>2</sup> **N 41** Alu

45-50 J 40-45 I 30-35 J 20-25 I 130-145 K



Ref.	d1	d2	l1	l2	r	z
36.324.0600	6	6	57	13	3	4
36.324.0800	8	10	69	19	4	4
36.324.1000	10	10	72	22	5	4

Ref.	d1	d2	l1	l2	r	z
36.324.1200	12	12	83	26	6	4
36.324.1600	16	16	92	32	8	4
36.324.2000	20	20	104	38	10	4

Ref.	d1	d2	l1	l2	r	z
36.324.2500	25	25	121	45	12.5	4





## > 36.410 Phantom

NL HSS-E Radiusfrees Kwarthol frees  
 FR Fraise à rayon HSS-E Fraise à 1/4 de cercle concave  
 ES Fresa de punta esférica HSS-E Fresa semicóncava de 1/4 de círculo  
 DE HSS-E Viertelrund-Profilfräser Viertelrund-Profilfräser

HSS-E 8%  
 DIN 6518-B  
 DIN 1835-B

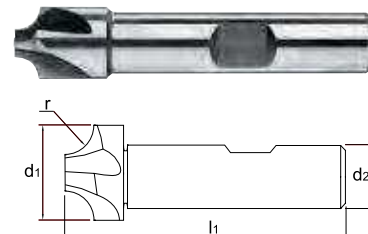
P 11 ≤500 N/mm<sup>2</sup>  
 P 12 ≤850 N/mm<sup>2</sup>  
 P 13 ≤1000 N/mm<sup>2</sup>  
 N 41 Alu

18-24 F  
 15-18 F  
 10-15 F  
 80-90 F

Ref.	r	d1	d2	l1	z
36.410.0100	1	8	10	60	4
36.410.0150	1.5	9	10	60	4
36.410.0200	2	10	10	60	4
36.410.0250	2.5	11	10	60	4
36.410.0300	3	12	12	60	4
36.410.0350	3.5	13	12	60	4
36.410.0400	4	14	12	60	4
36.410.0450	4.5	15	12	60	4
36.410.0500	5	16	12	60	4
36.410.0550	5.5	19	16	67	4

Ref.	r	d1	d2	l1	z
36.410.0600	6	20	16	67	4
36.410.0650	6.5	21	16	71	4
36.410.0700	7	22	16	71	4
36.410.0750	7.5	23	16	71	4
36.410.0800	8	24	16	71	4
36.410.0850	8.5	25	25	85	4
36.410.0900	9	26	25	85	4
36.410.0950	9.5	27	25	85	4
36.410.1000	10	28	25	85	4
36.410.1100	11	32	25	90	4

Ref.	r	d1	d2	l1	z
36.410.1200	12	34	25	90	4
36.410.1250	12.5	41	25	100	4
36.410.1300	13	42	25	100	4
36.410.1400	14	44	25	100	4
36.410.1500	15	46	25	100	4
36.410.1600	16	48	25	100	4
36.410.1800	18	52	32	112	4
36.410.2000	20	56	32	112	4



## > 36.510 Phantom

NL HSS-E Schijfspiefrees (Woodruff-frees) kruisvertand  
 FR Fraise pour logements de clavettes (type Woodruff) HSS-E denture alternée  
 ES Fresa de ranurar (tipo Woodruff) HSS-E diente alternado  
 DE HSS-E Schlitzfräser (Woodruff-Fräser) Kreuzverzahnt

HSS-E  
 DIN 850-D  
 DIN 1835-B

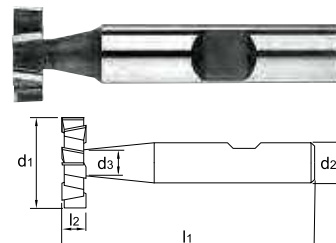
P 11 ≤500 N/mm<sup>2</sup>  
 P 12 ≤850 N/mm<sup>2</sup>  
 P 13 ≤1000 N/mm<sup>2</sup>  
 P 14 ≤1400 N/mm<sup>2</sup>  
 N 41 Alu

25-30 G  
 20-25 F  
 15-20 F  
 10-15 F  
 90-100 G

Ref.	d1	d2	d3	l1	l2	z
36.510.1020	10.5	6	4	50	2	8
36.510.1025	10.5	6	4	50	2.5	8
36.510.1030	10.5	6	4.2	50	3	8
36.510.1320	13.5	10	4.6	56	2	8
36.510.1330	13.5	10	4.6	56	3	8
36.510.1340	13.5	10	4.6	56	4	8
36.510.1630	16.5	10	4.6	56	3	8
36.510.1640	16.5	10	4.6	56	4	8
36.510.1650	16.5	10	5	56	5	8

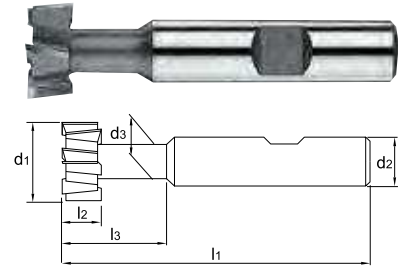
Ref.	d1	d2	d3	l1	l2	z
36.510.1930	19.5	10	5.6	56	3	8
36.510.1940	19.5	10	5.6	56	4	8
36.510.1950	19.5	10	6	56	5	8
36.510.1960	19.5	10	6.5	56	6	8
36.510.2240	22.5	10	6	63	4	8
36.510.2250	22.5	10	6	63	5	8
36.510.2260	22.5	10	6.5	63	6	8
36.510.2280	22.5	10	6.5	63	8	8
36.510.2550	25.5	10	7.5	63	5	8

Ref.	d1	d2	d3	l1	l2	z
36.510.2560	25.5	10	7.5	63	6	8
36.510.2580	25.5	10	7.5	63	8	8
36.510.2860	28.5	12	8.5	63	6	10
36.510.2880	28.5	12	8.5	63	8	10
36.510.2890	28.5	12	9.3	63	10	10
36.510.3260	32.5	12	8.5	63	6	10
36.510.3280	32.5	12	8.5	63	8	10
36.510.3290	32.5	12	9.3	71	10	10
36.510.4590	45.5	12	11.8	71	10	12



> **36.560** **Phantom**

NL HSS-E T-Gleuffrees kruisvertand  
 FR Fraise à rainurer en T HSS-E denture alternée  
 ES Fresa para ranurar en T HSS-E diente alternado  
 DE HSS-E T-Nutenfräser Kreuzverzahnt



HSS-E	DIN 851-AB	DIN 1835-B	
<b>P 11</b>	<b>P 12</b>	<b>P 13</b>	<b>N 41</b>
≤600 N/mm <sup>2</sup>	≤850 N/mm <sup>2</sup>	≤1000 N/mm <sup>2</sup>	Alu
25-30 G	20-25 F	15-20 F	90-100 G

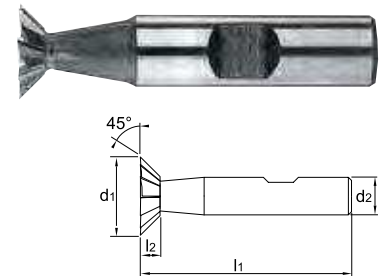
Ref.	d1	d2	d3	l1	l2	l3	z
36.560.1250	12.5	10	5	57	6	13	6
36.560.1600	16	10	7	62	8	18	6
36.560.1900	19	12	8	71	9	25	6

Ref.	d1	d2	d3	l1	l2	l3	z
36.560.2200	22	12	10	75	10	26	6
36.560.2500	25	16	12	82	11	28	6
36.560.2800	28	16	13	83	12	29	6

Ref.	d1	d2	d3	l1	l2	l3	z
36.560.3200	32	20	15	90	14	36	8

> **36.620** **Phantom**

NL HSS-E Zwaluwstaartfrees 45°  
 FR Fraise conique à cône renversé HSS-E 45°  
 ES Fresa cónica angular HSS-E 45°  
 DE HSS-E Winkelfräser 45°



HSS-E	DIN 1833-C	DIN 1835-B		
<b>P 11</b>	<b>P 12</b>	<b>P 13</b>	<b>P 14</b>	<b>N 41</b>
≤600 N/mm <sup>2</sup>	≤850 N/mm <sup>2</sup>	≤1000 N/mm <sup>2</sup>	≤1400 N/mm <sup>2</sup>	Alu
25-30 A	20-25 A	15-20 A	10-15 A	90-100 A

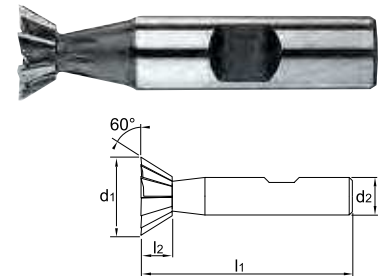
Ref.	d1	d2	l1	l2
36.620.1600	16	12	60	4
36.620.2000	20	12	63	5

Ref.	d1	d2	l1	l2
36.620.2500	25	12	67	6.3
36.620.3200	32	16	71	8

Ref.	d1	d2	l1	l2
36.620.4000	40	16	80	10

> **36.650** **Phantom**

NL HSS-E Zwaluwstaartfrees 60°  
 FR Fraise conique à cône renversé HSS-E 60°  
 ES Fresa cónica angular HSS-E 60°  
 DE HSS-E Winkelfräser 60°



HSS-E	DIN 1833-C	DIN 1835-B		
<b>P 11</b>	<b>P 12</b>	<b>P 13</b>	<b>P 14</b>	<b>N 41</b>
≤600 N/mm <sup>2</sup>	≤850 N/mm <sup>2</sup>	≤1000 N/mm <sup>2</sup>	≤1400 N/mm <sup>2</sup>	Alu
25-30 A	20-25 A	15-20 A	10-15 A	90-100 A

Ref.	d1	d2	l1	l2
36.650.1600	16	12	60	6.3
36.650.2000	20	12	63	8

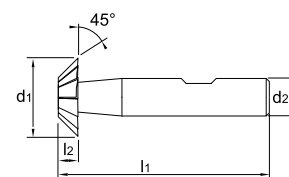
Ref.	d1	d2	l1	l2
36.650.2500	25	12	67	10
36.650.3200	32	16	71	12.5

Ref.	d1	d2	l1	l2
36.650.4000	40	16	80	16



## > 36.720 Phantom

NL HSS-E Duivenstaartfrees 45°  
 FR Fraise conique à cône direct HSS-E 45°  
 ES Fresa cónica angular HSS-E 45°  
 DE HSS-E Winkelstirnfräser 45°



HSS-E DIN 1833-D DIN 1835-B

P 11 P 12 P 13 P 14 N 41  
 ≤600 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> Alu

25-30 A 20-25 A 15-20 A 10-15 A 90-100 A

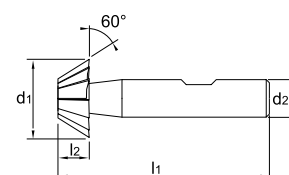
Ref.	d1	d2	l1	l2
36.720.1600	16	12	60	4
36.720.2000	20	12	63	5

Ref.	d1	d2	l1	l2
36.720.2500	25	12	67	6.3
36.720.3200	32	16	71	8

Ref.	d1	d2	l1	l2
36.720.4000	40	16	80	10

## > 36.750 Phantom

NL HSS-E Duivenstaartfrees 60°  
 FR Fraise conique à cône direct HSS-E 60°  
 ES Fresa cónica angular HSS-E 60°  
 DE HSS-E Winkelstirnfräser 60°



HSS-E DIN 1833-D DIN 1835-B

P 11 P 12 P 13 P 14 N 41  
 ≤600 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> Alu

25-30 A 20-25 A 15-20 A 10-15 A 90-100 A

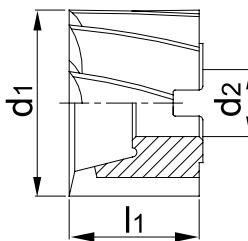
Ref.	d1	d2	l1	l2
36.750.1600	16	12	60	6.3
36.750.2000	20	12	63	8

Ref.	d1	d2	l1	l2
36.750.2500	25	12	67	10
36.750.3200	32	16	71	12.5

Ref.	d1	d2	l1	l2
36.750.4000	40	16	80	16

> **37.260 Phantom**

NL **HSS-E Mantelkopfrees grofgetand, DIN 841, type N**  
 FR **Fraise deux tailles HSS-E denture grosse, DIN 841, type N**  
 ES **Fresa frontal sin mango HSS-E dentado grueso, DIN 841, tipo N**  
 DE **HSS-E Walzenstirnfräser grobverzahnt, DIN 841, Typ N**



HSS-E **DIN 841** **N**

**P 11** ≤600 N/mm<sup>2</sup> **P 12** ≤850 N/mm<sup>2</sup> **P 13** ≤1000 N/mm<sup>2</sup> **P 14** ≤1400 N/mm<sup>2</sup> **M 21** INOX ≤850N/mm<sup>2</sup> **M 22** INOX >850N/mm<sup>2</sup> **K 31** GG **K 32** GGG GTS-GTW

25-30 H 20-25 G 15-20 G 10-15 F 10-15 G 8-12 F 17-22 G 20-25 H

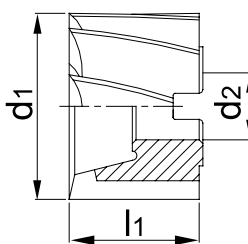
Ref.	d1	d2	l1	z
37.260.0303	30	13	30	6
37.260.0353	35	16	35	6
37.260.0402	40	16	20	8
37.260.0404	40	16	40	8

Ref.	d1	d2	l1	z
37.260.0502	50	22	25	8
37.260.0505	50	22	50	8
37.260.0603	60	27	30	8
37.260.0606	60	27	60	8

Ref.	d1	d2	l1	z
37.260.0753	75	27	35	10
37.260.0757	75	27	75	10
37.260.1103	110	32	35	12

> **37.270 Phantom**

NL **HSS-E Mantelkopfrees fijngetand, DIN 841, type H**  
 FR **Fraise deux tailles HSS-E denture fine, DIN 841, type H**  
 ES **Fresa frontal sin mango HSS-E dentado fino, DIN 841, tipo H**  
 DE **HSS-E Walzenstirnfräser feingezahnt, DIN 841, Typ H**



HSS-E **DIN 841** **H**

**P 11** ≤600 N/mm<sup>2</sup> **P 12** ≤850 N/mm<sup>2</sup> **P 13** ≤1000 N/mm<sup>2</sup> **P 14** ≤1400 N/mm<sup>2</sup> **K 31** GG **K 32** GGG GTS-GTW

25-30 H 20-25 G 15-20 G 10-15 F 17-22 G 20-25 H

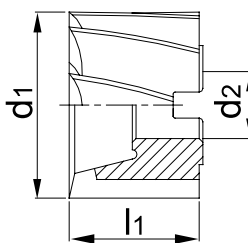
Ref.	d1	d2	l1	z
37.270.0303	30	13	30	8
37.270.0353	35	16	35	10

Ref.	d1	d2	l1	z
37.270.0404	40	16	40	10
37.270.0505	50	22	50	12

Ref.	d1	d2	l1	z
37.270.0606	60	27	60	12
37.270.0757	75	27	75	14

> **37.350 Phantom**

NL **HSS-E Mantelkopfrees DIN 1880, Aluminium**  
 FR **Fraise deux tailles HSS-E DIN 1880, Aluminium**  
 ES **Fresa frontal sin mango HSS-E DIN 1880, Aluminio**  
 DE **HSS-E Walzenstirnfräser DIN 1880, Aluminium**



HSS-E **DIN 1880**

**P 11** ≤600 N/mm<sup>2</sup> **P 12** ≤850 N/mm<sup>2</sup> **N 41** Alu **N 51** Cu

25-30 H 20-25 G 95-105 J 60-100 I

Ref.	d1	d2	l1	z
37.350.0400	40	16	32	4
37.350.0500	50	22	36	4

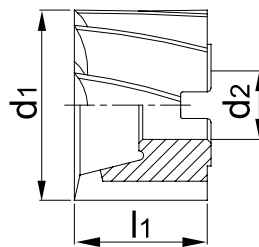
Ref.	d1	d2	l1	z
37.350.0630	63	27	40	5
37.350.0800	80	27	44.5	6

Ref.	d1	d2	l1	z
37.350.1000	100	32	49.5	7



### > 37.360 Phantom

NL HSS-E Mantelkopfrees type N, grofgetand  
 FR Fraise deux tailles HSS-E type N, denture grosse  
 ES Fresa frontal sin mango HSS-E tipo N, dentado grueso  
 DE HSS-E Walzenstirnfräser Typ N, grobverzahnt



HSS-E 8%  
 DIN 1880  
 N



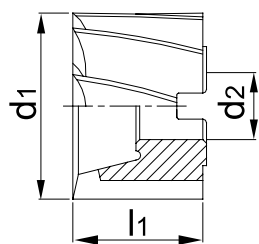
P 11  $\leq 600 \text{ N/mm}^2$  P 12  $\leq 850 \text{ N/mm}^2$  P 13  $\leq 1000 \text{ N/mm}^2$  P 14  $\leq 1400 \text{ N/mm}^2$   
 M 21 INOX  $\leq 850 \text{ N/mm}^2$  M 22 INOX  $> 850 \text{ N/mm}^2$  K 31 GG K 32 GGG GTS-GTW

25-30 H 20-25 G 15-20 G 10-15 F 10-15 G 8-12 F 17-22 G 20-25 H

Ref.	d1	d2	l1	z	Ref.	d1	d2	l1	z	Ref.	d1	d2	l1	z
37.360.0400	40	16	32	8	37.360.0800	80	27	44.5	10	37.360.1600	160	50	62.5	16
37.360.0500	50	22	36	8	37.360.1000	100	32	49.5	12					
37.360.0630	63	27	40	8	37.360.1250	125	40	55.5	14					

### > 37.370 Phantom

NL HSS-E Mantelkopfrees fijngetand, DIN 1880, type H  
 FR Fraise deux tailles HSS-E denture fine, DIN 1880, type H  
 ES Fresa frontal sin mango HSS-E dentado fino, DIN 1880, tipo H  
 DE HSS-E Walzenstirnfräser feingezahnt, DIN 1880, Typ H



HSS-E  
 DIN 1880  
 H



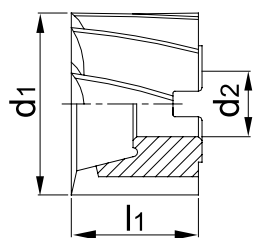
P 11  $\leq 600 \text{ N/mm}^2$  P 12  $\leq 850 \text{ N/mm}^2$  P 13  $\leq 1000 \text{ N/mm}^2$  P 14  $\leq 1400 \text{ N/mm}^2$   
 K 31 GG K 32 GGG GTS-GTW

25-30 H 20-25 G 15-20 G 10-15 F 17-22 G 20-25 H

Ref.	d1	d2	l1	z	Ref.	d1	d2	l1	z	Ref.	d1	d2	l1	z
37.370.0400	40	16	32	10	37.370.0630	63	27	40	12	37.370.1000	100	32	49.5	16
37.370.0500	50	22	36	12	37.370.0800	80	27	44.5	14	37.370.1250	125	40	55.5	18

### > 37.500 Phantom

NL HSS-E Mantelkopruwrees DIN 841, rond  
 FR Fraise deux tailles semi-finition HSS-E DIN 841, ronde  
 ES Fresa frontal sin mango de desbaste HSS-E DIN 841, redondo  
 DE HSS-E Walzenstirnschrupfräser DIN 841, rund



HSS-E  
 WR  
 DIN 841



P 11  $\leq 600 \text{ N/mm}^2$  P 12  $\leq 850 \text{ N/mm}^2$  P 13  $\leq 1000 \text{ N/mm}^2$  P 14  $\leq 1400 \text{ N/mm}^2$   
 N 41 Alu

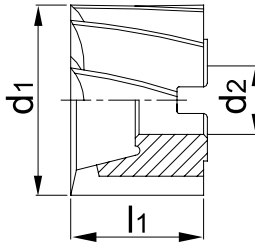
25-30 J 20-25 J 15-20 H 10-15 G 95-105 J

Ref.	d1	d2	l1	z	Ref.	d1	d2	l1	z
37.500.0404	40	16	40	6	37.500.0606	60	27	60	8
37.500.0505	50	22	50	6	37.500.0757	75	27	75	8



> **37.580** **Phantom**

NL HSS-E Mantelkopruwfrees DIN 841, vlak  
 FR Fraise deux tailles semi-finition HSS-E DIN 841, plate  
 ES Fresa frontal sin mango de desbaste HSS-E DIN 841, plano  
 DE HSS-E Walzenstirnschrupfräser DIN 841, Flach



HSS-E DIN 841

**P 11** **P 12** **P 13** **P 14** **N 41**

≤600 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> Alu

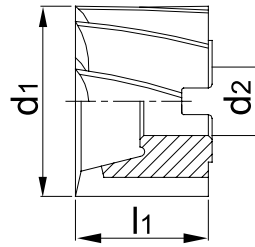
25-30 J 20-25 J 15-20 H 10-15 G 95-105 J

Ref.	d1	d2	l1	z
37.580.0404	40	16	40	6
37.580.0505	50	22	50	6

Ref.	d1	d2	l1	z
37.580.0606	60	27	60	8
37.580.0757	75	27	75	8

> **37.600** **Phantom**

NL HSS-E Mantelkopruwfrees DIN 1880, rond  
 FR Fraise deux tailles semi-finition HSS-E DIN 1880, ronde  
 ES Fresa frontal sin mango de desbaste HSS-E DIN 1880, redondo  
 DE HSS-E Walzenstirnschrupfräser DIN 1880, rund



HSS-E 8% DIN 1880

**P 11** **P 12** **P 13** **P 14** **N 41**

≤600 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup> Alu

25-30 J 20-25 J 15-20 H 10-15 G 95-105 J

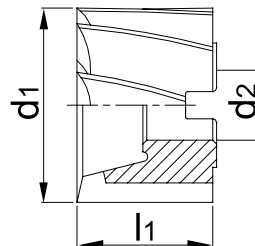
Ref.	d1	d2	l1	z
37.600.0400	40	16	32	6
37.600.0500	50	22	36	6
37.600.0630	63	27	40	8

Ref.	d1	d2	l1	z
37.600.0800	80	27	44.5	8
37.600.1000	100	32	49.5	10
37.600.1250	125	40	55.5	12

Ref.	d1	d2	l1	z
37.600.1600	160	50	62.5	14

> **37.604** **Phantom**

NL HSS-E Mantelkopruwfrees TiAlN, DIN 1880, rond  
 FR Fraise deux tailles semi-finition HSS-E TiAlN, DIN 1880, ronde  
 ES Fresa frontal sin mango de desbaste HSS-E TiAlN, DIN 1880, redondo  
 DE HSS-E Walzenstirnschrupfräser TiAlN, DIN 1880, rund



HSS-E 8% DIN 1880

**P 11** **P 12** **P 13** **P 14**

≤600 N/mm<sup>2</sup> ≤850 N/mm<sup>2</sup> ≤1000 N/mm<sup>2</sup> ≤1400 N/mm<sup>2</sup>

30-35 J 30-35 J 20-25 H 12-18 G

Ref.	d1	d2	l1	z
37.604.0400	40	16	32	6

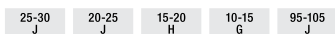
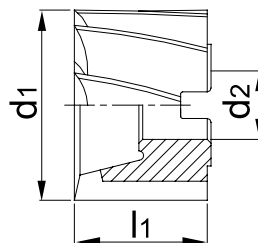
Ref.	d1	d2	l1	z
37.604.0500	50	22	36	6

Ref.	d1	d2	l1	z
37.604.0630	63	27	40	8



## > 37.680 Phantom

NL HSS-E Mantelkopruwfrees DIN 1880, vlak  
 FR Fraise deux tailles semi-finition HSS-E DIN 1880, plate  
 ES Fresa frontal sin mango de desbaste HSS-E DIN 1880, plano  
 DE HSS-E Walzenstirnschrupfräser DIN 1880, Flach



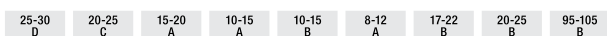
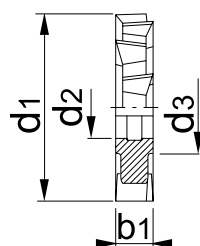
Ref.	d1	d2	l1	z
37.680.0400	40	16	32	6
37.680.0500	50	22	36	6
37.680.0630	63	27	40	8

Ref.	d1	d2	l1	z
37.680.0800	80	27	44.5	8
37.680.1000	100	32	49.5	10
37.680.1250	125	40	55.5	12

Ref.	d1	d2	l1	z
37.680.1600	160	50	62.5	14

## > 38.210 Phantom

NL HSS-E Schijffrees kruisvertand  
 FR Fraise trois tailles HSS-E denture alternée  
 ES Fresa para ranurar HSS-E diente alternado  
 DE HSS-E Scheibenfräser Kreuzverzahnt



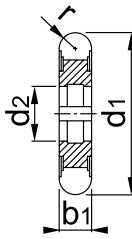
Ref.	d1	b1	d2	d3	z
38.210.0503	50	3	16	27	16
38.210.0504	50	4	16	27	16
38.210.0505	50	5	16	27	16
38.210.0506	50	6	16	27	16
38.210.0508	50	8	16	27	16
38.210.0510	50	10	16	27	14
38.210.0603	63	3	22	34	18
38.210.0604	63	4	22	34	18
38.210.0605	63	5	22	34	18
38.210.0606	63	6	22	34	18
38.210.0608	63	8	22	34	16
38.210.0610	63	10	22	34	16
38.210.0612	63	12	22	34	16
38.210.0614	63	14	22	34	14
38.210.0616	63	16	22	34	14
38.210.0618	63	18	22	34	14
38.210.0620	63	20	22	34	14
38.210.0803	80	3	27	41	24
38.210.0804	80	4	27	41	20
38.210.0805	80	5	27	41	20
38.210.0806	80	6	27	41	20

Ref.	d1	b1	d2	d3	z
38.210.0808	80	8	27	41	18
38.210.0810	80	10	27	41	18
38.210.0812	80	12	27	41	18
38.210.0814	80	14	27	41	18
38.210.0816	80	16	27	41	16
38.210.0820	80	20	27	41	16
38.210.1003	100	3	32	47	20
38.210.1004	100	4	32	47	20
38.210.1005	100	5	32	47	20
38.210.1006	100	6	32	47	20
38.210.1008	100	8	32	47	20
38.210.1010	100	10	32	47	20
38.210.1012	100	12	32	47	20
38.210.1014	100	14	32	47	20
38.210.1016	100	16	32	47	20
38.210.1018	100	18	32	47	20
38.210.1020	100	20	32	47	20
38.210.1022	100	22	32	47	18
38.210.1025	100	25	32	47	18
38.210.1204	125	4	32	47	26
38.210.1205	125	5	32	47	26

Ref.	d1	b1	d2	d3	z
38.210.1206	125	6	32	47	26
38.210.1208	125	8	32	47	26
38.210.1210	125	10	32	47	22
38.210.1212	125	12	32	47	22
38.210.1214	125	14	32	47	22
38.210.1216	125	16	32	47	20
38.210.1218	125	18	32	47	20
38.210.1220	125	20	32	47	20
38.210.1225	125	25	32	47	20
38.210.1604	160	4	40	55	32
38.210.1605	160	5	40	55	32
38.210.1606	160	6	40	55	28
38.210.1608	160	8	40	55	28
38.210.1610	160	10	40	55	28
38.210.1612	160	12	40	55	24
38.210.1614	160	14	40	55	24
38.210.1616	160	16	40	55	24
38.210.1618	160	18	40	55	24
38.210.1620	160	20	40	55	22

> **38.300** **Phantom**

NL HSS-E Convexfrees  
 FR Fraise 1/2 cercle convexe HSS-E  
 ES Fresa convexa para ranurar HSS-E  
 DE HSS-E Konvexfräser



HSS-E DIN 856

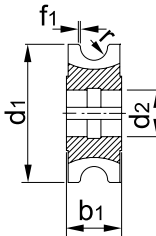
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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25-30 D	20-25 C	15-20 A	10-15 A	10-15 B	8-12 A	17-22 B	20-25 B	95-105 B
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Ref.	r	d1	b1	d2	z	Ref.	r	d1	b1	d2	z	Ref.	r	d1	b1	d2	z
38.300.0100	1	50	2	16	16	38.300.0300	3	63	6	22	12	38.300.0550	5.5	80	11	27	12
38.300.0125	1.25	50	2.5	16	16	38.300.0350	3.5	63	7	22	12	38.300.0600	6	80	12	27	12
38.300.0150	1.5	50	3	16	16	38.300.0400	4	63	8	22	12	38.300.0800	8	80	16	27	12
38.300.0200	2	50	4	16	16	38.300.0450	4.5	63	9	22	12	38.300.1000	10	100	20	32	12
38.300.0250	2.5	63	5	22	12	38.300.0500	5	63	10	22	12	38.300.1200	12	100	24	32	12

> **38.350** **Phantom**

NL HSS-E Concaafrees  
 FR Fraise 1/2 cercle concave HSS-E  
 ES Fresa cóncava para ranurar HSS-E  
 DE HSS-E Konkavfräser



HSS-E DIN 855

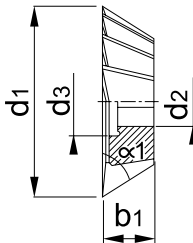
<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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25-30 D	20-25 C	15-20 A	10-15 A	10-15 B	8-12 A	17-22 B	20-25 B	95-105 B
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Ref.	r	d1	b1	d2	f1	z	Ref.	r	d1	b1	d2	f1	z
38.350.0100	1	50	6	16	0.2	14	38.350.0400	4	63	16	22	0.4	12
38.350.0125	1.25	50	6	16	0.2	14	38.350.0500	5	63	20	22	0.5	10
38.350.0150	1.5	50	8	16	0.2	14	38.350.0600	6	80	24	27	0.6	10
38.350.0200	2	50	9	16	0.25	14	38.350.0800	8	80	32	27	0.8	10
38.350.0250	2.5	63	10	22	0.3	14	38.350.1000	10	100	36	32	1	10
38.350.0300	3	63	12	22	0.3	12	38.350.1200	12	100	40	32	1.2	10

> **38.400** **Phantom**

NL HSS-E Hoekkopfrees  
 FR Fraise conique 2 tailles HSS-E  
 ES Fresa semicircular cónica HSS-E  
 DE HSS-E Winkelstirnfräser



HSS-E DIN 842

<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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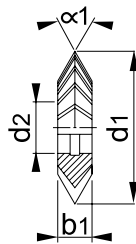
25-30 D	20-25 C	15-20 A	10-15 A	10-15 B	8-12 A	17-22 B	20-25 B	95-105 B
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Ref.	d1	d2	d3	b1	1	z	Ref.	d1	d2	d3	b1	1	z	Ref.	d1	d2	d3	b1	1	z
38.400.4504	40	10	15	12	45°	14	38.400.5004	40	10	15	13	50°	14	38.400.6004	40	10	15	13	60°	14
38.400.4505	50	13	19	15	45°	16	38.400.5005	50	13	19	16	50°	16	38.400.6005	50	16	19	16	60°	16
38.400.4506	63	16	23	18	45°	16	38.400.5006	63	16	23	20	50°	16	38.400.6006	63	16	23	20	60°	16
38.400.4508	80	22	30	23	45°	18	38.400.5008	80	22	30	25	50°	18	38.400.6008	80	22	30	25	60°	18
38.400.4510	100	32	39	30	45°	20	38.400.5010	100	32	39	32	50°	20	38.400.6010	100	32	39	32	60°	20



## > 38.450 Phantom

NL HSS-E Prismafrees  
FR Fraise isocèle 2 tailles HSS-E  
ES Fresa semicircular angular HSS-E  
DE HSS-E Prismenfräser



HSS-E  
DIN  
847

<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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25-30 D	20-25 C	15-20 A	10-15 A	10-15 B	8-12 A	17-22 B	20-25 B	95-105 B
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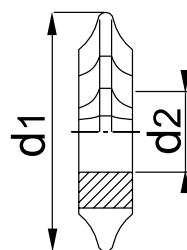
Ref.	d1	d2	b1	α1	z
38.450.4505	50	16	8	45°	16
38.450.4506	63	22	10	45°	16
38.450.4508	80	27	12	45°	20
38.450.4510	100	32	18	45°	20

Ref.	d1	d2	b1	α1	z
38.450.6005	50	16	10	60°	16
38.450.6006	63	22	14	60°	16
38.450.6008	80	27	18	60°	18
38.450.6010	100	32	25	60°	20

Ref.	d1	d2	b1	α1	z
38.450.9005	50	16	14	90°	16
38.450.9006	63	22	20	90°	16
38.450.9008	80	27	22	90°	18
38.450.9010	100	32	32	90°	20

## > 38.500 Phantom

NL HSS Moduulfrees drukhoek 20°  
FR Fraise module HSS angle de pression 20°  
ES Fresa de módulo HSS ángulo de presión 20°  
DE HSS Modulscheibenfräser Eingriffswinkel 20°



HSS  
DIN  
3972

<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>M 21</b> INOX ≤850N/mm <sup>2</sup>	<b>M 22</b> INOX >850N/mm <sup>2</sup>	<b>K 31</b> GG	<b>K 32</b> GGG GTS-GTW	<b>N 41</b> Alu
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25-30 D	20-25 C	15-20 A	10-15 A	10-15 B	8-12 A	17-22 B	20-25 B	95-105 B
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Ref.	Modul	d1	d2	Nr.
38.500.0501	0.5	40	16	1 (12-13z)
38.500.0502	0.5	40	16	2 (14-16z)
38.500.0503	0.5	40	16	3 (17-20z)
38.500.0504	0.5	40	16	4 (21-25z)
38.500.0505	0.5	40	16	5 (26-34z)
38.500.0506	0.5	40	16	6 (35-54z)
38.500.0507	0.5	40	16	7 (55-135z)
38.500.0508	0.5	40	16	8 (>136z)
38.500.0751	0.75	40	16	1 (12-13z)
38.500.0752	0.75	40	16	2 (14-16z)
38.500.0753	0.75	40	16	3 (17-20z)
38.500.0754	0.75	40	16	4 (21-25z)
38.500.0755	0.75	40	16	5 (26-34z)
38.500.0756	0.75	40	16	6 (35-54z)
38.500.0757	0.75	40	16	7 (55-135z)
38.500.0758	0.75	40	16	8 (>136z)
38.500.1001	1	50	16	1 (12-13z)
38.500.1002	1	50	16	2 (14-16z)
38.500.1003	1	50	16	3 (17-20z)
38.500.1004	1	50	16	4 (21-25z)
38.500.1005	1	50	16	5 (26-34z)
38.500.1006	1	50	16	6 (35-54z)
38.500.1007	1	50	16	7 (55-135z)
38.500.1008	1	50	16	8 (>136z)
38.500.1251	1.25	50	16	1 (12-13z)
38.500.1252	1.25	50	16	2 (14-16z)
38.500.1253	1.25	50	16	3 (17-20z)
38.500.1254	1.25	50	16	4 (21-25z)
38.500.1255	1.25	50	16	5 (26-34z)
38.500.1256	1.25	50	16	6 (35-54z)
38.500.1257	1.25	50	16	7 (55-135z)
38.500.1258	1.25	50	16	8 (>136z)
38.500.1501	1.5	63	22	1 (12-13z)
38.500.1502	1.5	63	22	2 (14-16z)
38.500.1503	1.5	63	22	3 (17-20z)
38.500.1504	1.5	63	22	4 (21-25z)
38.500.1505	1.5	63	22	5 (26-34z)
38.500.1506	1.5	63	22	6 (35-54z)
38.500.1507	1.5	63	22	7 (55-135z)
38.500.1508	1.5	63	22	8 (>136z)
38.500.1751	1.75	63	22	1 (12-13z)

Ref.	Modul	d1	d2	Nr.
38.500.1752	1.75	63	22	2 (14-16z)
38.500.1753	1.75	63	22	3 (17-20z)
38.500.1754	1.75	63	22	4 (21-25z)
38.500.1755	1.75	63	22	5 (26-34z)
38.500.1756	1.75	63	22	6 (35-54z)
38.500.1757	1.75	63	22	7 (55-135z)
38.500.1758	1.75	63	22	8 (>136z)
38.500.2001	2	63	22	1 (12-13z)
38.500.2002	2	63	22	2 (14-16z)
38.500.2003	2	63	22	3 (17-20z)
38.500.2004	2	63	22	4 (21-25z)
38.500.2005	2	63	22	5 (26-34z)
38.500.2006	2	63	22	6 (35-54z)
38.500.2007	2	63	22	7 (55-135z)
38.500.2008	2	63	22	8 (>136z)
38.500.2251	2.25	63	22	1 (12-13z)
38.500.2252	2.25	63	22	2 (14-16z)
38.500.2253	2.25	63	22	3 (17-20z)
38.500.2254	2.25	63	22	4 (21-25z)
38.500.2255	2.25	63	22	5 (26-34z)
38.500.2256	2.25	63	22	6 (35-54z)
38.500.2257	2.25	63	22	7 (55-135z)
38.500.2258	2.25	63	22	8 (>136z)
38.500.2501	2.5	63	22	1 (12-13z)
38.500.2502	2.5	63	22	2 (14-16z)
38.500.2503	2.5	63	22	3 (17-20z)
38.500.2504	2.5	63	22	4 (21-25z)
38.500.2505	2.5	63	22	5 (26-34z)
38.500.2506	2.5	63	22	6 (35-54z)
38.500.2507	2.5	63	22	7 (55-135z)
38.500.2508	2.5	63	22	8 (>136z)
38.500.2751	2.75	70	27	1 (12-13z)
38.500.2752	2.75	70	27	2 (14-16z)
38.500.2753	2.75	70	27	3 (17-20z)
38.500.2754	2.75	70	27	4 (21-25z)
38.500.2755	2.75	70	27	5 (26-34z)
38.500.2756	2.75	70	27	6 (35-54z)
38.500.2757	2.75	70	27	7 (55-135z)
38.500.2758	2.75	70	27	8 (>136z)
38.500.3001	3	70	27	1 (12-13z)
38.500.3002	3	70	27	2 (14-16z)

> **38.500** **Phantom**

Ref.	Modul	d1	d2	Nr.
38.500.3003	3	70	27	3 (17-20z)
38.500.3004	3	70	27	4 (21-25z)
38.500.3005	3	70	27	5 (26-34z)
38.500.3006	3	70	27	6 (35-54z)
38.500.3007	3	70	27	7 (55-135z)
38.500.3008	3	70	27	8 (>136z)
38.500.3251	3.25	70	27	1 (12-13z)
38.500.3252	3.25	70	27	2 (14-16z)
38.500.3253	3.25	70	27	3 (17-20z)
38.500.3254	3.25	70	27	4 (21-25z)
38.500.3255	3.25	70	27	5 (26-34z)
38.500.3256	3.25	70	27	6 (35-54z)
38.500.3257	3.25	70	27	7 (55-135z)
38.500.3258	3.25	70	27	8 (>136z)
38.500.3501	3.5	80	27	1 (12-13z)
38.500.3502	3.5	80	27	2 (14-16z)
38.500.3503	3.5	80	27	3 (17-20z)
38.500.3504	3.5	80	27	4 (21-25z)
38.500.3505	3.5	80	27	5 (26-34z)
38.500.3506	3.5	80	27	6 (35-54z)
38.500.3507	3.5	80	27	7 (55-135z)
38.500.3508	3.5	80	27	8 (>136z)
38.500.3751	3.75	80	27	1 (12-13z)
38.500.3752	3.75	80	27	2 (14-16z)
38.500.3753	3.75	80	27	3 (17-20z)
38.500.3754	3.75	80	27	4 (21-25z)
38.500.3755	3.75	80	27	5 (26-34z)
38.500.3756	3.75	80	27	6 (35-54z)
38.500.3757	3.75	80	27	7 (55-135z)
38.500.3758	3.75	80	27	8 (>136z)
38.500.4001	4	80	27	1 (12-13z)

Ref.	Modul	d1	d2	Nr.
38.500.4002	4	80	27	2 (14-16z)
38.500.4003	4	80	27	3 (17-20z)
38.500.4004	4	80	27	4 (21-25z)
38.500.4005	4	80	27	5 (26-34z)
38.500.4006	4	80	27	6 (35-54z)
38.500.4007	4	80	27	7 (55-135z)
38.500.4008	4	80	27	8 (>136z)
38.500.4501	4.5	90	27	1 (12-13z)
38.500.4502	4.5	90	27	2 (14-16z)
38.500.4503	4.5	90	27	3 (17-20z)
38.500.4504	4.5	90	27	4 (21-25z)
38.500.4505	4.5	90	27	5 (26-34z)
38.500.4506	4.5	90	27	6 (35-54z)
38.500.4507	4.5	90	27	7 (55-135z)
38.500.4508	4.5	90	27	8 (>136z)
38.500.5001	5	90	32	1 (12-13z)
38.500.5002	5	90	32	2 (14-16z)
38.500.5003	5	90	32	3 (17-20z)
38.500.5004	5	90	32	4 (21-25z)
38.500.5005	5	90	32	5 (26-34z)
38.500.5006	5	90	32	6 (35-54z)
38.500.5007	5	90	32	7 (55-135z)
38.500.5008	5	90	32	8 (>136z)
38.500.6001	6	100	32	1 (12-13z)
38.500.6002	6	100	32	2 (14-16z)
38.500.6003	6	100	32	3 (17-20z)
38.500.6004	6	100	32	4 (21-25z)
38.500.6005	6	100	32	5 (26-34z)
38.500.6006	6	100	32	6 (35-54z)
38.500.6007	6	100	32	7 (55-135z)
38.500.6008	6	100	32	8 (>136z)







### > 39.100 Phantom

NL **Cassette Frezen leeg**  
 FR **Coffret pour fraises vide**  
 ES **Estuche de fresas vacío**  
 DE **Fräserkassetten Leer**



Ref.	Type	Ø mm
39.100.1050	32.220	3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20 mm

Ref.	Type	Ø mm
39.100.1200	32.200/32.220/33.200/33.220/ 34.200/34.220	4, 5, 6, 8, 10, 12 mm

### > 39.200 Phantom

NL **HSS-E Set Schachtfrezen, 2-snijder**  
 FR **Jeu de Fraises à rainurer HSS-E**  
 ES **Juego de fresas frontales de 2 labios HSS-E**  
 DE **HSS-E Satz Langlochfräser**



P 11	P 12	P 13	P 14	N 41
≤600 N/mm <sup>2</sup>	≤850 N/mm <sup>2</sup>	≤1000 N/mm <sup>2</sup>	≤1400 N/mm <sup>2</sup>	Alu
30-35 J	28-32 I	20-25 J	15-20 I	75-105 K

Ref.	Type	Ø mm
39.200.1050	32.220	3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20 mm

Ref.	Type	Ø mm
39.200.1150	32.220	4, 5, 6, 8, 10, 12 mm

### > 39.300 Phantom

NL **HSS-E Set Schachtfrezen, 3-snijder**  
 FR **Jeu de Fraises universelles HSS-E**  
 ES **Juego de Fresas frontales de 3 labios HSS-E**  
 DE **HSS-E Satz Universalfräser**



P 11	P 12	P 13	P 14	N 41
≤600 N/mm <sup>2</sup>	≤850 N/mm <sup>2</sup>	≤1000 N/mm <sup>2</sup>	≤1400 N/mm <sup>2</sup>	Alu
30-35 J	28-32 I	20-25 J	15-20 I	75-105 K

Ref.	Type	Ø mm
39.300.1050	33.220	3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20 mm

Ref.	Type	Ø mm
39.300.1150	33.220	4, 5, 6, 8, 10, 12 mm

> **39.400** **Phantom**

NL **HSS-E set Schachtfrezen, meersnijder**  
 FR **Jeu de Fraises standards HSS-E**  
 ES **Juego de fresas frontales de varios labios HSS-E**  
 DE **HSS-E Satz Schafffräser (4 Schneiden)**



<b>P 11</b> ≤600 N/mm <sup>2</sup>	<b>P 12</b> ≤850 N/mm <sup>2</sup>	<b>P 13</b> ≤1000 N/mm <sup>2</sup>	<b>P 14</b> ≤1400 N/mm <sup>2</sup>	<b>N 41</b> Alu
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30-35 J	28-32 I	20-25 J	15-20 I	75-105 K
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Ref.	Type	Ø mm
39.400.1050	34.220	3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20 mm

Ref.	Type	Ø mm
39.400.1150	34.220	4, 5, 6, 8, 10, 12 mm



SC 1



HSS-E 1



2



SC 3



HSS-E 3



**P 11** = ISO  
 5600 N/mm<sup>2</sup>  
 25-35 E Vc = 25-35  
 FRC = E

NL Voedingswaardentabel  
 FR Tableau des avances  
 ES Tabla de avances  
 DE Vorschubtabelle

FRC																								
d1 (mm)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
	fz (mm/z)																							
0,3	0,001	0,001	0,001	0,002	0,003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,012	0,015	-	-	-
0,5	0,001	0,001	0,002	0,003	0,006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,019	0,024	-	-	-
0,8	0,002	0,002	0,003	0,005	0,008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,030	0,039	-	-	-
1	0,002	0,006	0,004	0,006	0,009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,037	0,048	0,012	0,008	0,008
1,5	0,003	0,008	0,005	0,009	0,012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,041	0,054	-	-	0,011
2	0,004	0,010	0,007	0,012	0,016	0,002	0,002	0,004	0,005	0,006	0,007	0,008	0,011	0,027	-	0,011	0,022	0,035	0,040	0,044	0,057	0,028	0,014	0,026
3	0,006	0,015	0,010	0,016	0,039	0,003	0,004	0,007	0,010	0,010	0,010	0,011	0,027	0,035	-	0,022	0,035	0,040	0,055	0,067	0,091	0,043	0,023	0,026
5	0,008	0,026	0,015	0,026	-	0,009	0,010	0,014	0,020	0,020	0,022	0,027	0,035	0,044	0,048	0,035	0,040	0,055	0,065	0,111	0,156	0,052	0,031	0,045
6	0,010	0,030	0,026	0,032	-	0,011	0,013	0,017	0,024	0,025	0,027	0,035	0,044	0,059	0,059	0,040	0,055	0,065	0,080	0,122	0,174	0,059	0,039	0,060
8	0,015	0,038	0,030	0,040	-	0,016	0,019	0,024	0,032	0,032	0,035	0,044	0,055	0,078	0,067	0,055	0,065	0,080	0,105	0,132	0,189	0,067	0,060	0,090
10	0,026	0,043	0,038	0,045	-	0,021	0,025	0,030	0,038	0,039	0,044	0,055	0,065	0,098	0,071	0,065	0,080	0,105	0,135	0,142	0,199	0,075	0,080	0,120
12	0,030	0,051	0,043	0,060	-	0,026	0,030	0,036	0,046	0,048	0,052	0,065	0,085	0,097	0,078	0,080	0,105	0,135	0,150	0,142	0,212	0,082	0,101	0,150
16	0,032	0,051	0,043	0,060	-	0,032	0,038	0,045	0,054	0,058	0,063	0,085	0,100	0,099	0,117	0,105	0,135	0,150	0,168	-	-	0,092	0,120	0,180
20	0,037	0,051	0,043	0,060	-	0,038	0,045	0,057	0,066	0,073	0,080	0,100	0,135	0,120	-	0,135	0,150	0,168	0,180	-	-	-	-	0,200
22	0,037	0,051	0,043	0,060	-	0,045	0,057	0,066	0,070	0,080	0,100	0,135	0,150	0,128	-	0,150	0,168	0,180	0,200	-	-	-	-	-
25	0,040	0,051	0,043	0,060	-	0,057	0,066	0,070	0,073	0,100	0,135	0,150	0,168	0,135	-	0,168	0,180	0,200	0,220	-	-	-	-	0,109
32	0,042	0,051	0,043	0,060	-	0,060	0,070	0,080	0,090	0,100	0,135	0,150	-	-	-	-	-	-	-	-	-	-	-	-
40	0,043	0,051	0,043	0,060	-	0,060	0,070	0,080	0,090	0,100	0,135	0,190	-	-	-	-	-	-	-	-	-	-	-	-
63	0,045	0,051	0,051	0,080	-	0,070	0,080	0,090	0,100	0,120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	0,045	0,051	0,051	0,080	-	0,080	0,090	0,100	0,110	0,140	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	0,045	0,051	0,051	0,080	-	0,090	0,100	0,110	0,120	0,150	-	-	-	-	-	-	-	-	-	-	-	-	-	-
125	0,045	0,051	0,051	0,080	-	0,100	0,110	0,120	0,130	0,160	-	-	-	-	-	-	-	-	-	-	-	-	-	-
160	0,045	0,051	0,051	0,080	-	0,110	0,120	0,130	0,140	0,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NL Toerentabel  
 FR Tableau des vitesses de rotation  
 ES Tabla de número de revoluciones  
 DE Drehzahltablelle

$$n = \frac{Vc \times 1000}{3,14 \times d1} \quad Vc = \frac{n \times 3,14 \times d1}{1000}$$

Vc (m/min)																					
d1 (mm)	5	8	10	12	15	20	25	30	35	40	50	60	70	80	90	100	110	120			
	n = rpm																				
1	1592	2546	3183	3820	4775	6366	7958	9549	11141	12732	15915	19099	22282	25465	28648	31831	35014	38197			
1,5	1061	1698	2122	2546	3183	4244	5305	6366	7427	8588	10610	12732	14854	16977	19099	21221	23343	25465			
2	796	1273	1592	1910	2387	3183	3937	4775	5570	6366	7958	9549	11141	12732	14324	15915	17507	19099			
2,5	637	1019	1273	1528	1910	2546	3183	3820	4456	5093	6366	7639	8913	10186	11459	12732	14006	15279			
3	531	849	1061	1273	1592	2122	2653	3183	3714	4244	5305	6366	7427	8488	9549	10610	11671	12732			
3,5	455	728	909	1091	1364	1819	2274	2728	3183	3638	4547	5457	6366	7276	8185	9095	10004	10913			
4	398	637	796	955	1194	1592	1989	2387	2785	3183	3979	4775	5570	6366	7162	7958	8754	9549			
4,5	354	566	707	849	1061	1415	1768	2122	2476	2829	3537	4244	4951	5659	6366	7074	7781	8488			
5	318	509	637	764	955	1273	1592	1910	2228	2546	3183	3820	4456	5093	5730	6366	7003	7639			
5,5	289	463	579	694	868	1157	1447	1739	2026	2315	2894	3472	4051	4630	5209	5787	6366	6945			
6	265	424	531	637	796	1061	1326	1592	1857	2122	2653	3183	3714	4244	4775	5305	5836	6366			
7	227	364	455	546	682	909	1137	1364	1592	1819	2274	2728	3183	3638	4093	4547	5002	5457			
8	199	318	398	477	597	796	995	1194	1393	1592	1989	2387	2785	3183	3581	3979	4377	4775			
9	177	283	354	424	531	707	884	1061	1238	1415	1768	2122	2476	2829	3183	3537	3890	4244			
10	159	255	318	382	477	637	796	955	1114	1273	1592	1910	2228	2546	2865	3183	3501	3820			
11	145	321	289	347	434	579	723	868	1013	1157	1447	1736	2026	2315	2604	2894	3183	3472			
12	133	212	265	318	398	531	663	796	928	1061	1326	1592	1857	2122	2387	2653	2918	3183			
13	122	196	245	294	367	490	612	735	857	979	1224	1469	1714	1959	2204	2449	2693	2938			
14	114	182	227	273	341	455	568	682	796	909	1137	1364	1592	1819	2046	2274	2501	2728			
15	106	170	212	255	318	424	531	637	743	849	1061	1273	1485	1698	1910	2122	2334	2546			
16	99	159	199	239	298	398	497	597	696	796	995	1194	1393	1592	1790	1989	2188	2387			
18	88	141	177	212	265	354	442	531	619	707	884	1061	1238	1415	1592	1768	1945	2122			
20	80	127	159	191	239	318	398	477	557	637	796	955	1114	1273	1432	1592	1751	1910			
22	72	116	145	174	217	289	362	434	506	579	723	868	1013	1157	1302	1447	1592	1736			
24	66	106	133	159	199	265	332	398	464	531	663	796	928	1061	1194	1326	1459	1592			
25	64	102	127	153	191	255	318	382	446	509	637	764	891	1019	1146	1273	1401	1528			
26	61	98	122	147	184	245	306	367	428	490	612	735	857	979	1102	1224	1347	1469			
28	57	91	114	136	171	227	284	341	398	455	568	682	796	909	1023	1137	1251	1364			
30	53	85	106	127	159	212	265	318	371	424	531	637	743	849	955	1061	1167	1273			
35	45	73	91	109	136	182	227	273	318	364	455	546	637	728	819	909	1000	1091			
40	40	64	80	95	119	159	199	239	279	318	398	477	557	637	716	796	875	955			
45	35	57	71	85	106	141	177	212	248	283	354	424	495	566	637	707	778	849			
50	32	51	64	76	95	127	159	191	223	255	318	382	446	509	573	637	700	764			
55	29	46	58	69	87	116	145	174	203	231	289	347	405	463	521	579	637	694			
60	27	42	53	64	80	106	133	159	186	212	265	318	371	424	477	531	584	637			

<b>FRC</b>	<b>fz (mm/z)</b>	<b>Vc</b>	<b>n=rpm</b>
NL: Voedingscode	NL: Voeding per tand (mm/z)	NL: Snijsnelheid (m/min)	NL: Spiltoerental (omw/min)
FR: Codification vitesse d'avance	FR: Avance par dent (mm/z)	FR: Vitesse de coupe (m/min)	FR: Vitesse de broche (tr/min)
ES: Codificación de velocidad de avance	ES: Avance por diente (mm/z)	ES: Velocidad de corte (m/min)	ES: Velocidad del husillo (rpm)
DE: Vorschubgeschwindigkeit Codierung	DE: Vorschub pro Zahn (mm/z)	DE: Schnittgeschwindigkeit (m/min)	DE: Spindeldrehzahl (U/min)