

Phantom 

**INTERNATIONAL
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
		Ongelegerd en gelegeerd staal ≤600 N/mm² 1.0037 (St37), 1.0038 (S235JR G2), 1.00402 (C22), 1.1178 (C30E)	Aciers non-alliés ou faiblement alliés ≤600 N/mm² 1.0037 (A37), 1.0038 (E 24-2 Ne), 1.00402 (1C20), 1.1178 (1C30)	Acero no aleado ≤600 N/mm² 1.0037 (S235JR), 1.0038 (S235JR G2), 1.0402 (F.112), 1.1178 (C30E)	Unlegierter und legierter Stahl ≤600 N/mm² 1.0037 (St37), 1.0038 (S235JR G2), 1.00402 (C22), 1.1178 (C30E)
		Ongelegerd en gelegeerd staal 600 - 850 N/mm² 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)	Aciers non-alliés ou faiblement alliés 600 - 850 N/mm² 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)	Acero no aleado 600 - 850 N/mm² 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)	Unlegierter und legierter Stahl 600 - 850 N/mm² 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)
		Gelegeerd staal 850 - 1000 N/mm² 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)	Aciers alliés 850 - 1000 N/mm² 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)	Acero aleado 850 - 1000 N/mm² 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)	Legierter Stahl 850 - 1000 N/mm² 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)
		Gelegeerd staal 1000 - 1400 N/mm² 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)	Aciers alliés 1000 - 1400 N/mm² 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)	Acero aleado 1000 - 1400 N/mm² 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)	Legierter Stahl 1000 - 1400 N/mm² 1.5710 (36NiCr6), 1.7035 (41Cr40), 1.7225 (42CrMo4), 1.8519 (31CrMoV9), 1.8550 (34CrAlNi7), 1.5752 (15NiCr13), 1.7131 (16MnCr5), 1.7264 (20CrMo5)
		Gehard en inzetgehard staal 50 - 60 HRC 1.2344 (X40CrMoV5), 1.2767 (X45NiCrMo4), 1.2379 (X155CrVMo12-1), 1.2080 (X210Cr12), 1.3343 (S6-5-2)	Aciers trempés et Aciers de cémentation alliés 50 - 60 HRC 1.2344 (Z 40 CDV 5), 1.2767 (X45NiCrMo4), 1.2379 (D2), 1.2080 (Z200C12), 1.3343 (Z85WDCV)	Acero templado 50 - 60 HRC 1.2344 (X40CrMoV5), 1.2767 (X45NiCrMo4), 1.2379 (X155CrVMo12-1), 1.2080 (X210Cr12), 1.3343 (S6-5-2)	Gehärteter und einsatzgehärteter Stahl, 50-60 HRC 1.2344 (X40CrMoV5), 1.2767 (X45NiCrMo4), 1.2767 (X45NiCrMo4), 1.2379 (X155CrVMo12-1), 1.2080 (X210Cr12), 1.3343 (S6-5-2)
		Roestvaststaal, INOX ≤850 N/mm² 1.4005 (X12CrS13), 1.4104 (X14CrMos17), 1.4105 (X6CrMoS17), 1.4301 (XCrNi18-10)(304), 1.4305 (X8CrNiS18-9)(303)	Aciers inoxydables ≤850 N/mm² 1.4005 (Z11CF13), 1.4104 (Z13CF17), 1.4105 (Z8CF17), 1.4301 (XCrNi18-10)(304), 1.4305 (X8CrNiS18-9)(303)	Acero inoxidable ≤850 N/mm² 1.4006 (F.3401-X10Cr13), 1.4104 (F.3117-X10Cr17), 1.4301 (F.3504-X5CrNi18-10)(304), 1.4305 (F.3508-X10CrNiS18-09)(303)	Rostfreier Stahl, INOX ≤850 N/mm² 1.4005 (X12CrS13), 1.4104 (X14CrMos17), 1.4105 (X6CrMoS17), 1.4301 (XCrNi18-10)(304), 1.4305 (X8CrNiS18-9)(303)
		Roestvaststaal, INOX >850 N/mm² 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (X6CrNiMoTi17-12-2)(316Ti)	Aciers inoxydables >850 N/mm² 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (X6CrNiMoTi17-12-2)(316Ti)	Acero inoxidable >850 N/mm² 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (F.3535-X6CrNiMoTi17-12-2)(316Ti)	Rostfreier Stahl, INOX >850 N/mm² 1.4438 (X2CrNiMo18-15-4)(317), 1.4404 (X2CrNiMo17-12-2)(316L), 1.4571 (X6CrNiMoTi17-12-2)(316Ti)
		Grijs gietijzer GG <260 HB30 0.6015 (GG 15), 0.6025 (GG 25), 0.6040 (GG 40)	Fontes <260 HB30 0.6015 (GG 15), 0.6025 (GG 25), 0.6040 (GG 40)	Fundición gris con grafito laminado GG <260 HB30 0.6015 (FG15), 0.6025 (FG25), 0.6040 (FG40)	Grauguss GG <260 HB30 0.6015 (GG 15), 0.6025 (GG 25), 0.6040 (GG 40)
		Smeedbaar en Nodulair gietijzer <260 HB30 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)	Fontes à graphites et malléables <260 HB30 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)	Fundición gris con grafito esférico <260 HB30 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)	Formbar und dehnbares Gusseisen <260 HB30 0.8145 (GTS-45), 0.8170 (GTS-70-02), 0.7040 (GGG 40), 0.7070 (GGG 70)
		Aluminium en Aluminiumlegeringen 3.0255 (Al99.5), 3.2315 (AlMgSi1), 3.3515 (AlMg1)	Aluminium et Alliages d'Aluminium 3.0255 (A59050C), 3.2315 (AlMgSi1), 3.3515 (AlMg1)	Aluminio y aleaciones de Aluminio 3.0255 (Al99.5), 3.2315 (AlMgSi1), 3.3515 (AlMg1)	Aluminium und Aluminiumlegerungen 3.0255 (Al99.5), 3.2315 (AlMgSi1), 3.3515 (AlMg1)
		Gietaluminium Si 10 - 24% 3.2131 (G-AlSi5Cu1), 3.2153 (G-AlSi7Cu3), (3.2573 G-AlSi9), 3.2581 (G-AlSi12), 3.2583 (G-AlSi12Cu)	Alliages d'Aluminium Si 10 - 24% 3.2131 (G-AlSi5Cu1), 3.2153 (G-AlSi7Cu3), (3.2573 G-AlSi9), 3.2581 (G-AlSi12), 3.2583 (G-AlSi12Cu)	Fundición de Aluminio aleada Si 10 - 24% 3.2131 (G-AlSi5Cu1), 3.2153 (G-AlSi7Cu3), (3.2573 G-AlSi9), 3.2581 (L-2520,21), 3.2583 (L2530)	Druckguss Si 10 - 24% 3.2131 (G-AlSi5Cu1), 3.2153 (G-AlSi7Cu3), (3.2573 G-AlSi9), 3.2581 (G-AlSi12), 3.2583 (G-AlSi12Cu)
		Magnesiumlegeringen 3.5200 (MgMn2), 3.5812 (G-MgAl8Zn1), 3.5612 (G-MgAl6Zn1)	Alliages de Magnésium 3.5200 (MgMn2), 3.5812 (AZ81hp), 3.5612 (AZ61)	Aleaciones de Magnesio 3.5200 (MgMn2), 3.5812 (AZ81hp), 3.5612 (AZ61)	Magnesiumlegerungen 3.5200 (MgMn2), 3.5812 (G-MgAl8Zn1), 3.5612 (G-MgAl6Zn1)
		Koper en Koperlegeringen 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)	Cuivres et Alliages de cuivres 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)	Cobre y aleaciones de cobre 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)	Kupfer und Kupferlegerungen 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)
		Koper- en Aluminiumlegering 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (CuBe2) AMPCO® 8, AMPCO® 8 15, AMPCO® 18	Cuivre et Alliages d'Aluminium 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (CuBe1.9) AMPCO® 8, AMPCO® 8 15, AMPCO® 18	Cobre y aleaciones de Aluminio 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (CuBe2) AMPCO® 8, AMPCO® 8 15, AMPCO® 18	Kupfer- und Aluminiumlegerungen 2.0916 (CuAl5), 2.0960 (CuAl9Mn), 2.1050 (CuSn10), 2.0980 (CuAl11Ni), 2.1247 (Cu-Be2) AMPCO® 8, AMPCO® 8 15, AMPCO® 18
		Duroplastic en Thermoplastic PMMA, PVC, PE, PP, PTFE	Duroplastiques et Thermoplastiques PMMA, PVC, PE, PP, PTFE	Duroplásticos en Termoplásticos PMMA, PVC, PE, PP, PTFE	Duroplaste und Thermoplaste PMMA, PVC, PE, PP, PTFE
		Versterkte kunststoffen GFK, CFK	Plastiques réinforcés GFK, CFK	Plásticos reforzados GFK, CFK	Verstärkte Kunststoffe GFK, CFK
		Nikkel- en Cobaltlegeringen Hastelloy, Inconel, Nimonic, Jetalloy	Alliages de Nickel et de Cobalt Hastelloy, Inconel, Nimonic, Jetalloy	Aleaciones de Níquel y Cobalto Hastelloy, Inconel, Nimonic, Jetalloy	Nickel und Kobaltlegerungen Hastelloy, Inconel, Nimonic, Jetalloy
		Titaniumlegeringen 3.7024 (Ti99.5), 3.7114 (TiAl5Sn2.5), 3.7124 (TiCu2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)	Alliages de Titane 3.7024 (T35), 3.7114 (TiAl5Sn2.5), 3.7124 (T-U2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)	Titanio aleado 3.7024 (Ti99.5), 3.7114 (TiAl5Sn2.5), 3.7124 (TiCu2), 3.7154 (TiAl6Zr5), 3.7165 (TiAl6V4), 3.7184 (TiAl4Mo4Sn2.5)	Titanlegerungen 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
HSS	HSS	HSS	HSS	HSS
HSS-E	HSS-E (5% Cobalt)	HSS-E (5% Cobalt)	HSS-E (5% Cobalt)	HSS-E (5% Cobalt)
HM-TIP	Hardmetaal Tip	Plaquette carbure brasée	Plaquitas de metal duro soldadas	mit HM-Schneiden
MG HM	Micro-Grain volhardmetaal	Carbure micrograin	Metal duro micrograno	Micro-Grain Vollhartmetall
AlCrN-X	AlCrN-X gecoat	Revêtement AlCrN-X	Recubrimiento AlCrN-X	AlCrN-X Be- schichtung
" inch	Diameter in inches	Diamètre en pouce	Diámetro en pulgadas	Durchmesser in Zoll-Masse
DIN 212-B	DIN norm	Norme DIN	Norma DIN	DIN Norm
DIN≈ 8051	DIN bij benadering	Equivalent norme DIN	Según norma DIN	Ähnlich nach DIN

	NL	FR	ES	DE
NORM	Fabriek standaard	Standard usine	Estándar de la fábrica	Werksnorm
1:10	Coniciteit	Conicité	Conicidad	Konizität
h8	Cilindrische schacht h8	Queue cylindrique h8	Mango cilindrico h8	Zylinderschaft h8
DIN 228-B	Morse Konus Opname	Cône morse	Mango cónico	Morsekegel
x0,01	Oplopend met 0,01 mm	Croissant par 0,01 mm	Creciente por 0,01 mm	Ansteigend mit 0,01 mm
H7	Passing	Tolérance	Tolerancia	Passung
≤03 -0,000 +0,003	Tolerantie diameter	Tolérance diamètre	Tolerancia diámetro	Toleranz Durchmesser
MT	Ruimen van Morse Konus	Pour alésage cône morse	Para escariar mango cónico	Für reiben von Morsekegel



1 SC



1 HSS-E



2



3 SC



3 HSS-E



4



5

NL Ruimen
FR Alésage
ES Escariar
DE Reibahlen

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

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

P= pagina
P= page
P= página
P= Seite

> 51.110	Phantom	HSS	DIN 206-B	H7	P K N		P. 3
> 51.170	Phantom	HSS	DIN 206-B	H7	P K N		P. 3
> 51.200	HUNGER	D			P K N		P. 4
> 51.201	HUNGER	D					P. 4
> 51.202	HUNGER	D					P. 4
> 51.210	HUNGER	E			P K N		P. 5
> 51.211	HUNGER	E					P. 5
> 51.212	HUNGER	E					P. 5
> 51.220	HUNGER	K			P K N		P. 5
> 51.221	HUNGER	K					P. 6
> 51.224	HUNGER	K					P. 6
> 51.230	HUNGER	U			P K N		P. 6
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> 51.232	HUNGER	U					P. 7
> 51.233	HUNGER	U					P. 7
> 51.234	HUNGER	U					P. 7
> 51.240	HUNGER	V			P K N		P. 8
> 51.241	HUNGER	V					P. 8
> 51.242	HUNGER	V					P. 8
> 51.244	HUNGER	V					P. 8
> 81.900							P. 9
> 81.905							P. 9
> 51.300	Phantom	HSS	DIN 212-C	H7	K N		P. 10
> 51.310	Phantom	HSS	DIN 212-B	H7	P K N		P. 10
> 51.320	Phantom	HSS-E	DIN 212-B	H7	P M K N S		P. 10
> 51.324	Phantom	HSS-E	DIN 212-B	H7	P M K N S		NEW P. 11
> 51.330	Phantom	MG HM	DIN 212-B	H7	P M K N S		P. 11
> 51.334	Phantom	MG HM	DIN 212-B	H7	P M K N S		P. 11
> 51.340	Phantom	HSS-E	DIN 212-B	P7	P M K N S		P. 12
> 51.350	Phantom	HSS-E	DIN 212-B	x0,01	P M K N S		P. 12
> 51.360	Phantom	MG HM	DIN 212-B	x0,01	P M K N S		P. 12
> 51.400	Phantom	HSS-E	NORM	H7	P M K N S		P. 13
> 51.420	Phantom	HSS-E	DIN 212-E	H7	P N		P. 13

SP 1
HSS-E 1
2
SP 3
HSS-E 3
4
5



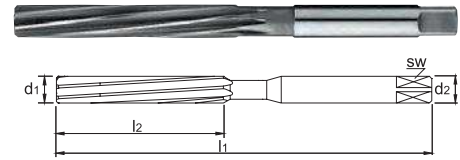
> 51.500	Phantom	HSS	DIN 208-A	H7		K N		P. 14
> 51.510	Phantom	HSS	DIN 208-B	H7	P	K N		P. 14
> 51.520	Phantom	HSS-E	DIN 208-B	H7	P M K N S			P. 14
> 51.570	Phantom	HSS-E	DIN 208-B	H7	P M K N S			P. 15
> 51.600	Phantom	HSS-E		H7	P M K N S			P. 15
> 51.620	Phantom	HSS-E	DIN 208-E	H7	P	N		P. 16
> 51.640	Phantom	HM-TIP	DIN 8094-B	H7	P M K N S			P. 16
> 51.645	Phantom	HM-TIP	DIN=8051	H7	P M K N S			P. 16
> 51.650	Phantom	HSS	DIN 219-B	H7	P	K N		P. 17
> 84.410	INTERNATIONAL TOOLS		DIN 217					P. 17
> 51.700	Phantom	HSS	DIN 311	k11	P	K N		P. 17
> 51.720	Phantom	HSS	DIN 9-A			K N		P. 18
> 51.730	Phantom	HSS	DIN 9-B		P	K N		P. 18
> 51.760	Phantom	HSS	DIN 204	MT	P	K N		P. 18
> 51.770	Phantom	HSS			P	K N		P. 19
> 51.780	Phantom	HSS	NPT		P	K N		P. 19
> 51.800	Phantom	HSS	DIN 2179		P	K N		P. 19
> 51.810	Phantom	HSS	DIN 2180		P	K N		P. 20
> 51.820	Phantom	HSS-E			P M K N S			P. 20
> 51.830	Phantom	HSS-E			P M	N		P. 20
> 51.840	Phantom	HSS-E			P M K N S			P. 21
> 51.850	Phantom	HSS-E			P M	N		P. 21
> 51.860	Phantom	HSS-E			P M K N S			P. 21
> 51.870	Phantom	HSS-E			P M	N		P. 21
> 59.200	HUNGER	D			P	K N		P. 22
> 59.210	HUNGER	E			P	K N		P. 22
> 59.220	HUNGER	K			P	K N		P. 22
> 59.230	HUNGER	U			P	K N		P. 22
> 59.240	HUNGER	V			P	K N		P. 23

> **51.110 Phantom**

NL **HSS Handruimer H7**
 FR **Alésoir à main HSS H7**
 ES **Escariador mano HSS H7**
 DE **HSS Handreibahle H7**

HSS **DIN 206-B** **H7**

P 11 **P 12** **P 13** **K 31** **K 32** **N 41** **N 51**
 ≤500 N/mm² ≤850 N/mm² ≤1000 N/mm² GG GGG GTS-GTW Alu Cu



Ref.	d1	l1	l2	d2	sw
51.110.0200	2	50	25	2	1.6
51.110.0250	2.5	58	29	2.5	2
51.110.0300	3	62	31	3	2.24
51.110.0350	3.5	71	35	3.5	2.8
51.110.0400	4	76	38	4	3.15
51.110.0450	4.5	81	41	4.5	3.55
51.110.0500	5	87	44	5	4
51.110.0550	5.5	93	47	5.5	4.5
51.110.0600	6	93	47	6	4.5
51.110.0650	6.5	100	50	6.5	5
51.110.0700	7	107	54	7	5.6
51.110.0750	7.5	115	58	7.5	6.3
51.110.0800	8	115	58	8	6.3
51.110.0850	8.5	124	62	8.5	7.1
51.110.0900	9	124	62	9	7.1
51.110.0950	9.5	133	66	9.5	8
51.110.1000	10	133	66	10	8
51.110.1100	11	142	71	11	9

Ref.	d1	l1	l2	d2	sw
51.110.1200	12	152	76	12	10
51.110.1300	13	152	76	13	10
51.110.1400	14	163	81	14	11.2
51.110.1500	15	163	81	15	11.2
51.110.1600	16	175	87	16	12.5
51.110.1700	17	175	87	17	12.5
51.110.1800	18	188	93	18	14
51.110.1900	19	188	93	19	14
51.110.2000	20	201	100	20	16
51.110.2100	21	201	100	21	16
51.110.2200	22	215	107	22	18
51.110.2300	23	215	107	23	18
51.110.2400	24	231	115	24	20
51.110.2500	25	231	115	25	20
51.110.2600	26	231	115	26	20
51.110.2700	27	247	124	27	22.4
51.110.2800	28	247	124	28	22.4
51.110.2900	29	247	124	29	22.4

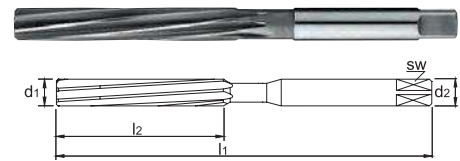
Ref.	d1	l1	l2	d2	sw
51.110.3000	30	247	124	30	22.4
51.110.3100	31	265	133	31	25
51.110.3200	32	265	133	32	25
51.110.3300	33	265	133	33	25
51.110.3400	34	284	142	34	28
51.110.3500	35	284	142	35	28
51.110.3600	36	284	142	36	28
51.110.3700	37	284	142	37	28
51.110.3800	38	305	152	38	31.5
51.110.3900	39	305	152	39	31.5
51.110.4000	40	305	152	40	31.5
51.110.4200	42	305	152	42	31.5
51.110.4400	44	326	163	44	35.5
51.110.4500	45	326	163	45	35.5
51.110.4600	46	326	163	46	35.5
51.110.4800	48	347	174	48	40
51.110.5000	50	347	174	50	40

> **51.170 Phantom**

NL **HSS Handruimer H7**
 FR **Alésoir à main HSS H7**
 ES **Escariador mano HSS H7**
 DE **HSS Handreibahle H7**

HSS **"** **DIN 206-B** **H7**

P 11 **P 12** **P 13** **K 31** **K 32** **N 41** **N 51**
 ≤500 N/mm² ≤850 N/mm² ≤1000 N/mm² GG GGG GTS-GTW Alu Cu



Ref.	d1	l1	l2	d2	sw
51.170.0317	1/8	3.175	66	33	3.17
51.170.0476	3/16	4.762	87	44	4.76
51.170.0635	1/4	6.35	100	50	6.35
51.170.0794	5/16	7.937	115	58	7.94
51.170.0952	3/8	9.525	133	66	9.52
51.170.1032	13/32	10.319	133	66	10.32
51.170.1111	7/16	11.112	142	71	11.11

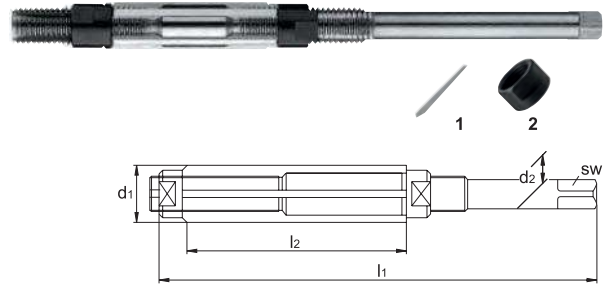
Ref.	d1	l1	l2	d2	sw
51.170.1270	1/2	12.7	152	76	12.7
51.170.1429	9/16	14.287	163	81	14.29
51.170.1588	5/8	15.875	175	87	15.88
51.170.1746	11/16	17.462	201	100	17.46
51.170.1905	3/4	19.05	201	100	19.05
51.170.2063	13/16	20.637	201	100	20.63
51.170.2222	7/8	22.225	215	107	22.22

Ref.	d1	l1	l2	d2	sw
51.170.2381	15/16	23.812	231	115	23.81
51.170.2540	1	25.4	231	115	25.4
51.170.2698	1.1/16	26.988	247	124	26.98
51.170.2858	1.1/8	28.575	247	124	28.58
51.170.3175	1.1/4	31.75	265	133	31.75
51.170.3810	1.1/2	38.1	305	152	38.1



> 51.200 HUNGER

NL HSS Verstelbare Handruimer type D
 FR Alésoir expansible à main HSS type D
 ES Escariador mano ajustable HSS tipo D
 DE HSS Verstellbare Handreibahlen Typ D



P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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Ref.	d1	l1	l2	z	d2	sw	1	2
51.200.0640	6,4-7,2	111	32	4	3.8	3	51.201.0640	51.202.0640
51.200.0720	7,2-8	111	32	4	4.25	3.5	51.201.0640	51.202.0700
51.200.0800	8-9	111	32	5	5.2	4.3	51.201.0800	51.202.0800
51.200.0900	9-10	115	32	5	5.6	4.3	51.201.0900	51.202.0900
51.200.1000	10-11	120	35	5	6.1	4.9	51.201.1000	51.202.1000
51.200.1100	11-12	125	35	5	7.4	6.2	51.201.1100	51.202.1100
51.200.1200	12-13,5	130	42	5	8.4	6.2	51.201.1200	51.202.1200
51.200.1350	13,5-15,5	145	50	5	9.4	7	51.201.1350	51.202.1350
51.200.1550	15,5-18	165	60	5	10.4	8	51.201.1550	51.202.1550
51.200.1800	18-21	180	65	5	11.4	9	51.201.1800	51.202.1800
51.200.2100	21-24	190	70	5	13.1	10	51.201.2100	51.202.2100
51.200.2400	24-27,5	205	75	5	14.1	11	51.201.2400	51.202.2400
51.200.2750	27,5-31,5	225	80	6	16.1	12	51.201.2750	51.202.2750
51.200.3150	31,5-37	240	90	6	18.1	14,5	51.201.3150	51.202.3150
51.200.3700	37-45	285	100	6	20.1	16	51.201.3700	51.202.3700
51.200.4500	45-55	320	109	6	25.1	20	51.201.4500	51.202.4500
51.200.5500	55-65	350	120	8	30.1	24	51.201.5500	51.202.5500
51.200.6500	65-80	460	145	10	38.5	29	51.201.6500	51.202.6500
51.200.8000	80-95	490	150	10	40.5	32	51.201.8000	51.202.8000
51.200.9500	95-110	490	150	10	45.4	36	51.201.9500	51.202.9500

> 51.201 HUNGER

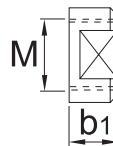
NL HSS Stel Reservemessen type D
 FR Jeu de Lames de rechange HSS type D
 ES Juego de cuchillas de recambio HSS tipo D
 DE HSS Satz Ersatzmesser Typ D



Ref.	Ø mm	l2	Ref.	Ø mm	l2	Ref.	Ø mm	l2
51.201.0640	6,4-8	32	51.201.1550	15,5-18	60	51.201.4500	45-55	109
51.201.0800	8-9	32	51.201.1800	18-21	65	51.201.5500	55-65	120
51.201.0900	9-10	32	51.201.2100	21-24	70	51.201.6500	65-80	145
51.201.1000	10-11	35	51.201.2400	24-27,5	75	51.201.8000	80-95	150
51.201.1100	11-12	35	51.201.2750	27,5-31,5	80	51.201.9500	95-110	150
51.201.1200	12-13,5	42	51.201.3150	31,5-37	90			
51.201.1350	13,5-15,5	50	51.201.3700	37-45	100			

> 51.202 HUNGER

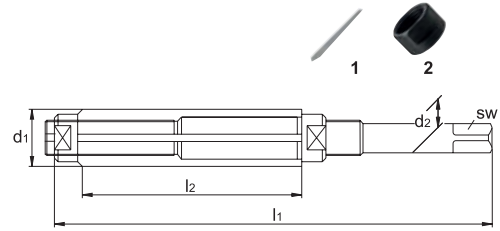
NL Reservemoer type D-K
 FR Ecrou de rechange type D-K
 ES Tuerca de recambio tipo D-K
 DE Ersatzmutter Typ D-K



Ref.	Ø mm	b1	M	Ref.	Ø mm	b1	M	Ref.	Ø mm	b1	M
51.202.0640	6,4-7,2	8	5x0,75	51.202.1350	13,5-15,5	10	11x1	51.202.3700	37-45	16	30x2
51.202.0700	7,2-8	8	5,75x1	51.202.1550	15,5-18	10	13x1	51.202.4500	45-55	16	36x2
51.202.0800	8-9	8	6,75x1	51.202.1800	18-21	11	15x1	51.202.5500	55-65	17	44x2
51.202.0900	9-10	8	7,5x1	51.202.2100	21-24	12	17x1,5	51.202.6500	65-80	20	55x2
51.202.1000	10-11	8,5	8x1	51.202.2400	24-27,5	13	19x1,5	51.202.8000	80-95	26	65x2
51.202.1100	11-12	9	9x1	51.202.2750	27,5-31,5	14	21x2	51.202.9500	95-110	26	75x2
51.202.1200	12-13,5	9	10x1	51.202.3150	31,5-37	15	25x2				

> **51.210 HUNGER**

NL HSS Verstelbare Handruimer extra lang, type E
 FR Alésoir expansible à main HSS extra long, type E
 ES Escariador mano ajustable HSS extra largo, tipo E
 DE HSS Verstellbare Handreibahlen extra lang, Typ E



P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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Ref.	d1	l1	l2	z	d2	sw	1	2
51.210.1050	10,5-12	160	65	5	6.9	5.5	51.211.1050	51.212.1050
51.210.1200	12-13,5	170	70	5	8.4	6.2	51.211.1200	51.202.1200
51.210.1350	13,5-15,5	195	80	5	9.4	7	51.211.1350	51.202.1350
51.210.1550	15,5-17,5	215	90	5	10.4	8	51.211.1550	51.202.1550
51.210.1750	17,5-19,5	230	100	5	11.4	9	51.211.1750	51.212.1750
51.210.1950	19,5-21,5	240	110	5	13.1	10	51.211.1950	51.212.1950
51.210.2150	21,5-24,5	260	120	5	13.1	10	51.211.2150	51.202.2100
51.210.2450	24,5-27,5	280	130	5	14.1	11	51.211.2450	51.202.2400
51.210.2750	27,5-31,5	310	140	6	16.1	12	51.211.2750	51.202.2750
51.210.3150	31,5-37	320	150	6	18.1	14.5	51.211.3150	51.202.3150
51.210.3700	37-45	370	165	6	20.1	16	51.211.3700	51.202.3700
51.210.4500	45-55	425	180	6	25.1	20	51.211.4500	51.202.4500

> **51.211 HUNGER**

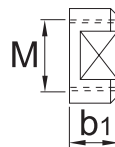
NL HSS Stel Reservemessen type E
 FR Jeu de Lames de rechange HSS type E
 ES Juego de cuchillas de recambio HSS tipo E
 DE HSS Satz Ersatzmesser Typ E



Ref.	Ø mm	l2	Ref.	Ø mm	l2	Ref.	Ø mm	l2
51.211.1050	10,5-12	65	51.211.1750	17,5-19,5	100	51.211.2750	27,5-31,5	140
51.211.1200	12-13,5	70	51.211.1950	19,5-21,5	110	51.211.3150	31,5-37	150
51.211.1350	13,5-15,5	80	51.211.2150	21,5-24,5	120	51.211.3700	37-45	165
51.211.1550	15,5-17,5	90	51.211.2450	24,5-27,5	130	51.211.4500	45-55	180

> **51.212 HUNGER**

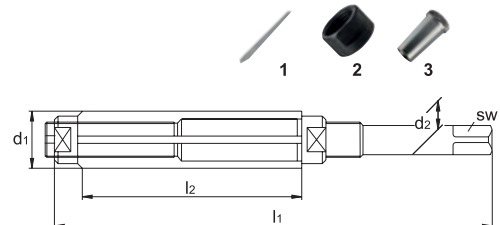
NL Reservemoer type E, (overige maten: 51.202)
 FR Ecrou de rechange type E, (autres dimensions: 51.202)
 ES Tuerca de recambio tipo E, (otros tamaños: 51.202)
 DE Ersatzmutter Typ E, (übrige Abmessungen: 51.202)



Ref.	Ø mm	b1	M	Ref.	Ø mm	b1	M	Ref.	Ø mm	b1	M
51.212.1050	10,5-12	9	8,25x1	51.212.1750	17,5-19,5	11	14x1	51.212.1950	19,5-21,5	11	16x1,5

> **51.220 HUNGER**

NL HSS Verstelbare Handruimer type K, enkelvoudige geleiding
 FR Alésoir expansible à main HSS type K, guidage simple
 ES Escariador mano ajustable HSS tipo K, guía simple
 DE HSS Verstellbare Handreibahlen Typ K, einseitiger Führung



P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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Ref.	d1	l1	l2	z	d2	sw	1	2	3
51.220.0700	7-8	175	32	4	4.25	3.5	51.221.0700	51.202.0700	51.224.0700
51.220.0800	8-9	175	32	5	5.2	4.3	51.221.0800	51.202.0800	51.224.0800
51.220.0900	9-10	175	32	5	5.6	4.3	51.221.0900	51.202.0900	51.224.0900
51.220.1000	10-11	185	35	5	6.1	4.9	51.221.1000	51.202.1000	51.224.1000
51.220.1100	11-12	195	35	5	7.4	6.2	51.221.1100	51.202.1100	51.224.1100
51.220.1200	12-13,5	215	42	5	8.4	6.2	51.221.1200	51.202.1200	51.224.1200
51.220.1350	13,5-15,5	235	50	5	9.4	7	51.221.1350	51.202.1350	51.224.1350

> 51.220 HUNGER

Ref.	d1	l1	l2	z	d2	sw	1	2	3
51.220.1550	15,5-18	265	60	5	10,4	8	51.221.1550	51.202.1550	51.224.1550
51.220.1800	18-21	290	65	5	11,4	9	51.221.1800	51.202.1800	51.224.1800
51.220.2100	21-24	310	70	5	13,1	10	51.221.2100	51.202.2100	51.224.2100
51.220.2400	24-27,5	335	75	5	14,1	11	51.221.2400	51.202.2400	51.224.2400
51.220.2750	27,5-31,5	365	80	6	16,1	12	51.221.2750	51.202.2750	51.224.2750
51.220.3150	31,5-37	400	90	6	18,1	14,5	51.221.3150	51.202.3150	51.224.3150
51.220.3700	37-45	465	100	6	20,1	16	51.221.3700	51.202.3700	51.224.3700
51.220.4500	45-55	530	109	6	25,1	20	51.221.4500	51.202.4500	51.224.4500
51.220.5500	55-65	570	120	8	30,1	24	51.221.5500	51.202.5500	51.224.5500
51.220.6500	65-80	670	145	10	38,5	29	51.221.6500	51.202.6500	51.224.6500
51.220.8000	80-95	700	150	10	40,5	32	51.221.8000	51.202.8000	51.224.8000
51.220.9500	95-110	700	150	10	45,4	36	51.221.9500	51.202.9500	51.224.9500

> 51.221 HUNGER

NL HSS Stel Reservemessen type K, (overige maten: 51.201)
 FR Jeu de Lames de rechange HSS type K, (autres dimensions: 51.201)
 ES Juego de cuchillas de recambio HSS tipo K, (otros tamaños: 51.201)
 DE HSS Satz Ersatzmesser Typ K, (übrige Abmessungen: 51.201)



Ref.	Ø mm	l2	Ref.	Ø mm	l2	Ref.	Ø mm	l2
51.221.0700	7-8	32	51.221.1350	13,5-15,5	50	51.221.3150	31,5-37	90
51.221.0800	8-9	32	51.221.1550	15,5-18	60	51.221.3700	37-45	100
51.221.0900	9-10	32	51.221.1800	18-21	65	51.221.4500	45-55	109
51.221.1000	10-11	35	51.221.2100	21-24	70	51.221.5500	55-65	120
51.221.1100	11-12	35	51.221.2400	24-27,5	75			
51.221.1200	12-13,5	42	51.221.2750	27,5-31,5	80			

> 51.224 HUNGER

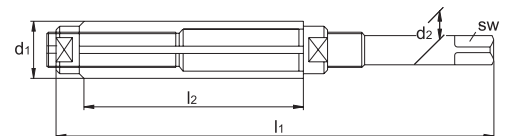
NL Geleidebus type K
 FR Bague de guidage type K
 ES Anillo de guía tipo K
 DE Führungsbüchsen Typ K



Ref.	Ø mm	Ref.	Ø mm	Ref.	Ø mm
51.224.0700	7-8	51.224.1550	15,5-18	51.224.4500	45-55
51.224.0800	8-9	51.224.1800	18-21	51.224.5500	55-65
51.224.0900	9-10	51.224.2100	21-24	51.224.6500	65-80
51.224.1000	10-11	51.224.2400	24-27,5	51.224.8000	80-95
51.224.1100	11-12	51.224.2750	27,5-31,5	51.224.9500	95-110
51.224.1200	12-13,5	51.224.3150	31,5-37		
51.224.1350	13,5-15,5	51.224.3700	37-45		

> 51.230 HUNGER

NL HSS Verstelbare Handruimer type U, dubbele geleiding
 FR Alésoir expansible à main HSS type U, guidage double
 ES Escariador mano ajustable HSS tipo U, guía doble
 DE HSS Verstellbare Handreibahlen Typ U, doppelter führung



P 11 ≤600 N/mm ²	P 12 ≤350 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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Ref.	d1	l1	l2	z	d2	sw	1	2	3	4
51.230.1200	12-13,5	250	30	5	10,3	8	51.231.1200	51.232.1200	51.233.1200	51.234.1200
51.230.1350	13,5-15,5	270	33	5	11,8	9	51.231.1350	51.232.1350	51.202.1350	51.234.1350
51.230.1550	15,5-18	295	36	5	13,8	10	51.231.1550	51.232.1550	51.233.1550	51.234.1550
51.230.1800	18-19,5	330	40	5	16,3	12	51.231.1800	51.232.1800	51.233.1800	51.234.1800
51.230.1950	19,5-21	352	44	5	17,8	13	51.231.1950	51.232.1950	51.202.1950	51.234.1950
51.230.2100	21-24,5	352	44	5	18,8	13	51.231.2100	51.232.2100	51.233.2100	51.234.2100
51.230.2450	24,5-29	385	48	6	21,8	13	51.231.2450	51.232.2450	51.233.2450	51.234.2450
51.230.2900	29-34	418	52	6	24,8	16	51.231.2900	51.232.2900	51.233.2900	51.234.2900

> **51.230 HUNGER**

Ref.	d1	l1	l2	z	d2	sw	1	2	3	4
51.230.3400	34-39	440	54	6	29.8	18	51.231.3400	51.232.3400	51.233.3400	51.234.3400
51.230.3900	39-45	475	60	6	32.8	18	51.231.3900	51.232.3900	51.233.3900	51.234.3900
51.230.4500	45-52	500	60	6	37.8	18	51.231.4500	51.232.4500	51.233.4500	51.234.4500
51.230.5200	52-59	500	60	6	39.8	18	51.231.4500	51.232.5200	51.233.5200	51.234.5200
51.230.5900	59-66	500	60	6	39.8	18	51.231.4500	51.232.5900	51.233.5900	51.234.5900

> **51.231 HUNGER**



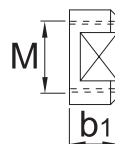
NL **HSS Stel Reservemessen type U**
 FR **Jeu de Lames de rechange HSS type U**
 ES **Juego de cuchillas de recambio HSS tipo U**
 DE **HSS Satz Ersatzmesser Typ U**

Ref.	Ø mm	l2
51.231.1200	12-13,5	30
51.231.1350	13,5-15,5	33
51.231.1550	15,5-18	36
51.231.1800	18-21	40

Ref.	Ø mm	l2
51.231.1950	19,5-22,5	44
51.231.2100	21-24,5	44
51.231.2450	24,5-29	48
51.231.2900	29-34	52

Ref.	Ø mm	l2
51.231.3400	34-39	54
51.231.3900	39-45	60
51.231.4500	45-52/59-66	60

> **51.232 HUNGER**



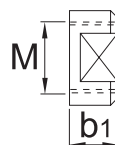
NL **Reservemoer type U, groot**
 FR **Ecrou de rechange type U, grand**
 ES **Tuerca de recambio tipo U, grande**
 DE **Ersatzmutter Typ U, groß**

Ref.	Ø mm	b1	M
51.232.1200	12-13,5	9	10x1
51.232.1350	13,5-15,5	10	11x1
51.232.1550	15,5-18	10	13x1
51.232.1800	18-21	11	15x1
51.232.1950	19,5-22,5	11	16x1

Ref.	Ø mm	b1	M
51.232.2100	21-24,5	12	17x1,5
51.232.2450	24,5-29	13	20x1,5
51.232.2900	29-34	14	24x2
51.232.3400	34-39	14,5	28x2
51.232.3900	39-45	15	31x2

Ref.	Ø mm	b1	M
51.232.4500	45-52	16	36x2
51.232.5200	52-59	15	39x2
51.232.5900	59-66	15	50x2

> **51.233 HUNGER**



NL **Reservemoer type U, klein, met schaalverdeling, (overige maten: 51.202)**
 FR **Ecrou de rechange type U, petit, avec graduation, (autres dimensions: 51.202)**
 ES **Tuerca de recambio tipo U, pequeño, con graduaciones, (otros tamaños: 51.202)**
 DE **Ersatzmutter Typ U, klein, mit Skala, (übrige Abmessungen: 51.202)**

Ref.	Ø mm	b1	M
51.233.1200	12-13,5	8,5	9x1
51.233.1550	15,5-18	9,5	12x1
51.233.1800	18-21	10,5	14x1
51.233.2100	21-24,5	11	16x1,5

Ref.	Ø mm	b1	M
51.233.2450	24,5-29	12	19x1,5
51.233.2900	29-34	13	21x2
51.233.3400	34-39	14	26x2
51.233.3900	39-45	14,5	28x2

Ref.	Ø mm	b1	M
51.233.4500	45-52	16	36x2
51.233.5200	52-59	15	39x2

> **51.234 HUNGER**



NL **Geleidebus type U**
 FR **Bague de guidage type U**
 ES **Anillo de guía tipo U**
 DE **Führungsbüchsen Typ U**

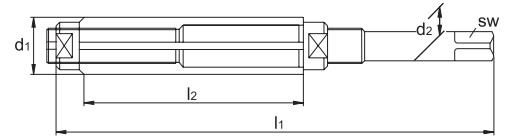
Ref.	Ø mm
51.234.1200	12-13,5
51.234.1350	13,5-15,5
51.234.1550	15,5-18
51.234.1800	18-21
51.234.1950	19,5-22,5

Ref.	Ø mm
51.234.2100	21-24,5
51.234.2450	24,5-29
51.234.2900	29-34
51.234.3400	34-39
51.234.3900	39-45

Ref.	Ø mm
51.234.4500	45-52
51.234.5200	52-59
51.234.5900	59-66

> 51.240 HUNGER

NL HSS Verstelbare Handruimer type V, klepgeleideruimer
 FR Alésoir expansible à main HSS type V, pour guide de soupapes
 ES Escariador mano ajustable HSS tipo V, para guías de válvulas
 DE HSS Verstellbare Handreibahlen Typ V, für Ventilführungen



P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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Ref.	d1	l1	l2	z	d2	sw	1	2	3
51.240.0540	5,4-6	160	28	3	5,3	4	51.241.0540	51.242.0540	51.244.0540
51.240.0590	5,9-6,5	160	28	3	5,6	4,3	51.241.0590	51.202.0640	51.244.0590
51.240.0640	6,4-7	160	28	3	6,1	4,9	51.241.0640	51.242.0640	51.244.0640
51.240.0690	6,9-7,5	160	28	3	6,6	5,5	51.241.0690	51.202.0700	51.244.0690
51.240.0740	7,4-8	165	28	3	7,1	5,5	51.241.0740	51.242.0740	51.244.0740
51.240.0790	7,9-8,5	170	28	3	7,6	6,2	51.241.0790	51.202.0800	51.244.0790
51.240.0840	8,4-9	175	28	3	8,1	6,2	51.241.0840	51.242.0840	51.244.0840
51.240.0890	8,9-9,5	180	32	4	8,6	7	51.241.0890	51.242.0890	51.244.0890
51.240.0940	9,4-10	190	32	4	9,1	7	51.241.0940	51.242.0940	51.244.0940
51.240.0990	9,9-11	200	36	5	9,6	8	51.241.0990	51.242.0990	51.244.0990
51.240.1090	10,9-12	220	36	5	10,5	8	51.241.1090	51.242.1090	51.244.1090

> 51.241 HUNGER

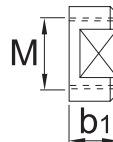
NL HSS Stel Reservemessen type V
 FR Jeu de Lames de rechange HSS type V
 ES Juego de cuchillas de recambio HSS tipo V
 DE HSS Satz Ersatzmesser Typ V



Ref.	Ø mm	l2	Ref.	Ø mm	l2	Ref.	Ø mm	l2
51.241.0540	5,4-6	28	51.241.0740	7,4-8	28	51.241.0940	9,4-10	32
51.241.0590	5,9-6,5	28	51.241.0790	7,9-8,5	28	51.241.0990	9,9-11	36
51.241.0640	6,4-7	28	51.241.0840	8,4-9	28	51.241.1090	10,9-12	36
51.241.0690	6,9-7,5	28	51.241.0890	8,9-9,5	32			

> 51.242 HUNGER

NL Reservemoer type V, (overige maten: 51.202)
 FR Ecrou de rechange type V, (autres dimensions: 51.202)
 ES Tuerca de recambio tipo V, (otros tamaños: 51.202)
 DE Ersatzmutter Typ V, (übrige Abmessungen: 51.202)



Ref.	Ø mm	b1	M	Ref.	Ø mm	b1	M	Ref.	Ø mm	b1	M
51.242.0540	5,4-6	8	4,5x0,75	51.242.0840	8,4-9	8	7,25x1	51.242.0990	9,9-11	9	8,25x1
51.242.0640	6,4-7	8	5,5x0,75	51.242.0890	8,9-9,5	8,5	7,25x1	51.242.1090	10,9-12	9	8,75x1
51.242.0740	7,4-8	8	5,5x0,75	51.242.0940	9,4-10	8,5	7,75x1				

> 51.244 HUNGER

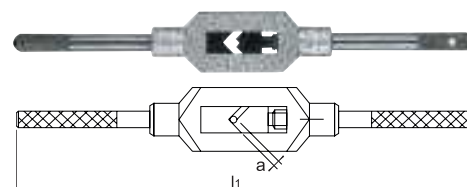
NL Geleidebus type V
 FR Bague de guidage type V
 ES Anillo de guía tipo V
 DE Führungsbüchsen Typ V



Ref.	Ø mm	Ref.	Ø mm	Ref.	Ø mm
51.244.0540	5,4-6	51.244.0740	7,4-8	51.244.0940	9,4-10
51.244.0590	5,9-6,5	51.244.0790	7,9-8,5	51.244.0990	9,9-11
51.244.0640	6,4-7	51.244.0840	8,4-9	51.244.1090	10,9-12
51.244.0690	6,9-7,5	51.244.0890	8,9-9,5		

> **81.900**

NL **Verstelbaar Wringijzer, standaard kwaliteit, Zink-legering**
 FR **Tourne à gauche expansible, qualité standard, alliage de zinc**
 ES **Giramacho extensible, calidad estándar, aleación de cinc**
 DE **Verstellbare Windeisen, Standard-Qualität, Zinkdruckgu**



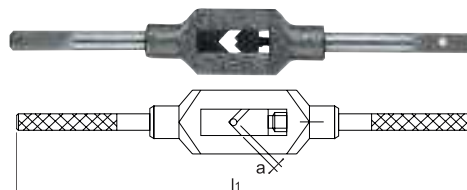
DIN
1814

Ref.	Nr.	M	BSW	BSP	l1	a
81.900.0000	0	M1-M8	1/16-1/4	-	125	2,1-4,9
81.900.0100	1	M1-M10	1/16-3/8	1/8	180	2,1-5,5
81.900.0150	1,5	M1-M12	1/16-1/2	1/8	200	2,1-7
81.900.0200	2	M3,5-M12	5/32-1/2	1/8	280	3-8

Ref.	Nr.	M	BSW	BSP	l1	a
81.900.0300	3	M5-M20	7/32-3/4	1/8-1/2	375	4,9-12
81.900.0400	4	M11-M27	7/16-1	1/4-3/4	500	6,2-16
81.900.0500	5L	M13-M32	1/2-1.1/4	1/4-1	750	7-20

> **81.905**

NL **Verstelbaar Wringijzer, extra kwaliteit, staal**
 FR **Tourne à gauche expansible, qualité supérieure, acier**
 ES **Giramacho extensible, calidad superior, acero**
 DE **Verstellbare Windeisen, Extra-Qualität, Stahl**



DIN
1814

Ref.	Nr.	M	BSW	BSP	l1	a
81.905.0000	0	M1-M8	1/16-1/4	-	130	2,1-4,9
81.905.0100	1	M1-M10	1/16-3/8	1/8	180	2,1-5,5
81.905.0150	1,5	M1-M12	1/16-1/2	1/8	200	2,1-7
81.905.0200	2	M3,5-M12	5/32-1/2	1/8	280	3-8
81.905.0300	3	M5-M20	7/32-3/4	1/8-1/2	375	4,9-12

Ref.	Nr.	M	BSW	BSP	l1	a
81.905.0400	4	M11-M27	7/16-1	1/4-3/4	500	6,2-16
81.905.0500	5S	M13-M32	1/2-1.1/4	1/4-1	750	7-20
81.905.0600	6L	M18-M42	3/4-1.1/2	1/2-1.1/4	1000	11-24
81.905.0800	8	M25-M64	1-2.1/2	3/4-3	1250	16-40



> 51.300 **Phantom**

NL HSS Machineruimer H7, rechte groeven
 FR Alésoir machine HSS H7, goujures droites
 ES Escariador máquina HSS H7, canales rectas
 DE HSS Maschinenreibahlen H7, gerade Nuten

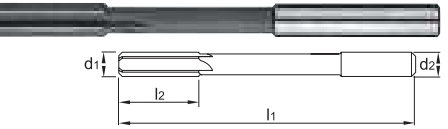
HSS	DIN 212 A/C	h9	H7
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K 31 GG	K 32 GGG GTS-GTW	N 51 Cu
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4-5 C	6-15 D	12-20 D
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Ref.	d1	l1	l2	l3	l5	z	d2
51.300.0400	4	75	19	43	32	6	4
51.300.0450	4.5	80	21	47	33	6	4.5
51.300.0500	5	86	23	52	34	6	5
51.300.0550	5.5	93	26	57	36	6	5.6
51.300.0600	6	101	28	63	38	6	6
51.300.0650	6.5	101	28	63	38	6	6.3

Ref.	d1	l1	l2	l3	l5	z	d2
51.300.0700	7	109	31	69	40	6	7.1
51.300.0800	8	117	33	75	42	6	8
51.300.0900	9	125	36	81	44	6	9
51.300.1000	10	133	38	87	46	6	10
51.300.1100	11	133	38	96	46	8	10
51.300.1200	12	151	44	105	46	8	10



> 51.310 **Phantom**

NL HSS Machineruimer H7
 FR Alésoir machine HSS H7
 ES Escariador máquina HSS H7
 DE HSS Maschinenreibahlen H7

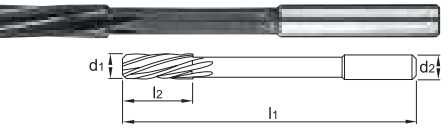
HSS	DIN 212 B/D	h9	H7
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P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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10-15 E	8-15 D	4-5 C	4-5 C	6-15 D	30-50 F	12-20 D
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Ref.	d1	l1	l2	l3	l5	z	d2
51.310.0400	4	75	19	43	32	6	4
51.310.0450	4.5	80	21	47	33	6	4.5
51.310.0500	5	86	23	52	34	6	5
51.310.0550	5.5	93	26	57	36	6	5.6
51.310.0600	6	101	28	63	38	6	6
51.310.0650	6.5	101	28	63	38	6	6.3
51.310.0700	7	109	31	69	40	6	7.1

Ref.	d1	l1	l2	l3	l5	z	d2
51.310.0800	8	117	33	75	42	6	8
51.310.0900	9	125	36	81	44	6	9
51.310.1000	10	133	38	87	46	6	10
51.310.1100	11	133	38	96	46	8	10
51.310.1200	12	151	44	105	46	8	10
51.310.1300	13	151	44	105	46	8	10
51.310.1400	14	160	47	110	50	8	12.5



> 51.320 **Phantom**

NL HSS-E Machineruimer H7
 FR Alésoir machine HSS-E H7
 ES Escariador máquina HSS-E H7
 DE HSS-E Maschinenreibahlen H7

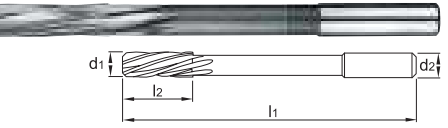
HSS-E	DIN 212 B/D	h8	H7
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P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 OX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 M/Co	S 72 Ti
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15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A
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Ref.	d1	d2	l1	l2
51.320.0100	1	1	38	7
51.320.0150	1.5	1.5	40	10
51.320.0200	2	2	49	12
51.320.0250	2.5	2.5	57	18
51.320.0300	3	3	57	18
51.320.0350	3.5	3.5	57	18
51.320.0400	4	4	75	19
51.320.0450	4.5	4.5	80	21
51.320.0500	5	5	86	23
51.320.0550	5.5	5.5	93	26

Ref.	d1	d2	l1	l2
51.320.0600	6	6	101	28
51.320.0650	6.5	6	101	28
51.320.0700	7	7	109	31
51.320.0750	7.5	7	109	31
51.320.0800	8	8	117	33
51.320.0850	8.5	8	117	33
51.320.0900	9	9	125	36
51.320.0950	9.5	9	125	36
51.320.1000	10	10	133	38
51.320.1050	10.5	10	133	38



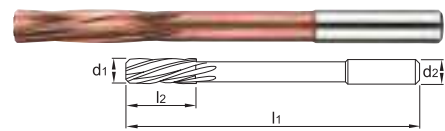
Ref.	d1	d2	l1	l2
51.320.1100	11	10	133	38
51.320.1150	11.5	12	151	44
51.320.1200	12	12	151	44
51.320.1250	12.5	12	151	44
51.320.1300	13	12	151	44
51.320.1350	13.5	14	160	47
51.320.1400	14	14	160	47
51.320.1450	14.5	14	162	50
51.320.1500	15	14	162	50
51.320.1600	16	16	170	52

» **51.324 Phantom**

NL HSS-E Machineruimer H7, AlCrN
 FR Alésoir machine HSS-E H7, AlCrN
 ES Escariador máquina HSS-E H7, AlCrN
 DE HSS-E Maschinenreibahlen H7, AlCrN

HSS-E	AlCrN	DIN 212 B/D	h8	H7								
P 11 ≤800 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A

Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2
51.324.0100	1	1	38	7	51.324.0400	4	4	75	19	51.324.0900	9	9	125	36
51.324.0150	1.5	1.5	40	10	51.324.0500	5	5	86	23	51.324.1000	10	10	133	38
51.324.0200	2	2	49	12	51.324.0600	6	6	101	28	51.324.1200	12	12	151	44
51.324.0250	2.5	2.5	57	18	51.324.0700	7	7	109	31					
51.324.0300	3	3	57	18	51.324.0800	8	8	117	33					



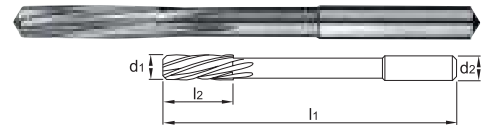
NIEUW NOUVEAU NUEVO NEU

» **51.330 Phantom**

NL VHM Machineruimer H7
 FR Alésoir machine Carbure H7
 ES Escariador máquina MD H7
 DE VHM Maschinenreibahlen H7

MG HM	DIN 212 B/D	h8	H7									
P 11 ≤800 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
25-40 E	20-25 D	12-18 C	10-15 B	8-14 A	7-12 A	8-15 C	15-20 D	50-60 G	40-60 G	20-30 D	6-10 A	6-10 A

Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2
51.330.0100	1	1	40	8	51.330.0300	3	3	61	15	51.330.0800	8	8	117	33
51.330.0150	1.5	1.5	40	8	51.330.0400	4	4	75	19	51.330.1000	10	10	133	38
51.330.0200	2	2	49	11	51.330.0500	5	5	86	23	51.330.1200	12	12	151	44
51.330.0250	2.5	2.5	57	14	51.330.0600	6	6	93	26	51.330.1400	14	14	160	47

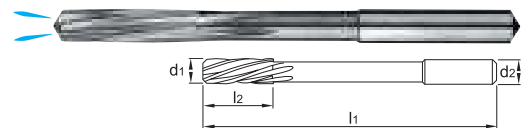


» **51.334 Phantom**

NL VHM Machineruimer H7, met koelkanaal
 FR Alésoir machine Carbure MG H7, à trou d'huile
 ES Escariador máquina MD H7, con canal de refrigeración
 DE VHM Maschinenreibahlen H7, mit Innenkühlung

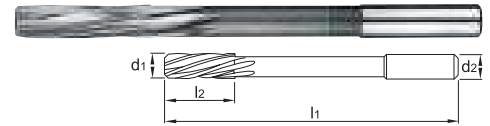
MG HM	DIN 212 B/D	h6	H7									
P 11 ≤800 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
25-40 E	20-25 D	12-18 C	10-15 B	8-14 A	7-12 A	8-15 C	15-20 D	50-60 G	40-60 G	20-30 D	6-10 A	6-10 A

Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2
51.334.0400	4	4	75	19	51.334.0600	6	6	93	26	51.334.1000	10	10	133	38
51.334.0500	5	5	86	23	51.334.0800	8	8	117	33	51.334.1200	12	12	151	44



> 51.340 Phantom

NL HSS-E Machineruimer passing P7
 FR Alésoir machine HSS-E tolérance P7
 ES Escariador máquina HSS-E tolerancia P7
 DE HSS-E Maschinenreibahlen Passung P7



HSS-E DIN 212 B/D h8 F7

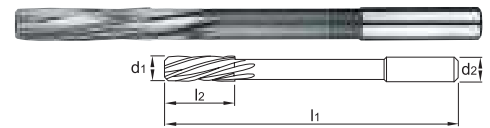
P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
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15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A
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Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2	Ref.	d1	d2	l1	l2
51.340.0100	1	1	38	12	51.340.0700	7	7	109	31	51.340.1300	13	12	151	44
51.340.0200	2	2	49	19	51.340.0800	8	8	117	33	51.340.1400	14	14	160	47
51.340.0300	3	3	57	20	51.340.0900	9	9	125	36	51.340.1500	15	14	162	50
51.340.0400	4	4	75	24	51.340.1000	10	10	133	38	51.340.1600	16	16	170	52
51.340.0500	5	5	86	26	51.340.1100	11	10	133	38	51.340.1800	18	16	182	56
51.340.0600	6	6	101	28	51.340.1200	12	12	151	44	51.340.2000	20	16	195	60

> 51.350 Phantom

NL HSS-E Precisie Machineruimer x 0,01 mm
 FR Alésoir machine de précision HSS-E x 0,01 mm
 ES Escariador máquina de precisión HSS-E x 0,01 mm
 DE HSS-E Präzisions Maschinenreibahlen x 0,01 mm



HSS-E DIN 212 B/D h8 x0,01

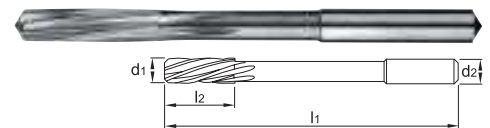
P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
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15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A
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Ref.	d1	d2	l1	l2	z	Ref.	d1	d2	l1	l2	z
51.350.0070-51.350.0079	0.70 - 0.79	0.7-0.79	33	7	4	51.350.0758-51.350.0855	7.58 - 8.55	8	117	33	6
51.350.0080-51.350.0105	0.80 - 1.05	0.8-1.05	38	12	4	51.350.0856-51.350.0955	8.56 - 9.55	9	125	36	6
51.350.0106-51.350.0144	1.06 - 1.44	1.06-1.44	40	15	6	51.350.0956-51.350.1130	9.56 - 11.30	10	133	38	6
51.350.0145-51.350.0179	1.45 - 1.79	1.45-1.79	43	18	6	51.350.1131-51.350.1320	11.31 - 13.20	12	151	44	6
51.350.0180-51.350.0236	1.80 - 2.36	1.8-2.36	49	19	6	51.350.1397-51.350.1405	13.97 - 14.05	14	160	47	8
51.350.0237-51.350.0375	2.37 - 3.75	2.37-3.75	57	20	6	51.350.1410-51.350.1510	14.10 - 15.10	14	162	50	8
51.350.0376-51.350.0425	3.76 - 4.25	4	75	24	6	51.350.1597-51.350.1615	15.97 - 16.15	16	170	52	8
51.350.0426-51.350.0475	4.26 - 4.75	4.5	80	25	6	51.350.1697-51.350.1705	16.97 - 17.05	16	175	54	8
51.350.0476-51.350.0530	4.76 - 5.30	5	86	26	6	51.350.1797-51.350.1820	17.97 - 18.20	16	182	56	8
51.350.0531-51.350.0580	5.31 - 5.80	5.5	93	27	6	51.350.1897-51.350.1905	18.97 - 19.05	16	189	58	8
51.350.0581-51.350.0670	5.81 - 6.70	6	101	28	6	51.350.1997-51.350.2010	19.97 - 20.10	16	195	60	8
51.350.0671-51.350.0755	6.71 - 7.55	7	109	31	6						

> 51.360 Phantom

NL VHM Precisie Machineruimer x 0,01 mm
 FR Alésoir machine de précision Carbure x 0,01 mm
 ES Escariador máquina de precisión MD x 0,01 mm
 DE VHM Präzisions Maschinenreibahlen x 0,01 mm



MG HM DIN 212 B h6 x0,01

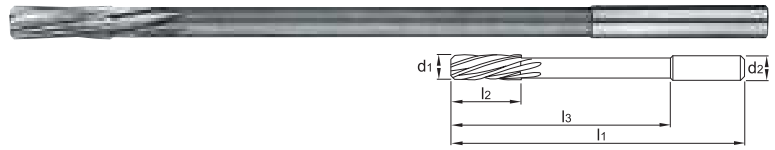
P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
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25-40 E	20-25 D	12-18 C	10-15 B	8-14 A	7-12 A	8-15 C	15-20 D	50-60 G	40-60 G	20-30 D	6-10 A	6-10 A
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Ref.	d1	d2	l1	l2	z	Ref.	d1	d2	l1	l2	z
51.360.0070-51.360.0079	0.70 - 0.79	0.7-0.79	33	7	4	51.360.0760-51.360.0855	7.60 - 8.55	8	117	33	6
51.360.0080-51.360.0105	0.80 - 1.05	0.8-1.05	38	12	4	51.360.0860-51.360.0955	8.60 - 9.55	9	125	36	6
51.360.0106-51.360.0144	1.06 - 1.44	1.06-1.44	40	15	6	51.360.0960-51.360.1130	9.60 - 11.30	10	133	38	6
51.360.0145-51.360.0179	1.45 - 1.79	1.45-1.79	43	18	6	51.360.1131-51.360.1305	11.31 - 13.05	12	151	44	6
51.360.0180-51.360.0236	1.80 - 2.36	1.8-2.36	49	19	6	51.360.1398-51.360.1405	13.98 - 14.05	14	160	47	8
51.360.0237-51.360.0375	2.37 - 3.75	2.37-3.75	57	20	6	51.360.1497-51.360.1505	14.97 - 15.05	14	162	50	8
51.360.0376-51.360.0425	3.76 - 4.25	4	75	24	6	51.360.1597-51.360.1605	15.97 - 16.05	16	170	52	8
51.360.0426-51.360.0475	4.26 - 4.75	4.5	80	25	6	51.360.1697-51.360.1705	16.97 - 17.05	16	175	54	8
51.360.0476-51.360.0530	4.76 - 5.30	5	86	26	6	51.360.1797-51.360.1805	17.97 - 18.05	16	182	56	8
51.360.0535-51.360.0580	5.35 - 5.80	5.5	93	27	6	51.360.1897-51.360.1905	18.97 - 19.05	16	189	58	8
51.360.0581-51.360.0670	5.81 - 6.70	6	101	28	6	51.360.1997-51.360.2005	19.97 - 20.05	16	195	60	8
51.360.0675-51.360.0755	6.75 - 7.55	7	109	31	6						

> **51.400 Phantom**

NL HSS-E Machineruimer H7, extra lang
 FR Alésoir machine HSS-E H7, extra long
 ES Escariador máquina HSS-E H7, extra larga
 DE HSS-E Maschinenreibahlen H7, extra lang



HSS-E **NORM** **h8** **H7**

P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850 N/mm ²	M 22 INOX >850 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 NiCo	S 72 Ti
15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A

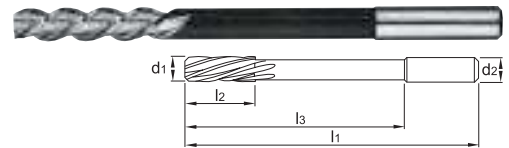
Ref.	d1	d2	l1	l2	l3
51.400.0200	2	2	65	14	45
51.400.0250	2.5	2.5	75	14	55
51.400.0300	3	3	90	14	70
51.400.0400	4	4	105	16	80

Ref.	d1	d2	l1	l2	l3
51.400.0500	5	5	115	16	90
51.400.0600	6	6	130	16	100
51.400.0700	7	7	140	18	110
51.400.0800	8	8	160	18	130

Ref.	d1	d2	l1	l2	l3
51.400.0900	9	9	175	18	140
51.400.1000	10	10	190	20	150
51.400.1100	11	10	200	20	160
51.400.1200	12	12	210	20	160

> **51.420 Phantom**

NL HSS-E Machineschilruimer H7
 FR Alésoir taille Gammon HSS-E H7
 ES Escariador máquina Gammon HSS-E H7
 DE HSS-E Maschinenschälreibahlen H7



HSS-E **DM 212-E** **h8** **H7**

P 11 ≤500 N/mm ²	P 12 ≤550 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	N 41 Alu	N 42 Alu Si>10%	N 51 Cu
15-22 E	12-17 D	7-10 C	5-7 B	25-35 G	20-30 G	12-17 D

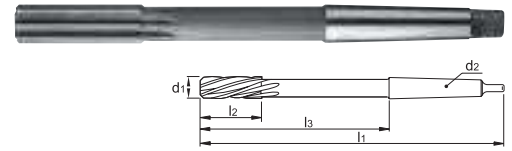
Ref.	d1	d2	l1	l2	l3
51.420.0300	3	3	61	20	42
51.420.0400	4	4	75	24	51
51.420.0500	5	5	86	26	60

Ref.	d1	d2	l1	l2	l3
51.420.0600	6	6	101	28	73
51.420.0700	7	7	109	31	80
51.420.0800	8	8	117	33	86

Ref.	d1	d2	l1	l2	l3
51.420.0900	9	9	125	36	91
51.420.1000	10	10	133	38	99
51.420.1200	12	12	151	44	106

> 51.500 Phantom

NL HSS Machineruimer H7, rechte groeven, MK
 FR Alésoir machine HSS H7, goujures droites, CM
 ES Escariador máquina HSS H7, canales rectas, CM
 DE HSS Maschinenreibahlen H7, gerade Nuten, MK



HSS	DIN 208-A	DIN 228-B	H7
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K 31 GG	K 32 GGG GTS-GTW	N 51 Cu
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4-5 C	6-15 D	12-20 D
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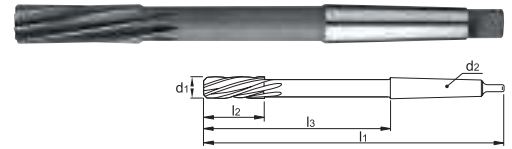
Ref.	d1	d2	l1	l2	l3
51.500.0500	5	MK 1	133	26	67
51.500.0600	6	MK 1	138	28	72
51.500.0700	7	MK 1	150	31	84
51.500.0800	8	MK 1	156	33	90
51.500.0900	9	MK 1	162	36	96
51.500.1000	10	MK 1	168	38	102
51.500.1100	11	MK 1	175	41	109
51.500.1200	12	MK 1	182	44	116
51.500.1300	13	MK 1	182	44	116
51.500.1400	14	MK 1	189	47	123

Ref.	d1	d2	l1	l2	l3
51.500.1500	15	MK 2	204	50	124
51.500.1600	16	MK 2	210	52	130
51.500.1700	17	MK 2	214	54	134
51.500.1800	18	MK 2	219	56	139
51.500.1900	19	MK 2	223	58	143
51.500.2000	20	MK 2	228	60	148
51.500.2100	21	MK 2	232	62	152
51.500.2200	22	MK 2	237	64	157
51.500.2300	23	MK 2	241	66	161
51.500.2400	24	MK 3	268	68	168

Ref.	d1	d2	l1	l2	l3
51.500.2500	25	MK 3	268	68	168
51.500.2600	26	MK 3	273	70	173
51.500.2800	28	MK 3	277	71	177
51.500.3000	30	MK 3	281	73	181
51.500.3100	31	MK 4	317	77	193
51.500.3200	32	MK 4	317	77	193
51.500.3300	33	MK 4	317	77	193
51.500.3400	34	MK 4	321	78	197

> 51.510 Phantom

NL HSS Machineruimer H7, MK
 FR Alésoir machine HSS H7, CM
 ES Escariador máquina HSS H7, CM
 DE HSS Maschinenreibahlen H7, MK



HSS	DIN 208-B	DIN 228-B	H7
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P 11 ≤500 N/mm²	P 12 ≤350 N/mm²	P 13 ≤1000 N/mm²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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10-15 E	8-15 D	4-5 C	4-5 C	6-15 D	30-50 F	12-20 D
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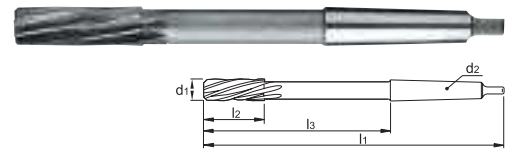
Ref.	d1	d2	l1	l2	l3
51.510.0500	5	MK 1	133	26	67
51.510.0600	6	MK 1	138	28	72
51.510.0700	7	MK 1	150	31	84
51.510.0800	8	MK 1	156	33	90
51.510.0900	9	MK 1	162	36	96
51.510.1000	10	MK 1	168	38	102
51.510.1100	11	MK 1	175	41	109
51.510.1200	12	MK 1	182	44	116
51.510.1300	13	MK 1	182	44	116
51.510.1400	14	MK 1	189	47	123

Ref.	d1	d2	l1	l2	l3
51.510.1500	15	MK 2	204	50	124
51.510.1600	16	MK 2	210	52	130
51.510.1700	17	MK 2	214	54	134
51.510.1800	18	MK 2	219	56	139
51.510.1900	19	MK 2	223	58	143
51.510.2000	20	MK 2	228	60	148
51.510.2100	21	MK 2	232	62	152
51.510.2200	22	MK 2	237	64	157
51.510.2300	23	MK 2	241	66	161
51.510.2400	24	MK 3	268	68	168

Ref.	d1	d2	l1	l2	l3
51.510.2500	25	MK 3	268	68	168
51.510.2600	26	MK 3	273	70	173
51.510.2700	27	MK 3	277	71	177
51.510.2800	28	MK 3	277	71	177
51.510.3000	30	MK 3	281	73	181
51.510.3100	31	MK 4	317	77	193
51.510.3200	32	MK 4	317	77	193
51.510.3400	34	MK 4	321	78	197

> 51.520 Phantom

NL HSS-E Machineruimer H7, MK
 FR Alésoir machine HSS-E H7, CM
 ES Escariador máquina HSS-E H7, CM
 DE HSS-E Maschinenreibahlen H7, MK



HSS-E	DIN 208-B	DIN 228-B	H7
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P 11 ≤500 N/mm²	P 12 ≤350 N/mm²	P 13 ≤1000 N/mm²	P 14 ≤1400 N/mm²	M 21 INOX ≤850N/mm²	M 22 INOX >850N/mm²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
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15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A
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Ref.	d1	d2	l1	l2	l3
51.520.0400	4	MK 1	120	24	54
51.520.0500	5	MK 1	133	26	67
51.520.0600	6	MK 1	138	28	72
51.520.0700	7	MK 1	150	31	84
51.520.0800	8	MK 1	156	33	90
51.520.0900	9	MK 1	162	36	96
51.520.1000	10	MK 1	168	38	102
51.520.1050	10.5	MK 1	175	41	109
51.520.1100	11	MK 1	175	41	109
51.520.1150	11.5	MK 1	175	41	109
51.520.1200	12	MK 1	182	44	116
51.520.1250	12.5	MK 1	182	44	116

Ref.	d1	d2	l1	l2	l3
51.520.1300	13	MK 1	182	44	116
51.520.1350	13.5	MK 1	189	47	123
51.520.1400	14	MK 1	189	47	123
51.520.1450	14.5	MK 2	204	50	124
51.520.1500	15	MK 2	204	50	124
51.520.1550	15.5	MK 2	210	52	130
51.520.1600	16	MK 2	210	52	130
51.520.1650	16.5	MK 2	214	54	134
51.520.1700	17	MK 2	214	54	134
51.520.1750	17.5	MK 2	219	56	139
51.520.1800	18	MK 2	219	56	139
51.520.1850	18.5	MK 2	223	58	143

Ref.	d1	d2	l1	l2	l3
51.520.1900	19	MK 2	223	58	143
51.520.1950	19.5	MK 2	228	60	148
51.520.2000	20	MK 2	228	60	148
51.520.2050	20.5	MK 2	232	62	152
51.520.2100	21	MK 2	232	62	152
51.520.2150	21.5	MK 2	237	64	157
51.520.2200	22	MK 2	237	64	157
51.520.2250	22.5	MK 2	241	66	161
51.520.2300	23	MK 2	241	66	161
51.520.2400	24	MK 3	268	68	168
51.520.2500	25	MK 3	268	68	168
51.520.2600	26	MK 3	273	70	173

> **51.520 Phantom**

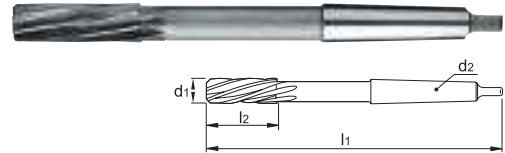
Ref.	d1	d2	l1	l2	l3
51.520.2700	27	MK 3	277	71	177
51.520.2800	28	MK 3	277	71	177
51.520.2900	29	MK 3	281	73	181
51.520.3000	30	MK 3	281	73	181
51.520.3100	31	MK 4	317	77	193
51.520.3200	32	MK 4	317	77	193
51.520.3300	33	MK 4	317	77	193
51.520.3400	34	MK 4	321	78	197

Ref.	d1	d2	l1	l2	l3
51.520.3500	35	MK 4	321	78	197
51.520.3600	36	MK 4	325	79	201
51.520.3700	37	MK 4	325	79	201
51.520.3800	38	MK 4	329	81	205
51.520.3900	39	MK 4	329	81	205
51.520.4000	40	MK 4	329	81	205
51.520.4100	41	MK 4	333	82	209

Ref.	d1	d2	l1	l2	l3
51.520.4300	43	MK 4	336	83	212
51.520.4400	44	MK 4	336	83	212
51.520.4500	45	MK 4	336	83	212
51.520.4600	46	MK 4	340	84	216
51.520.4700	47	MK 4	340	84	216
51.520.4800	48	MK 4	344	86	220
51.520.4900	49	MK 4	344	86	220
51.520.5000	50	MK 4	344	86	220

> **51.570 Phantom**

NL HSS-E Machineruimer H7, MK
 FR Alésoir machine HSS-E H7, CM
 ES Escariador máquina HSS-E H7, CM
 DE HSS-E Maschinenreibahlen H7, MK



HSS-E **"** DIN DIN H7
 inch 208-B 228-B

P 11 ≤500 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A

Ref.	d1	d2	l1	l2
51.570.0635	1/4	6.35	MK 1	150
51.570.0794	5/16	7.937	MK 1	156
51.570.0952	3/8	9.525	MK 1	168
51.570.1111	7/16	11.112	MK 1	182

Ref.	d1	d2	l1	l2
51.570.1270	1/2	12.7	MK 1	182
51.570.1429	9/16	14.287	MK 2	204
51.570.1588	5/8	15.875	MK 2	210
51.570.1905	3/4	19.05	MK 2	223

Ref.	d1	d2	l1	l2
51.570.2222	7/8	22.225	MK 2	237
51.570.2540	1	25.4	MK 3	273

> **51.600 Phantom**

NL HSS-E Machineruimer H7, extra lang, MK
 FR Alésoir machine HSS-E H7, extra long, CM
 ES Escariador máquina HSS-E H7, extra largo, CM
 DE HSS-E Maschinenreibahlen H7, extra lang, MK



HSS-E **"** DIN DIN H7
 inch 228-B 228-B

P 11 ≤500 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
15-22 E	12-17 D	7-10 C	5-7 B	4-6 A	3-5 A	4-5 C	6-15 D	25-35 G	20-30 G	12-17 D	2-3 A	2-3 A

Ref.	d1	d2	l1	l2	l3
51.600.1300	13	MK 1	245	22	180
51.600.1400	14	MK 1	245	22	180
51.600.1500	15	MK 2	260	22	180
51.600.1600	16	MK 2	260	25	180
51.600.1800	18	MK 2	260	25	180
51.600.2000	20	MK 2	270	28	190

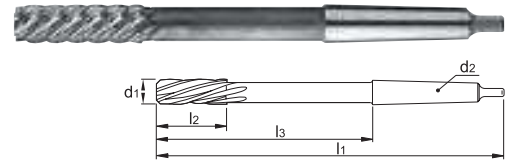
Ref.	d1	d2	l1	l2	l3
51.600.2200	22	MK 2	280	28	200
51.600.2400	24	MK 3	300	32	200
51.600.2500	25	MK 3	320	32	220
51.600.2600	26	MK 3	330	32	230
51.600.2800	28	MK 3	340	32	240
51.600.3000	30	MK 3	350	36	250

Ref.	d1	d2	l1	l2	l3
51.600.3200	32	MK 4	375	36	250
51.600.3400	34	MK 4	375	36	250
51.600.3600	36	MK 4	375	40	250
51.600.3800	38	MK 4	395	40	270
51.600.4000	40	MK 4	395	40	270



> 51.620 **Phantom**

NL HSS-E Machineschilruimer H7, MK
 FR Alésoir taille Gammon HSS-E H7, CM
 ES Escariador máquina Gammon HSS-E H7, CM
 DE HSS-E Maschinenschälreibahlen H7, MK



HSS-E	DIN 208-E	DIN 228-B	H7
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P 11 ≤800 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	N 41 Alu	N 42 Alu Si>10%	N 51 Cu
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15-22 E	12-17 D	7-10 C	5-7 B	25-35 G	20-30 G	12-17 D
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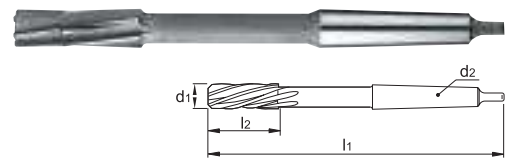
Ref.	d1	d2	l1	l2	l3
51.620.1200	12	MK 1	182	44	116
51.620.1400	14	MK 2	189	47	123
51.620.1500	15	MK 2	204	50	124
51.620.1600	16	MK 2	210	52	130
51.620.1800	18	MK 2	219	56	139
51.620.2000	20	MK 2	228	60	148
51.620.2200	22	MK 2	237	64	157

Ref.	d1	d2	l1	l2	l3
51.620.2400	24	MK 3	268	68	168
51.620.2500	25	MK 3	268	68	168
51.620.2600	26	MK 3	273	70	173
51.620.2700	27	MK 3	277	71	177
51.620.2800	28	MK 3	277	71	177
51.620.2900	29	MK 3	281	73	181
51.620.3000	30	MK 3	281	73	181

Ref.	d1	d2	l1	l2	l3
51.620.3100	31	MK 4	317	77	193
51.620.3200	32	MK 4	317	77	193
51.620.3400	34	MK 4	321	78	197
51.620.3500	35	MK 4	321	78	197
51.620.3800	38	MK 4	329	81	205
51.620.4000	40	MK 4	329	81	205

> 51.640 **Phantom**

NL HM-tip Machineruimer H7, MK
 FR Alésoir machine pointe carb. mét. H7, CM
 ES Escariador máquina punta MD H7, CM
 DE HM-Schneiden Maschinenreibahlen H7, MK



HM-TIP	DIN 8094-B	DIN 228-B	H7
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P 11 ≤800 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
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25-40 E	20-25 D	12-18 C	10-15 B	8-14 A	7-12 A	8-15 C	15-20 D	50-60 G	40-60 G	20-30 D	6-10 A	6-10 A
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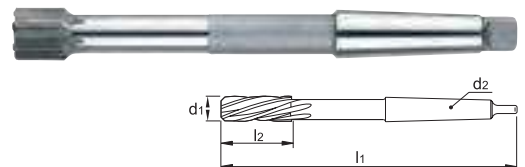
Ref.	d1	d2	l1	l2	z
51.640.1000	10	MK 1	168	38	6
51.640.1200	12	MK 1	182	44	6
51.640.1400	14	MK 1	189	47	6
51.640.1500	15	MK 2	204	50	6
51.640.1600	16	MK 2	210	52	6

Ref.	d1	d2	l1	l2	z
51.640.1800	18	MK 2	219	56	6
51.640.2000	20	MK 2	228	60	6
51.640.2200	22	MK 2	237	64	6
51.640.2400	24	MK 3	268	68	8
51.640.2500	25	MK 3	268	68	8

Ref.	d1	d2	l1	l2	z
51.640.2600	26	MK 3	273	70	8
51.640.2800	28	MK 3	277	71	8
51.640.3000	30	MK 3	281	73	8
51.640.3500	35	MK 4	321	78	8

> 51.645 **Phantom**

NL HM-tip Machineruimer 1% nastelbaar, H7, MK
 FR Alésoir machine pointe carb. mét. 1% réglable, H7, CM
 ES Escariador máquina punta MD 1% extensible, H7, CM
 DE HM-Schneiden Maschinenreibahlen 1% nachstellbar, H7, MK



HM-TIP	DIN≈ 8051	DIN 228-B	H7
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P 11 ≤800 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	P 14 ≤1400 N/mm ²	M 21 INOX ≤850N/mm ²	M 22 INOX >850N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 42 Alu Si>10%	N 51 Cu	S 71 Ni/Co	S 72 Ti
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25-40 E	20-25 D	12-18 C	10-15 B	8-14 A	7-12 A	8-15 C	15-20 D	50-60 G	40-60 G	20-30 D	6-10 A	6-10 A
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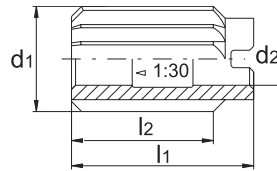
Ref.	d1	d2	l1	l2	z
51.645.0800	8	MK 1	156	16	4
51.645.1000	10	MK 1	168	19	6
51.645.1200	12	MK 1	182	19	6
51.645.1300	13	MK 1	182	19	6

Ref.	d1	d2	l1	l2	z
51.645.1400	14	MK 1	189	19	6
51.645.1500	15	MK 2	204	19	6
51.645.1600	16	MK 2	210	22	6
51.645.1800	18	MK 2	219	22	6

Ref.	d1	d2	l1	l2	z
51.645.2000	20	MK 2	228	22	6
51.645.2500	25	MK 3	268	25	8

> **51.650 Phantom**

NL **HSS Opsteekruimer H7**
 FR **Alésoir machine creux HSS H7**
 ES **Escariador hueco HSS H7**
 DE **HSS Aufsteckreibahlen H7**



HSS **DIN 219-B** **H7**

P 11 ≤500 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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10-15 E	8-15 D	4-5 C	4-5 C	6-15 D	30-50 F	12-20 D
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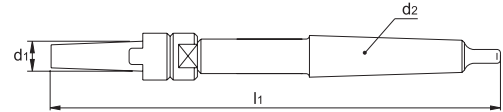
Ref.	d1	d2	l1	l2	84.410
51.650.2500	25	13	45	32	Nr. 2
51.650.2600	26	13	45	32	Nr. 2
51.650.2700	27	13	45	32	Nr. 2
51.650.2800	28	13	45	32	Nr. 2
51.650.2900	29	13	45	32	Nr. 2
51.650.3000	30	13	45	32	Nr. 2
51.650.3100	31	16	50	36	Nr. 3
51.650.3200	32	16	50	36	Nr. 3
51.650.3300	33	16	50	36	Nr. 3
51.650.3400	34	16	50	36	Nr. 3
51.650.3500	35	16	50	36	Nr. 3
51.650.3600	36	19	56	40	Nr. 4
51.650.3700	37	19	56	40	Nr. 4

Ref.	d1	d2	l1	l2	84.410
51.650.3800	38	19	56	40	Nr. 4
51.650.3900	39	19	56	40	Nr. 4
51.650.4000	40	19	56	40	Nr. 4
51.650.4100	41	19	56	40	Nr. 4
51.650.4200	42	19	56	40	Nr. 4
51.650.4300	43	22	63	45	Nr. 5
51.650.4400	44	22	63	45	Nr. 5
51.650.4500	45	22	63	45	Nr. 5
51.650.4600	46	22	63	45	Nr. 5
51.650.4700	47	22	63	45	Nr. 5
51.650.4800	48	22	63	45	Nr. 5
51.650.4900	49	22	63	45	Nr. 5
51.650.5000	50	22	63	45	Nr. 5

Ref.	d1	d2	l1	l2	84.410
51.650.5200	52	27	71	50	Nr. 6
51.650.5500	55	27	71	50	Nr. 6
51.650.5800	58	27	71	50	Nr. 6
51.650.6000	60	27	71	50	Nr. 6
51.650.6200	62	32	80	56	Nr. 7
51.650.6500	65	32	80	56	Nr. 7
51.650.6800	68	32	80	56	Nr. 7
51.650.7000	70	32	80	56	Nr. 7
51.650.7200	72	40	90	63	Nr. 8
51.650.7500	75	40	90	63	Nr. 8
51.650.8000	80	40	90	63	Nr. 8

> **84.410 INTERNATIONAL TOOLS**

NL **ECO PRO Opsteekhouder, DIN 217, voor opsteekruimers DIN 219 en opsteekopboor DIN 222, MK**
 FR **Arbre de montage ECO PRO, DIN 217, pour alésoirs creux DIN 219 et forets creux DIN 222, CM**
 ES **Porta-escariadores ECO PRO, DIN 217, para escariadores huecos DIN 219 y brocas escariadores huecos DIN 222, CM**
 DE **ECO PRO Aufsteckhalter, DIN 217, für Aufsteckreibahlen DIN 219 und Aufsteckaufbohrer DIN 222, MK**

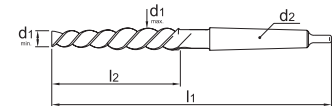


DIN 217 **ECO PRO**

Ref.	Nr.	d1	l1	d2	Ø 51.650	Ø 13.350	1	2	3
84.410.0200	2	13	250	3	25-30	25-35	84.411.0200	84.412.0200	84.413.0200
84.410.0300	3	16	261	3	31-35	36-45	84.411.0300	84.412.0300	84.413.0300
84.410.0400	4	19	298	4	36-42	46-52	84.411.0400	84.412.0400	84.413.0400
84.410.0500	5	22	312	4	43-50	53-62	84.411.0500	84.412.0500	84.413.0500
84.410.0600	6	27	359	5	51-60	63-75	84.411.0600	84.412.0600	84.413.0600
84.410.0700	7	32	376	5	61-71	76-90	84.411.0700	84.412.0700	84.413.0700
84.410.0800	8	40	396	5	72-85	91-100	84.411.0800	84.412.0800	84.413.0800
84.410.0900	9	50	416	5	86-100	-	84.411.0900	84.412.0900	84.413.0900

> **51.700 Phantom**

NL **HSS Klinknagelgatruimer tolerantie k11, MK**
 FR **Alésoir de chaudronniers HSS tolérance k11, CM**
 ES **Escariador de calderería HSS tolerancia k11, CM**
 DE **HSS Nietlochreibahlen Toleranz k11, MK**



HSS **DIN 311** **DIN 228-B** **k11**

P 11 ≤500 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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10-15	8-15	4-5	4-5	6-15	30-50	12-20
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Ref.	d1 min.	d1 max.	l1	l2	d2
51.700.1000	7	10	171	95	1
51.700.1100	7.7	11	176	100	1
51.700.1200	8.4	12	199	105	2
51.700.1300	9.1	13	199	105	2
51.700.1400	9.8	14	209	115	2
51.700.1500	10.5	15	219	125	2
51.700.1600	11.2	16	229	135	2
51.700.1700	11.9	17	251	135	3
51.700.1800	12.6	18	261	145	3

Ref.	d1 min.	d1 max.	l1	l2	d2
51.700.1900	13.3	19	261	145	3
51.700.2000	14	20	271	155	3
51.700.2100	14.7	21	271	155	3
51.700.2200	15.4	22	281	165	3
51.700.2300	16.1	23	281	165	3
51.700.2400	16.8	24	296	180	3
51.700.2500	17.5	25	296	180	3
51.700.2600	18.2	26	296	180	3
51.700.2800	19.6	28	311	195	3

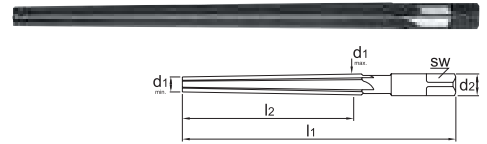
Ref.	d1 min.	d1 max.	l1	l2	d2
51.700.3000	21	30	311	195	3
51.700.3100	21.7	31	326	210	3
51.700.3200	22.4	32	354	210	4
51.700.3400	23.8	34	364	220	4
51.700.3700	25.9	37	364	220	4
51.700.3800	26.6	38	374	230	4
51.700.4000	28	40	374	230	4

> 51.720 Phantom

NL HSS Pengatruimer coniciteit 1:50
 FR Alésoir conique HSS conicité 1:50
 ES Escariador cónico HSS conicidad 1:50
 DE HSS Kegelseibahlen Konizität 1:50

HSS DIN 9-A 1:50

K 31 GG
 K 32 GGG GTS-GTW
 N 51 Cu



Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.720.0200	2	1.9	2.85	72	48	3.15	2.5
51.720.0250	2.5	2.4	3.36	68	48	3.15	2.5
51.720.0300	3	2.9	4.06	80	58	4	3.15
51.720.0400	4	3.9	5.26	93	68	5	4
51.720.0500	5	4.9	6.36	100	73	6.3	5

Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.720.0600	6	5.9	8	135	105	8	6.3
51.720.0800	8	7.9	10.8	180	145	10	8
51.720.1000	10	9.9	13.4	215	175	12.5	10
51.720.1200	12	11.8	16	255	210	14	11.2
51.720.1400	14	13.8	18	255	210	16	12.5

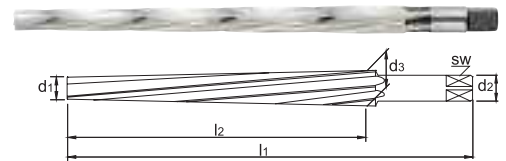
Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.720.1600	16	15.8	20.4	280	230	18	14
51.720.2000	20	19.8	24.8	310	250	22.4	18
51.720.2500	25	24.7	30.7	370	300	28	22.4
51.720.3000	30	29.7	36.1	400	320	31.5	25

> 51.730 Phantom

NL HSS Pengatruimer coniciteit 1:50
 FR Alésoir conique HSS conicité 1:50
 ES Escariador cónico HSS conicidad 1:50
 DE HSS Kegelseibahlen Konizität 1:50

HSS DIN 9-B 1:50

P 11 s600 N/mm²
 P 12 s850 N/mm²
 P 13 s1000 N/mm²
 K 31 GG
 K 32 GGG GTS-GTW
 N 41 Alu
 N 51 Cu



Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.730.0100	1	0.9	1.46	46	28	3.15	2.5
51.730.0150	1.5	1.4	2.14	57	37	3.15	2.5
51.730.0200	2	1.9	2.86	68	48	3.15	2.5
51.730.0250	2.5	2.4	3.36	68	48	3.15	2.5
51.730.0300	3	2.9	4.06	80	58	4	3.15
51.730.0400	4	3.9	5.26	93	68	5	4

Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.730.0500	5	4.9	6.36	100	73	6.3	5
51.730.0600	6	5.9	8	135	105	8	6.3
51.730.0700	7	6.9	9	140	105	9	7.1
51.730.0800	8	7.9	10.8	180	145	10	8
51.730.1000	10	9.9	13.4	215	175	12.5	10
51.730.1200	12	11.8	16	255	210	14	11.2

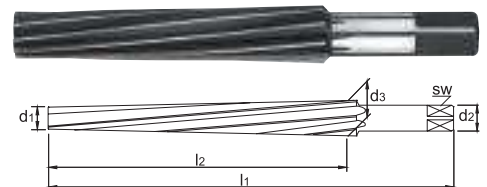
Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.730.1400	14	13.8	18	260	210	18	14
51.730.1600	16	15.8	20.4	280	230	18	14
51.730.2000	20	19.8	24.8	310	250	22.4	18
51.730.2500	25	24.7	30.7	370	300	28	22.4
51.730.3000	30	29.7	36.1	400	320	31.5	25

> 51.760 Phantom

NL HSS Morse Konus Eindruimer
 FR Alésoir finition pour cône morse HSS
 ES Escariador para cono Morse HSS
 DE HSS Kegelseibahlen für Morsekegel

HSS DIN 204 MT

P 11 s600 N/mm²
 P 12 s850 N/mm²
 P 13 s1000 N/mm²
 K 31 GG
 K 32 GGG GTS-GTW
 N 41 Alu
 N 51 Cu

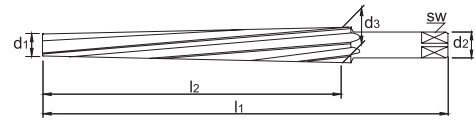


Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.760.0000	0	6.547	9.722	93	61	8	6.3
51.760.0100	1	9.571	12.863	102	66	10	8
51.760.0200	2	14.733	18.679	121	79	14	11.2
51.760.0300	3	20.01	24.829	146	96	20	16

Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2	sw
51.760.0400	4	26.229	32.41	179	119	25	20
51.760.0500	5	37.873	45.767	222	150	31.5	25
51.760.0600	6	54.172	65.016	300	208	45	35.5

> **51.770 Phantom**

NL **HSS Conische Ruimer coniciteit 1:10**
 FR **Alésoir conique HSS conicité 1:10**
 ES **Escariador cónico HSS conicidad 1:10**
 DE **HSS konische Reibahlen Konizität 1:10**



P 11 ≤600 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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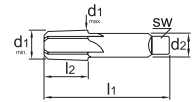
Ref.	d1 min.	d1 max	l1	l2	d2	sw
51.770.0300	3	10	100	70	8	6.3
51.770.0500	5	15	140	100	12.5	10

Ref.	d1 min.	d1 max	l1	l2	d2	sw
51.770.1000	10	25	195	150	20	16
51.770.1500	15	35	250	200	28	22.4

Ref.	d1 min.	d1 max	l1	l2	d2	sw
51.770.2300	23	45	275	220	40	31.5
51.770.3000	30	55	310	250	45	35.5

> **51.780 Phantom**

NL **HSS Conische Ruimer NPT, voor conische boringen 1:16**
 FR **Alésoir conique HSS NPT, pour perçage conique 1:16**
 ES **Escariador cónico HSS NPT, para perforación cónica 1:16**
 DE **HSS konische NPT-Reibahlen NPT, für konische Bohrungen 1:16**



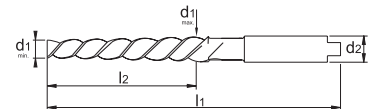
P 11 ≤600 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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Ref.	Nr.	d1 min.	d1 max	l1	l2	d2	sw
51.780.0794	1/16	6.1	7.68	53.98	19.05	7.94	5.9
51.780.1029	1/8	8.03	9.19	53.98	19.05	19.05	8.3
51.780.1372	1/4	10.31	11.99	61.91	26.99	14.29	10.6
51.780.1715	3/8	13.72	15.39	65.09	26.99	17.8	13.4

Ref.	Nr.	d1 min.	d1 max	l1	l2	d2	sw
51.780.2134	1/2	16.89	19.08	79.38	34.93	17.5	13.1
51.780.2667	3/4	22.25	24.43	82.55	34.93	23.02	17.2
51.780.3340	1	28.02	30.78	95.25	34.45	28.5	21.4

> **51.800 Phantom**

NL **HSS Pengatschilruimer coniciteit 1:50**
 FR **Alésoir conique taille Gammon HSS conicité 1:50**
 ES **Escariador cónico Gammon HSS conicidad 1:50**
 DE **HSS Kegelschälreibahlen Konizität 1:50**



P 11 ≤600 N/mm ²	P 12 ≤850 N/mm ²	P 13 ≤1000 N/mm ²	K 31 GG	K 32 GGG GTS-GTW	N 41 Alu	N 51 Cu
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10-15 E	8-15 D	4-5 C	4-5 C	6-15 D	30-50 F	12-20 D
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Ref.	Nr.	d1 min.	d1 max	l1	l2	d2
51.800.0200	2	1.9	2.86	86	48	3.15
51.800.0250	2.5	2.4	3.36	86	48	3.15
51.800.0300	3	2.9	4.06	100	58	4

Ref.	Nr.	d1 min.	d1 max	l1	l2	d2
51.800.0400	4	3.9	5.26	112	68	5
51.800.0500	5	4.9	6.36	122	73	6.3
51.800.0600	6	5.9	8	160	105	8

Ref.	Nr.	d1 min.	d1 max	l1	l2	d2
51.800.0800	8	7.9	10.8	207	145	10
51.800.1000	10	9.9	13.4	245	175	12.5
51.800.1200	12	11.8	16	290	210	16



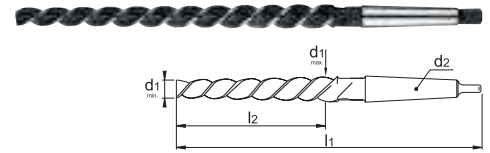
> 51.810 Phantom

NL HSS Pengatschilruimer coniciteit 1:50, MK
 FR Alésoir conique taille Gammon HSS conicité 1:50, CM
 ES Escariador cónico Gammon HSS conicidad 1:50, CM
 DE HSS Kegelschälreibahnen Konizität 1:50, MK



Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2
51.810.0500	5	4.9	6.36	155	73	MK 1
51.810.0600	6	5.9	8	187	105	MK 1
51.810.0800	8	7.9	10.8	227	145	MK 1
51.810.1000	10	9.9	13.4	257	175	MK 1

Ref.	Nr.	d1 min.	d1 max.	l1	l2	d2
51.810.1200	12	11.8	16	315	210	MK 2
51.810.1600	16	15.8	20.4	335	230	MK 2
51.810.2000	20	19.8	24.8	377	250	MK 3
51.810.2500	25	24.7	30.7	427	300	MK 3



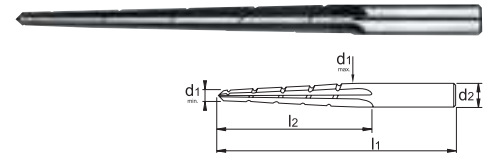
> 51.820 Phantom

NL HSS-E Pengatruimer coniciteit 1:20
 FR Alésoir conique HSS-E conicité 1:20
 ES Escariador cónico HSS-E conicidad 1:20
 DE HSS-E Kegelschälreibahnen Konizität 1:20



Ref.	d1 min.	d1 max.	l1	l2	d2
51.820.0100	1	2	50	20	2
51.820.0200	2	4	80	40	4
51.820.0300	3	6	110	60	6

Ref.	d1 min.	d1 max.	l1	l2	d2
51.820.0400	4	8	130	80	8
51.820.0500	5	10	155	100	10
51.820.0600	6	12	180	120	12



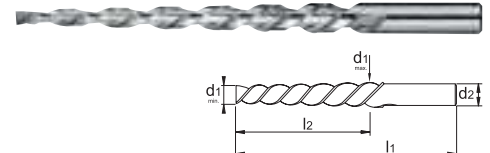
> 51.830 Phantom

NL HSS-E Pengatschilruimer coniciteit 1:20
 FR Alésoir conique taille Gammon HSS-E conicité 1:20
 ES Escariador cónico Gammon HSS-E conicidad 1:20
 DE HSS-E Kegelschälreibahnen Konizität 1:20



Ref.	d1 min.	d1 max.	l1	l2	d2
51.830.0300	3	6	110	60	6
51.830.0400	4	8	130	80	8

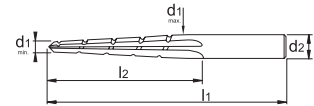
Ref.	d1 min.	d1 max.	l1	l2	d2
51.830.0500	5	10	155	100	10
51.830.0600	6	12	180	120	12





> 51.840 Phantom

NL HSS-E Pengatruimer coniciteit 1:12,5
 FR Alésoir conique HSS-E conicité 1:12,5
 ES Escariador cónico HSS-E conicidad 1:12,5
 DE HSS-E Kegelseibahlen Konizität 1:12,5



HSS-E **NORM** **1:12,5**

P 11 ≤600 N/mm² **P 12** ≤850 N/mm² **P 13** ≤1000 N/mm² **P 14** ≤1400 N/mm² **M 21** INOX ≤850N/mm² **M 22** INOX >850N/mm² **K 31** GG **K 32** GGG GTS-GTW **N 41** Alu **N 42** Alu Si>10% **N 51** Cu **S 71** Ni/Co **S 72** Ti

15-22 E 12-17 D 7-10 C 5-7 B 4-6 A 3-5 A 4-5 C 6-15 D 25-35 G 20-30 G 12-17 D 2-3 A 2-3 A

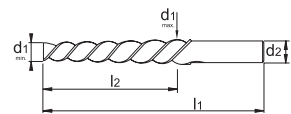
Ref.	d1 min.	d1 max	l1	l2	d2
51.840.0200	2	6	100	50	6
51.840.0300	3	8	110	62	8

Ref.	d1 min.	d1 max	l1	l2	d2
51.840.0400	4	10	130	75	10
51.840.0500	5	12	150	90	12

Ref.	d1 min.	d1 max	l1	l2	d2
51.840.0600	6	14	160	100	14

> 51.850 Phantom

NL HSS-E Pengatschilruimer coniciteit 1:12,5
 FR Alésoir conique taille Gammon HSS-E conicité 1:12,5
 ES Escariador cónico Gammon HSS-E conicidad 1:12,5
 DE HSS-E Kegelschäreibahlen Konizität 1:12,5



HSS-E **NORM** **1:12,5**

P 11 ≤600 N/mm² **P 12** ≤850 N/mm² **P 13** ≤1000 N/mm² **P 14** ≤1400 N/mm² **M 21** INOX ≤850N/mm² **M 22** INOX >850N/mm² **N 41** Alu **N 42** Alu Si>10% **N 51** Cu

15-22 E 12-17 D 7-10 C 5-7 B 4-6 A 3-5 A 25-35 G 20-30 G 12-17 D

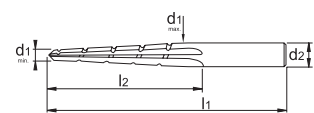
Ref.	d1 min.	d1 max	l1	l2	d2
51.850.0200	2	6	100	50	6
51.850.0300	3	8	110	62	8

Ref.	d1 min.	d1 max	l1	l2	d2
51.850.0400	4	10	130	75	10
51.850.0500	5	12	150	90	12

Ref.	d1 min.	d1 max	l1	l2	d2
51.850.0600	6	14	160	100	14

> 51.860 Phantom

NL HSS-E Pengatruimer coniciteit 1:10
 FR Alésoir conique HSS-E conicité 1:10
 ES Escariador cónico HSS-E conicidad 1:10
 DE HSS-E Kegelseibahlen Konizität 1:10



HSS-E **NORM** **1:10**

P 11 ≤600 N/mm² **P 12** ≤850 N/mm² **P 13** ≤1000 N/mm² **P 14** ≤1400 N/mm² **M 21** INOX ≤850N/mm² **M 22** INOX >850N/mm² **K 31** GG **K 32** GGG GTS-GTW **N 41** Alu **N 42** Alu Si>10% **N 51** Cu **S 71** Ni/Co **S 72** Ti

15-22 E 12-17 D 7-10 C 5-7 B 4-6 A 3-5 A 4-5 C 6-15 D 25-35 G 20-30 G 12-17 D 2-3 A 2-3 A

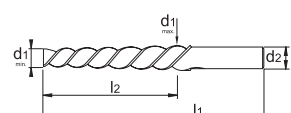
Ref.	d1 min.	d1 max	l1	l2	d2
51.860.0200	2	6	90	40	6
51.860.0300	3	8	100	50	8

Ref.	d1 min.	d1 max	l1	l2	d2
51.860.0400	4	10	115	60	10
51.860.0500	5	12	130	70	12

Ref.	d1 min.	d1 max	l1	l2	d2
51.860.0600	6	14	140	80	14

> 51.870 Phantom

NL HSS-E Pengatschilruimer coniciteit 1:10
 FR Alésoir conique taille Gammon HSS-E conicité 1:10
 ES Escariador cónico Gammon HSS-E conicidad 1:10
 DE HSS-E Kegelschäreibahlen Konizität 1:10



HSS-E **NORM** **1:10**

P 11 ≤600 N/mm² **P 12** ≤850 N/mm² **P 13** ≤1000 N/mm² **P 14** ≤1400 N/mm² **M 21** INOX ≤850N/mm² **M 22** INOX >850N/mm² **N 41** Alu **N 42** Alu Si>10% **N 51** Cu

15-22 E 12-17 D 7-10 C 5-7 B 4-6 A 3-5 A 25-35 G 20-30 G 12-17 D

Ref.	d1 min.	d1 max	l1	l2	d2
51.870.0200	2	6	90	40	6
51.870.0300	3	8	100	50	8

Ref.	d1 min.	d1 max	l1	l2	d2
51.870.0400	4	10	115	60	10
51.870.0500	5	12	130	70	12

Ref.	d1 min.	d1 max	l1	l2	d2
51.870.0600	6	14	140	80	14

> 59.200 HUNGER

NL Set Verstelbare Handruimers type D
 FR Jeu d'Alésoirs expansibles type D
 ES Juego de escariadores mano ajustables tipo D
 DE Satz Verstellbare Handreibahlen Typ D



Ref.	Ø mm	Type
59.200.3150	8-31,5	51.200 - 11x

Ref.	Ø mm	Type
59.200.4500	8-45	51.200 - 13x

> 59.210 HUNGER

NL Set Verstelbare Handruimers type E
 FR Jeu d'Alésoirs expansibles type E
 ES Juego de escariadores mano ajustables tipo E
 DE Satz Verstellbare Handreibahlen Typ E



Ref.	Ø mm	Type
59.210.3150	10,5-31,5	51.210 - 9x

Ref.	Ø mm	Type
59.210.4500	10,5-45	51.210 - 11x

> 59.220 HUNGER

NL Set Verstelbare Handruimers type K
 FR Jeu d'Alésoirs expansibles type K
 ES Juego de escariadores mano ajustables tipo K
 DE Satz Verstellbare Handreibahlen Typ K



Ref.	Ø mm	Type
59.220.3150	8-31,5	51.220 - 11x

Ref.	Ø mm	Type
59.220.4500	8-45	51.220 - 13x

> 59.230 HUNGER

NL Set Verstelbare Handruimers type U
 FR Jeu d'Alésoirs expansibles type U
 ES Juego de escariadores mano ajustables tipo U
 DE Satz Verstellbare Handreibahlen Typ U



Ref.	Ø mm	Type
59.230.3400	12-34	51.230 - 7x

Ref.	Ø mm	Type
59.230.4500	12-45	51.230 - 9x

> **59.240 HUNGER**

NL **Set Verstelbare Handruimers type V**
 FR **Jeu d'Alésoirs expansibles type V**
 ES **Juego de escariadores mano ajustables tipo V**
 DE **Satz Verstellbare Handreibahlen Typ V**



Ref.	Ø mm	Type
59.240.1200	5,9-12	51.240 - 10x

Ref.	Ø mm	Type
59.240.1250	5,9-12	51.240 - 10x + 51.244 - 10x



NL Voedingswaardentabel ruimers
 FR Tableau des avances alésoirs
 ES Tabla de avances escariadores
 DE Vorschubtabelle Reibahlen

P 11 = ISO
 5600 N/mm²
 25-35 Vc = 25-35
 E FRC = E

FRC							
	A	B	C	D	E	F	G
d1(mm)	f (mm/n)						
1	0,07	0,07	0,07	0,07	0,07	0,07	0,08
2	0,07	0,08	0,08	0,1	0,15	0,2	0,15
6	0,1	0,09	0,1	0,12	0,15	0,22	0,18
10	0,12	0,15	0,18	0,18	0,25	0,3	0,22
15	0,15	0,2	0,2	0,18	0,25	0,35	0,35
20	0,2	0,25	0,22	0,25	0,3	0,4	0,37
25	0,25	0,27	0,25	0,3	0,35	0,4	0,37
30	0,25	0,3	0,3	0,33	0,37	0,45	0,45
40	0,3	0,35	0,35	0,4	0,45	0,5	0,5

NL Voorboormaat voor ruimen
 FR Tableau de diamètre de pré-perçage pour alésage
 ES Tabla de perforación previa para escariar
 DE Bohrungsdurchmesser für Reiben

ISO	P11	P12	P13	P14	M21	M22	K31	K32	N41	N42	N51	N52	N61	S71	S72
≤ Ø 6 mm	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2	0,1 - 0,2
≤ Ø 10 mm	0,2	0,2	0,2	0,1 - 0,2	0,2	0,1 - 0,2	0,2	0,2	0,2 - 0,3	0,1 - 0,2	0,2 - 0,3	0,2	0,2	0,2	0,1 - 0,2
≤ Ø 16 mm	0,2 - 0,3	0,2 - 0,3	0,2	0,2	0,2	0,2	0,3	0,2 - 0,3	0,3 - 0,4	0,2	0,3 - 0,4	0,2 - 0,3	0,2	0,2	0,2
≤ Ø 25 mm	0,3 - 0,4	0,3 - 0,4	0,3	0,3	0,3	0,3	0,4	0,3 - 0,4	0,4 - 0,5	0,3	0,4 - 0,5	0,3	0,3	0,3	0,3
≥ Ø 25 mm	0,4 - 0,5	0,4 - 0,5	0,4 - 0,5	0,4 - 0,5	0,3 - 0,4	0,3 - 0,4	0,5	0,4 - 0,5	0,5	0,3 - 0,4	0,5	0,3 - 0,4	0,3 - 0,4	0,3 - 0,4	0,3 - 0,4

FRC

NL: Voedingscode

FR: Codification vitesse d'avance

ES: Codificación de velocidad de avance

DE: Vorschubgeschwindigkeit Codierung

f (mm/n)

NL: Voeding per omwenteling (mm/n)

FR: Avance par tour (mm/tr)

ES: Avance por revolucion (mm/r)

DE: Vorschub pro Umdrehung (mm/U)

Vc

NL: Snij snelheid (m/min)

FR: Vitesse de coupe (m/min)

ES: Velocidad de corte (m/min)

DE: Schnittgeschwindigkeit (m/min)

n=rpm

NL: Spiltoerental (omw/min)

FR: Vitesse de broche (tr/min)

ES: Velocidad del husillo (rpm)

DE: Spindeldrehzahl (U/min)

NL Herleidingstabel passingen
 FR Tableau de normalisation des tolérances
 ES Tabla de normalización de las tolerancias
 DE Zurückführungstabelle Passungen

d1 (mm)	C8	C9	C10	C11	CD7	D7	D8	D9	D10	D11	D12	E7	E8	E9	EF8	F7	F8
1	1,07	1,07	1,08	1,10	1,04	1,02	1,03	1,03	1,04	1,06	1,08	1,02	1,02	1,09	1,02	1,01	1,01
2	2,07	2,07	2,08	2,10	2,04	2,02	2,03	2,03	2,04	2,06	2,08	2,02	2,02	2,03	2,02	2,01	2,01
3	3,07	3,07	3,08	3,10	3,04	3,02	3,03	3,03	3,04	3,06	3,08	3,02	3,02	3,03	3,02	3,01	3,01
4	4,08	4,09	4,10	4,12	4,05	4,04	4,04	4,05	4,06	4,08	4,10	4,02	4,03	4,04	4,03	4,01	4,02
5	5,08	5,09	5,10	5,12	5,05	5,04	5,04	5,05	5,06	5,08	5,10	5,02	5,03	5,04	5,03	5,01	5,02
6	6,08	6,09	6,10	6,12	6,05	6,04	6,04	6,05	6,06	6,08	6,10	6,02	6,03	6,04	6,03	6,01	6,02
7	7,09	7,10	7,12	7,15	7,06	7,05	7,05	7,06	7,08	7,10	7,14	7,03	7,04	7,05	7,03	7,02	7,03
8	8,09	8,10	8,12	8,15	8,06	8,05	8,05	8,06	8,08	8,10	8,14	8,03	8,04	8,05	8,03	8,02	8,03
9	9,09	9,10	9,12	9,15	9,06	9,05	9,05	9,06	9,08	9,10	9,14	9,03	9,04	9,05	9,03	9,02	9,03
10	10,09	10,10	10,12	10,15	10,06	10,05	10,05	10,06	10,08	10,10	10,14	10,03	10,04	10,05	10,03	10,02	10,03
11	11,11	11,12	11,14	11,18	-	11,06	11,06	11,08	11,10	11,13	11,20	11,04	11,05	11,06	-	11,02	11,03
12	12,11	12,12	12,14	12,18	-	12,06	12,06	12,08	12,10	12,13	12,20	12,04	12,05	12,06	-	12,02	12,03

d1 (mm)	F9	F10	G6	G7	H5	H6	H7	H8	H9	H10	H11	H12	H13	HJ6	J7	J8	JS7
1	1,02	1,04	1,00	1,01	1,00	1,00	1,00	1,01	1,01	1,02	1,04	1,06	1,09	1,00	1,00	1,00	1,00
2	2,02	2,04	2,00	2,01	2,00	2,00	2,00	2,01	2,01	2,02	2,04	2,06	2,09	2,00	2,00	2,00	2,00
3	3,02	3,04	3,00	3,01	3,00	3,00	3,00	3,01	3,01	3,02	3,04	3,06	3,09	3,00	3,00	3,00	3,00
4	4,03	4,04	4,01	4,01	4,00	4,00	4,00	4,01	4,02	4,03	4,05	4,08	4,12	4,00	4,00	4,00	4,00
5	5,03	5,04	5,01	5,01	5,00	5,00	5,00	5,01	5,02	5,03	5,05	5,08	5,12	5,00	5,00	5,00	5,00
6	6,03	6,04	6,01	6,01	6,00	6,00	6,00	6,01	6,02	6,03	6,05	6,08	6,12	6,00	6,00	6,00	6,00
7	7,03	7,05	7,01	7,01	7,00	7,00	7,01	7,01	7,02	7,04	7,06	7,10	7,12	7,00	7,00	7,00	7,00
8	8,03	8,05	8,01	8,01	8,00	8,00	8,01	8,01	8,02	8,04	8,06	8,10	8,16	8,00	8,00	8,00	8,00
9	9,03	9,05	9,01	9,01	9,00	9,00	9,01	9,01	9,02	9,04	9,06	9,10	9,16	9,00	9,00	9,00	9,00
10	10,03	10,05	10,01	10,01	10,00	10,00	10,01	10,02	10,02	10,04	10,06	10,10	10,16	10,00	10,00	10,00	10,00
11	11,04	11,06	11,01	11,01	11,00	11,00	11,01	11,02	11,03	11,05	11,07	11,14	11,20	11,00	11,00	11,00	11,00
12	12,04	12,06	12,01	12,01	12,00	12,00	12,01	12,02	12,03	12,05	12,07	12,14	12,20	12,00	12,00	12,00	12,00

d1 (mm)	JS8	JS9	K6	K7	K8	M6	M7	M8	N6	N7	N8	P6	P7	P8	R6	R7	S6
1	1,00	1,00	-	-	0,99	-	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	-	0,98	0,98
2	2,00	2,00	-	-	1,99	-	1,99	1,99	1,99	1,99	1,99	1,99	1,99	1,99	-	1,98	1,98
3	3,00	3,00	-	-	2,99	-	2,99	2,99	2,99	2,99	2,99	2,99	2,99	2,99	-	2,98	2,98
4	4,00	4,00	4,00	4,00	4,00	3,99	3,99	3,99	3,99	3,99	3,99	3,99	3,99	3,98	3,98	3,98	3,98
5	5,00	5,00	5,00	5,00	5,00	4,99	4,99	4,99	4,99	4,99	4,99	4,99	4,99	4,98	4,98	4,98	4,98
6	6,00	6,00	6,00	6,00	6,00	5,99	5,99	5,99	5,99	5,99	5,99	5,99	5,99	5,98	5,98	5,98	5,98
7	7,00	7,00	-	7,00	7,00	6,99	6,99	6,99	-	6,99	6,99	6,98	6,98	6,97	6,98	6,98	6,97
8	8,00	8,00	-	8,00	8,00	7,99	7,99	7,99	-	7,99	7,99	7,98	7,98	7,97	7,98	7,98	7,97
9	9,00	9,00	-	9,00	9,00	8,99	8,99	8,99	-	8,99	8,99	8,98	8,98	8,97	8,98	8,98	8,97
10	10,00	10,00	-	10,00	10,00	9,99	9,99	9,99	-	9,99	9,99	9,98	9,98	9,97	9,98	9,98	9,97
11	11,00	11,01	-	11,00	11,00	10,99	10,99	10,99	-	10,99	10,99	10,98	10,98	10,97	10,97	10,98	10,97
12	12,00	12,01	-	12,00	12,00	11,99	11,99	11,99	-	11,99	11,99	11,98	11,98	11,97	11,97	11,98	11,97

d1 (mm)	S7	U6	U7	X7	X8	X9	Z7	Z8	Z9	Z10	ZA7	ZA8	ZA9	ZB8	ZB9
1	0,98	0,98	0,98	0,97	0,97	0,97	0,97	0,97	0,96	0,96	0,96	0,96	0,95	0,95	0,95
2	1,98	1,98	1,98	1,97	1,97	1,97	1,97	1,97	1,96	1,96	1,96	1,96	1,95	1,95	1,95
3	2,98	2,98	2,98	2,97	2,97	2,97	2,97	2,97	2,96	2,96	2,96	2,96	2,95	2,95	2,95
4	3,98	3,97	3,97	3,97	3,96	3,96	3,96	3,96	3,95	3,95	3,96	3,95	3,94	3,94	3,94
5	4,98	4,97	4,97	4,97	4,96	4,96	4,96	4,96	4,95	4,95	4,96	4,95	4,94	4,94	4,94
6	5,98	5,97	5,97	5,97	5,96	5,96	5,96	5,96	5,95	5,95	5,96	5,95	5,94	5,94	5,94
7	6,97	6,97	6,97	6,97	6,96	6,95	6,96	6,95	6,93	6,94	6,94	6,94	6,93	6,92	6,92
8	7,97	7,97	7,97	7,97	7,96	7,95	7,96	7,95	7,93	7,94	7,94	7,94	7,93	7,92	7,92
9	8,97	8,97	8,97	8,97	8,96	8,95	8,96	8,95	8,93	8,94	8,94	8,94	8,93	8,92	8,92
10	9,97	9,97	9,97	9,97	9,96	9,95	9,96	9,95	9,93	9,94	9,94	9,94	9,93	9,92	9,92
11	10,97	10,96	10,96	10,96	10,95	10,94	10,95	10,94	10,92	10,93	10,93	10,93	10,91	10,90	10,90
12	11,94	11,96	11,96	11,96	11,95	11,94	11,95	11,94	11,92	11,93	11,93	11,93	11,91	11,90	11,90

