



HOFMANN & VRATNY

— —
KATALOG 2019/2020

SHAPING TOMORROW

HERZLICH WILLKOMMEN BEI HOFMANN & VRATNY



- | TITAN VOLLENDEN. | STAHL ENTGRATEN.
- | HART ZERSPANEN. | INOX BEARBEITEN.
- | INCONEL BEZWINGEN. | ABRASIV MEISTERN.
- | KUNSTSTOFF SCHNEIDEN.

KATALOG 2019/2020

HOFMANN & VRATNY DE





DER RICHTIGE FRÄSER. JEDERZEIT.

Willkommen bei Hofmann & Vratny. Als der führende Hersteller von Vollhartmetallfräsern ermöglichen wir Unternehmen auf der ganzen Welt die Herstellung ihrer Produkte.

Jeden Tag arbeiten wir als starkes Team an unserem gemeinsamen Ziel, die weltbesten Fräser herzustellen. Unternehmen der Medizin- und Halbleiterindustrie, des Maschinen- und Anlagenbaus, der Luft- und Raumfahrttechnik und nicht zuletzt der Automobilindustrie setzen seit vielen Jahren auf unsere Fräser. Qualität - Made in Bavaria.

Unser Unternehmenserfolg basiert auf Innovation, einer Kultur des Miteinanders, dem offenen Umgang auf Augenhöhe sowie der langjährigen, erfolgreichen und vertrauensvollen Zusammenarbeit mit unseren Geschäftspartnern. Auf uns und unsere Fräser können Sie zählen, genauso wie auf unseren unbändigen Anspruch, gemeinsam die Zukunft der Industriebranche zu gestalten. Das bedeutet für uns Shaping Tomorrow.

Andreas Vratny

Zdenek Vratny

Marius
Heinemann-Gründer



8.000

H&V
PRODUKTE

2 Mio.

FRÄSER
PRO JAHR



**„UNSERE FRÄSER STEHEN FÜR
PRÄZISION & ZUVERLÄSSIGKEIT
AUF WELTNIVEAU.“**

—
Andreas Vratny,
Geschäftsführender Gesellschafter



**„DER MENSCH STEHT
FÜR UNS IM ZENTRUM ALLER
UNSERER AKTIVITÄTEN.“**

— Marius Heinemann-Grüder,
Geschäftsführer



Was uns als Team auszeichnet, sind unsere gemeinsamen Werte, nach denen wir uns richten.

INNOVATION

QUALITÄT

TRADITION

VERTRAUEN

REGIONALITÄT

FAMILIARITÄT

Unser starker Wertekodex gibt das wieder, wofür wir als Unternehmen stehen: Innovative Qualitätsprodukte, denen unsere Kunden jederzeit vertrauen können, geschaffen in einem familiären Umfeld mit einer starken Bindung an unsere bayerische Herkunft.

STARKE PRINZIPIEN.

Werte, die uns antreiben: Wir wissen, dass das Fundament für nachhaltigen Erfolg starke Prinzipien sind. Wir definieren uns täglich über unsere Arbeit und Werte, die jeder von uns verinnerlicht hat.



REGIONALITÄT

Als Unternehmen sind wir stolz auf unsere bayerische Heimat. Wir sind engagiert, tief in der Region verwurzelt und unterstützen insbesondere lokale Vereine und Projekte.

3
FIRMEN-
STANDORTE

43
JAHRE
ERFAHRUNG

120
MOTIVIERTE
MITARBEITER

WIR DEFINIEREN VERÄNDERUNG. JEDEN TAG.

01

TRADITION

Bereits seit über vier Jahrzehnten entwickeln und produzieren wir Vollhartmetallfräser an unseren Standorten in Bayern. Neben vollautomatisierter und digitaler Fertigung, einer Vielzahl an Innovationen und neuen Konzepten findet man bei uns noch heute traditionelle Werte, klassisches Schleiferhandwerk und generationenübergreifendes Arbeiten.

02

VERTRAUEN

Nicht nur innerhalb des Unternehmens, sondern auch mit allen Geschäftspartnern wie Lieferanten oder Händlern sind ein fairer Umgang und ein respektvolles Miteinander für uns selbstverständlich. Auf unser Wort können Sie sich verlassen.

QUALITÄT
INNOVATION
TRADITION
VERTRAUEN
REGIONALITÄT
FAMILIARITÄT



Effiziente Forschung und schnelle
Integration neuer Entwicklungen.

03

NACHHALTIG & SOZIAL

Wir nehmen unsere Verantwortung für Umwelt und Gesellschaft ernst. Wir stehen für eine möglichst nachhaltige Produktion durch eine energiefreundliche und ressourcenschonende Arbeitsweise. Darüber hinaus unterstützen wir zahlreiche soziale Projekte wie Fördereinrichtungen, Tierheime und Einrichtungen für Menschen mit Handicap.

04

HUMAN-CENTRIC

Wir sind überzeugt davon, dass das beste Produkt nur von den besten Mitarbeitern geschaffen werden kann. Deshalb stehen unsere Mitarbeiter für uns im Mittelpunkt.



01

STRATEGISCHE MATERIALAUSWAHL

Basierend auf unserer jahrzehntelangen Erfahrung wählen wir anhand des zu bearbeitenden Materials und dem zugehörigen Bearbeitungsprozess aus einem breiten Portfolio das optimale Hartmetall für den Fräser aus.

02

ENTWICKLUNG DER GEOMETRIE

Die Spezialisten in unserer Forschungsabteilung entwickeln verschiedene Fräser-Geometrien und wählen nach ausführlichen Tests die perfekte Form.

03

AUSWAHL DER PASSENDEN BESCHICHTUNG

Gemeinsam mit unseren Partnerunternehmen finden wir die ideale Beschichtung für jede Anwendung. Oftmals kommen hier exklusive Entwicklungen und auch neuartige Beschichtungen zum Einsatz, für die wir aktive Forschung betreiben.



04

AUSFÜHRLICHE TEST- UND ENTWICKLUNGSPHASE

Nach dem Bestehen der strengen internen Kontrolle und ausgiebigen Tests in unserem hochtechnisierten F&E-Zentrum werden die Fräser unter Realbedingungen bei ausgewählten Kunden in der Praxis erprobt.

Wir wollen die Zukunft der Industrie entscheidend mitgestalten und die gesamte Branche voranbringen. Deswegen ist es uns wichtig, den Status Quo immer wieder zu hinterfragen und neue Wege zu gehen. Wir stellen hohe Ansprüche an uns und unsere Produkte und streben stetig nach Weiterentwicklung.

INNOVATION

Um das beste Produkt zu entwickeln, braucht man starke Kooperationen. Wir betreiben gemeinsam mit unseren Partnern die Entwicklung neuer Hartmetalle und innovativer Beschichtungen. Gemeinsam erproben wir neuartige Materialien, um dann im nächsten Schritt optimale Zerspanungskonzepte zu entwickeln.

KOOPERATION

SO ARBEITEN WIR BEI H&V.

Unser Versprechen: Damit unsere Fräser jederzeit unseren Ansprüchen und denen unserer Kunden gerecht werden, setzen wir auf einen umfassenden Herstellungsprozess, der in jedem Schritt ausgezeichnete Qualität garantiert.

DER RICHTIGE FRÄSER. FÜR JEDE ANWENDUNG.

Unsere Leistungen: In erster Linie wollen wir unseren Kunden mit unseren Fräsern ermöglichen, so zu arbeiten, wie sie es möchten. Deshalb bieten wir ihnen ein Leistungsportfolio, das sich an ihren Bedürfnissen orientiert.



„**INNOVATION STEHT
FÜR UNS AN ERSTER STELLE.**“

— Anton Voglsinger,
Frästechniker, Forschung und Entwicklung



PRIVATE LABELLING

Als Private-Label Kunde profitieren Sie nicht nur von unserer langjährigen Erfahrung. Bei H&V erhalten Sie mehr als nur einen Fräser mit Ihrem Namen und Logo. Gemeinsam erarbeiten wir komplette Produktprogramme, Prozesse und Mehrwertdienste, die Sie direkt an Ihre Kunden weitergeben können.



MAßANFERTIGUNG

Individuell auf Ihre Anwendung abgestimmt, entwickeln wir mit Ihnen Hand in Hand ein Produkt, das Ihren Anforderungen und Wünschen zu 100% entspricht.



NACHSCHLEIFSERVICE

In unserem Nachschleifzentrum erreichen wir durch unseren Originalnachschliff langfristige Präzision und Haltbarkeit bereits eingesetzter Fräser.



SCHULUNGEN

Wir teilen unsere Erfahrungen gern. Deshalb bieten wir für Anwendungstechniker und Vertriebsmitarbeiter umfangreiche Schulungen an.



TECHNISCHE BERATUNG

Gerne unterstützen wir Sie bei Herausforderungen rund um unsere Fräser und deren Einsatz in verschiedenen Zerspanungsszenarien.



QUALITÄTSSICHERUNG

Als Großserienfertiger stellen wir sicher, dass alle Fräser einer Serie den gleichen Qualitätsansprüchen standhalten. Hierzu setzen wir sowohl auf herkömmliche Verfahren, als auch auf modernste Analysewerkzeuge und Messmethoden.

PRODUKTLINIEN

Unsere Vollhartmetallfräser sind so vielfältig wie ihr Einsatzbereich. Egal ob preissensibel, hochqualitativ oder spezialisiert für Extremanwendungen. Mit unserem 3-Linien-Produktprogramm bieten wir für alle Einsatzgebiete und Kundengruppen das passende Hochpräzisions-Werkzeug.

	 Basic	 Premium	 Expert
Beschreibung	Solide Qualitätswerkzeuge für preissensible Anwendungen.	Hochqualitative Premiumwerkzeuge. Für mehrere Anwendungen geeignet.	Speziell auf eine Anwendung abgestimmte High-Performance-Werkzeuge.
Hartmetall	Premium	Premium	Performance
Schliffbild und Oberflächengüte	Optimiert	Optimiert	Bestmöglich
Beschichtung	Ohne / Premium	Ohne / Premium	Ohne / Performance
Qualitätskontrolle	✓	✓	✓
Engste Toleranz- und Rundlaufgenauigkeit	✓	✓	✓
Einsatz für Serienfertigung	✓	✓	✓
Nachschleifen	✓	✓	✓
Abgestimmt auf moderne Frästrategien		✓	✓
Entwicklung im Realeinsatz		✓	✓
Höchste Zerspanungsleistung		✓	✓
Bester seiner Art		✓	✓
Geschaffen für Extrembedingungen			✓
Optimiert auf eine Materialgruppe			✓

✓ Trifft auf alle Artikel dieser Produktlinie zu.

✗ Ein Teil der Produkte dieser Linie teilen diese Eigenschaften.

NUMMERIERUNGSSYSTEM

ARTIKELGRUPPE

VHM Fräser

Katalog-Artikel



K 2 03 388

Produktgruppe

Produktbezeichnung

FRÄSER

Artikelgruppe



K201673 - 16

Schneidendurchmesser

FRÄSER MIT LÄNGENUNTERScheidung

Artikelgruppe



K201123 - 2 X 8

Schneidendurchmesser

Differenzierung anhand Schneidenlänge
oder Freistichlänge

FRÄSER MIT WEITEREM UNTERScheidungsmerkmal

Artikelgruppe



K202223 - 8 / 3

Schneidendurchmesser

Differenzierung anhand Eckradius oder
Schaftdurchmesser

BESONDERHEITEN

HA	Ohne Weldon	HB	Mit Weldon	ETC	Extended Trochoidal Cutting
HSC	High Speed Cutting	HPC	High Performance Cutting	MTC	Multi Task Cutting
UNI	Universalbearbeitung		Gravieren		Ungleiche Zahnteilung
	Kühlkanalsystem		Abzeilen		Besäumen
	Spanbrecher		Vollnut		Vorwärts- und Rückwärtsentgraten
	Wellenschliff		Entgraten		Viertelkreisfräsen
2xD	2xD	3xD	3xD	4xD	4xD
5xD	5xD		Dynamische Drallsteigung		

MATERIAL

	Seite		Seite		Seite
	Stahl	46 - 170		Gehärteter Stahl	172 - 220
	INOX (VA)	284 - 368		Guss	370 - 455
	Inconel	460 - 468		Titan	470 - 478

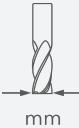
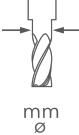
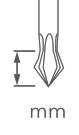
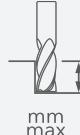
PRODUKTGRUPPEN

	Seite		Seite		Seite	
01	Schaftfräser	21 - 30	02	Torusfräser	31 - 33	
04	Formfräser	39 - 40	05	Fasenfräser	41	
07	Stirntorusfräser	45			03 Vollradiusfräser	35 - 37
					06 Schruppfräser	43

KÜHLUNG

	Trocken		Luftgekühlt		Öl
	Wasser ^{Min}		Wasser ^{Max}		

EIGENSCHAFTEN

	Schneidendurchmesser mm \varnothing		Kleiner Schneidendurchmesser mm \varnothing		Großer Schneidendurchmesser mm \varnothing
	Freistichdurchmesser mm \varnothing		Schneidenlänge mm		Gesamtfasenlänge mm
	Freistichlänge mm		Gesamtlänge mm		Schaftdurchmesser mm \varnothing
	Schneidenanzahl #		Eckradius mm		Eckfase mm
	Programmierradius mm		Maximale Schnitttiefe mm max		Spiralsteigung °

BESCHICHTUNGEN

Unsere Beschichtungen werden in einem ausführlichen Testverfahren intern sowie unter Realbedingungen beim Kunden mit der Werkzeuggeometrie in Einklang gebracht. Die Auswahl wird dabei perfekt auf das jeweilige Anwendungsgebiet abgestimmt.

TiN- α	TiN Alpha	TiSiN- α	TiSiN Alpha	TiAlN- α	TiAlN Alpha
Diamond- α	Diamond Alpha	TAC- α	TAC Alpha	ZrCn- α	ZrCrN Alpha
TiCn- α	TiCN Alpha				

INHALTSVERZEICHNIS

Im Inhaltsverzeichnis sind die möglichen Anwendungsbereiche der Fräser farblich gekennzeichnet. Jeder Fräser ist einmalig pro Hauptanwendung im Katalog unter der entsprechenden Seitenzahl aufgeführt. Anwendungen, die mit einem Stern (*) versehen sind, sind Nebenanwendungen und werden nicht separat im Katalog gelistet.

ANWENDUNGSTABELLE

Bei den angegebenen Werten der Anwendungstabelle handelt es sich lediglich um Richtwerte. Diese sind stark abhängig von den individuellen Anwendungsparametern.

ABBILDUNGEN

Alle abgebildeten technischen Zeichnungen und Fotografien sind beispielhaft. Abweichungen zum Originalprodukt bei Farbe und Abmessungen sind möglich.



MADE BAVIA

Unsere Fräser gehen an Unternehmen auf der ganzen Welt.
Doch sie alle haben einen gemeinsamen Ursprung: Unsere Werke
in Bayern.

Als Traditionssunternehmen sind wir stolz auf unsere starke
Bindung zur Region. Schon seit unserer Gründung sind wir fest mit
unserer Heimat verbunden und arbeiten in einem familiären Team
daran, die besten Fräser der Welt zu produzieren. Echte Qualitäts-
arbeit, höchste handwerkliche Qualität und eine starke Förderung
und Bindung unserer Talente: Das bedeutet für uns Made in Bavaria.

EIN RIA



MADE IN
BAVARIA

PROVEN QUALITY

SCHAFTFRÄSER



K201001

VHM Schafträser

224



K201012

VHM Schafträser

225



K201021

VHM Schafträser

226



K201022

VHM Schafträser TAC



227



K201031

VHM Schafträser kurz

48 * 286 372



K201032

VHM Schafträser kurz

48 * 286 372



K201033

VHM Schafträser kurz TiAlN

50 * 288 374



K201034

VHM Schafträser kurz TiAlN

50 * 288 374



K201051

VHM Schafträser

52 * 290 376



K201052

VHM Schafträser

52 * 290 376





K201053
VHM Schafträser TiAlN

53 228 291 377



K201054
VHM Schafträser TiAlN

53 228 291 377



K201071
VHM Schafträser kurz

54 * 292 378



K201081
VHM Schafträser

55 * 293 379



K201122
VHM Micro-Schafträser TiSiN HSC

* 174 * *



K201123
VHM Micro-Schafträser TAC HSC

229 *



K201133
VHM Schafträser kurz TAC HSC / MTC / HPC

231 *



K201143
VHM Schafträser lang TAC HSC / MTC / HPC

232 *



K201161
VHM Schafträser kurz MTC

56 * 294 380



K201162
VHM Schafträser kurz MTC

56 * 294 380





HA **HPC** **MTC** **UNI**

57 295 381

K201163
Premium

VHM Schafträser kurz TiAlN MTC / HPC



HB **HPC** **MTC** **UNI**

57 295 381

K201164
Premium

VHM Schafträser kurz TiAlN MTC / HPC



HA **MTC** **UNI**

58 * 296 382

K201181
Premium

VHM Schafträser lang MTC



HB **MTC** **UNI**

58 * 296 382

K201182
Premium

VHM Schafträser lang MTC



HA **HPC** **MTC** **UNI**

59 297 383

K201183
Premium

VHM Schafträser lang TiAlN MTC / HPC



HB **HPC** **MTC** **UNI**

59 297 383

K201184
Premium

VHM Schafträser lang TiAlN MTC / HPC



HA **UNI**

60 * 298 384

K201251
Basic

VHM Mini-Schafträser 30°

NEW



HB **UNI**

60 * 298 384

K201252
Basic

VHM Mini-Schafträser 30°

NEW



HA **UNI**

62 * 300 386

K201253
Basic

VHM Mini-Schafträser 30° TiAlN

NEW



HB **UNI**

62 * 300 386

K201254
Basic

VHM Mini-Schafträser 30° TiAlN

NEW





HA **UNI**

K201271
VHM Mini-Schaftfräser 45°



64 * 302 388



HB **UNI**

K201272
VHM Mini-Schaftfräser 45°



64 * 302 388



HA **UNI**

K201273
VHM Mini-Schaftfräser 45° TiAlN



65 * 303 389



HB **UNI**

K201274
VHM Mini-Schaftfräser 45° TiAlN



65 * 303 389



HA **MTC** **UNI**

K201291
VHM Schaftfräser kurz MTC

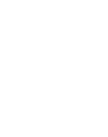


66 * 304 390



HB **MTC** **UNI**

K201292
VHM Schaftfräser kurz MTC



66 * 304 390



HA **HPC** **MTC** **UNI**

K201293
VHM Schaftfräser kurz TiAlN MTC / HPC



67 305 391



HB **HPC** **MTC** **UNI**

K201294
VHM Schaftfräser kurz TiAlN MTC / HPC



67 305 391



HA **MTC** **UNI**

K201311
VHM Schaftfräser lang MTC



68 * 306 392



HB **MTC** **UNI**

K201312
VHM Schaftfräser lang MTC



68 * 306 392





69 307 393

K201313

VHM Schafträser lang TiAlN MTC / HPC



69 307 393

K201314

VHM Schafträser lang TiAlN MTC / HPC



70 * 308 *

K201341

VHM Schafträser überlang MTC



70 * 308 *

K201342

VHM Schafträser überlang MTC



71 309 *

K201343

VHM Schafträser überlang TiAlN MTC / ETC / HPC



71 309 *

K201344

VHM Schafträser überlang TiAlN MTC / ETC / HPC



72 * 310 394

K201401

VHM Schafträser kurz MTC



72 * 310 394

K201402

VHM Schafträser kurz MTC



73 311 395

K201403

VHM Schafträser kurz TiCN MTC / ETC / HPC



73 311 395

K201404

VHM Schafträser kurz TiCN MTC / ETC / HPC





K201411

VHM Schafträser lang MTC

74 * 312 396



K201412

VHM Schafträser lang MTC

74 * 312 396



K201413

VHM Schafträser lang TiCN MTC / ETC / HPC

75 313 397



K201414

VHM Schafträser lang TiCN MTC / ETC / HPC

75 313 397



K201523

VHM Schafträser TiSiN HPC

76 179



K201533

VHM Schafträser lang TiSiN HPC / ETC

* 180



K201573

VHM Bananen-Schafträser Diamond

233 458



K201577

VHM Bananen-Schafträser lang Diamond

234 459



K201581

VHM Schafträser kurz

77 * 314 398



K201582

VHM Schafträser kurz

77 * 314 398





HA UNI L J

K201583
VHM Schafträser kurz TiAlN

78 * * 315 399



HB UNI L J

K201584
VHM Schafträser kurz TiAlN

78 * * 315 399



HA UNI L J

K201591
VHM Schafträser

79 * 316 400



HB UNI L J

K201592
VHM Schafträser

79 * 316 400



HA UNI L J

K201593
VHM Schafträser TiAlN

80 * * 317 401



HB UNI L J

K201594
VHM Schafträser TiAlN

80 * * 317 401



HA UNI L J

K201601
VHM Schafträser überlang

81 * 318 *



HB UNI L J

K201602
VHM Schafträser überlang

81 * 318 *



HA UNI L J

K201603
VHM Schafträser überlang TiAlN

82 * * *



HB UNI L J

K201604
VHM Schafträser überlang TiAlN

82 * * *





HA **UNI**

K201673
VHM Mini-Schaftfräser 45° TiAlN

83 * 319 402



HB **UNI**

K201674
VHM Mini-Schaftfräser 45° TiAlN

83 * 319 402



HA **UNI**

K201677
VHM Mini-Schaftfräser 30° TiAlN

84 * 320 403



HB **UNI**

K201678
VHM Mini-Schaftfräser 30° TiAlN

84 * 320 403



HB **ETC** **HPC** **≠**

K201688
VHM Schaftfräser kurz TiSiN ETC / HPC

NEW

472



HB **ETC** **HPC** **≠**

K201693
VHM Schaftfräser lang TiSiN ETC / HPC

NEW

473

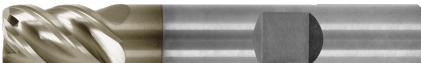


HB **ETC** **HPC** **MTC** **UNI** **≠**

K201719
VHM Schaftfräser kurz TiSiN ETC / HPC / MTC

NEW

85 * 404



HB **ETC** **HPC** **MTC** **UNI** **≠**

K201724
VHM Schaftfräser lang TiSiN ETC / HPC / MTC

NEW

86 * 405



HB **ETC** **HPC** **MTC** **UNI** **≠**

K201729
VHM Schaftfräser lang TiSiN ETC / HPC / MTC

NEW

87 * 406



HB **ETC** **UNI** **≠** **2xD**

K201734
VHM Schaftfräser 2xD TiSiN ETC

NEW

88 *





K201739
VHM Schafträser 3xD TiSiN ETC

89 *



K201744
VHM Schafträser 4xD TiSiN ETC

90 *



K201749
VHM Schafträser 5xD TiSiN ETC

91 *



K201754
VHM Schafträser kurz TiSiN ETC / HPC / MTC

* 321



K201759
VHM Schafträser kurz TiSiN ETC / HPC

462



K201764
VHM Schafträser TiSiN ETC / HPC

463



K201768
VHM Schafträser TAC ETC / HPC

235



K201773
VHM Schafträser lang TAC ETC / HPC

236



K201776
VHM Schafträser TAC ETC / HPC

237



K201779
VHM Schafträser lang TAC ETC / HPC

238





K201784

Expert

VHM Schafträser lang TiSiN ETC / HPC / MTC

92 322



K201789

Expert

VHM Schafträser lang TiSiN ETC / MTC

93 323

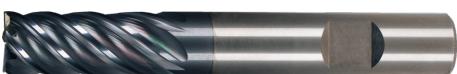


K201794

Expert

VHM Schafträser 2xD TiSiN ETC

* 324



K201799

Expert

VHM Schafträser 3xD TiSiN ETC

* 325



K201804

Expert

VHM Schafträser 2xD TiSiN ETC

* 326



K201809

Expert

VHM Schafträser 3xD TiSiN ETC

* 327



K201813

Expert

VHM Schafträser TAC ETC / HPC / HSC

239



K201816

Premium

VHM Schafträser HSC / MTC / HPC

240



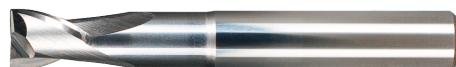
TORUSFRÄSER



K202001

VHM Torusfräser kurz HSC

241



K202002

VHM Torusfräser kurz HSC

241



K202003

VHM Torusfräser kurz TiN HSC

242



K202004

VHM Torusfräser kurz TiN HSC

242



K202005

VHM Torusfräser TAC HSC

243



K202011

VHM Torusfräser überlang HSC

244



K202012

VHM Torusfräser überlang HSC

244



K202013

VHM Torusfräser überlang TiN HSC

245



K202014

VHM Torusfräser überlang TiN HSC

245



K202015

VHM Torusfräser lang TAC HSC

246





K202082
VHM Micro-Torusfräser TiSiN HSC

94 181 247 *



K202092
VHM Micro-Torusfräser TiSiN HSC

96 183 249 *



K202102
VHM Micro-Torusfräser TiSiN HSC

98 185 251 *



K202112
VHM Micro-Torusfräser TiSiN HSC

100 187 253 *



K202143
VHM Torusfräser kurz TiAlN HSC / HPC

101 328 407



K202153
VHM Torusfräser lang TiAlN HSC / HPC

103 330 409



K202163
VHM Torusfräser kurz TiAlN HSC

105 188 332 411



K202173
VHM Torusfräser lang TiAlN HSC

107 190 334 413



K202202
VHM Torusfräser überlang TiAlN HSC

109 192 336 415



K202223
VHM Torusfräser kurz TiSiN HPC / HSC

110 193





112 195

K202233

VHM Torusfräser lang TiSiN HPC / HSC



114 197

K202253

VHM Torusfräser TiSiN HPC



* 199

K202293

VHM Torusfräser kurz TiSiN HPC / ETC



* 200

K202303

VHM Torusfräser lang TiSiN HPC / ETC



* 201

K202307

VHM Torusfräser überlang TiSiN HPC / ETC



464

K202414

VHM Torusfräser TiSiN ETC / MTC / HPC



474

K202424

VHM Torusfräser lang TiSiN ETC / HPC



116 * 416

K202509

VHM Torusfräser lang TiSiN ETC / HPC / HSC / MTC



VOLLRADIUSFRÄSER



K203001

VHM Vollradiusfräser HSC

118 * 337 418



K203003

VHM Vollradiusfräser TiAlN HSC

119 * 338 419



K203033

VHM Vollradiusfräser kurz TiAlN HPC / HSC

120 202 * 339 420



K203063

VHM Vollradiusfräser überlang TiAlN HPC / HSC

122 204 * 341 422



K203081

VHM Vollradiusfräser kurz

123 * 342 423



K203083

VHM Vollradiusfräser kurz TiAlN HSC

124 * 343 424



K203091

VHM Vollradiusfräser überlang

125 * 344 425



K203093

VHM Vollradiusfräser überlang TiAlN HSC

126 * 345 426



K203103

VHM Vollradiusfräser kurz TiSiN HPC / HSC

127 205



K203143

VHM Vollradiusfräser überlang TiSiN HPC / HSC

129 207





K203206

Expert

VHM Micro-Vollradiusfräser kurz TiSiN HSC

130 208 254 *



K203212

Expert

VHM Micro-Vollradiusfräser lang TiSiN HSC

133 211 257 *



K203253

Premium

VHM Vollradiusfräser kurz TiAlN MTC / HSC / HPC

135 259 346 427 *



K203263

Premium

VHM Vollradiusfräser lang TiAlN MTC / HSC / HPC

136 260 347 428 *



K203333

Expert

VHM Vollradiusfräser kurz TiSiN HPC / HSC

137 213



K203343

Expert

VHM Vollradiusfräser lang TiSiN HPC / HSC

138 214



K203373

Basic

VHM Mini-Vollradiusfräser TiSiN HSC

139 215



K203383

Expert

VHM Vollradiusfräser kurz TiSiN HPC / HSC

475



K203388

Expert

VHM Vollradiusfräser lang TiSiN HPC / HSC

476



K203393

Expert

VHM Vollradiusfräser kurz TiSiN HPC / HSC

465





HA HSC HPC

K203398

Expert

VHM Vollradiusfräser lang TiSiN HPC / HSC

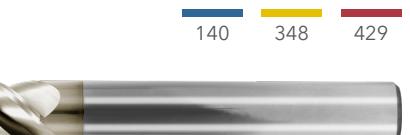


HA HSC HPC

K203413

Expert

VHM Vollradiusfräser kurz TiSiN HPC / HSC



140 348 429

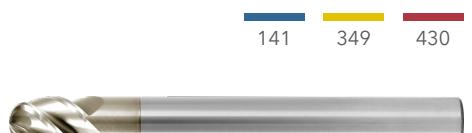


HA HSC HPC

K203418

Expert

VHM Vollradiusfräser lang TiSiN HPC / HSC



141 349 430

FORMFRÄSER



HA **UNI**

K204001

VHM Gravierfräser 60°

142 261 350 431



HA **UNI**

K204011

VHM Schlichtfräser konisch 0,5°

143 262 * 432



HA **UNI**

K204013

VHM Schlichtfräser konisch 0,5° TiAlN

144 263 351 433



HA **UNI**

K204021

VHM Schlichtfräser konisch 1°

145 264 * 434



HA **UNI**

K204023

VHM Schlichtfräser konisch 1° TiAlN

146 265 352 435



HA **UNI**

K204031

VHM Schlichtfräser konisch 1,5°

147 266 * 436



HA **UNI**

K204033

VHM Schlichtfräser konisch 1,5° TiAlN

148 267 353 437



HA **UNI**

K204041

VHM Schlichtfräser konisch 2°

149 268 * 438



HA **UNI**

K204043

VHM Schlichtfräser konisch 2° TiAlN

150 269 354 439



HA **UNI**

K204051

VHM Schlichtfräser konisch 2,5°

151 270 * 440





HA **UNI**

K204053

VHM Schlichtfräser konisch 2,5° TiAlN

152 271 355 441



HA **UNI**

K204061

VHM Schlichtfräser konisch 3°

153 272 * 442

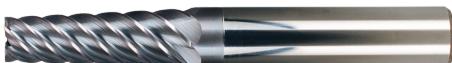


HA **UNI**

K204063

VHM Schlichtfräser konisch 3° TiAlN

154 273 356 443



HA **UNI**

K204071

VHM Schlichtfräser konisch 4°

155 274 * 444



HA **UNI**

K204073

VHM Schlichtfräser konisch 4° TiAlN

156 275 357 445



HA **UNI**

K204081

VHM Schlichtfräser konisch 5°

157 276 * 446



HA **UNI**

K204083

VHM Schlichtfräser konisch 5° TiAlN

158 277 358 447



HA **UNI**

K204092

VHM Vor- und Rückwärts Viertelkreisfräser TiAlN

159 278 * 448



HA **UNI**

K204106

VHM Viertelkreisfräser TiAlN

160 279 359 449 * *



HA **UNI**

K204108

VHM Viertelkreisfräser TiSiN

216 360



FASENFRÄSER



Expert

K205153
VHM Engrater 60° TiSiN

161 217



Expert

K205154
VHM Engrater 60° TiSiN

161 217



Expert

K205163
VHM Engrater 90° TiSiN

162 218



Expert

K205164
VHM Engrater 90° TiSiN

162 218



Premium

K205173
VHM Engrater 60° TiAlN

163 280 361 450 * *



Premium

K205174
VHM Engrater 60° TiAlN

163 280 361 450 * *



Premium

K205183
VHM Engrater 90° TiAlN

164 281 362 451 * *



Premium

K205184
VHM Engrater 90° TiAlN

164 281 362 451 * *



Basic

K205193
VHM Vor- und Rückwärtsentgrater TiAlN

165 282 363 452 * *



SCHRUPPFRÄSER



HA **MTC** **UNI**

K206083

VHM Schrupfräser kurz TiAlN MTC

166 364 453 *



HB **MTC** **UNI**

K206084

VHM Schrupfräser kurz TiAlN MTC

166 364 453 *



HA **MTC** **UNI**

K206093

VHM Schrupfräser lang TiAlN MTC

167 * 454 *



HB **MTC** **UNI**

K206094

VHM Schrupfräser lang TiAlN MTC

167 * 454 *



HA **MTC** **UNI**

K206113

VHM Schrupfräser lang TiAlN MTC

168 365 455 *



HB **MTC** **UNI**

K206114

VHM Schrupfräser lang TiAlN MTC

168 365 455 *



HA **MTC**

K206123

VHM Schrupfräser lang TiAlN MTC

* 366



HB **MTC**

K206124

VHM Schrupfräser lang TiAlN MTC

* 366



STIRNTORUSFRÄSER



HA HSC UNI

K207003

VHM Stirntorusfräser TiSiN HSC



169 367



HA HSC UNI

K207008

VHM Stirntorusfräser lang TiSiN HSC



170 368



HA HSC

K207013

VHM Stirntorusfräser TiSiN HSC



219



HA HSC

K207018

VHM Stirntorusfräser lang TiSiN HSC



220



HA HSC

K207033

VHM Stirntorusfräser TiSiN HSC



477



HA HSC

K207038

VHM Stirntorusfräser lang TiSiN HSC



478



HA HSC

K207043

VHM Stirntorusfräser TiSiN HSC



467



HA HSC

K207048

VHM Stirntorusfräser lang TiSiN HSC



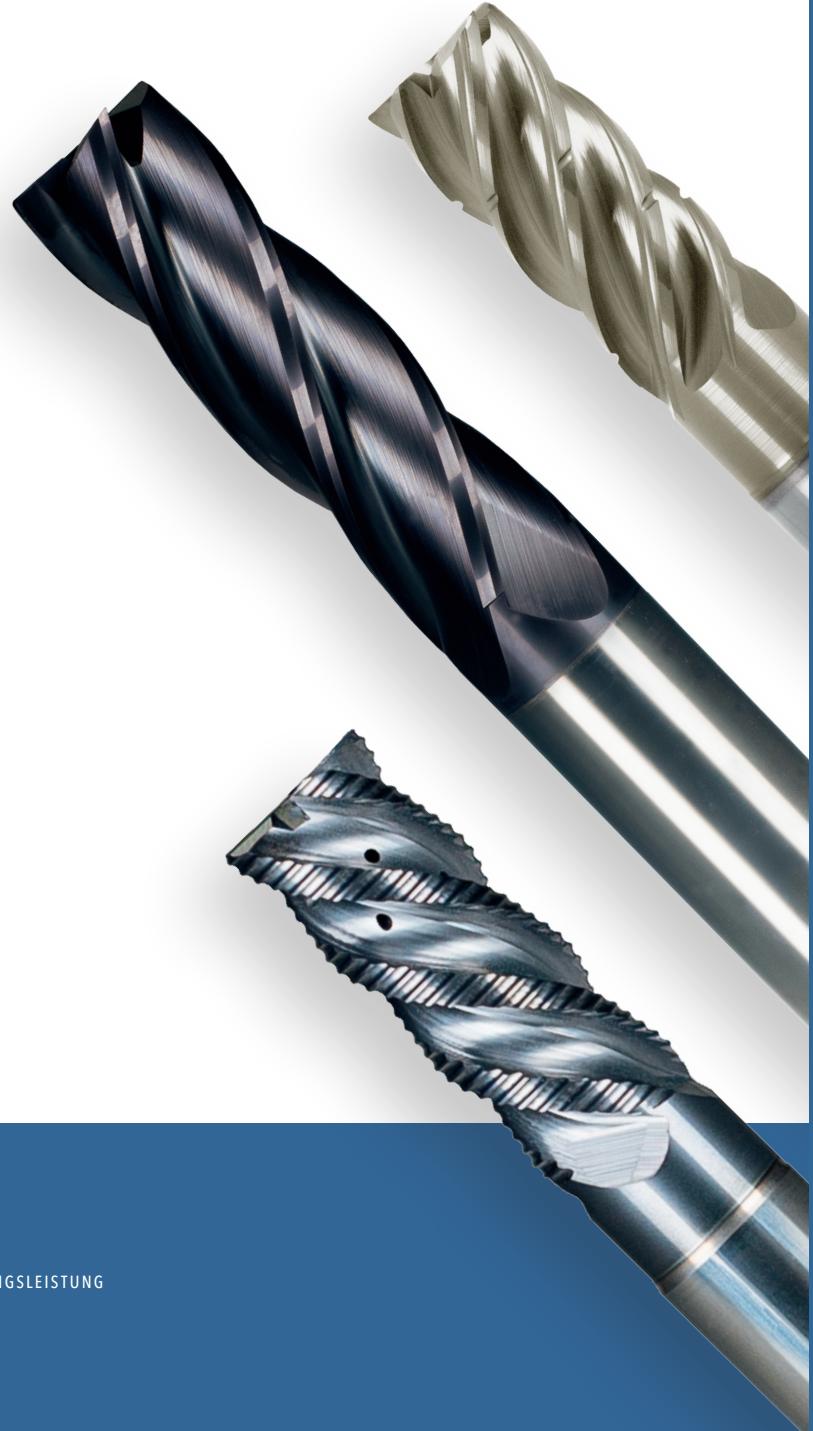
468



HÖMANN & VRATINY — HÖCHSTE ZERSPANNUNGSLEISTUNG

STAHL





HOFMANN & VRATNY — HÖCHSTE ZERSPANUNGSLEISTUNG

STAHL

In den letzten Jahrzehnten haben sich am Markt etliche Stahllegierungen etabliert. Wir haben unsere Zerspanungswerkzeuge immer wieder an die neuen Legierungen angepasst und gewährleisten somit stets ein effizientes Zerspanungsergebnis.

Höchste Zerspanungsleistung bei maximalem Materialabtrag. Wir bieten Fräser für nahezu alle am Markt erhältlichen Stähle, wie zum Beispiel unlegierte, niedriglegierte, hochlegierte und

pulvermetallurgische Stähle. In diesem Bereich bieten wir durch unser 3-Linien-Produktprogramm für jede Anwendung und jedes Budget das optimale Werkzeug.

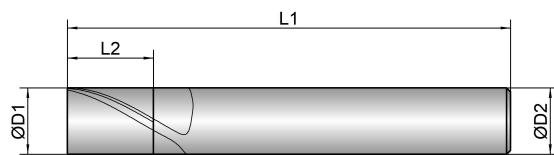
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201031



HB K201032



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201031	K201032	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
0,25/3	-	0,25	0,5	38,0	3,0	2	30
0,3/3	-	0,3	1,0	38,0	3,0	2	30
0,35/3	-	0,35	1,0	38,0	3,0	2	30
0,4/3	-	0,4	1,0	38,0	3,0	2	30
0,5/3	-	0,5	1,5	38,0	3,0	2	30
0,6/3	-	0,6	1,5	38,0	3,0	2	30
0,7/3	-	0,7	2,0	38,0	3,0	2	30
0,8/3	-	0,8	2,0	38,0	3,0	2	30
0,9/3	-	0,9	2,5	38,0	3,0	2	30
1/3	-	1,0	3,0	50,0	3,0	2	30
1,1/3	-	1,1	3,0	50,0	3,0	2	30
1,2/3	-	1,2	4,0	50,0	3,0	2	30
1,4/3	-	1,4	4,0	50,0	3,0	2	30

K201031	K201032	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
1,5/6	1,5	1,5	3,0	54,0	6,0	2	30
1,5/3	-	1,5	4,0	50,0	3,0	2	30
1,6/3	-	1,6	4,0	50,0	3,0	2	30
1,8/3	-	1,8	5,0	50,0	3,0	2	30
2/6	2	2,0	4,0	54,0	6,0	2	30
2/3	-	2,0	5,0	50,0	3,0	2	30
2,5/3	-	2,5	6,0	50,0	3,0	2	30
3/6	3	3,0	6,0	54,0	6,0	2	30
4/6	4	4,0	7,0	54,0	6,0	2	30
5/6	5	5,0	8,0	54,0	6,0	2	30
6/6	6	6,0	10,0	54,0	6,0	2	30
8/8	8	8,0	12,0	59,0	8,0	2	30
10/10	10	10,0	13,0	67,0	10,0	2	30
12/12	12	12,0	16,0	74,0	12,0	2	30
14/14	14	14,0	16,0	75,0	14,0	2	30
16/16	16	16,0	20,0	83,0	16,0	2	30
18/18	18	18,0	20,0	85,0	18,0	2	30
20/20	20	20,0	25,0	93,0	20,0	2	30



Toleranz e8

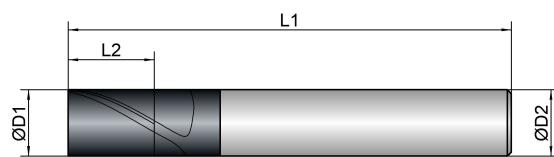
Premium

Beschichtung TiAlN- α 

HA K201033



HB K201034



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	100	80					80	100	280					CFK / GFK	Grafit

K201033	K201034	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
0,25/3	-	0,25	0,5	38,0	3,0	2	30
0,3/3	-	0,3	1,0	38,0	3,0	2	30
0,35/3	-	0,35	1,0	38,0	3,0	2	30
0,4/3	-	0,4	1,0	38,0	3,0	2	30
0,5/3	-	0,5	1,5	38,0	3,0	2	30
0,6/3	-	0,6	1,5	38,0	3,0	2	30
0,7/3	-	0,7	2,0	38,0	3,0	2	30
0,8/3	-	0,8	2,0	38,0	3,0	2	30
0,9/3	-	0,9	2,5	38,0	3,0	2	30
1/3	-	1,0	3,0	50,0	3,0	2	30
1,1/3	-	1,1	3,0	50,0	3,0	2	30
1,2/3	-	1,2	4,0	50,0	3,0	2	30
1,4/3	-	1,4	4,0	50,0	3,0	2	30

K201033	K201034	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
1,5/6	1,5	1,5	3,0	54,0	6,0	2	30
1,5/3	-	1,5	4,0	50,0	3,0	2	30
1,6/3	-	1,6	4,0	50,0	3,0	2	30
1,8/3	-	1,8	5,0	50,0	3,0	2	30
2/6	2	2,0	4,0	54,0	6,0	2	30
2/3	-	2,0	5,0	50,0	3,0	2	30
2,5/3	-	2,5	6,0	50,0	3,0	2	30
3/6	3	3,0	6,0	54,0	6,0	2	30
4/6	4	4,0	7,0	54,0	6,0	2	30
5/6	5	5,0	8,0	54,0	6,0	2	30
6/6	6	6,0	10,0	54,0	6,0	2	30
8/8	8	8,0	12,0	59,0	8,0	2	30
10/10	10	10,0	13,0	67,0	10,0	2	30
12/12	12	12,0	16,0	74,0	12,0	2	30
14/14	14	14,0	16,0	75,0	14,0	2	30
16/16	16	16,0	20,0	83,0	16,0	2	30
18/18	18	18,0	20,0	85,0	18,0	2	30
20/20	20	20,0	25,0	93,0	20,0	2	30

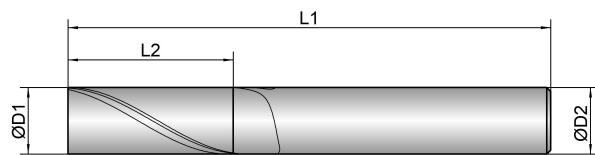
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201051



HB K201052



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201051		K201052		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



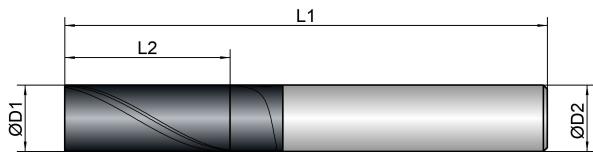
Premium



HA K201053



HB K201054



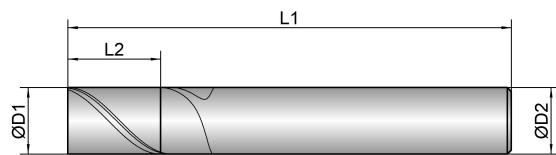
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
100	80	60					80	100	180						

K201053		K201054		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

Kühlung				
Toleranz	e8			
Beschichtung	-			



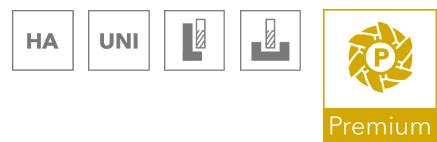
HA K201071



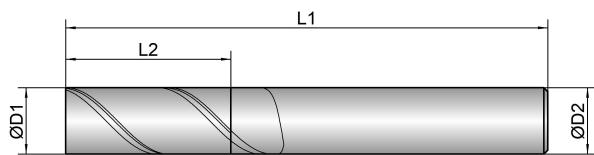
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
60	40	30					45	60	140					CFK / GFK	Grafit	

K201071	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
	2	2,0	4,0	32,0	2,0	2
3	3,0	6,0	32,0	3,0	2	45
4	4,0	7,0	36,0	4,0	2	45
5	5,0	8,0	54,0	6,0	2	45
6	6,0	10,0	54,0	6,0	2	45
7	7,0	12,0	59,0	8,0	2	45
8	8,0	12,0	59,0	8,0	2	45
9	9,0	14,0	67,0	10,0	2	45
10	10,0	14,0	67,0	10,0	2	45
12	12,0	16,0	73,0	12,0	2	45
14	14,0	18,0	75,0	14,0	2	45
16	16,0	20,0	83,0	16,0	2	45
18	18,0	20,0	85,0	18,0	2	45
20	20,0	25,0	93,0	20,0	2	45

Kühlung	
Toleranz	e8
Beschichtung	-



HA K201081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
60	40	30					45	60	140						

K201081	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	
	2	2,0	7,0	32,0	2,0	2
3	3,0	10,0	38,0	3,0	2	45
4	4,0	13,0	40,0	4,0	2	45
5	5,0	15,0	58,0	6,0	2	45
6	6,0	16,0	58,0	6,0	2	45
7	7,0	20,0	70,0	8,0	2	45
8	8,0	22,0	70,0	8,0	2	45
9	9,0	22,0	73,0	10,0	2	45
10	10,0	25,0	73,0	10,0	2	45
12	12,0	28,0	84,0	12,0	2	45
14	14,0	30,0	84,0	14,0	2	45
16	16,0	35,0	93,0	16,0	2	45
18	18,0	35,0	101,0	18,0	2	45
20	20,0	40,0	104,0	20,0	2	45

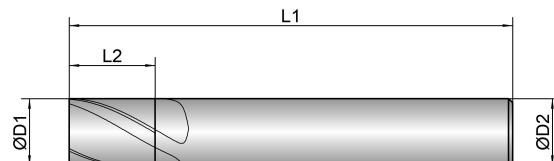
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201161



HB K201162



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
60	40	30					45	60	140							

K201161		K201162		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1,5	1,5			1,5	3,0	54,0	6,0	3	30
2	2			2,0	4,0	54,0	6,0	3	30
3	3			3,0	6,0	54,0	6,0	3	30
4	4			4,0	7,0	54,0	6,0	3	30
5	5			5,0	8,0	54,0	6,0	3	30
6	6			6,0	10,0	54,0	6,0	3	30
8	8			8,0	12,0	59,0	8,0	3	30
10	10			10,0	13,0	67,0	10,0	3	30
12	12			12,0	16,0	74,0	12,0	3	30
14	14			14,0	16,0	75,0	14,0	3	30
16	16			16,0	20,0	83,0	16,0	3	30
18	18			18,0	20,0	85,0	18,0	3	30
20	20			20,0	25,0	93,0	20,0	3	30

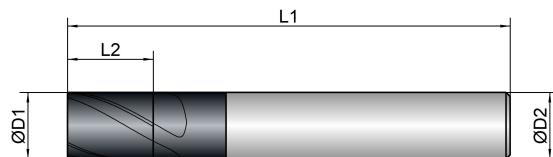
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201163



HB K201164



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

D1 mm \varnothing		L2 mm		L1 mm		D2 mm \varnothing		z #		.	
1,5	1,5			1,5	3,0	54,0	6,0	3	30		
2	2			2,0	4,0	54,0	6,0	3	30		
3	3			3,0	6,0	54,0	6,0	3	30		
4	4			4,0	7,0	54,0	6,0	3	30		
5	5			5,0	8,0	54,0	6,0	3	30		
6	6			6,0	10,0	54,0	6,0	3	30		
8	8			8,0	12,0	59,0	8,0	3	30		
10	10			10,0	13,0	67,0	10,0	3	30		
12	12			12,0	16,0	74,0	12,0	3	30		
14	14			14,0	16,0	75,0	14,0	3	30		
16	16			16,0	20,0	83,0	16,0	3	30		
18	18			18,0	20,0	85,0	18,0	3	30		
20	20			20,0	25,0	93,0	20,0	3	30		



Toleranz e8

Premium

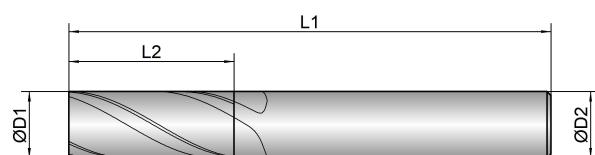
Beschichtung -



HA K201181



HB K201182



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201181		K201182		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1	1			1,0	4,0	58,0	6,0	3	30
1,5	1,5			1,5	6,0	58,0	6,0	3	30
2	2			2,0	7,0	58,0	6,0	3	30
3	3			3,0	10,0	58,0	6,0	3	30
4	4			4,0	13,0	58,0	6,0	3	30
5	5			5,0	15,0	58,0	6,0	3	30
6	6			6,0	16,0	58,0	6,0	3	30
8	8			8,0	22,0	70,0	8,0	3	30
10	10			10,0	25,0	73,0	10,0	3	30
12	12			12,0	26,0	84,0	12,0	3	30
14	14			14,0	26,0	84,0	14,0	3	30
16	16			16,0	32,0	93,0	16,0	3	30
18	18			18,0	32,0	93,0	18,0	3	30
20	20			20,0	40,0	104,0	20,0	3	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



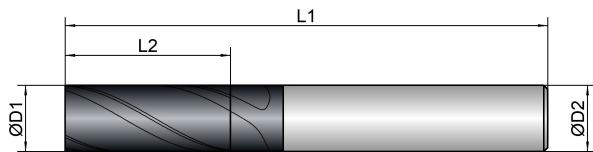
Premium



HA K201183



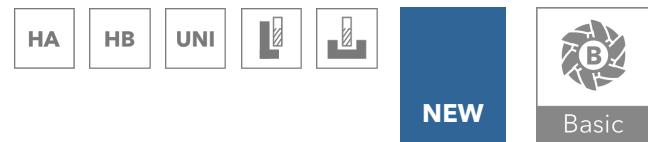
HB K201184



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201183		K201184		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	4,0	58,0	6,0	3	30
1,5	1,5			1,5	6,0	58,0	6,0	3	30
2	2			2,0	7,0	58,0	6,0	3	30
3	3			3,0	10,0	58,0	6,0	3	30
4	4			4,0	13,0	58,0	6,0	3	30
5	5			5,0	15,0	58,0	6,0	3	30
6	6			6,0	16,0	58,0	6,0	3	30
8	8			8,0	22,0	70,0	8,0	3	30
10	10			10,0	25,0	73,0	10,0	3	30
12	12			12,0	26,0	84,0	12,0	3	30
14	14			14,0	26,0	84,0	14,0	3	30
16	16			16,0	32,0	93,0	16,0	3	30
18	18			18,0	32,0	93,0	18,0	3	30
20	20			20,0	40,0	104,0	20,0	3	30

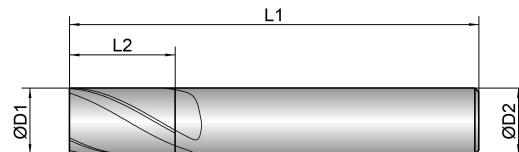
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201251



HB K201252



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
80	55	40					60	70	210							

K201251		K201252		D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	z °
1	1			1,0	2,0	45,0	6,0	3	30
1,2	1,2			1,2	2,0	45,0	6,0	3	30
1,5	1,5			1,5	3,0	45,0	6,0	3	30
1,8	1,8			1,8	3,0	45,0	6,0	3	30
2	2			2,0	4,0	45,0	6,0	3	30
2,5	2,5			2,5	4,0	45,0	6,0	3	30
2,8	2,8			2,8	6,0	45,0	6,0	3	30
3	3			3,0	6,0	45,0	6,0	3	30
3,5	3,5			3,5	6,0	45,0	6,0	3	30
3,8	3,8			3,8	7,0	45,0	6,0	3	30
4	4			4,0	7,0	45,0	6,0	3	30
4,5	4,5			4,5	7,0	45,0	6,0	3	30
4,75	4,75			4,75	8,0	45,0	6,0	3	30

K201251	K201252	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
5	5	5,0	8,0	45,0	6,0	3	30
5,5	5,5	5,5	8,0	45,0	6,0	3	30
5,75	5,75	5,75	10,0	45,0	6,0	3	30
6	6	6,0	10,0	45,0	6,0	3	30
6,75	6,75	6,75	10,0	55,0	8,0	3	30
7	7	7,0	12,0	55,0	8,0	3	30
7,75	7,75	7,75	12,0	55,0	8,0	3	30
8	8	8,0	13,0	55,0	8,0	3	30
8,7	8,7	8,7	14,0	55,0	10,0	3	30
9	9	9,0	14,0	55,0	10,0	3	30
9,7	9,7	9,7	16,0	55,0	10,0	3	30
10	10	10,0	16,0	55,0	10,0	3	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



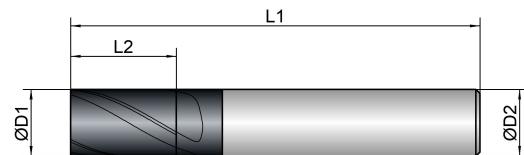
NEW



HA K201253



HB K201254

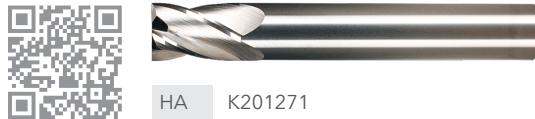
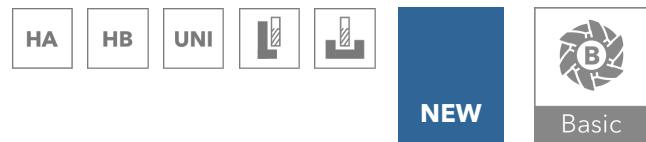


Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe			
110	75	65					85	95	290					CFK / GFK	Grafit	

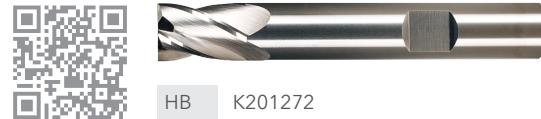
K201253		K201254		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	2,0	45,0	6,0	3	30
1,2	1,2			1,2	2,0	45,0	6,0	3	30
1,5	1,5			1,5	3,0	45,0	6,0	3	30
1,8	1,8			1,8	3,0	45,0	6,0	3	30
2	2			2,0	4,0	45,0	6,0	3	30
2,5	2,5			2,5	4,0	45,0	6,0	3	30
2,8	2,8			2,8	6,0	45,0	6,0	3	30
3	3			3,0	6,0	45,0	6,0	3	30
3,5	3,5			3,5	6,0	45,0	6,0	3	30
3,8	3,8			3,8	7,0	45,0	6,0	3	30
4	4			4,0	7,0	45,0	6,0	3	30
4,5	4,5			4,5	7,0	45,0	6,0	3	30
4,75	4,75			4,75	8,0	45,0	6,0	3	30

K201253	K201254	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
5	5	5,0	8,0	45,0	6,0	3	30
5,5	5,5	5,5	8,0	45,0	6,0	3	30
5,75	5,75	5,75	10,0	45,0	6,0	3	30
6	6	6,0	10,0	45,0	6,0	3	30
6,75	6,75	6,75	10,0	55,0	8,0	3	30
7	7	7,0	12,0	55,0	8,0	3	30
7,75	7,75	7,75	12,0	55,0	8,0	3	30
8	8	8,0	13,0	55,0	8,0	3	30
8,7	8,7	8,7	14,0	55,0	10,0	3	30
9	9	9,0	14,0	55,0	10,0	3	30
9,7	9,7	9,7	16,0	55,0	10,0	3	30
10	10	10,0	16,0	55,0	10,0	3	30

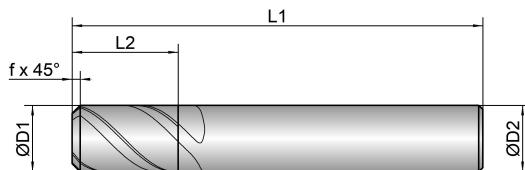
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201271



HB K201272



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	45	30					60	65	200	160						

K201271		K201272		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
1/6	1/6			1,0	2,0	45,0	6,0	3	0,02	45
1,5/6	1,5/6			1,5	3,0	45,0	6,0	3	0,03	45
2/6	2/6			2,0	4,0	45,0	6,0	3	0,03	45
2,5/6	2,5/6			2,5	5,0	45,0	6,0	3	0,03	45
3/6	3/6			3,0	6,0	45,0	6,0	3	0,03	45
3,5/6	3,5/6			3,5	6,0	45,0	6,0	3	0,03	45
4/6	4/6			4,0	7,0	45,0	6,0	3	0,04	45
4,5/6	4,5/6			4,5	8,0	45,0	6,0	3	0,04	45
5/6	5/6			5,0	8,0	45,0	6,0	3	0,04	45
5,5/6	5,5/6			5,5	8,0	45,0	6,0	3	0,04	45
6/6	6/6			6,0	10,0	45,0	6,0	3	0,04	45
8/8	8/8			8,0	13,0	55,0	8,0	3	0,05	45
10/10	10/10			10,0	16,0	55,0	10,0	3	0,05	45

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α

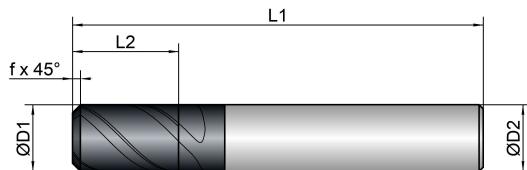
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HA K201273



HB K201274



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
100	70	50					90	85	290	200						

K201273	K201274	D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	 mm	°
1/6	1/6	1,0	2,0	45,0	6,0	3	0,02	45
1,5/6	1,5/6	1,5	3,0	45,0	6,0	3	0,03	45
2/6	2/6	2,0	4,0	45,0	6,0	3	0,03	45
2,5/6	2,5/6	2,5	5,0	45,0	6,0	3	0,03	45
3/6	3/6	3,0	6,0	45,0	6,0	3	0,03	45
3,5/6	3,5/6	3,5	6,0	45,0	6,0	3	0,03	45
4/6	4/6	4,0	7,0	45,0	6,0	3	0,04	45
4,5/6	4,5/6	4,5	8,0	45,0	6,0	3	0,04	45
5/6	5/6	5,0	8,0	45,0	6,0	3	0,04	45
5,5/6	5,5/6	5,5	8,0	45,0	6,0	3	0,04	45
6/6	6/6	6,0	10,0	45,0	6,0	3	0,04	45
8/8	8/8	8,0	13,0	55,0	8,0	3	0,05	45
10/10	10/10	10,0	16,0	55,0	10,0	3	0,05	45

Kühlung	
Toleranz	e8
Beschichtung	-

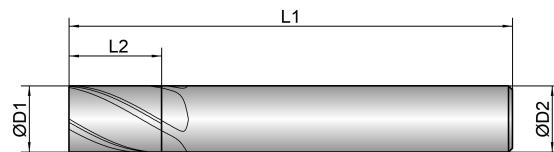
HA HB MTC UNI



HA K201291



HB K201292



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201291		K201292		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1,5/3	-			1,5	3,0	38,0	3,0	4	30
2/6	2			2,0	4,0	54,0	6,0	4	30
2/3	-			2,0	4,0	38,0	3,0	4	30
2,5/3	-			2,5	4,0	38,0	3,0	4	30
3/6	3			3,0	6,0	54,0	6,0	4	30
3/3	-			3,0	6,0	38,0	3,0	4	30
4/6	4			4,0	7,0	54,0	6,0	4	30
5/6	5			5,0	8,0	54,0	6,0	4	30
6/6	6			6,0	10,0	54,0	6,0	4	30
8/8	8			8,0	12,0	59,0	8,0	4	30
10/10	10			10,0	14,0	67,0	10,0	4	30
12/12	12			12,0	16,0	74,0	12,0	4	30
14/14	14			14,0	18,0	75,0	14,0	4	30
16/16	16			16,0	22,0	83,0	16,0	4	30
18/18	18			18,0	20,0	80,0	18,0	4	30
20/20	20			20,0	25,0	93,0	20,0	4	30

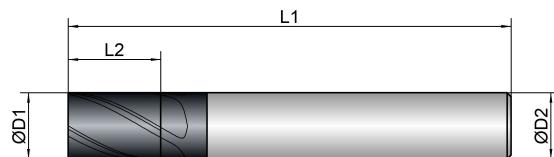
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201293



HB K201294



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	190	160					80	160						CFK / GFK	Grafit	

K201293		K201294		D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	
1,5/3	-			1,5	3,0	38,0	3,0	4	30
2/6	2			2,0	4,0	54,0	6,0	4	30
2/3	-			2,0	4,0	38,0	3,0	4	30
2,5/3	-			2,5	4,0	38,0	3,0	4	30
3/6	3			3,0	6,0	54,0	6,0	4	30
3/3	-			3,0	6,0	38,0	3,0	4	30
4/6	4			4,0	7,0	54,0	6,0	4	30
5/6	5			5,0	8,0	54,0	6,0	4	30
6/6	6			6,0	10,0	54,0	6,0	4	30
8/8	8			8,0	12,0	59,0	8,0	4	30
10/10	10			10,0	14,0	67,0	10,0	4	30
12/12	12			12,0	16,0	74,0	12,0	4	30
14/14	14			14,0	18,0	75,0	14,0	4	30
16/16	16			16,0	22,0	83,0	16,0	4	30
18/18	18			18,0	20,0	80,0	18,0	4	30
20/20	20			20,0	25,0	93,0	20,0	4	30

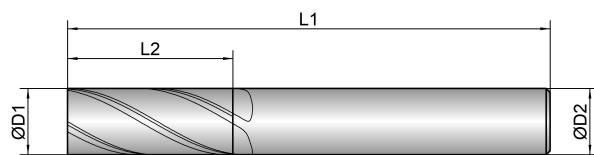
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201311



HB K201312



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201311		K201312		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
2/6	2			2,0	7,0	58,0	6,0	4	30
2/2	-			2,0	7,0	38,0	2,0	4	30
3/6	3			3,0	10,0	58,0	6,0	4	30
3/3	-			3,0	10,0	38,0	3,0	4	30
4/6	4			4,0	13,0	58,0	6,0	4	30
4/4	-			4,0	13,0	50,0	4,0	4	30
5/6	5			5,0	15,0	58,0	6,0	4	30
5/5	-			5,0	15,0	50,0	5,0	4	30
6/6	6			6,0	16,0	58,0	6,0	4	30
7/8	7			7,0	19,0	64,0	8,0	4	30
8/8	8			8,0	22,0	70,0	8,0	4	30
9/10	9			9,0	23,0	73,0	10,0	4	30
10/10	10			10,0	25,0	73,0	10,0	4	30
11/12	11			11,0	26,0	84,0	12,0	4	30
12/12	12			12,0	28,0	84,0	12,0	4	30
14/14	14			14,0	30,0	84,0	14,0	4	30
16/16	16			16,0	35,0	93,0	16,0	4	30
18/18	18			18,0	35,0	93,0	18,0	4	30
20/20	20			20,0	40,0	104,0	20,0	4	30

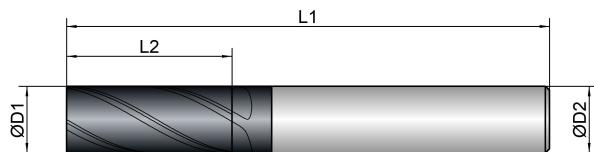
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201313



HB K201314



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201313		K201314		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
2/6	2			2,0	7,0	58,0	6,0	4	30
2/2	-			2,0	7,0	38,0	2,0	4	30
3/6	3			3,0	10,0	58,0	6,0	4	30
3/3	-			3,0	10,0	38,0	3,0	4	30
4/6	4			4,0	13,0	58,0	6,0	4	30
4/4	-			4,0	13,0	50,0	4,0	4	30
5/6	5			5,0	15,0	58,0	6,0	4	30
5/5	-			5,0	15,0	50,0	5,0	4	30
6/6	6			6,0	16,0	58,0	6,0	4	30
7/8	7			7,0	19,0	64,0	8,0	4	30
8/8	8			8,0	22,0	70,0	8,0	4	30
9/10	9			9,0	23,0	73,0	10,0	4	30
10/10	10			10,0	25,0	73,0	10,0	4	30
11/12	11			11,0	26,0	84,0	12,0	4	30
12/12	12			12,0	28,0	84,0	12,0	4	30
14/14	14			14,0	30,0	84,0	14,0	4	30
16/16	16			16,0	35,0	93,0	16,0	4	30
18/18	18			18,0	35,0	93,0	18,0	4	30
20/20	20			20,0	40,0	104,0	20,0	4	30



Toleranz e8

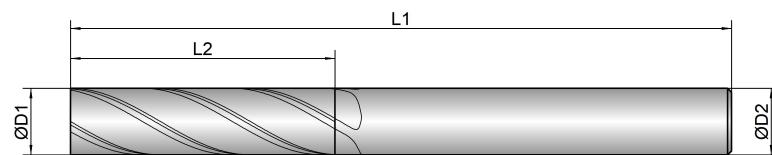
Beschichtung -



HA K201341



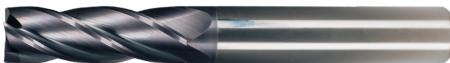
HB K201342



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
45	35	25					35	55	110					CFK / GFK	Grafit

K201341	K201342	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
3X16	-	3,0	16,0	75,0	3,0	4	30
4X16	-	4,0	16,0	75,0	4,0	4	30
4X20	-	4,0	20,0	100,0	4,0	4	30
5X20	-	5,0	20,0	75,0	5,0	4	30
5X25	-	5,0	25,0	100,0	5,0	4	30
6X24	6X24	6,0	24,0	80,0	6,0	4	30
6X30	6X30	6,0	30,0	100,0	6,0	4	30
8X32	8X32	8,0	32,0	100,0	8,0	4	30
8X40	8X40	8,0	40,0	120,0	8,0	4	30
10X40	10X40	10,0	40,0	100,0	10,0	4	30
10X50	10X50	10,0	50,0	120,0	10,0	4	30
12X48	12X48	12,0	48,0	120,0	12,0	4	30
12X60	12X60	12,0	60,0	150,0	12,0	4	30
14X45	14X45	14,0	45,0	100,0	14,0	4	30
14X56	14X56	14,0	56,0	150,0	14,0	4	30
16X50	16X50	16,0	50,0	125,0	16,0	4	30
16X65	16X65	16,0	65,0	150,0	16,0	4	30
18X55	18X55	18,0	55,0	130,0	18,0	4	30
18X72	18X72	18,0	72,0	150,0	18,0	4	30
20X60	20X60	20,0	60,0	135,0	20,0	4	30
20X80	20X80	20,0	80,0	150,0	20,0	4	30
25X75	25X75	25,0	75,0	150,0	25,0	4	30

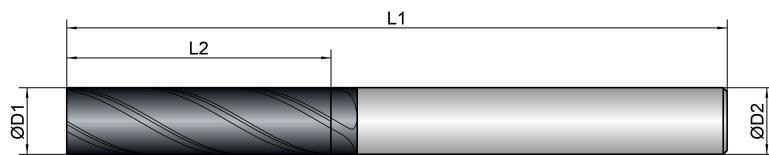
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201343



HB K201344



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
90	75	65					45								30

K201343		K201344		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	z °
3X16	-			3,0	16,0	75,0	3,0	4	30
4X16	-			4,0	16,0	75,0	4,0	4	30
4X20	-			4,0	20,0	100,0	4,0	4	30
5X20	-			5,0	20,0	75,0	5,0	4	30
5X25	-			5,0	25,0	100,0	5,0	4	30
6X24	6X24			6,0	24,0	80,0	6,0	4	30
6X30	6X30			6,0	30,0	100,0	6,0	4	30
8X32	8X32			8,0	32,0	100,0	8,0	4	30
8X40	8X40			8,0	40,0	120,0	8,0	4	30
10X40	10X40			10,0	40,0	100,0	10,0	4	30
10X50	10X50			10,0	50,0	120,0	10,0	4	30
12X48	12X48			12,0	48,0	120,0	12,0	4	30
12X60	12X60			12,0	60,0	150,0	12,0	4	30
14X45	14X45			14,0	45,0	100,0	14,0	4	30
14X56	14X56			14,0	56,0	150,0	14,0	4	30
16X50	16X50			16,0	50,0	125,0	16,0	4	30
16X65	16X65			16,0	65,0	150,0	16,0	4	30
18X55	18X55			18,0	55,0	130,0	18,0	4	30
18X72	18X72			18,0	72,0	150,0	18,0	4	30
20X60	20X60			20,0	60,0	135,0	20,0	4	30
20X80	20X80			20,0	80,0	150,0	20,0	4	30
25X75	25X75			25,0	75,0	150,0	25,0	4	30



Kühlung

Toleranz

e8

Beschichtung

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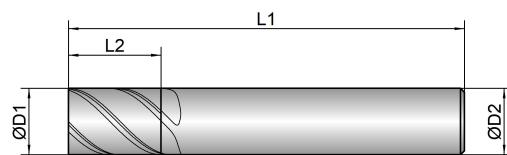
Premium



HA K201401



HB K201402



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201401		K201402		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	°
3	3			3,0	6,0	54,0	6,0	4	45
4	4			4,0	7,0	54,0	6,0	4	45
5	5			5,0	8,0	54,0	6,0	4	45
6	6			6,0	10,0	54,0	6,0	4	45
8	8			8,0	12,0	59,0	8,0	4	45
10	10			10,0	14,0	60,0	10,0	4	45
12	12			12,0	16,0	70,0	12,0	4	45
14	14			14,0	18,0	70,0	14,0	4	45
16	16			16,0	20,0	80,0	16,0	4	45
18	18			18,0	20,0	80,0	18,0	4	45
20	20			20,0	25,0	85,0	20,0	4	45

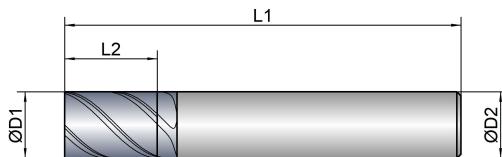
Kühlung	
Toleranz	e8
Beschichtung	TiCn- α



HA K201403



HB K201404



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

D1 mm \varnothing		L2 mm	L1 mm	D2 mm \varnothing	z #	°
K201403	K201404	3,0	6,0	54,0	6,0	45
3	3	4,0	7,0	54,0	6,0	45
4	4	5,0	8,0	54,0	6,0	45
5	5	6,0	10,0	54,0	6,0	45
6	6	8,0	12,0	59,0	8,0	45
8	8	10,0	14,0	60,0	10,0	45
10	10	12,0	16,0	70,0	12,0	45
12	12	14,0	18,0	70,0	14,0	45
14	14	16,0	20,0	80,0	16,0	45
16	16	18,0	20,0	80,0	18,0	45
18	18	20,0	25,0	85,0	20,0	45
20	20					



Toleranz	e8
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Premium

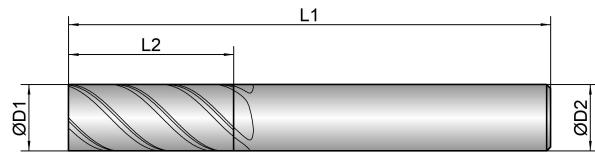
Beschichtung	-
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HA K201411



HB K201412



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201411		K201412		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
3	3			3,0	10,0	58,0	6,0	4	45
4	4			4,0	13,0	58,0	6,0	4	45
5	5			5,0	15,0	58,0	6,0	4	45
6	6			6,0	16,0	58,0	6,0	4	45
8	8			8,0	22,0	64,0	8,0	4	45
10	10			10,0	25,0	73,0	10,0	4	45
12	12			12,0	28,0	84,0	12,0	4	45
14	14			14,0	30,0	84,0	14,0	4	45
16	16			16,0	36,0	93,0	16,0	4	45
18	18			18,0	36,0	93,0	18,0	4	45
20	20			20,0	41,0	104,0	20,0	4	45
25	25			25,0	50,0	125,0	25,0	4	45

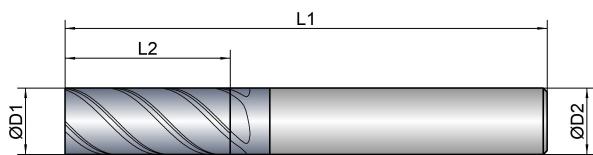
Kühlung	
Toleranz	e8
Beschichtung	TiCn- α



HA K201413



HB K201414



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201413		K201414		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	
3	3			3,0	10,0	58,0	6,0	4	45
4	4			4,0	13,0	58,0	6,0	4	45
5	5			5,0	15,0	58,0	6,0	4	45
6	6			6,0	16,0	58,0	6,0	4	45
8	8			8,0	22,0	64,0	8,0	4	45
10	10			10,0	25,0	73,0	10,0	4	45
12	12			12,0	28,0	84,0	12,0	4	45
14	14			14,0	30,0	84,0	14,0	4	45
16	16			16,0	36,0	93,0	16,0	4	45
18	18			18,0	36,0	93,0	18,0	4	45
20	20			20,0	41,0	104,0	20,0	4	45
25	25			25,0	50,0	125,0	25,0	4	45

Kühlung


HA HPC L U V

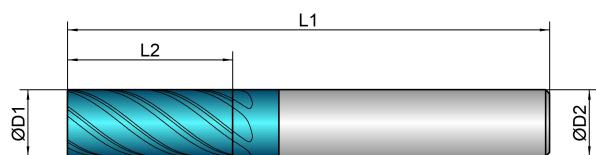

Toleranz

e8

Beschichtung

TiSiN- α 

HA K201523



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
180	175	150	105	90										CFK / GFK	Grafit	

K201523	D1	L2	L1	D2	z	
	mm \varnothing	mm	mm	mm \varnothing	#	°
2X8	2,0	8,0	58,0	6,0	4	37,5
3X12	3,0	12,0	58,0	6,0	4	37,5
4X13	4,0	13,0	58,0	6,0	4	37,5
5X15	5,0	15,0	58,0	6,0	6	37,5
6X16	6,0	16,0	58,0	6,0	6	37,5
8X22	8,0	22,0	70,0	8,0	6	37,5
10X25	10,0	25,0	73,0	10,0	6	37,5
12X28	12,0	28,0	84,0	12,0	6	37,5
14X30	14,0	30,0	84,0	14,0	6	37,5
16X36	16,0	36,0	93,0	16,0	8	37,5
18X36	18,0	36,0	93,0	18,0	10	37,5
20X41	20,0	41,0	104,0	20,0	10	37,5

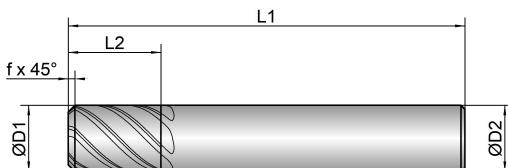
Kühlung				
Toleranz	e8			
Beschichtung	-			



HA K201581



HB K201582



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
70	40	30					45	60	150						

K201581		K201582		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	8,0	54,0	6,0	6	0,02	45
6	6			6,0	10,0	54,0	6,0	6	0,03	45
7	7			7,0	12,0	59,0	8,0	6	0,04	45
8	8			8,0	12,0	59,0	8,0	6	0,04	45
9	9			9,0	14,0	60,0	10,0	6	0,04	45
10	10			10,0	14,0	60,0	10,0	6	0,05	45
12	12			12,0	16,0	70,0	12,0	6	0,05	45
14	14			14,0	18,0	70,0	14,0	6	0,06	45
16	16			16,0	20,0	80,0	16,0	6	0,06	45
18	18			18,0	20,0	80,0	18,0	8	0,07	45
20	20			20,0	25,0	85,0	20,0	8	0,07	45



Kühlung

Toleranz

e8

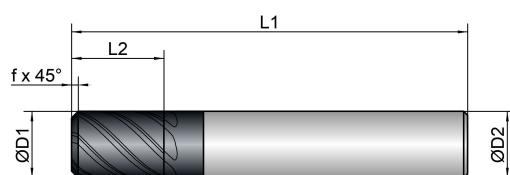
Beschichtung

TiAlN- α 

HA K201583



HB K201584



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
170	100	90	70				95	125	600							

K201583		K201584		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
5	5			5,0	8,0	54,0	6,0	6	0,02	45
6	6			6,0	10,0	54,0	6,0	6	0,03	45
7	7			7,0	12,0	59,0	8,0	6	0,04	45
8	8			8,0	12,0	59,0	8,0	6	0,04	45
9	9			9,0	14,0	60,0	10,0	6	0,04	45
10	10			10,0	14,0	60,0	10,0	6	0,05	45
12	12			12,0	16,0	70,0	12,0	6	0,05	45
14	14			14,0	18,0	70,0	14,0	6	0,06	45
16	16			16,0	20,0	80,0	16,0	6	0,06	45
18	18			18,0	20,0	80,0	18,0	8	0,07	45
20	20			20,0	25,0	85,0	20,0	8	0,07	45

Kühlung				
Toleranz	e8			
Beschichtung	-			

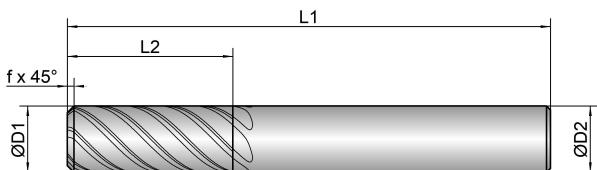
Premium				



HA K201591



HB K201592



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					40	60	140						

K201591		K201592		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	13,0	58,0	6,0	6	0,02	45
6	6			6,0	16,0	58,0	6,0	6	0,03	45
7	7			7,0	22,0	70,0	8,0	6	0,04	45
8	8			8,0	22,0	70,0	8,0	6	0,04	45
9	9			9,0	25,0	73,0	10,0	6	0,04	45
10	10			10,0	25,0	73,0	10,0	6	0,05	45
12	12			12,0	28,0	84,0	12,0	6	0,05	45
14	14			14,0	30,0	84,0	14,0	6	0,06	45
16	16			16,0	35,0	93,0	16,0	6	0,06	45
18	18			18,0	35,0	93,0	18,0	8	0,07	45
20	20			20,0	40,0	100,0	20,0	8	0,07	45
25	25			25,0	55,0	125,0	25,0	8	0,08	45



Toleranz

e8

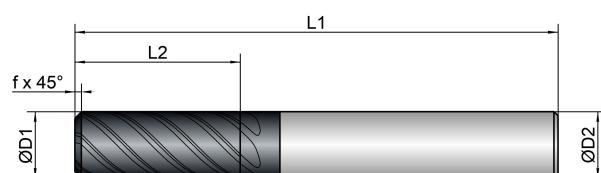
Beschichtung

TiAlN- α 

HA K201593



HB K201594



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
175	100	90	65				95	125	600							

K201593		K201594		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
5	5			5,0	13,0	58,0	6,0	6	0,02	45
6	6			6,0	16,0	58,0	6,0	6	0,03	45
7	7			7,0	22,0	70,0	8,0	6	0,04	45
8	8			8,0	22,0	70,0	8,0	6	0,04	45
9	9			9,0	25,0	73,0	10,0	6	0,04	45
10	10			10,0	25,0	73,0	10,0	6	0,05	45
12	12			12,0	28,0	84,0	12,0	6	0,05	45
14	14			14,0	30,0	84,0	14,0	6	0,06	45
16	16			16,0	35,0	93,0	16,0	6	0,06	45
18	18			18,0	35,0	93,0	18,0	8	0,07	45
20	20			20,0	40,0	100,0	20,0	8	0,07	45
25	25			25,0	55,0	125,0	25,0	8	0,08	45

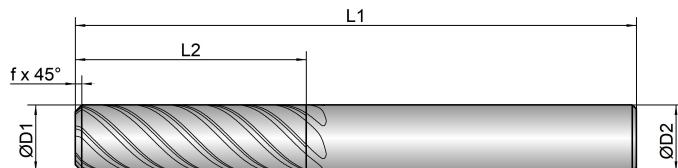
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201601



HB K201602



Stahl			Gehärteter Stahl						INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC					Alu	Kupfer	Mg	Kunststoffe			
45	35	25					35	55	110						CFK / GFK	Grafit	

K201601		K201602		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
6X21	6X21			6,0	21,0	65,0	6,0	6	0,03	45
7X25	7X25			7,0	25,0	75,0	8,0	6	0,04	45
8X28	8X28			8,0	28,0	75,0	8,0	6	0,04	45
9X30	9X30			9,0	30,0	85,0	10,0	6	0,04	45
10X35	10X35			10,0	35,0	85,0	10,0	6	0,05	45
12X45	12X45			12,0	45,0	100,0	12,0	6	0,05	45
16X50	16X50			16,0	50,0	110,0	16,0	6	0,06	45
16X65	16X65			16,0	65,0	125,0	16,0	6	0,06	45
20X55	20X55			20,0	55,0	115,0	20,0	8	0,07	45
20X70	20X70			20,0	70,0	135,0	20,0	8	0,07	45
25X75	25X75			25,0	75,0	150,0	25,0	8	0,08	45
32X125	32X125			32,0	125,0	215,0	32,0	9	0,10	45



Toleranz e8

Beschichtung TiAlN- α

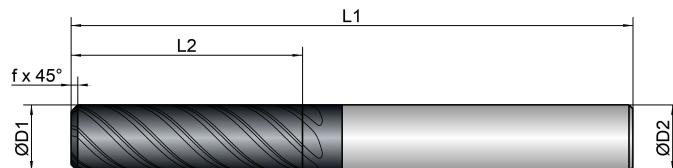
Premium



HA K201603



HB K201604



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
110	95	85	60				80	170								

		D1 	L2 	L1 	D2 	z 			
		mm Ø	mm	mm	mm Ø	#	45° mm	°	
K201603	K201604	6,0	21,0	65,0	6,0	6	0,03	45	
6X21	6X21								
7X25	7X25	7,0	25,0	75,0	8,0	6	0,04	45	
8X28	8X28	8,0	28,0	75,0	8,0	6	0,04	45	
9X30	9X30	9,0	30,0	85,0	10,0	6	0,04	45	
10X35	10X35	10,0	35,0	85,0	10,0	6	0,05	45	
12X45	12X45	12,0	45,0	100,0	12,0	6	0,05	45	
16X50	16X50	16,0	50,0	110,0	16,0	6	0,06	45	
16X65	16X65	16,0	65,0	125,0	16,0	6	0,06	45	
20X55	20X55	20,0	55,0	115,0	20,0	8	0,07	45	
20X70	20X70	20,0	70,0	135,0	20,0	8	0,07	45	
25X75	25X75	25,0	75,0	150,0	25,0	8	0,08	45	
32X125	32X125	32,0	125,0	215,0	32,0	9	0,10	45	

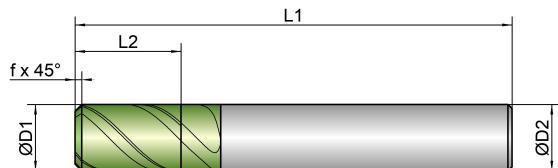
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201673



HB K201674



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
100	70	50					90	85	290	200						

K201673		K201674		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
1	-			1,0	2,0	38,0	3,0	3	0,02	45
1,2	-			1,2	2,0	38,0	3,0	3	0,02	45
1,5	-			1,5	3,0	38,0	3,0	3	0,025	45
2	2			2,0	4,0	50,0	6,0	3	0,03	45
2,5	2,5			2,5	5,0	50,0	6,0	3	0,03	45
3	3			3,0	6,0	50,0	6,0	3	0,03	45
4	4			4,0	7,0	50,0	6,0	3	0,04	45
4,5	4,5			4,5	8,0	50,0	6,0	3	0,04	45
5	5			5,0	8,0	50,0	6,0	3	0,04	45
5,5	5,5			5,5	8,0	50,0	6,0	3	0,04	45
5,75	5,75			5,75	10,0	50,0	6,0	3	0,04	45
6	6			6,0	10,0	50,0	6,0	3	0,04	45
7	7			7,0	12,0	55,0	8,0	3	0,045	45
7,75	7,75			7,75	12,0	55,0	8,0	3	0,05	45
8	8			8,0	13,0	55,0	8,0	3	0,05	45
9	9			9,0	14,0	66,0	10,0	3	0,05	45
9,7	9,7			9,7	16,0	66,0	10,0	3	0,05	45
10	10			10,0	16,0	66,0	10,0	3	0,05	45
12	12			12,0	16,0	73,0	12,0	3	0,05	45
14	14			14,0	16,0	83,0	14,0	3	0,06	45
16	16			16,0	18,0	80,0	16,0	3	0,06	45



Kühlung



Toleranz

e8

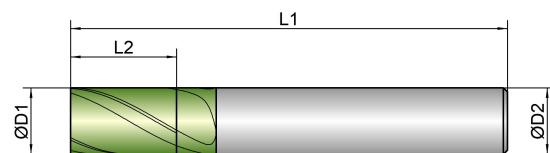
Beschichtung

TiAlN- α 

HA K201677



HB K201678

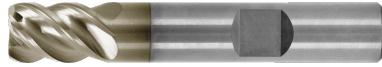


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	75	65					85	95	290					CFK / GFK	Grafit

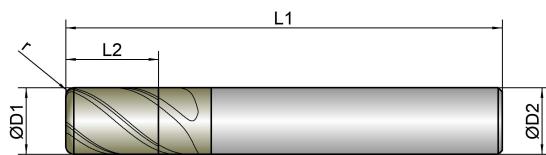
K201677		K201678		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	-			1,0	2,0	38,0	3,0	3	30
1,2	-			1,2	2,0	38,0	3,0	3	30
1,5	-			1,5	3,0	38,0	3,0	3	30
2	2			2,0	4,0	50,0	6,0	3	30
2,5	2,5			2,5	5,0	50,0	6,0	3	30
3	3			3,0	6,0	50,0	6,0	3	30
4	4			4,0	7,0	50,0	6,0	3	30
4,5	4,5			4,5	8,0	50,0	6,0	3	30
5	5			5,0	8,0	50,0	6,0	3	30
5,5	5,5			5,5	8,0	50,0	6,0	3	30
5,75	5,75			5,75	10,0	50,0	6,0	3	30
6	6			6,0	10,0	50,0	6,0	3	30
7	7			7,0	12,0	55,0	8,0	3	30
7,75	7,75			7,75	12,0	55,0	8,0	3	30
8	8			8,0	13,0	55,0	8,0	3	30
9	9			9,0	14,0	66,0	10,0	3	30
9,7	9,7			9,7	16,0	66,0	10,0	3	30
10	10			10,0	16,0	66,0	10,0	3	30
12	12			12,0	16,0	73,0	12,0	3	30
14	14			14,0	16,0	83,0	14,0	3	30
16	16			16,0	18,0	80,0	16,0	3	30

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

NEW



HB K201719



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
230	185	150					75	260								

K201719		D1 	L2 	L1 	D2 	z 	r 	°
		mm Ø	mm	mm	mm Ø	#	mm	°
3		3,0	6,0	54,0	6,0	4	0,10	40
4		4,0	8,0	54,0	6,0	4	0,10	40
5		5,0	9,0	54,0	6,0	4	0,20	40
6		6,0	10,0	54,0	6,0	4	0,20	40
8		8,0	12,0	58,0	8,0	4	0,20	40
10		10,0	14,0	66,0	10,0	4	0,20	40
12		12,0	16,0	73,0	12,0	4	0,20	40
16		16,0	22,0	82,0	16,0	4	0,30	40
20		20,0	26,0	92,0	20,0	4	0,30	40

Kühlung



HB ETC HPC MTC

NEW

Toleranz

e8

UNI ≠



Beschichtung

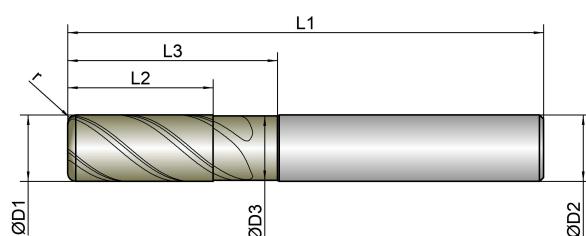
TiSiN- α

HPC

Expert



HB K201724



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
230	185	150					260	75							

K201724	D1 mm	D3 mm	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	o
	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
3	3,0	2,8	8,0	13,0	57,0	6,0	4	0,10	40
4	4,0	3,8	11,0	17,0	57,0	6,0	4	0,10	40
5	5,0	4,8	13,0	20,0	57,0	6,0	4	0,20	40
6	6,0	5,8	13,0	20,0	57,0	6,0	4	0,20	40
8	8,0	7,7	19,0	25,0	63,0	8,0	4	0,20	40
10	10,0	9,7	22,0	32,0	72,0	10,0	4	0,20	40
12	12,0	11,6	26,0	38,0	83,0	12,0	4	0,20	40
16	16,0	15,5	32,0	44,0	92,0	16,0	4	0,30	40
20	20,0	19,5	41,0	54,0	104,0	20,0	4	0,30	40

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

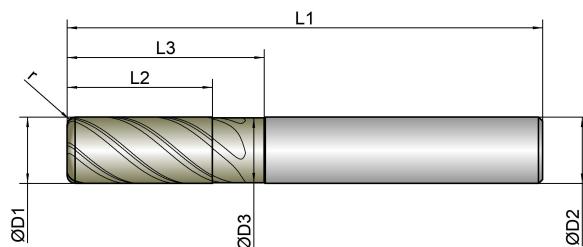
HB **ETC** **HPC** **MTC** **UNI** **≠**

NEW

Expert



HB K201729



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
230	185	150					75	260						CFK / GFK	Grafit

K201729	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
6	6,0	5,8	13,0	19,0	57,0	6,0	5	0,15	40
8	8,0	7,8	19,0	25,0	63,0	8,0	5	0,20	40
10	10,0	9,8	22,0	30,0	72,0	10,0	5	0,20	40
12	12,0	11,8	26,0	36,0	83,0	12,0	5	0,20	40
16	16,0	15,8	32,0	42,0	92,0	16,0	5	0,30	40
20	20,0	19,8	41,0	52,0	104,0	20,0	5	0,30	40

Kühlung



HB **ETC** **UNI** **≠** **L** **W** **2xD**

NEW

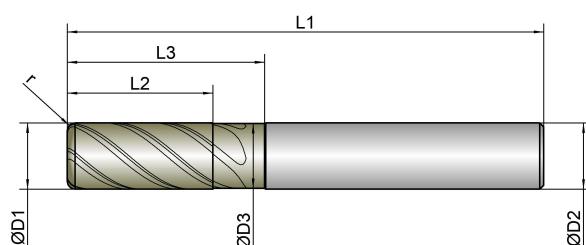
Toleranz

e8

Beschichtung

TiSiN- α 

HB K201734



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
320	240	160					190									

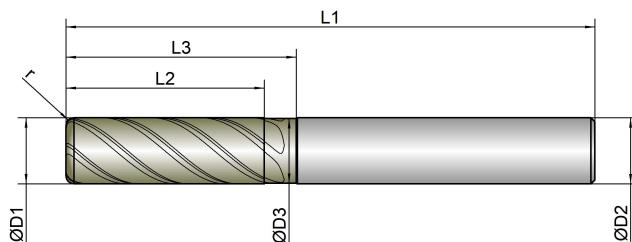
K201734		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
6		6,0	5,8	13,0	19,0	57,0	6,0	5	0,15	40
8		8,0	7,8	19,0	25,0	63,0	8,0	5	0,20	40
10		10,0	9,8	22,0	30,0	72,0	10,0	5	0,20	40
12		12,0	11,8	26,0	36,0	83,0	12,0	5	0,20	40
16		16,0	15,8	32,0	42,0	92,0	16,0	5	0,30	40
20		20,0	19,8	41,0	52,0	104,0	20,0	5	0,30	40

Kühlung				
Toleranz	e8			
Beschichtung	TiSiN- α			

NEW						



HB K201739



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
320	260	140					190								

K201739	D1	D3	L2	L3	L1	D2	z	r	
	mm \varnothing	mm \varnothing	mm	mm	mm	mm \varnothing	#	mm	°
6	6,0	5,8	18,0	25,0	65,0	6,0	5	0,15	40
8	8,0	7,8	24,0	30,0	70,0	8,0	5	0,20	40
10	10,0	9,8	30,0	35,0	80,0	10,0	5	0,20	40
12	12,0	11,8	36,0	45,0	93,0	12,0	5	0,20	40
16	16,0	15,8	48,0	55,0	110,0	16,0	5	0,30	40
20	20,0	19,8	60,0	70,0	125,0	20,0	5	0,30	40

Kühlung



HB **ETC** **UNI** **≠** **L** **l** **4xD**

NEW

Expert

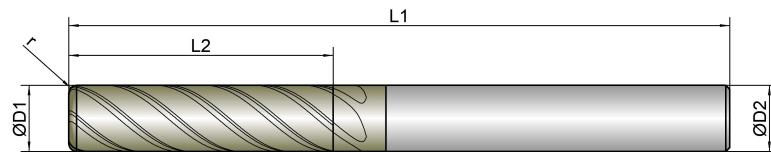
Toleranz

e8

Beschichtung

TiSiN- α 

HB K201744



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
310	230	150					180							CFK / GFK	Grafit

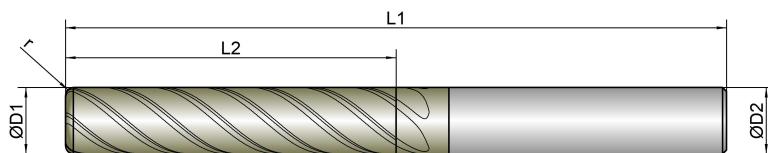
K201744		D1 	L2 	L1 	D2 	z 	r 	°
6		6,0	24,0	68,0	6,0	5	0,15	40
8		8,0	32,0	75,0	8,0	5	0,20	40
10		10,0	40,0	90,0	10,0	5	0,20	40
12		12,0	48,0	100,0	12,0	5	0,20	40
16		16,0	64,0	125,0	16,0	5	0,30	40
20		20,0	80,0	150,0	20,0	5	0,30	40

Kühlung				
Toleranz	e8			
Beschichtung	TiSiN-α			

NEW						



HB K201749



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
290	210	120					150							CFK / GFK	Grafit	

K201749	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm R	ø
8	8,0	40,0	90,0	8,0	5	0,20	40
10	10,0	50,0	100,0	10,0	5	0,20	40
12	12,0	60,0	119,0	12,0	5	0,20	40
16	16,0	80,0	136,0	16,0	5	0,30	40
20	20,0	100,0	160,0	20,0	5	0,30	40

Kühlung



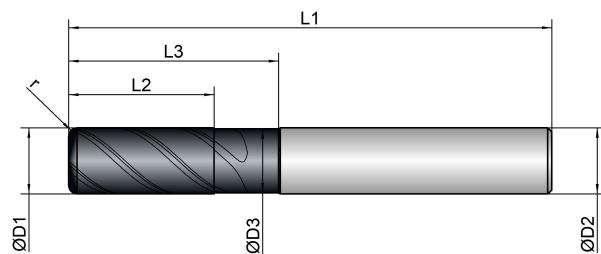
Toleranz

e8

Beschichtung

TiSiN- α
HB ETC HPC MTC
 \neq L L L


HB K201784



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
185	175						100									

K201784		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
3/0,1		3,0	2,8	8,0	20,0	58,0	6,0	4	0,10	42,5
4/0,2		4,0	3,8	11,0	20,0	58,0	6,0	4	0,20	42,5
5/0,2		5,0	4,8	13,0	20,0	58,0	6,0	4	0,20	42,5
6/0,2		6,0	5,8	13,0	20,0	58,0	6,0	4	0,20	42,5
8/0,3		8,0	7,7	19,0	25,0	63,0	8,0	4	0,30	42,5
10/0,3		10,0	9,7	22,0	32,0	73,0	10,0	4	0,30	42,5
12/0,3		12,0	11,6	26,0	38,0	84,0	12,0	4	0,30	42,5
16/0,5		16,0	15,5	32,0	44,0	92,0	16,0	4	0,50	42,5
20/0,5		20,0	19,5	38,0	54,0	104,0	20,0	4	0,50	42,5
25/0,5		25,0	24,5	45,0	65,0	125,0	25,0	4	0,50	42,5

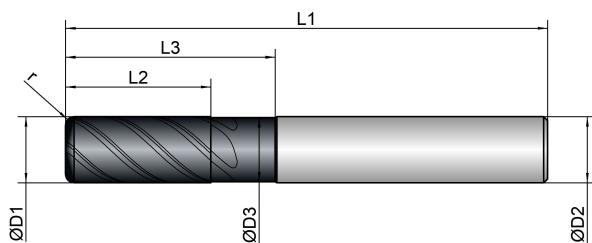
Kühlung		
Toleranz	e8	
Beschichtung	TiSiN-α	



Expert



HB K201789



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
185	175						115								

K201789	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
6/0,2	6,0	5,8	13,0	20,0	58,0	6,0	5	0,20	42,5
8/0,3	8,0	7,7	19,0	25,0	63,0	8,0	5	0,30	42,5
10/0,3	10,0	9,7	22,0	32,0	73,0	10,0	5	0,30	42,5
12/0,3	12,0	11,6	26,0	38,0	84,0	12,0	5	0,30	42,5
16/0,5	16,0	15,5	32,0	44,0	92,0	16,0	5	0,50	42,5
20/0,5	20,0	19,5	38,0	54,0	104,0	20,0	5	0,50	42,5
25/0,5	25,0	24,5	45,0	65,0	125,0	25,0	5	0,50	42,5

Kühlung



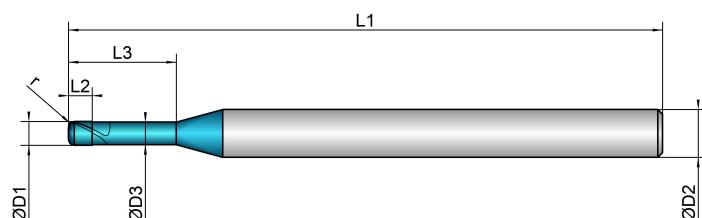

Toleranz

0-0,01

Beschichtung

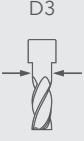
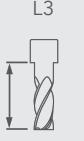
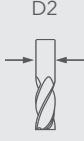
TiSiN- α 

HA K202082



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

K202082	D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	
	0,4X1	0,4	0,38	0,4	1,0	50,0	4,0	2	0,10
0,4X1,5	0,4	0,38	0,4	1,5	50,0	4,0	2	0,10	30
0,4X2	0,4	0,38	0,4	2,0	50,0	4,0	2	0,10	30
0,4X3	0,4	0,38	0,4	3,0	50,0	4,0	2	0,10	30
0,4X4	0,4	0,38	0,4	4,0	50,0	4,0	2	0,10	30
0,5X1	0,5	0,48	0,5	1,0	50,0	4,0	2	0,10	30
0,5X2	0,5	0,48	0,5	2,0	50,0	4,0	2	0,10	30
0,5X3	0,5	0,48	0,5	3,0	50,0	4,0	2	0,10	30
0,5X4	0,5	0,48	0,5	4,0	50,0	4,0	2	0,10	30
0,5X5	0,5	0,48	0,5	5,0	50,0	4,0	2	0,10	30
0,5X6	0,5	0,48	0,5	6,0	50,0	4,0	2	0,10	30
0,6X2	0,6	0,58	0,6	2,0	50,0	4,0	2	0,10	30
0,6X3	0,6	0,58	0,6	3,0	50,0	4,0	2	0,10	30
0,6X4	0,6	0,58	0,6	4,0	50,0	4,0	2	0,10	30

									
K202082	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
0,6X6	0,6	0,58	0,6	6,0	50,0	4,0	2	0,10	30
0,6X8	0,6	0,58	0,6	8,0	50,0	4,0	2	0,10	30
0,7X4	0,7	0,68	0,7	4,0	50,0	4,0	2	0,10	30
0,7X6	0,7	0,68	0,7	6,0	50,0	4,0	2	0,10	30
0,8X4	0,8	0,78	0,8	4,0	50,0	4,0	2	0,10	30
0,8X6	0,8	0,78	0,8	6,0	50,0	4,0	2	0,10	30
1X2	1,0	0,95	1,0	2,0	50,0	4,0	2	0,10	30
1X4	1,0	0,95	1,0	4,0	50,0	4,0	2	0,10	30
1X6	1,0	0,95	1,0	6,0	50,0	4,0	2	0,10	30
1X8	1,0	0,95	1,0	8,0	50,0	4,0	2	0,10	30
1X10	1,0	0,95	1,0	10,0	50,0	4,0	2	0,10	30
1X12	1,0	0,95	1,0	12,0	54,0	4,0	2	0,10	30
1X16	1,0	0,95	1,0	16,0	60,0	4,0	2	0,10	30
1X20	1,0	0,95	1,0	20,0	60,0	4,0	2	0,10	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,10	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,10	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,10	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,10	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,10	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,10	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,10	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,10	30

Kühlung



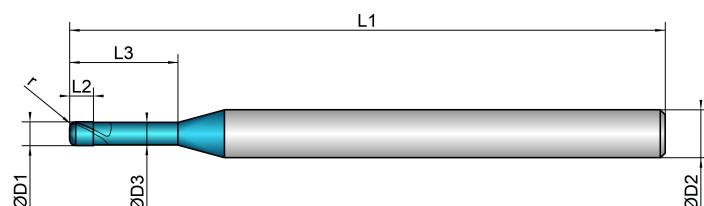

Toleranz

0-0,01

Beschichtung

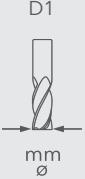
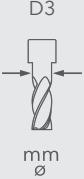
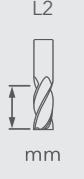
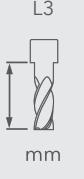
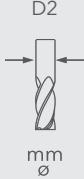
TiSiN- α 

HA K202092



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
225	210	200	125	75	55	40	100		150							

K202092	D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
	0,8X4	0,8	0,78	0,8	4,0	50,0	4,0	2	0,20
0,8X6	0,8	0,78	0,8	6,0	50,0	4,0	2	0,20	30
1X2	1,0	0,95	1,0	2,0	50,0	4,0	2	0,20	30
1X4	1,0	0,95	1,0	4,0	50,0	4,0	2	0,20	30
1X6	1,0	0,95	1,0	6,0	50,0	4,0	2	0,20	30
1X8	1,0	0,95	1,0	8,0	50,0	4,0	2	0,20	30
1X10	1,0	0,95	1,0	10,0	50,0	4,0	2	0,20	30
1X12	1,0	0,95	1,0	12,0	54,0	4,0	2	0,20	30
1X16	1,0	0,95	1,0	16,0	60,0	4,0	2	0,20	30
1X20	1,0	0,95	1,0	20,0	60,0	4,0	2	0,20	30
1,2X6	1,2	1,14	1,2	6,0	50,0	4,0	2	0,20	30
1,2X12	1,2	1,14	1,2	12,0	54,0	4,0	2	0,20	30

									
K202092	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
1,2X20	1,2	1,14	1,2	20,0	60,0	4,0	2	0,20	30
1,5X4	1,5	1,44	1,5	4,0	50,0	4,0	2	0,20	30
1,5X6	1,5	1,44	1,5	6,0	50,0	4,0	2	0,20	30
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,20	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,20	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,20	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,20	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,20	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,20	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,20	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,20	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,20	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,20	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,20	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,20	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,20	30

Kühlung



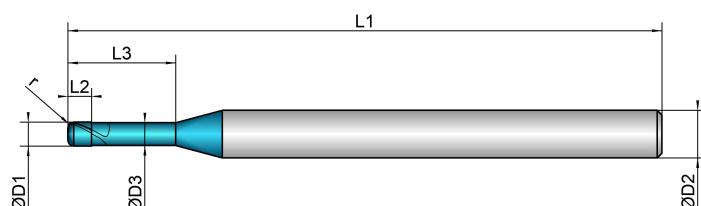

Toleranz

0-0,01

Beschichtung

TiSiN- α 

HA K202102



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

K202102		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	o
1X2		1,0	0,95	1,0	2,0	50,0	4,0	2	0,30	30
1X4		1,0	0,95	1,0	4,0	50,0	4,0	2	0,30	30
1X6		1,0	0,95	1,0	6,0	50,0	4,0	2	0,30	30
1X8		1,0	0,95	1,0	8,0	50,0	4,0	2	0,30	30
1X10		1,0	0,95	1,0	10,0	50,0	4,0	2	0,30	30
1X12		1,0	0,95	1,0	12,0	54,0	4,0	2	0,30	30
1X16		1,0	0,95	1,0	16,0	60,0	4,0	2	0,30	30
1X20		1,0	0,95	1,0	20,0	60,0	4,0	2	0,30	30
1,2X6		1,2	1,14	1,2	6,0	50,0	4,0	2	0,30	30
1,2X12		1,2	1,14	1,2	12,0	54,0	4,0	2	0,30	30
1,2X20		1,2	1,14	1,2	20,0	60,0	4,0	2	0,30	30
1,5X4		1,5	1,44	1,5	4,0	50,0	4,0	2	0,30	30
1,5X6		1,5	1,44	1,5	6,0	50,0	4,0	2	0,30	30

		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202102										
1,5X8		1,5	1,44	1,5	8,0	50,0	4,0	2	0,30	30
1,5X10		1,5	1,44	1,5	10,0	50,0	4,0	2	0,30	30
1,5X12		1,5	1,44	1,5	12,0	54,0	4,0	2	0,30	30
1,5X16		1,5	1,44	1,5	16,0	54,0	4,0	2	0,30	30
1,5X20		1,5	1,44	1,5	20,0	60,0	4,0	2	0,30	30
2X4		2,0	1,91	2,0	4,0	50,0	4,0	2	0,30	30
2X6		2,0	1,91	2,0	6,0	50,0	4,0	2	0,30	30
2X8		2,0	1,91	2,0	8,0	50,0	4,0	2	0,30	30
2X10		2,0	1,91	2,0	10,0	50,0	4,0	2	0,30	30
2X12		2,0	1,91	2,0	12,0	54,0	4,0	2	0,30	30
2X16		2,0	1,91	2,0	16,0	54,0	4,0	2	0,30	30
2X20		2,0	1,91	2,0	20,0	60,0	4,0	2	0,30	30
2X26		2,0	1,91	2,0	26,0	70,0	4,0	2	0,30	30
2,5X10		2,5	2,41	2,5	10,0	50,0	4,0	2	0,30	30
2,5X12		2,5	2,41	2,5	12,0	60,0	4,0	2	0,30	30
2,5X30		2,5	2,41	2,5	30,0	70,0	4,0	2	0,30	30
3X10		3,0	2,92	4,5	10,0	50,0	4,0	2	0,30	30
3X12		3,0	2,92	4,5	12,0	50,0	4,0	2	0,30	30
3X30		3,0	2,92	4,5	30,0	70,0	4,0	2	0,30	30

Kühlung




Toleranz

0-0,01

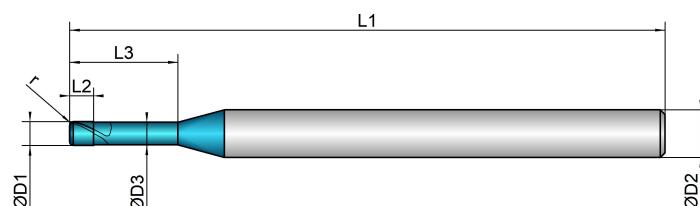
Beschichtung

TiSiN- α

Expert



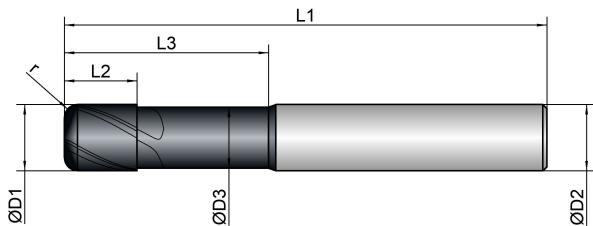
HA K202112



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
225	210	200	125	75	55	40	100		150							

K202112	D1 mm	D3 mm	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	°
	\varnothing	\varnothing	\varnothing	\varnothing	\varnothing	\varnothing	#	R	°
1,5X4	1,5	1,44	1,5	4,0	50,0	4,0	2	0,50	30
1,5X6	1,5	1,44	1,5	6,0	50,0	4,0	2	0,50	30
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,50	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,50	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,50	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,50	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,50	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,50	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,50	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,50	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,50	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,50	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,50	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,50	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,50	30
2,5X10	2,5	2,41	2,5	10,0	50,0	4,0	2	0,50	30
2,5X12	2,5	2,41	2,5	12,0	60,0	4,0	2	0,50	30
2,5X30	2,5	2,41	2,5	30,0	70,0	4,0	2	0,50	30
3X10	3,0	2,92	4,5	10,0	50,0	4,0	2	0,50	30
3X12	3,0	2,92	4,5	12,0	50,0	4,0	2	0,50	30
3X30	3,0	2,92	4,5	30,0	70,0	4,0	2	0,50	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
110	80						90	100						CFK / GFK	Grafit	

K202143	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	10,0	50,0	3,0	4	0,10	30
1/0,2	1,0	0,85	1,5	10,0	50,0	3,0	4	0,20	30
2/0,2	2,0	1,8	2,5	12,0	50,0	3,0	4	0,20	30
2/0,3	2,0	1,8	2,5	12,0	50,0	3,0	4	0,30	30
2/0,5	2,0	1,8	2,5	12,0	50,0	3,0	4	0,50	30
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	30
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	30
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	30
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	30
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	30
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	30
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	30
5/1	5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202143									
6/0,5	6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	30
6/1	6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	30
6/1,5	6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	30
8/0,5	8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	30
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	30
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	30
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	30
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	30
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	30
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	30
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	30
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	30
12/1	12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	30
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	30
12/2	12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	30
12/5	12,0	11,0	12,0	38,0	84,0	12,0	4	5,00	30
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	30
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	30
16/6	16,0	15,0	16,0	44,0	93,0	16,0	4	6,00	30
20/1	20,0	18,5	20,0	55,0	104,0	20,0	4	1,00	30
20/2,5	20,0	18,5	20,0	55,0	104,0	20,0	4	2,50	30

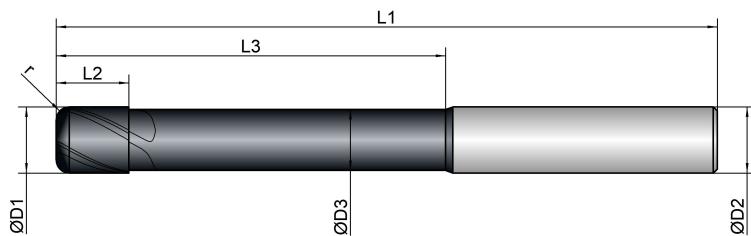
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202153



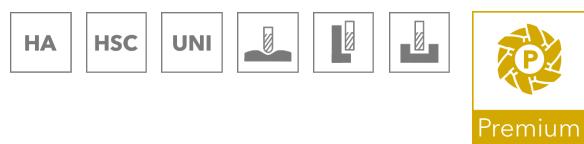
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
110	80						90	100						CFK / GFK	Grafit	

K202153	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	20,0	75,0	3,0	4	0,10	30
1/0,2	1,0	0,85	1,5	20,0	75,0	3,0	4	0,20	30
2/0,2	2,0	1,8	2,5	25,0	75,0	3,0	4	0,20	30
2/0,3	2,0	1,8	2,5	25,0	75,0	3,0	4	0,30	30
2/0,5	2,0	1,8	2,5	25,0	75,0	3,0	4	0,50	30
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	30
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	30
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	30
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	30
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	30
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	30
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	30
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	30



	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm R	°
K202153									
5,95/0,5	5,95	5,5	7,0	44,0	80,0	6,0	4	0,50	30
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	30
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	30
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	30
7,95/0,5	7,95	7,4	9,0	54,0	100,0	8,0	4	0,50	30
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	30
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	30
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	30
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	30
9,95/0,5	9,95	9,2	11,0	60,0	100,0	10,0	4	0,50	30
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	30
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	30
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	30
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	30
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	30
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	30
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	30
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	30
12/5	12,0	11,0	12,0	75,0	120,0	12,0	4	5,00	30
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	30
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	30
16/6	16,0	15,0	16,0	92,0	150,0	16,0	4	6,00	30
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	30
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	30

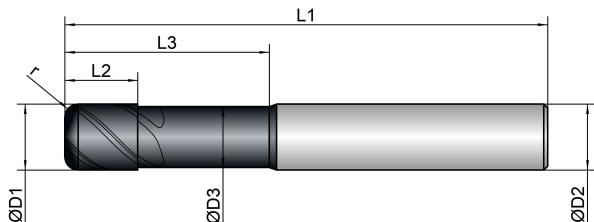
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium

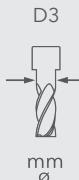
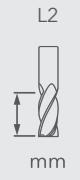
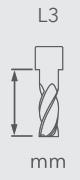
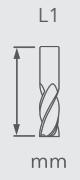
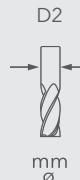


HA K202163

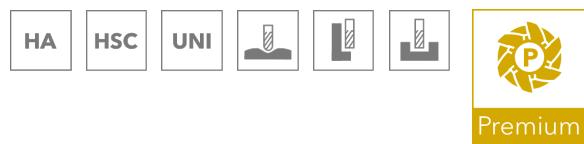


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	80	70	40	35			85	95						CFK / GFK	Grafit

K202163	D1 mm	Ø	D3 mm	Ø	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	o		
	3,0		2,7		4,0		14,0		50,0	3,0	4	0,30	45
3/0,3													
3/0,5	3,0		2,7		4,0		14,0		50,0	3,0	4	0,50	45
3/1	3,0		2,7		4,0		14,0		50,0	3,0	4	1,00	45
4/0,4	4,0		3,7		5,0		16,0		50,0	4,0	4	0,40	45
4/0,5	4,0		3,7		5,0		16,0		50,0	4,0	4	0,50	45
4/1	4,0		3,7		5,0		16,0		50,0	4,0	4	1,00	45
5/0,5	5,0		4,6		6,0		18,0		54,0	5,0	4	0,50	45
5/1	5,0		4,6		6,0		18,0		54,0	5,0	4	1,00	45
6/0,5	6,0		5,5		7,0		21,0		58,0	6,0	4	0,50	45
6/1	6,0		5,5		7,0		21,0		58,0	6,0	4	1,00	45
6/1,5	6,0		5,5		7,0		21,0		58,0	6,0	4	1,50	45
8/0,5	8,0		7,4		9,0		27,0		64,0	8,0	4	0,50	45

									
K202163									
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	50,0	104,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	50,0	104,0	20,0	4	2,50	45

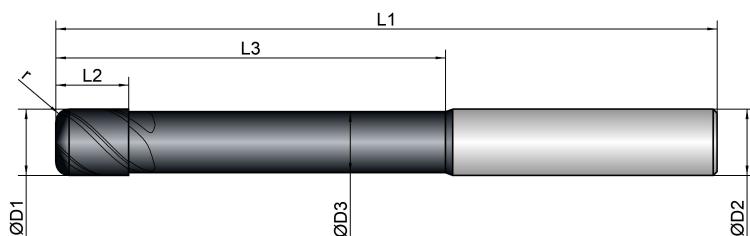
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202173



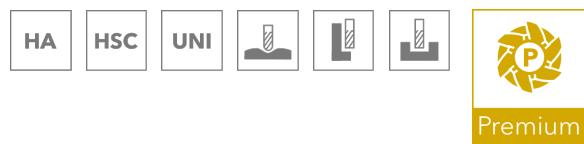
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	80	70	40	35			85	95						CFK / GFK	Grafit

K202173	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	45
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	45
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	45
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	45
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	45
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	45
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	45
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	45
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	45
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	45
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	45
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	45



	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm (R)	°
K202173									
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	45

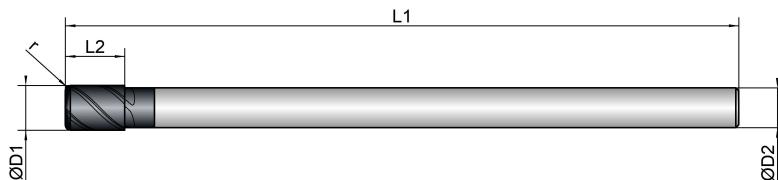
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202202



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
75	55	50	28	23			65	70								

K202202	D1 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	r mm 	°
	7,0	9,0	121,0	6,0	4	0,50	45
7/1	7,0	9,0	121,0	6,0	4	1,00	45
7/1,5	7,0	9,0	121,0	6,0	4	1,50	45
9/0,5	9,0	12,0	136,0	8,0	4	0,50	45
9/1	9,0	12,0	136,0	8,0	4	1,00	45
9/1,5	9,0	12,0	136,0	8,0	4	1,50	45
11/1	11,0	15,0	150,0	10,0	4	1,00	45
11/1,5	11,0	15,0	150,0	10,0	4	1,50	45
11/2	11,0	15,0	150,0	10,0	4	2,00	45
13/1	13,0	18,0	160,0	12,0	4	1,00	45
13/1,5	13,0	18,0	160,0	12,0	4	1,50	45
13/2	13,0	18,0	160,0	12,0	4	2,00	45
15/1	15,0	21,0	160,0	14,0	4	1,00	45
15/1,5	15,0	21,0	160,0	14,0	4	1,50	45
15/2	15,0	21,0	160,0	14,0	4	2,00	45
17/1	17,0	24,0	180,0	16,0	4	1,00	45
17/1,5	17,0	24,0	180,0	16,0	4	1,50	45
17/2	17,0	24,0	180,0	16,0	4	2,00	45
17/3	17,0	24,0	180,0	16,0	4	3,00	45

Kühlung


HA HSC HPC ≠

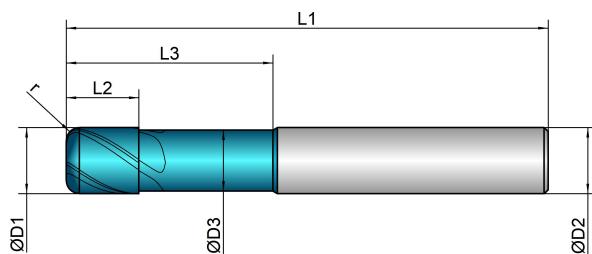

Toleranz

e8

Beschichtung

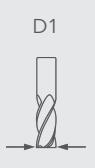
TiSiN- α 

HA K202223



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
	210	175	155	120	90										

K202223	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	10,0	50,0	3,0	4	0,10	35
1/0,2	1,0	0,85	1,5	10,0	50,0	3,0	4	0,20	35
2/0,2	2,0	1,8	2,5	12,0	50,0	3,0	4	0,20	35
2/0,3	2,0	1,8	2,5	12,0	50,0	3,0	4	0,30	35
2/0,5	2,0	1,8	2,5	12,0	50,0	3,0	4	0,50	35
3/0,25	3,0	2,7	4,0	14,0	50,0	3,0	4	0,25	35
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	35
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	35
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	35
4/0,2	4,0	3,7	5,0	16,0	50,0	4,0	4	0,20	35
4/0,25	4,0	3,7	5,0	16,0	50,0	4,0	4	0,25	35
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	35
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	35
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	35
5/0,25	5,0	4,6	6,0	18,0	54,0	5,0	4	0,25	35
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	35

		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202223										
5/1		5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	35
6/0,25		6,0	5,5	7,0	21,0	58,0	6,0	4	0,25	35
6/0,5		6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	35
6/0,8		6,0	5,5	7,0	21,0	58,0	6,0	4	0,80	35
6/1		6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	35
6/1,5		6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	35
6/2		6,0	5,5	7,0	21,0	58,0	6,0	4	2,00	35
8/0,25		8,0	7,4	9,0	27,0	64,0	8,0	4	0,25	35
8/0,5		8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	35
8/0,8		8,0	7,4	9,0	27,0	64,0	8,0	4	0,80	35
8/1		8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	35
8/1,5		8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	35
8/2		8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	35
8/2,5		8,0	7,4	9,0	27,0	64,0	8,0	4	2,50	35
8/3		8,0	7,4	9,0	27,0	64,0	8,0	4	3,00	35
10/0,25		10,0	9,2	11,0	32,0	73,0	10,0	4	0,25	35
10/0,5		10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	35
10/0,8		10,0	9,2	11,0	32,0	73,0	10,0	4	0,80	35
10/1		10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	35
10/1,5		10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	35
10/2		10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	35
10/3		10,0	9,2	11,0	32,0	73,0	10,0	4	3,00	35
10/3,5		10,0	9,2	11,0	32,0	73,0	10,0	4	3,50	35
12/0,5		12,0	9,2	12,0	38,0	84,0	12,0	4	0,50	35
12/1		12,0	9,2	12,0	38,0	84,0	12,0	4	1,00	35
12/1,5		12,0	9,2	12,0	38,0	84,0	12,0	4	1,50	35
12/2		12,0	9,2	12,0	38,0	84,0	12,0	4	2,00	35
12/3		12,0	9,2	12,0	38,0	84,0	12,0	4	3,00	35
16/1		16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	35
16/2		16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	35
16/3		16,0	15,0	16,0	44,0	93,0	16,0	4	3,00	35
20/1		20,0	18,5	20,0	55,0	104,0	20,0	4	1,00	35
20/2,5		20,0	18,5	20,0	55,0	104,0	20,0	4	2,50	35

Kühlung


HA HSC HPC ≠

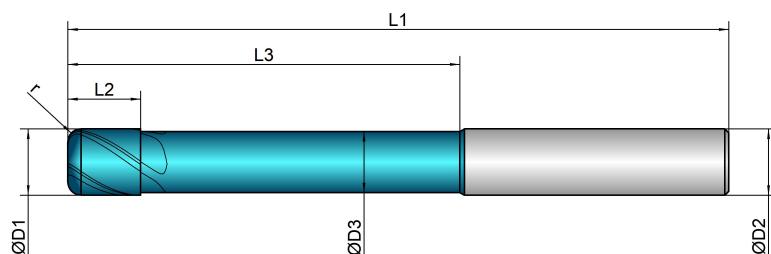

Toleranz

e8

Beschichtung

TiSiN- α 

HA K202233



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
			210	175	155	120	90									

K202233	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	20,0	75,0	3,0	4	0,10	35
1/0,2	1,0	0,85	1,5	20,0	75,0	3,0	4	0,20	35
2/0,2	2,0	1,8	2,5	25,0	75,0	3,0	4	0,20	35
2/0,3	2,0	1,8	2,5	25,0	75,0	3,0	4	0,30	35
2/0,5	2,0	1,8	2,5	25,0	75,0	3,0	4	0,50	35
3/0,25	3,0	2,7	4,0	32,0	75,0	3,0	4	0,25	35
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	35
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	35
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	35
4/0,2	4,0	3,7	5,0	36,0	75,0	4,0	4	0,20	35
4/0,25	4,0	3,7	5,0	36,0	75,0	4,0	4	0,25	35
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	35
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	35
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	35
5/0,25	5,0	4,6	6,0	40,0	75,0	5,0	4	0,25	35

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202233									
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	35
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	35
6/0,25	6,0	5,5	7,0	44,0	80,0	6,0	4	0,25	35
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	35
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	35
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	35
8/0,25	8,0	7,4	9,0	54,0	100,0	8,0	4	0,25	35
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	35
8/0,8	8,0	7,4	9,0	54,0	100,0	8,0	4	0,80	35
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	35
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	35
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	35
8/3	8,0	7,4	9,0	54,0	100,0	8,0	4	3,00	35
10/0,25	10,0	9,2	11,0	60,0	100,0	10,0	4	0,25	35
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	35
10/0,8	10,0	9,2	11,0	60,0	100,0	10,0	4	0,80	35
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	35
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	35
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	35
10/3	10,0	9,2	11,0	60,0	100,0	10,0	4	3,00	35
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	35
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	35
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	35
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	35
12/3	12,0	11,0	12,0	75,0	120,0	12,0	4	3,00	35
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	35
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	35
16/3	16,0	15,0	16,0	92,0	150,0	16,0	4	3,00	35
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	35
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	35

Kühlung


HA HPC Inconel Abrasivmaterial Titan

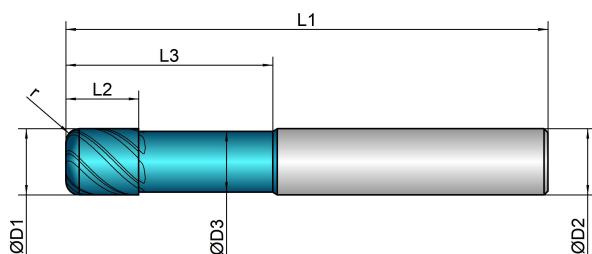

Toleranz

e8

Beschichtung

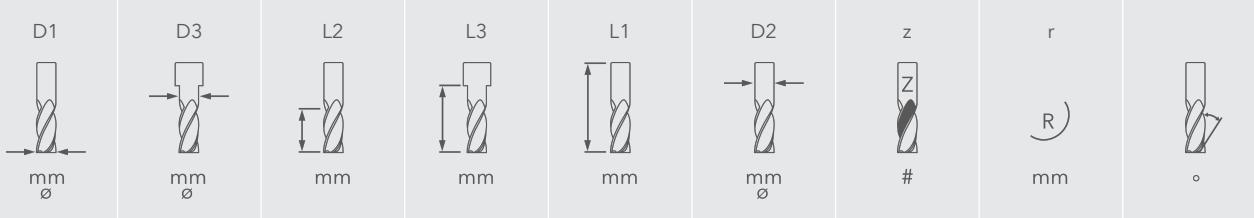
TiSiN- α 

HA K202253



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
205	175	160	100	65												

K202253		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
3/0,3		3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	45
3/0,5		3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	45
3/1		3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	45
4/0,4		4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	45
4/0,5		4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	45
4/1		4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	45
5/0,5		5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	45
5/1		5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	45
6/0,5		6,0	5,5	7,0	21,0	58,0	6,0	6	0,50	45
6/0,8		6,0	5,5	7,0	21,0	58,0	6,0	6	0,80	45
6/1		6,0	5,5	7,0	21,0	58,0	6,0	6	1,00	45
6/1,5		6,0	5,5	7,0	21,0	58,0	6,0	6	1,50	45
8/0,5		8,0	7,4	9,0	27,0	64,0	8,0	6	0,50	45

		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202253										
8/0,8		8,0	7,4	9,0	27,0	64,0	8,0	6	0,80	45
8/1		8,0	7,4	9,0	27,0	64,0	8,0	6	1,00	45
8/1,5		8,0	7,4	9,0	27,0	64,0	8,0	6	1,50	45
8/2		8,0	7,4	9,0	27,0	64,0	8,0	6	2,00	45
8/3		8,0	7,4	9,0	27,0	64,0	8,0	6	3,00	45
10/0,5		10,0	9,2	11,0	32,0	73,0	10,0	6	0,50	45
10/0,8		10,0	9,2	11,0	32,0	73,0	10,0	6	0,80	45
10/1		10,0	9,2	11,0	32,0	73,0	10,0	6	1,00	45
10/1,5		10,0	9,2	11,0	32,0	73,0	10,0	6	1,50	45
10/2		10,0	9,2	11,0	32,0	73,0	10,0	6	2,00	45
10/3		10,0	9,2	11,0	32,0	73,0	10,0	6	3,00	45
12/0,5		12,0	11,0	12,0	38,0	84,0	12,0	6	0,50	45
12/1		12,0	11,0	12,0	38,0	84,0	12,0	6	1,00	45
12/1,5		12,0	11,0	12,0	38,0	84,0	12,0	6	1,50	45
12/2		12,0	11,0	12,0	38,0	84,0	12,0	6	2,00	45
12/3		12,0	11,0	12,0	38,0	84,0	12,0	6	3,00	45
16/1		16,0	15,0	16,0	44,0	93,0	16,0	6	1,00	45
16/2		16,0	15,0	16,0	44,0	93,0	16,0	6	2,00	45
16/3		16,0	15,0	16,0	44,0	93,0	16,0	6	3,00	45
20/1		20,0	18,5	20,0	50,0	104,0	20,0	6	1,00	45
20/2,5		20,0	18,5	20,0	50,0	104,0	20,0	6	2,50	45

Kühlung



HB ETC HSC HPC MTC

UNI ≠

NEW



Toleranz

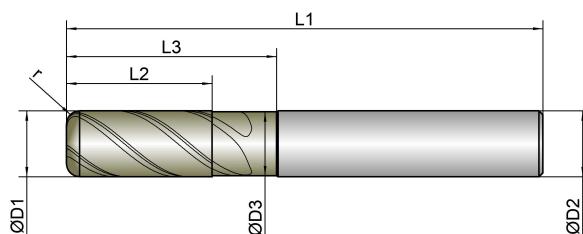
e8

Beschichtung

TiSiN-α



HB K202509



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
230	185	150					75	260							

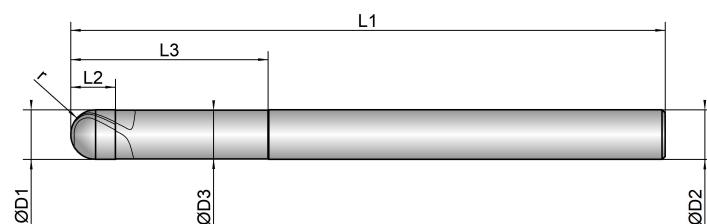
K202509	D1	D3	L2	L3	L1	D2	z	r	o
	mm	mm	mm	mm	mm	mm	#	mm	°
6/0,5	6,0	5,8	13,0	20,0	57,0	6,0	4	0,50	40
6/1	6,0	5,8	13,0	20,0	57,0	6,0	4	1,00	40
6/1,5	6,0	5,8	13,0	20,0	57,0	6,0	4	1,50	40
8/0,5	8,0	7,7	19,0	25,0	63,0	8,0	4	0,50	40
8/1	8,0	7,7	19,0	25,0	63,0	8,0	4	1,00	40
8/2	8,0	7,7	19,0	25,0	63,0	8,0	4	2,00	40
8/3	8,0	7,7	19,0	25,0	63,0	8,0	4	3,00	40
10/0,5	10,0	9,7	22,0	32,0	72,0	10,0	4	0,50	40
10/1	10,0	9,7	22,0	32,0	72,0	10,0	4	1,00	40
10/2	10,0	9,7	22,0	32,0	72,0	10,0	4	2,00	40
10/3	10,0	9,7	22,0	32,0	72,0	10,0	4	3,00	40
12/0,5	12,0	11,6	26,0	38,0	83,0	12,0	4	0,50	40

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202509									
12/1	12,0	11,6	26,0	38,0	83,0	12,0	4	1,00	40
12/2	12,0	11,6	26,0	38,0	83,0	12,0	4	2,00	40
12/3	12,0	11,6	26,0	38,0	83,0	12,0	4	3,00	40
16/0,5	16,0	15,5	32,0	44,0	92,0	16,0	4	0,50	40
16/1	16,0	15,5	32,0	44,0	92,0	16,0	4	1,00	40
16/2	16,0	15,5	32,0	44,0	92,0	16,0	4	2,00	40
16/3	16,0	15,5	32,0	44,0	92,0	16,0	4	3,00	40
20/1	20,0	19,5	41,0	54,0	104,0	20,0	4	1,00	40
20/2	20,0	19,5	41,0	54,0	104,0	20,0	4	2,00	40
20/3	20,0	19,5	41,0	54,0	104,0	20,0	4	3,00	40
20/4	20,0	19,5	41,0	54,0	104,0	20,0	4	4,00	40

Kühlung	
Toleranz	f7
Beschichtung	-



HA K203001



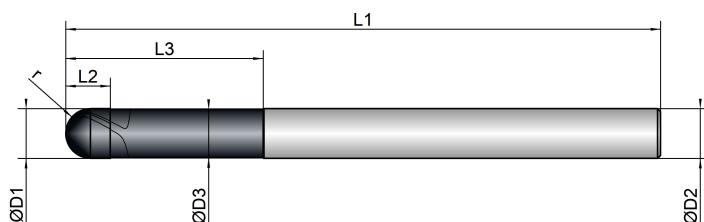
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
80	50						45	75	190	170		240		CFK / GFK	Grafit

K203001	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	°
	mm Ø	mm Ø	mm Ø	mm	mm	mm Ø	#	mm	°
1/6	1,0	0,9	2,0	6,0	100,0	6,0	2	0,50	30
2/6	2,0	1,8	3,0	8,0	100,0	6,0	2	1,00	30
3/6	3,0	2,8	4,0	12,0	100,0	6,0	2	1,50	30
4/6	4,0	3,8	5,0	16,0	100,0	6,0	2	2,00	30
5/6	5,0	4,8	6,0	20,0	100,0	6,0	2	2,50	30
6/6	6,0	5,8	6,0	25,0	100,0	6,0	2	3,00	30
6/8	6,0	5,8	6,0	25,0	100,0	8,0	2	3,00	30
8/8	8,0	7,8	7,0	32,0	100,0	8,0	2	4,00	30
8/10	8,0	7,8	7,0	32,0	120,0	10,0	2	4,00	30
10/10	10,0	9,8	9,0	40,0	120,0	10,0	2	5,00	30
10/12	10,0	9,8	9,0	40,0	160,0	12,0	2	5,00	30
12/12	12,0	11,8	11,0	50,0	160,0	12,0	2	6,00	30
12/16	12,0	11,8	11,0	50,0	200,0	16,0	2	6,00	30
16/16	16,0	15,5	14,0	60,0	200,0	16,0	2	8,00	30

Kühlung	
Toleranz	f7
Beschichtung	TiAlN- α



HA K203003



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
400	290	210					210	580	360	330				CFK / GFK	Grafit	

K203003	D1 mm 	D3 mm 	L2 mm 	L3 mm 	L1 mm 	D2 mm 	z # 	r mm 	
	1,0	0,9	2,0	6,0	100,0	6,0	2	0,50	30
1/6	2,0	1,8	3,0	8,0	100,0	6,0	2	1,00	30
2/6	3,0	2,8	4,0	12,0	100,0	6,0	2	1,50	30
3/6	4,0	3,8	5,0	16,0	100,0	6,0	2	2,00	30
4/6	5,0	4,8	6,0	20,0	100,0	6,0	2	2,50	30
5/6	6,0	5,8	6,0	25,0	100,0	6,0	2	3,00	30
6/6	6,0	5,8	6,0	25,0	100,0	8,0	2	3,00	30
6/8	8,0	7,8	7,0	32,0	100,0	8,0	2	4,00	30
8/8	8,0	7,8	7,0	32,0	120,0	10,0	2	4,00	30
8/10	10,0	9,8	9,0	40,0	120,0	10,0	2	5,00	30
10/10	10,0	9,8	9,0	40,0	160,0	12,0	2	5,00	30
10/12	12,0	11,8	11,0	50,0	160,0	12,0	2	6,00	30
12/12	12,0	11,8	11,0	50,0	200,0	16,0	2	6,00	30
12/16	16,0	15,5	14,0	60,0	200,0	16,0	2	8,00	30
16/16									



Kühlung

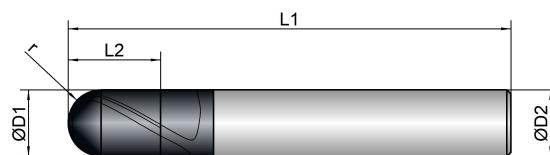
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203033



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
420	290	220	165	150			225	615		850				CFK / GFK	Grafit	

K203033		D1 	L2 	L1 	D2 	z 	r 	°
0,1/3		0,1	0,2	38,0	3,0	2	0,05	30
0,15/3		0,15	0,3	38,0	3,0	2	0,075	30
0,2/3		0,2	0,4	38,0	3,0	2	0,10	30
0,25/3		0,25	0,5	38,0	3,0	2	0,125	30
0,3/3		0,3	1,0	38,0	3,0	2	0,15	30
0,35/3		0,35	1,0	38,0	3,0	2	0,175	30
0,4/3		0,4	1,0	38,0	3,0	2	0,20	30
0,5/3		0,5	1,5	38,0	3,0	2	0,25	30
0,5/6		0,5	1,5	54,0	6,0	2	0,25	30
0,6/3		0,6	1,5	38,0	3,0	2	0,30	30
0,7/3		0,7	2,0	38,0	3,0	2	0,35	30
0,8/3		0,8	2,0	38,0	3,0	2	0,40	30
0,9/3		0,9	2,5	38,0	3,0	2	0,45	30
1/3		1,0	2,0	50,0	3,0	2	0,50	30
1/6		1,0	2,0	54,0	6,0	2	0,50	30

K203033	D1 	L2 	L1 	D2 	z 	r 	
1,1/3	1,1	3,0	50,0	3,0	2	0,55	30
1,2/3	1,2	3,0	50,0	3,0	2	0,60	30
1,4/3	1,4	3,0	50,0	3,0	2	0,70	30
1,5/3	1,5	3,0	50,0	3,0	2	0,75	30
1,5/6	1,5	3,0	54,0	6,0	2	0,75	30
1,6/3	1,6	4,0	50,0	3,0	2	0,80	30
1,8/3	1,8	4,0	50,0	3,0	2	0,90	30
2/3	2,0	4,0	50,0	3,0	2	1,00	30
2/6	2,0	4,0	54,0	6,0	2	1,00	30
2,5/3	2,5	5,0	50,0	3,0	2	1,25	30
2,5/6	2,5	5,0	54,0	6,0	2	1,25	30
3/3	3,0	6,0	50,0	3,0	2	1,50	30
3/6	3,0	6,0	54,0	6,0	2	1,50	30
4/4	4,0	7,0	54,0	4,0	2	2,00	30
4/6	4,0	7,0	54,0	6,0	2	2,00	30
5/5	5,0	8,0	54,0	5,0	2	2,50	30
5/6	5,0	8,0	54,0	6,0	2	2,50	30
6/6	6,0	10,0	54,0	6,0	2	3,00	30
7/8	7,0	12,0	59,0	8,0	2	3,50	30
8/8	8,0	12,0	59,0	8,0	2	4,00	30
10/10	10,0	14,0	67,0	10,0	2	5,00	30
12/12	12,0	16,0	73,0	12,0	2	6,00	30
14/14	14,0	16,0	75,0	14,0	2	7,00	30
16/16	16,0	20,0	83,0	16,0	2	8,00	30
18/18	18,0	22,0	93,0	18,0	2	9,00	30
20/20	20,0	25,0	93,0	20,0	2	10,00	30



Kühlung

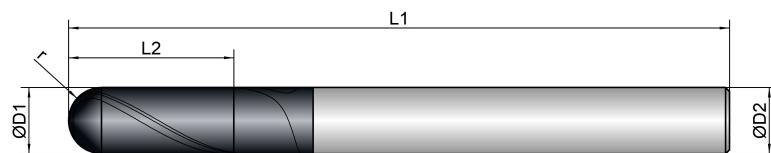
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203063



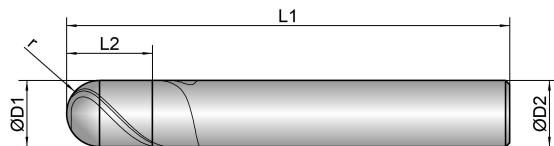
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
350	240	180	135	125			180	500		695				CFK / GFK	Grafit

K203063	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
	0,5/3	0,5	1,5	75,0	3,0	2	0,25
0,5/6	0,5	1,5	80,0	6,0	2	0,25	30
1/3	1,0	3,0	75,0	3,0	2	0,50	30
1/6	1,0	3,0	80,0	6,0	2	0,50	30
1,5/3	1,5	4,0	75,0	3,0	2	0,75	30
1,5/6	1,5	4,0	80,0	6,0	2	0,75	30
2/3	2,0	6,0	75,0	3,0	2	1,00	30
2/6	2,0	6,0	80,0	6,0	2	1,00	30
2,5/3	2,5	8,0	75,0	3,0	2	1,25	30
2,5/6	2,5	8,0	80,0	6,0	2	1,25	30
3/3	3,0	10,0	75,0	3,0	2	1,50	30
3/6	3,0	10,0	80,0	6,0	2	1,50	30
4/4	4,0	13,0	75,0	4,0	2	2,00	30
4/6	4,0	13,0	80,0	6,0	2	2,00	30
5/5	5,0	14,0	75,0	5,0	2	2,50	30
5/6	5,0	14,0	100,0	6,0	2	2,50	30
6/6	6,0	16,0	100,0	6,0	2	3,00	30
8/8	8,0	22,0	100,0	8,0	2	4,00	30
10/10	10,0	25,0	100,0	10,0	2	5,00	30
12/12	12,0	26,0	100,0	12,0	2	6,00	30
14/14	14,0	26,0	100,0	14,0	2	7,00	30
16/16	16,0	30,0	150,0	16,0	2	8,00	30
20/20	20,0	40,0	150,0	20,0	2	10,00	30

Kühlung				
Toleranz	f8			
Beschichtung	-			



HA K203081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
70	50						45	75	190	160		240		CFK / GFK	Grafit

K203081	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	
3	3,0	6,0	50,0	3,0	2	1,50	45
4	4,0	7,0	54,0	4,0	2	2,00	45
5	5,0	8,0	54,0	5,0	2	2,50	45
6	6,0	10,0	54,0	6,0	2	3,00	45
8	8,0	12,0	59,0	8,0	2	4,00	45
10	10,0	13,0	67,0	10,0	2	5,00	45
12	12,0	16,0	74,0	12,0	2	6,00	45
14	14,0	16,0	75,0	14,0	2	7,00	45
16	16,0	20,0	83,0	16,0	2	8,00	45
20	20,0	25,0	93,0	20,0	2	10,00	45



Kühlung

Toleranz

f8

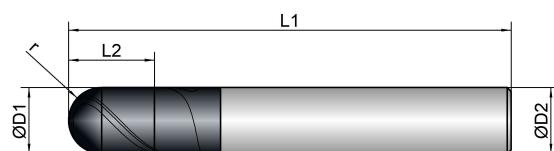
Beschichtung

TiAlN- α

Premium



HA K203083



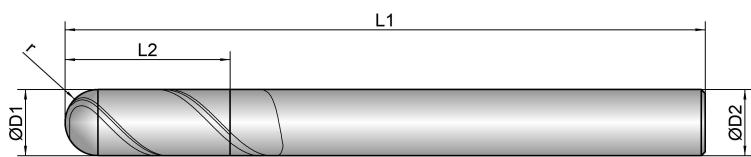
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
140	80	75					85	130	360	330		400		CFK / GFK	Grafit

K203083	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
3	3,0	6,0	50,0	3,0	2	1,50	45
4	4,0	7,0	54,0	4,0	2	2,00	45
5	5,0	8,0	54,0	5,0	2	2,50	45
6	6,0	10,0	54,0	6,0	2	3,00	45
8	8,0	12,0	59,0	8,0	2	4,00	45
10	10,0	13,0	67,0	10,0	2	5,00	45
12	12,0	16,0	74,0	12,0	2	6,00	45
14	14,0	16,0	75,0	14,0	2	7,00	45
16	16,0	20,0	83,0	16,0	2	8,00	45
20	20,0	25,0	93,0	20,0	2	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	-



HA K203091



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40						35	65	170	140		220		CFK / GFK	Grafit

K203091	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm (R)	°
3	3,0	10,0	75,0	3,0	2	1,50	45
4	4,0	13,0	75,0	4,0	2	2,00	45
5	5,0	15,0	75,0	5,0	2	2,50	45
6	6,0	16,0	100,0	6,0	2	3,00	45
8	8,0	22,0	100,0	8,0	2	4,00	45
10	10,0	25,0	100,0	10,0	2	5,00	45
12	12,0	26,0	100,0	12,0	2	6,00	45
14	14,0	26,0	100,0	14,0	2	7,00	45
16	16,0	30,0	150,0	16,0	2	8,00	45
20	20,0	40,0	150,0	20,0	2	10,00	45



Kühlung



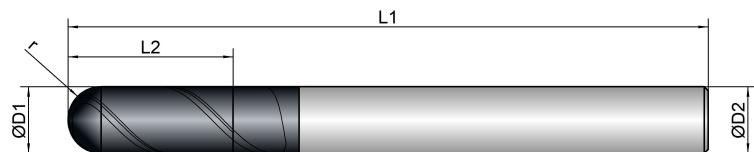
Toleranz

f8

Beschichtung

TiAlN- α 

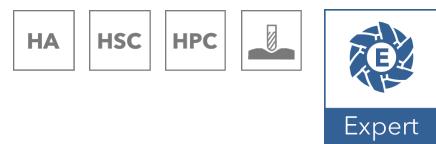
HA K203093



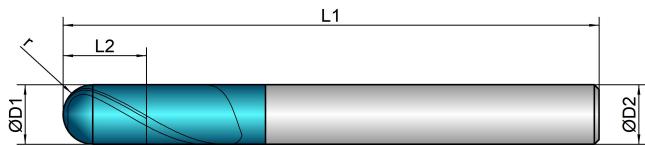
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	70	65					75	120	340	310		380		CFK / GFK	Grafit

K203093		D1 	L2 	L1 	D2 	z 	r 	°
3		3,0	10,0	75,0	3,0	2	1,50	45
4		4,0	13,0	75,0	4,0	2	2,00	45
5		5,0	15,0	75,0	5,0	2	2,50	45
6		6,0	16,0	100,0	6,0	2	3,00	45
8		8,0	22,0	100,0	8,0	2	4,00	45
10		10,0	25,0	100,0	10,0	2	5,00	45
12		12,0	26,0	100,0	12,0	2	6,00	45
14		14,0	26,0	100,0	14,0	2	7,00	45
16		16,0	30,0	150,0	16,0	2	8,00	45
20		20,0	40,0	150,0	20,0	2	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α

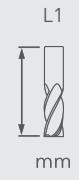
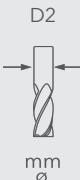


HA K203103



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
			210	180	160	110	85									

K203103	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
0,1/3	0,1	0,2	38,0	3,0	2	0,05	30
0,15/3	0,15	0,3	38,0	3,0	2	0,075	30
0,2/3	0,2	0,4	38,0	3,0	2	0,10	30
0,25/3	0,25	0,5	38,0	3,0	2	0,125	30
0,3/3	0,3	1,0	38,0	3,0	2	0,15	30
0,35/3	0,35	1,0	38,0	3,0	2	0,175	30
0,4/3	0,4	1,0	38,0	3,0	2	0,20	30
0,5/3	0,5	1,5	38,0	3,0	2	0,25	30
0,5/6	0,5	1,5	54,0	6,0	2	0,25	30
0,6/3	0,6	1,5	38,0	3,0	2	0,30	30
0,7/3	0,7	2,0	38,0	3,0	2	0,35	30
0,8/3	0,8	2,0	38,0	3,0	2	0,40	30
0,9/3	0,9	2,5	38,0	3,0	2	0,45	30
1/3	1,0	2,0	50,0	3,0	2	0,50	30
1/6	1,0	2,0	54,0	6,0	2	0,50	30

K203103	D1 	L2 	L1 	D2 	z 	r 	
	mm ø	mm	mm	mm ø	#	mm	°
1,1/3	1,1	3,0	50,0	3,0	2	0,55	30
1,2/3	1,2	3,0	50,0	3,0	2	0,60	30
1,4/3	1,4	3,0	50,0	3,0	2	0,70	30
1,5/3	1,5	3,0	50,0	3,0	2	0,75	30
1,5/6	1,5	3,0	54,0	6,0	2	0,75	30
1,6/3	1,6	4,0	50,0	3,0	2	0,80	30
1,8/3	1,8	4,0	50,0	3,0	2	0,90	30
2/3	2,0	4,0	50,0	3,0	2	1,00	30
2/6	2,0	4,0	54,0	6,0	2	1,00	30
2,5/3	2,5	5,0	50,0	3,0	2	1,25	30
2,5/6	2,5	5,0	54,0	6,0	2	1,25	30
3/3	3,0	6,0	50,0	3,0	2	1,50	30
3/6	3,0	6,0	54,0	6,0	2	1,50	30
4/4	4,0	7,0	54,0	4,0	2	2,00	30
4/6	4,0	7,0	54,0	6,0	2	2,00	30
5/5	5,0	8,0	54,0	5,0	2	2,50	30
5/6	5,0	8,0	54,0	6,0	2	2,50	30
6/6	6,0	10,0	54,0	6,0	2	3,00	30
8/8	8,0	12,0	59,0	8,0	2	4,00	30
10/10	10,0	14,0	67,0	10,0	2	5,00	30
12/12	12,0	16,0	74,0	12,0	2	6,00	30
14/14	14,0	18,0	75,0	14,0	2	7,00	30
16/16	16,0	22,0	83,0	16,0	2	8,00	30
20/20	20,0	26,0	93,0	20,0	2	10,00	30

Kühlung


HA HSC HPC

Expert

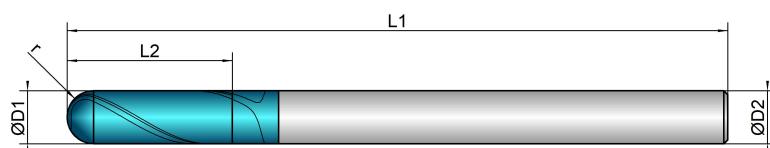
Toleranz

f8

Beschichtung

TiSiN- α 

HA K203143



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
			200	175	155	95	80									

K203143	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
0,5/3	0,5	1,5	75,0	3,0	2	0,25	30
0,5/6	0,5	1,5	80,0	6,0	2	0,25	30
1/3	1,0	3,0	75,0	3,0	2	0,50	30
1/6	1,0	3,0	80,0	6,0	2	0,50	30
1,5/3	1,5	4,0	75,0	3,0	2	0,75	30
1,5/6	1,5	4,0	80,0	6,0	2	0,75	30
2/3	2,0	6,0	75,0	3,0	2	1,00	30
2/6	2,0	6,0	80,0	6,0	2	1,00	30
2,5/3	2,5	8,0	75,0	3,0	2	1,25	30
2,5/6	2,5	8,0	80,0	6,0	2	1,25	30
3/3	3,0	10,0	75,0	3,0	2	1,50	30
3/6	3,0	10,0	80,0	6,0	2	1,50	30
4/4	4,0	13,0	75,0	4,0	2	2,00	30
4/6	4,0	13,0	80,0	6,0	2	2,00	30
5/5	5,0	14,0	75,0	5,0	2	2,50	30
5/6	5,0	14,0	100,0	6,0	2	2,50	30
6/6	6,0	16,0	100,0	6,0	2	3,00	30
8/8	8,0	22,0	100,0	8,0	2	4,00	30
10/10	10,0	25,0	100,0	10,0	2	5,00	30
12/12	12,0	26,0	100,0	12,0	2	6,00	30
14/14	14,0	26,0	100,0	14,0	2	7,00	30
16/16	16,0	30,0	150,0	16,0	2	8,00	30
20/20	20,0	40,0	150,0	20,0	2	10,00	30

Kühlung


HA HSC

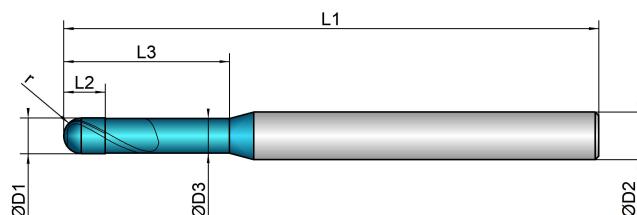

Toleranz

0-0,01

Beschichtung

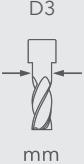
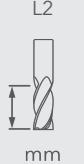
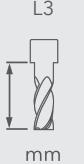
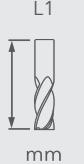
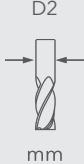
TiSiN- α 

HA K203206



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	210	195	125	75	60	45	100			150				CFK / GFK	Grafit	

K203206	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	°
	mm ø	mm ø	mm	mm	mm	mm ø	#	mm	°
0,2X0,3	0,2	0,17	0,16	0,3	45,0	4,0	2	0,10	30
0,2X0,5	0,2	0,17	0,16	0,5	45,0	4,0	2	0,10	30
0,2X0,75	0,2	0,17	0,16	0,75	45,0	4,0	2	0,10	30
0,2X1	0,2	0,17	0,16	1,0	45,0	4,0	2	0,10	30
0,2X1,25	0,2	0,17	0,16	1,25	45,0	4,0	2	0,10	30
0,2X1,5	0,2	0,17	0,16	1,5	45,0	4,0	2	0,10	30
0,2X1,75	0,2	0,17	0,16	1,75	45,0	4,0	2	0,10	30
0,2X2	0,2	0,17	0,16	2,0	45,0	4,0	2	0,10	30
0,2X2,5	0,2	0,17	0,16	2,5	45,0	4,0	2	0,10	30
0,2X3	0,2	0,17	0,16	3,0	45,0	4,0	2	0,10	30
0,3X0,5	0,3	0,27	0,24	0,5	45,0	4,0	2	0,15	30
0,3X0,75	0,3	0,27	0,24	0,75	45,0	4,0	2	0,15	30
0,3X1	0,3	0,27	0,24	1,0	45,0	4,0	2	0,15	30
0,3X1,25	0,3	0,27	0,24	1,25	45,0	4,0	2	0,15	30
0,3X1,5	0,3	0,27	0,24	1,5	45,0	4,0	2	0,15	30
0,4X0,5	0,4	0,34	0,32	0,5	45,0	4,0	2	0,20	30
0,4X0,75	0,4	0,34	0,32	0,75	45,0	4,0	2	0,20	30
0,4X1	0,4	0,34	0,32	1,0	45,0	4,0	2	0,20	30
0,4X1,5	0,4	0,34	0,32	1,5	45,0	4,0	2	0,20	30

	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	° 
K203206									
0,4X2	0,4	0,34	0,32	2,0	45,0	4,0	2	0,20	30
0,4X2,5	0,4	0,34	0,32	2,5	45,0	4,0	2	0,20	30
0,4X3	0,4	0,34	0,32	3,0	45,0	4,0	2	0,20	30
0,4X3,5	0,4	0,34	0,32	3,5	45,0	4,0	2	0,20	30
0,4X4	0,4	0,34	0,32	4,0	45,0	4,0	2	0,20	30
0,4X4,5	0,4	0,34	0,32	4,5	45,0	4,0	2	0,20	30
0,4X5	0,4	0,34	0,32	5,0	45,0	4,0	2	0,20	30
0,4X5,5	0,4	0,34	0,32	5,5	45,0	4,0	2	0,20	30
0,4X6	0,4	0,34	0,32	6,0	45,0	4,0	2	0,20	30
0,5X1	0,5	0,47	0,4	1,0	45,0	4,0	2	0,25	30
0,5X1,5	0,5	0,47	0,4	1,5	45,0	4,0	2	0,25	30
0,5X2	0,5	0,47	0,4	2,0	45,0	4,0	2	0,25	30
0,5X2,5	0,5	0,47	0,4	2,5	45,0	4,0	2	0,25	30
0,5X3	0,5	0,47	0,4	3,0	45,0	4,0	2	0,25	30
0,5X3,5	0,5	0,47	0,4	3,5	45,0	4,0	2	0,25	30
0,5X4	0,5	0,47	0,4	4,0	45,0	4,0	2	0,25	30
0,5X4,5	0,5	0,47	0,4	4,5	45,0	4,0	2	0,25	30
0,5X5	0,5	0,47	0,4	5,0	45,0	4,0	2	0,25	30
0,5X5,5	0,5	0,47	0,4	5,5	45,0	4,0	2	0,25	30
0,5X6	0,5	0,47	0,4	6,0	45,0	4,0	2	0,25	30
0,5X7	0,5	0,47	0,4	7,0	45,0	4,0	2	0,25	30
0,5X8	0,5	0,47	0,4	8,0	45,0	4,0	2	0,25	30
0,5X9	0,5	0,47	0,4	9,0	45,0	4,0	2	0,25	30
0,6X1	0,6	0,57	0,48	1,0	45,0	4,0	2	0,30	30
0,6X2	0,6	0,57	0,48	2,0	45,0	4,0	2	0,30	30
0,6X3	0,6	0,57	0,48	3,0	45,0	4,0	2	0,30	30
0,6X4	0,6	0,57	0,48	4,0	45,0	4,0	2	0,30	30
0,6X5	0,6	0,57	0,48	5,0	45,0	4,0	2	0,30	30
0,6X6	0,6	0,57	0,48	6,0	45,0	4,0	2	0,30	30
0,6X8	0,6	0,57	0,48	8,0	45,0	4,0	2	0,30	30
0,8X2	0,8	0,77	0,64	2,0	45,0	4,0	2	0,40	30
0,8X3	0,8	0,77	0,64	3,0	45,0	4,0	2	0,40	30
0,8X4	0,8	0,77	0,64	4,0	45,0	4,0	2	0,40	30
0,8X5	0,8	0,77	0,64	5,0	45,0	4,0	2	0,40	30
0,8X6	0,8	0,77	0,64	6,0	45,0	4,0	2	0,40	30
0,8X7	0,8	0,77	0,64	7,0	45,0	4,0	2	0,40	30
0,8X8	0,8	0,77	0,64	8,0	45,0	4,0	2	0,40	30
0,8X9	0,8	0,77	0,64	9,0	45,0	4,0	2	0,40	30
1X2,5	1,0	0,96	0,8	2,5	45,0	4,0	2	0,50	30
1X3	1,0	0,96	0,8	3,0	45,0	4,0	2	0,50	30



	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K203206									
1X4	1,0	0,96	0,8	4,0	45,0	4,0	2	0,50	30
1X5	1,0	0,96	0,8	5,0	45,0	4,0	2	0,50	30
1X6	1,0	0,96	0,8	6,0	45,0	4,0	2	0,50	30
1X7	1,0	0,96	0,8	7,0	45,0	4,0	2	0,50	30
1X8	1,0	0,96	0,8	8,0	45,0	4,0	2	0,50	30
1X9	1,0	0,96	0,8	9,0	45,0	4,0	2	0,50	30
1X10	1,0	0,96	0,8	10,0	45,0	4,0	2	0,50	30
1X12	1,0	0,96	0,8	12,0	45,0	4,0	2	0,50	30
1,2X6	1,2	1,16	0,96	6,0	45,0	4,0	2	0,60	30
1,2X8	1,2	1,16	0,96	8,0	45,0	4,0	2	0,60	30
1,2X10	1,2	1,16	0,96	10,0	45,0	4,0	2	0,60	30
1,2X12	1,2	1,16	0,96	12,0	45,0	4,0	2	0,60	30
1,4X8	1,4	1,34	1,12	8,0	45,0	4,0	2	0,70	30
1,4X12	1,4	1,34	1,12	12,0	45,0	4,0	2	0,70	30
1,5X3	1,5	1,44	1,2	3,0	45,0	4,0	2	0,75	30
1,5X4	1,5	1,44	1,2	4,0	45,0	4,0	2	0,75	30
1,5X6	1,5	1,44	1,2	6,0	45,0	4,0	2	0,75	30
1,5X8	1,5	1,44	1,2	8,0	45,0	4,0	2	0,75	30
1,5X10	1,5	1,44	1,2	10,0	45,0	4,0	2	0,75	30
1,5X12	1,5	1,44	1,2	12,0	45,0	4,0	2	0,75	30
1,6X8	1,6	1,54	1,28	8,0	45,0	4,0	2	0,80	30
1,6X12	1,6	1,54	1,28	12,0	45,0	4,0	2	0,80	30
1,8X8	1,8	1,74	1,44	8,0	45,0	4,0	2	0,90	30
1,8X12	1,8	1,74	1,44	12,0	45,0	4,0	2	0,90	30
2X3	2,0	1,94	1,6	3,0	45,0	4,0	2	1,00	30
2X4	2,0	1,94	1,6	4,0	45,0	4,0	2	1,00	30
2X6	2,0	1,94	1,6	6,0	45,0	4,0	2	1,00	30
2X8	2,0	1,94	1,6	8,0	45,0	4,0	2	1,00	30
2X10	2,0	1,94	1,6	10,0	45,0	4,0	2	1,00	30
2X12	2,0	1,94	1,6	12,0	45,0	4,0	2	1,00	30
2,5X10	2,5	2,41	2,0	10,0	45,0	4,0	2	1,25	30
3X8	3,0	2,92	3,5	8,0	45,0	4,0	2	1,50	30
3X10	3,0	2,92	3,5	10,0	45,0	4,0	2	1,50	30
3X12	3,0	2,92	3,5	12,0	45,0	4,0	2	1,50	30
3X16	3,0	2,92	3,5	16,0	45,0	4,0	2	1,50	30

Kühlung


HA HSC

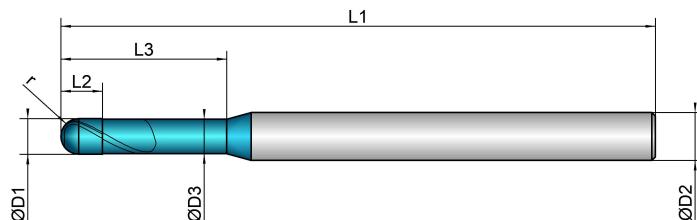

Toleranz

0-0,01

Beschichtung

TiSiN- α 

HA K203212



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	210	195	125	75	60	45	100		150					CFK / GFK	Grafit	

K203212	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
0,3X1,75	0,3	0,27	0,24	1,75	50,0	4,0	2	0,15	30
0,3X2	0,3	0,27	0,24	2,0	50,0	4,0	2	0,15	30
0,3X2,25	0,3	0,27	0,24	2,25	50,0	4,0	2	0,15	30
0,3X2,5	0,3	0,27	0,24	2,5	50,0	4,0	2	0,15	30
0,3X2,75	0,3	0,27	0,24	2,75	50,0	4,0	2	0,15	30
0,3X3	0,3	0,27	0,24	3,0	50,0	4,0	2	0,15	30
0,3X3,5	0,3	0,27	0,24	3,5	50,0	4,0	2	0,15	30
0,3X4	0,3	0,27	0,24	4,0	50,0	4,0	2	0,15	30
0,3X4,5	0,3	0,27	0,24	4,5	50,0	4,0	2	0,15	30
0,5X10	0,5	0,47	0,4	10,0	50,0	4,0	2	0,25	30
0,6X10	0,6	0,57	0,48	10,0	50,0	4,0	2	0,30	30
0,6X12	0,6	0,57	0,48	12,0	50,0	4,0	2	0,30	30



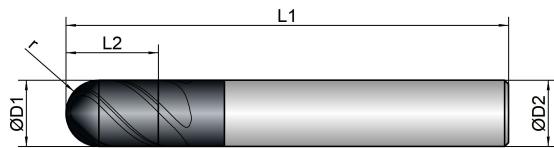
	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K203212									
0,8X10	0,8	0,77	0,64	10,0	50,0	4,0	2	0,40	30
1X14	1,0	0,96	0,8	14,0	50,0	4,0	2	0,50	30
1X16	1,0	0,96	0,8	16,0	50,0	4,0	2	0,50	30
1,2X14	1,2	1,16	0,96	14,0	50,0	4,0	2	0,60	30
1,2X16	1,2	1,16	0,96	16,0	50,0	4,0	2	0,60	30
1,4X16	1,4	1,34	1,12	16,0	50,0	4,0	2	0,70	30
1,5X14	1,5	1,44	1,2	14,0	50,0	4,0	2	0,75	30
1,5X16	1,5	1,44	1,2	16,0	50,0	4,0	2	0,75	30
1,6X16	1,6	1,54	1,28	16,0	50,0	4,0	2	0,80	30
1,8X16	1,8	1,74	1,44	16,0	50,0	4,0	2	0,90	30
2X14	2,0	1,94	1,6	14,0	50,0	4,0	2	1,00	30
2X16	2,0	1,94	1,6	16,0	50,0	4,0	2	1,00	30
2,5X15	2,5	2,41	2,0	15,0	50,0	4,0	2	1,25	30
3X16	3,0	2,92	3,5	16,0	50,0	4,0	2	1,50	30

Kühlung				
Toleranz	f8			
Beschichtung	TiAlN- α			

Premium						



HA K203253



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
210	150	140					90	360	400					CFK / GFK	Grafit	50

K203253	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
3	3,0	5,0	50,0	3,0	4	1,50	45
4	4,0	8,0	54,0	4,0	4	2,00	45
5	5,0	9,0	54,0	5,0	4	2,50	45
6	6,0	10,0	54,0	6,0	4	3,00	45
8	8,0	12,0	59,0	8,0	4	4,00	45
10	10,0	14,0	67,0	10,0	4	5,00	45
12	12,0	16,0	74,0	12,0	4	6,00	45
14	14,0	18,0	75,0	14,0	4	7,00	45
16	16,0	22,0	83,0	16,0	4	8,00	45
20	20,0	26,0	93,0	20,0	4	10,00	45



Kühlung

Toleranz

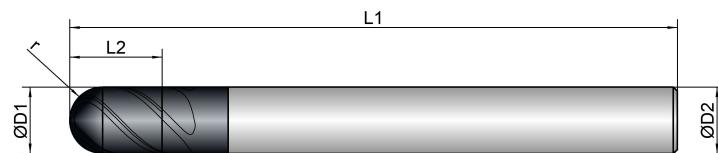
f8

Premium

Beschichtung

TiAlN- α 

HA K203263



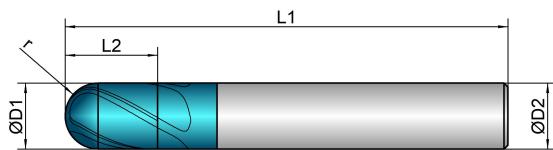
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
190	130	120					80	340	380						40	

K203263	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
3	3,0	5,0	75,0	3,0	4	1,50	45
4	4,0	8,0	75,0	4,0	4	2,00	45
5	5,0	9,0	75,0	5,0	4	2,50	45
6	6,0	10,0	100,0	6,0	4	3,00	45
8	8,0	12,0	100,0	8,0	4	4,00	45
10	10,0	14,0	100,0	10,0	4	5,00	45
12	12,0	16,0	100,0	12,0	4	6,00	45
14	14,0	18,0	100,0	14,0	4	7,00	45
16	16,0	22,0	150,0	16,0	4	8,00	45
20	20,0	26,0	150,0	20,0	4	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203333



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
200	175	155	110	85												

K203333	D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	r mm	
2/3	2,0	4,0	50,0	3,0	4	1,00	30
2/6	2,0	4,0	54,0	6,0	4	1,00	30
2,5/6	2,5	5,0	54,0	6,0	4	1,25	30
3/3	3,0	5,0	50,0	3,0	4	1,50	30
3/6	3,0	5,0	54,0	6,0	4	1,50	30
4/4	4,0	8,0	54,0	4,0	4	2,00	30
4/6	4,0	8,0	54,0	6,0	4	2,00	30
5/5	5,0	9,0	54,0	5,0	4	2,50	30
5/6	5,0	9,0	54,0	6,0	4	2,50	30
6/6	6,0	10,0	54,0	6,0	4	3,00	30
7/8	7,0	12,0	59,0	8,0	4	3,50	30
8/8	8,0	12,0	59,0	8,0	4	4,00	30
9/10	9,0	14,0	67,0	10,0	4	4,50	30
10/10	10,0	14,0	67,0	10,0	4	5,00	30
12/12	12,0	16,0	74,0	12,0	4	6,00	30
14/14	14,0	18,0	75,0	14,0	4	7,00	30
16/16	16,0	22,0	83,0	16,0	4	8,00	30
20/20	20,0	26,0	93,0	20,0	4	10,00	30

Kühlung



Toleranz

f8

Beschichtung

TiSiN- α

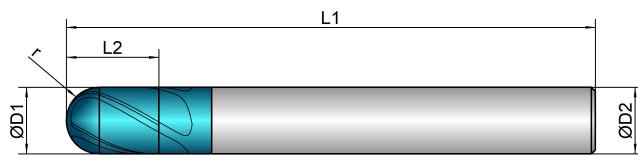
HA

HSC

HPC



HA K203343



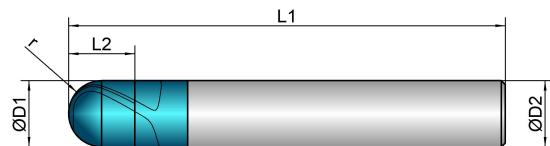
Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
200	175	155	110	85												

K203343	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
2/3	2,0	4,0	75,0	3,0	4	1,00	30
2/6	2,0	4,0	80,0	6,0	4	1,00	30
2,5/6	2,5	5,0	80,0	6,0	4	1,25	30
3/3	3,0	5,0	75,0	3,0	4	1,50	30
3/6	3,0	5,0	80,0	6,0	4	1,50	30
4/4	4,0	8,0	75,0	4,0	4	2,00	30
4/6	4,0	8,0	80,0	6,0	4	2,00	30
5/5	5,0	9,0	75,0	5,0	4	2,50	30
5/6	5,0	9,0	100,0	6,0	4	2,50	30
6/6	6,0	10,0	100,0	6,0	4	3,00	30
8/8	8,0	12,0	100,0	8,0	4	4,00	30
10/10	10,0	14,0	100,0	10,0	4	5,00	30
12/12	12,0	16,0	100,0	12,0	4	6,00	30
14/14	14,0	18,0	100,0	14,0	4	7,00	30
16/16	16,0	22,0	150,0	16,0	4	8,00	30
20/20	20,0	26,0	150,0	20,0	4	10,00	30

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



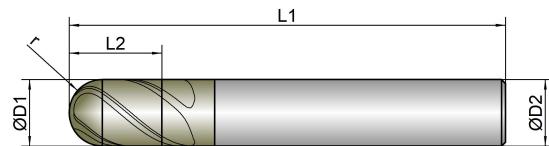
HA K203373



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
200	175	155	115	95										CFK / GFK	Grafit	

K203373	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm (R)	o
0,5	0,5	0,5	50,0	4,0	2	0,25	30
1	1,0	1,0	50,0	4,0	2	0,50	30
1,5	1,5	1,5	50,0	4,0	2	0,75	30
2	2,0	2,0	50,0	4,0	2	1,00	30
2,5	2,5	2,5	50,0	4,0	2	1,25	30
3	3,0	3,0	50,0	6,0	2	1,50	30
4	4,0	4,0	50,0	6,0	2	2,00	30
5	5,0	5,0	50,0	6,0	2	2,50	30
6	6,0	6,0	50,0	6,0	2	3,00	30
8	8,0	8,0	59,0	8,0	2	4,00	30
10	10,0	10,0	66,0	10,0	2	5,00	30
12	12,0	12,0	73,0	12,0	2	6,00	30

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



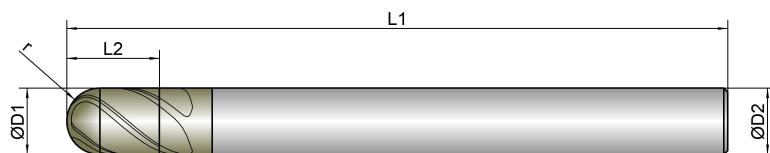
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
200	160	150					100	350						CFK / GFK	Grafit	

K203413		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	
3	3,0		5,0	54,0	6,0	4	1,50	40
4	4,0		8,0	54,0	6,0	4	2,00	40
5	5,0		9,0	54,0	6,0	4	2,50	40
6	6,0		10,0	54,0	6,0	4	3,00	40
8	8,0		12,0	58,0	8,0	4	4,00	40
10	10,0		14,0	66,0	10,0	4	5,00	40
12	12,0		16,0	73,0	12,0	4	6,00	40
16	16,0		22,0	82,0	16,0	4	8,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203418



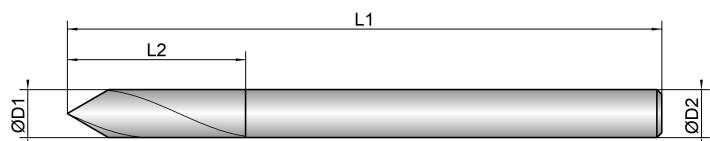
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
190	150	140					90	340								

K203418		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
3		3,0	5,0	83,0	6,0	4	1,50	40
4		4,0	8,0	83,0	6,0	4	2,00	40
5		5,0	9,0	83,0	6,0	4	2,50	40
6		6,0	10,0	83,0	6,0	4	3,00	40
8		8,0	12,0	100,0	8,0	4	4,00	40
10		10,0	14,0	100,0	10,0	4	5,00	40
12		12,0	16,0	100,0	12,0	4	6,00	40
16		16,0	22,0	150,0	16,0	4	8,00	40

Kühlung				
Toleranz	-			
Beschichtung	-			



HA K204001



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	35						40	55	200	●			CFK / GFK	Grafit	

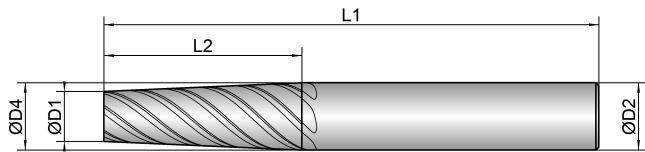
K204001		D1 	L2 	L1 	D2 	z 	
3		3,0	15,0	50,0	3,0	1	30
4		4,0	18,0	50,0	4,0	1	30
6		6,0	20,0	54,0	6,0	1	30

Kühlung	
Toleranz	-
Beschichtung	-

HA **UNI**



HA K204011



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204011	D1 mm ∅	D4 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
	2X10	2	3	10,0	50,0	3,0	4
2,5X10	2,5	3	10,0	50,0	3,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung



HA UNI



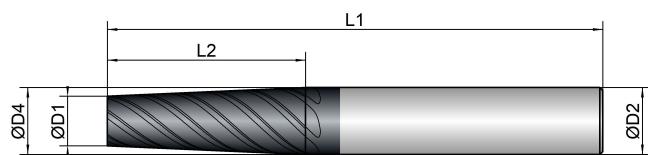
Toleranz

-

Beschichtung

TiAlN- α 

HA K204013



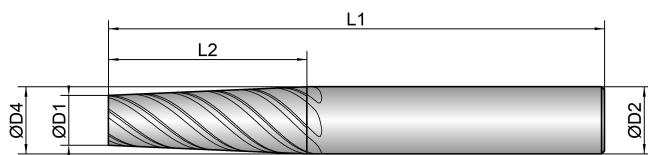
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204013	D1 mm \varnothing	D4 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	3	10,0	50,0	3,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	-



HA K204021



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204021	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45


 HA UNI

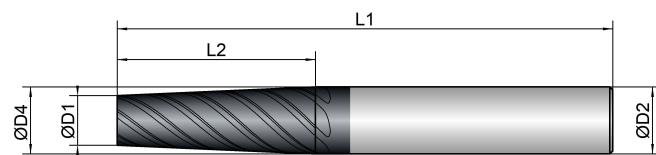

Toleranz

-

Beschichtung

TiAlN- α 

HA K204023



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

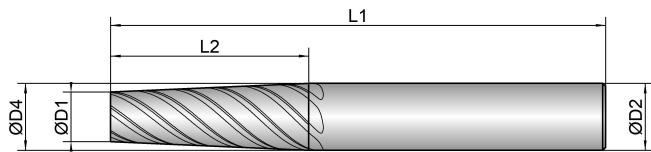
K204023	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	-

HA **UNI**



HA K204031



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204031	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	
	2X10	2	3	10,0	50,0	3,0	4
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung



HA UNI



Toleranz

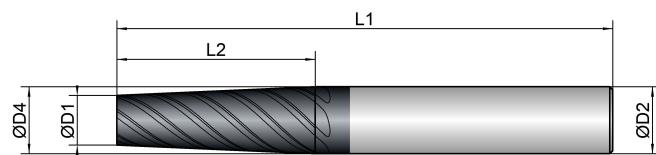
-

Premium

Beschichtung

TiAlN- α 

HA K204033



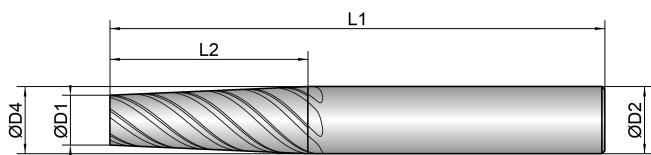
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204033	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung	
Toleranz	-
Beschichtung	-



HA K204041



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●		●	●					

K204041	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

Kühlung



HA UNI



Toleranz

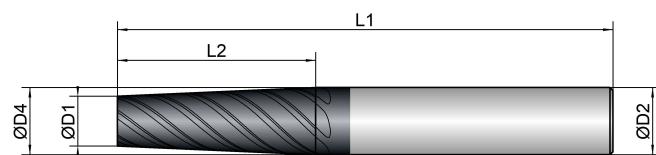
-

Premium

Beschichtung

TiAlN- α 

HA K204043



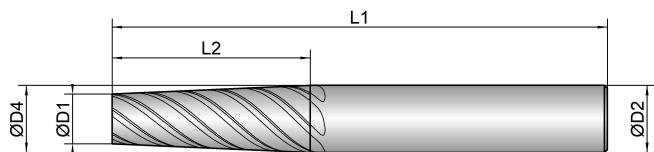
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204043	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

Kühlung	
Toleranz	-
Beschichtung	-



HA K204051



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204051	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	°
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45



HA	UNI
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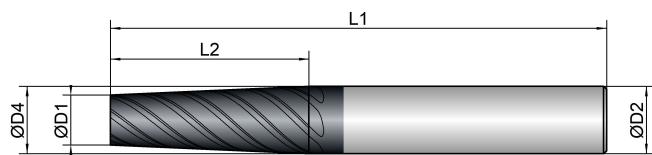
Toleranz

-

Beschichtung

TiAlN- α 

HA K204053



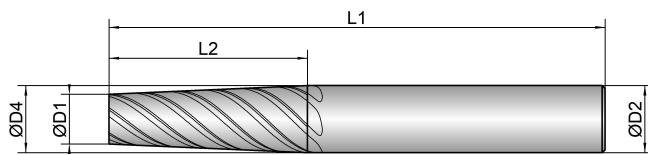
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204053	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45

Kühlung	
Toleranz	-
Beschichtung	-



HA K204061



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
●	●						●	●	●							

K204061	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	Z	o
2X10	2	4	10,0	50,0	4,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45



HA	UNI
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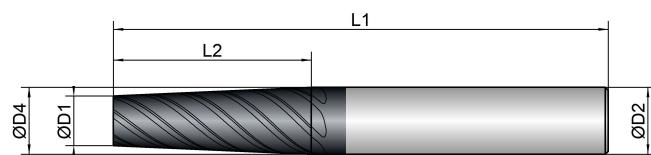
Toleranz

-

Beschichtung

TiAlN- α 

HA K204063



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

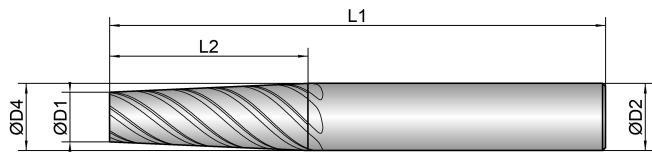
K204063	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
	2X10	2	4	10,0	50,0	4,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	-

HA **UNI**



HA K204071



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

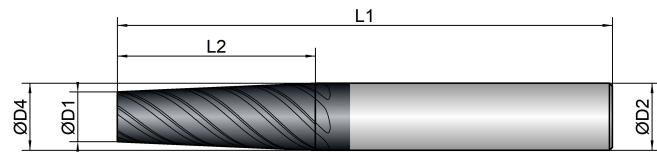
K204071	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X25	2,5	6	25,0	65,0	6,0	4	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	37
5X30	5	10	30,0	85,0	10,0	6	37
5X45	5	12	45,0	100,0	12,0	6	37
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α

HA **UNI**



HA K204073

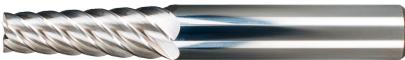


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

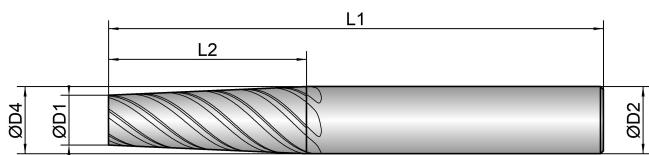
K204073	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X25	2,5	6	25,0	65,0	6,0	4	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	45
5X30	5	10	30,0	85,0	10,0	6	45
5X45	5	12	45,0	100,0	12,0	6	45
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

Kühlung	(4 icons)
Toleranz	-
Beschichtung	-

HA **UNI**



HA K204081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204081	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30
3,5X30	3,5	10	30,0	80,0	10,0	4	30
4X30	4	10	30,0	80,0	10,0	6	45
4,5X30	4,5	10	30,0	80,0	10,0	6	45
5X30	5	12	30,0	84,0	12,0	6	45
5X40	5	12	40,0	100,0	12,0	6	45
6X30	6	12	30,0	93,0	12,0	6	45
6X55	6	16	55,0	110,0	16,0	6	45
8X30	8	14	30,0	90,0	14,0	6	45
8X50	8	18	50,0	114,0	18,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X55	10	20	55,0	115,0	20,0	6	45
12X30	12	18	30,0	93,0	18,0	6	45
12X45	12	20	45,0	100,0	20,0	6	45


 HA UNI

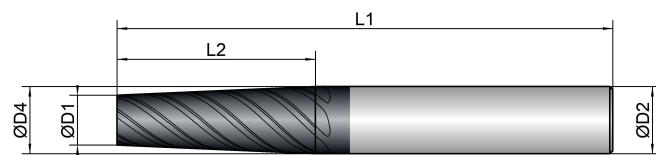

Toleranz

-

Beschichtung

TiAlN- α 

HA K204083



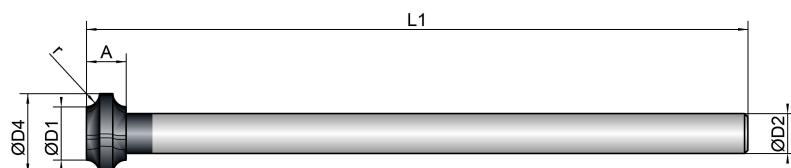
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204083	D1 mm \varnothing	D4 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #		
	2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30	
3,5X30	3,5	10	30,0	80,0	10,0	4	30	
4X30	4	10	30,0	80,0	10,0	6	45	
4,5X30	4,5	10	30,0	80,0	10,0	6	45	
5X30	5	12	30,0	84,0	12,0	6	45	
5X40	5	12	40,0	100,0	12,0	6	45	
6X30	6	12	30,0	93,0	12,0	6	45	
6X55	6	16	55,0	110,0	16,0	6	45	
8X30	8	14	30,0	90,0	14,0	6	45	
8X50	8	18	50,0	114,0	18,0	6	45	
10X30	10	16	30,0	93,0	16,0	6	45	
10X55	10	20	55,0	115,0	20,0	6	45	
12X30	12	18	30,0	93,0	18,0	6	45	
12X45	12	20	45,0	100,0	20,0	6	45	

Kühlung	
Toleranz	0-0,01
Beschichtung	TiAlN- α



HA K204092



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
60	40						35	40	120							

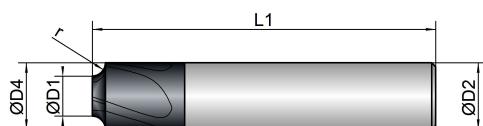
K204092	r 	D1 	D4 	A 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm	mm \varnothing	#
5,6/0,2	0,20	5,6	6	2,0	75,0	4,0	4
7,6/0,2	0,20	7,6	8	2,0	100,0	6,0	4
5,4/0,3	0,30	5,4	6	2,0	75,0	4,0	4
7,4/0,3	0,30	7,4	8	2,0	100,0	6,0	4
5,2/0,4	0,40	5,2	6	2,0	75,0	4,0	4
7,2/0,4	0,40	7,2	8	2,0	100,0	6,0	4
5/0,5	0,50	5	6	2,0	75,0	4,0	4
7/0,5	0,50	7	8	2,0	100,0	6,0	4
8,4/0,8	0,80	8,4	10	4,0	100,0	6,0	4
8/1	1,00	8	10	4,0	100,0	6,0	4
7,6/1,2	1,20	7,6	10	5,0	100,0	6,0	4
7/1,5	1,50	7	10	5,0	100,0	6,0	4
8,4/1,8	1,80	8,4	12	6,0	100,0	6,0	4
8/2	2,00	8	12	7,0	100,0	6,0	4
7/2,5	2,50	7	12	8,0	100,0	6,0	4



Kühlung				
Toleranz	0-0,01			
Beschichtung	TiAlN- α			



HA K204106



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
170	100						85	125	400				25		45	

K204106	r 	D1 	D4 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm \varnothing	#
3,6/0,2	0,20	3,6	4	50,0	4,0	4
3,4/0,3	0,30	3,4	4	50,0	4,0	4
3,2/0,4	0,40	3,2	4	50,0	4,0	4
3/0,5	0,50	3	4	50,0	4,0	4
4,8/0,6	0,60	4,8	6	50,0	6,0	4
4,4/0,8	0,80	4,4	6	50,0	6,0	4
4/1	1,00	4	6	50,0	6,0	4
5/1,5	1,50	5	8	55,0	10,0	4
6/2	2,00	6	10	66,0	10,0	4
7/2,5	2,50	7	12	75,0	12,0	4
6/3	3,00	6	12	75,0	12,0	4
9/3,5	3,50	9	16	80,0	16,0	4
8/4	4,00	8	16	80,0	16,0	4
7/4,5	4,50	7	16	80,0	16,0	4
10/5	5,00	10	20	80,0	20,0	4
8/6	6,00	8	20	80,0	20,0	4
9/8	8,00	9	25	100,0	25,0	4
5/10	10,00	5	25	100,0	25,0	4

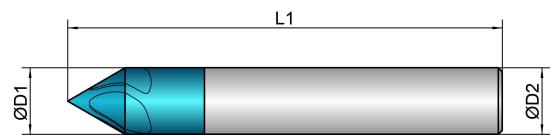
Kühlung	
Toleranz	-
Beschichtung	TiSiN-α



HA K205153



HB K205154



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
65	50	45	40	35									CFK / GFK	Grafit	

K205153		K205154		D1 mm Ø	L1 mm	D2 mm Ø	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung



Toleranz

-

Beschichtung

TiSiN- α

HA

HB

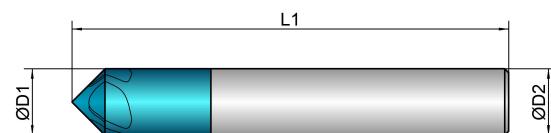
L



HA K205163



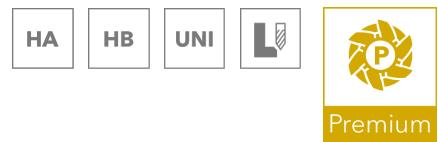
HB K205164



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
65	50	45	40	35									CFK / GFK	Grafit	

K205163		K205164		D1	L1	D2	z
				mm Ø	mm	mm Ø	#
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

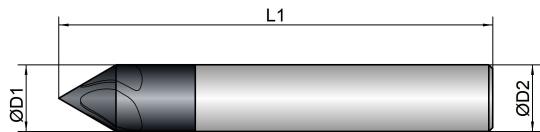
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205173



HB K205174



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205173		K205174		D1 mm \varnothing	L1 mm	D2 mm \varnothing	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

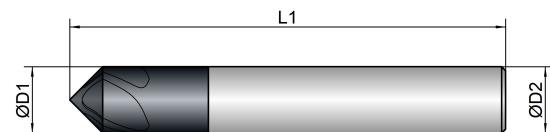
Kühlung				
Toleranz	-			
Beschichtung	TiAlN- α			



HA K205183



HB K205184



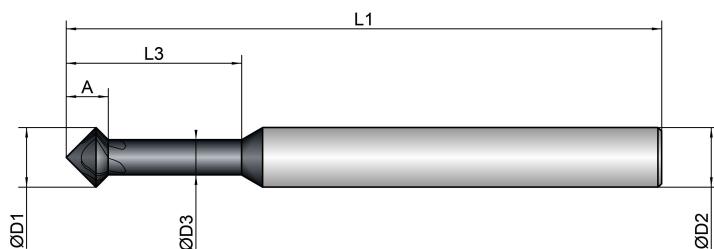
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205183		K205184		D1 mm Ø	L1 mm	D2 mm Ø	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung				
Toleranz	-			
Beschichtung	TiAlN- α			



HA K205193



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	45						40	38	120				25		35	

K205193	D1	D3	A	L3	L1	D2	z
	mm \varnothing	mm \varnothing	mm	mm	mm	mm \varnothing	#
3	3,0	2,2	2,0	10,0	50,0	4,0	4
4	4,0	2,9	2,5	10,0	50,0	4,0	4
5	5,0	3,9	3,0	15,0	65,0	6,0	4
6	6,0	3,9	4,0	15,0	65,0	6,0	4
8	8,0	5,9	2,5	20,0	70,0	8,0	4
10	10,0	5,9	4,0	23,0	73,0	10,0	4
12	12,0	5,9	6,0	23,0	75,0	12,0	4



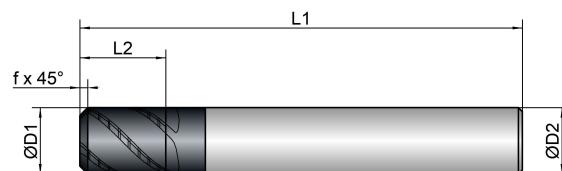
Toleranz d11

Beschichtung TiAlN- α 

HA K206083



HB K206084



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
175	150	125					60	125							40	

K206083		K206084		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
6	6			6,0	8,0	54,0	6,0	4	0,15	45
8	8			8,0	11,0	59,0	8,0	4	0,20	45
10	10			10,0	13,0	67,0	10,0	4	0,20	45
12	12			12,0	16,0	74,0	12,0	4	0,25	45
14	14			14,0	16,0	75,0	14,0	4	0,25	45
16	16			16,0	19,0	83,0	16,0	5	0,35	45
18	18			18,0	19,0	80,0	18,0	5	0,35	45
20	20			20,0	19,0	93,0	20,0	5	0,40	45

Kühlung	
Toleranz	d11
Beschichtung	TiAlN- α



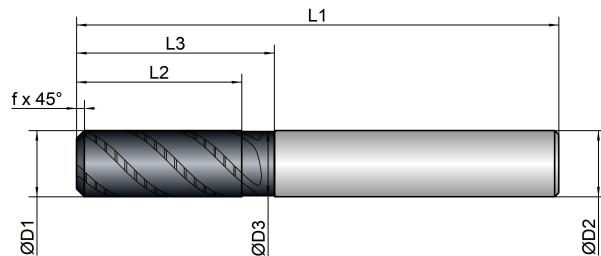
Premium



HA K206093



HB K206094



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
175	150	125					60	125							40

		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
K206093	K206094									
6	6	6,0	5,8	16,0	21,0	58,0	6,0	4	0,15	45
8	8	8,0	7,7	22,0	27,0	70,0	8,0	4	0,20	45
10	10	10,0	9,7	25,0	30,0	73,0	10,0	4	0,20	45
12	12	12,0	11,6	28,0	38,0	84,0	12,0	4	0,25	45
14	14	14,0	13,6	30,0	40,0	84,0	14,0	4	0,25	45
16	16	16,0	15,5	36,0	45,0	93,0	16,0	5	0,35	45
18	18	18,0	17,5	36,0	45,0	93,0	18,0	5	0,35	45
20	20	20,0	19,5	41,0	55,0	104,0	20,0	5	0,40	45
25	25	25,0	24,0	50,0	65,0	125,0	25,0	5	0,50	45



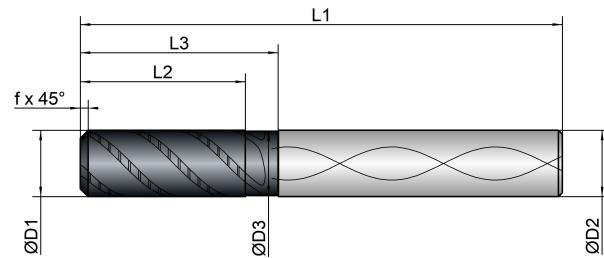
Toleranz d11

Beschichtung TiAlN- α 

HA K206113



HB K206114



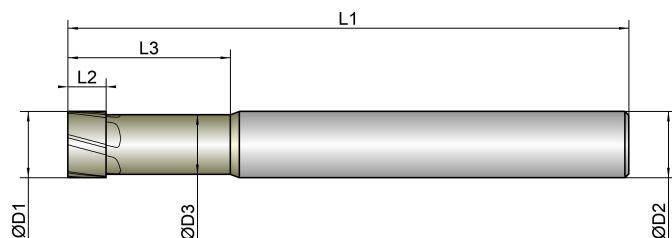
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
200	170	150					70	150							40	

K206113	K206114	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	45° mm	°
6	6	6,0	5,8	16,0	21,0	58,0	6,0	4	0,15	45
8	8	8,0	7,7	22,0	27,0	70,0	8,0	4	0,20	45
10	10	10,0	9,7	25,0	30,0	73,0	10,0	4	0,20	45
12	12	12,0	11,6	28,0	38,0	84,0	12,0	4	0,25	45
14	14	14,0	13,6	30,0	40,0	84,0	14,0	4	0,25	45
16	16	16,0	15,5	36,0	45,0	93,0	16,0	5	0,35	45
18	18	18,0	17,5	36,0	45,0	93,0	18,0	5	0,35	45
20	20	20,0	19,5	41,0	55,0	104,0	20,0	5	0,40	45

Kühlung	
Toleranz	h9
Beschichtung	TiSiN-α



HA K207003



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
150	145	135					100								

K207003	D1	D3	L2	L3	L1	D2	z							
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	mm max	°				
2	2,0	1,7	1,5	13,0	54,0	6,0	2	0,3	0,15	15				
3	3,0	2,7	1,5	15,0	54,0	6,0	2	0,3	0,20	15				
4	4,0	3,6	2,5	16,0	57,0	6,0	2	0,5	0,25	15				
5	5,0	4,6	3,5	18,0	65,0	6,0	4	0,5	0,35	15				
6	6,0	5,2	3,5	20,0	65,0	6,0	4	1,0	0,40	15				
8	8,0	7,0	4,8	24,0	70,0	8,0	5	1,5	0,50	15				
10	10,0	9,0	5,8	26,0	85,0	10,0	5	2,0	0,75	15				
12	12,0	11,0	6,8	30,0	93,0	12,0	5	2,0	0,80	15				
16	16,0	14,5	8,8	35,0	100,0	16,0	5	2,5	1,00	15				

Kühlung	
Toleranz	h9
Beschichtung	TiSiN- α

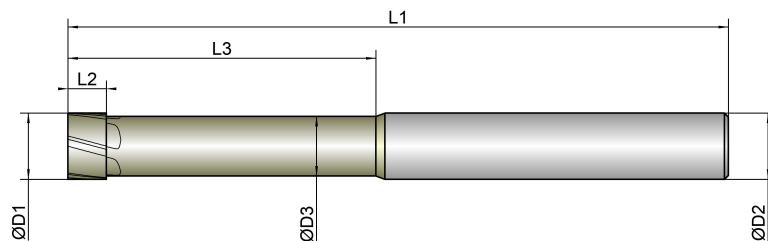
HA HSC UNI

NEW

Expert



HA K207008

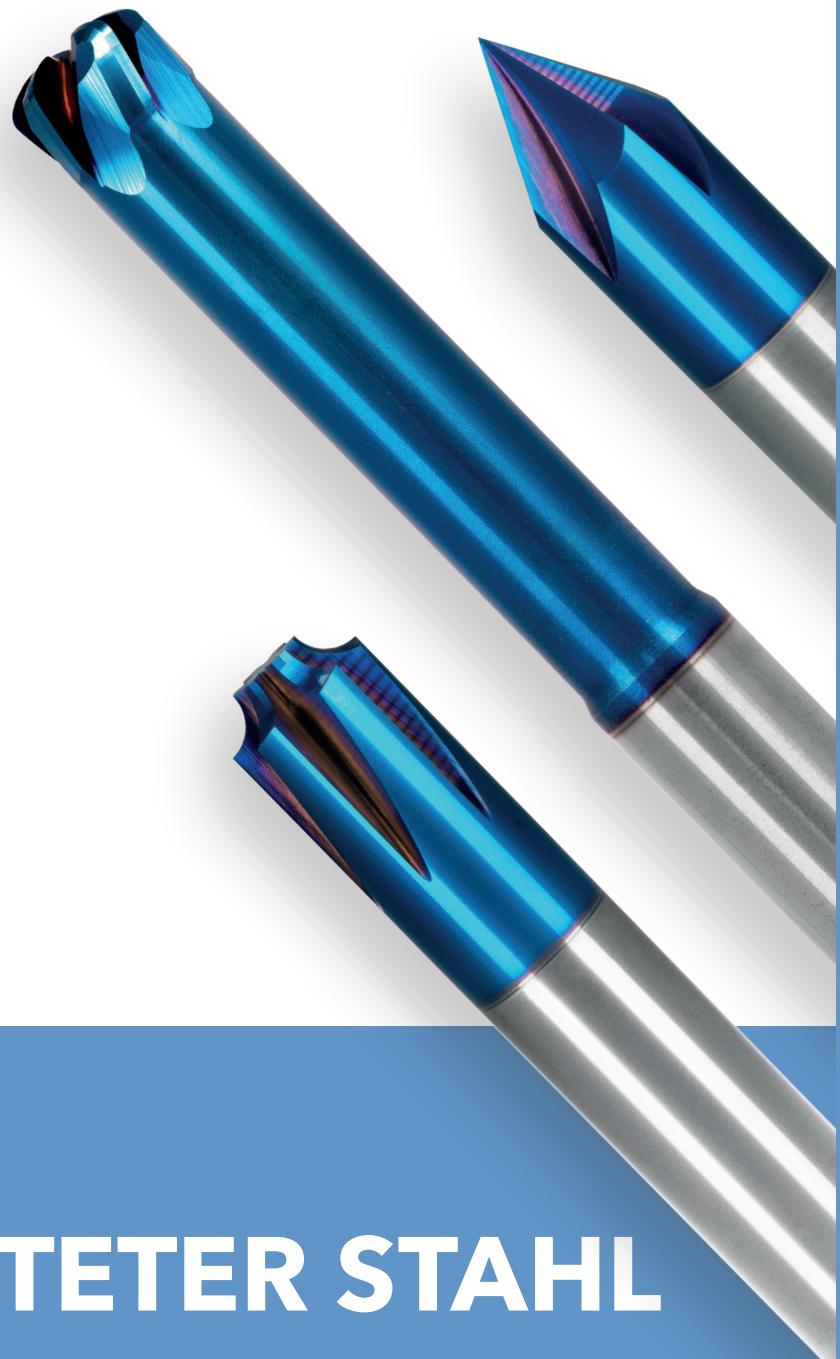


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
130	125	115					80									

K207008	D1	D3	L2	L3	L1	D2	z			
	mm	mm	mm	mm	mm	mm	#	mm	mm	°
2	2,0	1,7	1,5	18,0	75,0	6,0	2	0,3	0,15	15
3	3,0	2,7	1,5	20,0	75,0	6,0	2	0,3	0,20	15
4	4,0	3,6	2,5	24,0	83,0	6,0	2	0,5	0,25	15
5	5,0	4,6	3,5	28,0	100,0	6,0	4	0,5	0,35	15
6	6,0	5,2	3,5	28,0	100,0	6,0	4	1,0	0,40	15
8	8,0	7,0	4,8	40,0	100,0	8,0	5	1,5	0,50	15
10	10,0	9,0	5,8	48,0	100,0	10,0	5	2,0	0,75	15
12	12,0	11,0	6,8	56,0	119,0	12,0	5	2,0	0,80	15
16	16,0	14,5	8,8	65,0	150,0	16,0	5	2,5	1,00	15

GEHÄRTER STAHL





HOFMANN & VRATNY — PRÄZISE TECHNIK

GEHÄRTETER STAHL

Als einer der führenden Hersteller von Fräsern für die Hartbearbeitung bis 70 HRC bieten wir Ihnen ein breites Produktprogramm. Auch Sonderserien mit spezieller Geometrie und höchster Präzision sind Teil unserer Leistung.

Präzise Technik für höchste Ansprüche.

Unsere Hartbearbeitungslinie umfasst ein breites Spektrum an Geometrien und deckt nahezu alle Anwendungsgebiete ab.

Unsere Fräser zur Hartbearbeitung werden bei führenden deutschen Unternehmen im Formenbau sowie der Automobil-, Luft- und Raum-

fahrtindustrie mit Erfolg eingesetzt. Ein wichtiger Erfolgsfaktor ist dabei die Auswahl des am besten geeigneten Hartmetalls. Mit modernsten Fertigungs-, Beschichtungs- und Messverfahren bieten wir Ihnen so hochpräzise Werkzeuge mit geringsten Toleranzen und ausgezeichneter Qualität.

Kühlung



Toleranz

0-0,01

Beschichtung

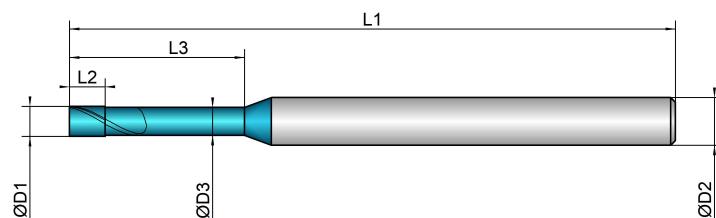
TiSiN- α

HA

HSC

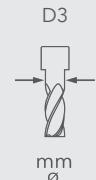
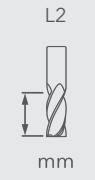
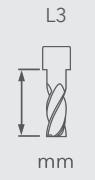
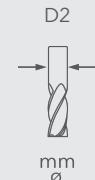
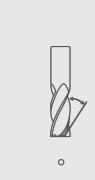


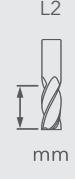
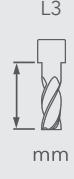
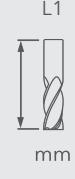
HA K201122



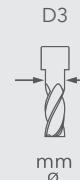
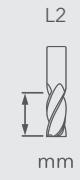
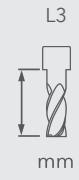
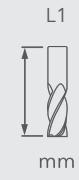
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
200	150	100	60	45	90				145					CFK / GFK	Grafit

K201122	D1 	D3 	L2 	L3 	L1 	D2 	z 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	°
0,2X0,5	0,2	0,18	0,3	0,5	45,0	4,0	2	30
0,2X1	0,2	0,18	0,3	1,0	45,0	4,0	2	30
0,2X1,5	0,2	0,18	0,3	1,5	45,0	4,0	2	30
0,3X1	0,3	0,28	0,4	1,0	45,0	4,0	2	30
0,3X2	0,3	0,28	0,4	2,0	45,0	4,0	2	30
0,3X3	0,3	0,28	0,4	3,0	45,0	4,0	2	30
0,3X6	0,3	0,28	0,4	6,0	45,0	4,0	2	30
0,3X9	0,3	0,28	0,4	9,0	45,0	4,0	2	30
0,4X2	0,4	0,38	0,6	2,0	45,0	4,0	2	30
0,4X3	0,4	0,38	0,6	3,0	45,0	4,0	2	30
0,4X4	0,4	0,38	0,6	4,0	45,0	4,0	2	30
0,4X5	0,4	0,38	0,6	5,0	45,0	4,0	2	30
0,4X8	0,4	0,38	0,6	8,0	45,0	4,0	2	30
0,4X12	0,4	0,38	0,6	12,0	45,0	4,0	2	30
0,5X2	0,5	0,48	0,7	2,0	45,0	4,0	2	30

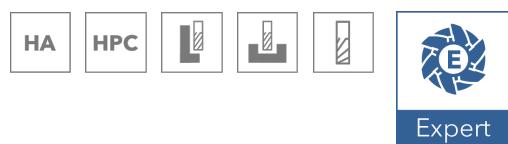
K201122	D1 	D3 	L2 	L3 	L1 	D2 	z 	° 
0,5X4	0,5	0,48	0,7	4,0	45,0	4,0	2	30
0,5X6	0,5	0,48	0,7	6,0	45,0	4,0	2	30
0,5X8	0,5	0,48	0,7	8,0	45,0	4,0	2	30
0,5X10	0,5	0,48	0,7	10,0	50,0	4,0	2	30
0,5X15	0,5	0,48	0,7	15,0	50,0	4,0	2	30
0,6X2	0,6	0,58	0,9	2,0	45,0	4,0	2	30
0,6X4	0,6	0,58	0,9	4,0	45,0	4,0	2	30
0,6X6	0,6	0,58	0,9	6,0	45,0	4,0	2	30
0,6X8	0,6	0,58	0,9	8,0	45,0	4,0	2	30
0,6X10	0,6	0,58	0,9	10,0	45,0	4,0	2	30
0,6X12	0,6	0,58	0,9	12,0	50,0	4,0	2	30
0,6X18	0,6	0,58	0,9	18,0	50,0	4,0	2	30
0,7X2	0,7	0,68	1,0	2,0	45,0	4,0	2	30
0,7X4	0,7	0,68	1,0	4,0	45,0	4,0	2	30
0,7X6	0,7	0,68	1,0	6,0	45,0	4,0	2	30
0,7X8	0,7	0,68	1,0	8,0	45,0	4,0	2	30
0,7X10	0,7	0,68	1,0	10,0	50,0	4,0	2	30
0,8X4	0,8	0,78	1,2	4,0	45,0	4,0	2	30
0,8X6	0,8	0,78	1,2	6,0	45,0	4,0	2	30
0,8X8	0,8	0,78	1,2	8,0	45,0	4,0	2	30
0,8X10	0,8	0,78	1,2	10,0	50,0	4,0	2	30
0,8X12	0,8	0,78	1,2	12,0	50,0	4,0	2	30
0,8X16	0,8	0,78	1,2	16,0	50,0	4,0	2	30
0,8X24	0,8	0,78	1,2	24,0	60,0	4,0	2	30
0,9X4	0,9	0,88	1,3	4,0	45,0	4,0	2	30
0,9X6	0,9	0,88	1,3	6,0	45,0	4,0	2	30
0,9X8	0,9	0,88	1,3	8,0	45,0	4,0	2	30
0,9X10	0,9	0,88	1,3	10,0	45,0	4,0	2	30
0,9X15	0,9	0,88	1,3	15,0	50,0	4,0	2	30
1X4	1,0	0,95	1,5	4,0	45,0	4,0	2	30

K201122	D1 	D3 	L2 	L3 	L1 	D2 	z 	° 
	mm	mm	mm	mm	mm	mm	#	°
1X6	1,0	0,95	1,5	6,0	45,0	4,0	2	30
1X8	1,0	0,95	1,5	8,0	45,0	4,0	2	30
1X10	1,0	0,95	1,5	10,0	45,0	4,0	2	30
1X12	1,0	0,95	1,5	12,0	45,0	4,0	2	30
1X14	1,0	0,95	1,5	14,0	45,0	4,0	2	30
1X16	1,0	0,95	1,5	16,0	50,0	4,0	2	30
1X20	1,0	0,95	1,5	20,0	54,0	4,0	2	30
1X25	1,0	0,95	1,5	25,0	70,0	4,0	2	30
1X30	1,0	0,95	1,5	30,0	70,0	4,0	2	30
1,2X6	1,2	1,14	1,8	6,0	45,0	4,0	2	30
1,2X8	1,2	1,14	1,8	8,0	45,0	4,0	2	30
1,2X10	1,2	1,14	1,8	10,0	45,0	4,0	2	30
1,2X12	1,2	1,14	1,8	12,0	45,0	4,0	2	30
1,2X16	1,2	1,14	1,8	16,0	50,0	4,0	2	30
1,2X20	1,2	1,14	1,8	20,0	60,0	4,0	2	30
1,4X6	1,4	1,34	2,1	6,0	45,0	4,0	2	30
1,4X8	1,4	1,34	2,1	8,0	45,0	4,0	2	30
1,4X10	1,4	1,34	2,1	10,0	45,0	4,0	2	30
1,4X12	1,4	1,34	2,1	12,0	45,0	4,0	2	30
1,4X14	1,4	1,34	2,1	14,0	45,0	4,0	2	30
1,4X16	1,4	1,34	2,1	16,0	50,0	4,0	2	30
1,4X22	1,4	1,34	2,1	22,0	54,0	4,0	2	30
1,5X6	1,5	1,44	2,3	6,0	45,0	4,0	2	30
1,5X8	1,5	1,44	2,3	8,0	45,0	4,0	2	30
1,5X10	1,5	1,44	2,3	10,0	45,0	4,0	2	30
1,5X12	1,5	1,44	2,3	12,0	45,0	4,0	2	30
1,5X14	1,5	1,44	2,3	14,0	50,0	4,0	2	30
1,5X16	1,5	1,44	2,3	16,0	50,0	4,0	2	30
1,5X18	1,5	1,44	2,3	18,0	54,0	4,0	2	30
1,5X20	1,5	1,44	2,3	20,0	54,0	4,0	2	30

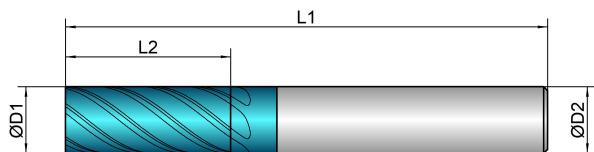
K201122	D1 mm ∅	D3 mm ∅	L2 mm	L3 mm	L1 mm	D2 mm ∅	z #	°
1,5X25	1,5	1,44	2,3	25,0	70,0	4,0	2	30
1,5X30	1,5	1,44	2,3	30,0	70,0	4,0	2	30
1,5X35	1,5	1,44	2,3	35,0	70,0	4,0	2	30
1,5X40	1,5	1,44	2,3	40,0	80,0	4,0	2	30
1,5X45	1,5	1,44	2,3	45,0	80,0	4,0	2	30
1,6X6	1,6	1,51	2,4	6,0	45,0	4,0	2	30
1,6X8	1,6	1,51	2,4	8,0	45,0	4,0	2	30
1,6X10	1,6	1,51	2,4	10,0	45,0	4,0	2	30
1,6X12	1,6	1,51	2,4	12,0	45,0	4,0	2	30
1,6X14	1,6	1,51	2,4	14,0	50,0	4,0	2	30
1,6X16	1,6	1,51	2,4	16,0	50,0	4,0	2	30
1,6X18	1,6	1,51	2,4	18,0	54,0	4,0	2	30
1,6X20	1,6	1,51	2,4	20,0	54,0	4,0	2	30
1,6X26	1,6	1,51	2,4	26,0	60,0	4,0	2	30
1,8X6	1,8	1,71	2,7	6,0	45,0	4,0	2	30
1,8X8	1,8	1,71	2,7	8,0	45,0	4,0	2	30
1,8X10	1,8	1,71	2,7	10,0	45,0	4,0	2	30
1,8X12	1,8	1,71	2,7	12,0	45,0	4,0	2	30
1,8X14	1,8	1,71	2,7	14,0	50,0	4,0	2	30
1,8X16	1,8	1,71	2,7	16,0	50,0	4,0	2	30
1,8X18	1,8	1,71	2,7	18,0	54,0	4,0	2	30
1,8X20	1,8	1,71	2,7	20,0	54,0	4,0	2	30
1,8X25	1,8	1,71	2,7	25,0	60,0	4,0	2	30
2X6	2,0	1,91	3,0	6,0	45,0	4,0	2	30
2X8	2,0	1,91	3,0	8,0	45,0	4,0	2	30
2X10	2,0	1,91	3,0	10,0	45,0	4,0	2	30
2X12	2,0	1,91	3,0	12,0	45,0	4,0	2	30
2X14	2,0	1,91	3,0	14,0	50,0	4,0	2	30
2X16	2,0	1,91	3,0	16,0	50,0	4,0	2	30
2X18	2,0	1,91	3,0	18,0	54,0	4,0	2	30

	D1 	D3 	L2 	L3 	L1 	D2 	z 	° 
K201122								
2X20	2,0	1,91	3,0	20,0	54,0	4,0	2	30
2X25	2,0	1,91	3,0	25,0	60,0	4,0	2	30
2X30	2,0	1,91	3,0	30,0	70,0	4,0	2	30
2X35	2,0	1,91	3,0	35,0	80,0	4,0	2	30
2X40	2,0	1,91	3,0	40,0	90,0	4,0	2	30
2X50	2,0	1,91	3,0	50,0	100,0	4,0	2	30
2X60	2,0	1,91	3,0	60,0	110,0	4,0	2	30
2,5X8	2,5	2,41	3,7	8,0	45,0	4,0	2	30
2,5X10	2,5	2,41	3,7	10,0	45,0	4,0	2	30
2,5X12	2,5	2,41	3,7	12,0	45,0	4,0	2	30
2,5X14	2,5	2,41	3,7	14,0	50,0	4,0	2	30
2,5X16	2,5	2,41	3,7	16,0	50,0	4,0	2	30
2,5X18	2,5	2,41	3,7	18,0	54,0	4,0	2	30
2,5X20	2,5	2,41	3,7	20,0	54,0	4,0	2	30
2,5X25	2,5	2,41	3,7	25,0	60,0	4,0	2	30
2,5X30	2,5	2,41	3,7	30,0	70,0	4,0	2	30
2,5X40	2,5	2,41	3,7	40,0	90,0	4,0	2	30
2,5X50	2,5	2,41	3,7	50,0	100,0	4,0	2	30
3X8	3,0	2,92	4,5	8,0	45,0	4,0	2	30
3X12	3,0	2,92	4,5	12,0	45,0	4,0	2	30
3X16	3,0	2,92	4,5	16,0	50,0	4,0	2	30
3X20	3,0	2,92	4,5	20,0	54,0	4,0	2	30

Kühlung		
Toleranz	e8	
Beschichtung	TiSiN- α	



HA K201523



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
180	175	150	105	90										CFK / GFK	Grafit	

K201523	D1	L2	L1	D2	z	
	mm \varnothing	mm	mm	mm \varnothing	#	°
2X8	2,0	8,0	58,0	6,0	4	37,5
3X12	3,0	12,0	58,0	6,0	4	37,5
4X13	4,0	13,0	58,0	6,0	4	37,5
5X15	5,0	15,0	58,0	6,0	6	37,5
6X16	6,0	16,0	58,0	6,0	6	37,5
8X22	8,0	22,0	70,0	8,0	6	37,5
10X25	10,0	25,0	73,0	10,0	6	37,5
12X28	12,0	28,0	84,0	12,0	6	37,5
14X30	14,0	30,0	84,0	14,0	6	37,5
16X36	16,0	36,0	93,0	16,0	8	37,5
18X36	18,0	36,0	93,0	18,0	10	37,5
20X41	20,0	41,0	104,0	20,0	10	37,5

Kühlung



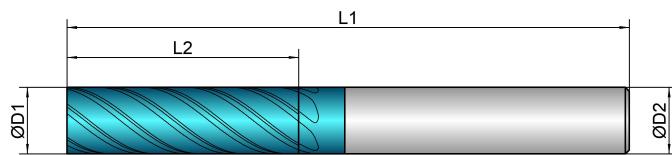
Toleranz

e8

Beschichtung

TiSiN- α
HA ETC HPC L U T

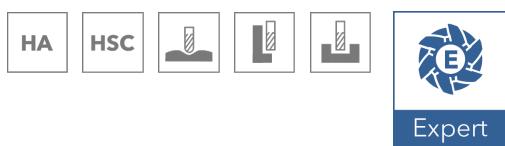

HA K201533



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			180	175	150	110	40						CFK / GFK	Grafit	

K201533	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	
	6X21	6,0	21,0	65,0	6,0	37,5
8X28	8,0	28,0	75,0	8,0	6	37,5
10X35	10,0	35,0	85,0	10,0	6	37,5
12X45	12,0	45,0	100,0	12,0	6	37,5
14X45	14,0	45,0	100,0	14,0	6	37,5
16X50	16,0	50,0	110,0	16,0	8	37,5
16X65	16,0	65,0	125,0	16,0	8	37,5
18X54	18,0	54,0	114,0	18,0	10	37,5
20X55	20,0	55,0	126,0	20,0	10	37,5
20X70	20,0	70,0	135,0	20,0	10	37,5
20X75	20,0	75,0	135,0	20,0	10	37,5
25X75	25,0	75,0	150,0	25,0	10	37,5

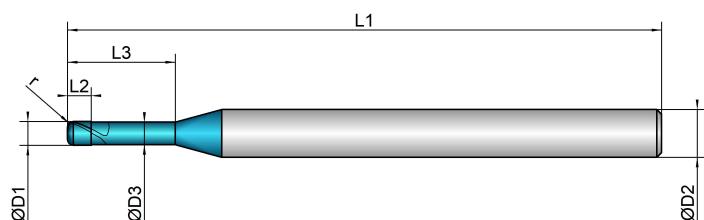
Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



Expert



HA K202082

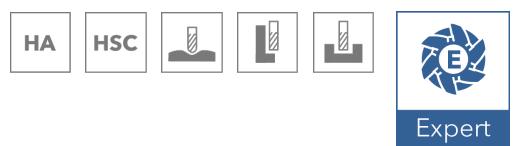


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

K202082	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
0,4X1	0,4	0,38	0,4	1,0	50,0	4,0	2	0,10	30
0,4X1,5	0,4	0,38	0,4	1,5	50,0	4,0	2	0,10	30
0,4X2	0,4	0,38	0,4	2,0	50,0	4,0	2	0,10	30
0,4X3	0,4	0,38	0,4	3,0	50,0	4,0	2	0,10	30
0,4X4	0,4	0,38	0,4	4,0	50,0	4,0	2	0,10	30
0,5X1	0,5	0,48	0,5	1,0	50,0	4,0	2	0,10	30
0,5X2	0,5	0,48	0,5	2,0	50,0	4,0	2	0,10	30
0,5X3	0,5	0,48	0,5	3,0	50,0	4,0	2	0,10	30
0,5X4	0,5	0,48	0,5	4,0	50,0	4,0	2	0,10	30
0,5X5	0,5	0,48	0,5	5,0	50,0	4,0	2	0,10	30
0,5X6	0,5	0,48	0,5	6,0	50,0	4,0	2	0,10	30
0,6X2	0,6	0,58	0,6	2,0	50,0	4,0	2	0,10	30
0,6X3	0,6	0,58	0,6	3,0	50,0	4,0	2	0,10	30
0,6X4	0,6	0,58	0,6	4,0	50,0	4,0	2	0,10	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202082									
0,6X6	0,6	0,58	0,6	6,0	50,0	4,0	2	0,10	30
0,6X8	0,6	0,58	0,6	8,0	50,0	4,0	2	0,10	30
0,7X4	0,7	0,68	0,7	4,0	50,0	4,0	2	0,10	30
0,7X6	0,7	0,68	0,7	6,0	50,0	4,0	2	0,10	30
0,8X4	0,8	0,78	0,8	4,0	50,0	4,0	2	0,10	30
0,8X6	0,8	0,78	0,8	6,0	50,0	4,0	2	0,10	30
1X2	1,0	0,95	1,0	2,0	50,0	4,0	2	0,10	30
1X4	1,0	0,95	1,0	4,0	50,0	4,0	2	0,10	30
1X6	1,0	0,95	1,0	6,0	50,0	4,0	2	0,10	30
1X8	1,0	0,95	1,0	8,0	50,0	4,0	2	0,10	30
1X10	1,0	0,95	1,0	10,0	50,0	4,0	2	0,10	30
1X12	1,0	0,95	1,0	12,0	54,0	4,0	2	0,10	30
1X16	1,0	0,95	1,0	16,0	60,0	4,0	2	0,10	30
1X20	1,0	0,95	1,0	20,0	60,0	4,0	2	0,10	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,10	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,10	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,10	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,10	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,10	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,10	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,10	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,10	30

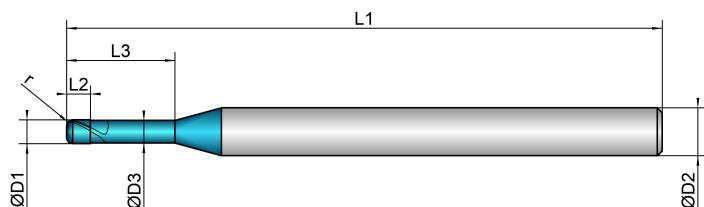
Kühlung				
Toleranz	0-0,01			
Beschichtung	TiSiN- α			



Expert



HA K202092



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

K202092	D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
0,8X4	0,8	0,78	0,8	4,0	50,0	4,0	2	0,20	30
0,8X6	0,8	0,78	0,8	6,0	50,0	4,0	2	0,20	30
1X2	1,0	0,95	1,0	2,0	50,0	4,0	2	0,20	30
1X4	1,0	0,95	1,0	4,0	50,0	4,0	2	0,20	30
1X6	1,0	0,95	1,0	6,0	50,0	4,0	2	0,20	30
1X8	1,0	0,95	1,0	8,0	50,0	4,0	2	0,20	30
1X10	1,0	0,95	1,0	10,0	50,0	4,0	2	0,20	30
1X12	1,0	0,95	1,0	12,0	54,0	4,0	2	0,20	30
1X16	1,0	0,95	1,0	16,0	60,0	4,0	2	0,20	30
1X20	1,0	0,95	1,0	20,0	60,0	4,0	2	0,20	30
1,2X6	1,2	1,14	1,2	6,0	50,0	4,0	2	0,20	30
1,2X12	1,2	1,14	1,2	12,0	54,0	4,0	2	0,20	30

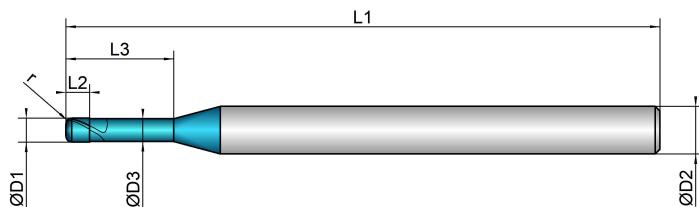


	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202092									
1,2X20	1,2	1,14	1,2	20,0	60,0	4,0	2	0,20	30
1,5X4	1,5	1,44	1,5	4,0	50,0	4,0	2	0,20	30
1,5X6	1,5	1,44	1,5	6,0	50,0	4,0	2	0,20	30
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,20	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,20	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,20	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,20	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,20	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,20	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,20	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,20	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,20	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,20	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,20	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,20	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,20	30

Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



HA K202102



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

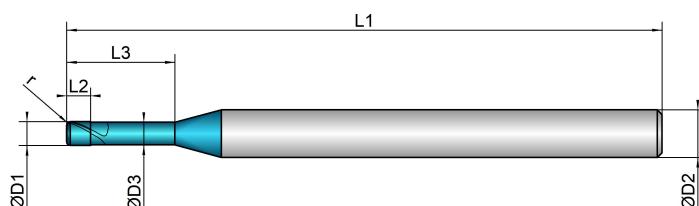
K202102		D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	o
1X2		1,0	0,95	1,0	2,0	50,0	4,0	2	0,30	30
1X4		1,0	0,95	1,0	4,0	50,0	4,0	2	0,30	30
1X6		1,0	0,95	1,0	6,0	50,0	4,0	2	0,30	30
1X8		1,0	0,95	1,0	8,0	50,0	4,0	2	0,30	30
1X10		1,0	0,95	1,0	10,0	50,0	4,0	2	0,30	30
1X12		1,0	0,95	1,0	12,0	54,0	4,0	2	0,30	30
1X16		1,0	0,95	1,0	16,0	60,0	4,0	2	0,30	30
1X20		1,0	0,95	1,0	20,0	60,0	4,0	2	0,30	30
1,2X6		1,2	1,14	1,2	6,0	50,0	4,0	2	0,30	30
1,2X12		1,2	1,14	1,2	12,0	54,0	4,0	2	0,30	30
1,2X20		1,2	1,14	1,2	20,0	60,0	4,0	2	0,30	30
1,5X4		1,5	1,44	1,5	4,0	50,0	4,0	2	0,30	30
1,5X6		1,5	1,44	1,5	6,0	50,0	4,0	2	0,30	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202102									
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,30	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,30	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,30	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,30	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,30	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,30	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,30	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,30	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,30	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,30	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,30	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,30	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,30	30
2,5X10	2,5	2,41	2,5	10,0	50,0	4,0	2	0,30	30
2,5X12	2,5	2,41	2,5	12,0	60,0	4,0	2	0,30	30
2,5X30	2,5	2,41	2,5	30,0	70,0	4,0	2	0,30	30
3X10	3,0	2,92	4,5	10,0	50,0	4,0	2	0,30	30
3X12	3,0	2,92	4,5	12,0	50,0	4,0	2	0,30	30
3X30	3,0	2,92	4,5	30,0	70,0	4,0	2	0,30	30

Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



HA K202112



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

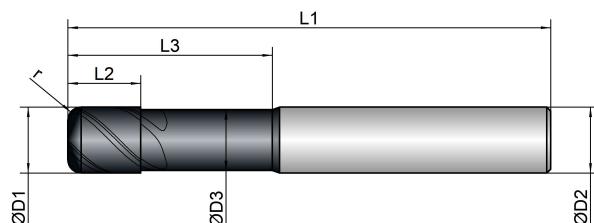
K202112	D1 mm	D3 mm	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	
	\varnothing	\varnothing	\varnothing	\varnothing	\varnothing	\varnothing	#	mm	°
1,5X4	1,5	1,44	1,5	4,0	50,0	4,0	2	0,50	30
1,5X6	1,5	1,44	1,5	6,0	50,0	4,0	2	0,50	30
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,50	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,50	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,50	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,50	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,50	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,50	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,50	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,50	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,50	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,50	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,50	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,50	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,50	30
2,5X10	2,5	2,41	2,5	10,0	50,0	4,0	2	0,50	30
2,5X12	2,5	2,41	2,5	12,0	60,0	4,0	2	0,50	30
2,5X30	2,5	2,41	2,5	30,0	70,0	4,0	2	0,50	30
3X10	3,0	2,92	4,5	10,0	50,0	4,0	2	0,50	30
3X12	3,0	2,92	4,5	12,0	50,0	4,0	2	0,50	30
3X30	3,0	2,92	4,5	30,0	70,0	4,0	2	0,50	30



Toleranz e8

Beschichtung TiAlN- α 

HA K202163



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	80	70	40	35			85	95						CFK / GFK	Grafit

K202163	D1 mm	Ø	D3 mm	Ø	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	o
	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	45		
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	45		
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	45		
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	0,40	45		
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	45		
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	45		
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	45		
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	45		
5/1	5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	45		
6/0,5	6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	45		
6/1	6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	45		
6/1,5	6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	45		
8/0,5	8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	45		

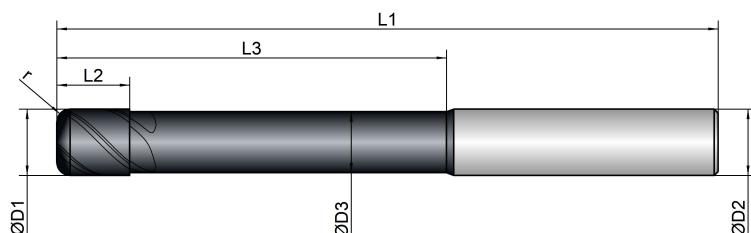
K202163									
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	50,0	104,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	50,0	104,0	20,0	4	2,50	45



Toleranz e8

Beschichtung TiAlN- α 

HA K202173



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
120	80	70	40	35			85	95								

K202173	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	o
	mm	mm	mm	mm	mm	mm	#	mm	°
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	45
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	45
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	45
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	45
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	45
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	45
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	45
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	45
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	45
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	45
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	45
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	45

K202173									
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	45



Premium

Kühlung

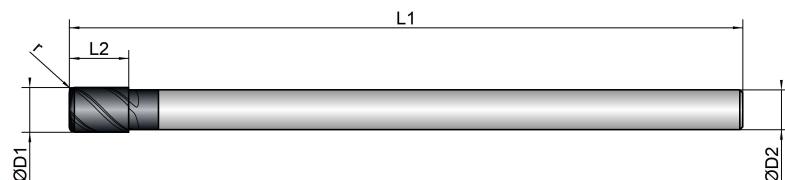
Toleranz

e8

Beschichtung

TiAlN- α 

HA K202202



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
75	55	50	28	23			65	70							

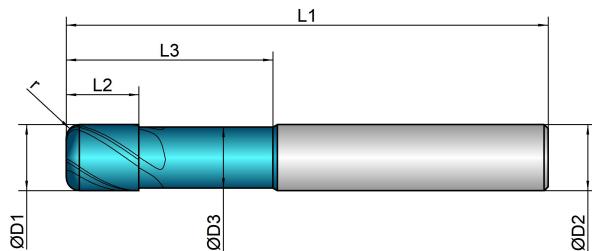
K202202	D1	L2	L1	D2	z	r	°
	mm Ø	mm	mm	mm Ø	#	mm	
7/0,5	7,0	9,0	121,0	6,0	4	0,50	45
7/1	7,0	9,0	121,0	6,0	4	1,00	45
7/1,5	7,0	9,0	121,0	6,0	4	1,50	45
9/0,5	9,0	12,0	136,0	8,0	4	0,50	45
9/1	9,0	12,0	136,0	8,0	4	1,00	45
9/1,5	9,0	12,0	136,0	8,0	4	1,50	45
11/1	11,0	15,0	150,0	10,0	4	1,00	45
11/1,5	11,0	15,0	150,0	10,0	4	1,50	45
11/2	11,0	15,0	150,0	10,0	4	2,00	45
13/1	13,0	18,0	160,0	12,0	4	1,00	45
13/1,5	13,0	18,0	160,0	12,0	4	1,50	45
13/2	13,0	18,0	160,0	12,0	4	2,00	45
15/1	15,0	21,0	160,0	14,0	4	1,00	45
15/1,5	15,0	21,0	160,0	14,0	4	1,50	45
15/2	15,0	21,0	160,0	14,0	4	2,00	45
17/1	17,0	24,0	180,0	16,0	4	1,00	45
17/1,5	17,0	24,0	180,0	16,0	4	1,50	45
17/2	17,0	24,0	180,0	16,0	4	2,00	45
17/3	17,0	24,0	180,0	16,0	4	3,00	45

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

Expert						



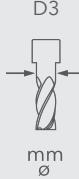
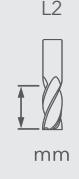
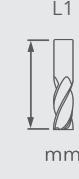
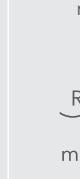
HA K202223



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			210	175	155	120	90						CFK / GFK	Grafit	

K202223	D1	D3	L2	L3	L1	D2	z	r	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
1/0,1	1,0	0,85	1,5	10,0	50,0	3,0	4	0,10	35
1/0,2	1,0	0,85	1,5	10,0	50,0	3,0	4	0,20	35
2/0,2	2,0	1,8	2,5	12,0	50,0	3,0	4	0,20	35
2/0,3	2,0	1,8	2,5	12,0	50,0	3,0	4	0,30	35
2/0,5	2,0	1,8	2,5	12,0	50,0	3,0	4	0,50	35
3/0,25	3,0	2,7	4,0	14,0	50,0	3,0	4	0,25	35
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	35
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	35
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	35
4/0,2	4,0	3,7	5,0	16,0	50,0	4,0	4	0,20	35
4/0,25	4,0	3,7	5,0	16,0	50,0	4,0	4	0,25	35
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	35
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	35
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	35
5/0,25	5,0	4,6	6,0	18,0	54,0	5,0	4	0,25	35
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	35



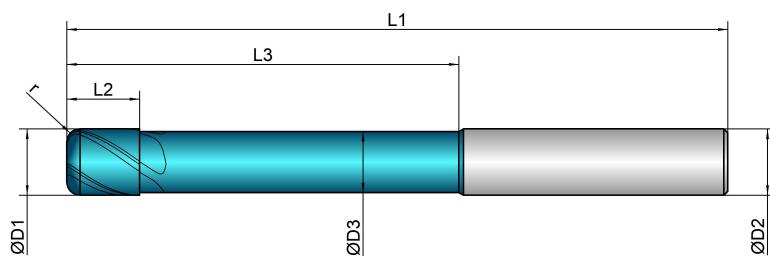
	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	° 
K202223									
5/1	5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	35
6/0,25	6,0	5,5	7,0	21,0	58,0	6,0	4	0,25	35
6/0,5	6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	35
6/0,8	6,0	5,5	7,0	21,0	58,0	6,0	4	0,80	35
6/1	6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	35
6/1,5	6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	35
6/2	6,0	5,5	7,0	21,0	58,0	6,0	4	2,00	35
8/0,25	8,0	7,4	9,0	27,0	64,0	8,0	4	0,25	35
8/0,5	8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	35
8/0,8	8,0	7,4	9,0	27,0	64,0	8,0	4	0,80	35
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	35
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	35
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	35
8/2,5	8,0	7,4	9,0	27,0	64,0	8,0	4	2,50	35
8/3	8,0	7,4	9,0	27,0	64,0	8,0	4	3,00	35
10/0,25	10,0	9,2	11,0	32,0	73,0	10,0	4	0,25	35
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	35
10/0,8	10,0	9,2	11,0	32,0	73,0	10,0	4	0,80	35
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	35
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	35
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	35
10/3	10,0	9,2	11,0	32,0	73,0	10,0	4	3,00	35
10/3,5	10,0	9,2	11,0	32,0	73,0	10,0	4	3,50	35
12/0,5	12,0	9,2	12,0	38,0	84,0	12,0	4	0,50	35
12/1	12,0	9,2	12,0	38,0	84,0	12,0	4	1,00	35
12/1,5	12,0	9,2	12,0	38,0	84,0	12,0	4	1,50	35
12/2	12,0	9,2	12,0	38,0	84,0	12,0	4	2,00	35
12/3	12,0	9,2	12,0	38,0	84,0	12,0	4	3,00	35
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	35
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	35
16/3	16,0	15,0	16,0	44,0	93,0	16,0	4	3,00	35
20/1	20,0	18,5	20,0	55,0	104,0	20,0	4	1,00	35
20/2,5	20,0	18,5	20,0	55,0	104,0	20,0	4	2,50	35

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

Expert						



HA K202233



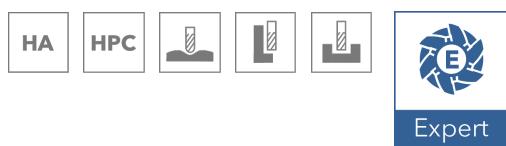
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			210	175	155	120	90						CFK / GFK	Grafit	

K202233		D1 mm ø	D3 mm ø	L2 mm	L3 mm	L1 mm	D2 mm ø	z #	r mm	°
1/0,1		1,0	0,85	1,5	20,0	75,0	3,0	4	0,10	35
1/0,2		1,0	0,85	1,5	20,0	75,0	3,0	4	0,20	35
2/0,2		2,0	1,8	2,5	25,0	75,0	3,0	4	0,20	35
2/0,3		2,0	1,8	2,5	25,0	75,0	3,0	4	0,30	35
2/0,5		2,0	1,8	2,5	25,0	75,0	3,0	4	0,50	35
3/0,25		3,0	2,7	4,0	32,0	75,0	3,0	4	0,25	35
3/0,3		3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	35
3/0,5		3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	35
3/1		3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	35
4/0,2		4,0	3,7	5,0	36,0	75,0	4,0	4	0,20	35
4/0,25		4,0	3,7	5,0	36,0	75,0	4,0	4	0,25	35
4/0,4		4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	35
4/0,5		4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	35
4/1		4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	35
5/0,25		5,0	4,6	6,0	40,0	75,0	5,0	4	0,25	35

VHM Torusfräser lang TiSiN HPC / HSC | K202233

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202233									
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	35
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	35
6/0,25	6,0	5,5	7,0	44,0	80,0	6,0	4	0,25	35
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	35
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	35
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	35
8/0,25	8,0	7,4	9,0	54,0	100,0	8,0	4	0,25	35
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	35
8/0,8	8,0	7,4	9,0	54,0	100,0	8,0	4	0,80	35
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	35
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	35
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	35
8/3	8,0	7,4	9,0	54,0	100,0	8,0	4	3,00	35
10/0,25	10,0	9,2	11,0	60,0	100,0	10,0	4	0,25	35
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	35
10/0,8	10,0	9,2	11,0	60,0	100,0	10,0	4	0,80	35
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	35
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	35
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	35
10/3	10,0	9,2	11,0	60,0	100,0	10,0	4	3,00	35
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	35
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	35
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	35
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	35
12/3	12,0	11,0	12,0	75,0	120,0	12,0	4	3,00	35
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	35
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	35
16/3	16,0	15,0	16,0	92,0	150,0	16,0	4	3,00	35
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	35
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	35

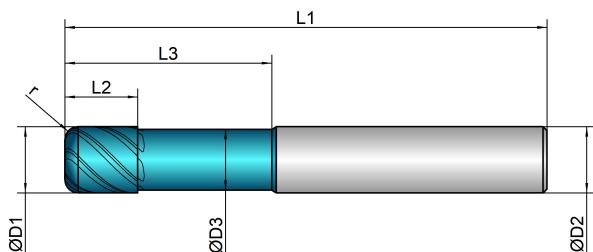
Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α



Expert



HA K202253

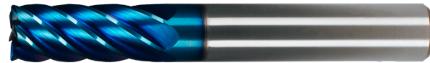


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
205	175	160	100	65											

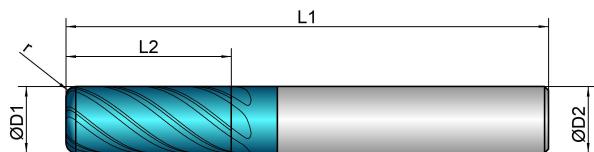
K202253		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
3/0,3		3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	45
3/0,5		3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	45
3/1		3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	45
4/0,4		4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	45
4/0,5		4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	45
4/1		4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	45
5/0,5		5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	45
5/1		5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	45
6/0,5		6,0	5,5	7,0	21,0	58,0	6,0	6	0,50	45
6/0,8		6,0	5,5	7,0	21,0	58,0	6,0	6	0,80	45
6/1		6,0	5,5	7,0	21,0	58,0	6,0	6	1,00	45
6/1,5		6,0	5,5	7,0	21,0	58,0	6,0	6	1,50	45
8/0,5		8,0	7,4	9,0	27,0	64,0	8,0	6	0,50	45

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202253									
8/0,8	8,0	7,4	9,0	27,0	64,0	8,0	6	0,80	45
8/1	8,0	7,4	9,0	27,0	64,0	8,0	6	1,00	45
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	6	1,50	45
8/2	8,0	7,4	9,0	27,0	64,0	8,0	6	2,00	45
8/3	8,0	7,4	9,0	27,0	64,0	8,0	6	3,00	45
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	6	0,50	45
10/0,8	10,0	9,2	11,0	32,0	73,0	10,0	6	0,80	45
10/1	10,0	9,2	11,0	32,0	73,0	10,0	6	1,00	45
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	6	1,50	45
10/2	10,0	9,2	11,0	32,0	73,0	10,0	6	2,00	45
10/3	10,0	9,2	11,0	32,0	73,0	10,0	6	3,00	45
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	6	0,50	45
12/1	12,0	11,0	12,0	38,0	84,0	12,0	6	1,00	45
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	6	1,50	45
12/2	12,0	11,0	12,0	38,0	84,0	12,0	6	2,00	45
12/3	12,0	11,0	12,0	38,0	84,0	12,0	6	3,00	45
16/1	16,0	15,0	16,0	44,0	93,0	16,0	6	1,00	45
16/2	16,0	15,0	16,0	44,0	93,0	16,0	6	2,00	45
16/3	16,0	15,0	16,0	44,0	93,0	16,0	6	3,00	45
20/1	20,0	18,5	20,0	50,0	104,0	20,0	6	1,00	45
20/2,5	20,0	18,5	20,0	50,0	104,0	20,0	6	2,50	45

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α



HA K202293



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			180	180	150	95	70							CFK / GFK	Grafit

K202293	D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	r mm	°
5/0,5	5,0	15,0	58,0	6,0	6	0,50	37,5
5/1	5,0	15,0	58,0	6,0	6	1,00	37,5
6/0,5	6,0	16,0	58,0	6,0	6	0,50	37,5
6/1	6,0	16,0	58,0	6,0	6	1,00	37,5
8/0,5	8,0	22,0	70,0	8,0	6	0,50	37,5
8/1	8,0	22,0	70,0	8,0	6	1,00	37,5
10/0,5	10,0	25,0	73,0	10,0	6	0,50	37,5
10/1	10,0	25,0	73,0	10,0	6	1,00	37,5
10/1,5	10,0	25,0	73,0	10,0	6	1,50	37,5
12/0,5	12,0	28,0	84,0	12,0	6	0,50	37,5
12/1	12,0	28,0	84,0	12,0	6	1,00	37,5
12/1,5	12,0	28,0	84,0	12,0	6	1,50	37,5
14/1	14,0	30,0	84,0	14,0	6	1,00	37,5
16/1	16,0	36,0	93,0	16,0	8	1,00	37,5
16/2	16,0	36,0	93,0	16,0	8	2,00	37,5
18/1	18,0	36,0	93,0	18,0	10	1,00	37,5
20/1	20,0	41,0	104,0	20,0	10	1,00	37,5
20/2	20,0	41,0	104,0	20,0	10	2,00	37,5

Kühlung


HA ETC HPC

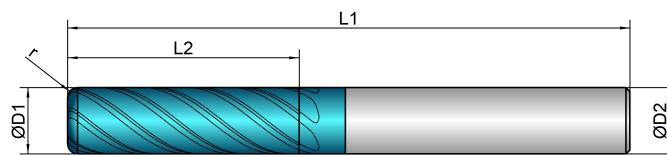

Toleranz

e8

Beschichtung

TiSiN- α 

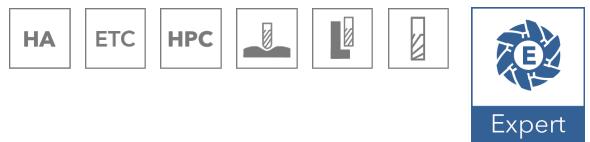
HA K202303



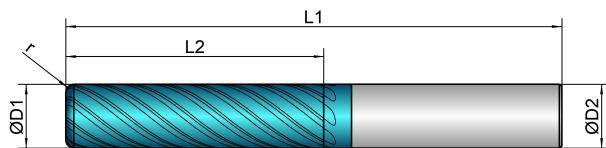
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
			160	160	130	85	60							CFK / GFK	Grafit	

K202303	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
6/0,5	6,0	21,0	65,0	6,0	6	0,50	37,5
6/1	6,0	21,0	65,0	6,0	6	1,00	37,5
8/0,5	8,0	28,0	75,0	8,0	6	0,50	37,5
8/1	8,0	28,0	75,0	8,0	6	1,00	37,5
10/0,5	10,0	35,0	85,0	10,0	6	0,50	37,5
10/1	10,0	35,0	85,0	10,0	6	1,00	37,5
10/1,5	10,0	35,0	85,0	10,0	6	1,50	37,5
12/0,5	12,0	45,0	100,0	12,0	6	0,50	37,5
12/1	12,0	45,0	100,0	12,0	6	1,00	37,5
12/1,5	12,0	45,0	100,0	12,0	6	1,50	37,5
14/1	14,0	45,0	100,0	14,0	6	1,00	37,5
16/1	16,0	50,0	110,0	16,0	8	1,00	37,5
16/2	16,0	50,0	110,0	16,0	8	2,00	37,5
18/1	18,0	54,0	114,0	18,0	10	1,00	37,5
20/1	20,0	55,0	126,0	20,0	10	1,00	37,5
20/2	20,0	55,0	126,0	20,0	10	2,00	37,5

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α



HA K202307



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			160	160	130	85	60						CFK / GFK	Grafit	

K202307		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm R	
16/1		16,0	65,0	125,0	16,0	8	1,00	37,5
16/2		16,0	65,0	125,0	16,0	8	2,00	37,5
20/1		20,0	70,0	135,0	20,0	10	1,00	37,5
20/2		20,0	70,0	135,0	20,0	10	2,00	37,5



Kühlung

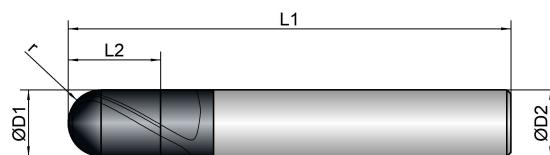
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203033



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
420	290	220	165	150			225	615		850				CFK / GFK	Grafit	

K203033		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
0,1/3		0,1	0,2	38,0	3,0	2	0,05	30
0,15/3		0,15	0,3	38,0	3,0	2	0,075	30
0,2/3		0,2	0,4	38,0	3,0	2	0,10	30
0,25/3		0,25	0,5	38,0	3,0	2	0,125	30
0,3/3		0,3	1,0	38,0	3,0	2	0,15	30
0,35/3		0,35	1,0	38,0	3,0	2	0,175	30
0,4/3		0,4	1,0	38,0	3,0	2	0,20	30
0,5/3		0,5	1,5	38,0	3,0	2	0,25	30
0,5/6		0,5	1,5	54,0	6,0	2	0,25	30
0,6/3		0,6	1,5	38,0	3,0	2	0,30	30
0,7/3		0,7	2,0	38,0	3,0	2	0,35	30
0,8/3		0,8	2,0	38,0	3,0	2	0,40	30
0,9/3		0,9	2,5	38,0	3,0	2	0,45	30
1/3		1,0	2,0	50,0	3,0	2	0,50	30
1/6		1,0	2,0	54,0	6,0	2	0,50	30

K203033	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
1,1/3	1,1	3,0	50,0	3,0	2	0,55	30
1,2/3	1,2	3,0	50,0	3,0	2	0,60	30
1,4/3	1,4	3,0	50,0	3,0	2	0,70	30
1,5/3	1,5	3,0	50,0	3,0	2	0,75	30
1,5/6	1,5	3,0	54,0	6,0	2	0,75	30
1,6/3	1,6	4,0	50,0	3,0	2	0,80	30
1,8/3	1,8	4,0	50,0	3,0	2	0,90	30
2/3	2,0	4,0	50,0	3,0	2	1,00	30
2/6	2,0	4,0	54,0	6,0	2	1,00	30
2,5/3	2,5	5,0	50,0	3,0	2	1,25	30
2,5/6	2,5	5,0	54,0	6,0	2	1,25	30
3/3	3,0	6,0	50,0	3,0	2	1,50	30
3/6	3,0	6,0	54,0	6,0	2	1,50	30
4/4	4,0	7,0	54,0	4,0	2	2,00	30
4/6	4,0	7,0	54,0	6,0	2	2,00	30
5/5	5,0	8,0	54,0	5,0	2	2,50	30
5/6	5,0	8,0	54,0	6,0	2	2,50	30
6/6	6,0	10,0	54,0	6,0	2	3,00	30
7/8	7,0	12,0	59,0	8,0	2	3,50	30
8/8	8,0	12,0	59,0	8,0	2	4,00	30
10/10	10,0	14,0	67,0	10,0	2	5,00	30
12/12	12,0	16,0	73,0	12,0	2	6,00	30
14/14	14,0	16,0	75,0	14,0	2	7,00	30
16/16	16,0	20,0	83,0	16,0	2	8,00	30
18/18	18,0	22,0	93,0	18,0	2	9,00	30
20/20	20,0	25,0	93,0	20,0	2	10,00	30



Kühlung

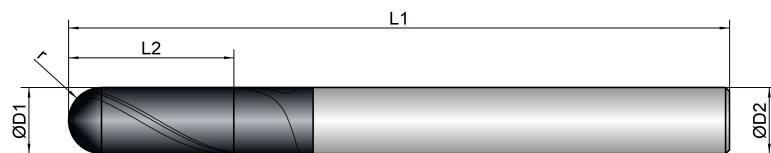
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203063



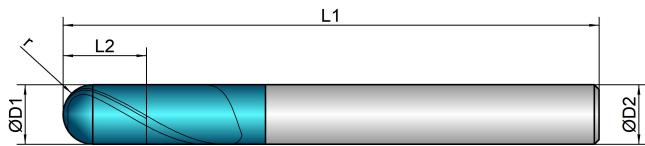
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
350	240	180	135	125			180	500		695				CFK / GFK	Grafit

K203063	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
0,5/3	0,5	1,5	75,0	3,0	2	0,25	30
0,5/6	0,5	1,5	80,0	6,0	2	0,25	30
1/3	1,0	3,0	75,0	3,0	2	0,50	30
1/6	1,0	3,0	80,0	6,0	2	0,50	30
1,5/3	1,5	4,0	75,0	3,0	2	0,75	30
1,5/6	1,5	4,0	80,0	6,0	2	0,75	30
2/3	2,0	6,0	75,0	3,0	2	1,00	30
2/6	2,0	6,0	80,0	6,0	2	1,00	30
2,5/3	2,5	8,0	75,0	3,0	2	1,25	30
2,5/6	2,5	8,0	80,0	6,0	2	1,25	30
3/3	3,0	10,0	75,0	3,0	2	1,50	30
3/6	3,0	10,0	80,0	6,0	2	1,50	30
4/4	4,0	13,0	75,0	4,0	2	2,00	30
4/6	4,0	13,0	80,0	6,0	2	2,00	30
5/5	5,0	14,0	75,0	5,0	2	2,50	30
5/6	5,0	14,0	100,0	6,0	2	2,50	30
6/6	6,0	16,0	100,0	6,0	2	3,00	30
8/8	8,0	22,0	100,0	8,0	2	4,00	30
10/10	10,0	25,0	100,0	10,0	2	5,00	30
12/12	12,0	26,0	100,0	12,0	2	6,00	30
14/14	14,0	26,0	100,0	14,0	2	7,00	30
16/16	16,0	30,0	150,0	16,0	2	8,00	30
20/20	20,0	40,0	150,0	20,0	2	10,00	30

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α

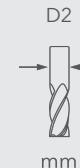


HA K203103



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
			210	180	160	110	85									

K203103	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
0,1/3	0,1	0,2	38,0	3,0	2	0,05	30
0,15/3	0,15	0,3	38,0	3,0	2	0,075	30
0,2/3	0,2	0,4	38,0	3,0	2	0,10	30
0,25/3	0,25	0,5	38,0	3,0	2	0,125	30
0,3/3	0,3	1,0	38,0	3,0	2	0,15	30
0,35/3	0,35	1,0	38,0	3,0	2	0,175	30
0,4/3	0,4	1,0	38,0	3,0	2	0,20	30
0,5/3	0,5	1,5	38,0	3,0	2	0,25	30
0,5/6	0,5	1,5	54,0	6,0	2	0,25	30
0,6/3	0,6	1,5	38,0	3,0	2	0,30	30
0,7/3	0,7	2,0	38,0	3,0	2	0,35	30
0,8/3	0,8	2,0	38,0	3,0	2	0,40	30
0,9/3	0,9	2,5	38,0	3,0	2	0,45	30
1/3	1,0	2,0	50,0	3,0	2	0,50	30
1/6	1,0	2,0	54,0	6,0	2	0,50	30

	D1  mm ø	L2  mm	L1  mm	D2  mm ø	z  #	r  mm	 °
K203103							
1,1/3	1,1	3,0	50,0	3,0	2	0,55	30
1,2/3	1,2	3,0	50,0	3,0	2	0,60	30
1,4/3	1,4	3,0	50,0	3,0	2	0,70	30
1,5/3	1,5	3,0	50,0	3,0	2	0,75	30
1,5/6	1,5	3,0	54,0	6,0	2	0,75	30
1,6/3	1,6	4,0	50,0	3,0	2	0,80	30
1,8/3	1,8	4,0	50,0	3,0	2	0,90	30
2/3	2,0	4,0	50,0	3,0	2	1,00	30
2/6	2,0	4,0	54,0	6,0	2	1,00	30
2,5/3	2,5	5,0	50,0	3,0	2	1,25	30
2,5/6	2,5	5,0	54,0	6,0	2	1,25	30
3/3	3,0	6,0	50,0	3,0	2	1,50	30
3/6	3,0	6,0	54,0	6,0	2	1,50	30
4/4	4,0	7,0	54,0	4,0	2	2,00	30
4/6	4,0	7,0	54,0	6,0	2	2,00	30
5/5	5,0	8,0	54,0	5,0	2	2,50	30
5/6	5,0	8,0	54,0	6,0	2	2,50	30
6/6	6,0	10,0	54,0	6,0	2	3,00	30
8/8	8,0	12,0	59,0	8,0	2	4,00	30
10/10	10,0	14,0	67,0	10,0	2	5,00	30
12/12	12,0	16,0	74,0	12,0	2	6,00	30
14/14	14,0	18,0	75,0	14,0	2	7,00	30
16/16	16,0	22,0	83,0	16,0	2	8,00	30
20/20	20,0	26,0	93,0	20,0	2	10,00	30

Kühlung


HA HSC HPC

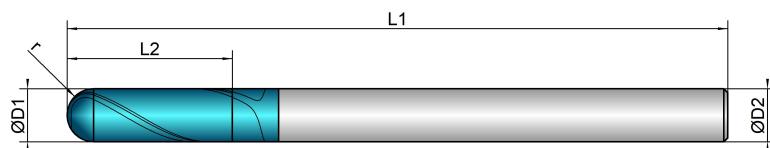

Toleranz

f8

Beschichtung

TiSiN- α 

HA K203143



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
			200	175	155	95	80									

K203143	D1 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	r mm 	
	0,5	1,5	75,0	3,0	2	0,25	
0,5/3	0,5	1,5	80,0	6,0	2	0,25	30
0,5/6	0,5	3,0	75,0	3,0	2	0,50	30
1/3	1,0	3,0	80,0	6,0	2	0,50	30
1/6	1,0	4,0	75,0	3,0	2	0,75	30
1,5/3	1,5	4,0	80,0	6,0	2	0,75	30
1,5/6	1,5	6,0	75,0	3,0	2	1,00	30
2/3	2,0	6,0	80,0	6,0	2	1,00	30
2/6	2,0	8,0	75,0	3,0	2	1,25	30
2,5/3	2,5	8,0	80,0	6,0	2	1,25	30
2,5/6	2,5	10,0	75,0	6,0	2	1,50	30
3/3	3,0	10,0	80,0	6,0	2	1,50	30
3/6	3,0	13,0	75,0	4,0	2	2,00	30
4/4	4,0	13,0	80,0	6,0	2	2,00	30
4/6	4,0	14,0	75,0	5,0	2	2,50	30
5/5	5,0	14,0	100,0	6,0	2	2,50	30
5/6	5,0	16,0	100,0	6,0	2	3,00	30
6/6	6,0	22,0	100,0	8,0	2	4,00	30
8/8	10,0	25,0	100,0	10,0	2	5,00	30
10/10	12,0	26,0	100,0	12,0	2	6,00	30
12/12	14,0	26,0	100,0	14,0	2	7,00	30
14/14	16,0	30,0	150,0	16,0	2	8,00	30
16/16	20,0	40,0	150,0	20,0	2	10,00	30
20/20							

Kühlung


HA HSC

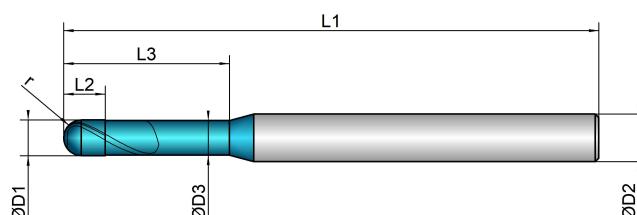

Toleranz

0-0,01

Beschichtung

TiSiN- α 

HA K203206



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	210	195	125	75	60	45	100		150					CFK / GFK	Grafit	

K203206	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	°
	mm ø	mm ø	mm	mm	mm	mm ø	#	mm	°
0,2X0,3	0,2	0,17	0,16	0,3	45,0	4,0	2	0,10	30
0,2X0,5	0,2	0,17	0,16	0,5	45,0	4,0	2	0,10	30
0,2X0,75	0,2	0,17	0,16	0,75	45,0	4,0	2	0,10	30
0,2X1	0,2	0,17	0,16	1,0	45,0	4,0	2	0,10	30
0,2X1,25	0,2	0,17	0,16	1,25	45,0	4,0	2	0,10	30
0,2X1,5	0,2	0,17	0,16	1,5	45,0	4,0	2	0,10	30
0,2X1,75	0,2	0,17	0,16	1,75	45,0	4,0	2	0,10	30
0,2X2	0,2	0,17	0,16	2,0	45,0	4,0	2	0,10	30
0,2X2,5	0,2	0,17	0,16	2,5	45,0	4,0	2	0,10	30
0,2X3	0,2	0,17	0,16	3,0	45,0	4,0	2	0,10	30
0,3X0,5	0,3	0,27	0,24	0,5	45,0	4,0	2	0,15	30
0,3X0,75	0,3	0,27	0,24	0,75	45,0	4,0	2	0,15	30
0,3X1	0,3	0,27	0,24	1,0	45,0	4,0	2	0,15	30
0,3X1,25	0,3	0,27	0,24	1,25	45,0	4,0	2	0,15	30
0,3X1,5	0,3	0,27	0,24	1,5	45,0	4,0	2	0,15	30
0,4X0,5	0,4	0,34	0,32	0,5	45,0	4,0	2	0,20	30
0,4X0,75	0,4	0,34	0,32	0,75	45,0	4,0	2	0,20	30
0,4X1	0,4	0,34	0,32	1,0	45,0	4,0	2	0,20	30
0,4X1,5	0,4	0,34	0,32	1,5	45,0	4,0	2	0,20	30

K203206									
0,4X2	0,4	0,34	0,32	2,0	45,0	4,0	2	0,20	30
0,4X2,5	0,4	0,34	0,32	2,5	45,0	4,0	2	0,20	30
0,4X3	0,4	0,34	0,32	3,0	45,0	4,0	2	0,20	30
0,4X3,5	0,4	0,34	0,32	3,5	45,0	4,0	2	0,20	30
0,4X4	0,4	0,34	0,32	4,0	45,0	4,0	2	0,20	30
0,4X4,5	0,4	0,34	0,32	4,5	45,0	4,0	2	0,20	30
0,4X5	0,4	0,34	0,32	5,0	45,0	4,0	2	0,20	30
0,4X5,5	0,4	0,34	0,32	5,5	45,0	4,0	2	0,20	30
0,4X6	0,4	0,34	0,32	6,0	45,0	4,0	2	0,20	30
0,5X1	0,5	0,47	0,4	1,0	45,0	4,0	2	0,25	30
0,5X1,5	0,5	0,47	0,4	1,5	45,0	4,0	2	0,25	30
0,5X2	0,5	0,47	0,4	2,0	45,0	4,0	2	0,25	30
0,5X2,5	0,5	0,47	0,4	2,5	45,0	4,0	2	0,25	30
0,5X3	0,5	0,47	0,4	3,0	45,0	4,0	2	0,25	30
0,5X3,5	0,5	0,47	0,4	3,5	45,0	4,0	2	0,25	30
0,5X4	0,5	0,47	0,4	4,0	45,0	4,0	2	0,25	30
0,5X4,5	0,5	0,47	0,4	4,5	45,0	4,0	2	0,25	30
0,5X5	0,5	0,47	0,4	5,0	45,0	4,0	2	0,25	30
0,5X5,5	0,5	0,47	0,4	5,5	45,0	4,0	2	0,25	30
0,5X6	0,5	0,47	0,4	6,0	45,0	4,0	2	0,25	30
0,5X7	0,5	0,47	0,4	7,0	45,0	4,0	2	0,25	30
0,5X8	0,5	0,47	0,4	8,0	45,0	4,0	2	0,25	30
0,5X9	0,5	0,47	0,4	9,0	45,0	4,0	2	0,25	30
0,6X1	0,6	0,57	0,48	1,0	45,0	4,0	2	0,30	30
0,6X2	0,6	0,57	0,48	2,0	45,0	4,0	2	0,30	30
0,6X3	0,6	0,57	0,48	3,0	45,0	4,0	2	0,30	30
0,6X4	0,6	0,57	0,48	4,0	45,0	4,0	2	0,30	30
0,6X5	0,6	0,57	0,48	5,0	45,0	4,0	2	0,30	30
0,6X6	0,6	0,57	0,48	6,0	45,0	4,0	2	0,30	30
0,6X8	0,6	0,57	0,48	8,0	45,0	4,0	2	0,30	30
0,8X2	0,8	0,77	0,64	2,0	45,0	4,0	2	0,40	30
0,8X3	0,8	0,77	0,64	3,0	45,0	4,0	2	0,40	30
0,8X4	0,8	0,77	0,64	4,0	45,0	4,0	2	0,40	30
0,8X5	0,8	0,77	0,64	5,0	45,0	4,0	2	0,40	30
0,8X6	0,8	0,77	0,64	6,0	45,0	4,0	2	0,40	30
0,8X7	0,8	0,77	0,64	7,0	45,0	4,0	2	0,40	30
0,8X8	0,8	0,77	0,64	8,0	45,0	4,0	2	0,40	30
0,8X9	0,8	0,77	0,64	9,0	45,0	4,0	2	0,40	30
1X2,5	1,0	0,96	0,8	2,5	45,0	4,0	2	0,50	30
1X3	1,0	0,96	0,8	3,0	45,0	4,0	2	0,50	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm (R)	°
K203206									
1X4	1,0	0,96	0,8	4,0	45,0	4,0	2	0,50	30
1X5	1,0	0,96	0,8	5,0	45,0	4,0	2	0,50	30
1X6	1,0	0,96	0,8	6,0	45,0	4,0	2	0,50	30
1X7	1,0	0,96	0,8	7,0	45,0	4,0	2	0,50	30
1X8	1,0	0,96	0,8	8,0	45,0	4,0	2	0,50	30
1X9	1,0	0,96	0,8	9,0	45,0	4,0	2	0,50	30
1X10	1,0	0,96	0,8	10,0	45,0	4,0	2	0,50	30
1X12	1,0	0,96	0,8	12,0	45,0	4,0	2	0,50	30
1,2X6	1,2	1,16	0,96	6,0	45,0	4,0	2	0,60	30
1,2X8	1,2	1,16	0,96	8,0	45,0	4,0	2	0,60	30
1,2X10	1,2	1,16	0,96	10,0	45,0	4,0	2	0,60	30
1,2X12	1,2	1,16	0,96	12,0	45,0	4,0	2	0,60	30
1,4X8	1,4	1,34	1,12	8,0	45,0	4,0	2	0,70	30
1,4X12	1,4	1,34	1,12	12,0	45,0	4,0	2	0,70	30
1,5X3	1,5	1,44	1,2	3,0	45,0	4,0	2	0,75	30
1,5X4	1,5	1,44	1,2	4,0	45,0	4,0	2	0,75	30
1,5X6	1,5	1,44	1,2	6,0	45,0	4,0	2	0,75	30
1,5X8	1,5	1,44	1,2	8,0	45,0	4,0	2	0,75	30
1,5X10	1,5	1,44	1,2	10,0	45,0	4,0	2	0,75	30
1,5X12	1,5	1,44	1,2	12,0	45,0	4,0	2	0,75	30
1,6X8	1,6	1,54	1,28	8,0	45,0	4,0	2	0,80	30
1,6X12	1,6	1,54	1,28	12,0	45,0	4,0	2	0,80	30
1,8X8	1,8	1,74	1,44	8,0	45,0	4,0	2	0,90	30
1,8X12	1,8	1,74	1,44	12,0	45,0	4,0	2	0,90	30
2X3	2,0	1,94	1,6	3,0	45,0	4,0	2	1,00	30
2X4	2,0	1,94	1,6	4,0	45,0	4,0	2	1,00	30
2X6	2,0	1,94	1,6	6,0	45,0	4,0	2	1,00	30
2X8	2,0	1,94	1,6	8,0	45,0	4,0	2	1,00	30
2X10	2,0	1,94	1,6	10,0	45,0	4,0	2	1,00	30
2X12	2,0	1,94	1,6	12,0	45,0	4,0	2	1,00	30
2,5X10	2,5	2,41	2,0	10,0	45,0	4,0	2	1,25	30
3X8	3,0	2,92	3,5	8,0	45,0	4,0	2	1,50	30
3X10	3,0	2,92	3,5	10,0	45,0	4,0	2	1,50	30
3X12	3,0	2,92	3,5	12,0	45,0	4,0	2	1,50	30
3X16	3,0	2,92	3,5	16,0	45,0	4,0	2	1,50	30

Kühlung


HA HSC

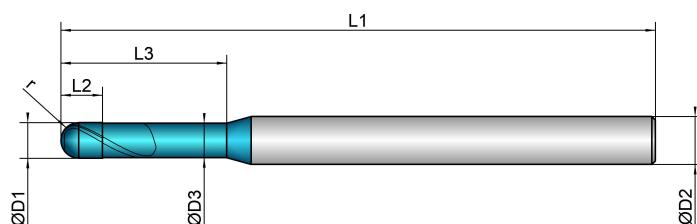

Toleranz

0-0,01

Beschichtung

TiSiN- α 

HA K203212



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	210	195	125	75	60	45	100		150					CFK / GFK	Grafit	

K203212	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
0,3X1,75	0,3	0,27	0,24	1,75	50,0	4,0	2	0,15	30
0,3X2	0,3	0,27	0,24	2,0	50,0	4,0	2	0,15	30
0,3X2,25	0,3	0,27	0,24	2,25	50,0	4,0	2	0,15	30
0,3X2,5	0,3	0,27	0,24	2,5	50,0	4,0	2	0,15	30
0,3X2,75	0,3	0,27	0,24	2,75	50,0	4,0	2	0,15	30
0,3X3	0,3	0,27	0,24	3,0	50,0	4,0	2	0,15	30
0,3X3,5	0,3	0,27	0,24	3,5	50,0	4,0	2	0,15	30
0,3X4	0,3	0,27	0,24	4,0	50,0	4,0	2	0,15	30
0,3X4,5	0,3	0,27	0,24	4,5	50,0	4,0	2	0,15	30
0,5X10	0,5	0,47	0,4	10,0	50,0	4,0	2	0,25	30
0,6X10	0,6	0,57	0,48	10,0	50,0	4,0	2	0,30	30
0,6X12	0,6	0,57	0,48	12,0	50,0	4,0	2	0,30	30



	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K203212									
0,8X10	0,8	0,77	0,64	10,0	50,0	4,0	2	0,40	30
1X14	1,0	0,96	0,8	14,0	50,0	4,0	2	0,50	30
1X16	1,0	0,96	0,8	16,0	50,0	4,0	2	0,50	30
1,2X14	1,2	1,16	0,96	14,0	50,0	4,0	2	0,60	30
1,2X16	1,2	1,16	0,96	16,0	50,0	4,0	2	0,60	30
1,4X16	1,4	1,34	1,12	16,0	50,0	4,0	2	0,70	30
1,5X14	1,5	1,44	1,2	14,0	50,0	4,0	2	0,75	30
1,5X16	1,5	1,44	1,2	16,0	50,0	4,0	2	0,75	30
1,6X16	1,6	1,54	1,28	16,0	50,0	4,0	2	0,80	30
1,8X16	1,8	1,74	1,44	16,0	50,0	4,0	2	0,90	30
2X14	2,0	1,94	1,6	14,0	50,0	4,0	2	1,00	30
2X16	2,0	1,94	1,6	16,0	50,0	4,0	2	1,00	30
2,5X15	2,5	2,41	2,0	15,0	50,0	4,0	2	1,25	30
3X16	3,0	2,92	3,5	16,0	50,0	4,0	2	1,50	30

Kühlung


HA HSC HPC

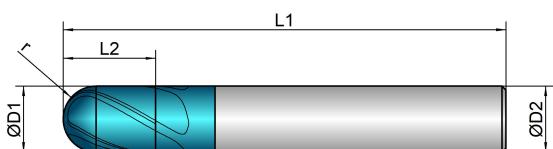

Toleranz

f8

Beschichtung

TiSiN- α 

HA K203333



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
200	175	155	110	85												

K203333	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r R mm	°
2/3	2,0	4,0	50,0	3,0	4	1,00	30
2/6	2,0	4,0	54,0	6,0	4	1,00	30
2,5/6	2,5	5,0	54,0	6,0	4	1,25	30
3/3	3,0	5,0	50,0	3,0	4	1,50	30
3/6	3,0	5,0	54,0	6,0	4	1,50	30
4/4	4,0	8,0	54,0	4,0	4	2,00	30
4/6	4,0	8,0	54,0	6,0	4	2,00	30
5/5	5,0	9,0	54,0	5,0	4	2,50	30
5/6	5,0	9,0	54,0	6,0	4	2,50	30
6/6	6,0	10,0	54,0	6,0	4	3,00	30
7/8	7,0	12,0	59,0	8,0	4	3,50	30
8/8	8,0	12,0	59,0	8,0	4	4,00	30
9/10	9,0	14,0	67,0	10,0	4	4,50	30
10/10	10,0	14,0	67,0	10,0	4	5,00	30
12/12	12,0	16,0	74,0	12,0	4	6,00	30
14/14	14,0	18,0	75,0	14,0	4	7,00	30
16/16	16,0	22,0	83,0	16,0	4	8,00	30
20/20	20,0	26,0	93,0	20,0	4	10,00	30

Kühlung


HA
HSC
HPC



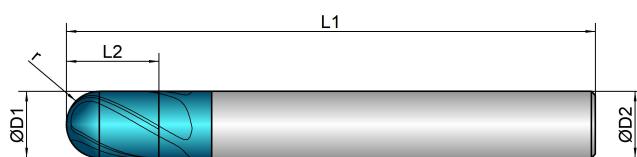
Toleranz

f8

Beschichtung

TiSiN- α 

HA K203343



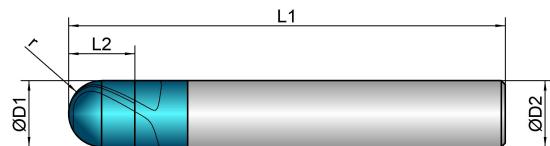
Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
200	175	155	110	85												

K203343		D1 mm	L2 mm	L1 mm	D2 mm	z #	r mm	
2/3		2,0	4,0	75,0	3,0	4	1,00	30
2/6		2,0	4,0	80,0	6,0	4	1,00	30
2,5/6		2,5	5,0	80,0	6,0	4	1,25	30
3/3		3,0	5,0	75,0	3,0	4	1,50	30
3/6		3,0	5,0	80,0	6,0	4	1,50	30
4/4		4,0	8,0	75,0	4,0	4	2,00	30
4/6		4,0	8,0	80,0	6,0	4	2,00	30
5/5		5,0	9,0	75,0	5,0	4	2,50	30
5/6		5,0	9,0	100,0	6,0	4	2,50	30
6/6		6,0	10,0	100,0	6,0	4	3,00	30
8/8		8,0	12,0	100,0	8,0	4	4,00	30
10/10		10,0	14,0	100,0	10,0	4	5,00	30
12/12		12,0	16,0	100,0	12,0	4	6,00	30
14/14		14,0	18,0	100,0	14,0	4	7,00	30
16/16		16,0	22,0	150,0	16,0	4	8,00	30
20/20		20,0	26,0	150,0	20,0	4	10,00	30

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203373



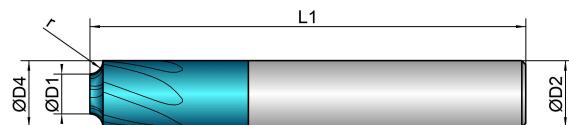
Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
200	175	155	115	95										CFK / GFK	Grafit	

K203373	D1	L2	L1	D2	z	r	
	mm Ø	mm	mm	mm Ø	#	mm	°
0,5	0,5	0,5	50,0	4,0	2	0,25	30
1	1,0	1,0	50,0	4,0	2	0,50	30
1,5	1,5	1,5	50,0	4,0	2	0,75	30
2	2,0	2,0	50,0	4,0	2	1,00	30
2,5	2,5	2,5	50,0	4,0	2	1,25	30
3	3,0	3,0	50,0	6,0	2	1,50	30
4	4,0	4,0	50,0	6,0	2	2,00	30
5	5,0	5,0	50,0	6,0	2	2,50	30
6	6,0	6,0	50,0	6,0	2	3,00	30
8	8,0	8,0	59,0	8,0	2	4,00	30
10	10,0	10,0	66,0	10,0	2	5,00	30
12	12,0	12,0	73,0	12,0	2	6,00	30

Kühlung				
Toleranz	0-0,01			
Beschichtung	TiSiN- α			



HA K204108



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
			50	45	40	30	95								

K204108	r 	D1 	D4 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm \varnothing	#
3,6/0,2	0,20	3,6	4	50,0	4,0	6
3,4/0,3	0,30	3,4	4	50,0	4,0	6
3,2/0,4	0,40	3,2	4	50,0	4,0	6
3/0,5	0,50	3	4	50,0	4,0	6
4,8/0,6	0,60	4,8	6	50,0	6,0	6
4,4/0,8	0,80	4,4	6	50,0	6,0	6
4/1	1,00	4	6	50,0	6,0	6
5/1,5	1,50	5	8	55,0	10,0	6
6/2	2,00	6	10	66,0	10,0	6
7/2,5	2,50	7	12	73,0	12,0	6
6/3	3,00	6	12	73,0	12,0	6
9/3,5	3,50	9	16	80,0	16,0	6
8/4	4,00	8	16	80,0	16,0	6
7/4,5	4,50	7	16	80,0	16,0	6
10/5	5,00	10	20	93,0	20,0	6
8/6	6,00	8	20	93,0	20,0	6
9/8	8,00	9	25	100,0	25,0	6
5/10	10,00	5	25	100,0	25,0	6

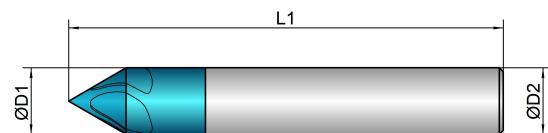
Kühlung	
Toleranz	-
Beschichtung	TiSiN-α



HA K205153



HB K205154



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
			65	50	45	40	35									

K205153		K205154		D1 mm Ø	L1 mm	D2 mm Ø	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung



Toleranz

-

Beschichtung

TiSiN- α

HA

HB

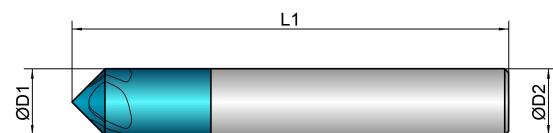
L



HA K205163



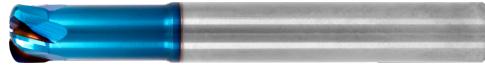
HB K205164



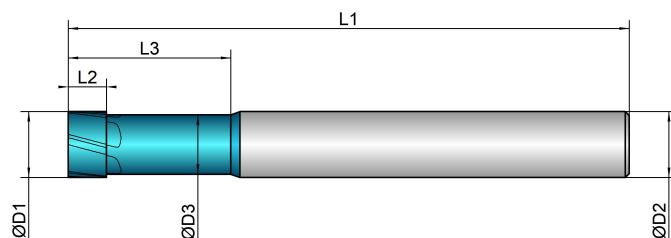
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
65	50	45	40	35									CFK / GFK	Grafit	

K205163		K205164		D1	L1	D2	z
				mm \varnothing	mm	mm \varnothing	#
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung	
Toleranz	h9
Beschichtung	TiSiN-α



HA K207013



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			160	120	90									CFK / GFK	Grafit

K207013	D1	D3	L2	L3	L1	D2	z							
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	mm max	°				
2	2,0	1,7	1,5	13,0	54,0	6,0	2	0,3	0,06	15				
3	3,0	2,7	1,5	15,0	54,0	6,0	2	0,3	0,10	15				
4	4,0	3,6	2,5	16,0	57,0	6,0	2	0,5	0,15	15				
5	5,0	4,6	3,5	18,0	65,0	6,0	4	0,5	0,17	15				
6	6,0	5,2	3,5	20,0	65,0	6,0	4	1,0	0,20	15				
8	8,0	7,0	4,8	24,0	70,0	8,0	5	1,5	0,25	15				
10	10,0	9,0	5,8	26,0	85,0	10,0	5	2,0	0,30	15				
12	12,0	11,0	6,8	30,0	93,0	12,0	5	2,0	0,40	15				
16	16,0	14,5	8,8	35,0	100,0	16,0	5	2,5	0,50	15				

Kühlung



Toleranz

h9

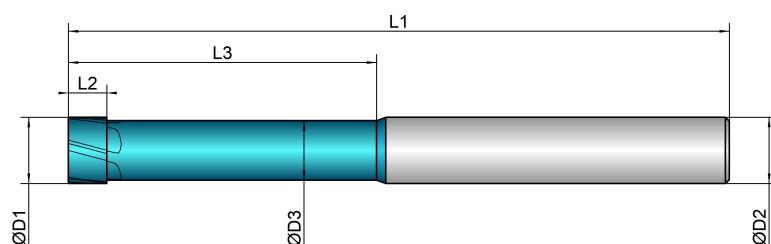
Beschichtung

TiSiN- α
HA
HSC

NEW

Expert


HA K207018



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
			140	100	80									CFK / GFK	Grafit

K207018	D1	D3	L2	L3	L1	D2	z							
	mm \varnothing	mm \varnothing	mm	mm	mm	mm \varnothing	#	mm	mm max	°				
2	2,0	1,7	1,5	18,0	75,0	6,0	2	0,3	0,06	15				
3	3,0	2,7	1,5	20,0	75,0	6,0	2	0,3	0,10	15				
4	4,0	3,6	2,5	24,0	83,0	6,0	2	0,5	0,15	15				
5	5,0	4,6	3,5	28,0	100,0	6,0	4	0,5	0,17	15				
6	6,0	5,2	3,5	28,0	100,0	6,0	4	1,0	0,20	15				
8	8,0	7,0	4,8	40,0	100,0	8,0	5	1,5	0,25	15				
10	10,0	9,0	5,8	48,0	100,0	10,0	5	2,0	0,30	15				
12	12,0	11,0	6,8	56,0	119,0	12,0	5	2,0	0,40	15				
16	16,0	14,5	8,8	65,0	150,0	16,0	5	2,5	0,50	15				

HOFMANN & VRATNY — SCHARFE SCHNEIDEN

NE-WERKSTOFFE





HOFMANN & VRATNY — SCHARFE SCHNEIDEN

NE-WERKSTOFFE

NE-Werkstoffe sind sehr vielfältig und reichen von Aluminium über Kunststoff bis hin zu Sandwichmaterialien. Im Laufe der Jahre haben wir für diese Einsatzgebiete ein breites Produktspektrum aufgebaut, um potentiell leicht zerspanbare Materialien sicher zu bearbeiten.

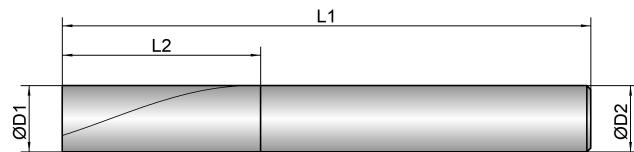
Scharfe Schneiden für weiche Materialien. Trotz ihrer leichten Zerspanbarkeit stellen diese Werkstoffe durch den Einsatz als Verbundwerkstoff oder ihrer Neigung zum Verkleben gesonderte Anforderungen an die Zerspanungswerk-

zeuge. Die Vielfältigkeit der NE-Werkstoffe decken wir durch ein breites Spektrum an Fräsern aus unserem 3-Linien-Produktprogramm ab.

Kühlung				
Toleranz	h10			
Beschichtung	-			



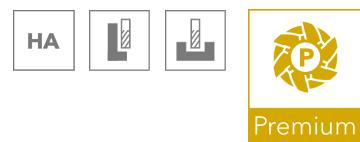
HA K201001



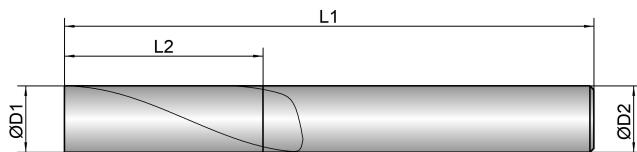
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
									150			200			

K201001		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
1,5		1,5	10,0	50,0	3,0	1	20
2		2,0	10,0	50,0	3,0	1	20
3		3,0	12,0	50,0	3,0	1	20
4		4,0	15,0	60,0	4,0	1	20
5		5,0	17,0	60,0	5,0	1	20
6		6,0	20,0	65,0	6,0	1	20
8		8,0	22,0	64,0	8,0	1	20
10		10,0	30,0	80,0	10,0	1	20
12		12,0	35,0	84,0	12,0	1	20

Kühlung	
Toleranz	h10
Beschichtung	-



HA K201012



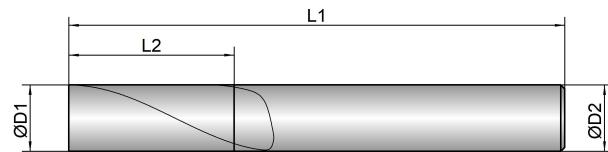
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
									160			200				

K201012	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
	1,5	1,5	10,0	50,0	3,0	1
2	2,0	10,0	50,0	3,0	1	23
3	3,0	12,0	50,0	3,0	1	23
4	4,0	15,0	60,0	4,0	1	23
5	5,0	17,0	60,0	5,0	1	23
6	6,0	20,0	65,0	6,0	1	23
8	8,0	22,0	64,0	8,0	1	23
10	10,0	30,0	80,0	10,0	1	23
12	12,0	35,0	84,0	12,0	1	23

Kühlung				
Toleranz	h10			
Beschichtung	-			



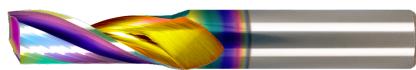
HA K201021



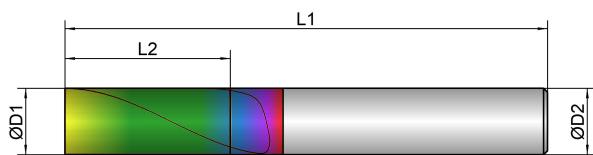
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
									140			180			

K201021		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
1,5		1,5	6,0	50,0	3,0	1	26
2		2,0	8,0	50,0	3,0	1	26
3		3,0	12,0	50,0	3,0	1	26
4		4,0	15,0	60,0	4,0	1	26
5		5,0	17,0	60,0	5,0	1	26
6		6,0	20,0	65,0	6,0	1	26
8		8,0	22,0	64,0	8,0	1	26
10		10,0	25,0	75,0	10,0	1	26
12		12,0	30,0	80,0	12,0	1	26

Kühlung	
Toleranz	h10
Beschichtung	TAC- α



HA K201022



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
									430			480				

K201022		D1 	L2 	L1 	D2 	z 	
		mm Ø	mm	mm	mm Ø	#	°
1		1,0	4,0	50,0	3,0	1	30
1,5		1,5	6,0	50,0	3,0	1	30
2		2,0	8,0	50,0	3,0	1	30
3		3,0	12,0	50,0	3,0	1	30
4		4,0	15,0	54,0	4,0	1	30
5		5,0	17,0	54,0	5,0	1	30
6		6,0	20,0	65,0	6,0	1	30
8		8,0	22,0	63,0	8,0	1	30
10		10,0	25,0	72,0	10,0	1	30
12		12,0	30,0	83,0	12,0	1	30



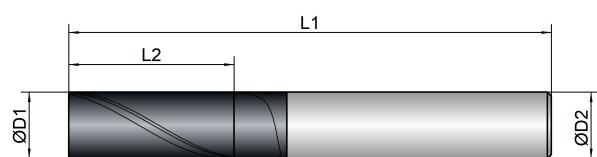
Toleranz e8

Beschichtung TiAlN- α 

HA K201053



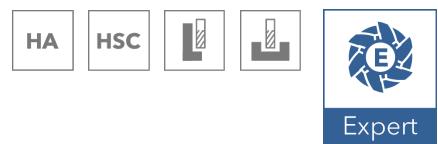
HB K201054



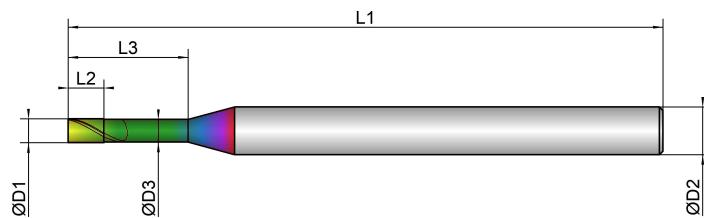
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
100	80	60					80	100	180						

K201053		K201054		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

Kühlung				
Toleranz	0-0,01			
Beschichtung	TAC- α			

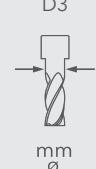
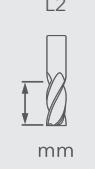
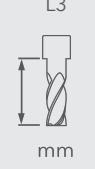
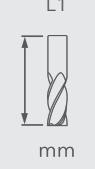
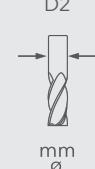


HA K201123



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
500	180												200	350	

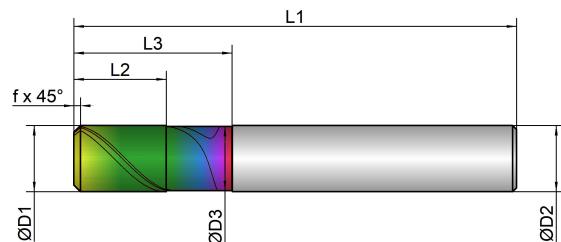
K201123	D1 	D3 	L2 	L3 	L1 	D2 	z 	°
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	
0,2X0,5	0,2	0,18	0,3	0,5	45,0	4,0	2	30
0,2X1	0,2	0,18	0,3	1,0	45,0	4,0	2	30
0,2X1,5	0,2	0,18	0,3	1,5	45,0	4,0	2	30
0,3X1	0,3	0,28	0,4	1,0	45,0	4,0	2	30
0,3X2	0,3	0,28	0,4	2,0	45,0	4,0	2	30
0,4X2	0,4	0,38	0,6	2,0	45,0	4,0	2	30
0,4X3	0,4	0,38	0,6	3,0	45,0	4,0	2	30
0,5X2	0,5	0,48	0,7	2,0	45,0	4,0	2	30
0,5X4	0,5	0,48	0,7	4,0	45,0	4,0	2	30
0,5X6	0,5	0,48	0,7	6,0	45,0	4,0	2	30
0,6X2	0,6	0,58	0,9	2,0	45,0	4,0	2	30
0,6X4	0,6	0,58	0,9	4,0	45,0	4,0	2	30
0,6X6	0,6	0,58	0,9	6,0	45,0	4,0	2	30
0,7X2	0,7	0,68	1,0	2,0	45,0	4,0	2	30
0,7X4	0,7	0,68	1,0	4,0	45,0	4,0	2	30
0,8X4	0,8	0,78	1,2	4,0	45,0	4,0	2	30
0,8X6	0,8	0,78	1,2	6,0	45,0	4,0	2	30
0,8X8	0,8	0,78	1,2	8,0	45,0	4,0	2	30
1X4	1,0	0,95	1,5	4,0	45,0	4,0	2	30
1X6	1,0	0,95	1,5	6,0	45,0	4,0	2	30
1X8	1,0	0,95	1,5	8,0	45,0	4,0	2	30

K201123	D1 	D3 	L2 	L3 	L1 	D2 	z 	° 
1X10	1,0	0,95	1,5	10,0	45,0	4,0	2	30
1X12	1,0	0,95	1,5	12,0	45,0	4,0	2	30
1X14	1,0	0,95	1,5	14,0	45,0	4,0	2	30
1X16	1,0	0,95	1,5	16,0	50,0	4,0	2	30
1X25	1,0	0,95	1,5	25,0	70,0	4,0	2	30
1,2X6	1,2	1,14	1,8	6,0	45,0	4,0	2	30
1,2X8	1,2	1,14	1,8	8,0	45,0	4,0	2	30
1,2X10	1,2	1,14	1,8	10,0	45,0	4,0	2	30
1,4X6	1,4	1,34	2,1	6,0	45,0	4,0	2	30
1,4X8	1,4	1,34	2,1	8,0	45,0	4,0	2	30
1,5X6	1,5	1,44	2,3	6,0	45,0	4,0	2	30
1,5X8	1,5	1,44	2,3	8,0	45,0	4,0	2	30
1,5X10	1,5	1,44	2,3	10,0	45,0	4,0	2	30
1,5X12	1,5	1,44	2,3	12,0	45,0	4,0	2	30
1,5X14	1,5	1,44	2,3	14,0	50,0	4,0	2	30
1,5X16	1,5	1,44	2,3	16,0	50,0	4,0	2	30
1,5X20	1,5	1,44	2,3	20,0	54,0	4,0	2	30
1,5X25	1,5	1,44	2,3	25,0	70,0	4,0	2	30
1,6X6	1,6	1,51	2,4	6,0	45,0	4,0	2	30
1,6X10	1,6	1,51	2,4	10,0	45,0	4,0	2	30
1,8X6	1,8	1,71	2,7	6,0	45,0	4,0	2	30
1,8X8	1,8	1,71	2,7	8,0	45,0	4,0	2	30
1,8X10	1,8	1,71	2,7	10,0	45,0	4,0	2	30
2X6	2,0	1,91	3,0	6,0	45,0	4,0	2	30
2X8	2,0	1,91	3,0	8,0	45,0	4,0	2	30
2X10	2,0	1,91	3,0	10,0	45,0	4,0	2	30
2X12	2,0	1,91	3,0	12,0	45,0	4,0	2	30
2X14	2,0	1,91	3,0	14,0	50,0	4,0	2	30
2X16	2,0	1,91	3,0	16,0	50,0	4,0	2	30
2X20	2,0	1,91	3,0	20,0	54,0	4,0	2	30
2X25	2,0	1,91	3,0	25,0	60,0	4,0	2	30
2X30	2,0	1,91	3,0	30,0	70,0	4,0	2	30
2X35	2,0	1,91	3,0	35,0	80,0	4,0	2	30
2,5X8	2,5	2,41	3,7	8,0	45,0	4,0	2	30
2,5X12	2,5	2,41	3,7	12,0	45,0	4,0	2	30
2,5X16	2,5	2,41	3,7	16,0	50,0	4,0	2	30
2,5X20	2,5	2,41	3,7	20,0	54,0	4,0	2	30
2,5X25	2,5	2,41	3,7	25,0	60,0	4,0	2	30
2,5X30	2,5	2,41	3,7	30,0	70,0	4,0	2	30

Kühlung	
Toleranz	e8
Beschichtung	TAC- α



Premium



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
520									520					140	290	

K201133	D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
	2,0	1,9	5,0	10,0	54,0	6,0	2	0,05	45
2	2,0	1,9	5,0	10,0	54,0	6,0	2	0,05	45
3	3,0	2,9	5,0	12,0	54,0	6,0	2	0,10	45
4	4,0	3,9	8,0	15,0	54,0	6,0	2	0,10	45
5	5,0	4,9	9,0	16,0	54,0	6,0	2	0,10	45
6	6,0	5,9	10,0	17,0	54,0	6,0	2	0,10	45
8	8,0	7,7	12,0	20,0	59,0	8,0	2	0,10	45
10	10,0	9,7	14,0	24,0	67,0	10,0	2	0,10	45
11	11,0	10,7	15,0	25,0	74,0	12,0	2	0,10	45
12	12,0	11,7	16,0	26,0	74,0	12,0	2	0,10	45
14	14,0	13,7	18,0	28,0	75,0	14,0	2	0,10	45
16	16,0	15,5	22,0	32,0	83,0	16,0	2	0,10	45
20	20,0	19,5	26,0	40,0	83,0	20,0	2	0,10	45



Kühlung

Toleranz

e8

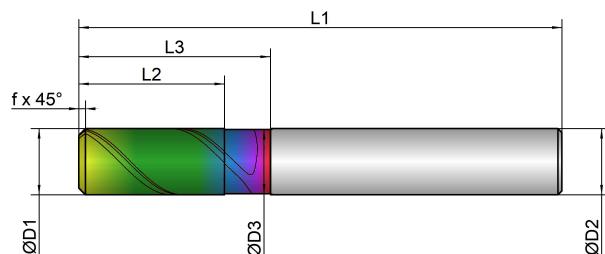
Beschichtung

TAC- α

Premium



HA K201143



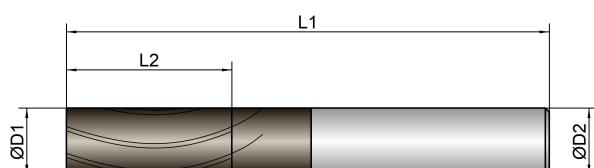
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
								520						140	290

K201143	D1	D3	L2	L3	L1	D2	z	45°	mm	°
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#			
2	2,0	1,9	8,0	16,0	58,0	6,0	2	0,05		45
3	3,0	2,9	8,0	18,0	58,0	6,0	2	0,10		45
4	4,0	3,9	11,0	18,0	58,0	6,0	2	0,10		45
5	5,0	4,9	13,0	20,0	58,0	6,0	2	0,10		45
6	6,0	5,9	13,0	20,0	58,0	6,0	2	0,10		45
8	8,0	7,7	19,0	26,0	64,0	8,0	2	0,10		45
10	10,0	9,7	22,0	29,0	73,0	10,0	2	0,10		45
11	11,0	10,7	24,0	34,0	84,0	12,0	2	0,10		45
12	12,0	11,7	26,0	36,0	84,0	12,0	2	0,10		45
14	14,0	13,7	26,0	36,0	84,0	14,0	2	0,10		45
16	16,0	15,5	32,0	42,0	93,0	16,0	2	0,10		45
18	18,0	17,5	32,0	42,0	93,0	18,0	2	0,10		45
20	20,0	19,5	38,0	52,0	104,0	20,0	2	0,10		45

Kühlung	
Toleranz	h10
Beschichtung	Diamond- α



HA K201573



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
													210	200	350	

K201573		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #
6		6,0	16,0	58,0	6,0	4
8		8,0	22,0	70,0	8,0	6
10		10,0	25,0	73,0	10,0	6
12		12,0	28,0	84,0	12,0	6

Kühlung



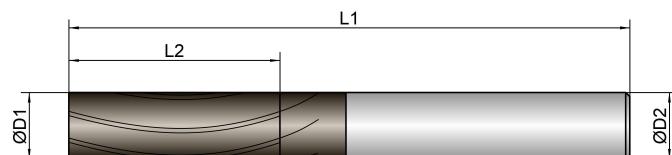
Toleranz

h10

Beschichtung

Diamond- α 

HA K201577



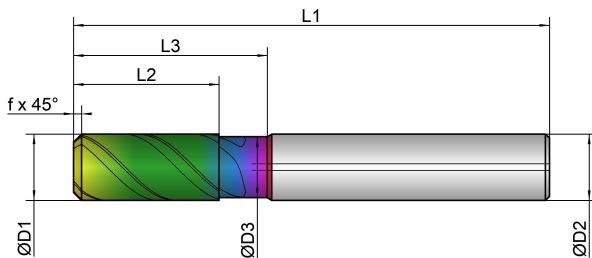
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
													350	210	200	

K201577		D1 	L2 	L1 	D2 	z
6		6,0	21,0	65,0	6,0	4
8		8,0	28,0	85,0	8,0	6
10		10,0	32,0	85,0	10,0	6
12		12,0	36,0	93,0	12,0	6

Kühlung	
Toleranz	e8
Beschichtung	TAC- α



HA K201768



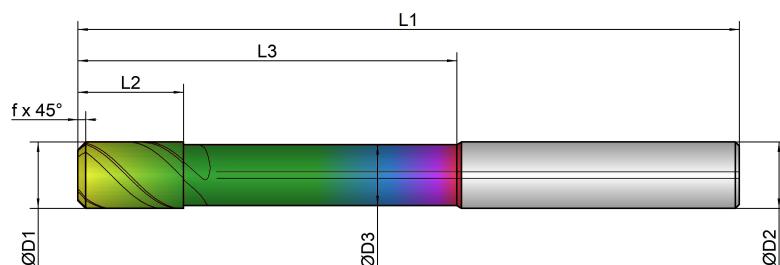
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
									480				500			

K201768	D1	D3	L2	L3	L1	D2	z	45°	mm	°
	mm	mm	mm	mm	mm	mm	#			
5	5,0	4,7	13,0	18,0	57,0	6,0	3	45	0,10	45
6	6,0	5,7	13,0	18,0	57,0	6,0	3	45	0,20	45
8	8,0	7,4	21,0	25,0	63,0	8,0	3	45	0,20	45
10	10,0	9,2	22,0	30,0	72,0	10,0	3	45	0,20	45
12	12,0	11,0	26,0	36,0	83,0	12,0	3	45	0,20	45
16	16,0	15,0	36,0	42,0	92,0	16,0	3	45	0,20	45
20	20,0	19,0	41,0	52,0	104,0	20,0	3	45	0,20	45

Kühlung	
Toleranz	e8
Beschichtung	TAC- α



HA K201773

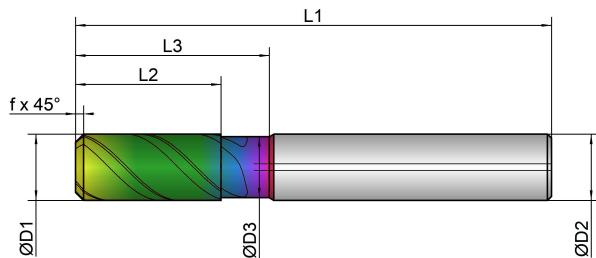


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
260									260				270		

K201773	D1	D3	L2	L3	L1	D2	z	45°	mm	°
	mm	mm	mm	mm	mm	mm	#			
5	5,0	4,7	8,0	30,0	83,0	6,0	3	0,10	45	
6	6,0	5,7	10,0	42,0	83,0	6,0	3	0,20	45	
8	8,0	7,4	13,0	62,0	100,0	8,0	3	0,20	45	
10	10,0	9,2	16,0	58,0	100,0	10,0	3	0,20	45	
12	12,0	11,0	19,0	73,0	119,0	12,0	3	0,20	45	
16	16,0	15,0	25,0	100,0	150,0	16,0	3	0,20	45	
20	20,0	19,0	32,0	98,0	150,0	20,0	3	0,20	45	

Kühlung	
Toleranz	e8
Beschichtung	TAC- α

HA	ETC	HPC			
NEW					



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									480			500			

K201776		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	45° mm	°
3	3,0	2,7		8,0	12,0	57,0	6,0	3	0,10	40
4	4,0	3,7		11,0	18,0	57,0	6,0	3	0,10	40
5	5,0	4,7		13,0	18,0	57,0	6,0	3	0,10	40
6	6,0	5,7		13,0	18,0	57,0	6,0	3	0,20	40
8	8,0	7,4		21,0	25,0	63,0	8,0	3	0,20	40
10	10,0	9,2		22,0	30,0	72,0	10,0	3	0,20	40
12	12,0	11,0		26,0	36,0	83,0	12,0	3	0,20	40
16	16,0	15,0		36,0	42,0	92,0	16,0	3	0,20	40
20	20,0	19,0		41,0	52,0	104,0	20,0	3	0,20	40

Kühlung



Toleranz

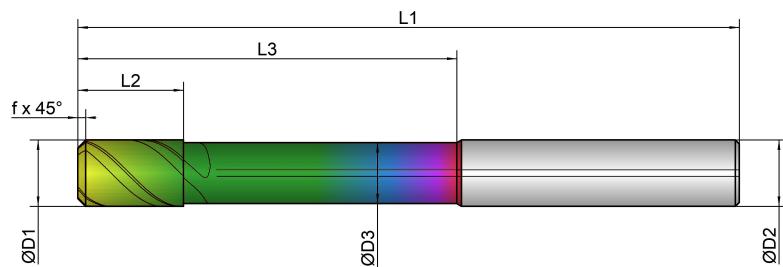
e8

Beschichtung

TAC- α
HA ETC HPC \neq
NEW


Expert


HA K201779



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									260			270			

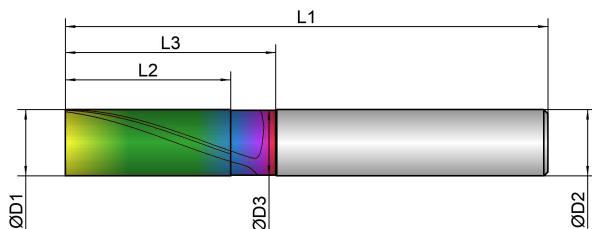
K201779		D1 	D3 	L2 	L3 	L1 	D2 	z 	45° 	°
3		3,0	2,7	5,0	18,0	83,0	6,0	3	0,10	40
4		4,0	3,7	6,5	24,0	83,0	6,0	3	0,10	40
5		5,0	4,7	8,0	30,0	83,0	6,0	3	0,10	40
6		6,0	5,7	10,0	42,0	83,0	6,0	3	0,20	40
8		8,0	7,4	13,0	62,0	100,0	8,0	3	0,20	40
10		10,0	9,2	16,0	58,0	100,0	10,0	3	0,20	40
12		12,0	11,0	19,0	73,0	119,0	12,0	3	0,20	40
16		16,0	15,0	25,0	100,0	150,0	16,0	3	0,20	40
20		20,0	19,0	32,0	98,0	150,0	20,0	3	0,20	40

Kühlung	
Toleranz	e8
Beschichtung	TAC- α

Expert					



HA K201813



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									450			425			

K201813		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	
1		1,0	0,9	5,0	8,0	50,0	3,0	2	20
2		2,0	1,85	8,0	11,0	50,0	3,0	2	20
3		3,0	2,8	11,0	14,0	50,0	3,0	2	20
4		4,0	3,8	13,0	16,0	54,0	4,0	2	20
5		5,0	4,8	15,0	18,0	54,0	5,0	2	20
6		6,0	5,8	16,0	21,0	65,0	6,0	2	20
8		8,0	7,8	22,0	27,0	70,0	8,0	2	20
10		10,0	9,8	25,0	32,0	73,0	10,0	2	20
12		12,0	11,8	28,0	38,0	84,0	12,0	3	20
14		14,0	13,8	30,0	42,0	84,0	14,0	3	20
16		16,0	15,8	36,0	44,0	93,0	16,0	3	20
20		20,0	19,8	41,0	54,0	104,0	20,0	3	20

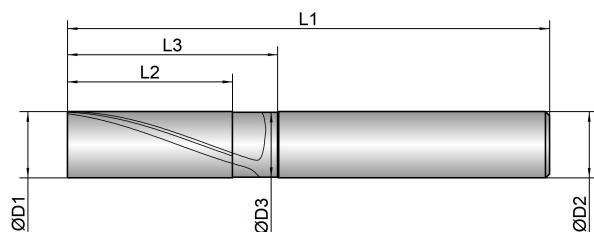
Kühlung				
Toleranz	d11			
Beschichtung	-			



Premium



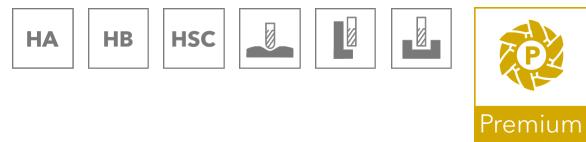
HA K201816



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									250			280			

K201816		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	°
4		4,0	3,8	13,0	16,0	54,0	4,0	2	20
5		5,0	4,8	15,0	18,0	54,0	5,0	2	20
6		6,0	5,8	16,0	21,0	65,0	6,0	2	20
8		8,0	7,8	22,0	27,0	70,0	8,0	2	20
10		10,0	9,8	25,0	32,0	73,0	10,0	2	20
12		12,0	11,8	28,0	38,0	84,0	12,0	3	20
14		14,0	13,8	30,0	42,0	84,0	14,0	3	20
16		16,0	15,8	36,0	44,0	93,0	16,0	3	20
20		20,0	19,8	41,0	54,0	104,0	20,0	3	20

Kühlung	
Toleranz	e8
Beschichtung	-



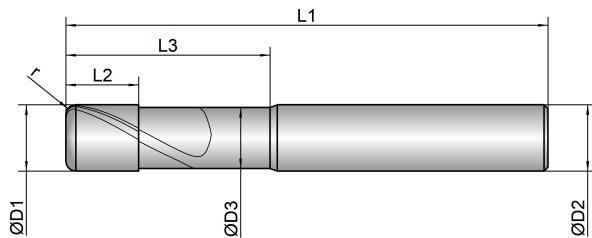
Premium



HA K202001



HB K202002



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
									160				200		

K202001	K202002	D1 mm ∅	D3 mm ∅	L2 mm	L3 mm	L1 mm	D2 mm ∅	z #	r mm	°
3/0,3	-	3,0	2,7	4,0	14,0	50,0	3,0	2	0,30	30
4/0,3	-	4,0	3,7	5,0	16,0	50,0	4,0	2	0,30	30
5/0,3	-	5,0	4,6	6,0	18,0	54,0	5,0	2	0,30	30
6/0,3	6/0,3	6,0	5,5	7,0	21,0	58,0	6,0	2	0,30	30
6/1	6/1	6,0	5,5	7,0	21,0	58,0	6,0	2	1,00	30
6/2	6/2	6,0	5,5	7,0	21,0	58,0	6,0	2	2,00	30
8/0,3	8/0,3	8,0	7,4	9,0	27,0	64,0	8,0	2	0,30	30
8/1	8/1	8,0	7,4	9,0	27,0	64,0	8,0	2	1,00	30
8/2	8/2	8,0	7,4	9,0	27,0	64,0	8,0	2	2,00	30
10/0,3	10/0,3	10,0	9,2	11,0	32,0	73,0	10,0	2	0,30	30
10/1,5	10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	2	1,50	30
10/3	10/3	10,0	9,2	11,0	32,0	73,0	10,0	2	3,00	30
12/0,5	12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	2	0,50	30
12/1,5	12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	2	1,50	30
12/4	12/4	12,0	11,0	12,0	38,0	84,0	12,0	2	4,00	30
16/1	16/1	16,0	15,0	16,0	44,0	93,0	16,0	2	1,00	30
16/2	16/2	16,0	15,0	16,0	44,0	93,0	16,0	2	2,00	30
16/5	16/5	16,0	15,0	16,0	44,0	93,0	16,0	2	5,00	30



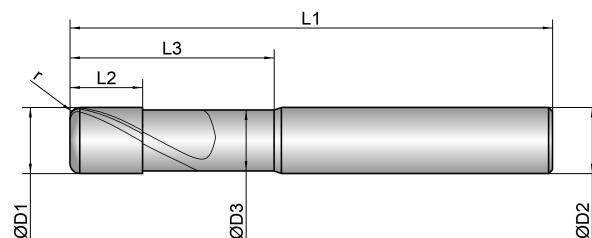
Toleranz e8

Beschichtung TiN- α 

HA K202003



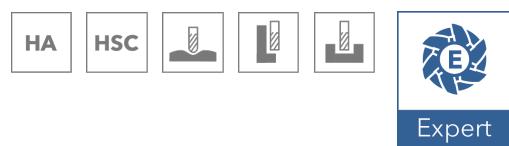
HB K202004



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									320			350			

		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
K202003	K202004	3,0	2,7	4,0	14,0	50,0	3,0	2	0,30	30
4/0,3	-	4,0	3,7	5,0	16,0	50,0	4,0	2	0,30	30
5/0,3	-	5,0	4,6	6,0	18,0	54,0	5,0	2	0,30	30
6/0,3	6/0,3	6,0	5,5	7,0	21,0	58,0	6,0	2	0,30	30
6/1	6/1	6,0	5,5	7,0	21,0	58,0	6,0	2	1,00	30
6/2	6/2	6,0	5,5	7,0	21,0	58,0	6,0	2	2,00	30
8/0,3	8/0,3	8,0	7,4	9,0	27,0	64,0	8,0	2	0,30	30
8/1	8/1	8,0	7,4	9,0	27,0	64,0	8,0	2	1,00	30
8/2	8/2	8,0	7,4	9,0	27,0	64,0	8,0	2	2,00	30
10/0,3	10/0,3	10,0	9,2	11,0	32,0	73,0	10,0	2	0,30	30
10/1,5	10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	2	1,50	30
10/3	10/3	10,0	9,2	11,0	32,0	73,0	10,0	2	3,00	30
12/0,5	12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	2	0,50	30
12/1,5	12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	2	1,50	30
12/4	12/4	12,0	11,0	12,0	38,0	84,0	12,0	2	4,00	30
16/1	16/1	16,0	15,0	16,0	44,0	93,0	16,0	2	1,00	30
16/2	16/2	16,0	15,0	16,0	44,0	93,0	16,0	2	2,00	30
16/5	16/5	16,0	15,0	16,0	44,0	93,0	16,0	2	5,00	30

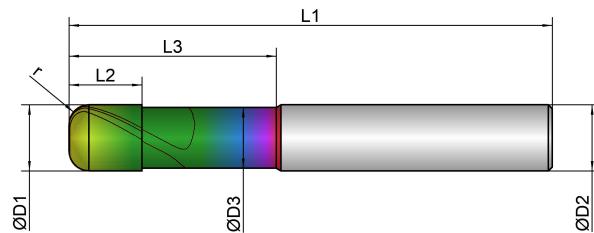
Kühlung	
Toleranz	e8
Beschichtung	TAC- α



Expert



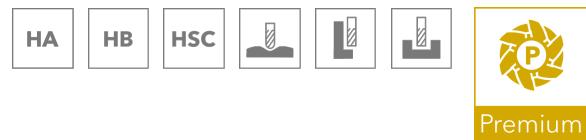
HA K202005



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									320			350			

K202005	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	2	0,30	30
4/0,3	4,0	3,7	5,0	16,0	50,0	4,0	2	0,30	30
5/0,3	5,0	4,6	6,0	18,0	54,0	5,0	2	0,30	30
6/0,3	6,0	5,5	7,0	21,0	58,0	6,0	2	0,30	30
6/1	6,0	5,5	7,0	21,0	58,0	6,0	2	1,00	30
6/2	6,0	5,5	7,0	21,0	58,0	6,0	2	2,00	30
8/0,3	8,0	7,4	9,0	27,0	64,0	8,0	2	0,30	30
8/1	8,0	7,4	9,0	27,0	64,0	8,0	2	1,00	30
8/2	8,0	7,4	9,0	27,0	64,0	8,0	2	2,00	30
10/0,3	10,0	9,2	11,0	32,0	73,0	10,0	2	0,30	30
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	2	1,50	30
10/3	10,0	9,2	11,0	32,0	73,0	10,0	2	3,00	30
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	2	1,50	30
12/4	12,0	11,0	12,0	38,0	84,0	12,0	2	4,00	30
16/2	16,0	15,0	16,0	44,0	93,0	16,0	2	2,00	30
16/5	16,0	15,0	16,0	44,0	93,0	16,0	2	5,00	30

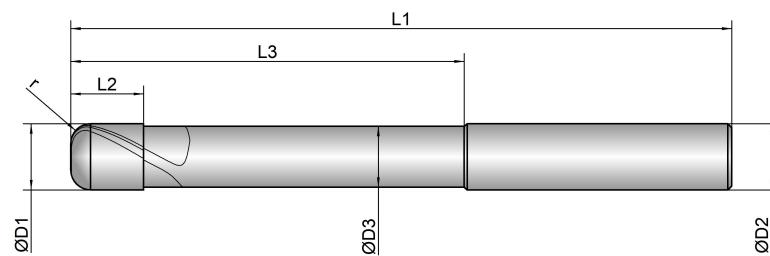
Kühlung	
Toleranz	e8
Beschichtung	-



HA K202011



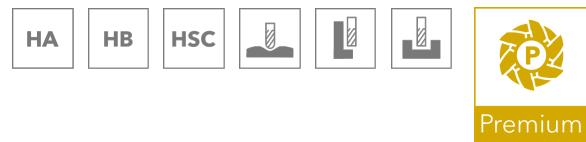
HB K202012



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									160			200			

K202011	K202012	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
3/0,3	-	3,0	2,7	4,0	32,0	75,0	3,0	2	0,30	30
4/0,3	-	4,0	3,7	5,0	36,0	75,0	4,0	2	0,30	30
5/0,3	-	5,0	4,6	6,0	40,0	75,0	5,0	2	0,30	30
6/0,3	6/0,3	6,0	5,5	7,0	44,0	80,0	6,0	2	0,30	30
6/1	6/1	6,0	5,5	7,0	44,0	80,0	6,0	2	1,00	30
6/2	6/2	6,0	5,5	7,0	44,0	80,0	6,0	2	2,00	30
8/0,3	8/0,3	8,0	7,4	9,0	54,0	100,0	8,0	2	0,30	30
8/1	8/1	8,0	7,4	9,0	54,0	100,0	8,0	2	1,00	30
8/2	8/2	8,0	7,4	9,0	54,0	100,0	8,0	2	2,00	30
10/0,3	10/0,3	10,0	9,2	11,0	60,0	100,0	10,0	2	0,30	30
10/1,5	10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	2	1,50	30
10/3	10/3	10,0	9,2	11,0	60,0	100,0	10,0	2	3,00	30
12/0,5	12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	2	0,50	30
12/1,5	12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	2	1,50	30
12/4	12/4	12,0	11,0	12,0	75,0	120,0	12,0	2	4,00	30
16/1	16/1	16,0	15,0	16,0	92,0	150,0	16,0	2	1,00	30
16/2	16/2	16,0	15,0	16,0	92,0	150,0	16,0	2	2,00	30
16/5	16/5	16,0	15,0	16,0	92,0	150,0	16,0	2	5,00	30

Kühlung	
Toleranz	e8
Beschichtung	TiN- α



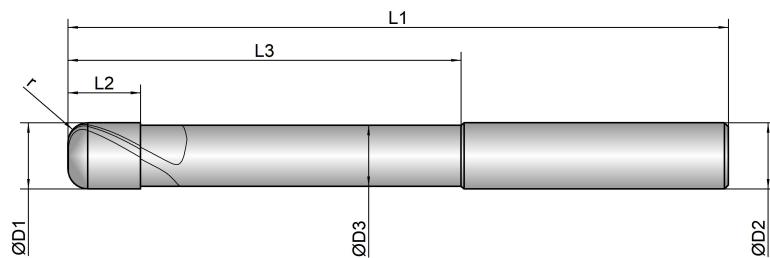
Premium



HA K202013



HB K202014



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
								320					350			

		D1 mm 	D3 mm 	L2 mm 	L3 mm 	L1 mm 	D2 mm 	z # 	r mm 	°
K202013	K202014									
3/0,3	-	3,0	2,7	4,0	32,0	75,0	3,0	2	0,30	30
4/0,3	-	4,0	3,7	5,0	36,0	75,0	4,0	2	0,30	30
5/0,3	-	5,0	4,6	6,0	40,0	75,0	5,0	2	0,30	30
6/0,3	6/0,3	6,0	5,5	7,0	44,0	80,0	6,0	2	0,30	30
6/1	6/1	6,0	5,5	7,0	44,0	80,0	6,0	2	1,00	30
6/2	6/2	6,0	5,5	7,0	44,0	80,0	6,0	2	2,00	30
8/0,3	8/0,3	8,0	7,4	9,0	54,0	100,0	8,0	2	0,30	30
8/1	8/1	8,0	7,4	9,0	54,0	100,0	8,0	2	1,00	30
8/2	8/2	8,0	7,4	9,0	54,0	100,0	8,0	2	2,00	30
10/0,3	10/0,3	10,0	9,2	11,0	60,0	100,0	10,0	2	0,30	30
10/1,5	10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	2	1,50	30
10/3	10/3	10,0	9,2	11,0	60,0	100,0	10,0	2	3,00	30
12/0,5	12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	2	0,50	30
12/1,5	12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	2	1,50	30
12/4	12/4	12,0	11,0	12,0	75,0	120,0	12,0	2	4,00	30
16/1	16/1	16,0	15,0	16,0	92,0	150,0	16,0	2	1,00	30
16/2	16/2	16,0	15,0	16,0	92,0	150,0	16,0	2	2,00	30
16/5	16/5	16,0	15,0	16,0	92,0	150,0	16,0	2	5,00	30

Kühlung



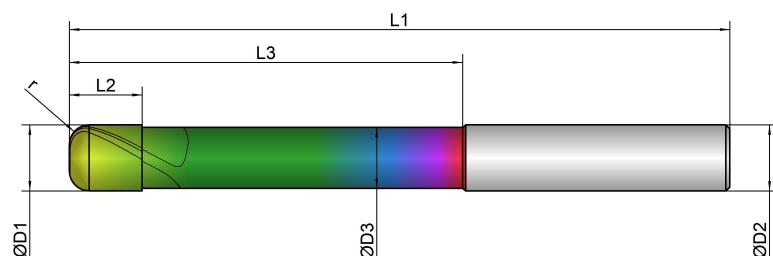
Toleranz

e8

Beschichtung

TAC- α 

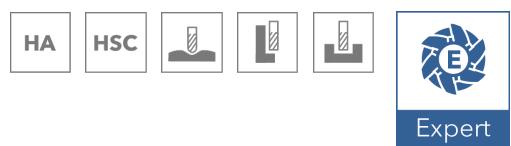
HA K202015



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
									180			220			

K202015		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
3/0,3		3,0	2,7	4,0	32,0	75,0	3,0	2	0,30	30
4/0,3		4,0	3,7	5,0	36,0	75,0	4,0	2	0,30	30
5/0,3		5,0	4,6	6,0	40,0	75,0	5,0	2	0,30	30
6/0,3		6,0	5,5	7,0	44,0	80,0	6,0	2	0,30	30
6/1		6,0	5,5	7,0	44,0	80,0	6,0	2	1,00	30
6/2		6,0	5,5	7,0	44,0	80,0	6,0	2	2,00	30
8/0,3		8,0	7,4	9,0	54,0	100,0	8,0	2	0,30	30
8/1		8,0	7,4	9,0	54,0	100,0	8,0	2	1,00	30
8/2		8,0	7,4	9,0	54,0	100,0	8,0	2	2,00	30
10/0,3		10,0	9,2	11,0	60,0	100,0	10,0	2	0,30	30
10/1,5		10,0	9,2	11,0	60,0	100,0	10,0	2	1,50	30
10/3		10,0	9,2	11,0	60,0	100,0	10,0	2	3,00	30
12/1,5		12,0	11,0	12,0	75,0	120,0	12,0	2	1,50	30
12/4		12,0	11,0	12,0	75,0	120,0	12,0	2	4,00	30
16/2		16,0	15,0	16,0	92,0	150,0	16,0	2	2,00	30
16/5		16,0	15,0	16,0	92,0	150,0	16,0	2	5,00	30

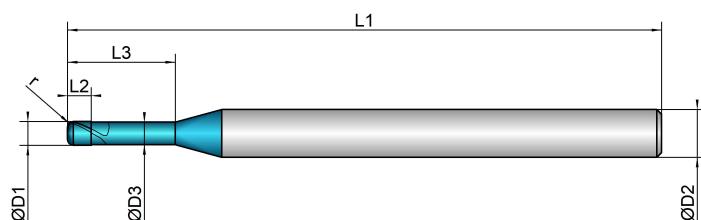
Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



Expert



HA K202082



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

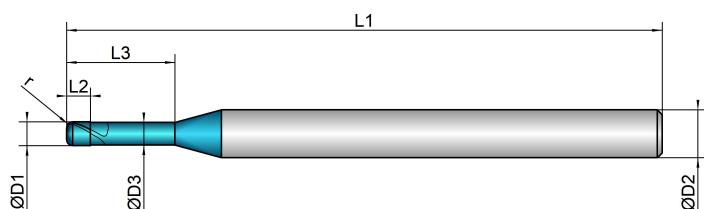
K202082	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
0,4X1	0,4	0,38	0,4	1,0	50,0	4,0	2	0,10	30
0,4X1,5	0,4	0,38	0,4	1,5	50,0	4,0	2	0,10	30
0,4X2	0,4	0,38	0,4	2,0	50,0	4,0	2	0,10	30
0,4X3	0,4	0,38	0,4	3,0	50,0	4,0	2	0,10	30
0,4X4	0,4	0,38	0,4	4,0	50,0	4,0	2	0,10	30
0,5X1	0,5	0,48	0,5	1,0	50,0	4,0	2	0,10	30
0,5X2	0,5	0,48	0,5	2,0	50,0	4,0	2	0,10	30
0,5X3	0,5	0,48	0,5	3,0	50,0	4,0	2	0,10	30
0,5X4	0,5	0,48	0,5	4,0	50,0	4,0	2	0,10	30
0,5X5	0,5	0,48	0,5	5,0	50,0	4,0	2	0,10	30
0,5X6	0,5	0,48	0,5	6,0	50,0	4,0	2	0,10	30
0,6X2	0,6	0,58	0,6	2,0	50,0	4,0	2	0,10	30
0,6X3	0,6	0,58	0,6	3,0	50,0	4,0	2	0,10	30
0,6X4	0,6	0,58	0,6	4,0	50,0	4,0	2	0,10	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202082									
0,6X6	0,6	0,58	0,6	6,0	50,0	4,0	2	0,10	30
0,6X8	0,6	0,58	0,6	8,0	50,0	4,0	2	0,10	30
0,7X4	0,7	0,68	0,7	4,0	50,0	4,0	2	0,10	30
0,7X6	0,7	0,68	0,7	6,0	50,0	4,0	2	0,10	30
0,8X4	0,8	0,78	0,8	4,0	50,0	4,0	2	0,10	30
0,8X6	0,8	0,78	0,8	6,0	50,0	4,0	2	0,10	30
1X2	1,0	0,95	1,0	2,0	50,0	4,0	2	0,10	30
1X4	1,0	0,95	1,0	4,0	50,0	4,0	2	0,10	30
1X6	1,0	0,95	1,0	6,0	50,0	4,0	2	0,10	30
1X8	1,0	0,95	1,0	8,0	50,0	4,0	2	0,10	30
1X10	1,0	0,95	1,0	10,0	50,0	4,0	2	0,10	30
1X12	1,0	0,95	1,0	12,0	54,0	4,0	2	0,10	30
1X16	1,0	0,95	1,0	16,0	60,0	4,0	2	0,10	30
1X20	1,0	0,95	1,0	20,0	60,0	4,0	2	0,10	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,10	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,10	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,10	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,10	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,10	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,10	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,10	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,10	30

Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



HA K202092



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
225	210	200	125	75	55	40	100		150							

K202092	D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
0,8X4	0,8	0,78	0,8	4,0	50,0	4,0	2	0,20	30
0,8X6	0,8	0,78	0,8	6,0	50,0	4,0	2	0,20	30
1X2	1,0	0,95	1,0	2,0	50,0	4,0	2	0,20	30
1X4	1,0	0,95	1,0	4,0	50,0	4,0	2	0,20	30
1X6	1,0	0,95	1,0	6,0	50,0	4,0	2	0,20	30
1X8	1,0	0,95	1,0	8,0	50,0	4,0	2	0,20	30
1X10	1,0	0,95	1,0	10,0	50,0	4,0	2	0,20	30
1X12	1,0	0,95	1,0	12,0	54,0	4,0	2	0,20	30
1X16	1,0	0,95	1,0	16,0	60,0	4,0	2	0,20	30
1X20	1,0	0,95	1,0	20,0	60,0	4,0	2	0,20	30
1,2X6	1,2	1,14	1,2	6,0	50,0	4,0	2	0,20	30
1,2X12	1,2	1,14	1,2	12,0	54,0	4,0	2	0,20	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202092									
1,2X20	1,2	1,14	1,2	20,0	60,0	4,0	2	0,20	30
1,5X4	1,5	1,44	1,5	4,0	50,0	4,0	2	0,20	30
1,5X6	1,5	1,44	1,5	6,0	50,0	4,0	2	0,20	30
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,20	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,20	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,20	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,20	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,20	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,20	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,20	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,20	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,20	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,20	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,20	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,20	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,20	30

Kühlung




Toleranz

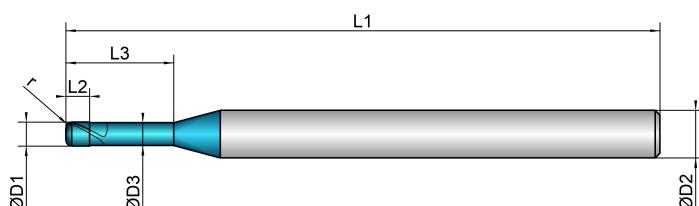
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Expert

Beschichtung

TiSiN- α 

HA K202102



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

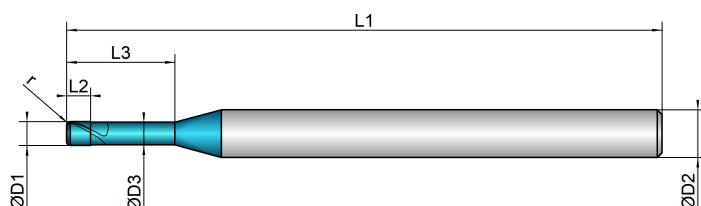
K202102		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	r mm	°
1X2		1,0	0,95	1,0	2,0	50,0	4,0	2	0,30	30
1X4		1,0	0,95	1,0	4,0	50,0	4,0	2	0,30	30
1X6		1,0	0,95	1,0	6,0	50,0	4,0	2	0,30	30
1X8		1,0	0,95	1,0	8,0	50,0	4,0	2	0,30	30
1X10		1,0	0,95	1,0	10,0	50,0	4,0	2	0,30	30
1X12		1,0	0,95	1,0	12,0	54,0	4,0	2	0,30	30
1X16		1,0	0,95	1,0	16,0	60,0	4,0	2	0,30	30
1X20		1,0	0,95	1,0	20,0	60,0	4,0	2	0,30	30
1,2X6		1,2	1,14	1,2	6,0	50,0	4,0	2	0,30	30
1,2X12		1,2	1,14	1,2	12,0	54,0	4,0	2	0,30	30
1,2X20		1,2	1,14	1,2	20,0	60,0	4,0	2	0,30	30
1,5X4		1,5	1,44	1,5	4,0	50,0	4,0	2	0,30	30
1,5X6		1,5	1,44	1,5	6,0	50,0	4,0	2	0,30	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202102									
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,30	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,30	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,30	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,30	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,30	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,30	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,30	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,30	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,30	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,30	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,30	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,30	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,30	30
2,5X10	2,5	2,41	2,5	10,0	50,0	4,0	2	0,30	30
2,5X12	2,5	2,41	2,5	12,0	60,0	4,0	2	0,30	30
2,5X30	2,5	2,41	2,5	30,0	70,0	4,0	2	0,30	30
3X10	3,0	2,92	4,5	10,0	50,0	4,0	2	0,30	30
3X12	3,0	2,92	4,5	12,0	50,0	4,0	2	0,30	30
3X30	3,0	2,92	4,5	30,0	70,0	4,0	2	0,30	30

Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



HA K202112



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
225	210	200	125	75	55	40	100		150						

K202112	D1 mm	D3 mm	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	°
	\varnothing	\varnothing	\varnothing	\varnothing	\varnothing	\varnothing	#	R	°
1,5X4	1,5	1,44	1,5	4,0	50,0	4,0	2	0,50	30
1,5X6	1,5	1,44	1,5	6,0	50,0	4,0	2	0,50	30
1,5X8	1,5	1,44	1,5	8,0	50,0	4,0	2	0,50	30
1,5X10	1,5	1,44	1,5	10,0	50,0	4,0	2	0,50	30
1,5X12	1,5	1,44	1,5	12,0	54,0	4,0	2	0,50	30
1,5X16	1,5	1,44	1,5	16,0	54,0	4,0	2	0,50	30
1,5X20	1,5	1,44	1,5	20,0	60,0	4,0	2	0,50	30
2X4	2,0	1,91	2,0	4,0	50,0	4,0	2	0,50	30
2X6	2,0	1,91	2,0	6,0	50,0	4,0	2	0,50	30
2X8	2,0	1,91	2,0	8,0	50,0	4,0	2	0,50	30
2X10	2,0	1,91	2,0	10,0	50,0	4,0	2	0,50	30
2X12	2,0	1,91	2,0	12,0	54,0	4,0	2	0,50	30
2X16	2,0	1,91	2,0	16,0	54,0	4,0	2	0,50	30
2X20	2,0	1,91	2,0	20,0	60,0	4,0	2	0,50	30
2X26	2,0	1,91	2,0	26,0	70,0	4,0	2	0,50	30
2,5X10	2,5	2,41	2,5	10,0	50,0	4,0	2	0,50	30
2,5X12	2,5	2,41	2,5	12,0	60,0	4,0	2	0,50	30
2,5X30	2,5	2,41	2,5	30,0	70,0	4,0	2	0,50	30
3X10	3,0	2,92	4,5	10,0	50,0	4,0	2	0,50	30
3X12	3,0	2,92	4,5	12,0	50,0	4,0	2	0,50	30
3X30	3,0	2,92	4,5	30,0	70,0	4,0	2	0,50	30

Kühlung


HA HSC

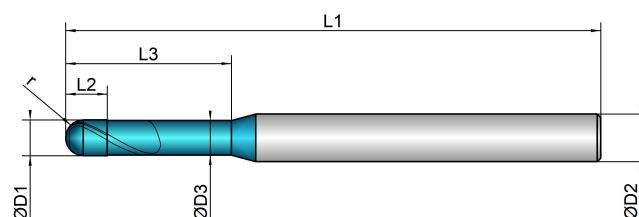

Toleranz

0-0,01

Beschichtung

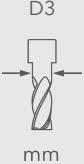
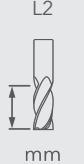
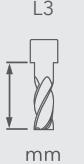
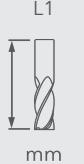
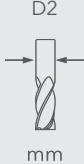
TiSiN- α 

HA K203206

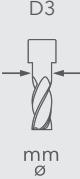
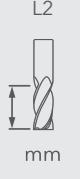
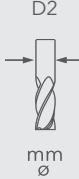


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	210	195	125	75	60	45	100		150				CFK / GFK	Grafit	

K203206	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	°
	mm ø	mm ø	mm	mm	mm	mm ø	#	mm	°
0,2X0,3	0,2	0,17	0,16	0,3	45,0	4,0	2	0,10	30
0,2X0,5	0,2	0,17	0,16	0,5	45,0	4,0	2	0,10	30
0,2X0,75	0,2	0,17	0,16	0,75	45,0	4,0	2	0,10	30
0,2X1	0,2	0,17	0,16	1,0	45,0	4,0	2	0,10	30
0,2X1,25	0,2	0,17	0,16	1,25	45,0	4,0	2	0,10	30
0,2X1,5	0,2	0,17	0,16	1,5	45,0	4,0	2	0,10	30
0,2X1,75	0,2	0,17	0,16	1,75	45,0	4,0	2	0,10	30
0,2X2	0,2	0,17	0,16	2,0	45,0	4,0	2	0,10	30
0,2X2,5	0,2	0,17	0,16	2,5	45,0	4,0	2	0,10	30
0,2X3	0,2	0,17	0,16	3,0	45,0	4,0	2	0,10	30
0,3X0,5	0,3	0,27	0,24	0,5	45,0	4,0	2	0,15	30
0,3X0,75	0,3	0,27	0,24	0,75	45,0	4,0	2	0,15	30
0,3X1	0,3	0,27	0,24	1,0	45,0	4,0	2	0,15	30
0,3X1,25	0,3	0,27	0,24	1,25	45,0	4,0	2	0,15	30
0,3X1,5	0,3	0,27	0,24	1,5	45,0	4,0	2	0,15	30
0,4X0,5	0,4	0,34	0,32	0,5	45,0	4,0	2	0,20	30
0,4X0,75	0,4	0,34	0,32	0,75	45,0	4,0	2	0,20	30
0,4X1	0,4	0,34	0,32	1,0	45,0	4,0	2	0,20	30
0,4X1,5	0,4	0,34	0,32	1,5	45,0	4,0	2	0,20	30

	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	° 
K203206									
0,4X2	0,4	0,34	0,32	2,0	45,0	4,0	2	0,20	30
0,4X2,5	0,4	0,34	0,32	2,5	45,0	4,0	2	0,20	30
0,4X3	0,4	0,34	0,32	3,0	45,0	4,0	2	0,20	30
0,4X3,5	0,4	0,34	0,32	3,5	45,0	4,0	2	0,20	30
0,4X4	0,4	0,34	0,32	4,0	45,0	4,0	2	0,20	30
0,4X4,5	0,4	0,34	0,32	4,5	45,0	4,0	2	0,20	30
0,4X5	0,4	0,34	0,32	5,0	45,0	4,0	2	0,20	30
0,4X5,5	0,4	0,34	0,32	5,5	45,0	4,0	2	0,20	30
0,4X6	0,4	0,34	0,32	6,0	45,0	4,0	2	0,20	30
0,5X1	0,5	0,47	0,4	1,0	45,0	4,0	2	0,25	30
0,5X1,5	0,5	0,47	0,4	1,5	45,0	4,0	2	0,25	30
0,5X2	0,5	0,47	0,4	2,0	45,0	4,0	2	0,25	30
0,5X2,5	0,5	0,47	0,4	2,5	45,0	4,0	2	0,25	30
0,5X3	0,5	0,47	0,4	3,0	45,0	4,0	2	0,25	30
0,5X3,5	0,5	0,47	0,4	3,5	45,0	4,0	2	0,25	30
0,5X4	0,5	0,47	0,4	4,0	45,0	4,0	2	0,25	30
0,5X4,5	0,5	0,47	0,4	4,5	45,0	4,0	2	0,25	30
0,5X5	0,5	0,47	0,4	5,0	45,0	4,0	2	0,25	30
0,5X5,5	0,5	0,47	0,4	5,5	45,0	4,0	2	0,25	30
0,5X6	0,5	0,47	0,4	6,0	45,0	4,0	2	0,25	30
0,5X7	0,5	0,47	0,4	7,0	45,0	4,0	2	0,25	30
0,5X8	0,5	0,47	0,4	8,0	45,0	4,0	2	0,25	30
0,5X9	0,5	0,47	0,4	9,0	45,0	4,0	2	0,25	30
0,6X1	0,6	0,57	0,48	1,0	45,0	4,0	2	0,30	30
0,6X2	0,6	0,57	0,48	2,0	45,0	4,0	2	0,30	30
0,6X3	0,6	0,57	0,48	3,0	45,0	4,0	2	0,30	30
0,6X4	0,6	0,57	0,48	4,0	45,0	4,0	2	0,30	30
0,6X5	0,6	0,57	0,48	5,0	45,0	4,0	2	0,30	30
0,6X6	0,6	0,57	0,48	6,0	45,0	4,0	2	0,30	30
0,6X8	0,6	0,57	0,48	8,0	45,0	4,0	2	0,30	30
0,8X2	0,8	0,77	0,64	2,0	45,0	4,0	2	0,40	30
0,8X3	0,8	0,77	0,64	3,0	45,0	4,0	2	0,40	30
0,8X4	0,8	0,77	0,64	4,0	45,0	4,0	2	0,40	30
0,8X5	0,8	0,77	0,64	5,0	45,0	4,0	2	0,40	30
0,8X6	0,8	0,77	0,64	6,0	45,0	4,0	2	0,40	30
0,8X7	0,8	0,77	0,64	7,0	45,0	4,0	2	0,40	30
0,8X8	0,8	0,77	0,64	8,0	45,0	4,0	2	0,40	30
0,8X9	0,8	0,77	0,64	9,0	45,0	4,0	2	0,40	30
1X2,5	1,0	0,96	0,8	2,5	45,0	4,0	2	0,50	30
1X3	1,0	0,96	0,8	3,0	45,0	4,0	2	0,50	30

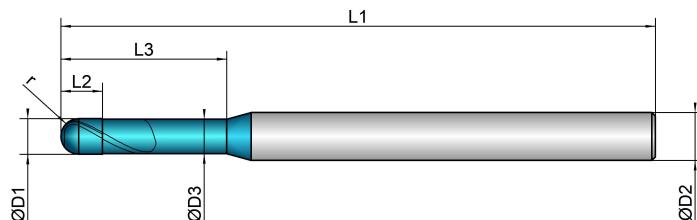


	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	° 
K203206									
1X4	1,0	0,96	0,8	4,0	45,0	4,0	2	0,50	30
1X5	1,0	0,96	0,8	5,0	45,0	4,0	2	0,50	30
1X6	1,0	0,96	0,8	6,0	45,0	4,0	2	0,50	30
1X7	1,0	0,96	0,8	7,0	45,0	4,0	2	0,50	30
1X8	1,0	0,96	0,8	8,0	45,0	4,0	2	0,50	30
1X9	1,0	0,96	0,8	9,0	45,0	4,0	2	0,50	30
1X10	1,0	0,96	0,8	10,0	45,0	4,0	2	0,50	30
1X12	1,0	0,96	0,8	12,0	45,0	4,0	2	0,50	30
1,2X6	1,2	1,16	0,96	6,0	45,0	4,0	2	0,60	30
1,2X8	1,2	1,16	0,96	8,0	45,0	4,0	2	0,60	30
1,2X10	1,2	1,16	0,96	10,0	45,0	4,0	2	0,60	30
1,2X12	1,2	1,16	0,96	12,0	45,0	4,0	2	0,60	30
1,4X8	1,4	1,34	1,12	8,0	45,0	4,0	2	0,70	30
1,4X12	1,4	1,34	1,12	12,0	45,0	4,0	2	0,70	30
1,5X3	1,5	1,44	1,2	3,0	45,0	4,0	2	0,75	30
1,5X4	1,5	1,44	1,2	4,0	45,0	4,0	2	0,75	30
1,5X6	1,5	1,44	1,2	6,0	45,0	4,0	2	0,75	30
1,5X8	1,5	1,44	1,2	8,0	45,0	4,0	2	0,75	30
1,5X10	1,5	1,44	1,2	10,0	45,0	4,0	2	0,75	30
1,5X12	1,5	1,44	1,2	12,0	45,0	4,0	2	0,75	30
1,6X8	1,6	1,54	1,28	8,0	45,0	4,0	2	0,80	30
1,6X12	1,6	1,54	1,28	12,0	45,0	4,0	2	0,80	30
1,8X8	1,8	1,74	1,44	8,0	45,0	4,0	2	0,90	30
1,8X12	1,8	1,74	1,44	12,0	45,0	4,0	2	0,90	30
2X3	2,0	1,94	1,6	3,0	45,0	4,0	2	1,00	30
2X4	2,0	1,94	1,6	4,0	45,0	4,0	2	1,00	30
2X6	2,0	1,94	1,6	6,0	45,0	4,0	2	1,00	30
2X8	2,0	1,94	1,6	8,0	45,0	4,0	2	1,00	30
2X10	2,0	1,94	1,6	10,0	45,0	4,0	2	1,00	30
2X12	2,0	1,94	1,6	12,0	45,0	4,0	2	1,00	30
2,5X10	2,5	2,41	2,0	10,0	45,0	4,0	2	1,25	30
3X8	3,0	2,92	3,5	8,0	45,0	4,0	2	1,50	30
3X10	3,0	2,92	3,5	10,0	45,0	4,0	2	1,50	30
3X12	3,0	2,92	3,5	12,0	45,0	4,0	2	1,50	30
3X16	3,0	2,92	3,5	16,0	45,0	4,0	2	1,50	30

Kühlung	
Toleranz	0-0,01
Beschichtung	TiSiN- α



HA K203212



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	210	195	125	75	60	45	100		150					CFK / GFK	Grafit	

K203212	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
0,3X1,75	0,3	0,27	0,24	1,75	50,0	4,0	2	0,15	30
0,3X2	0,3	0,27	0,24	2,0	50,0	4,0	2	0,15	30
0,3X2,25	0,3	0,27	0,24	2,25	50,0	4,0	2	0,15	30
0,3X2,5	0,3	0,27	0,24	2,5	50,0	4,0	2	0,15	30
0,3X2,75	0,3	0,27	0,24	2,75	50,0	4,0	2	0,15	30
0,3X3	0,3	0,27	0,24	3,0	50,0	4,0	2	0,15	30
0,3X3,5	0,3	0,27	0,24	3,5	50,0	4,0	2	0,15	30
0,3X4	0,3	0,27	0,24	4,0	50,0	4,0	2	0,15	30
0,3X4,5	0,3	0,27	0,24	4,5	50,0	4,0	2	0,15	30
0,5X10	0,5	0,47	0,4	10,0	50,0	4,0	2	0,25	30
0,6X10	0,6	0,57	0,48	10,0	50,0	4,0	2	0,30	30
0,6X12	0,6	0,57	0,48	12,0	50,0	4,0	2	0,30	30



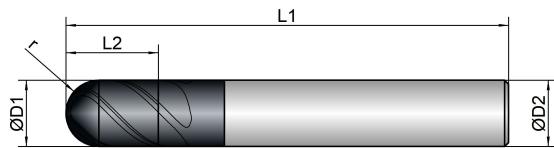
	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K203212									
0,8X10	0,8	0,77	0,64	10,0	50,0	4,0	2	0,40	30
1X14	1,0	0,96	0,8	14,0	50,0	4,0	2	0,50	30
1X16	1,0	0,96	0,8	16,0	50,0	4,0	2	0,50	30
1,2X14	1,2	1,16	0,96	14,0	50,0	4,0	2	0,60	30
1,2X16	1,2	1,16	0,96	16,0	50,0	4,0	2	0,60	30
1,4X16	1,4	1,34	1,12	16,0	50,0	4,0	2	0,70	30
1,5X14	1,5	1,44	1,2	14,0	50,0	4,0	2	0,75	30
1,5X16	1,5	1,44	1,2	16,0	50,0	4,0	2	0,75	30
1,6X16	1,6	1,54	1,28	16,0	50,0	4,0	2	0,80	30
1,8X16	1,8	1,74	1,44	16,0	50,0	4,0	2	0,90	30
2X14	2,0	1,94	1,6	14,0	50,0	4,0	2	1,00	30
2X16	2,0	1,94	1,6	16,0	50,0	4,0	2	1,00	30
2,5X15	2,5	2,41	2,0	15,0	50,0	4,0	2	1,25	30
3X16	3,0	2,92	3,5	16,0	50,0	4,0	2	1,50	30

Kühlung	
Toleranz	f8
Beschichtung	TiAlN- α

Premium						



HA K203253



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
210	150	140					90	360	400						50

K203253	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
3	3,0	5,0	50,0	3,0	4	1,50	45
4	4,0	8,0	54,0	4,0	4	2,00	45
5	5,0	9,0	54,0	5,0	4	2,50	45
6	6,0	10,0	54,0	6,0	4	3,00	45
8	8,0	12,0	59,0	8,0	4	4,00	45
10	10,0	14,0	67,0	10,0	4	5,00	45
12	12,0	16,0	74,0	12,0	4	6,00	45
14	14,0	18,0	75,0	14,0	4	7,00	45
16	16,0	22,0	83,0	16,0	4	8,00	45
20	20,0	26,0	93,0	20,0	4	10,00	45



Kühlung

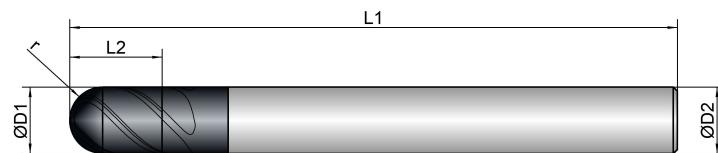
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203263



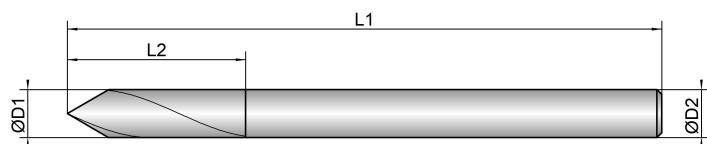
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
190	130	120					80	340	380						40	

K203263	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
3	3,0	5,0	75,0	3,0	4	1,50	45
4	4,0	8,0	75,0	4,0	4	2,00	45
5	5,0	9,0	75,0	5,0	4	2,50	45
6	6,0	10,0	100,0	6,0	4	3,00	45
8	8,0	12,0	100,0	8,0	4	4,00	45
10	10,0	14,0	100,0	10,0	4	5,00	45
12	12,0	16,0	100,0	12,0	4	6,00	45
14	14,0	18,0	100,0	14,0	4	7,00	45
16	16,0	22,0	150,0	16,0	4	8,00	45
20	20,0	26,0	150,0	20,0	4	10,00	45

Kühlung	
Toleranz	-
Beschichtung	-



HA K204001



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe			
60	35						40	55	200	●				CFK / GFK	Grafit	

K204001		D1 	L2 	L1 	D2 	z 	o
3		3,0	15,0	50,0	3,0	1	30
4		4,0	18,0	50,0	4,0	1	30
6		6,0	20,0	54,0	6,0	1	30

Kühlung



HA UNI



Toleranz

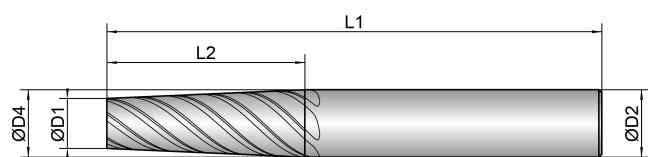
-

Beschichtung

-



HA K204011



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
●	●						●	●	●					CFK / GFK	Grafit

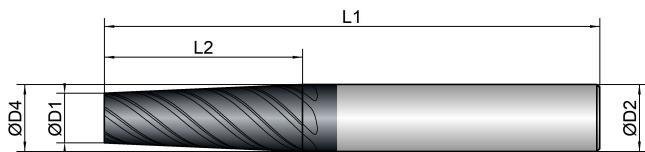
K204011	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	3	10,0	50,0	3,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α

HA **UNI**



HA K204013



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204013	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	3	10,0	50,0	3,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung



HA UNI



Toleranz

-

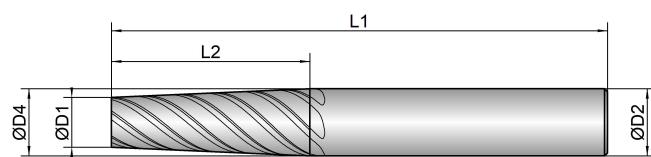
Premium

Beschichtung

-



HA K204021



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204021	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45

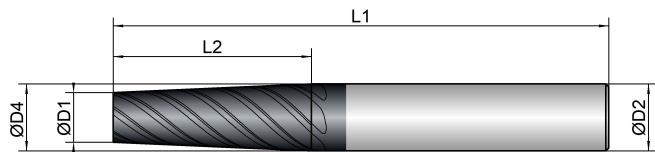
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



Premium



HA K204023



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204023	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
	2X10	2	3	10,0	50,0	3,0	4
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45

Kühlung



HA UNI



Toleranz

-

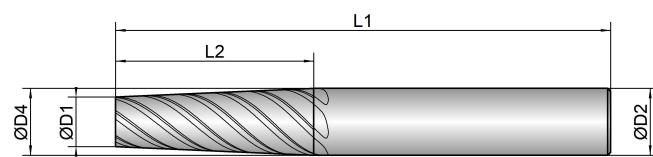
Premium

Beschichtung

-



HA K204031



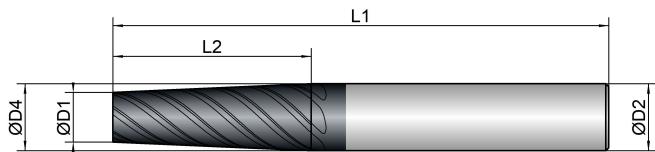
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204031	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204033



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

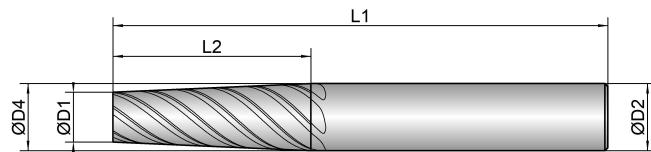
K204033	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
	2	3	10,0	50,0	3,0	4	
2X10	2,5	4	10,0	50,0	4,0	4	30
2,5X10	2,5	4	20,0	60,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	5,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung	(4 icons)
Toleranz	-
Beschichtung	-

HA **UNI**



HA K204041



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204041	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	
	2X10	2	3	10,0	50,0	3,0	4
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

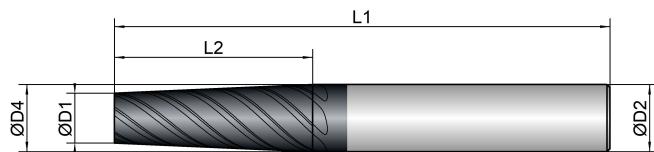
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



Premium



HA K204043



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204043	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

Kühlung



HA UNI



Toleranz

-

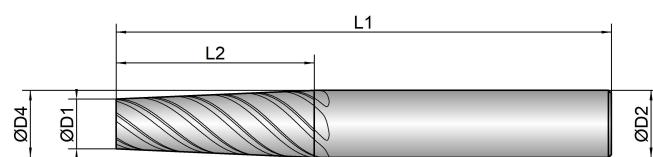
Premium

Beschichtung

-



HA K204051



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

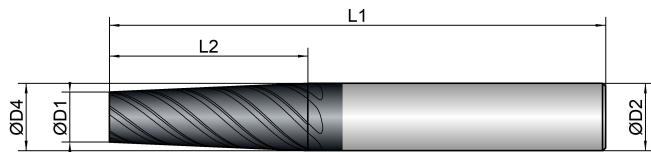
K204051	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α

HA **UNI**



HA K204053



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204053	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45

Kühlung


HA UNI

Toleranz

-

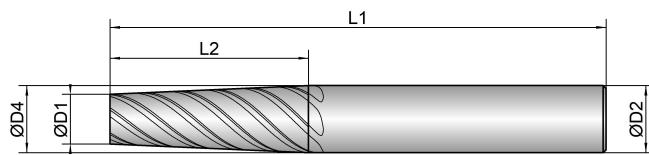


Beschichtung

-



HA K204061



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204061	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	Z	o
2X10	2	4	10,0	50,0	4,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45

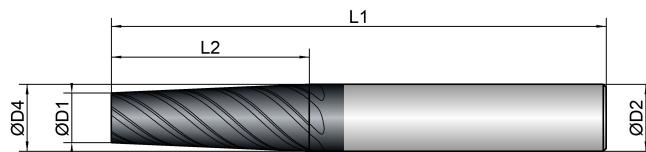
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



Premium



HA K204063



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204063	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	4	10,0	50,0	4,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45

Kühlung



HA UNI



Toleranz

-

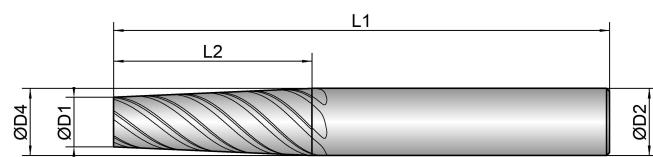
Premium

Beschichtung

-



HA K204071



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204071	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z Z #	o
	2,5X25	2,5	6	25,0	65,0	6,0	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	37
5X30	5	10	30,0	85,0	10,0	6	37
5X45	5	12	45,0	100,0	12,0	6	37
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

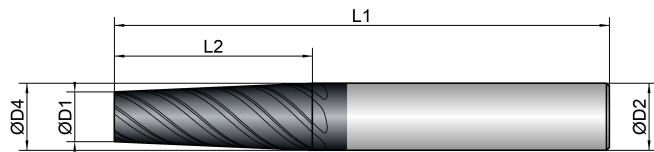
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



Premium



HA K204073



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204073	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X25	2,5	6	25,0	65,0	6,0	4	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	45
5X30	5	10	30,0	85,0	10,0	6	45
5X45	5	12	45,0	100,0	12,0	6	45
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

Kühlung



HA UNI



Toleranz

-

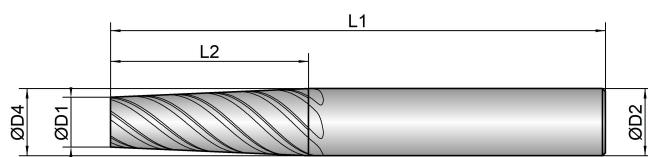
Premium

Beschichtung

-



HA K204081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●		●	●					

K204081	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30
3,5X30	3,5	10	30,0	80,0	10,0	4	30
4X30	4	10	30,0	80,0	10,0	6	45
4,5X30	4,5	10	30,0	80,0	10,0	6	45
5X30	5	12	30,0	84,0	12,0	6	45
5X40	5	12	40,0	100,0	12,0	6	45
6X30	6	12	30,0	93,0	12,0	6	45
6X55	6	16	55,0	110,0	16,0	6	45
8X30	8	14	30,0	90,0	14,0	6	45
8X50	8	18	50,0	114,0	18,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X55	10	20	55,0	115,0	20,0	6	45
12X30	12	18	30,0	93,0	18,0	6	45
12X45	12	20	45,0	100,0	20,0	6	45

Kühlung



HA UNI



Toleranz

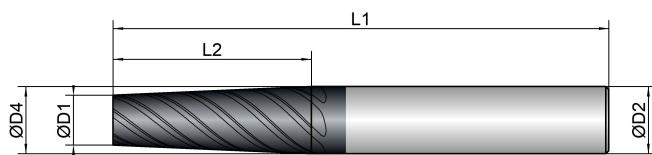
-

Premium

Beschichtung

TiAlN- α 

HA K204083



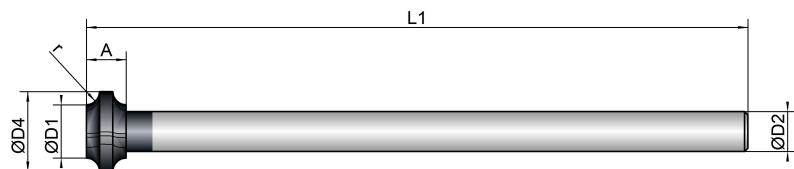
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204083	D1	D4	L2	L1	D2	z	
	mm \varnothing	mm \varnothing	mm	mm	mm \varnothing	#	o
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30
3,5X30	3,5	10	30,0	80,0	10,0	4	30
4X30	4	10	30,0	80,0	10,0	6	45
4,5X30	4,5	10	30,0	80,0	10,0	6	45
5X30	5	12	30,0	84,0	12,0	6	45
5X40	5	12	40,0	100,0	12,0	6	45
6X30	6	12	30,0	93,0	12,0	6	45
6X55	6	16	55,0	110,0	16,0	6	45
8X30	8	14	30,0	90,0	14,0	6	45
8X50	8	18	50,0	114,0	18,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X55	10	20	55,0	115,0	20,0	6	45
12X30	12	18	30,0	93,0	18,0	6	45
12X45	12	20	45,0	100,0	20,0	6	45

Kühlung				
Toleranz	0-0,01			
Beschichtung	TiAlN- α			



HA K204092



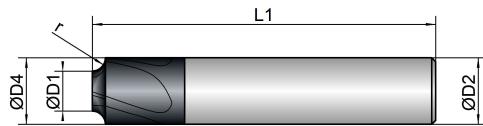
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
60	40						35	40	120							

K204092	r 	D1 	D4 	A 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm	mm \varnothing	#
5,6/0,2	0,20	5,6	6	2,0	75,0	4,0	4
7,6/0,2	0,20	7,6	8	2,0	100,0	6,0	4
5,4/0,3	0,30	5,4	6	2,0	75,0	4,0	4
7,4/0,3	0,30	7,4	8	2,0	100,0	6,0	4
5,2/0,4	0,40	5,2	6	2,0	75,0	4,0	4
7,2/0,4	0,40	7,2	8	2,0	100,0	6,0	4
5/0,5	0,50	5	6	2,0	75,0	4,0	4
7/0,5	0,50	7	8	2,0	100,0	6,0	4
8,4/0,8	0,80	8,4	10	4,0	100,0	6,0	4
8/1	1,00	8	10	4,0	100,0	6,0	4
7,6/1,2	1,20	7,6	10	5,0	100,0	6,0	4
7/1,5	1,50	7	10	5,0	100,0	6,0	4
8,4/1,8	1,80	8,4	12	6,0	100,0	6,0	4
8/2	2,00	8	12	7,0	100,0	6,0	4
7/2,5	2,50	7	12	8,0	100,0	6,0	4

Kühlung				
Toleranz	0-0,01			
Beschichtung	TiAlN- α			



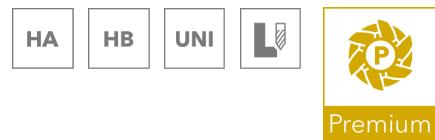
HA K204106



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
170	100						85	125	400				25		45

K204106	r 	D1 	D4 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm \varnothing	#
3,6/0,2	0,20	3,6	4	50,0	4,0	4
3,4/0,3	0,30	3,4	4	50,0	4,0	4
3,2/0,4	0,40	3,2	4	50,0	4,0	4
3/0,5	0,50	3	4	50,0	4,0	4
4,8/0,6	0,60	4,8	6	50,0	6,0	4
4,4/0,8	0,80	4,4	6	50,0	6,0	4
4/1	1,00	4	6	50,0	6,0	4
5/1,5	1,50	5	8	55,0	10,0	4
6/2	2,00	6	10	66,0	10,0	4
7/2,5	2,50	7	12	75,0	12,0	4
6/3	3,00	6	12	75,0	12,0	4
9/3,5	3,50	9	16	80,0	16,0	4
8/4	4,00	8	16	80,0	16,0	4
7/4,5	4,50	7	16	80,0	16,0	4
10/5	5,00	10	20	80,0	20,0	4
8/6	6,00	8	20	80,0	20,0	4
9/8	8,00	9	25	100,0	25,0	4
5/10	10,00	5	25	100,0	25,0	4

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205173



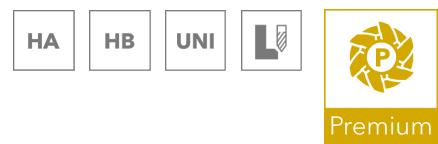
HB K205174



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205173		K205174		D1	L1	D2	z
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

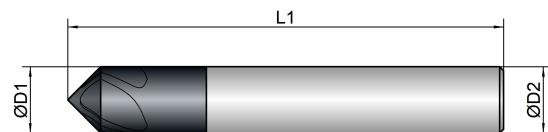
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205183



HB K205184



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205183		K205184		D1 mm \varnothing	L1 mm	D2 mm \varnothing	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung


HA
UNI
B

Toleranz

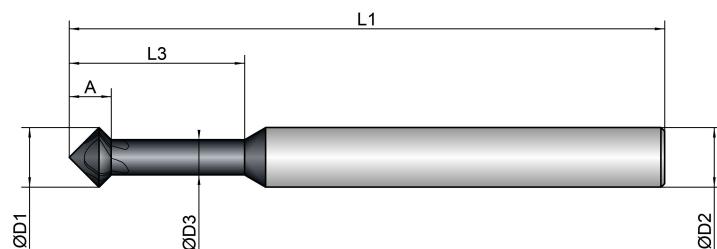
-

Basic

Beschichtung

TiAlN- α 

HA K205193

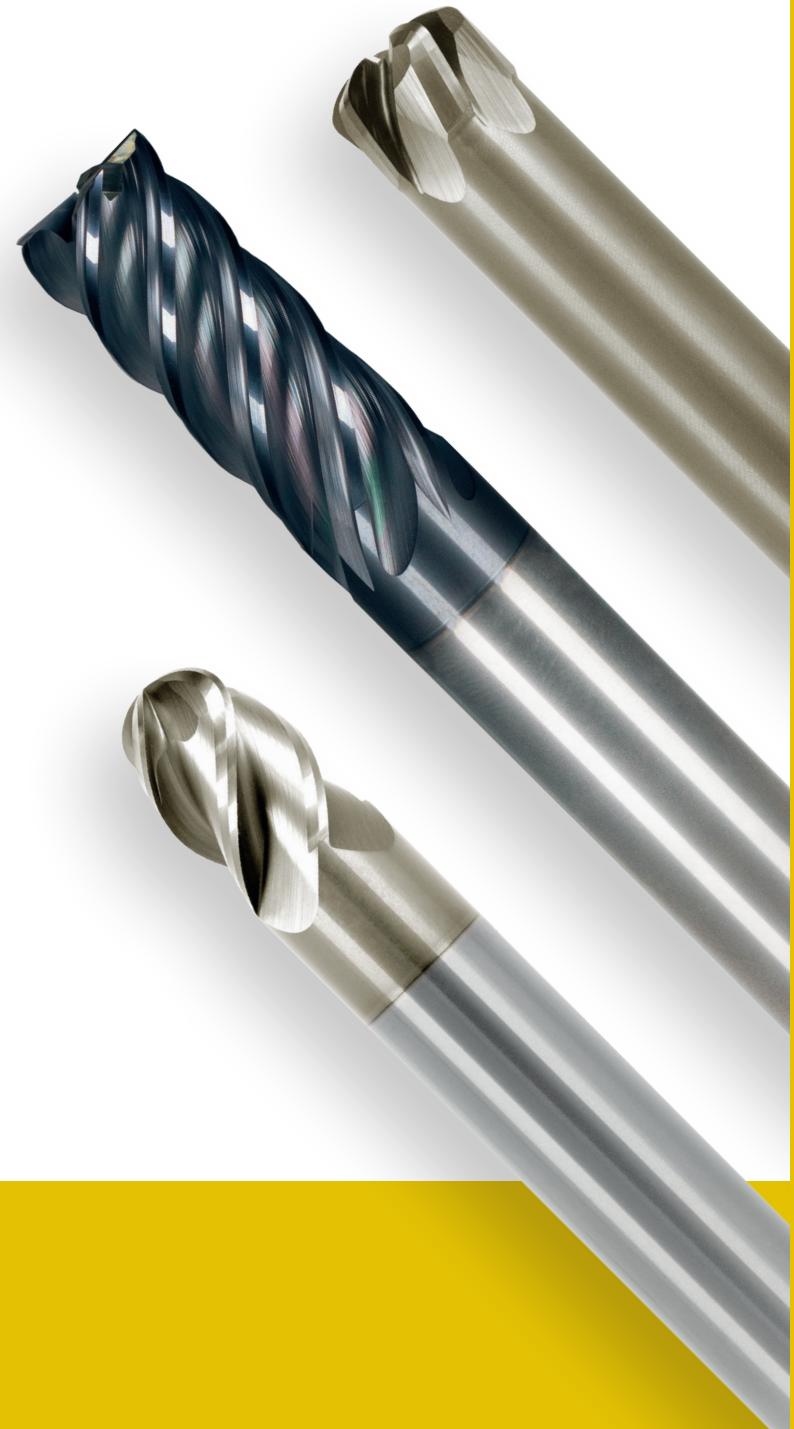


Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
70	45						40	38	120				25		35

K205193	D1 mm \varnothing	D3 mm \varnothing	A mm	L3 mm	L1 mm	D2 mm \varnothing	z Z #
3	3,0	2,2	2,0	10,0	50,0	4,0	4
4	4,0	2,9	2,5	10,0	50,0	4,0	4
5	5,0	3,9	3,0	15,0	65,0	6,0	4
6	6,0	3,9	4,0	15,0	65,0	6,0	4
8	8,0	5,9	2,5	20,0	70,0	8,0	4
10	10,0	5,9	4,0	23,0	73,0	10,0	4
12	12,0	5,9	6,0	23,0	75,0	12,0	4

INOX





HOFMANN & VRATNY — STARKES WERKZEUG

INOX

Rostfreier Stahl überzeugt durch seine Korrosions- und Säurebeständigkeit. Er ist aber auch zäh und neigt dazu, sich „festzufressen“. Für den Zerspanungsprozess eine Herausforderung – der wir uns annehmen, und das bereits seit vielen Jahren.

Starkes Werkzeug für ein starkes Material.

Aufgrund ihrer besonderen Eigenschaften haben rostfreie Stähle einen hohen Stellenwert in der Industrie. Zur Zerspanung dieser äußerst zähen Werkstoffe bieten wir Ihnen langjährig erprobte Werkzeuge aus allen drei Produktlinien an.

Namhafte Unternehmen aus der Medizinbranche setzen seit Jahren auf unsere bewährte Qualität in diesem Bereich.

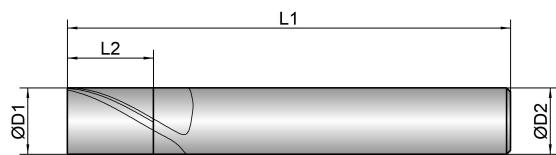
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201031



HB K201032



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201031	K201032	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
0,25/3	-	0,25	0,5	38,0	3,0	2	30
0,3/3	-	0,3	1,0	38,0	3,0	2	30
0,35/3	-	0,35	1,0	38,0	3,0	2	30
0,4/3	-	0,4	1,0	38,0	3,0	2	30
0,5/3	-	0,5	1,5	38,0	3,0	2	30
0,6/3	-	0,6	1,5	38,0	3,0	2	30
0,7/3	-	0,7	2,0	38,0	3,0	2	30
0,8/3	-	0,8	2,0	38,0	3,0	2	30
0,9/3	-	0,9	2,5	38,0	3,0	2	30
1/3	-	1,0	3,0	50,0	3,0	2	30
1,1/3	-	1,1	3,0	50,0	3,0	2	30
1,2/3	-	1,2	4,0	50,0	3,0	2	30
1,4/3	-	1,4	4,0	50,0	3,0	2	30

K201031	K201032	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
1,5/6	1,5	1,5	3,0	54,0	6,0	2	30
1,5/3	-	1,5	4,0	50,0	3,0	2	30
1,6/3	-	1,6	4,0	50,0	3,0	2	30
1,8/3	-	1,8	5,0	50,0	3,0	2	30
2/6	2	2,0	4,0	54,0	6,0	2	30
2/3	-	2,0	5,0	50,0	3,0	2	30
2,5/3	-	2,5	6,0	50,0	3,0	2	30
3/6	3	3,0	6,0	54,0	6,0	2	30
4/6	4	4,0	7,0	54,0	6,0	2	30
5/6	5	5,0	8,0	54,0	6,0	2	30
6/6	6	6,0	10,0	54,0	6,0	2	30
8/8	8	8,0	12,0	59,0	8,0	2	30
10/10	10	10,0	13,0	67,0	10,0	2	30
12/12	12	12,0	16,0	74,0	12,0	2	30
14/14	14	14,0	16,0	75,0	14,0	2	30
16/16	16	16,0	20,0	83,0	16,0	2	30
18/18	18	18,0	20,0	85,0	18,0	2	30
20/20	20	20,0	25,0	93,0	20,0	2	30



Kühlung



Toleranz

e8

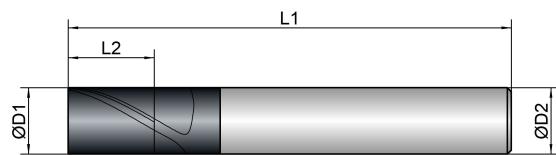
Beschichtung

TiAlN- α 

HA K201033



HB K201034



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	100	80					80	100	280					CFK / GFK	Grafit

K201033	K201034	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	
0,25/3	-	0,25	0,5	38,0	3,0	2	30
0,3/3	-	0,3	1,0	38,0	3,0	2	30
0,35/3	-	0,35	1,0	38,0	3,0	2	30
0,4/3	-	0,4	1,0	38,0	3,0	2	30
0,5/3	-	0,5	1,5	38,0	3,0	2	30
0,6/3	-	0,6	1,5	38,0	3,0	2	30
0,7/3	-	0,7	2,0	38,0	3,0	2	30
0,8/3	-	0,8	2,0	38,0	3,0	2	30
0,9/3	-	0,9	2,5	38,0	3,0	2	30
1/3	-	1,0	3,0	50,0	3,0	2	30
1,1/3	-	1,1	3,0	50,0	3,0	2	30
1,2/3	-	1,2	4,0	50,0	3,0	2	30
1,4/3	-	1,4	4,0	50,0	3,0	2	30

K201033	K201034	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
1,5/6	1,5	1,5	3,0	54,0	6,0	2	30
1,5/3	-	1,5	4,0	50,0	3,0	2	30
1,6/3	-	1,6	4,0	50,0	3,0	2	30
1,8/3	-	1,8	5,0	50,0	3,0	2	30
2/6	2	2,0	4,0	54,0	6,0	2	30
2/3	-	2,0	5,0	50,0	3,0	2	30
2,5/3	-	2,5	6,0	50,0	3,0	2	30
3/6	3	3,0	6,0	54,0	6,0	2	30
4/6	4	4,0	7,0	54,0	6,0	2	30
5/6	5	5,0	8,0	54,0	6,0	2	30
6/6	6	6,0	10,0	54,0	6,0	2	30
8/8	8	8,0	12,0	59,0	8,0	2	30
10/10	10	10,0	13,0	67,0	10,0	2	30
12/12	12	12,0	16,0	74,0	12,0	2	30
14/14	14	14,0	16,0	75,0	14,0	2	30
16/16	16	16,0	20,0	83,0	16,0	2	30
18/18	18	18,0	20,0	85,0	18,0	2	30
20/20	20	20,0	25,0	93,0	20,0	2	30

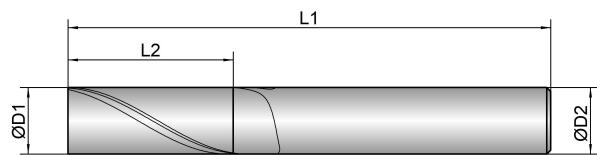
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201051



HB K201052



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201051		K201052		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

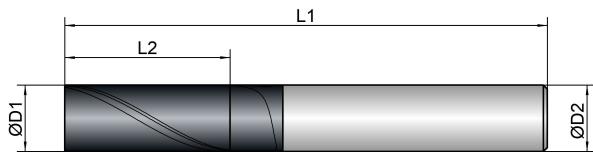
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201053



HB K201054



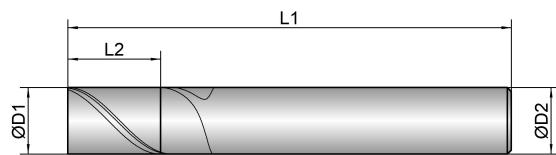
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
100	80	60					80	100	180					CFK / GFK	Grafit

K201053		K201054		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	o
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

Kühlung				
Toleranz	e8			
Beschichtung	-			



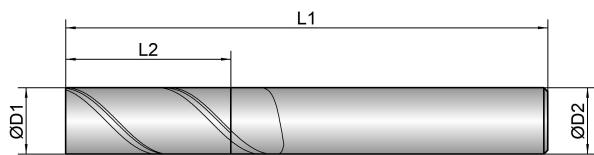
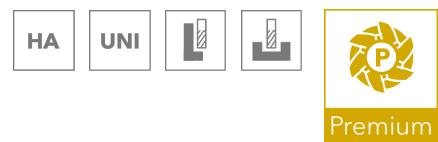
HA K201071



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201071	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
2	2,0	4,0	32,0	2,0	2	45
3	3,0	6,0	32,0	3,0	2	45
4	4,0	7,0	36,0	4,0	2	45
5	5,0	8,0	54,0	6,0	2	45
6	6,0	10,0	54,0	6,0	2	45
7	7,0	12,0	59,0	8,0	2	45
8	8,0	12,0	59,0	8,0	2	45
9	9,0	14,0	67,0	10,0	2	45
10	10,0	14,0	67,0	10,0	2	45
12	12,0	16,0	73,0	12,0	2	45
14	14,0	18,0	75,0	14,0	2	45
16	16,0	20,0	83,0	16,0	2	45
18	18,0	20,0	85,0	18,0	2	45
20	20,0	25,0	93,0	20,0	2	45

Kühlung				
Toleranz	e8			
Beschichtung	-			



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201081	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	
	2	2,0	7,0	32,0	2,0	45
3	3,0	10,0	38,0	3,0	2	45
4	4,0	13,0	40,0	4,0	2	45
5	5,0	15,0	58,0	6,0	2	45
6	6,0	16,0	58,0	6,0	2	45
7	7,0	20,0	70,0	8,0	2	45
8	8,0	22,0	70,0	8,0	2	45
9	9,0	22,0	73,0	10,0	2	45
10	10,0	25,0	73,0	10,0	2	45
12	12,0	28,0	84,0	12,0	2	45
14	14,0	30,0	84,0	14,0	2	45
16	16,0	35,0	93,0	16,0	2	45
18	18,0	35,0	101,0	18,0	2	45
20	20,0	40,0	104,0	20,0	2	45

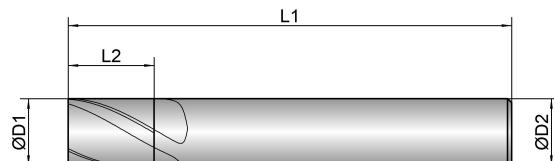
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201161



HB K201162



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
60	40	30					45	60	140							

K201161		K201162		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
1,5	1,5			1,5	3,0	54,0	6,0	3	30
2	2			2,0	4,0	54,0	6,0	3	30
3	3			3,0	6,0	54,0	6,0	3	30
4	4			4,0	7,0	54,0	6,0	3	30
5	5			5,0	8,0	54,0	6,0	3	30
6	6			6,0	10,0	54,0	6,0	3	30
8	8			8,0	12,0	59,0	8,0	3	30
10	10			10,0	13,0	67,0	10,0	3	30
12	12			12,0	16,0	74,0	12,0	3	30
14	14			14,0	16,0	75,0	14,0	3	30
16	16			16,0	20,0	83,0	16,0	3	30
18	18			18,0	20,0	85,0	18,0	3	30
20	20			20,0	25,0	93,0	20,0	3	30

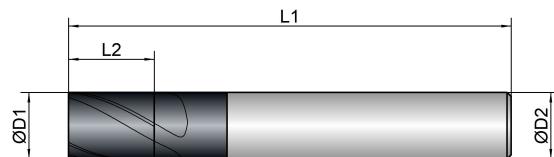
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201163



HB K201164



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160							80	160					
													CFK / GFK	Grafit	

D1 mm \varnothing		L2 mm	L1 mm	D2 mm \varnothing	z #	
K201163	K201164					
1,5	1,5	1,5	3,0	54,0	6,0	3 30
2	2	2,0	4,0	54,0	6,0	3 30
3	3	3,0	6,0	54,0	6,0	3 30
4	4	4,0	7,0	54,0	6,0	3 30
5	5	5,0	8,0	54,0	6,0	3 30
6	6	6,0	10,0	54,0	6,0	3 30
8	8	8,0	12,0	59,0	8,0	3 30
10	10	10,0	13,0	67,0	10,0	3 30
12	12	12,0	16,0	74,0	12,0	3 30
14	14	14,0	16,0	75,0	14,0	3 30
16	16	16,0	20,0	83,0	16,0	3 30
18	18	18,0	20,0	85,0	18,0	3 30
20	20	20,0	25,0	93,0	20,0	3 30



Toleranz e8

Premium

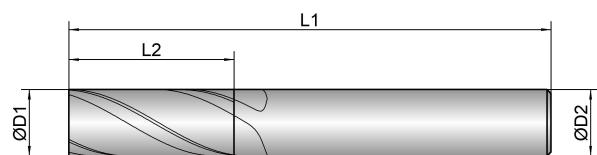
Beschichtung -



HA K201181



HB K201182



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201181		K201182		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1	1			1,0	4,0	58,0	6,0	3	30
1,5	1,5			1,5	6,0	58,0	6,0	3	30
2	2			2,0	7,0	58,0	6,0	3	30
3	3			3,0	10,0	58,0	6,0	3	30
4	4			4,0	13,0	58,0	6,0	3	30
5	5			5,0	15,0	58,0	6,0	3	30
6	6			6,0	16,0	58,0	6,0	3	30
8	8			8,0	22,0	70,0	8,0	3	30
10	10			10,0	25,0	73,0	10,0	3	30
12	12			12,0	26,0	84,0	12,0	3	30
14	14			14,0	26,0	84,0	14,0	3	30
16	16			16,0	32,0	93,0	16,0	3	30
18	18			18,0	32,0	93,0	18,0	3	30
20	20			20,0	40,0	104,0	20,0	3	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



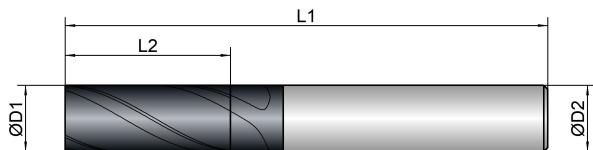
Premium



HA K201183



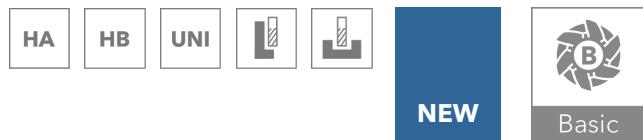
HB K201184



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201183		K201184		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	4,0	58,0	6,0	3	30
1,5	1,5			1,5	6,0	58,0	6,0	3	30
2	2			2,0	7,0	58,0	6,0	3	30
3	3			3,0	10,0	58,0	6,0	3	30
4	4			4,0	13,0	58,0	6,0	3	30
5	5			5,0	15,0	58,0	6,0	3	30
6	6			6,0	16,0	58,0	6,0	3	30
8	8			8,0	22,0	70,0	8,0	3	30
10	10			10,0	25,0	73,0	10,0	3	30
12	12			12,0	26,0	84,0	12,0	3	30
14	14			14,0	26,0	84,0	14,0	3	30
16	16			16,0	32,0	93,0	16,0	3	30
18	18			18,0	32,0	93,0	18,0	3	30
20	20			20,0	40,0	104,0	20,0	3	30

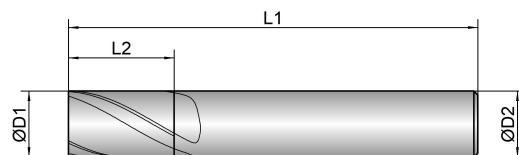
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201251



HB K201252



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
80	55	40					60	70	210							

K201251		K201252		D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	z °
1	1			1,0	2,0	45,0	6,0	3	30
1,2	1,2			1,2	2,0	45,0	6,0	3	30
1,5	1,5			1,5	3,0	45,0	6,0	3	30
1,8	1,8			1,8	3,0	45,0	6,0	3	30
2	2			2,0	4,0	45,0	6,0	3	30
2,5	2,5			2,5	4,0	45,0	6,0	3	30
2,8	2,8			2,8	6,0	45,0	6,0	3	30
3	3			3,0	6,0	45,0	6,0	3	30
3,5	3,5			3,5	6,0	45,0	6,0	3	30
3,8	3,8			3,8	7,0	45,0	6,0	3	30
4	4			4,0	7,0	45,0	6,0	3	30
4,5	4,5			4,5	7,0	45,0	6,0	3	30
4,75	4,75			4,75	8,0	45,0	6,0	3	30

K201251	K201252	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
5	5	5,0	8,0	45,0	6,0	3	30
5,5	5,5	5,5	8,0	45,0	6,0	3	30
5,75	5,75	5,75	10,0	45,0	6,0	3	30
6	6	6,0	10,0	45,0	6,0	3	30
6,75	6,75	6,75	10,0	55,0	8,0	3	30
7	7	7,0	12,0	55,0	8,0	3	30
7,75	7,75	7,75	12,0	55,0	8,0	3	30
8	8	8,0	13,0	55,0	8,0	3	30
8,7	8,7	8,7	14,0	55,0	10,0	3	30
9	9	9,0	14,0	55,0	10,0	3	30
9,7	9,7	9,7	16,0	55,0	10,0	3	30
10	10	10,0	16,0	55,0	10,0	3	30

Kühlung


HA HB UNI L U

NEW



Toleranz

e8

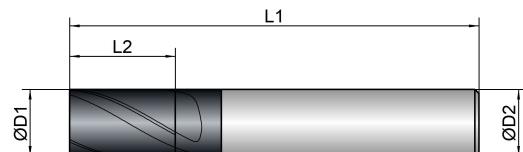
Beschichtung

TiAlN- α 

HA K201253



HB K201254

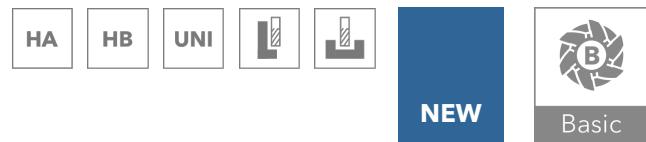


Stahl			Gehärteter Stahl			INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC		Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
110	75	65					85	95	290					

K201253		K201254		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	2,0	45,0	6,0	3	30
1,2	1,2			1,2	2,0	45,0	6,0	3	30
1,5	1,5			1,5	3,0	45,0	6,0	3	30
1,8	1,8			1,8	3,0	45,0	6,0	3	30
2	2			2,0	4,0	45,0	6,0	3	30
2,5	2,5			2,5	4,0	45,0	6,0	3	30
2,8	2,8			2,8	6,0	45,0	6,0	3	30
3	3			3,0	6,0	45,0	6,0	3	30
3,5	3,5			3,5	6,0	45,0	6,0	3	30
3,8	3,8			3,8	7,0	45,0	6,0	3	30
4	4			4,0	7,0	45,0	6,0	3	30
4,5	4,5			4,5	7,0	45,0	6,0	3	30
4,75	4,75			4,75	8,0	45,0	6,0	3	30

K201253	K201254	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
5	5	5,0	8,0	45,0	6,0	3	30
5,5	5,5	5,5	8,0	45,0	6,0	3	30
5,75	5,75	5,75	10,0	45,0	6,0	3	30
6	6	6,0	10,0	45,0	6,0	3	30
6,75	6,75	6,75	10,0	55,0	8,0	3	30
7	7	7,0	12,0	55,0	8,0	3	30
7,75	7,75	7,75	12,0	55,0	8,0	3	30
8	8	8,0	13,0	55,0	8,0	3	30
8,7	8,7	8,7	14,0	55,0	10,0	3	30
9	9	9,0	14,0	55,0	10,0	3	30
9,7	9,7	9,7	16,0	55,0	10,0	3	30
10	10	10,0	16,0	55,0	10,0	3	30

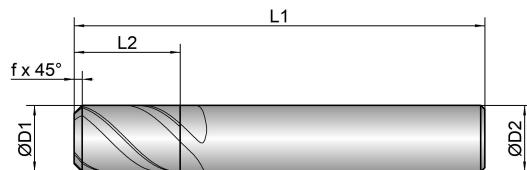
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201271



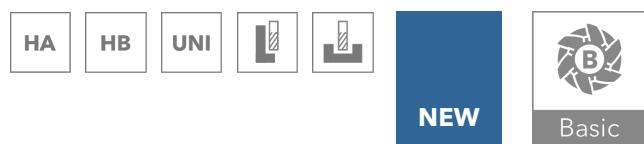
HB K201272



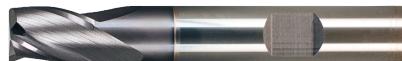
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	45	30					60	65	200	160						

K201271	K201272	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #		
1/6	1/6	1,0	2,0	45,0	6,0	3	0,02	45
1,5/6	1,5/6	1,5	3,0	45,0	6,0	3	0,03	45
2/6	2/6	2,0	4,0	45,0	6,0	3	0,03	45
2,5/6	2,5/6	2,5	5,0	45,0	6,0	3	0,03	45
3/6	3/6	3,0	6,0	45,0	6,0	3	0,03	45
3,5/6	3,5/6	3,5	6,0	45,0	6,0	3	0,03	45
4/6	4/6	4,0	7,0	45,0	6,0	3	0,04	45
4,5/6	4,5/6	4,5	8,0	45,0	6,0	3	0,04	45
5/6	5/6	5,0	8,0	45,0	6,0	3	0,04	45
5,5/6	5,5/6	5,5	8,0	45,0	6,0	3	0,04	45
6/6	6/6	6,0	10,0	45,0	6,0	3	0,04	45
8/8	8/8	8,0	13,0	55,0	8,0	3	0,05	45
10/10	10/10	10,0	16,0	55,0	10,0	3	0,05	45

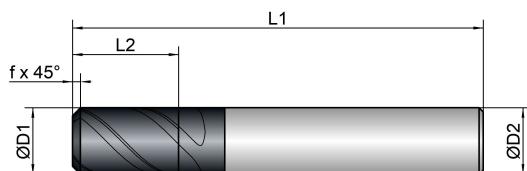
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201273



HB K201274



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
100	70	50					90	85	290	200				CFK / GFK	Grafit	

K201273		K201274		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
1/6	1/6			1,0	2,0	45,0	6,0	3	0,02	45
1,5/6	1,5/6			1,5	3,0	45,0	6,0	3	0,03	45
2/6	2/6			2,0	4,0	45,0	6,0	3	0,03	45
2,5/6	2,5/6			2,5	5,0	45,0	6,0	3	0,03	45
3/6	3/6			3,0	6,0	45,0	6,0	3	0,03	45
3,5/6	3,5/6			3,5	6,0	45,0	6,0	3	0,03	45
4/6	4/6			4,0	7,0	45,0	6,0	3	0,04	45
4,5/6	4,5/6			4,5	8,0	45,0	6,0	3	0,04	45
5/6	5/6			5,0	8,0	45,0	6,0	3	0,04	45
5,5/6	5,5/6			5,5	8,0	45,0	6,0	3	0,04	45
6/6	6/6			6,0	10,0	45,0	6,0	3	0,04	45
8/8	8/8			8,0	13,0	55,0	8,0	3	0,05	45
10/10	10/10			10,0	16,0	55,0	10,0	3	0,05	45

Kühlung	
Toleranz	e8
Beschichtung	-

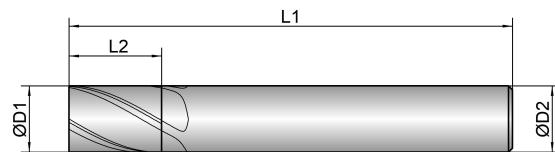
HA HB MTC UNI



HA K201291



HB K201292



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201291		K201292		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1,5/3	-			1,5	3,0	38,0	3,0	4	30
2/6	2			2,0	4,0	54,0	6,0	4	30
2/3	-			2,0	4,0	38,0	3,0	4	30
2,5/3	-			2,5	4,0	38,0	3,0	4	30
3/6	3			3,0	6,0	54,0	6,0	4	30
3/3	-			3,0	6,0	38,0	3,0	4	30
4/6	4			4,0	7,0	54,0	6,0	4	30
5/6	5			5,0	8,0	54,0	6,0	4	30
6/6	6			6,0	10,0	54,0	6,0	4	30
8/8	8			8,0	12,0	59,0	8,0	4	30
10/10	10			10,0	14,0	67,0	10,0	4	30
12/12	12			12,0	16,0	74,0	12,0	4	30
14/14	14			14,0	18,0	75,0	14,0	4	30
16/16	16			16,0	22,0	83,0	16,0	4	30
18/18	18			18,0	20,0	80,0	18,0	4	30
20/20	20			20,0	25,0	93,0	20,0	4	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α

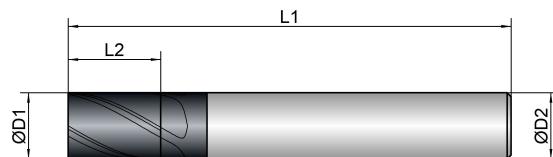
Premium						



HA K201293



HB K201294



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160							80	160					
														CFK / GFK	Grafit

K201293		K201294		D1 	L2 	L1 	D2 	z 	
1,5/3	-			1,5 mm	3,0 mm	38,0 mm	3,0 mm	4	30
2/6	2			2,0 mm	4,0 mm	54,0 mm	6,0 mm	4	30
2/3	-			2,0 mm	4,0 mm	38,0 mm	3,0 mm	4	30
2,5/3	-			2,5 mm	4,0 mm	38,0 mm	3,0 mm	4	30
3/6	3			3,0 mm	6,0 mm	54,0 mm	6,0 mm	4	30
3/3	-			3,0 mm	6,0 mm	38,0 mm	3,0 mm	4	30
4/6	4			4,0 mm	7,0 mm	54,0 mm	6,0 mm	4	30
5/6	5			5,0 mm	8,0 mm	54,0 mm	6,0 mm	4	30
6/6	6			6,0 mm	10,0 mm	54,0 mm	6,0 mm	4	30
8/8	8			8,0 mm	12,0 mm	59,0 mm	8,0 mm	4	30
10/10	10			10,0 mm	14,0 mm	67,0 mm	10,0 mm	4	30
12/12	12			12,0 mm	16,0 mm	74,0 mm	12,0 mm	4	30
14/14	14			14,0 mm	18,0 mm	75,0 mm	14,0 mm	4	30
16/16	16			16,0 mm	22,0 mm	83,0 mm	16,0 mm	4	30
18/18	18			18,0 mm	20,0 mm	80,0 mm	18,0 mm	4	30
20/20	20			20,0 mm	25,0 mm	93,0 mm	20,0 mm	4	30

Kühlung	
Toleranz	e8
Beschichtung	-



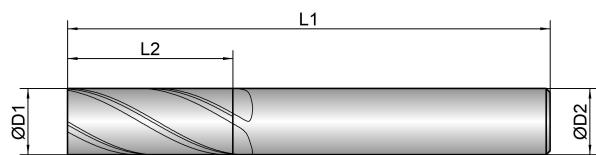
Premium



HA K201311



HB K201312



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201311		K201312		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
2/6	2			2,0	7,0	58,0	6,0	4	30
2/2	-			2,0	7,0	38,0	2,0	4	30
3/6	3			3,0	10,0	58,0	6,0	4	30
3/3	-			3,0	10,0	38,0	3,0	4	30
4/6	4			4,0	13,0	58,0	6,0	4	30
4/4	-			4,0	13,0	50,0	4,0	4	30
5/6	5			5,0	15,0	58,0	6,0	4	30
5/5	-			5,0	15,0	50,0	5,0	4	30
6/6	6			6,0	16,0	58,0	6,0	4	30
7/8	7			7,0	19,0	64,0	8,0	4	30
8/8	8			8,0	22,0	70,0	8,0	4	30
9/10	9			9,0	23,0	73,0	10,0	4	30
10/10	10			10,0	25,0	73,0	10,0	4	30
11/12	11			11,0	26,0	84,0	12,0	4	30
12/12	12			12,0	28,0	84,0	12,0	4	30
14/14	14			14,0	30,0	84,0	14,0	4	30
16/16	16			16,0	35,0	93,0	16,0	4	30
18/18	18			18,0	35,0	93,0	18,0	4	30
20/20	20			20,0	40,0	104,0	20,0	4	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α

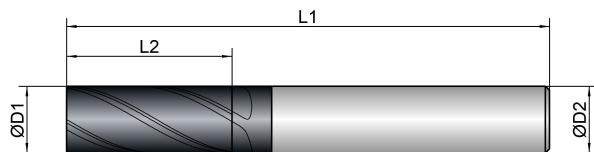
HA	HB	HPC	MTC	UNI		
						Premium



HA K201313



HB K201314



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201313		K201314		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
2/6	2			2,0	7,0	58,0	6,0	4	30
2/2	-			2,0	7,0	38,0	2,0	4	30
3/6	3			3,0	10,0	58,0	6,0	4	30
3/3	-			3,0	10,0	38,0	3,0	4	30
4/6	4			4,0	13,0	58,0	6,0	4	30
4/4	-			4,0	13,0	50,0	4,0	4	30
5/6	5			5,0	15,0	58,0	6,0	4	30
5/5	-			5,0	15,0	50,0	5,0	4	30
6/6	6			6,0	16,0	58,0	6,0	4	30
7/8	7			7,0	19,0	64,0	8,0	4	30
8/8	8			8,0	22,0	70,0	8,0	4	30
9/10	9			9,0	23,0	73,0	10,0	4	30
10/10	10			10,0	25,0	73,0	10,0	4	30
11/12	11			11,0	26,0	84,0	12,0	4	30
12/12	12			12,0	28,0	84,0	12,0	4	30
14/14	14			14,0	30,0	84,0	14,0	4	30
16/16	16			16,0	35,0	93,0	16,0	4	30
18/18	18			18,0	35,0	93,0	18,0	4	30
20/20	20			20,0	40,0	104,0	20,0	4	30



Toleranz e8

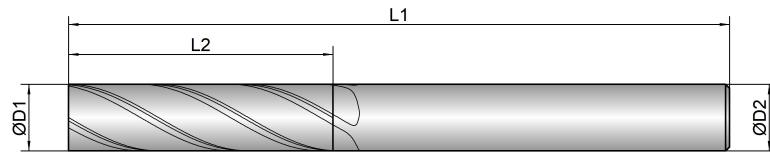
Beschichtung -



HA K201341



HB K201342



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
45	35	25					35	55	110					CFK / GFK	Grafit

K201341	K201342	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
3X16	-	3,0	16,0	75,0	3,0	4	30
4X16	-	4,0	16,0	75,0	4,0	4	30
4X20	-	4,0	20,0	100,0	4,0	4	30
5X20	-	5,0	20,0	75,0	5,0	4	30
5X25	-	5,0	25,0	100,0	5,0	4	30
6X24	6X24	6,0	24,0	80,0	6,0	4	30
6X30	6X30	6,0	30,0	100,0	6,0	4	30
8X32	8X32	8,0	32,0	100,0	8,0	4	30
8X40	8X40	8,0	40,0	120,0	8,0	4	30
10X40	10X40	10,0	40,0	100,0	10,0	4	30
10X50	10X50	10,0	50,0	120,0	10,0	4	30
12X48	12X48	12,0	48,0	120,0	12,0	4	30
12X60	12X60	12,0	60,0	150,0	12,0	4	30
14X45	14X45	14,0	45,0	100,0	14,0	4	30
14X56	14X56	14,0	56,0	150,0	14,0	4	30
16X50	16X50	16,0	50,0	125,0	16,0	4	30
16X65	16X65	16,0	65,0	150,0	16,0	4	30
18X55	18X55	18,0	55,0	130,0	18,0	4	30
18X72	18X72	18,0	72,0	150,0	18,0	4	30
20X60	20X60	20,0	60,0	135,0	20,0	4	30
20X80	20X80	20,0	80,0	150,0	20,0	4	30
25X75	25X75	25,0	75,0	150,0	25,0	4	30

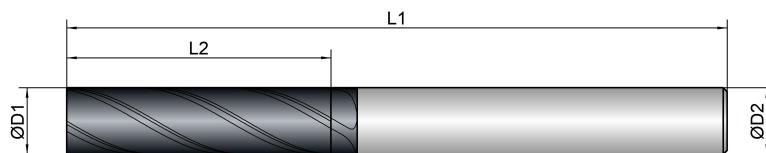
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201343



HB K201344



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
90	75	65					45								30

K201343		K201344		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	z \circ
3X16	-			3,0	16,0	75,0	3,0	4	30
4X16	-			4,0	16,0	75,0	4,0	4	30
4X20	-			4,0	20,0	100,0	4,0	4	30
5X20	-			5,0	20,0	75,0	5,0	4	30
5X25	-			5,0	25,0	100,0	5,0	4	30
6X24	6X24			6,0	24,0	80,0	6,0	4	30
6X30	6X30			6,0	30,0	100,0	6,0	4	30
8X32	8X32			8,0	32,0	100,0	8,0	4	30
8X40	8X40			8,0	40,0	120,0	8,0	4	30
10X40	10X40			10,0	40,0	100,0	10,0	4	30
10X50	10X50			10,0	50,0	120,0	10,0	4	30
12X48	12X48			12,0	48,0	120,0	12,0	4	30
12X60	12X60			12,0	60,0	150,0	12,0	4	30
14X45	14X45			14,0	45,0	100,0	14,0	4	30
14X56	14X56			14,0	56,0	150,0	14,0	4	30
16X50	16X50			16,0	50,0	125,0	16,0	4	30
16X65	16X65			16,0	65,0	150,0	16,0	4	30
18X55	18X55			18,0	55,0	130,0	18,0	4	30
18X72	18X72			18,0	72,0	150,0	18,0	4	30
20X60	20X60			20,0	60,0	135,0	20,0	4	30
20X80	20X80			20,0	80,0	150,0	20,0	4	30
25X75	25X75			25,0	75,0	150,0	25,0	4	30

Kühlung	
Toleranz	e8
Beschichtung	-



Premium



HA K201401



HB K201402



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201401		K201402		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	°
3	3			3,0	6,0	54,0	6,0	4	45
4	4			4,0	7,0	54,0	6,0	4	45
5	5			5,0	8,0	54,0	6,0	4	45
6	6			6,0	10,0	54,0	6,0	4	45
8	8			8,0	12,0	59,0	8,0	4	45
10	10			10,0	14,0	60,0	10,0	4	45
12	12			12,0	16,0	70,0	12,0	4	45
14	14			14,0	18,0	70,0	14,0	4	45
16	16			16,0	20,0	80,0	16,0	4	45
18	18			18,0	20,0	80,0	18,0	4	45
20	20			20,0	25,0	85,0	20,0	4	45

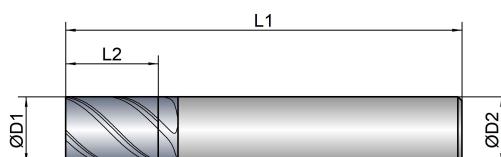
Kühlung	
Toleranz	e8
Beschichtung	TiCn- α



HA K201403



HB K201404



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

D1 mm \varnothing		L2 mm	L1 mm	D2 mm \varnothing	z #	
K201403	K201404					
3	3	3,0	6,0	54,0	6,0	4
4	4	4,0	7,0	54,0	6,0	4
5	5	5,0	8,0	54,0	6,0	4
6	6	6,0	10,0	54,0	6,0	4
8	8	8,0	12,0	59,0	8,0	4
10	10	10,0	14,0	60,0	10,0	4
12	12	12,0	16,0	70,0	12,0	4
14	14	14,0	18,0	70,0	14,0	4
16	16	16,0	20,0	80,0	16,0	4
18	18	18,0	20,0	80,0	18,0	4
20	20	20,0	25,0	85,0	20,0	4
						45

Kühlung	
Toleranz	e8
Beschichtung	-



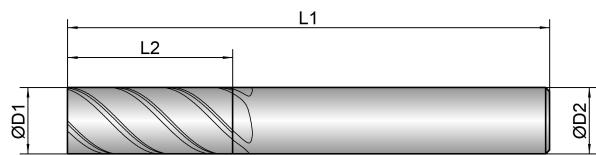
Premium



HA K201411



HB K201412



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201411		K201412		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
3	3			3,0	10,0	58,0	6,0	4	45
4	4			4,0	13,0	58,0	6,0	4	45
5	5			5,0	15,0	58,0	6,0	4	45
6	6			6,0	16,0	58,0	6,0	4	45
8	8			8,0	22,0	64,0	8,0	4	45
10	10			10,0	25,0	73,0	10,0	4	45
12	12			12,0	28,0	84,0	12,0	4	45
14	14			14,0	30,0	84,0	14,0	4	45
16	16			16,0	36,0	93,0	16,0	4	45
18	18			18,0	36,0	93,0	18,0	4	45
20	20			20,0	41,0	104,0	20,0	4	45
25	25			25,0	50,0	125,0	25,0	4	45

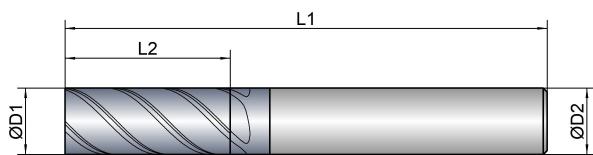
Kühlung	
Toleranz	e8
Beschichtung	TiCn- α



HA K201413



HB K201414



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201413		K201414		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	z °
3	3			3,0	10,0	58,0	6,0	4	45
4	4			4,0	13,0	58,0	6,0	4	45
5	5			5,0	15,0	58,0	6,0	4	45
6	6			6,0	16,0	58,0	6,0	4	45
8	8			8,0	22,0	64,0	8,0	4	45
10	10			10,0	25,0	73,0	10,0	4	45
12	12			12,0	28,0	84,0	12,0	4	45
14	14			14,0	30,0	84,0	14,0	4	45
16	16			16,0	36,0	93,0	16,0	4	45
18	18			18,0	36,0	93,0	18,0	4	45
20	20			20,0	41,0	104,0	20,0	4	45
25	25			25,0	50,0	125,0	25,0	4	45

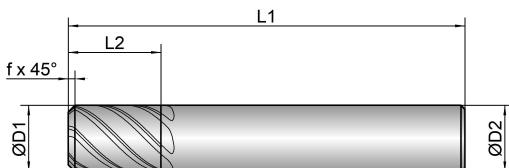
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201581



HB K201582



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	40	30					45	60	150							

K201581		K201582		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	8,0	54,0	6,0	6	0,02	45
6	6			6,0	10,0	54,0	6,0	6	0,03	45
7	7			7,0	12,0	59,0	8,0	6	0,04	45
8	8			8,0	12,0	59,0	8,0	6	0,04	45
9	9			9,0	14,0	60,0	10,0	6	0,04	45
10	10			10,0	14,0	60,0	10,0	6	0,05	45
12	12			12,0	16,0	70,0	12,0	6	0,05	45
14	14			14,0	18,0	70,0	14,0	6	0,06	45
16	16			16,0	20,0	80,0	16,0	6	0,06	45
18	18			18,0	20,0	80,0	18,0	8	0,07	45
20	20			20,0	25,0	85,0	20,0	8	0,07	45

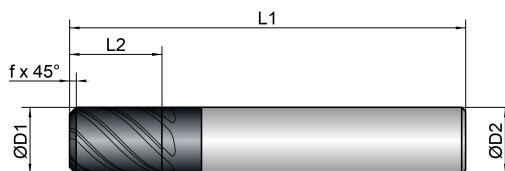
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201583



HB K201584



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe	CFK / GFK	Grafit					
170	100	90	70				95	125	600								

K201583		K201584		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	8,0	54,0	6,0	6	0,02	45
6	6			6,0	10,0	54,0	6,0	6	0,03	45
7	7			7,0	12,0	59,0	8,0	6	0,04	45
8	8			8,0	12,0	59,0	8,0	6	0,04	45
9	9			9,0	14,0	60,0	10,0	6	0,04	45
10	10			10,0	14,0	60,0	10,0	6	0,05	45
12	12			12,0	16,0	70,0	12,0	6	0,05	45
14	14			14,0	18,0	70,0	14,0	6	0,06	45
16	16			16,0	20,0	80,0	16,0	6	0,06	45
18	18			18,0	20,0	80,0	18,0	8	0,07	45
20	20			20,0	25,0	85,0	20,0	8	0,07	45

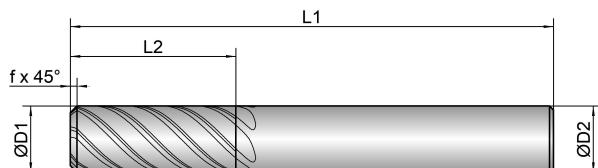
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201591



HB K201592



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe	CFK / GFK	Grafit					
60	40	30					40	60	140								

K201591		K201592		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	13,0	58,0	6,0	6	0,02	45
6	6			6,0	16,0	58,0	6,0	6	0,03	45
7	7			7,0	22,0	70,0	8,0	6	0,04	45
8	8			8,0	22,0	70,0	8,0	6	0,04	45
9	9			9,0	25,0	73,0	10,0	6	0,04	45
10	10			10,0	25,0	73,0	10,0	6	0,05	45
12	12			12,0	28,0	84,0	12,0	6	0,05	45
14	14			14,0	30,0	84,0	14,0	6	0,06	45
16	16			16,0	35,0	93,0	16,0	6	0,06	45
18	18			18,0	35,0	93,0	18,0	8	0,07	45
20	20			20,0	40,0	100,0	20,0	8	0,07	45
25	25			25,0	55,0	125,0	25,0	8	0,08	45

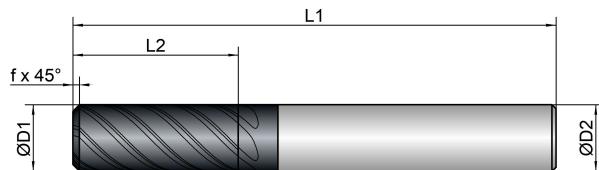
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201593



HB K201594



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe			
175	100	90	65				95	125	600					CFK / GFK	Grafit	

K201593		K201594		D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	45° mm	° ø
5	5			5,0	13,0	58,0	6,0	6	0,02	45
6	6			6,0	16,0	58,0	6,0	6	0,03	45
7	7			7,0	22,0	70,0	8,0	6	0,04	45
8	8			8,0	22,0	70,0	8,0	6	0,04	45
9	9			9,0	25,0	73,0	10,0	6	0,04	45
10	10			10,0	25,0	73,0	10,0	6	0,05	45
12	12			12,0	28,0	84,0	12,0	6	0,05	45
14	14			14,0	30,0	84,0	14,0	6	0,06	45
16	16			16,0	35,0	93,0	16,0	6	0,06	45
18	18			18,0	35,0	93,0	18,0	8	0,07	45
20	20			20,0	40,0	100,0	20,0	8	0,07	45
25	25			25,0	55,0	125,0	25,0	8	0,08	45



Toleranz e8

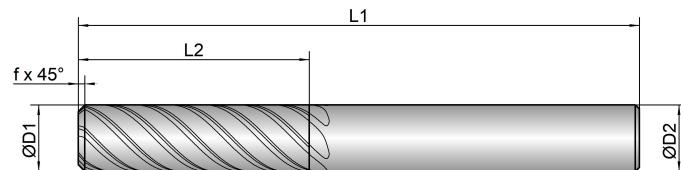
Beschichtung -



HA K201601



HB K201602



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
45	35	25					35	55	110							

K201601		K201602		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
6X21	6X21			6,0	21,0	65,0	6,0	6	0,03	45
7X25	7X25			7,0	25,0	75,0	8,0	6	0,04	45
8X28	8X28			8,0	28,0	75,0	8,0	6	0,04	45
9X30	9X30			9,0	30,0	85,0	10,0	6	0,04	45
10X35	10X35			10,0	35,0	85,0	10,0	6	0,05	45
12X45	12X45			12,0	45,0	100,0	12,0	6	0,05	45
16X50	16X50			16,0	50,0	110,0	16,0	6	0,06	45
16X65	16X65			16,0	65,0	125,0	16,0	6	0,06	45
20X55	20X55			20,0	55,0	115,0	20,0	8	0,07	45
20X70	20X70			20,0	70,0	135,0	20,0	8	0,07	45
25X75	25X75			25,0	75,0	150,0	25,0	8	0,08	45
32X125	32X125			32,0	125,0	215,0	32,0	9	0,10	45

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



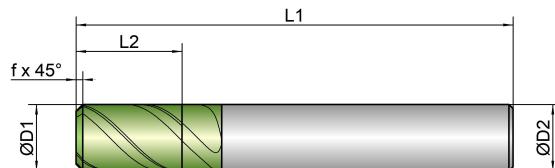
Basic



HA K201673



HB K201674



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
100	70	50					90	85	290	200						

K201673		K201674		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
1	-			1,0	2,0	38,0	3,0	3	0,02	45
1,2	-			1,2	2,0	38,0	3,0	3	0,02	45
1,5	-			1,5	3,0	38,0	3,0	3	0,025	45
2	2			2,0	4,0	50,0	6,0	3	0,03	45
2,5	2,5			2,5	5,0	50,0	6,0	3	0,03	45
3	3			3,0	6,0	50,0	6,0	3	0,03	45
4	4			4,0	7,0	50,0	6,0	3	0,04	45
4,5	4,5			4,5	8,0	50,0	6,0	3	0,04	45
5	5			5,0	8,0	50,0	6,0	3	0,04	45
5,5	5,5			5,5	8,0	50,0	6,0	3	0,04	45
5,75	5,75			5,75	10,0	50,0	6,0	3	0,04	45
6	6			6,0	10,0	50,0	6,0	3	0,04	45
7	7			7,0	12,0	55,0	8,0	3	0,045	45
7,75	7,75			7,75	12,0	55,0	8,0	3	0,05	45
8	8			8,0	13,0	55,0	8,0	3	0,05	45
9	9			9,0	14,0	66,0	10,0	3	0,05	45
9,7	9,7			9,7	16,0	66,0	10,0	3	0,05	45
10	10			10,0	16,0	66,0	10,0	3	0,05	45
12	12			12,0	16,0	73,0	12,0	3	0,05	45
14	14			14,0	16,0	83,0	14,0	3	0,06	45
16	16			16,0	18,0	80,0	16,0	3	0,06	45



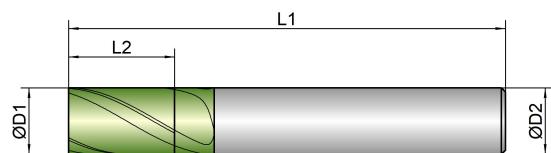
Toleranz e8

Beschichtung TiAlN- α 

HA K201677



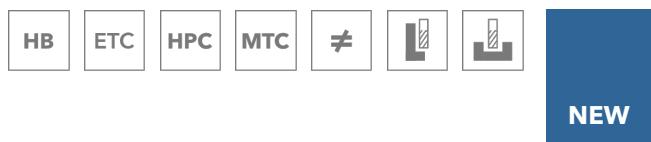
HB K201678



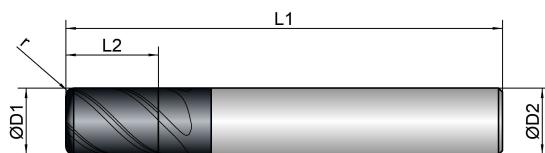
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	75	65					85	95	290					CFK / GFK	Grafit

K201677		K201678		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	
1	-			1,0	2,0	38,0	3,0	3	30
1,2	-			1,2	2,0	38,0	3,0	3	30
1,5	-			1,5	3,0	38,0	3,0	3	30
2	2			2,0	4,0	50,0	6,0	3	30
2,5	2,5			2,5	5,0	50,0	6,0	3	30
3	3			3,0	6,0	50,0	6,0	3	30
4	4			4,0	7,0	50,0	6,0	3	30
4,5	4,5			4,5	8,0	50,0	6,0	3	30
5	5			5,0	8,0	50,0	6,0	3	30
5,5	5,5			5,5	8,0	50,0	6,0	3	30
5,75	5,75			5,75	10,0	50,0	6,0	3	30
6	6			6,0	10,0	50,0	6,0	3	30
7	7			7,0	12,0	55,0	8,0	3	30
7,75	7,75			7,75	12,0	55,0	8,0	3	30
8	8			8,0	13,0	55,0	8,0	3	30
9	9			9,0	14,0	66,0	10,0	3	30
9,7	9,7			9,7	16,0	66,0	10,0	3	30
10	10			10,0	16,0	66,0	10,0	3	30
12	12			12,0	16,0	73,0	12,0	3	30
14	14			14,0	16,0	83,0	14,0	3	30
16	16			16,0	18,0	80,0	16,0	3	30

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α



HB K201754



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
185	175						100						CFK / GFK	Grafit	

K201754		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
3		3,0	6,0	54,0	6,0	4	0,10	45
4		4,0	8,0	54,0	6,0	4	0,10	45
5		5,0	9,0	54,0	6,0	4	0,20	45
6		6,0	10,0	54,0	6,0	4	0,20	45
8		8,0	12,0	58,0	8,0	4	0,20	45
10		10,0	14,0	66,0	10,0	4	0,20	45
12		12,0	16,0	73,0	12,0	4	0,20	45
16		16,0	22,0	82,0	16,0	4	0,30	45
20		20,0	26,0	92,0	20,0	4	0,30	45

Kühlung



HB ETC HPC MTC



Toleranz

e8

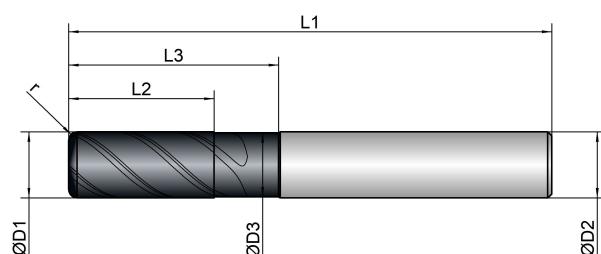
≠ L L L

Expert

Beschichtung

TiSiN- α 

HB K201784



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
185	175						100									

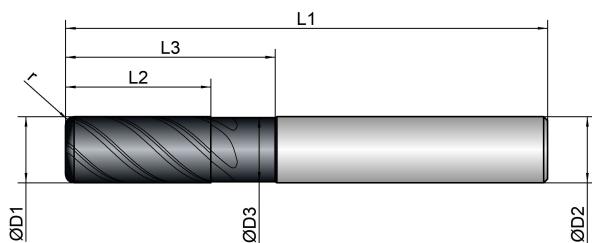
K201784		D1 mm 	D3 mm 	L2 mm 	L3 mm 	L1 mm 	D2 mm 	z # 	r mm 	°
3/0,1		3,0	2,8	8,0	20,0	58,0	6,0	4	0,10	42,5
4/0,2		4,0	3,8	11,0	20,0	58,0	6,0	4	0,20	42,5
5/0,2		5,0	4,8	13,0	20,0	58,0	6,0	4	0,20	42,5
6/0,2		6,0	5,8	13,0	20,0	58,0	6,0	4	0,20	42,5
8/0,3		8,0	7,7	19,0	25,0	63,0	8,0	4	0,30	42,5
10/0,3		10,0	9,7	22,0	32,0	73,0	10,0	4	0,30	42,5
12/0,3		12,0	11,6	26,0	38,0	84,0	12,0	4	0,30	42,5
16/0,5		16,0	15,5	32,0	44,0	92,0	16,0	4	0,50	42,5
20/0,5		20,0	19,5	38,0	54,0	104,0	20,0	4	0,50	42,5
25/0,5		25,0	24,5	45,0	65,0	125,0	25,0	4	0,50	42,5

Kühlung		
Toleranz	e8	
Beschichtung	TiSiN-α	

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HB K201789



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
185	175						115									

K201789	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
6/0,2	6,0	5,8	13,0	20,0	58,0	6,0	5	0,20	42,5
8/0,3	8,0	7,7	19,0	25,0	63,0	8,0	5	0,30	42,5
10/0,3	10,0	9,7	22,0	32,0	73,0	10,0	5	0,30	42,5
12/0,3	12,0	11,6	26,0	38,0	84,0	12,0	5	0,30	42,5
16/0,5	16,0	15,5	32,0	44,0	92,0	16,0	5	0,50	42,5
20/0,5	20,0	19,5	38,0	54,0	104,0	20,0	5	0,50	42,5
25/0,5	25,0	24,5	45,0	65,0	125,0	25,0	5	0,50	42,5

Kühlung


HB ETC ≠ 2xD

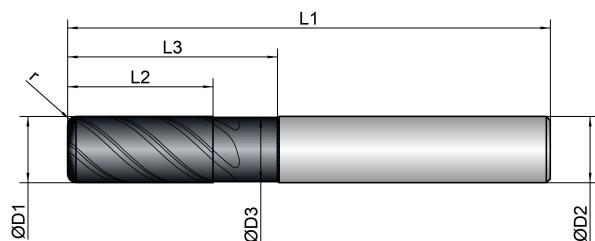

Toleranz

e8

Beschichtung

TiSiN- α 

HB K201794



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
230	180						200									

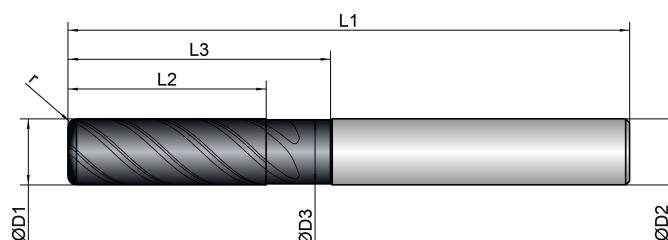
K201794		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	
6/0,2		6,0	5,8	13,0	20,0	58,0	6,0	5	0,20	42,5
8/0,3		8,0	7,7	19,0	25,0	63,0	8,0	5	0,30	42,5
10/0,3		10,0	9,7	22,0	32,0	73,0	10,0	5	0,30	42,5
12/0,3		12,0	11,6	26,0	38,0	84,0	12,0	5	0,30	42,5
16/0,5		16,0	15,5	32,0	44,0	92,0	16,0	5	0,50	42,5
20/0,5		20,0	19,5	38,0	54,0	104,0	20,0	5	0,50	42,5

Kühlung				
Toleranz	e8			
Beschichtung	TiSiN- α			

HB	ETC	≠	3xD	3xD



HB K201799



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
230	180						200									

K201799		D1 mm 	D3 mm 	L2 mm 	L3 mm 	L1 mm 	D2 mm 	z # 	r mm 	°
6/0,2		6,0	5,8	18,0	25,0	65,0	6,0	5	0,20	42,5
8/0,3		8,0	7,7	24,0	32,0	70,0	8,0	5	0,30	42,5
10/0,3		10,0	9,7	30,0	40,0	85,0	10,0	5	0,30	42,5
12/0,3		12,0	11,6	36,0	46,0	100,0	12,0	5	0,30	42,5
16/0,5		16,0	15,5	48,0	58,0	110,0	16,0	5	0,50	42,5
20/0,5		20,0	19,5	60,0	70,0	126,0	20,0	5	0,50	42,5

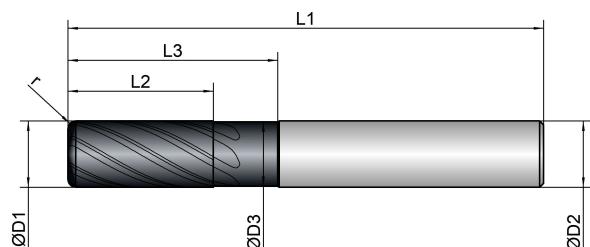
Kühlung				
Toleranz	e8			
Beschichtung	TiSiN-α			



Expert



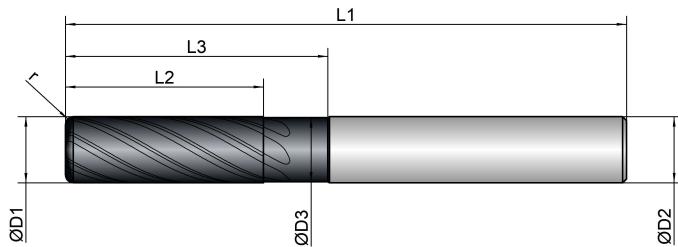
HB K201804



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
240	210						220								

K201804	D1	D3	L2	L3	L1	D2	z	r	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
6/0,15	6,0	5,8	13,0	20,0	57,0	6,0	7	0,15	42,5
8/0,15	8,0	7,7	19,0	25,0	63,0	8,0	7	0,15	42,5
10/0,2	10,0	9,7	22,0	32,0	72,0	10,0	7	0,20	42,5
12/0,2	12,0	11,6	26,0	38,0	83,0	12,0	7	0,20	42,5
16/0,3	16,0	15,5	32,0	44,0	92,0	16,0	7	0,30	42,5
20/0,3	20,0	19,5	38,0	54,0	104,0	20,0	7	0,30	42,5

Kühlung				
Toleranz	e8			
Beschichtung	TiSiN-α			



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
240	210						220								

K201809	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm ø	mm ø	mm	mm	mm	mm ø	#	mm	ø
6/0,15	6,0	5,8	18,0	25,0	65,0	6,0	7	0,15	42,5
8/0,15	8,0	7,7	24,0	32,0	70,0	8,0	7	0,15	42,5
10/0,2	10,0	9,7	30,0	40,0	85,0	10,0	7	0,20	42,5
12/0,2	12,0	11,6	36,0	46,0	100,0	12,0	7	0,20	42,5
16/0,3	16,0	15,5	48,0	58,0	110,0	16,0	7	0,30	42,5
20/0,3	20,0	19,5	60,0	70,0	125,0	20,0	7	0,30	42,5



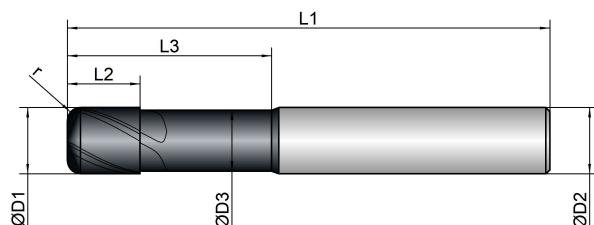
Toleranz e8

Beschichtung TiAlN- α

Premium



HA K202143



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
110	80						90	100						CFK / GFK	Grafit	

K202143	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	10,0	50,0	3,0	4	0,10	30
1/0,2	1,0	0,85	1,5	10,0	50,0	3,0	4	0,20	30
2/0,2	2,0	1,8	2,5	12,0	50,0	3,0	4	0,20	30
2/0,3	2,0	1,8	2,5	12,0	50,0	3,0	4	0,30	30
2/0,5	2,0	1,8	2,5	12,0	50,0	3,0	4	0,50	30
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	30
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	30
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	30
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	30
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	30
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	30
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	30
5/1	5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	30

		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm R	°
K202143										
6/0,5		6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	30
6/1		6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	30
6/1,5		6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	30
8/0,5		8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	30
8/1		8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	30
8/1,5		8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	30
8/2		8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	30
10/0,5		10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	30
10/1		10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	30
10/1,5		10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	30
10/2		10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	30
12/0,5		12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	30
12/1		12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	30
12/1,5		12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	30
12/2		12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	30
12/5		12,0	11,0	12,0	38,0	84,0	12,0	4	5,00	30
16/1		16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	30
16/2		16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	30
16/6		16,0	15,0	16,0	44,0	93,0	16,0	4	6,00	30
20/1		20,0	18,5	20,0	55,0	104,0	20,0	4	1,00	30
20/2,5		20,0	18,5	20,0	55,0	104,0	20,0	4	2,50	30



Kühlung

Toleranz

e8

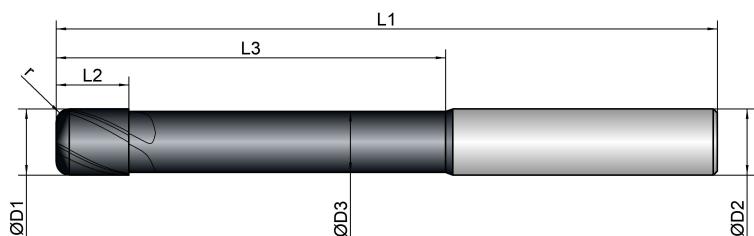
Beschichtung

TiAlN- α

Premium



HA K202153



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
110	80						90	100						CFK / GFK	Grafit	

K202153	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	20,0	75,0	3,0	4	0,10	30
1/0,2	1,0	0,85	1,5	20,0	75,0	3,0	4	0,20	30
2/0,2	2,0	1,8	2,5	25,0	75,0	3,0	4	0,20	30
2/0,3	2,0	1,8	2,5	25,0	75,0	3,0	4	0,30	30
2/0,5	2,0	1,8	2,5	25,0	75,0	3,0	4	0,50	30
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	30
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	30
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	30
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	30
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	30
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	30
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	30
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	30

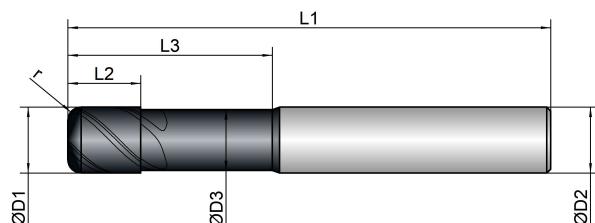
	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202153									
5,95/0,5	5,95	5,5	7,0	44,0	80,0	6,0	4	0,50	30
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	30
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	30
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	30
7,95/0,5	7,95	7,4	9,0	54,0	100,0	8,0	4	0,50	30
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	30
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	30
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	30
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	30
9,95/0,5	9,95	9,2	11,0	60,0	100,0	10,0	4	0,50	30
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	30
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	30
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	30
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	30
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	30
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	30
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	30
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	30
12/5	12,0	11,0	12,0	75,0	120,0	12,0	4	5,00	30
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	30
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	30
16/6	16,0	15,0	16,0	92,0	150,0	16,0	4	6,00	30
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	30
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	30



Toleranz e8

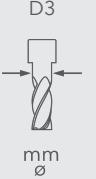
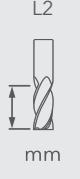
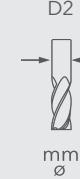
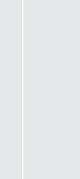
Beschichtung TiAlN- α 

HA K202163



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	80	70	40	35			85	95						CFK / GFK	Grafit

K202163	D1 mm	Ø	D3 mm	Ø	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	o	
	3,0		2,7		4,0		14,0	50,0	3,0	4	0,30	45
3/0,3												
3/0,5	3,0		2,7		4,0		14,0	50,0	3,0	4	0,50	45
3/1	3,0		2,7		4,0		14,0	50,0	3,0	4	1,00	45
4/0,4	4,0		3,7		5,0		16,0	50,0	4,0	4	0,40	45
4/0,5	4,0		3,7		5,0		16,0	50,0	4,0	4	0,50	45
4/1	4,0		3,7		5,0		16,0	50,0	4,0	4	1,00	45
5/0,5	5,0		4,6		6,0		18,0	54,0	5,0	4	0,50	45
5/1	5,0		4,6		6,0		18,0	54,0	5,0	4	1,00	45
6/0,5	6,0		5,5		7,0		21,0	58,0	6,0	4	0,50	45
6/1	6,0		5,5		7,0		21,0	58,0	6,0	4	1,00	45
6/1,5	6,0		5,5		7,0		21,0	58,0	6,0	4	1,50	45
8/0,5	8,0		7,4		9,0		27,0	64,0	8,0	4	0,50	45

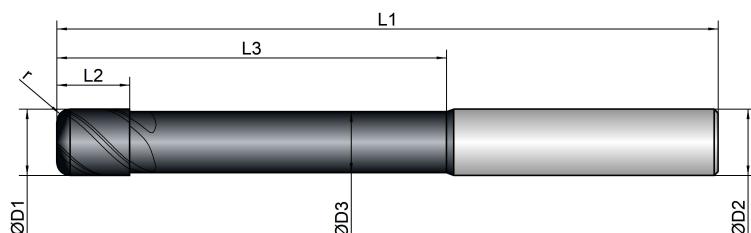
									
K202163									
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	50,0	104,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	50,0	104,0	20,0	4	2,50	45



Toleranz e8

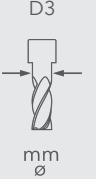
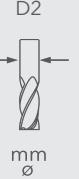
Beschichtung TiAlN- α 

HA K202173



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
120	80	70	40	35			85	95								

K202173	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	45
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	45
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	45
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	45
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	45
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	45
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	45
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	45
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	45
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	45
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	45
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	45

									
K202173									
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	45

VHM Torusfräser überlang TiAIN HSC | K202202



Premium

Toleranz

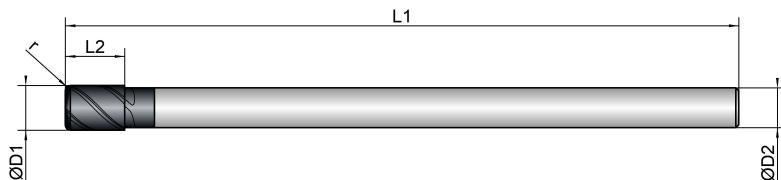
e8

Beschichtung

TiAlN- α



HA K202202



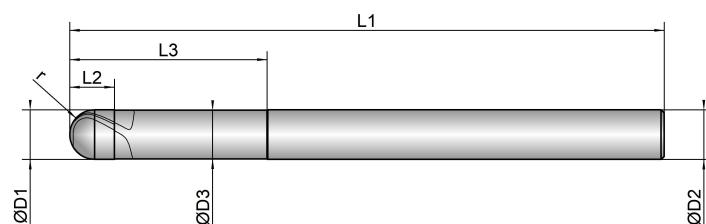
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
75	55	50	28	23			65	70						CFK / GFK	Grafit

K202202	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm (R)	°
	7,0	9,0	121,0	6,0	4	0,50	45
7/1	7,0	9,0	121,0	6,0	4	1,00	45
7/1,5	7,0	9,0	121,0	6,0	4	1,50	45
9/0,5	9,0	12,0	136,0	8,0	4	0,50	45
9/1	9,0	12,0	136,0	8,0	4	1,00	45
9/1,5	9,0	12,0	136,0	8,0	4	1,50	45
11/1	11,0	15,0	150,0	10,0	4	1,00	45
11/1,5	11,0	15,0	150,0	10,0	4	1,50	45
11/2	11,0	15,0	150,0	10,0	4	2,00	45
13/1	13,0	18,0	160,0	12,0	4	1,00	45
13/1,5	13,0	18,0	160,0	12,0	4	1,50	45
13/2	13,0	18,0	160,0	12,0	4	2,00	45
15/1	15,0	21,0	160,0	14,0	4	1,00	45
15/1,5	15,0	21,0	160,0	14,0	4	1,50	45
15/2	15,0	21,0	160,0	14,0	4	2,00	45
17/1	17,0	24,0	180,0	16,0	4	1,00	45
17/1,5	17,0	24,0	180,0	16,0	4	1,50	45
17/2	17,0	24,0	180,0	16,0	4	2,00	45
17/3	17,0	24,0	180,0	16,0	4	3,00	45

Kühlung	
Toleranz	f7
Beschichtung	-



HA K203001



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
80	50						45	75	190	170		240		CFK / GFK	Grafit

K203001	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
1/6	1,0	0,9	2,0	6,0	100,0	6,0	2	0,50	30
2/6	2,0	1,8	3,0	8,0	100,0	6,0	2	1,00	30
3/6	3,0	2,8	4,0	12,0	100,0	6,0	2	1,50	30
4/6	4,0	3,8	5,0	16,0	100,0	6,0	2	2,00	30
5/6	5,0	4,8	6,0	20,0	100,0	6,0	2	2,50	30
6/6	6,0	5,8	6,0	25,0	100,0	6,0	2	3,00	30
6/8	6,0	5,8	6,0	25,0	100,0	8,0	2	3,00	30
8/8	8,0	7,8	7,0	32,0	100,0	8,0	2	4,00	30
8/10	8,0	7,8	7,0	32,0	120,0	10,0	2	4,00	30
10/10	10,0	9,8	9,0	40,0	120,0	10,0	2	5,00	30
10/12	10,0	9,8	9,0	40,0	160,0	12,0	2	5,00	30
12/12	12,0	11,8	11,0	50,0	160,0	12,0	2	6,00	30
12/16	12,0	11,8	11,0	50,0	200,0	16,0	2	6,00	30
16/16	16,0	15,5	14,0	60,0	200,0	16,0	2	8,00	30

Kühlung


HA HSC UNI Welded

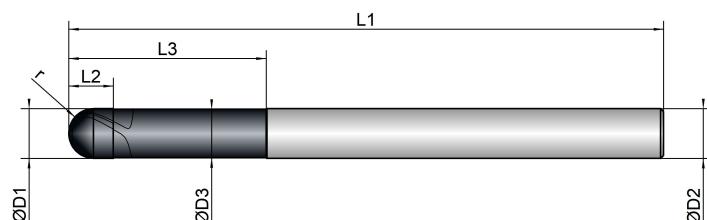

Toleranz

f7

Beschichtung

TiAlN- α 

HA K203003



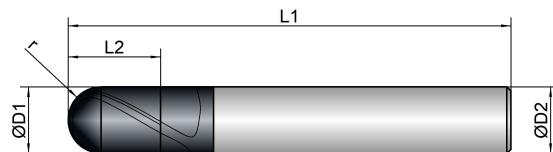
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
400	290	210					210	580	360	330				CFK / GFK	Grafit	

K203003	D1 mm	D3 mm	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	°
	Ø	Ø	Ø	Ø	Ø	Ø	Z	R	o
1/6	1,0	0,9	2,0	6,0	100,0	6,0	2	0,50	30
2/6	2,0	1,8	3,0	8,0	100,0	6,0	2	1,00	30
3/6	3,0	2,8	4,0	12,0	100,0	6,0	2	1,50	30
4/6	4,0	3,8	5,0	16,0	100,0	6,0	2	2,00	30
5/6	5,0	4,8	6,0	20,0	100,0	6,0	2	2,50	30
6/6	6,0	5,8	6,0	25,0	100,0	6,0	2	3,00	30
6/8	6,0	5,8	6,0	25,0	100,0	8,0	2	3,00	30
8/8	8,0	7,8	7,0	32,0	100,0	8,0	2	4,00	30
8/10	8,0	7,8	7,0	32,0	120,0	10,0	2	4,00	30
10/10	10,0	9,8	9,0	40,0	120,0	10,0	2	5,00	30
10/12	10,0	9,8	9,0	40,0	160,0	12,0	2	5,00	30
12/12	12,0	11,8	11,0	50,0	160,0	12,0	2	6,00	30
12/16	12,0	11,8	11,0	50,0	200,0	16,0	2	6,00	30
16/16	16,0	15,5	14,0	60,0	200,0	16,0	2	8,00	30

Kühlung	
Toleranz	f8
Beschichtung	TiAlN- α

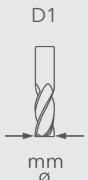
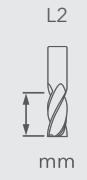
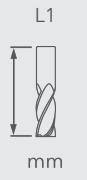
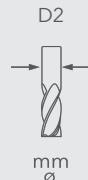


HA K203033



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
420	290	220	165	150			225	615		850				CFK / GFK	Grafit	

K203033	D1 mm ø	L2 mm	L1 mm	D2 mm ø	z Z #	r R mm	°
0,1/3	0,1	0,2	38,0	3,0	2	0,05	30
0,15/3	0,15	0,3	38,0	3,0	2	0,075	30
0,2/3	0,2	0,4	38,0	3,0	2	0,10	30
0,25/3	0,25	0,5	38,0	3,0	2	0,125	30
0,3/3	0,3	1,0	38,0	3,0	2	0,15	30
0,35/3	0,35	1,0	38,0	3,0	2	0,175	30
0,4/3	0,4	1,0	38,0	3,0	2	0,20	30
0,5/3	0,5	1,5	38,0	3,0	2	0,25	30
0,5/6	0,5	1,5	54,0	6,0	2	0,25	30
0,6/3	0,6	1,5	38,0	3,0	2	0,30	30
0,7/3	0,7	2,0	38,0	3,0	2	0,35	30
0,8/3	0,8	2,0	38,0	3,0	2	0,40	30
0,9/3	0,9	2,5	38,0	3,0	2	0,45	30
1/3	1,0	2,0	50,0	3,0	2	0,50	30
1/6	1,0	2,0	54,0	6,0	2	0,50	30

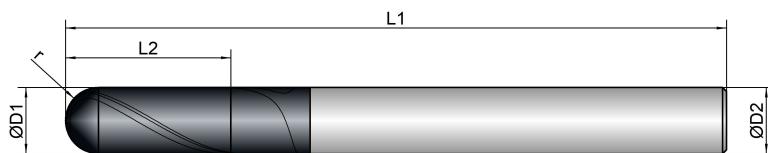
K203033	D1  mm ø	L2  mm	L1  mm	D2  mm ø	z  #	r  mm	 °
	1,1/3	1,1	3,0	50,0	3,0	2	0,55
1,2/3	1,2	3,0	50,0	3,0	2	0,60	30
1,4/3	1,4	3,0	50,0	3,0	2	0,70	30
1,5/3	1,5	3,0	50,0	3,0	2	0,75	30
1,5/6	1,5	3,0	54,0	6,0	2	0,75	30
1,6/3	1,6	4,0	50,0	3,0	2	0,80	30
1,8/3	1,8	4,0	50,0	3,0	2	0,90	30
2/3	2,0	4,0	50,0	3,0	2	1,00	30
2/6	2,0	4,0	54,0	6,0	2	1,00	30
2,5/3	2,5	5,0	50,0	3,0	2	1,25	30
2,5/6	2,5	5,0	54,0	6,0	2	1,25	30
3/3	3,0	6,0	50,0	3,0	2	1,50	30
3/6	3,0	6,0	54,0	6,0	2	1,50	30
4/4	4,0	7,0	54,0	4,0	2	2,00	30
4/6	4,0	7,0	54,0	6,0	2	2,00	30
5/5	5,0	8,0	54,0	5,0	2	2,50	30
5/6	5,0	8,0	54,0	6,0	2	2,50	30
6/6	6,0	10,0	54,0	6,0	2	3,00	30
7/8	7,0	12,0	59,0	8,0	2	3,50	30
8/8	8,0	12,0	59,0	8,0	2	4,00	30
10/10	10,0	14,0	67,0	10,0	2	5,00	30
12/12	12,0	16,0	73,0	12,0	2	6,00	30
14/14	14,0	16,0	75,0	14,0	2	7,00	30
16/16	16,0	20,0	83,0	16,0	2	8,00	30
18/18	18,0	22,0	93,0	18,0	2	9,00	30
20/20	20,0	25,0	93,0	20,0	2	10,00	30

Kühlung	
Toleranz	f8
Beschichtung	TiAlN- α

				Premium



HA K203063



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
350	240	180	135	125			180	500	695				CFK / GFK	Grafit	

K203063	D1 	L2 	L1 	D2 	z 	r 	
	mm Ø	mm	mm	mm Ø	#	mm	°
0,5/3	0,5	1,5	75,0	3,0	2	0,25	30
0,5/6	0,5	1,5	80,0	6,0	2	0,25	30
1/3	1,0	3,0	75,0	3,0	2	0,50	30
1/6	1,0	3,0	80,0	6,0	2	0,50	30
1,5/3	1,5	4,0	75,0	3,0	2	0,75	30
1,5/6	1,5	4,0	80,0	6,0	2	0,75	30
2/3	2,0	6,0	75,0	3,0	2	1,00	30
2/6	2,0	6,0	80,0	6,0	2	1,00	30
2,5/3	2,5	8,0	75,0	3,0	2	1,25	30
2,5/6	2,5	8,0	80,0	6,0	2	1,25	30
3/3	3,0	10,0	75,0	3,0	2	1,50	30
3/6	3,0	10,0	80,0	6,0	2	1,50	30
4/4	4,0	13,0	75,0	4,0	2	2,00	30
4/6	4,0	13,0	80,0	6,0	2	2,00	30
5/5	5,0	14,0	75,0	5,0	2	2,50	30
5/6	5,0	14,0	100,0	6,0	2	2,50	30
6/6	6,0	16,0	100,0	6,0	2	3,00	30
8/8	8,0	22,0	100,0	8,0	2	4,00	30
10/10	10,0	25,0	100,0	10,0	2	5,00	30
12/12	12,0	26,0	100,0	12,0	2	6,00	30
14/14	14,0	26,0	100,0	14,0	2	7,00	30
16/16	16,0	30,0	150,0	16,0	2	8,00	30
20/20	20,0	40,0	150,0	20,0	2	10,00	30

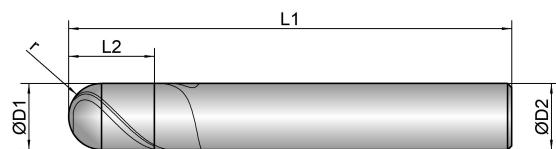


Toleranz f8

Beschichtung -



HA K203081



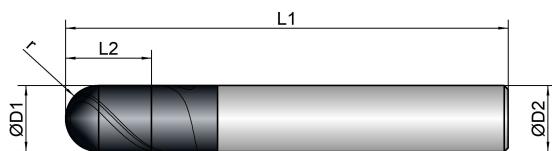
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
70	50						45	75	190	160		240		CFK / GFK	Grafit

K203081		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	o
3	3,0		6,0	50,0	3,0	2	1,50	45
4	4,0		7,0	54,0	4,0	2	2,00	45
5	5,0		8,0	54,0	5,0	2	2,50	45
6	6,0		10,0	54,0	6,0	2	3,00	45
8	8,0		12,0	59,0	8,0	2	4,00	45
10	10,0		13,0	67,0	10,0	2	5,00	45
12	12,0		16,0	74,0	12,0	2	6,00	45
14	14,0		16,0	75,0	14,0	2	7,00	45
16	16,0		20,0	83,0	16,0	2	8,00	45
20	20,0		25,0	93,0	20,0	2	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	TiAlN- α



HA K203083



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
140	80	75					85	130	360	330		400		CFK / GFK	Grafit

K203083	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm (R)	o
3	3,0	6,0	50,0	3,0	2	1,50	45
4	4,0	7,0	54,0	4,0	2	2,00	45
5	5,0	8,0	54,0	5,0	2	2,50	45
6	6,0	10,0	54,0	6,0	2	3,00	45
8	8,0	12,0	59,0	8,0	2	4,00	45
10	10,0	13,0	67,0	10,0	2	5,00	45
12	12,0	16,0	74,0	12,0	2	6,00	45
14	14,0	16,0	75,0	14,0	2	7,00	45
16	16,0	20,0	83,0	16,0	2	8,00	45
20	20,0	25,0	93,0	20,0	2	10,00	45

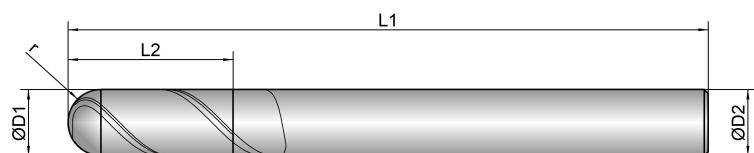


Toleranz f8

Beschichtung -



HA K203091



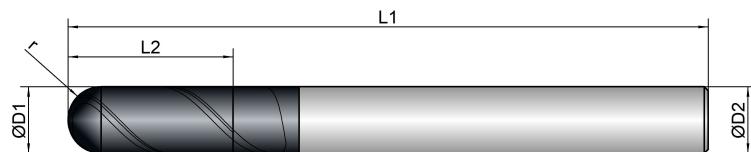
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40						35	65	170	140		220		CFK / GFK	Grafit

K203091	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm	o
3	3,0	10,0	75,0	3,0	2	1,50	45
4	4,0	13,0	75,0	4,0	2	2,00	45
5	5,0	15,0	75,0	5,0	2	2,50	45
6	6,0	16,0	100,0	6,0	2	3,00	45
8	8,0	22,0	100,0	8,0	2	4,00	45
10	10,0	25,0	100,0	10,0	2	5,00	45
12	12,0	26,0	100,0	12,0	2	6,00	45
14	14,0	26,0	100,0	14,0	2	7,00	45
16	16,0	30,0	150,0	16,0	2	8,00	45
20	20,0	40,0	150,0	20,0	2	10,00	45

Kühlung				
Toleranz	f8			
Beschichtung	TiAlN- α			



HA K203093



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	70	65					75	120	340	310		380		CFK / GFK	Grafit

K203093		D1 	L2 	L1 	D2 	z 	r 	°
3		3,0	10,0	75,0	3,0	2	1,50	45
4		4,0	13,0	75,0	4,0	2	2,00	45
5		5,0	15,0	75,0	5,0	2	2,50	45
6		6,0	16,0	100,0	6,0	2	3,00	45
8		8,0	22,0	100,0	8,0	2	4,00	45
10		10,0	25,0	100,0	10,0	2	5,00	45
12		12,0	26,0	100,0	12,0	2	6,00	45
14		14,0	26,0	100,0	14,0	2	7,00	45
16		16,0	30,0	150,0	16,0	2	8,00	45
20		20,0	40,0	150,0	20,0	2	10,00	45



Kühlung

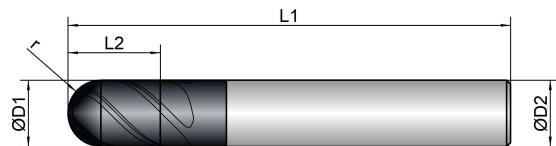
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203253



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
210	150	140					90	360	400						50

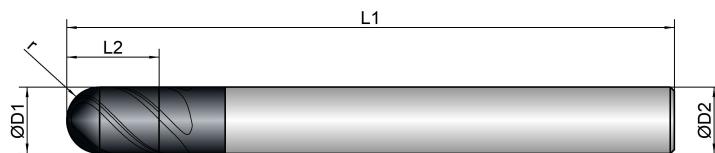
K203253	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
3	3,0	5,0	50,0	3,0	4	1,50	45
4	4,0	8,0	54,0	4,0	4	2,00	45
5	5,0	9,0	54,0	5,0	4	2,50	45
6	6,0	10,0	54,0	6,0	4	3,00	45
8	8,0	12,0	59,0	8,0	4	4,00	45
10	10,0	14,0	67,0	10,0	4	5,00	45
12	12,0	16,0	74,0	12,0	4	6,00	45
14	14,0	18,0	75,0	14,0	4	7,00	45
16	16,0	22,0	83,0	16,0	4	8,00	45
20	20,0	26,0	93,0	20,0	4	10,00	45

Kühlung				
Toleranz	f8			
Beschichtung	TiAlN- α			

Premium						



HA K203263



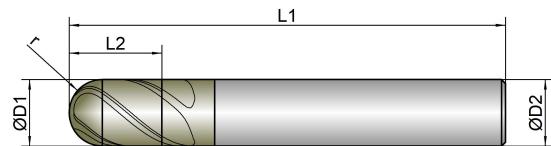
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
190	130	120					80	340	380						40	

K203263	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	\circ
3	3,0	5,0	75,0	3,0	4	1,50	45
4	4,0	8,0	75,0	4,0	4	2,00	45
5	5,0	9,0	75,0	5,0	4	2,50	45
6	6,0	10,0	100,0	6,0	4	3,00	45
8	8,0	12,0	100,0	8,0	4	4,00	45
10	10,0	14,0	100,0	10,0	4	5,00	45
12	12,0	16,0	100,0	12,0	4	6,00	45
14	14,0	18,0	100,0	14,0	4	7,00	45
16	16,0	22,0	150,0	16,0	4	8,00	45
20	20,0	26,0	150,0	20,0	4	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203413



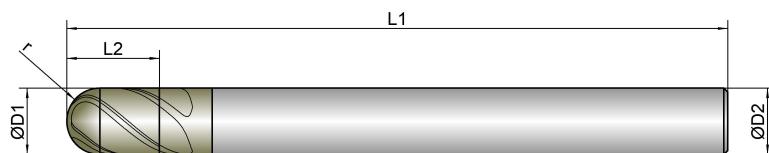
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
200	160	150					100	350						CFK / GFK	Grafit	

K203413		D1 	L2 	L1 	D2 	z 	r 	°
		mm ø	mm	mm	mm ø	#	mm	°
3	3,0		5,0	54,0	6,0	4	1,50	40
4	4,0		8,0	54,0	6,0	4	2,00	40
5	5,0		9,0	54,0	6,0	4	2,50	40
6	6,0		10,0	54,0	6,0	4	3,00	40
8	8,0		12,0	58,0	8,0	4	4,00	40
10	10,0		14,0	66,0	10,0	4	5,00	40
12	12,0		16,0	73,0	12,0	4	6,00	40
16	16,0		22,0	82,0	16,0	4	8,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203418



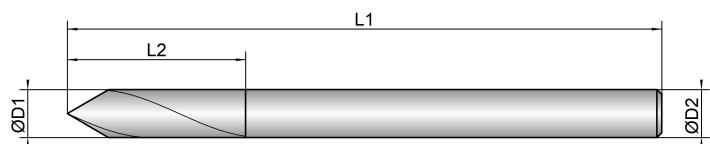
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
190	150	140					90	340								

K203418		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
3		3,0	5,0	83,0	6,0	4	1,50	40
4		4,0	8,0	83,0	6,0	4	2,00	40
5		5,0	9,0	83,0	6,0	4	2,50	40
6		6,0	10,0	83,0	6,0	4	3,00	40
8		8,0	12,0	100,0	8,0	4	4,00	40
10		10,0	14,0	100,0	10,0	4	5,00	40
12		12,0	16,0	100,0	12,0	4	6,00	40
16		16,0	22,0	150,0	16,0	4	8,00	40

Kühlung				
Toleranz	-			
Beschichtung	-			



HA K204001



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	35						40	55	200	●			CFK / GFK	Grafit	

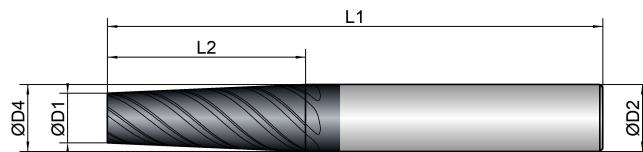
K204001		D1 	L2 	L1 	D2 	z 	
3		3,0	15,0	50,0	3,0	1	30
4		4,0	18,0	50,0	4,0	1	30
6		6,0	20,0	54,0	6,0	1	30

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α

HA **UNI**



HA K204013



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204013	D1 mm \varnothing	D4 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	o
	2	3	10,0	50,0	3,0	4	30
2X10	2,5	3	10,0	50,0	3,0	4	30
2,5X10	2,5	4	20,0	60,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung



HA UNI



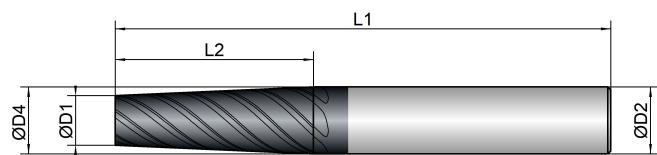
Toleranz

-

Beschichtung

TiAlN- α 

HA K204023



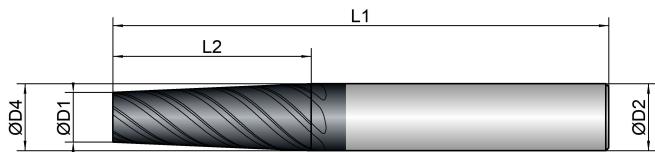
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204023	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204033



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204033	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
	2	3	10,0	50,0	3,0	4	
2X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung



HA UNI



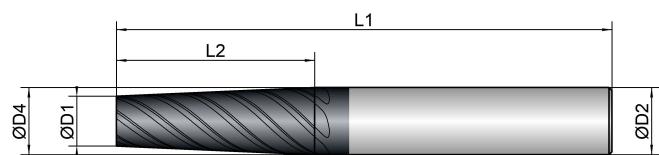
Toleranz

-

Beschichtung

TiAlN- α 

HA K204043



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

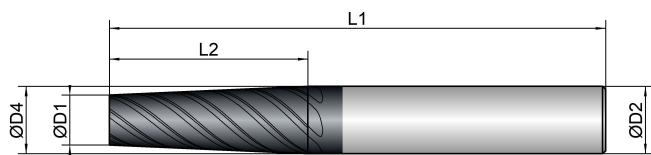
K204043	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α

HA **UNI**



HA K204053



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204053	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45

Kühlung


HA UNI

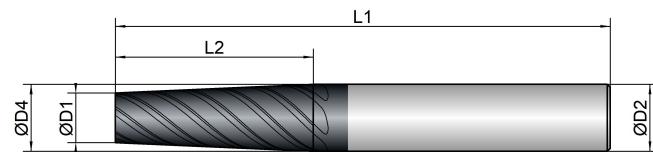

Toleranz

-

Beschichtung

TiAlN- α 

HA K204063



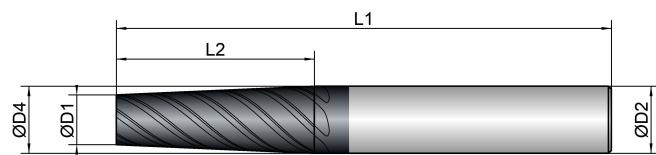
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204063	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
	2X10	2	4	10,0	50,0	4,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204073



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204073	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X25	2,5	6	25,0	65,0	6,0	4	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	45
5X30	5	10	30,0	85,0	10,0	6	45
5X45	5	12	45,0	100,0	12,0	6	45
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

Kühlung


 HA UNI

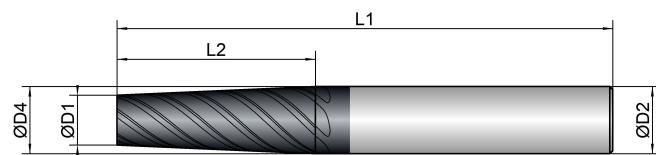

Toleranz

-

Beschichtung

TiAlN- α 

HA K204083



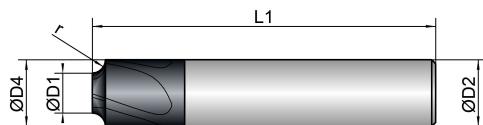
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204083	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30
3,5X30	3,5	10	30,0	80,0	10,0	4	30
4X30	4	10	30,0	80,0	10,0	6	45
4,5X30	4,5	10	30,0	80,0	10,0	6	45
5X30	5	12	30,0	84,0	12,0	6	45
5X40	5	12	40,0	100,0	12,0	6	45
6X30	6	12	30,0	93,0	12,0	6	45
6X55	6	16	55,0	110,0	16,0	6	45
8X30	8	14	30,0	90,0	14,0	6	45
8X50	8	18	50,0	114,0	18,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X55	10	20	55,0	115,0	20,0	6	45
12X30	12	18	30,0	93,0	18,0	6	45
12X45	12	20	45,0	100,0	20,0	6	45

Kühlung				
Toleranz	0-0,01			
Beschichtung	TiAlN- α			



HA K204106



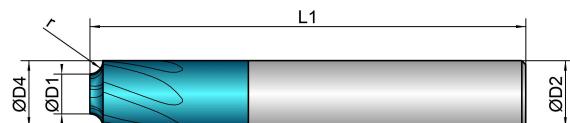
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
170	100						85	125	400				25		45

K204106	r 	D1 	D4 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm \varnothing	#
3,6/0,2	0,20	3,6	4	50,0	4,0	4
3,4/0,3	0,30	3,4	4	50,0	4,0	4
3,2/0,4	0,40	3,2	4	50,0	4,0	4
3/0,5	0,50	3	4	50,0	4,0	4
4,8/0,6	0,60	4,8	6	50,0	6,0	4
4,4/0,8	0,80	4,4	6	50,0	6,0	4
4/1	1,00	4	6	50,0	6,0	4
5/1,5	1,50	5	8	55,0	10,0	4
6/2	2,00	6	10	66,0	10,0	4
7/2,5	2,50	7	12	75,0	12,0	4
6/3	3,00	6	12	75,0	12,0	4
9/3,5	3,50	9	16	80,0	16,0	4
8/4	4,00	8	16	80,0	16,0	4
7/4,5	4,50	7	16	80,0	16,0	4
10/5	5,00	10	20	80,0	20,0	4
8/6	6,00	8	20	80,0	20,0	4
9/8	8,00	9	25	100,0	25,0	4
5/10	10,00	5	25	100,0	25,0	4

Kühlung				
Toleranz	0-0,01			
Beschichtung	TiSiN- α			



HA K204108



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
			50	45	40	30	95								

K204108	r 	D1 	D4 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm \varnothing	#
3,6/0,2	0,20	3,6	4	50,0	4,0	6
3,4/0,3	0,30	3,4	4	50,0	4,0	6
3,2/0,4	0,40	3,2	4	50,0	4,0	6
3/0,5	0,50	3	4	50,0	4,0	6
4,8/0,6	0,60	4,8	6	50,0	6,0	6
4,4/0,8	0,80	4,4	6	50,0	6,0	6
4/1	1,00	4	6	50,0	6,0	6
5/1,5	1,50	5	8	55,0	10,0	6
6/2	2,00	6	10	66,0	10,0	6
7/2,5	2,50	7	12	73,0	12,0	6
6/3	3,00	6	12	73,0	12,0	6
9/3,5	3,50	9	16	80,0	16,0	6
8/4	4,00	8	16	80,0	16,0	6
7/4,5	4,50	7	16	80,0	16,0	6
10/5	5,00	10	20	93,0	20,0	6
8/6	6,00	8	20	93,0	20,0	6
9/8	8,00	9	25	100,0	25,0	6
5/10	10,00	5	25	100,0	25,0	6

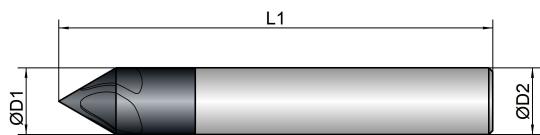
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205173



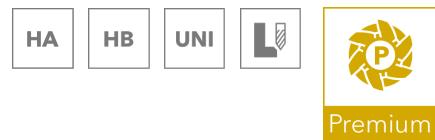
HB K205174



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205173		K205174		D1	L1	D2	z
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

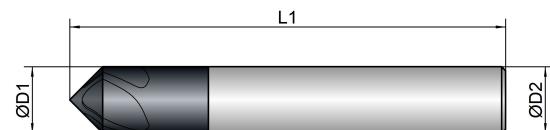
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205183



HB K205184



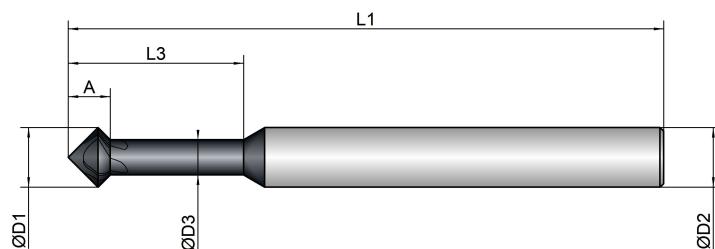
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205183		K205184		D1 mm Ø	L1 mm	D2 mm Ø	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung				
Toleranz	-			
Beschichtung	TiAlN- α			



HA K205193



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	45						40	38	120				25		35	

K205193	D1	D3	A	L3	L1	D2	z
	mm \varnothing	mm \varnothing	mm	mm	mm	mm \varnothing	#
3	3,0	2,2	2,0	10,0	50,0	4,0	4
4	4,0	2,9	2,5	10,0	50,0	4,0	4
5	5,0	3,9	3,0	15,0	65,0	6,0	4
6	6,0	3,9	4,0	15,0	65,0	6,0	4
8	8,0	5,9	2,5	20,0	70,0	8,0	4
10	10,0	5,9	4,0	23,0	73,0	10,0	4
12	12,0	5,9	6,0	23,0	75,0	12,0	4



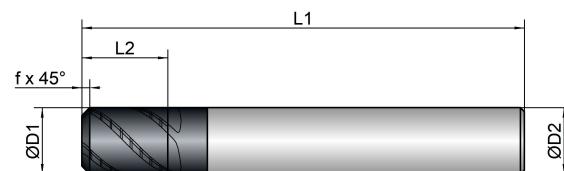
Toleranz d11

Beschichtung TiAlN- α 

HA K206083



HB K206084



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
175	150	125					60	125							40	

K206083		K206084		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
6	6			6,0	8,0	54,0	6,0	4	0,15	45
8	8			8,0	11,0	59,0	8,0	4	0,20	45
10	10			10,0	13,0	67,0	10,0	4	0,20	45
12	12			12,0	16,0	74,0	12,0	4	0,25	45
14	14			14,0	16,0	75,0	14,0	4	0,25	45
16	16			16,0	19,0	83,0	16,0	5	0,35	45
18	18			18,0	19,0	80,0	18,0	5	0,35	45
20	20			20,0	19,0	93,0	20,0	5	0,40	45

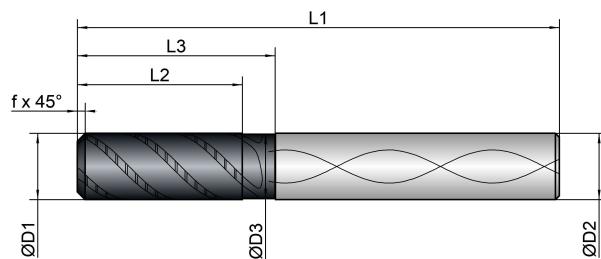
Kühlung	
Toleranz	d11
Beschichtung	TiAlN- α



HA K206113



HB K206114



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
200	170	150					70	150							40	

K206113		K206114		D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	45° mm	°
6	6			6,0	5,8	16,0	21,0	58,0	6,0	4	0,15	45
8	8			8,0	7,7	22,0	27,0	70,0	8,0	4	0,20	45
10	10			10,0	9,7	25,0	30,0	73,0	10,0	4	0,20	45
12	12			12,0	11,6	28,0	38,0	84,0	12,0	4	0,25	45
14	14			14,0	13,6	30,0	40,0	84,0	14,0	4	0,25	45
16	16			16,0	15,5	36,0	45,0	93,0	16,0	5	0,35	45
18	18			18,0	17,5	36,0	45,0	93,0	18,0	5	0,35	45
20	20			20,0	19,5	41,0	55,0	104,0	20,0	5	0,40	45



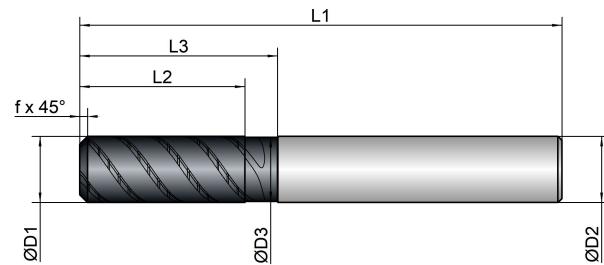
Toleranz d11

Beschichtung TiAlN- α 

HA K206123



HB K206124



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
175	150						90								

K206123		K206124		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
6	6	6	6,0	5,8	16,0	21,0	58,0	6,0	4	0,15	55	
8	8	8	8,0	7,7	22,0	27,0	70,0	8,0	4	0,20	55	
10	10	10	10,0	9,7	25,0	30,0	73,0	10,0	4	0,20	55	
12	12	12	12,0	11,6	28,0	38,0	84,0	12,0	4	0,25	55	
14	14	14	14,0	13,6	30,0	40,0	84,0	14,0	4	0,30	55	
16	16	16	16,0	15,5	36,0	45,0	93,0	16,0	5	0,35	55	
18	18	18	18,0	17,5	36,0	45,0	93,0	18,0	5	0,40	55	
20	20	20	20,0	19,5	41,0	55,0	104,0	20,0	5	0,40	55	
25	25	25	25,0	24,0	50,0	65,0	125,0	25,0	5	0,50	55	

Kühlung	
Toleranz	h9
Beschichtung	TiSiN- α



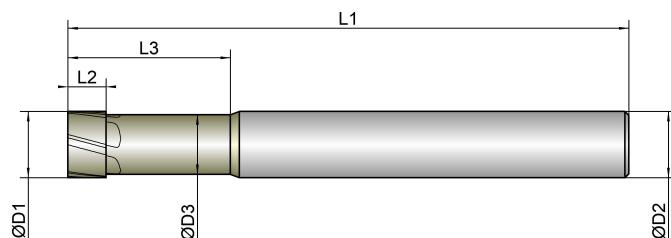
NEW



Expert



HA K207003



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
150	145	135					100								

K207003	D1	D3	L2	L3	L1	D2	z							
	mm	mm	mm	mm	mm	mm	#	mm	mm	mm	max	°		
2	2,0	1,7	1,5	13,0	54,0	6,0	2	0,3	0,15	15				
3	3,0	2,7	1,5	15,0	54,0	6,0	2	0,3	0,20	15				
4	4,0	3,6	2,5	16,0	57,0	6,0	2	0,5	0,25	15				
5	5,0	4,6	3,5	18,0	65,0	6,0	4	0,5	0,35	15				
6	6,0	5,2	3,5	20,0	65,0	6,0	4	1,0	0,40	15				
8	8,0	7,0	4,8	24,0	70,0	8,0	5	1,5	0,50	15				
10	10,0	9,0	5,8	26,0	85,0	10,0	5	2,0	0,75	15				
12	12,0	11,0	6,8	30,0	93,0	12,0	5	2,0	0,80	15				
16	16,0	14,5	8,8	35,0	100,0	16,0	5	2,5	1,00	15				

Kühlung	
Toleranz	h9
Beschichtung	TiSiN- α

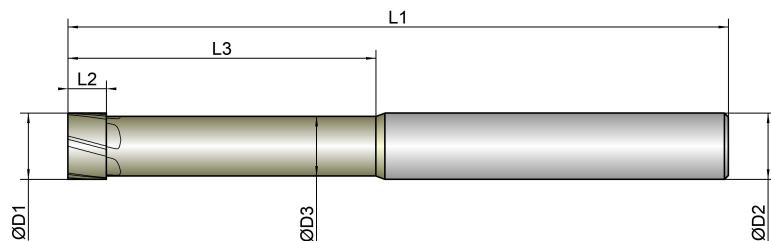
HA HSC UNI

NEW

Expert



HA K207008



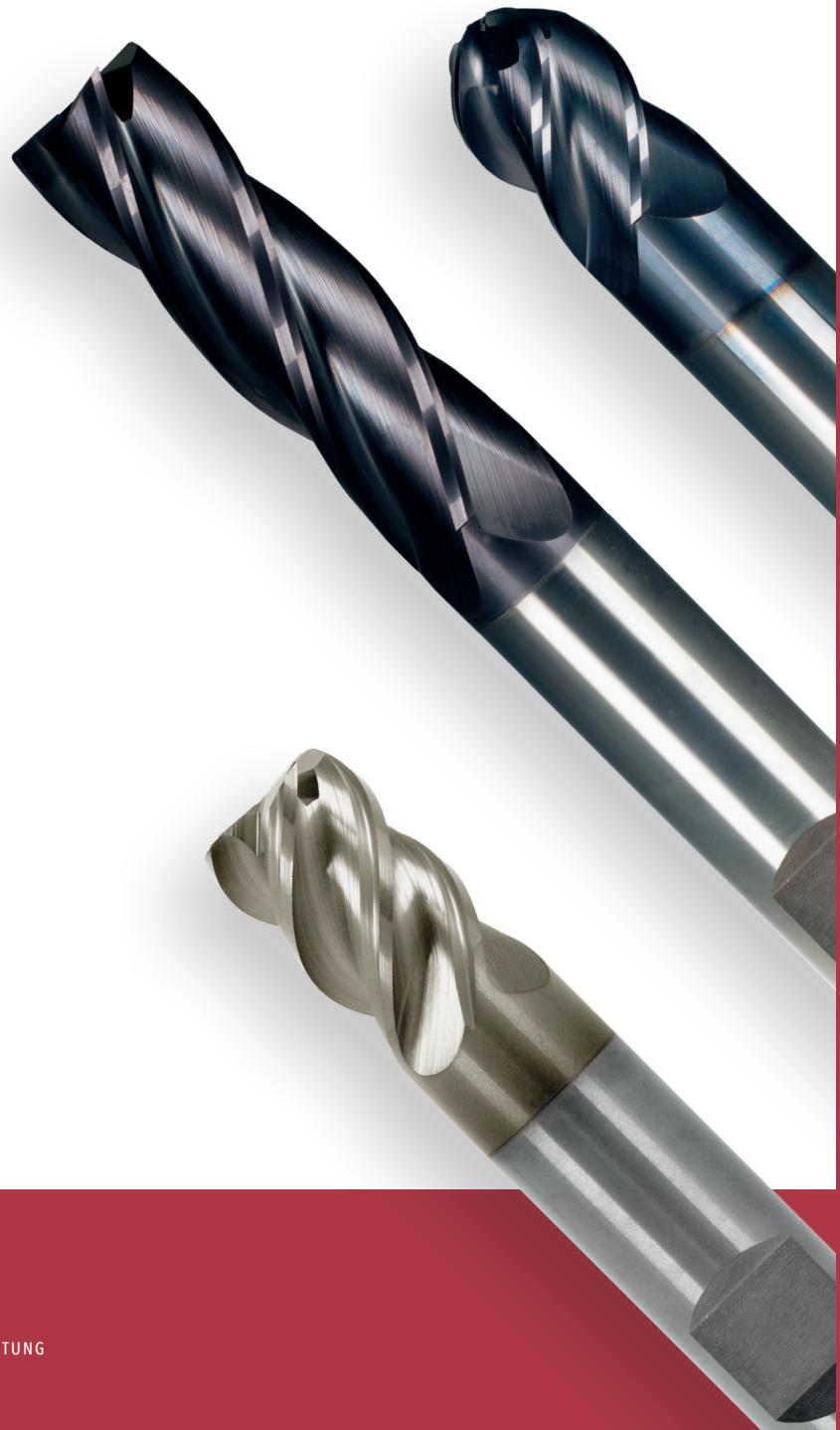
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
130	125	115					80									

K207008	D1	D3	L2	L3	L1	D2	z			
	mm	mm	mm	mm	mm	mm	#	mm	mm	°
2	2,0	1,7	1,5	18,0	75,0	6,0	2	0,3	0,15	15
3	3,0	2,7	1,5	20,0	75,0	6,0	2	0,3	0,20	15
4	4,0	3,6	2,5	24,0	83,0	6,0	2	0,5	0,25	15
5	5,0	4,6	3,5	28,0	100,0	6,0	4	0,5	0,35	15
6	6,0	5,2	3,5	28,0	100,0	6,0	4	1,0	0,40	15
8	8,0	7,0	4,8	40,0	100,0	8,0	5	1,5	0,50	15
10	10,0	9,0	5,8	48,0	100,0	10,0	5	2,0	0,75	15
12	12,0	11,0	6,8	56,0	119,0	12,0	5	2,0	0,80	15
16	16,0	14,5	8,8	65,0	150,0	16,0	5	2,5	1,00	15

HOFMANN & VRATINY — SICHERE BEARBEITUNG

GUSS





HOFMANN & VRATNY — SICHERE BEARBEITUNG

GUSS

Gussmaterialien zeichnen sich in der Zerspanung vor allem durch ihr ungleiches Gefüge aus und den daraus resultierenden Wechselbelastungen auf den Fräser. Unsere optimale Zahnteilung gewährleistet eine sichere Bearbeitung, auch bei labilen Bauteilen.

Stark in allen Belastungssituationen. In unserem umfangreichen 3-Linien-Produktprogramm

finden Sie viele Fräser, die zur Bearbeitung aller Gusswerkstoffe hervorragend geeignet sind.

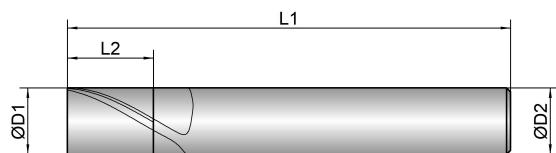
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201031



HB K201032



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201031	K201032	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
0,25/3	-	0,25	0,5	38,0	3,0	2	30
0,3/3	-	0,3	1,0	38,0	3,0	2	30
0,35/3	-	0,35	1,0	38,0	3,0	2	30
0,4/3	-	0,4	1,0	38,0	3,0	2	30
0,5/3	-	0,5	1,5	38,0	3,0	2	30
0,6/3	-	0,6	1,5	38,0	3,0	2	30
0,7/3	-	0,7	2,0	38,0	3,0	2	30
0,8/3	-	0,8	2,0	38,0	3,0	2	30
0,9/3	-	0,9	2,5	38,0	3,0	2	30
1/3	-	1,0	3,0	50,0	3,0	2	30
1,1/3	-	1,1	3,0	50,0	3,0	2	30
1,2/3	-	1,2	4,0	50,0	3,0	2	30
1,4/3	-	1,4	4,0	50,0	3,0	2	30

K201031	K201032	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
1,5/6	1,5	1,5	3,0	54,0	6,0	2	30
1,5/3	-	1,5	4,0	50,0	3,0	2	30
1,6/3	-	1,6	4,0	50,0	3,0	2	30
1,8/3	-	1,8	5,0	50,0	3,0	2	30
2/6	2	2,0	4,0	54,0	6,0	2	30
2/3	-	2,0	5,0	50,0	3,0	2	30
2,5/3	-	2,5	6,0	50,0	3,0	2	30
3/6	3	3,0	6,0	54,0	6,0	2	30
4/6	4	4,0	7,0	54,0	6,0	2	30
5/6	5	5,0	8,0	54,0	6,0	2	30
6/6	6	6,0	10,0	54,0	6,0	2	30
8/8	8	8,0	12,0	59,0	8,0	2	30
10/10	10	10,0	13,0	67,0	10,0	2	30
12/12	12	12,0	16,0	74,0	12,0	2	30
14/14	14	14,0	16,0	75,0	14,0	2	30
16/16	16	16,0	20,0	83,0	16,0	2	30
18/18	18	18,0	20,0	85,0	18,0	2	30
20/20	20	20,0	25,0	93,0	20,0	2	30



Toleranz e8

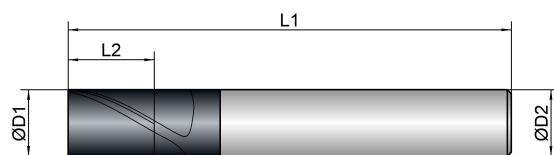
Premium

Beschichtung TiAlN- α 

HA K201033



HB K201034



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	100	80					80	100	280					CFK / GFK	Grafit

K201033	K201034	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	
0,25/3	-	0,25	0,5	38,0	3,0	2	30
0,3/3	-	0,3	1,0	38,0	3,0	2	30
0,35/3	-	0,35	1,0	38,0	3,0	2	30
0,4/3	-	0,4	1,0	38,0	3,0	2	30
0,5/3	-	0,5	1,5	38,0	3,0	2	30
0,6/3	-	0,6	1,5	38,0	3,0	2	30
0,7/3	-	0,7	2,0	38,0	3,0	2	30
0,8/3	-	0,8	2,0	38,0	3,0	2	30
0,9/3	-	0,9	2,5	38,0	3,0	2	30
1/3	-	1,0	3,0	50,0	3,0	2	30
1,1/3	-	1,1	3,0	50,0	3,0	2	30
1,2/3	-	1,2	4,0	50,0	3,0	2	30
1,4/3	-	1,4	4,0	50,0	3,0	2	30

K201033	K201034	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
1,5/6	1,5	1,5	3,0	54,0	6,0	2	30
1,5/3	-	1,5	4,0	50,0	3,0	2	30
1,6/3	-	1,6	4,0	50,0	3,0	2	30
1,8/3	-	1,8	5,0	50,0	3,0	2	30
2/6	2	2,0	4,0	54,0	6,0	2	30
2/3	-	2,0	5,0	50,0	3,0	2	30
2,5/3	-	2,5	6,0	50,0	3,0	2	30
3/6	3	3,0	6,0	54,0	6,0	2	30
4/6	4	4,0	7,0	54,0	6,0	2	30
5/6	5	5,0	8,0	54,0	6,0	2	30
6/6	6	6,0	10,0	54,0	6,0	2	30
8/8	8	8,0	12,0	59,0	8,0	2	30
10/10	10	10,0	13,0	67,0	10,0	2	30
12/12	12	12,0	16,0	74,0	12,0	2	30
14/14	14	14,0	16,0	75,0	14,0	2	30
16/16	16	16,0	20,0	83,0	16,0	2	30
18/18	18	18,0	20,0	85,0	18,0	2	30
20/20	20	20,0	25,0	93,0	20,0	2	30

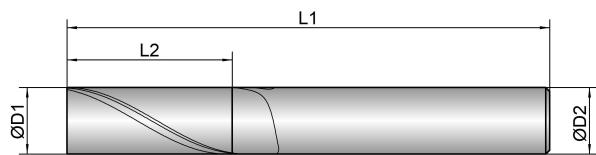
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201051



HB K201052



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201051		K201052		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

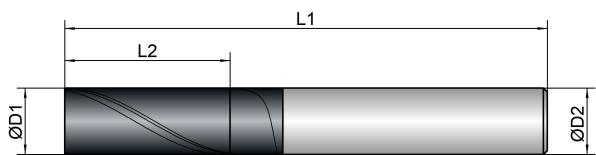
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201053



HB K201054



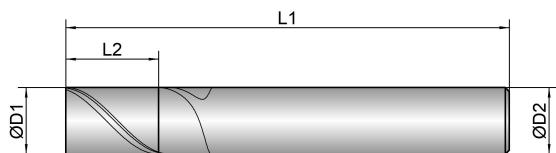
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
100	80	60					80	100	180						

K201053		K201054		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	4,0	58,0	6,0	2	30
1,5	1,5			1,5	6,0	58,0	6,0	2	30
2	2			2,0	7,0	58,0	6,0	2	30
3	3			3,0	10,0	58,0	6,0	2	30
4	4			4,0	13,0	58,0	6,0	2	30
5	5			5,0	15,0	58,0	6,0	2	30
6	6			6,0	16,0	58,0	6,0	2	30
8	8			8,0	22,0	70,0	8,0	2	30
10	10			10,0	25,0	73,0	10,0	2	30
12	12			12,0	26,0	84,0	12,0	2	30
14	14			14,0	26,0	84,0	14,0	2	30
16	16			16,0	30,0	93,0	16,0	2	30
18	18			18,0	30,0	93,0	18,0	2	30
20	20			20,0	40,0	104,0	20,0	2	30

Kühlung	
Toleranz	e8
Beschichtung	-



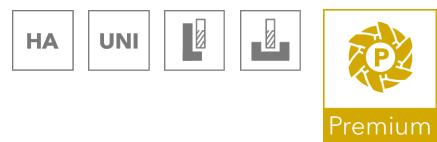
HA K201071



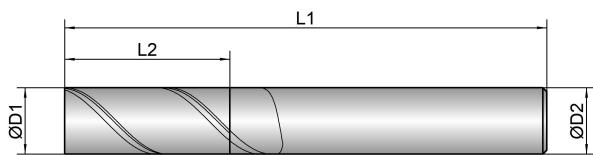
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201071	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
2	2,0	4,0	32,0	2,0	2	45
3	3,0	6,0	32,0	3,0	2	45
4	4,0	7,0	36,0	4,0	2	45
5	5,0	8,0	54,0	6,0	2	45
6	6,0	10,0	54,0	6,0	2	45
7	7,0	12,0	59,0	8,0	2	45
8	8,0	12,0	59,0	8,0	2	45
9	9,0	14,0	67,0	10,0	2	45
10	10,0	14,0	67,0	10,0	2	45
12	12,0	16,0	73,0	12,0	2	45
14	14,0	18,0	75,0	14,0	2	45
16	16,0	20,0	83,0	16,0	2	45
18	18,0	20,0	85,0	18,0	2	45
20	20,0	25,0	93,0	20,0	2	45

Kühlung				
Toleranz	e8			
Beschichtung	-			



HA K201081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
60	40	30					45	60	140					CFK / GFK	Grafit	

K201081	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	
	2,0	7,0	32,0	2,0	2	45
3	3,0	10,0	38,0	3,0	2	45
4	4,0	13,0	40,0	4,0	2	45
5	5,0	15,0	58,0	6,0	2	45
6	6,0	16,0	58,0	6,0	2	45
7	7,0	20,0	70,0	8,0	2	45
8	8,0	22,0	70,0	8,0	2	45
9	9,0	22,0	73,0	10,0	2	45
10	10,0	25,0	73,0	10,0	2	45
12	12,0	28,0	84,0	12,0	2	45
14	14,0	30,0	84,0	14,0	2	45
16	16,0	35,0	93,0	16,0	2	45
18	18,0	35,0	101,0	18,0	2	45
20	20,0	40,0	104,0	20,0	2	45

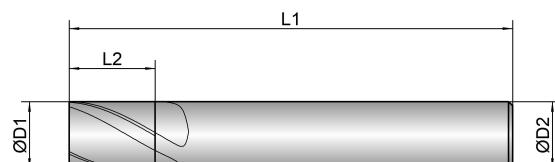
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201161



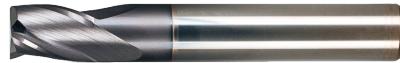
HB K201162



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
60	40	30					45	60	140							

K201161		K201162		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
1,5	1,5			1,5	3,0	54,0	6,0	3	30
2	2			2,0	4,0	54,0	6,0	3	30
3	3			3,0	6,0	54,0	6,0	3	30
4	4			4,0	7,0	54,0	6,0	3	30
5	5			5,0	8,0	54,0	6,0	3	30
6	6			6,0	10,0	54,0	6,0	3	30
8	8			8,0	12,0	59,0	8,0	3	30
10	10			10,0	13,0	67,0	10,0	3	30
12	12			12,0	16,0	74,0	12,0	3	30
14	14			14,0	16,0	75,0	14,0	3	30
16	16			16,0	20,0	83,0	16,0	3	30
18	18			18,0	20,0	85,0	18,0	3	30
20	20			20,0	25,0	93,0	20,0	3	30

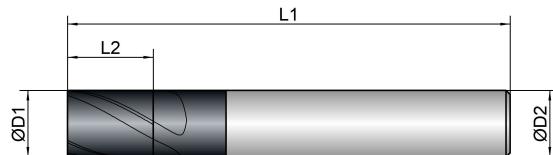
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201163



HB K201164



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

D1 mm \varnothing		L2 mm		L1 mm		D2 mm \varnothing		z #		.	
1,5	1,5	1,5	3,0	54,0	6,0	3	30				
2	2	2,0	4,0	54,0	6,0	3	30				
3	3	3,0	6,0	54,0	6,0	3	30				
4	4	4,0	7,0	54,0	6,0	3	30				
5	5	5,0	8,0	54,0	6,0	3	30				
6	6	6,0	10,0	54,0	6,0	3	30				
8	8	8,0	12,0	59,0	8,0	3	30				
10	10	10,0	13,0	67,0	10,0	3	30				
12	12	12,0	16,0	74,0	12,0	3	30				
14	14	14,0	16,0	75,0	14,0	3	30				
16	16	16,0	20,0	83,0	16,0	3	30				
18	18	18,0	20,0	85,0	18,0	3	30				
20	20	20,0	25,0	93,0	20,0	3	30				

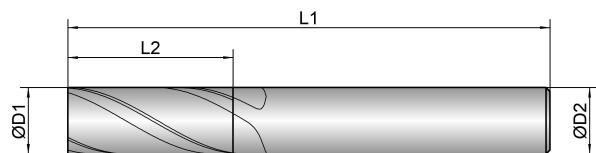
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201181



HB K201182



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201181		K201182		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1	1			1,0	4,0	58,0	6,0	3	30
1,5	1,5			1,5	6,0	58,0	6,0	3	30
2	2			2,0	7,0	58,0	6,0	3	30
3	3			3,0	10,0	58,0	6,0	3	30
4	4			4,0	13,0	58,0	6,0	3	30
5	5			5,0	15,0	58,0	6,0	3	30
6	6			6,0	16,0	58,0	6,0	3	30
8	8			8,0	22,0	70,0	8,0	3	30
10	10			10,0	25,0	73,0	10,0	3	30
12	12			12,0	26,0	84,0	12,0	3	30
14	14			14,0	26,0	84,0	14,0	3	30
16	16			16,0	32,0	93,0	16,0	3	30
18	18			18,0	32,0	93,0	18,0	3	30
20	20			20,0	40,0	104,0	20,0	3	30

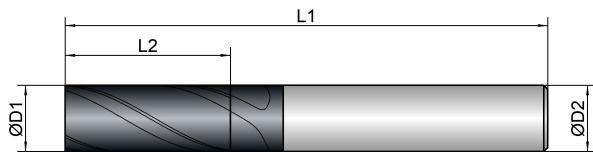
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201183



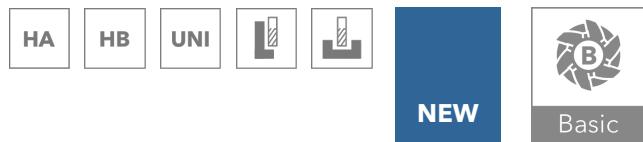
HB K201184



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201183		K201184		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	4,0	58,0	6,0	3	30
1,5	1,5			1,5	6,0	58,0	6,0	3	30
2	2			2,0	7,0	58,0	6,0	3	30
3	3			3,0	10,0	58,0	6,0	3	30
4	4			4,0	13,0	58,0	6,0	3	30
5	5			5,0	15,0	58,0	6,0	3	30
6	6			6,0	16,0	58,0	6,0	3	30
8	8			8,0	22,0	70,0	8,0	3	30
10	10			10,0	25,0	73,0	10,0	3	30
12	12			12,0	26,0	84,0	12,0	3	30
14	14			14,0	26,0	84,0	14,0	3	30
16	16			16,0	32,0	93,0	16,0	3	30
18	18			18,0	32,0	93,0	18,0	3	30
20	20			20,0	40,0	104,0	20,0	3	30

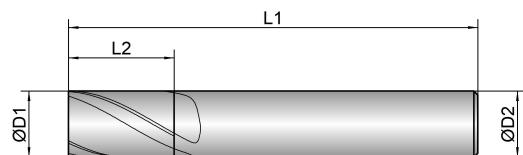
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201251



HB K201252



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
80	55	40					60	70	210						

K201251		K201252		D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	z °
1	1			1,0	2,0	45,0	6,0	3	30
1,2	1,2			1,2	2,0	45,0	6,0	3	30
1,5	1,5			1,5	3,0	45,0	6,0	3	30
1,8	1,8			1,8	3,0	45,0	6,0	3	30
2	2			2,0	4,0	45,0	6,0	3	30
2,5	2,5			2,5	4,0	45,0	6,0	3	30
2,8	2,8			2,8	6,0	45,0	6,0	3	30
3	3			3,0	6,0	45,0	6,0	3	30
3,5	3,5			3,5	6,0	45,0	6,0	3	30
3,8	3,8			3,8	7,0	45,0	6,0	3	30
4	4			4,0	7,0	45,0	6,0	3	30
4,5	4,5			4,5	7,0	45,0	6,0	3	30
4,75	4,75			4,75	8,0	45,0	6,0	3	30

K201251	K201252	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
5	5	5,0	8,0	45,0	6,0	3	30
5,5	5,5	5,5	8,0	45,0	6,0	3	30
5,75	5,75	5,75	10,0	45,0	6,0	3	30
6	6	6,0	10,0	45,0	6,0	3	30
6,75	6,75	6,75	10,0	55,0	8,0	3	30
7	7	7,0	12,0	55,0	8,0	3	30
7,75	7,75	7,75	12,0	55,0	8,0	3	30
8	8	8,0	13,0	55,0	8,0	3	30
8,7	8,7	8,7	14,0	55,0	10,0	3	30
9	9	9,0	14,0	55,0	10,0	3	30
9,7	9,7	9,7	16,0	55,0	10,0	3	30
10	10	10,0	16,0	55,0	10,0	3	30

Kühlung


HA HB UNI L U


Toleranz

e8

NEW

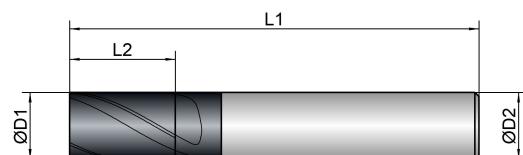
Beschichtung

TiAlN- α 

HA K201253



HB K201254

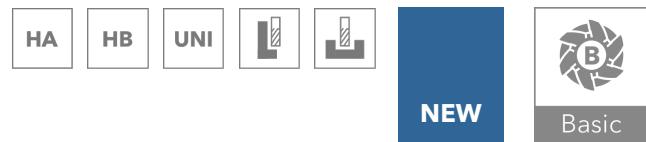


Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe			
110	75	65					85	95	290					CFK / GFK	Grafit	

K201253		K201254		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
1	1			1,0	2,0	45,0	6,0	3	30
1,2	1,2			1,2	2,0	45,0	6,0	3	30
1,5	1,5			1,5	3,0	45,0	6,0	3	30
1,8	1,8			1,8	3,0	45,0	6,0	3	30
2	2			2,0	4,0	45,0	6,0	3	30
2,5	2,5			2,5	4,0	45,0	6,0	3	30
2,8	2,8			2,8	6,0	45,0	6,0	3	30
3	3			3,0	6,0	45,0	6,0	3	30
3,5	3,5			3,5	6,0	45,0	6,0	3	30
3,8	3,8			3,8	7,0	45,0	6,0	3	30
4	4			4,0	7,0	45,0	6,0	3	30
4,5	4,5			4,5	7,0	45,0	6,0	3	30
4,75	4,75			4,75	8,0	45,0	6,0	3	30

K201253	K201254	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	°
5	5	5,0	8,0	45,0	6,0	3	30
5,5	5,5	5,5	8,0	45,0	6,0	3	30
5,75	5,75	5,75	10,0	45,0	6,0	3	30
6	6	6,0	10,0	45,0	6,0	3	30
6,75	6,75	6,75	10,0	55,0	8,0	3	30
7	7	7,0	12,0	55,0	8,0	3	30
7,75	7,75	7,75	12,0	55,0	8,0	3	30
8	8	8,0	13,0	55,0	8,0	3	30
8,7	8,7	8,7	14,0	55,0	10,0	3	30
9	9	9,0	14,0	55,0	10,0	3	30
9,7	9,7	9,7	16,0	55,0	10,0	3	30
10	10	10,0	16,0	55,0	10,0	3	30

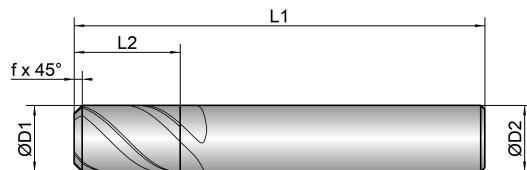
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201271



HB K201272



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	45	30					60	65	200	160						

K201271	K201272	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
1/6	1/6	1,0	2,0	45,0	6,0	3	0,02	45
1,5/6	1,5/6	1,5	3,0	45,0	6,0	3	0,03	45
2/6	2/6	2,0	4,0	45,0	6,0	3	0,03	45
2,5/6	2,5/6	2,5	5,0	45,0	6,0	3	0,03	45
3/6	3/6	3,0	6,0	45,0	6,0	3	0,03	45
3,5/6	3,5/6	3,5	6,0	45,0	6,0	3	0,03	45
4/6	4/6	4,0	7,0	45,0	6,0	3	0,04	45
4,5/6	4,5/6	4,5	8,0	45,0	6,0	3	0,04	45
5/6	5/6	5,0	8,0	45,0	6,0	3	0,04	45
5,5/6	5,5/6	5,5	8,0	45,0	6,0	3	0,04	45
6/6	6/6	6,0	10,0	45,0	6,0	3	0,04	45
8/8	8/8	8,0	13,0	55,0	8,0	3	0,05	45
10/10	10/10	10,0	16,0	55,0	10,0	3	0,05	45

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α

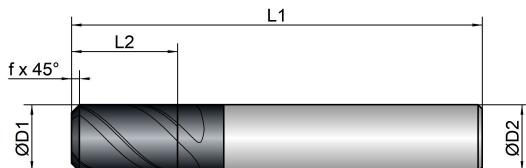
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HA K201273



HB K201274



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
100	70	50					90	85	290	200						

K201273	K201274	D1 mm ø	L2 mm	L1 mm	D2 mm ø	z #	45° mm	°
1/6	1/6	1,0	2,0	45,0	6,0	3	0,02	45
1,5/6	1,5/6	1,5	3,0	45,0	6,0	3	0,03	45
2/6	2/6	2,0	4,0	45,0	6,0	3	0,03	45
2,5/6	2,5/6	2,5	5,0	45,0	6,0	3	0,03	45
3/6	3/6	3,0	6,0	45,0	6,0	3	0,03	45
3,5/6	3,5/6	3,5	6,0	45,0	6,0	3	0,03	45
4/6	4/6	4,0	7,0	45,0	6,0	3	0,04	45
4,5/6	4,5/6	4,5	8,0	45,0	6,0	3	0,04	45
5/6	5/6	5,0	8,0	45,0	6,0	3	0,04	45
5,5/6	5,5/6	5,5	8,0	45,0	6,0	3	0,04	45
6/6	6/6	6,0	10,0	45,0	6,0	3	0,04	45
8/8	8/8	8,0	13,0	55,0	8,0	3	0,05	45
10/10	10/10	10,0	16,0	55,0	10,0	3	0,05	45

Kühlung	
Toleranz	e8
Beschichtung	-

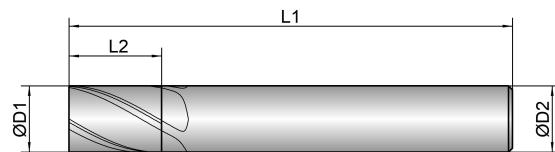
HA HB MTC UNI



HA K201291



HB K201292



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201291		K201292		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
1,5/3	-			1,5	3,0	38,0	3,0	4	30
2/6	2			2,0	4,0	54,0	6,0	4	30
2/3	-			2,0	4,0	38,0	3,0	4	30
2,5/3	-			2,5	4,0	38,0	3,0	4	30
3/6	3			3,0	6,0	54,0	6,0	4	30
3/3	-			3,0	6,0	38,0	3,0	4	30
4/6	4			4,0	7,0	54,0	6,0	4	30
5/6	5			5,0	8,0	54,0	6,0	4	30
6/6	6			6,0	10,0	54,0	6,0	4	30
8/8	8			8,0	12,0	59,0	8,0	4	30
10/10	10			10,0	14,0	67,0	10,0	4	30
12/12	12			12,0	16,0	74,0	12,0	4	30
14/14	14			14,0	18,0	75,0	14,0	4	30
16/16	16			16,0	22,0	83,0	16,0	4	30
18/18	18			18,0	20,0	80,0	18,0	4	30
20/20	20			20,0	25,0	93,0	20,0	4	30

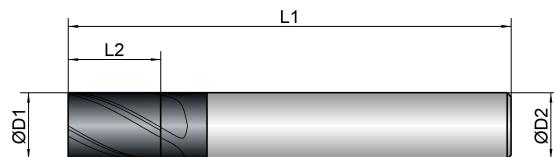
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201293



HB K201294



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
220	190	160					80	160						CFK / GFK	Grafit	

D1 mm \varnothing		L2 mm		L1 mm		D2 mm \varnothing		z #		.	
K201293	K201294	1,5/3	-	1,5	3,0	38,0	3,0	4	4	30	
2/6	2	2,0		4,0		54,0	6,0	4	4	30	
2/3	-	2,0		4,0		38,0	3,0	4	4	30	
2,5/3	-	2,5		4,0		38,0	3,0	4	4	30	
3/6	3	3,0		6,0		54,0	6,0	4	4	30	
3/3	-	3,0		6,0		38,0	3,0	4	4	30	
4/6	4	4,0		7,0		54,0	6,0	4	4	30	
5/6	5	5,0		8,0		54,0	6,0	4	4	30	
6/6	6	6,0		10,0		54,0	6,0	4	4	30	
8/8	8	8,0		12,0		59,0	8,0	4	4	30	
10/10	10	10,0		14,0		67,0	10,0	4	4	30	
12/12	12	12,0		16,0		74,0	12,0	4	4	30	
14/14	14	14,0		18,0		75,0	14,0	4	4	30	
16/16	16	16,0		22,0		83,0	16,0	4	4	30	
18/18	18	18,0		20,0		80,0	18,0	4	4	30	
20/20	20	20,0		25,0		93,0	20,0	4	4	30	

Kühlung	
Toleranz	e8
Beschichtung	-



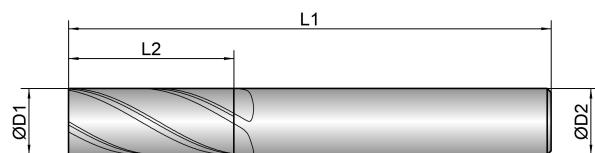
Premium



HA K201311



HB K201312



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201311		K201312		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	z °
2/6	2			2,0	7,0	58,0	6,0	4	30
2/2	-			2,0	7,0	38,0	2,0	4	30
3/6	3			3,0	10,0	58,0	6,0	4	30
3/3	-			3,0	10,0	38,0	3,0	4	30
4/6	4			4,0	13,0	58,0	6,0	4	30
4/4	-			4,0	13,0	50,0	4,0	4	30
5/6	5			5,0	15,0	58,0	6,0	4	30
5/5	-			5,0	15,0	50,0	5,0	4	30
6/6	6			6,0	16,0	58,0	6,0	4	30
7/8	7			7,0	19,0	64,0	8,0	4	30
8/8	8			8,0	22,0	70,0	8,0	4	30
9/10	9			9,0	23,0	73,0	10,0	4	30
10/10	10			10,0	25,0	73,0	10,0	4	30
11/12	11			11,0	26,0	84,0	12,0	4	30
12/12	12			12,0	28,0	84,0	12,0	4	30
14/14	14			14,0	30,0	84,0	14,0	4	30
16/16	16			16,0	35,0	93,0	16,0	4	30
18/18	18			18,0	35,0	93,0	18,0	4	30
20/20	20			20,0	40,0	104,0	20,0	4	30

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α

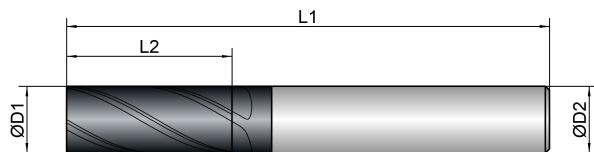
HA	HB	HPC	MTC	UNI		
						Premium



HA K201313



HB K201314



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201313		K201314		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	°
2/6	2			2,0	7,0	58,0	6,0	4	30
2/2	-			2,0	7,0	38,0	2,0	4	30
3/6	3			3,0	10,0	58,0	6,0	4	30
3/3	-			3,0	10,0	38,0	3,0	4	30
4/6	4			4,0	13,0	58,0	6,0	4	30
4/4	-			4,0	13,0	50,0	4,0	4	30
5/6	5			5,0	15,0	58,0	6,0	4	30
5/5	-			5,0	15,0	50,0	5,0	4	30
6/6	6			6,0	16,0	58,0	6,0	4	30
7/8	7			7,0	19,0	64,0	8,0	4	30
8/8	8			8,0	22,0	70,0	8,0	4	30
9/10	9			9,0	23,0	73,0	10,0	4	30
10/10	10			10,0	25,0	73,0	10,0	4	30
11/12	11			11,0	26,0	84,0	12,0	4	30
12/12	12			12,0	28,0	84,0	12,0	4	30
14/14	14			14,0	30,0	84,0	14,0	4	30
16/16	16			16,0	35,0	93,0	16,0	4	30
18/18	18			18,0	35,0	93,0	18,0	4	30
20/20	20			20,0	40,0	104,0	20,0	4	30

Kühlung				
Toleranz	e8			
Beschichtung	-			



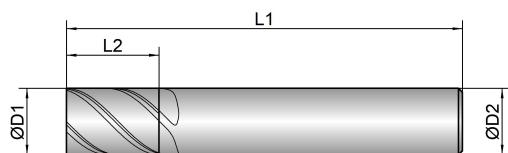
Premium



HA K201401



HB K201402



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201401		K201402		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	°
3	3			3,0	6,0	54,0	6,0	4	45
4	4			4,0	7,0	54,0	6,0	4	45
5	5			5,0	8,0	54,0	6,0	4	45
6	6			6,0	10,0	54,0	6,0	4	45
8	8			8,0	12,0	59,0	8,0	4	45
10	10			10,0	14,0	60,0	10,0	4	45
12	12			12,0	16,0	70,0	12,0	4	45
14	14			14,0	18,0	70,0	14,0	4	45
16	16			16,0	20,0	80,0	16,0	4	45
18	18			18,0	20,0	80,0	18,0	4	45
20	20			20,0	25,0	85,0	20,0	4	45

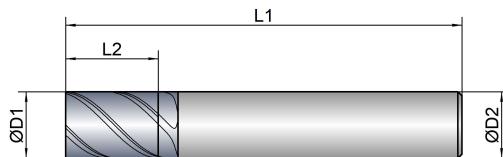
Kühlung	
Toleranz	e8
Beschichtung	TiCn- α



HA K201403



HB K201404



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

D1 mm \varnothing		L2 mm	L1 mm	D2 mm \varnothing	z #	
K201403	K201404	3,0	6,0	54,0	6,0	4 45
3	3	4,0	7,0	54,0	6,0	4 45
4	4	5,0	8,0	54,0	6,0	4 45
5	5	6,0	10,0	54,0	6,0	4 45
6	6	8,0	12,0	59,0	8,0	4 45
8	8	10,0	14,0	60,0	10,0	4 45
10	10	12,0	16,0	70,0	12,0	4 45
12	12	14,0	18,0	70,0	14,0	4 45
14	14	16,0	20,0	80,0	16,0	4 45
16	16	18,0	20,0	80,0	18,0	4 45
18	18	20,0	25,0	85,0	20,0	4 45
20	20					

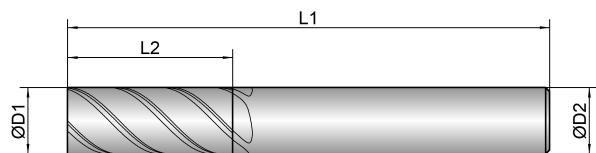
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201411



HB K201412



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40	30					45	60	140					CFK / GFK	Grafit

K201411		K201412		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
3	3			3,0	10,0	58,0	6,0	4	45
4	4			4,0	13,0	58,0	6,0	4	45
5	5			5,0	15,0	58,0	6,0	4	45
6	6			6,0	16,0	58,0	6,0	4	45
8	8			8,0	22,0	64,0	8,0	4	45
10	10			10,0	25,0	73,0	10,0	4	45
12	12			12,0	28,0	84,0	12,0	4	45
14	14			14,0	30,0	84,0	14,0	4	45
16	16			16,0	36,0	93,0	16,0	4	45
18	18			18,0	36,0	93,0	18,0	4	45
20	20			20,0	41,0	104,0	20,0	4	45
25	25			25,0	50,0	125,0	25,0	4	45

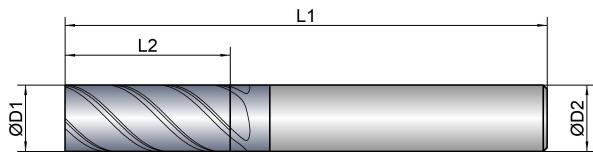
Kühlung	
Toleranz	e8
Beschichtung	TiCn- α



HA K201413



HB K201414



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
220	190	160					80	160						CFK / GFK	Grafit

K201413		K201414		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	o
3	3			3,0	10,0	58,0	6,0	4	45
4	4			4,0	13,0	58,0	6,0	4	45
5	5			5,0	15,0	58,0	6,0	4	45
6	6			6,0	16,0	58,0	6,0	4	45
8	8			8,0	22,0	64,0	8,0	4	45
10	10			10,0	25,0	73,0	10,0	4	45
12	12			12,0	28,0	84,0	12,0	4	45
14	14			14,0	30,0	84,0	14,0	4	45
16	16			16,0	36,0	93,0	16,0	4	45
18	18			18,0	36,0	93,0	18,0	4	45
20	20			20,0	41,0	104,0	20,0	4	45
25	25			25,0	50,0	125,0	25,0	4	45

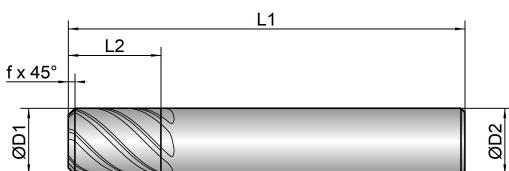
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201581



HB K201582



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	40	30					45	60	150							

K201581		K201582		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	8,0	54,0	6,0	6	0,02	45
6	6			6,0	10,0	54,0	6,0	6	0,03	45
7	7			7,0	12,0	59,0	8,0	6	0,04	45
8	8			8,0	12,0	59,0	8,0	6	0,04	45
9	9			9,0	14,0	60,0	10,0	6	0,04	45
10	10			10,0	14,0	60,0	10,0	6	0,05	45
12	12			12,0	16,0	70,0	12,0	6	0,05	45
14	14			14,0	18,0	70,0	14,0	6	0,06	45
16	16			16,0	20,0	80,0	16,0	6	0,06	45
18	18			18,0	20,0	80,0	18,0	8	0,07	45
20	20			20,0	25,0	85,0	20,0	8	0,07	45

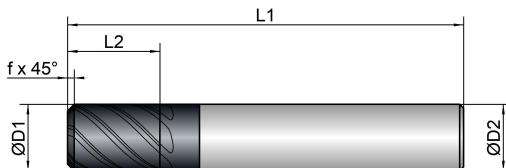
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201583



HB K201584



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe	CFK / GFK	Grafit					
170	100	90	70				95	125	600								

K201583		K201584		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	8,0	54,0	6,0	6	0,02	45
6	6			6,0	10,0	54,0	6,0	6	0,03	45
7	7			7,0	12,0	59,0	8,0	6	0,04	45
8	8			8,0	12,0	59,0	8,0	6	0,04	45
9	9			9,0	14,0	60,0	10,0	6	0,04	45
10	10			10,0	14,0	60,0	10,0	6	0,05	45
12	12			12,0	16,0	70,0	12,0	6	0,05	45
14	14			14,0	18,0	70,0	14,0	6	0,06	45
16	16			16,0	20,0	80,0	16,0	6	0,06	45
18	18			18,0	20,0	80,0	18,0	8	0,07	45
20	20			20,0	25,0	85,0	20,0	8	0,07	45

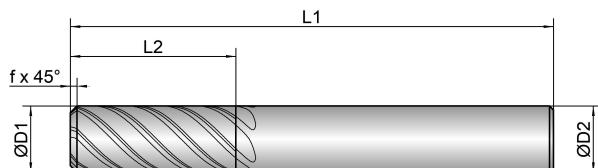
Kühlung	
Toleranz	e8
Beschichtung	-



HA K201591



HB K201592



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe	CFK / GFK	Grafit					
60	40	30					40	60	140								

K201591		K201592		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
5	5			5,0	13,0	58,0	6,0	6	0,02	45
6	6			6,0	16,0	58,0	6,0	6	0,03	45
7	7			7,0	22,0	70,0	8,0	6	0,04	45
8	8			8,0	22,0	70,0	8,0	6	0,04	45
9	9			9,0	25,0	73,0	10,0	6	0,04	45
10	10			10,0	25,0	73,0	10,0	6	0,05	45
12	12			12,0	28,0	84,0	12,0	6	0,05	45
14	14			14,0	30,0	84,0	14,0	6	0,06	45
16	16			16,0	35,0	93,0	16,0	6	0,06	45
18	18			18,0	35,0	93,0	18,0	8	0,07	45
20	20			20,0	40,0	100,0	20,0	8	0,07	45
25	25			25,0	55,0	125,0	25,0	8	0,08	45

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



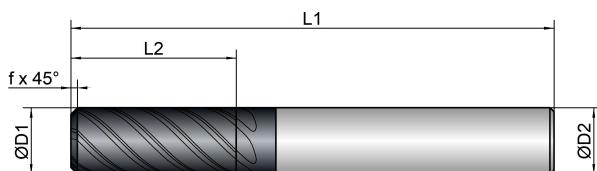
Premium



HA K201593



HB K201594



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe			
175	100	90	65				95	125	600					CFK / GFK	Grafit	

K201593		K201594		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	45° mm	°
5	5			5,0	13,0	58,0	6,0	6	0,02	45
6	6			6,0	16,0	58,0	6,0	6	0,03	45
7	7			7,0	22,0	70,0	8,0	6	0,04	45
8	8			8,0	22,0	70,0	8,0	6	0,04	45
9	9			9,0	25,0	73,0	10,0	6	0,04	45
10	10			10,0	25,0	73,0	10,0	6	0,05	45
12	12			12,0	28,0	84,0	12,0	6	0,05	45
14	14			14,0	30,0	84,0	14,0	6	0,06	45
16	16			16,0	35,0	93,0	16,0	6	0,06	45
18	18			18,0	35,0	93,0	18,0	8	0,07	45
20	20			20,0	40,0	100,0	20,0	8	0,07	45
25	25			25,0	55,0	125,0	25,0	8	0,08	45

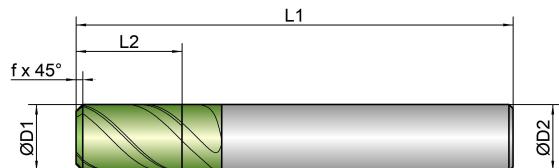
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201673



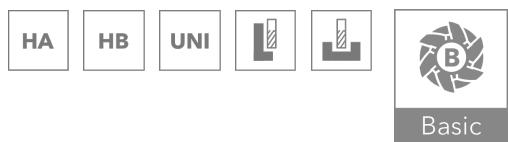
HB K201674



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
100	70	50					90	85	290	200						

K201673		K201674		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	45° mm	°
1	-			1,0	2,0	38,0	3,0	3	0,02	45
1,2	-			1,2	2,0	38,0	3,0	3	0,02	45
1,5	-			1,5	3,0	38,0	3,0	3	0,025	45
2	2			2,0	4,0	50,0	6,0	3	0,03	45
2,5	2,5			2,5	5,0	50,0	6,0	3	0,03	45
3	3			3,0	6,0	50,0	6,0	3	0,03	45
4	4			4,0	7,0	50,0	6,0	3	0,04	45
4,5	4,5			4,5	8,0	50,0	6,0	3	0,04	45
5	5			5,0	8,0	50,0	6,0	3	0,04	45
5,5	5,5			5,5	8,0	50,0	6,0	3	0,04	45
5,75	5,75			5,75	10,0	50,0	6,0	3	0,04	45
6	6			6,0	10,0	50,0	6,0	3	0,04	45
7	7			7,0	12,0	55,0	8,0	3	0,045	45
7,75	7,75			7,75	12,0	55,0	8,0	3	0,05	45
8	8			8,0	13,0	55,0	8,0	3	0,05	45
9	9			9,0	14,0	66,0	10,0	3	0,05	45
9,7	9,7			9,7	16,0	66,0	10,0	3	0,05	45
10	10			10,0	16,0	66,0	10,0	3	0,05	45
12	12			12,0	16,0	73,0	12,0	3	0,05	45
14	14			14,0	16,0	83,0	14,0	3	0,06	45
16	16			16,0	18,0	80,0	16,0	3	0,06	45

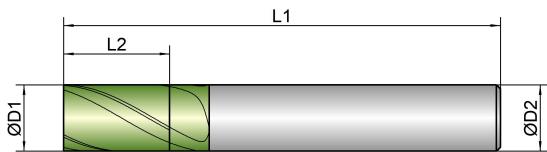
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



HA K201677



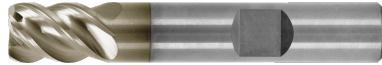
HB K201678



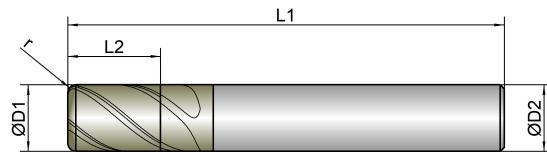
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	75	65					85	95	290					CFK / GFK	Grafit

K201677		K201678		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	z °
1	-			1,0	2,0	38,0	3,0	3	30
1,2	-			1,2	2,0	38,0	3,0	3	30
1,5	-			1,5	3,0	38,0	3,0	3	30
2	2			2,0	4,0	50,0	6,0	3	30
2,5	2,5			2,5	5,0	50,0	6,0	3	30
3	3			3,0	6,0	50,0	6,0	3	30
4	4			4,0	7,0	50,0	6,0	3	30
4,5	4,5			4,5	8,0	50,0	6,0	3	30
5	5			5,0	8,0	50,0	6,0	3	30
5,5	5,5			5,5	8,0	50,0	6,0	3	30
5,75	5,75			5,75	10,0	50,0	6,0	3	30
6	6			6,0	10,0	50,0	6,0	3	30
7	7			7,0	12,0	55,0	8,0	3	30
7,75	7,75			7,75	12,0	55,0	8,0	3	30
8	8			8,0	13,0	55,0	8,0	3	30
9	9			9,0	14,0	66,0	10,0	3	30
9,7	9,7			9,7	16,0	66,0	10,0	3	30
10	10			10,0	16,0	66,0	10,0	3	30
12	12			12,0	16,0	73,0	12,0	3	30
14	14			14,0	16,0	83,0	14,0	3	30
16	16			16,0	18,0	80,0	16,0	3	30

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α



HB K201719



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
230	185	150					75	260							

K201719	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm	°
3	3,0	6,0	54,0	6,0	4	0,10	40
4	4,0	8,0	54,0	6,0	4	0,10	40
5	5,0	9,0	54,0	6,0	4	0,20	40
6	6,0	10,0	54,0	6,0	4	0,20	40
8	8,0	12,0	58,0	8,0	4	0,20	40
10	10,0	14,0	66,0	10,0	4	0,20	40
12	12,0	16,0	73,0	12,0	4	0,20	40
16	16,0	22,0	82,0	16,0	4	0,30	40
20	20,0	26,0	92,0	20,0	4	0,30	40

Kühlung



HB ETC HPC MTC



Toleranz

e8

UNI ≠



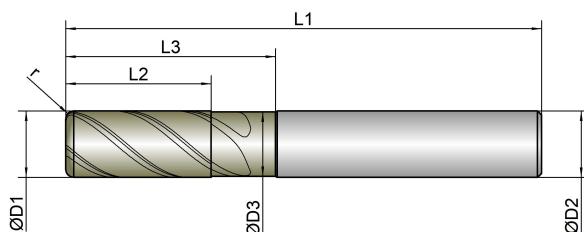
Beschichtung

TiSiN-α

HPC



HB K201724



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
230	185	150					260	75							

K201724	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
3	3,0	2,8	8,0	13,0	57,0	6,0	4	0,10	40
4	4,0	3,8	11,0	17,0	57,0	6,0	4	0,10	40
5	5,0	4,8	13,0	20,0	57,0	6,0	4	0,20	40
6	6,0	5,8	13,0	20,0	57,0	6,0	4	0,20	40
8	8,0	7,7	19,0	25,0	63,0	8,0	4	0,20	40
10	10,0	9,7	22,0	32,0	72,0	10,0	4	0,20	40
12	12,0	11,6	26,0	38,0	83,0	12,0	4	0,20	40
16	16,0	15,5	32,0	44,0	92,0	16,0	4	0,30	40
20	20,0	19,5	41,0	54,0	104,0	20,0	4	0,30	40

Kühlung


HB ETC HPC MTC UNI ≠ L


Toleranz

e8

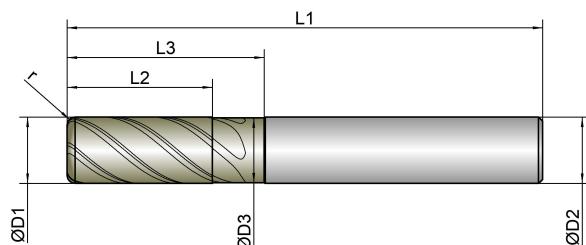
NEW



Beschichtung

TiSiN- α 

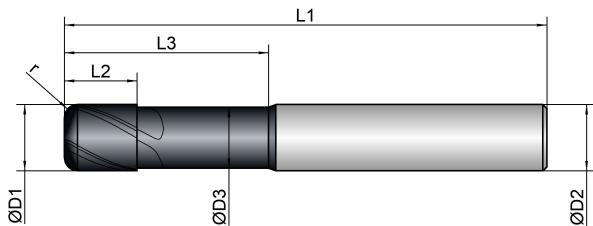
HB K201729



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
230	185	150					75	260						CFK / GFK	Grafit	

K201729	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
6	6,0	5,8	13,0	19,0	57,0	6,0	5	0,15	40
8	8,0	7,8	19,0	25,0	63,0	8,0	5	0,20	40
10	10,0	9,8	22,0	30,0	72,0	10,0	5	0,20	40
12	12,0	11,8	26,0	36,0	83,0	12,0	5	0,20	40
16	16,0	15,8	32,0	42,0	92,0	16,0	5	0,30	40
20	20,0	19,8	41,0	52,0	104,0	20,0	5	0,30	40

Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
110	80						90	100						CFK / GFK	Grafit	

K202143	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	10,0	50,0	3,0	4	0,10	30
1/0,2	1,0	0,85	1,5	10,0	50,0	3,0	4	0,20	30
2/0,2	2,0	1,8	2,5	12,0	50,0	3,0	4	0,20	30
2/0,3	2,0	1,8	2,5	12,0	50,0	3,0	4	0,30	30
2/0,5	2,0	1,8	2,5	12,0	50,0	3,0	4	0,50	30
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	30
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	30
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	30
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,40	30
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	30
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	30
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	30
5/1	5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	30

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202143									
6/0,5	6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	30
6/1	6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	30
6/1,5	6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	30
8/0,5	8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	30
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	30
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	30
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	30
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	30
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	30
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	30
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	30
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	30
12/1	12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	30
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	30
12/2	12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	30
12/5	12,0	11,0	12,0	38,0	84,0	12,0	4	5,00	30
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	30
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	30
16/6	16,0	15,0	16,0	44,0	93,0	16,0	4	6,00	30
20/1	20,0	18,5	20,0	55,0	104,0	20,0	4	1,00	30
20/2,5	20,0	18,5	20,0	55,0	104,0	20,0	4	2,50	30

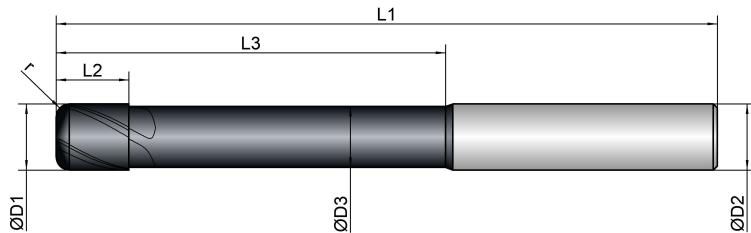
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202153



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
110	80						90	100						CFK / GFK	Grafit	

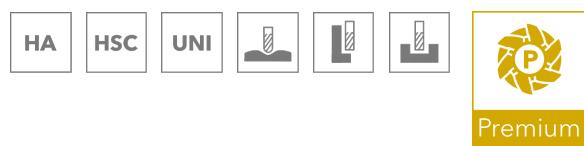
K202153	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
1/0,1	1,0	0,85	1,5	20,0	75,0	3,0	4	0,10	30
1/0,2	1,0	0,85	1,5	20,0	75,0	3,0	4	0,20	30
2/0,2	2,0	1,8	2,5	25,0	75,0	3,0	4	0,20	30
2/0,3	2,0	1,8	2,5	25,0	75,0	3,0	4	0,30	30
2/0,5	2,0	1,8	2,5	25,0	75,0	3,0	4	0,50	30
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	30
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	30
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	30
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	30
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	30
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	30
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	30
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	30



VHM Torusfräser lang TiAlN HSC / HPC | K202153

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm R	°
K202153									
5,95/0,5	5,95	5,5	7,0	44,0	80,0	6,0	4	0,50	30
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	30
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	30
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	30
7,95/0,5	7,95	7,4	9,0	54,0	100,0	8,0	4	0,50	30
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	30
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	30
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	30
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	30
9,95/0,5	9,95	9,2	11,0	60,0	100,0	10,0	4	0,50	30
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	30
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	30
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	30
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	30
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	30
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	30
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	30
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	30
12/5	12,0	11,0	12,0	75,0	120,0	12,0	4	5,00	30
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	30
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	30
16/6	16,0	15,0	16,0	92,0	150,0	16,0	4	6,00	30
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	30
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	30

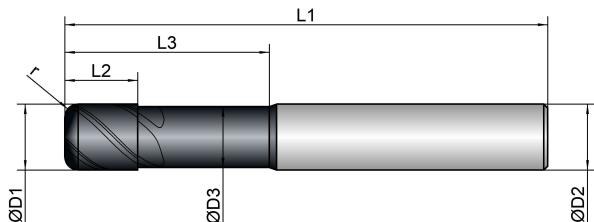
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202163



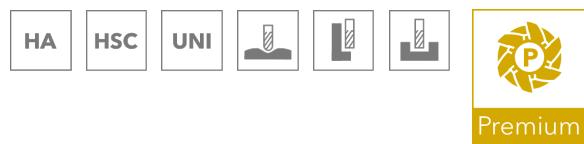
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	80	70	40	35			85	95						CFK / GFK	Grafit

K202163	D1 mm	Ø	D3 mm	Ø	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	o
	3,0	2,7	4,0	14,0	50,0	3,0	4	0,30	45		
3/0,3	3,0	2,7	4,0	14,0	50,0	3,0	4	0,50	45		
3/0,5	3,0	2,7	4,0	14,0	50,0	3,0	4	1,00	45		
3/1	3,0	2,7	4,0	14,0	50,0	3,0	4	0,40	45		
4/0,4	4,0	3,7	5,0	16,0	50,0	4,0	4	0,50	45		
4/0,5	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	45		
4/1	4,0	3,7	5,0	16,0	50,0	4,0	4	1,00	45		
5/0,5	5,0	4,6	6,0	18,0	54,0	5,0	4	0,50	45		
5/1	5,0	4,6	6,0	18,0	54,0	5,0	4	1,00	45		
6/0,5	6,0	5,5	7,0	21,0	58,0	6,0	4	0,50	45		
6/1	6,0	5,5	7,0	21,0	58,0	6,0	4	1,00	45		
6/1,5	6,0	5,5	7,0	21,0	58,0	6,0	4	1,50	45		
8/0,5	8,0	7,4	9,0	27,0	64,0	8,0	4	0,50	45		



	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202163									
8/1	8,0	7,4	9,0	27,0	64,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	27,0	64,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	27,0	64,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	32,0	73,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	32,0	73,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	32,0	73,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	32,0	73,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	38,0	84,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	38,0	84,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	38,0	84,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	38,0	84,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	44,0	93,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	44,0	93,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	50,0	104,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	50,0	104,0	20,0	4	2,50	45

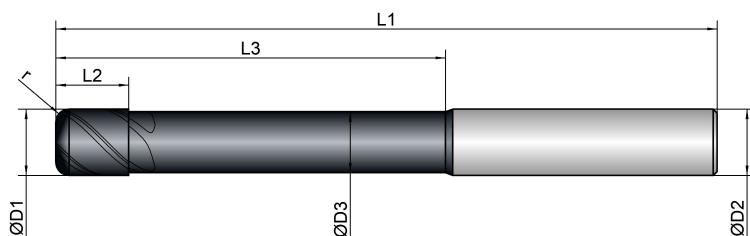
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202173



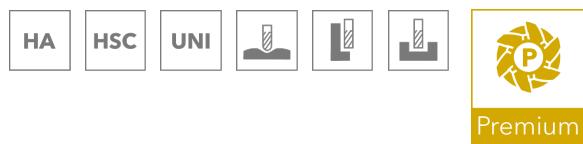
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
120	80	70	40	35			85	95						CFK / GFK	Grafit

K202173	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
3/0,3	3,0	2,7	4,0	32,0	75,0	3,0	4	0,30	45
3/0,5	3,0	2,7	4,0	32,0	75,0	3,0	4	0,50	45
3/1	3,0	2,7	4,0	32,0	75,0	3,0	4	1,00	45
4/0,4	4,0	3,7	5,0	36,0	75,0	4,0	4	0,40	45
4/0,5	4,0	3,7	5,0	36,0	75,0	4,0	4	0,50	45
4/1	4,0	3,7	5,0	36,0	75,0	4,0	4	1,00	45
5/0,5	5,0	4,6	6,0	40,0	75,0	5,0	4	0,50	45
5/1	5,0	4,6	6,0	40,0	75,0	5,0	4	1,00	45
6/0,5	6,0	5,5	7,0	44,0	80,0	6,0	4	0,50	45
6/1	6,0	5,5	7,0	44,0	80,0	6,0	4	1,00	45
6/1,5	6,0	5,5	7,0	44,0	80,0	6,0	4	1,50	45
8/0,5	8,0	7,4	9,0	54,0	100,0	8,0	4	0,50	45



	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202173									
8/1	8,0	7,4	9,0	54,0	100,0	8,0	4	1,00	45
8/1,5	8,0	7,4	9,0	54,0	100,0	8,0	4	1,50	45
8/2	8,0	7,4	9,0	54,0	100,0	8,0	4	2,00	45
10/0,5	10,0	9,2	11,0	60,0	100,0	10,0	4	0,50	45
10/1	10,0	9,2	11,0	60,0	100,0	10,0	4	1,00	45
10/1,5	10,0	9,2	11,0	60,0	100,0	10,0	4	1,50	45
10/2	10,0	9,2	11,0	60,0	100,0	10,0	4	2,00	45
12/0,5	12,0	11,0	12,0	75,0	120,0	12,0	4	0,50	45
12/1	12,0	11,0	12,0	75,0	120,0	12,0	4	1,00	45
12/1,5	12,0	11,0	12,0	75,0	120,0	12,0	4	1,50	45
12/2	12,0	11,0	12,0	75,0	120,0	12,0	4	2,00	45
16/1	16,0	15,0	16,0	92,0	150,0	16,0	4	1,00	45
16/2	16,0	15,0	16,0	92,0	150,0	16,0	4	2,00	45
20/1	20,0	18,5	20,0	92,0	150,0	20,0	4	1,00	45
20/2,5	20,0	18,5	20,0	92,0	150,0	20,0	4	2,50	45

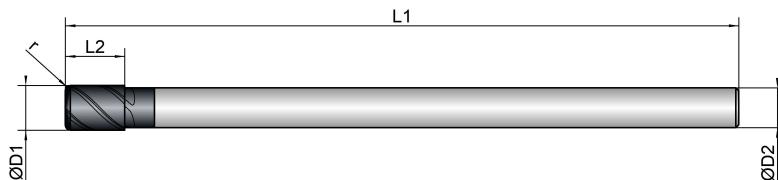
Kühlung	
Toleranz	e8
Beschichtung	TiAlN- α



Premium



HA K202202



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC	Alu	Kupfer	Mg	Kunststoffe						
75	55	50	28	23			65	70								

K202202	D1 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	r mm 	°
	7,0	9,0	121,0	6,0	4	0,50	45
7/0,5	7,0	9,0	121,0	6,0	4	1,00	45
7/1	7,0	9,0	121,0	6,0	4	1,50	45
7/1,5	7,0	9,0	121,0	6,0	4	0,50	45
9/0,5	9,0	12,0	136,0	8,0	4	1,00	45
9/1	9,0	12,0	136,0	8,0	4	1,50	45
9/1,5	9,0	12,0	136,0	8,0	4	2,00	45
11/1	11,0	15,0	150,0	10,0	4	1,00	45
11/1,5	11,0	15,0	150,0	10,0	4	1,50	45
11/2	11,0	15,0	150,0	10,0	4	2,00	45
13/1	13,0	18,0	160,0	12,0	4	1,00	45
13/1,5	13,0	18,0	160,0	12,0	4	1,50	45
13/2	13,0	18,0	160,0	12,0	4	2,00	45
15/1	15,0	21,0	160,0	14,0	4	1,00	45
15/1,5	15,0	21,0	160,0	14,0	4	1,50	45
15/2	15,0	21,0	160,0	14,0	4	2,00	45
17/1	17,0	24,0	180,0	16,0	4	1,00	45
17/1,5	17,0	24,0	180,0	16,0	4	1,50	45
17/2	17,0	24,0	180,0	16,0	4	2,00	45
17/3	17,0	24,0	180,0	16,0	4	3,00	45

Kühlung



HB ETC HSC HPC MTC

UNI ≠

NEW



Toleranz

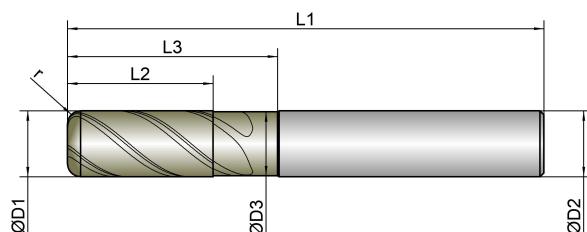
e8

Beschichtung

TiSiN-α



HB K202509



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
230	185	150					75	260							

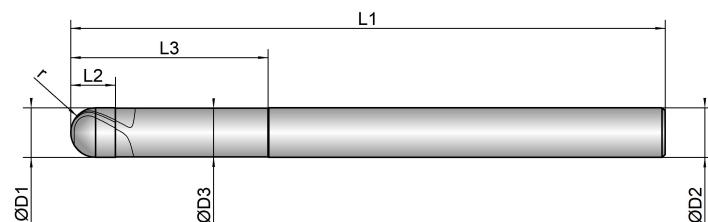
K202509	D1	D3	L2	L3	L1	D2	z	r	
	mm	mm	mm	mm	mm	mm	#	mm	°
6/0,5	6,0	5,8	13,0	20,0	57,0	6,0	4	0,50	40
6/1	6,0	5,8	13,0	20,0	57,0	6,0	4	1,00	40
6/1,5	6,0	5,8	13,0	20,0	57,0	6,0	4	1,50	40
8/0,5	8,0	7,7	19,0	25,0	63,0	8,0	4	0,50	40
8/1	8,0	7,7	19,0	25,0	63,0	8,0	4	1,00	40
8/2	8,0	7,7	19,0	25,0	63,0	8,0	4	2,00	40
8/3	8,0	7,7	19,0	25,0	63,0	8,0	4	3,00	40
10/0,5	10,0	9,7	22,0	32,0	72,0	10,0	4	0,50	40
10/1	10,0	9,7	22,0	32,0	72,0	10,0	4	1,00	40
10/2	10,0	9,7	22,0	32,0	72,0	10,0	4	2,00	40
10/3	10,0	9,7	22,0	32,0	72,0	10,0	4	3,00	40
12/0,5	12,0	11,6	26,0	38,0	83,0	12,0	4	0,50	40

	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	r mm	°
K202509									
12/1	12,0	11,6	26,0	38,0	83,0	12,0	4	1,00	40
12/2	12,0	11,6	26,0	38,0	83,0	12,0	4	2,00	40
12/3	12,0	11,6	26,0	38,0	83,0	12,0	4	3,00	40
16/0,5	16,0	15,5	32,0	44,0	92,0	16,0	4	0,50	40
16/1	16,0	15,5	32,0	44,0	92,0	16,0	4	1,00	40
16/2	16,0	15,5	32,0	44,0	92,0	16,0	4	2,00	40
16/3	16,0	15,5	32,0	44,0	92,0	16,0	4	3,00	40
20/1	20,0	19,5	41,0	54,0	104,0	20,0	4	1,00	40
20/2	20,0	19,5	41,0	54,0	104,0	20,0	4	2,00	40
20/3	20,0	19,5	41,0	54,0	104,0	20,0	4	3,00	40
20/4	20,0	19,5	41,0	54,0	104,0	20,0	4	4,00	40

Kühlung				
Toleranz	f7			
Beschichtung	-			



HA K203001



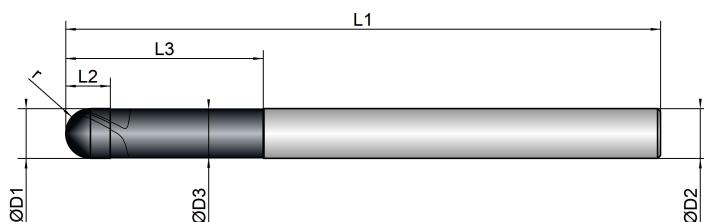
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
80	50						45	75	190	170		240		CFK / GFK	Grafit

K203001	D1 mm	D3 mm	L2 mm	L3 mm	L1 mm	D2 mm	z #	r mm	°
	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø
1/6	1,0	0,9	2,0	6,0	100,0	6,0	2	0,50	30
2/6	2,0	1,8	3,0	8,0	100,0	6,0	2	1,00	30
3/6	3,0	2,8	4,0	12,0	100,0	6,0	2	1,50	30
4/6	4,0	3,8	5,0	16,0	100,0	6,0	2	2,00	30
5/6	5,0	4,8	6,0	20,0	100,0	6,0	2	2,50	30
6/6	6,0	5,8	6,0	25,0	100,0	6,0	2	3,00	30
6/8	6,0	5,8	6,0	25,0	100,0	8,0	2	3,00	30
8/8	8,0	7,8	7,0	32,0	100,0	8,0	2	4,00	30
8/10	8,0	7,8	7,0	32,0	120,0	10,0	2	4,00	30
10/10	10,0	9,8	9,0	40,0	120,0	10,0	2	5,00	30
10/12	10,0	9,8	9,0	40,0	160,0	12,0	2	5,00	30
12/12	12,0	11,8	11,0	50,0	160,0	12,0	2	6,00	30
12/16	12,0	11,8	11,0	50,0	200,0	16,0	2	6,00	30
16/16	16,0	15,5	14,0	60,0	200,0	16,0	2	8,00	30

Kühlung	
Toleranz	f7
Beschichtung	TiAlN- α



HA K203003



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
400	290	210					210	580	360	330				CFK / GFK	Grafit	

K203003	D1 mm 	D3 mm 	L2 mm 	L3 mm 	L1 mm 	D2 mm 	z # 	r mm 	
	1,0	0,9	2,0	6,0	100,0	6,0	2	0,50	30
1/6	2,0	1,8	3,0	8,0	100,0	6,0	2	1,00	30
2/6	3,0	2,8	4,0	12,0	100,0	6,0	2	1,50	30
3/6	4,0	3,8	5,0	16,0	100,0	6,0	2	2,00	30
4/6	5,0	4,8	6,0	20,0	100,0	6,0	2	2,50	30
5/6	6,0	5,8	6,0	25,0	100,0	6,0	2	3,00	30
6/6	6,0	5,8	6,0	25,0	100,0	8,0	2	3,00	30
6/8	8,0	7,8	7,0	32,0	100,0	8,0	2	4,00	30
8/8	8,0	7,8	7,0	32,0	120,0	10,0	2	4,00	30
8/10	10,0	9,8	9,0	40,0	120,0	10,0	2	5,00	30
10/10	10,0	9,8	9,0	40,0	160,0	12,0	2	5,00	30
10/12	12,0	11,8	11,0	50,0	160,0	12,0	2	6,00	30
12/12	12,0	11,8	11,0	50,0	200,0	16,0	2	6,00	30
12/16	16,0	15,5	14,0	60,0	200,0	16,0	2	8,00	30
16/16									



Kühlung

Toleranz

f8

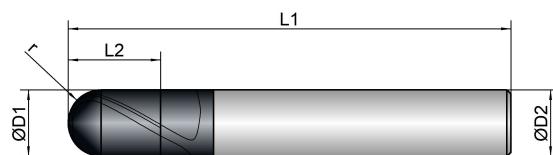
Beschichtung

TiAlN- α

Premium



HA K203033



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
420	290	220	165	150			225	615		850				CFK / GFK	Grafit	

K203033		D1 	L2 	L1 	D2 	z 	r 	°
0,1/3		0,1	0,2	38,0	3,0	2	0,05	30
0,15/3		0,15	0,3	38,0	3,0	2	0,075	30
0,2/3		0,2	0,4	38,0	3,0	2	0,10	30
0,25/3		0,25	0,5	38,0	3,0	2	0,125	30
0,3/3		0,3	1,0	38,0	3,0	2	0,15	30
0,35/3		0,35	1,0	38,0	3,0	2	0,175	30
0,4/3		0,4	1,0	38,0	3,0	2	0,20	30
0,5/3		0,5	1,5	38,0	3,0	2	0,25	30
0,5/6		0,5	1,5	54,0	6,0	2	0,25	30
0,6/3		0,6	1,5	38,0	3,0	2	0,30	30
0,7/3		0,7	2,0	38,0	3,0	2	0,35	30
0,8/3		0,8	2,0	38,0	3,0	2	0,40	30
0,9/3		0,9	2,5	38,0	3,0	2	0,45	30
1/3		1,0	2,0	50,0	3,0	2	0,50	30
1/6		1,0	2,0	54,0	6,0	2	0,50	30

K203033	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
1,1/3	1,1	3,0	50,0	3,0	2	0,55	30
1,2/3	1,2	3,0	50,0	3,0	2	0,60	30
1,4/3	1,4	3,0	50,0	3,0	2	0,70	30
1,5/3	1,5	3,0	50,0	3,0	2	0,75	30
1,5/6	1,5	3,0	54,0	6,0	2	0,75	30
1,6/3	1,6	4,0	50,0	3,0	2	0,80	30
1,8/3	1,8	4,0	50,0	3,0	2	0,90	30
2/3	2,0	4,0	50,0	3,0	2	1,00	30
2/6	2,0	4,0	54,0	6,0	2	1,00	30
2,5/3	2,5	5,0	50,0	3,0	2	1,25	30
2,5/6	2,5	5,0	54,0	6,0	2	1,25	30
3/3	3,0	6,0	50,0	3,0	2	1,50	30
3/6	3,0	6,0	54,0	6,0	2	1,50	30
4/4	4,0	7,0	54,0	4,0	2	2,00	30
4/6	4,0	7,0	54,0	6,0	2	2,00	30
5/5	5,0	8,0	54,0	5,0	2	2,50	30
5/6	5,0	8,0	54,0	6,0	2	2,50	30
6/6	6,0	10,0	54,0	6,0	2	3,00	30
7/8	7,0	12,0	59,0	8,0	2	3,50	30
8/8	8,0	12,0	59,0	8,0	2	4,00	30
10/10	10,0	14,0	67,0	10,0	2	5,00	30
12/12	12,0	16,0	73,0	12,0	2	6,00	30
14/14	14,0	16,0	75,0	14,0	2	7,00	30
16/16	16,0	20,0	83,0	16,0	2	8,00	30
18/18	18,0	22,0	93,0	18,0	2	9,00	30
20/20	20,0	25,0	93,0	20,0	2	10,00	30



Kühlung

Toleranz

f8

Beschichtung

TiAlN- α 

HA K203063



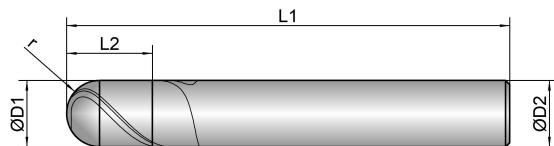
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
350	240	180	135	125			180	500		695				CFK / GFK	Grafit

K203063	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
	0,5/3	0,5	1,5	75,0	3,0	2	0,25
0,5/6	0,5	1,5	80,0	6,0	2	0,25	30
1/3	1,0	3,0	75,0	3,0	2	0,50	30
1/6	1,0	3,0	80,0	6,0	2	0,50	30
1,5/3	1,5	4,0	75,0	3,0	2	0,75	30
1,5/6	1,5	4,0	80,0	6,0	2	0,75	30
2/3	2,0	6,0	75,0	3,0	2	1,00	30
2/6	2,0	6,0	80,0	6,0	2	1,00	30
2,5/3	2,5	8,0	75,0	3,0	2	1,25	30
2,5/6	2,5	8,0	80,0	6,0	2	1,25	30
3/3	3,0	10,0	75,0	3,0	2	1,50	30
3/6	3,0	10,0	80,0	6,0	2	1,50	30
4/4	4,0	13,0	75,0	4,0	2	2,00	30
4/6	4,0	13,0	80,0	6,0	2	2,00	30
5/5	5,0	14,0	75,0	5,0	2	2,50	30
5/6	5,0	14,0	100,0	6,0	2	2,50	30
6/6	6,0	16,0	100,0	6,0	2	3,00	30
8/8	8,0	22,0	100,0	8,0	2	4,00	30
10/10	10,0	25,0	100,0	10,0	2	5,00	30
12/12	12,0	26,0	100,0	12,0	2	6,00	30
14/14	14,0	26,0	100,0	14,0	2	7,00	30
16/16	16,0	30,0	150,0	16,0	2	8,00	30
20/20	20,0	40,0	150,0	20,0	2	10,00	30

Kühlung				
Toleranz	f8			
Beschichtung	-			



HA K203081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
70	50						45	75	190	160		240		CFK / GFK	Grafit

K203081	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	o
3	3,0	6,0	50,0	3,0	2	1,50	45
4	4,0	7,0	54,0	4,0	2	2,00	45
5	5,0	8,0	54,0	5,0	2	2,50	45
6	6,0	10,0	54,0	6,0	2	3,00	45
8	8,0	12,0	59,0	8,0	2	4,00	45
10	10,0	13,0	67,0	10,0	2	5,00	45
12	12,0	16,0	74,0	12,0	2	6,00	45
14	14,0	16,0	75,0	14,0	2	7,00	45
16	16,0	20,0	83,0	16,0	2	8,00	45
20	20,0	25,0	93,0	20,0	2	10,00	45



Kühlung

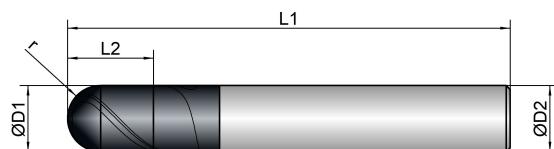
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203083



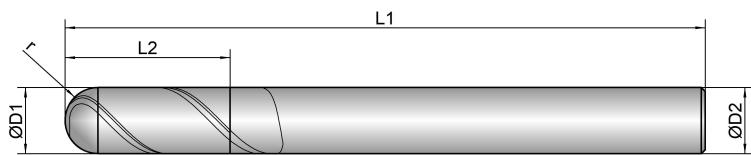
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
140	80	75					85	130	360	330		400		CFK / GFK	Grafit

K203083	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
3	3,0	6,0	50,0	3,0	2	1,50	45
4	4,0	7,0	54,0	4,0	2	2,00	45
5	5,0	8,0	54,0	5,0	2	2,50	45
6	6,0	10,0	54,0	6,0	2	3,00	45
8	8,0	12,0	59,0	8,0	2	4,00	45
10	10,0	13,0	67,0	10,0	2	5,00	45
12	12,0	16,0	74,0	12,0	2	6,00	45
14	14,0	16,0	75,0	14,0	2	7,00	45
16	16,0	20,0	83,0	16,0	2	8,00	45
20	20,0	25,0	93,0	20,0	2	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	-



HA K203091



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
60	40						35	65	170	140		220		CFK / GFK	Grafit

K203091	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm (R)	o
3	3,0	10,0	75,0	3,0	2	1,50	45
4	4,0	13,0	75,0	4,0	2	2,00	45
5	5,0	15,0	75,0	5,0	2	2,50	45
6	6,0	16,0	100,0	6,0	2	3,00	45
8	8,0	22,0	100,0	8,0	2	4,00	45
10	10,0	25,0	100,0	10,0	2	5,00	45
12	12,0	26,0	100,0	12,0	2	6,00	45
14	14,0	26,0	100,0	14,0	2	7,00	45
16	16,0	30,0	150,0	16,0	2	8,00	45
20	20,0	40,0	150,0	20,0	2	10,00	45



Kühlung

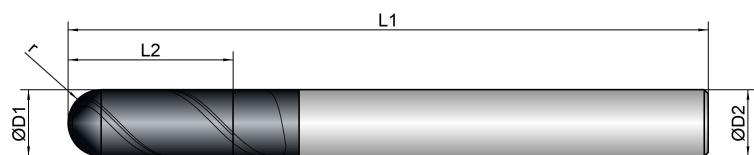
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203093



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	70	65					75	120	340	310		380		CFK / GFK	Grafit

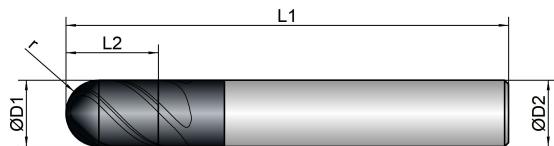
K203093		D1 	L2 	L1 	D2 	z 	r 	°
3		3,0	10,0	75,0	3,0	2	1,50	45
4		4,0	13,0	75,0	4,0	2	2,00	45
5		5,0	15,0	75,0	5,0	2	2,50	45
6		6,0	16,0	100,0	6,0	2	3,00	45
8		8,0	22,0	100,0	8,0	2	4,00	45
10		10,0	25,0	100,0	10,0	2	5,00	45
12		12,0	26,0	100,0	12,0	2	6,00	45
14		14,0	26,0	100,0	14,0	2	7,00	45
16		16,0	30,0	150,0	16,0	2	8,00	45
20		20,0	40,0	150,0	20,0	2	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	TiAlN- α

Premium						



HA K203253



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
210	150	140					90	360	400					CFK / GFK	Grafit	50

K203253	D1	L2	L1	D2	z	r	
	mm \varnothing	mm	mm	mm \varnothing	#	mm	°
3	3,0	5,0	50,0	3,0	4	1,50	45
4	4,0	8,0	54,0	4,0	4	2,00	45
5	5,0	9,0	54,0	5,0	4	2,50	45
6	6,0	10,0	54,0	6,0	4	3,00	45
8	8,0	12,0	59,0	8,0	4	4,00	45
10	10,0	14,0	67,0	10,0	4	5,00	45
12	12,0	16,0	74,0	12,0	4	6,00	45
14	14,0	18,0	75,0	14,0	4	7,00	45
16	16,0	22,0	83,0	16,0	4	8,00	45
20	20,0	26,0	93,0	20,0	4	10,00	45



Kühlung



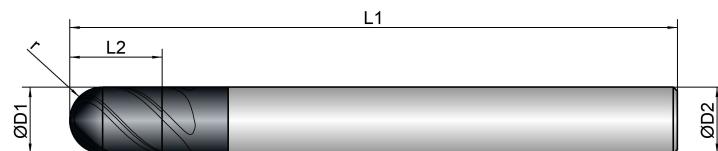
Toleranz

f8

Beschichtung

TiAlN- α 

HA K203263



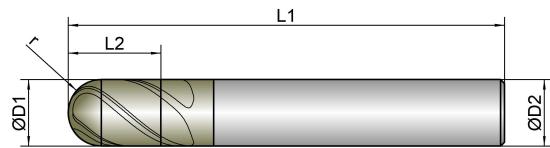
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
190	130	120					80	340	380					CFK / GFK	Grafit	40

K203263	D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #	r mm	
3	3,0	5,0	75,0	3,0	4	1,50	45
4	4,0	8,0	75,0	4,0	4	2,00	45
5	5,0	9,0	75,0	5,0	4	2,50	45
6	6,0	10,0	100,0	6,0	4	3,00	45
8	8,0	12,0	100,0	8,0	4	4,00	45
10	10,0	14,0	100,0	10,0	4	5,00	45
12	12,0	16,0	100,0	12,0	4	6,00	45
14	14,0	18,0	100,0	14,0	4	7,00	45
16	16,0	22,0	150,0	16,0	4	8,00	45
20	20,0	26,0	150,0	20,0	4	10,00	45

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203413



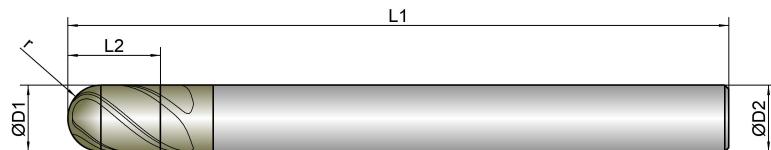
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
200	160	150					100	350						CFK / GFK	Grafit	

K203413		D1 	L2 	L1 	D2 	z 	r 	°
		mm	mm	mm	mm	#	mm	°
3		3,0	5,0	54,0	6,0	4	1,50	40
4		4,0	8,0	54,0	6,0	4	2,00	40
5		5,0	9,0	54,0	6,0	4	2,50	40
6		6,0	10,0	54,0	6,0	4	3,00	40
8		8,0	12,0	58,0	8,0	4	4,00	40
10		10,0	14,0	66,0	10,0	4	5,00	40
12		12,0	16,0	73,0	12,0	4	6,00	40
16		16,0	22,0	82,0	16,0	4	8,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN- α



HA K203418



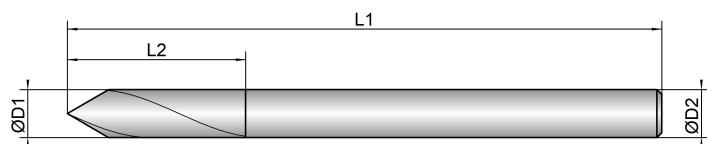
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
190	150	140					90	340								

K203418		D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm	° ○
3		3,0	5,0	83,0	6,0	4	1,50	40
4		4,0	8,0	83,0	6,0	4	2,00	40
5		5,0	9,0	83,0	6,0	4	2,50	40
6		6,0	10,0	83,0	6,0	4	3,00	40
8		8,0	12,0	100,0	8,0	4	4,00	40
10		10,0	14,0	100,0	10,0	4	5,00	40
12		12,0	16,0	100,0	12,0	4	6,00	40
16		16,0	22,0	150,0	16,0	4	8,00	40

Kühlung	
Toleranz	-
Beschichtung	-



HA K204001



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC				Alu	Kupfer	Mg	Kunststoffe			
60	35						40	55	200	●				CFK / GFK	Grafit	

K204001		D1 	L2 	L1 	D2 	z 	o
3		3,0	15,0	50,0	3,0	1	30
4		4,0	18,0	50,0	4,0	1	30
6		6,0	20,0	54,0	6,0	1	30

Kühlung



HA UNI



Toleranz

-

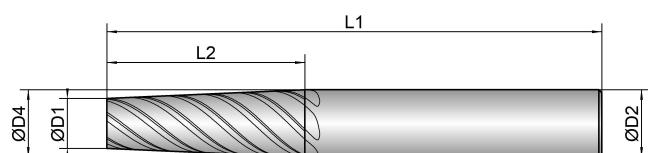
Premium

Beschichtung

-



HA K204011



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
●	●						●	●	●					CFK / GFK	Grafit

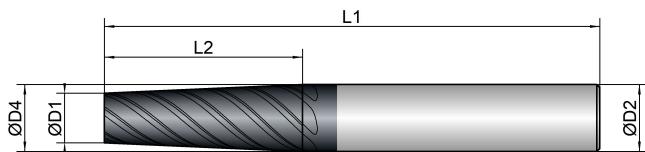
K204011	D1 mm ∅	D4 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	3	10,0	50,0	3,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α

HA **UNI**



HA K204013



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204013	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	3	10,0	50,0	3,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
5X30	5	6	30,0	75,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X60	16	18	60,0	120,0	18,0	6	45

Kühlung


 HA UNI


Toleranz

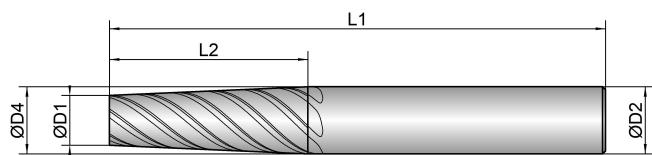
-

Beschichtung

-



HA K204021



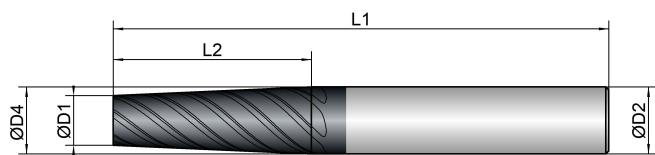
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204021	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	3	10,0	50,0	3,0	4	30
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204023



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204023	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	3	10,0	50,0	3,0	4	45
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	6	45
5X25	5	6	25,0	70,0	6,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	14	50,0	110,0	14,0	6	45
16X55	16	18	55,0	115,0	18,0	6	45

Kühlung



HA UNI



Toleranz

-

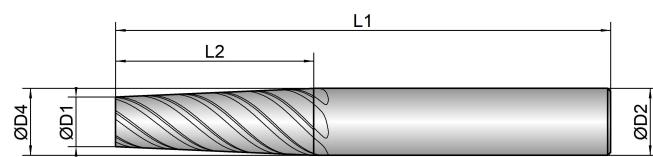
Premium

Beschichtung

-



HA K204031



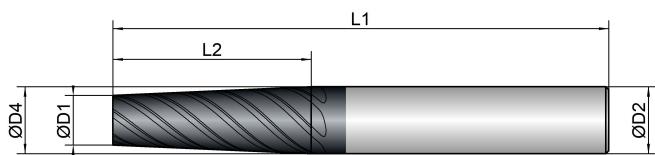
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204031	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204033



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204033	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	o
	2	3	10,0	50,0	3,0	4	
2X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	4	20,0	60,0	4,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	5	20,0	60,0	5,0	4	30
4,5X20	4,5	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	8	30,0	75,0	8,0	6	45
8X30	8	10	30,0	80,0	10,0	6	45
10X30	10	12	30,0	85,0	12,0	6	45
12X30	12	14	30,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X60	16	20	60,0	126,0	20,0	6	45

Kühlung



Toleranz

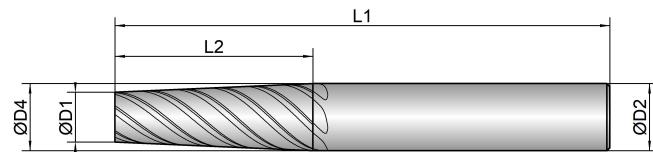
-

Beschichtung

-



HA K204041



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204041	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

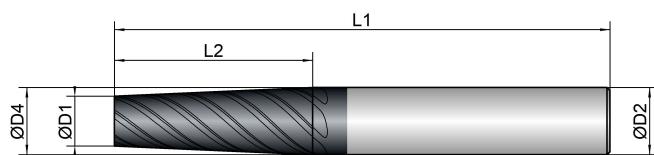
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



Premium



HA K204043



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204043	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
	2X10	2	3	10,0	50,0	3,0	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	4	20,0	60,0	4,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
3,5X20	3,5	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
4,5X30	4,5	8	30,0	75,0	8,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X28	6	8	28,0	75,0	8,0	6	45
8X28	8	10	28,0	75,0	10,0	6	45
10X28	10	12	28,0	85,0	12,0	6	45
12X28	12	14	28,0	85,0	14,0	6	45
12X50	12	16	50,0	110,0	16,0	6	45
16X55	16	20	55,0	115,0	20,0	6	45

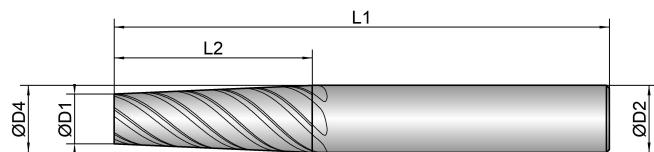
Kühlung	
Toleranz	-
Beschichtung	-



HA UNI



HA K204051



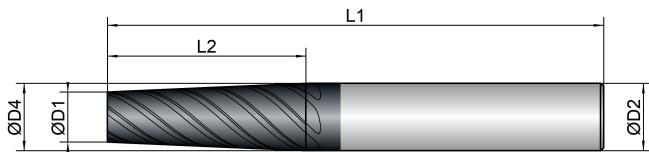
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204051	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	z °
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204053



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204053	D1 mm 	D4 mm 	L2 mm 	L1 mm 	D2 mm 	z # 	
2X15	2	4	15,0	50,0	4,0	4	30
2,5X20	2,5	5	20,0	60,0	5,0	4	30
3X20	3	5	20,0	60,0	5,0	4	30
4X20	4	6	20,0	65,0	6,0	4	30
5X30	5	8	30,0	75,0	8,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	85,0	12,0	6	45
10X40	10	14	40,0	100,0	14,0	6	45

Kühlung


HA
UNI


Toleranz

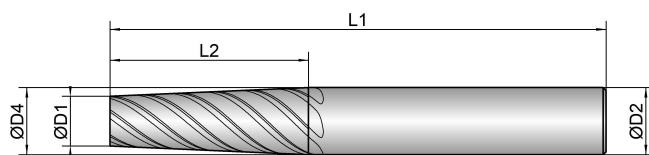
-

Beschichtung

-



HA K204061



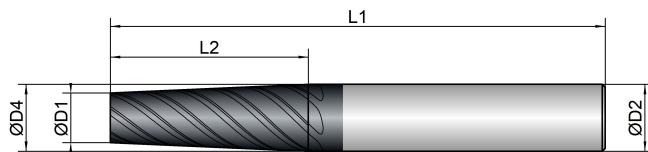
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204061	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	Z	o
2X10	2	4	10,0	50,0	4,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45

Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K204063



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204063	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	o
2X10	2	4	10,0	50,0	4,0	4	30
2,5X10	2,5	4	10,0	50,0	4,0	4	30
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X25	3	6	25,0	70,0	6,0	4	30
3X30	3	8	30,0	75,0	8,0	4	30
3X40	3	8	40,0	85,0	8,0	4	30
4X25	4	8	25,0	70,0	8,0	6	45
4X30	4	8	30,0	75,0	8,0	6	45
5X40	5	10	40,0	90,0	10,0	6	45
6X30	6	10	30,0	80,0	10,0	6	45
8X30	8	12	30,0	84,0	12,0	6	45
8X50	8	14	50,0	110,0	14,0	6	45
10X30	10	14	30,0	84,0	14,0	6	45
10X50	10	16	50,0	110,0	16,0	6	45
12X30	12	16	30,0	90,0	16,0	6	45
12X50	12	18	50,0	110,0	18,0	6	45

Kühlung


 HA UNI


Toleranz

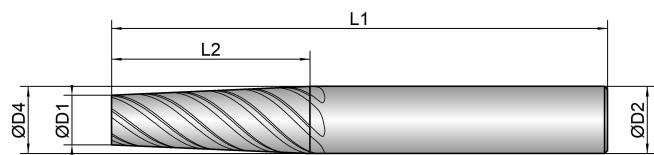
-

Beschichtung

-



HA K204071



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●						●	●	●						

K204071	D1 mm Ø	D4 mm Ø	L2 mm	L1 mm	D2 mm Ø	z Z #	o
2,5X25	2,5	6	25,0	65,0	6,0	4	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	37
5X30	5	10	30,0	85,0	10,0	6	37
5X45	5	12	45,0	100,0	12,0	6	37
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

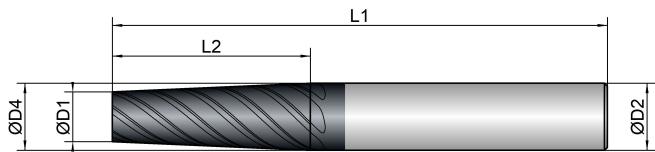
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



Premium



HA K204073



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

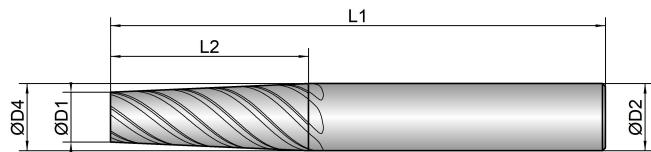
K204073	D1	D4	L2	L1	D2	z	
	mm \varnothing	mm \varnothing	mm	mm	mm \varnothing	#	o
2,5X25	2,5	6	25,0	65,0	6,0	4	30
3X20	3	6	20,0	65,0	6,0	4	30
3,5X25	3,5	8	25,0	70,0	8,0	4	30
4X28	4	8	28,0	70,0	8,0	6	45
5X30	5	10	30,0	85,0	10,0	6	45
5X45	5	12	45,0	100,0	12,0	6	45
6X30	6	12	30,0	84,0	12,0	6	45
6X50	6	14	50,0	110,0	14,0	6	45
8X30	8	14	30,0	84,0	14,0	6	45
8X50	8	16	50,0	110,0	16,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X50	10	18	50,0	114,0	18,0	6	45

Kühlung	(4 icons)
Toleranz	-
Beschichtung	-

HA **UNI**



HA K204081



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204081	D1	D4	L2	L1	D2	z	
	mm Ø	mm Ø	mm	mm	mm Ø	#	°
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30
3,5X30	3,5	10	30,0	80,0	10,0	4	30
4X30	4	10	30,0	80,0	10,0	6	45
4,5X30	4,5	10	30,0	80,0	10,0	6	45
5X30	5	12	30,0	84,0	12,0	6	45
5X40	5	12	40,0	100,0	12,0	6	45
6X30	6	12	30,0	93,0	12,0	6	45
6X55	6	16	55,0	110,0	16,0	6	45
8X30	8	14	30,0	90,0	14,0	6	45
8X50	8	18	50,0	114,0	18,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X55	10	20	55,0	115,0	20,0	6	45
12X30	12	18	30,0	93,0	18,0	6	45
12X45	12	20	45,0	100,0	20,0	6	45

Kühlung


HA UNI


Toleranz

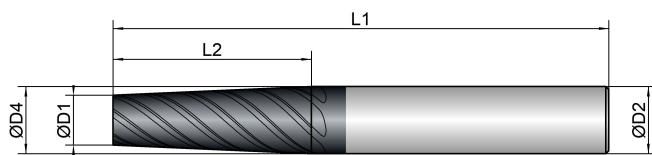
-

Premium

Beschichtung

TiAlN- α 

HA K204083



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
●	●	●					●	●	●						

K204083	D1	D4	L2	L1	D2	z	
	mm \varnothing	mm \varnothing	mm	mm	mm \varnothing	#	o
2,5X20	2,5	6	20,0	65,0	6,0	4	30
3X28	3	8	28,0	70,0	8,0	4	30
3,5X30	3,5	10	30,0	80,0	10,0	4	30
4X30	4	10	30,0	80,0	10,0	6	45
4,5X30	4,5	10	30,0	80,0	10,0	6	45
5X30	5	12	30,0	84,0	12,0	6	45
5X40	5	12	40,0	100,0	12,0	6	45
6X30	6	12	30,0	93,0	12,0	6	45
6X55	6	16	55,0	110,0	16,0	6	45
8X30	8	14	30,0	90,0	14,0	6	45
8X50	8	18	50,0	114,0	18,0	6	45
10X30	10	16	30,0	93,0	16,0	6	45
10X55	10	20	55,0	115,0	20,0	6	45
12X30	12	18	30,0	93,0	18,0	6	45
12X45	12	20	45,0	100,0	20,0	6	45

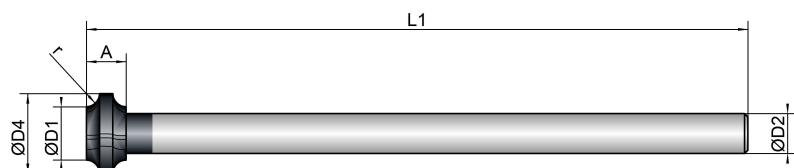
Kühlung				
Toleranz	0-0,01			
Beschichtung	TiAlN- α			



Expert



HA K204092



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
60	40						35	40	120							

K204092	r 	D1 	D4 	A 	L1 	D2 	z
	mm	mm ∅	mm ∅	mm	mm	mm ∅	#
5,6/0,2	0,20	5,6	6	2,0	75,0	4,0	4
7,6/0,2	0,20	7,6	8	2,0	100,0	6,0	4
5,4/0,3	0,30	5,4	6	2,0	75,0	4,0	4
7,4/0,3	0,30	7,4	8	2,0	100,0	6,0	4
5,2/0,4	0,40	5,2	6	2,0	75,0	4,0	4
7,2/0,4	0,40	7,2	8	2,0	100,0	6,0	4
5/0,5	0,50	5	6	2,0	75,0	4,0	4
7/0,5	0,50	7	8	2,0	100,0	6,0	4
8,4/0,8	0,80	8,4	10	4,0	100,0	6,0	4
8/1	1,00	8	10	4,0	100,0	6,0	4
7,6/1,2	1,20	7,6	10	5,0	100,0	6,0	4
7/1,5	1,50	7	10	5,0	100,0	6,0	4
8,4/1,8	1,80	8,4	12	6,0	100,0	6,0	4
8/2	2,00	8	12	7,0	100,0	6,0	4
7/2,5	2,50	7	12	8,0	100,0	6,0	4

Kühlung				
Toleranz	0-0,01			
Beschichtung	TiAlN- α			



HA K204106



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit
170	100						85	125	400				25		45

K204106	r 	D1 	D4 	L1 	D2 	z
	mm	mm \varnothing	mm \varnothing	mm	mm \varnothing	#
3,6/0,2	0,20	3,6	4	50,0	4,0	4
3,4/0,3	0,30	3,4	4	50,0	4,0	4
3,2/0,4	0,40	3,2	4	50,0	4,0	4
3/0,5	0,50	3	4	50,0	4,0	4
4,8/0,6	0,60	4,8	6	50,0	6,0	4
4,4/0,8	0,80	4,4	6	50,0	6,0	4
4/1	1,00	4	6	50,0	6,0	4
5/1,5	1,50	5	8	55,0	10,0	4
6/2	2,00	6	10	66,0	10,0	4
7/2,5	2,50	7	12	75,0	12,0	4
6/3	3,00	6	12	75,0	12,0	4
9/3,5	3,50	9	16	80,0	16,0	4
8/4	4,00	8	16	80,0	16,0	4
7/4,5	4,50	7	16	80,0	16,0	4
10/5	5,00	10	20	80,0	20,0	4
8/6	6,00	8	20	80,0	20,0	4
9/8	8,00	9	25	100,0	25,0	4
5/10	10,00	5	25	100,0	25,0	4

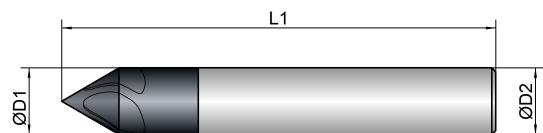
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205173



HB K205174



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205173		K205174		D1	L1	D2	z
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

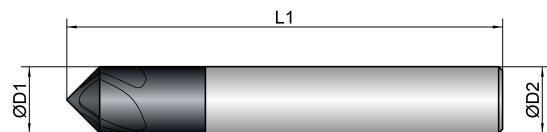
Kühlung	
Toleranz	-
Beschichtung	TiAlN- α



HA K205183



HB K205184



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
110	85	65					80	90	280	250	●		30	CFK / GFK	40

K205183		K205184		D1 mm \varnothing	L1 mm	D2 mm \varnothing	z #
3	-			3,0	50,0	3,0	3
4	-			4,0	50,0	4,0	4
6	6			6,0	50,0	6,0	4
8	8			8,0	59,0	8,0	4
10	10			10,0	66,0	10,0	4
12	12			12,0	73,0	12,0	4

Kühlung


HA UNI CFK

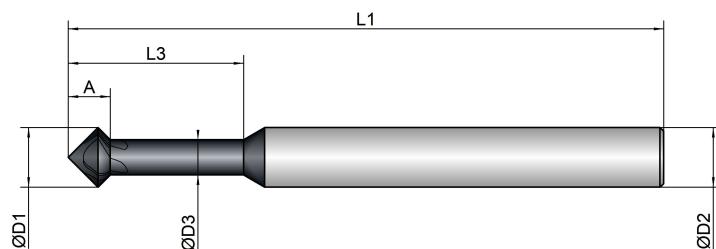

Toleranz

-

Beschichtung

TiAlN- α 

HA K205193



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
70	45						40	38	120				25		35	

K205193	D1 mm \varnothing	D3 mm \varnothing	A mm	L3 mm	L1 mm	D2 mm \varnothing	z Z #
3	3,0	2,2	2,0	10,0	50,0	4,0	4
4	4,0	2,9	2,5	10,0	50,0	4,0	4
5	5,0	3,9	3,0	15,0	65,0	6,0	4
6	6,0	3,9	4,0	15,0	65,0	6,0	4
8	8,0	5,9	2,5	20,0	70,0	8,0	4
10	10,0	5,9	4,0	23,0	73,0	10,0	4
12	12,0	5,9	6,0	23,0	75,0	12,0	4

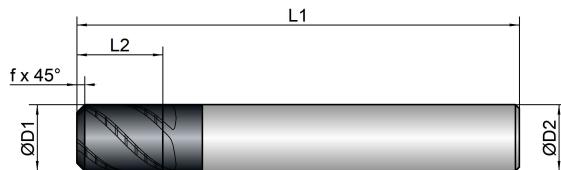
Kühlung	
Toleranz	d11
Beschichtung	TiAlN- α



HA K206083



HB K206084



Stahl			Gehärteter Stahl					INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
175	150	125					60	125							40	

K206083		K206084		D1 	L2 	L1 	D2 	z 	45° 	°
6	6			6,0	8,0	54,0	6,0	4	0,15	45
8	8			8,0	11,0	59,0	8,0	4	0,20	45
10	10			10,0	13,0	67,0	10,0	4	0,20	45
12	12			12,0	16,0	74,0	12,0	4	0,25	45
14	14			14,0	16,0	75,0	14,0	4	0,25	45
16	16			16,0	19,0	83,0	16,0	5	0,35	45
18	18			18,0	19,0	80,0	18,0	5	0,35	45
20	20			20,0	19,0	93,0	20,0	5	0,40	45

Kühlung	
Toleranz	d11
Beschichtung	TiAlN- α

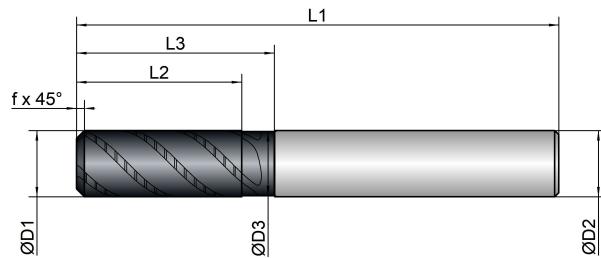
HA	HB	MTC	UNI
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HA K206093



HB K206094



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
175	150	125					60	125							40

K206093		K206094		D1 mm \varnothing	D3 mm \varnothing	L2 mm	L3 mm	L1 mm	D2 mm \varnothing	z #	45° mm	45 °
6	6			6,0	5,8	16,0	21,0	58,0	6,0	4	0,15	45
8	8			8,0	7,7	22,0	27,0	70,0	8,0	4	0,20	45
10	10			10,0	9,7	25,0	30,0	73,0	10,0	4	0,20	45
12	12			12,0	11,6	28,0	38,0	84,0	12,0	4	0,25	45
14	14			14,0	13,6	30,0	40,0	84,0	14,0	4	0,25	45
16	16			16,0	15,5	36,0	45,0	93,0	16,0	5	0,35	45
18	18			18,0	17,5	36,0	45,0	93,0	18,0	5	0,35	45
20	20			20,0	19,5	41,0	55,0	104,0	20,0	5	0,40	45
25	25			25,0	24,0	50,0	65,0	125,0	25,0	5	0,50	45

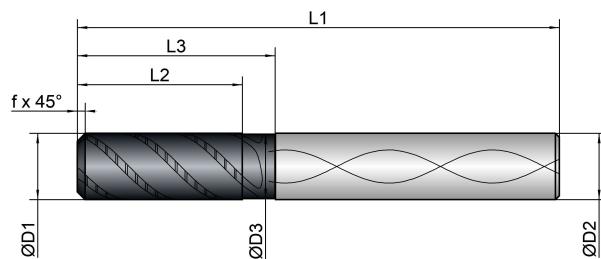
Kühlung	
Toleranz	d11
Beschichtung	TiAlN- α



HA K206113



HB K206114



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
200	170	150					70	150							40	

K206113	K206114	D1 mm Ø	D3 mm Ø	L2 mm	L3 mm	L1 mm	D2 mm Ø	z #	45° mm	°
6	6	6,0	5,8	16,0	21,0	58,0	6,0	4	0,15	45
8	8	8,0	7,7	22,0	27,0	70,0	8,0	4	0,20	45
10	10	10,0	9,7	25,0	30,0	73,0	10,0	4	0,20	45
12	12	12,0	11,6	28,0	38,0	84,0	12,0	4	0,25	45
14	14	14,0	13,6	30,0	40,0	84,0	14,0	4	0,25	45
16	16	16,0	15,5	36,0	45,0	93,0	16,0	5	0,35	45
18	18	18,0	17,5	36,0	45,0	93,0	18,0	5	0,35	45
20	20	20,0	19,5	41,0	55,0	104,0	20,0	5	0,40	45

HÖTMANN & VRATNY — PATENTIERTE QUALITÄT

ABRASIVMATERIAL





HOFMANN & VRATNY — PATENTIERTE QUALITÄT

ABRASIVMATERIAL

Als einer der Innovatoren beim Zerspanen von CFK und GFK mit VHM-Fräsern greifen wir auf fundierte Kenntnisse und jahrelange Erfahrung zurück. Wir haben patentierte Lösungen, die Ihnen und Ihren Kunden die Arbeit deutlich erleichtern.

Patentierte Qualität bis ins Detail. Verbundstoffe wie CFK und GFK sind mittlerweile fester Bestandteil der Industrie. Die Bearbeitung ist jedoch nach wie vor eine Herausforderung. Mit un-

serem patentierten VHM-Bananenfräser werden Carbonteile weltweit effektiv bearbeitet. Unser besonderer Fokus liegt dabei auf einer absolut sauberen Werkstückkante nach der Bearbeitung.

Kühlung



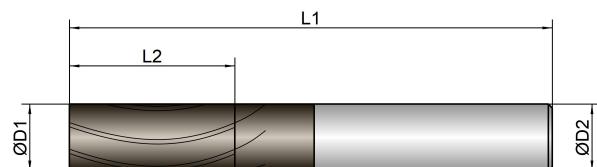
Toleranz

h10

Beschichtung

Diamond- α 

HA K201573



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial		Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit		
													210		200	350	

K201573		D1 mm \varnothing	L2 mm	L1 mm	D2 mm \varnothing	z #
6		6,0	16,0	58,0	6,0	4
8		8,0	22,0	70,0	8,0	6
10		10,0	25,0	73,0	10,0	6
12		12,0	28,0	84,0	12,0	6

Kühlung	
Toleranz	h10
Beschichtung	Diamond- α



HA

L

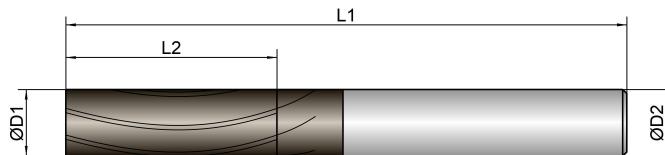
L

E

Expert



HA K201577



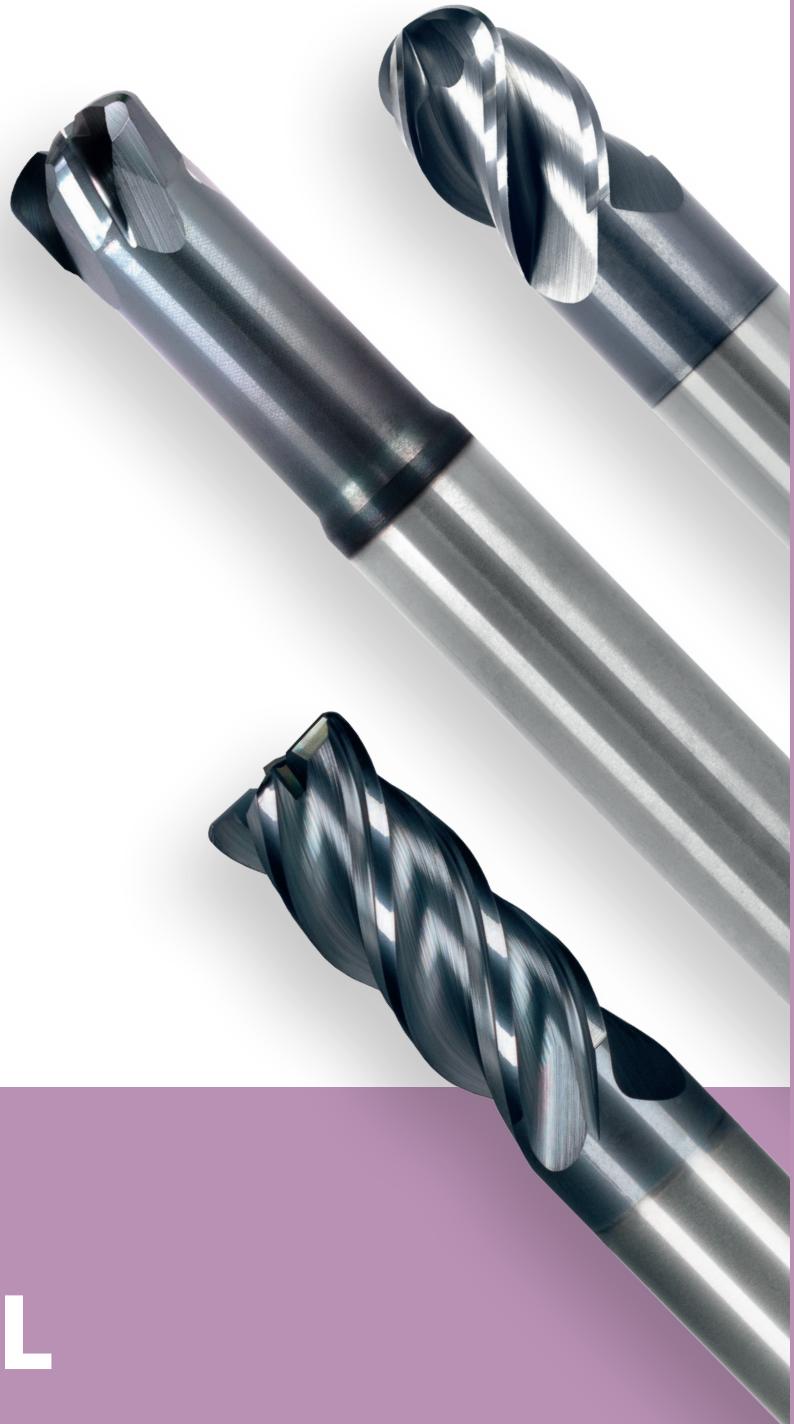
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
													350	210	200

D1		L2		L1		D2		z	
mm \varnothing		mm		mm		mm \varnothing		#	
K201577		6,0		21,0		65,0		6,0	
6		8,0		28,0		85,0		8,0	
8		10,0		32,0		85,0		10,0	
10		12,0		36,0		93,0		12,0	
12									

HOFMANN & VRATNY — 1A-PERFORMANCE

INCONEL





HOFMANN & VRATNY — 1A-PERFORMANCE

INCONEL

Inconel ist ein für spezielle Anforderungen entwickelter Werkstoff, der in Bauteilen mit extremer Beanspruchung eingesetzt wird, wie zum Beispiel im Turbinenbau. Daher erfordert die Zerspanung von Inconel ein Werkzeug, das noch höheren Belastungen standhält.

Optimale Geometrie für eine 1A-Performance. Durch die extremen Veränderungen im Gefüge beim Zerspanen von Inconel, bedarf es einer ausgeklügelten Abstimmung der Werkzeuggeometrie auf alle Gegebenheiten. Dieser

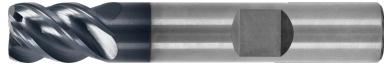
Herausforderung haben wir uns in der Entwicklung gestellt und das Ergebnis ist kein geringeres als unsere Inconel Expert-Linie, bei der eine Kaltaufschweißung (Aufbauschneide) komplett unterbunden wird.

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

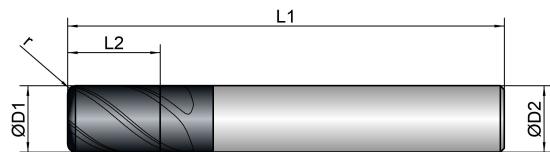
HB **ETC** **HPC** **≠**

NEW

Expert



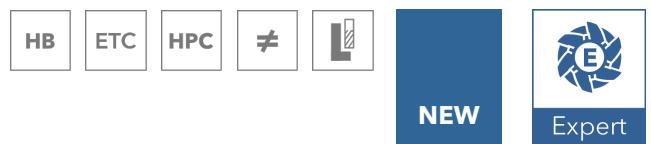
HB K201759



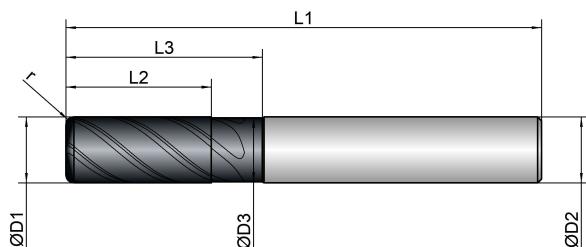
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
													35		

K201759		D1 	L2 	L1 	D2 	z 	r 	°
		mm ø	mm	mm	mm ø	#	mm	
4		4,0	8,0	54,0	6,0	4	0,10	40
5		5,0	9,0	54,0	6,0	4	0,20	40
6		6,0	10,0	54,0	6,0	4	0,20	40
8		8,0	12,0	58,0	8,0	4	0,20	40
10		10,0	14,0	66,0	10,0	4	0,20	40
12		12,0	16,0	73,0	12,0	4	0,20	40
16		16,0	22,0	82,0	16,0	4	0,30	40
20		20,0	26,0	92,0	20,0	4	0,30	40

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α



HB K201764



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
													35		

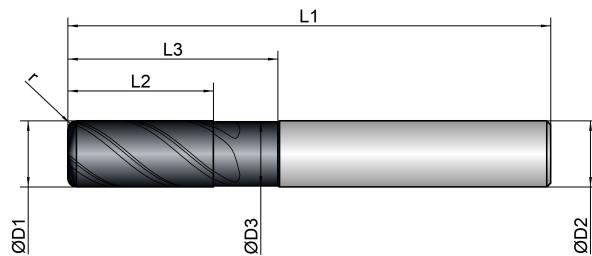
K201764	D1 	D3 	L2 	L3 	L1 	D2 	z 	r 	o
	mm ø	mm ø	mm	mm	mm	mm ø	#	mm	°
6	6,0	5,8	13,0	19,0	57,0	6,0	5	0,10	40
8	8,0	7,7	19,0	25,0	63,0	8,0	5	0,20	40
10	10,0	9,7	22,0	30,0	72,0	10,0	5	0,20	40
12	12,0	11,6	26,0	36,0	83,0	12,0	5	0,20	40
16	16,0	15,5	36,0	42,0	92,0	16,0	5	0,30	40
20	20,0	19,5	41,0	52,0	104,0	20,0	5	0,30	40

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

HB **ETC** **HPC** **MTC** **≠**



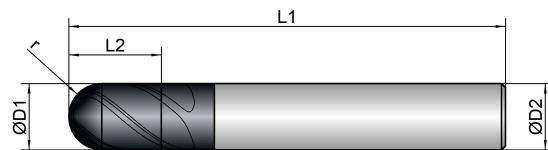
HB K202414



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
													35		

K202414	D1	D3	L2	L3	L1	D2	z	r	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
4/0,3	4,0	3,8	11,0	20,0	58,0	6,0	4	0,30	40
4/1	4,0	3,8	11,0	20,0	58,0	6,0	4	1,00	40
5/0,3	5,0	4,8	13,0	20,0	58,0	6,0	4	0,30	40
5/1	5,0	4,8	13,0	20,0	58,0	6,0	4	1,00	40
6/0,3	6,0	5,8	13,0	20,0	58,0	6,0	4	0,30	40
6/1	6,0	5,8	13,0	20,0	58,0	6,0	4	1,00	40
8/0,3	8,0	7,7	19,0	25,0	63,0	8,0	4	0,30	40
8/1	8,0	7,7	19,0	25,0	63,0	8,0	4	1,00	40
10/0,3	10,0	9,7	22,0	32,0	73,0	10,0	4	0,30	40
10/1	10,0	9,7	22,0	32,0	73,0	10,0	4	1,00	40
10/2	10,0	9,7	22,0	32,0	73,0	10,0	4	2,00	40
12/0,3	12,0	11,6	26,0	38,0	85,0	12,0	4	0,30	40
12/1	12,0	11,6	26,0	38,0	85,0	12,0	4	1,00	40
12/2	12,0	11,6	26,0	38,0	85,0	12,0	4	2,00	40
16/0,3	16,0	15,5	32,0	44,0	93,0	16,0	4	0,30	40
16/1	16,0	15,5	32,0	44,0	93,0	16,0	4	1,00	40
16/2	16,0	15,5	32,0	44,0	93,0	16,0	4	2,00	40
20/0,3	20,0	19,5	38,0	54,0	104,0	20,0	4	0,30	40
20/1	20,0	19,5	38,0	54,0	104,0	20,0	4	1,00	40
20/2	20,0	19,5	38,0	54,0	104,0	20,0	4	2,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



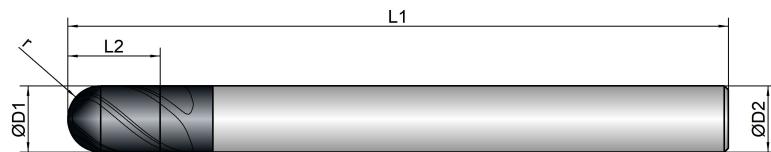
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
													40			

K203393	D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
2	2,0	4,0	54,0	6,0	4	1,00	40
3	3,0	5,0	54,0	6,0	4	1,50	40
4	4,0	8,0	54,0	6,0	4	2,00	40
5	5,0	9,0	54,0	6,0	4	2,50	40
6	6,0	10,0	54,0	6,0	4	3,00	40
8	8,0	12,0	58,0	8,0	4	4,00	40
10	10,0	14,0	66,0	10,0	4	5,00	40
12	12,0	16,0	73,0	12,0	4	6,00	40
16	16,0	20,0	82,0	16,0	4	8,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203398



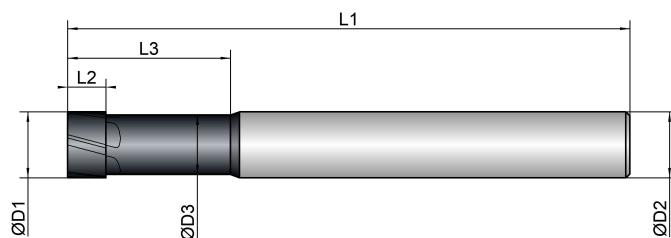
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
													35		

K203398		D1 mm ∅	L2 mm	L1 mm	D2 mm ∅	z #	r mm	°
2	2,0	4,0	83,0	6,0	4	1,00	40	
3	3,0	5,0	83,0	6,0	4	1,50	40	
4	4,0	8,0	83,0	6,0	4	2,00	40	
5	5,0	9,0	83,0	6,0	4	2,50	40	
6	6,0	10,0	83,0	6,0	4	3,00	40	
8	8,0	12,0	100,0	8,0	4	4,00	40	
10	10,0	14,0	100,0	10,0	4	5,00	40	
12	12,0	16,0	100,0	12,0	4	6,00	40	
16	16,0	20,0	100,0	16,0	4	8,00	40	

Kühlung	
Toleranz	h9
Beschichtung	TiSiN-α



HA K207043



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
													55		

K207043	D1 	D3 	L2 	L3 	L1 	D2 	z 						
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	mm max	°			
2	2,0	1,7	1,5	13,0	54,0	6,0	2	0,3	0,06	15			
3	3,0	2,7	1,5	15,0	54,0	6,0	2	0,3	0,10	15			
4	4,0	3,6	2,5	16,0	57,0	6,0	2	0,5	0,15	15			
5	5,0	4,6	3,5	18,0	68,0	6,0	4	0,5	0,17	15			
6	6,0	5,2	3,5	20,0	68,0	6,0	4	1,0	0,20	15			
8	8,0	7,0	4,8	24,0	70,0	8,0	5	1,5	0,25	15			
10	10,0	9,0	5,8	26,0	85,0	10,0	5	2,0	0,30	15			
12	12,0	11,0	6,8	30,0	93,0	12,0	5	2,0	0,40	15			
16	16,0	14,5	8,8	35,0	100,0	16,0	5	2,5	0,50	15			

Kühlung	
Toleranz	h9
Beschichtung	TiSiN- α

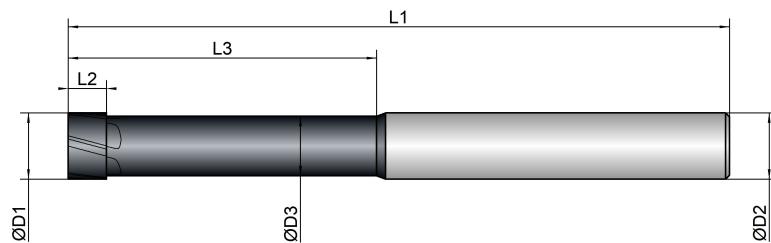
HA HSC

NEW

Expert



HA K207048



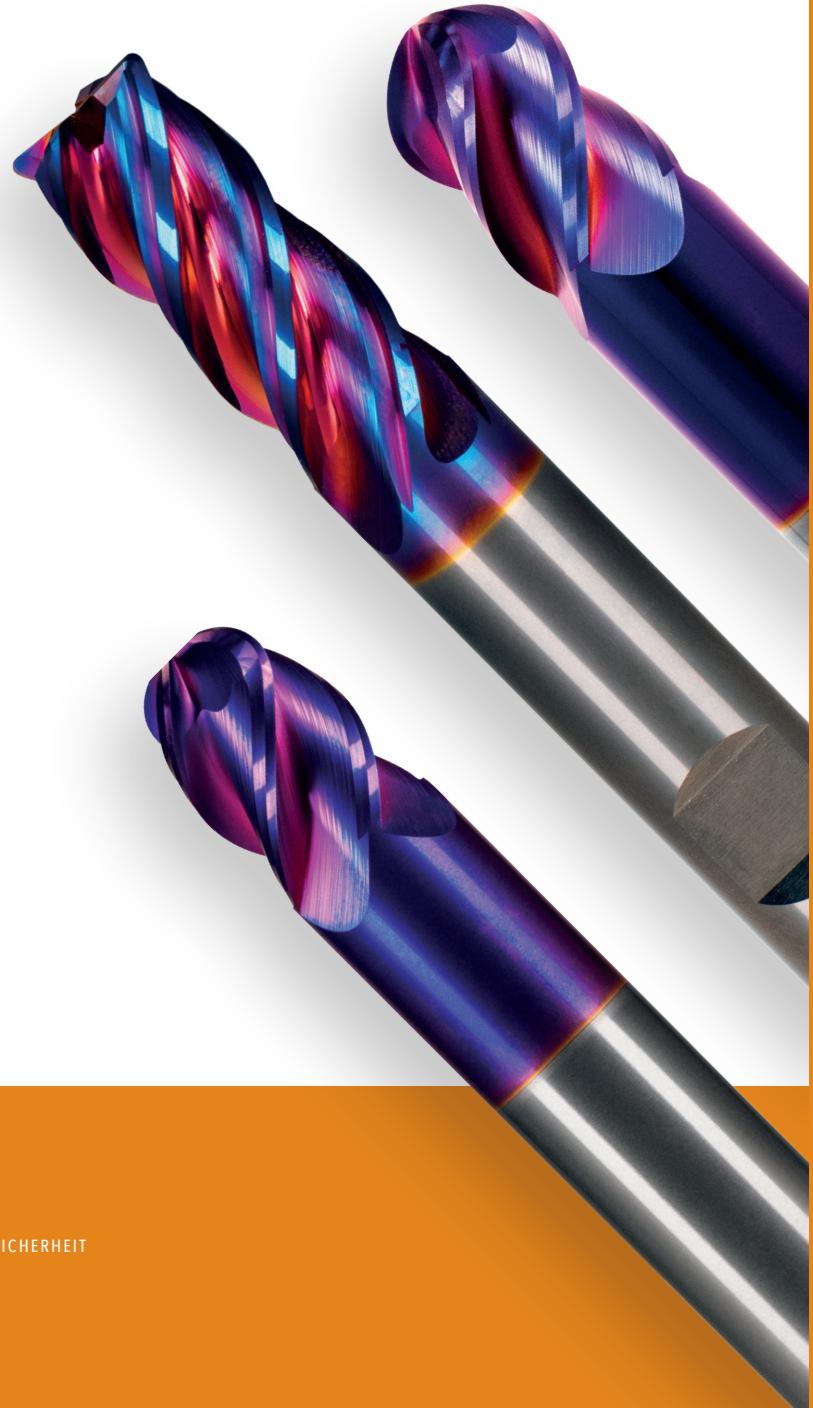
Stahl			Gehärteter Stahl			INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC			Alu	Kupfer	Mg	Kunststoffe			
50												CFK / GFK	Grafit	

K207048	D1	D3	L2	L3	L1	D2	z					
	mm	mm	mm	mm	mm	mm	#	mm	mm	mm	max	°
2	2,0	1,7	1,5	18,0	75,0	6,0	2	0,3	0,06	15		
3	3,0	2,7	1,5	20,0	75,0	6,0	2	0,3	0,10	15		
4	4,0	3,6	2,5	24,0	83,0	6,0	2	0,5	0,15	15		
5	5,0	4,6	3,5	28,0	100,0	6,0	4	0,5	0,17	15		
6	6,0	5,2	3,5	28,0	100,0	6,0	4	1,0	0,20	15		
8	8,0	7,0	4,8	40,0	100,0	8,0	5	1,5	0,25	15		
10	10,0	9,0	5,8	48,0	100,0	10,0	5	2,0	0,30	15		
12	12,0	11,0	6,8	56,0	119,0	12,0	5	2,0	0,40	15		
16	16,0	14,5	8,8	65,0	150,0	16,0	5	2,5	0,50	15		

HOFMANN & VRATNY — MAXIMALE PROZESSSICHERHEIT

TITAN





HOFMANN & VRATNY — MAXIMALE PROZESSSICHERHEIT

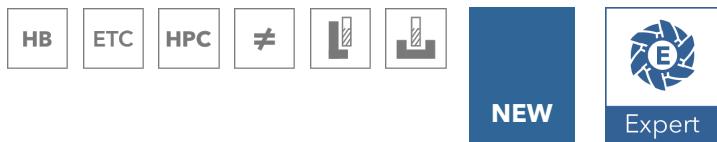
TITAN

Titan ist eines der meist eingesetzten Materialien in den Bereichen Medizintechnik sowie Luft- und Raumfahrt. Es gewinnt zunehmend an Bedeutung in der gesamten Industrie. Die Bearbeitung von Titan ist dabei mit keiner anderen Werkstoffgruppe vergleichbar.

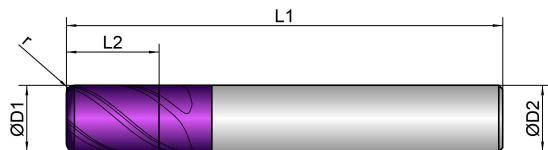
Perfekt abgestimmtes Werkzeug für maximale Prozesssicherheit. Der schwierige Zerspanungsprozess im Titan erfordert extra dafür abgestimmte Hartmetalle, sowie eine optimierte Multi-Layer-Beschichtung der neuesten Genera-

tion und nicht zuletzt die perfekte Geometrie. Mit den Titanfräsern unserer Expert-Line erreichen Sie für Ihre Fertigung höchste Prozesssicherheit bei maximaler Standzeit.

Kühlung	
Toleranz	e8
Beschichtung	TiSiN- α



HB K201688



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
														CFK / GFK	Grafit	80

K201688		D1 	L2 	L1 	D2 	z 	r 	°
		mm Ø	mm	mm	mm Ø	#	mm	°
4		4,0	8,0	54,0	6,0	4	0,10	40
5		5,0	9,0	54,0	6,0	4	0,20	40
6		6,0	10,0	54,0	6,0	4	0,20	40
8		8,0	12,0	58,0	8,0	4	0,20	40
10		10,0	14,0	66,0	10,0	4	0,20	40
12		12,0	16,0	73,0	12,0	4	0,20	40
16		16,0	22,0	82,0	16,0	4	0,30	40
20		20,0	26,0	92,0	20,0	4	0,30	40

Kühlung	
Toleranz	e8
Beschichtung	TiSiN-α

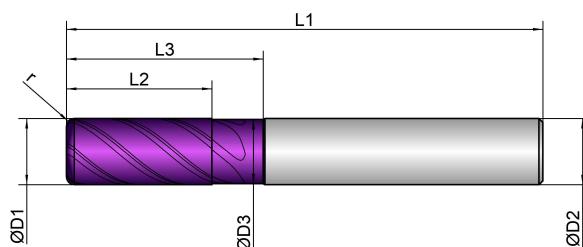
HB **ETC** **HPC** **≠** **L** **L+**

NEW

Expert



HB K201693



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
														CFK / GFK	Grafit

K201693	D1	D3	L2	L3	L1	D2	z	r	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
6	6,0	5,8	13,0	19,0	57,0	6,0	5	0,10	40
8	8,0	7,7	19,0	25,0	63,0	8,0	5	0,20	40
10	10,0	9,7	22,0	30,0	72,0	10,0	5	0,20	40
12	12,0	11,6	26,0	36,0	83,0	12,0	5	0,20	40
16	16,0	15,5	36,0	42,0	92,0	16,0	5	0,30	40
20	20,0	19,5	41,0	52,0	104,0	20,0	5	0,30	40

Kühlung



HB

ETC

HPC

≠

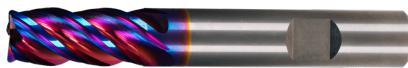


Toleranz

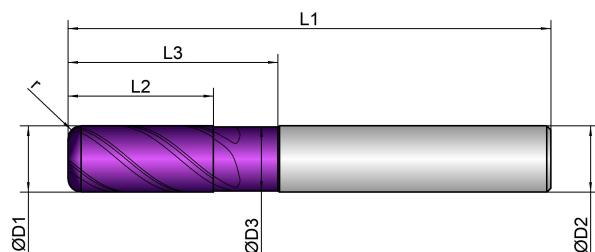
e8

Beschichtung

TiSiN-α



HB K202424



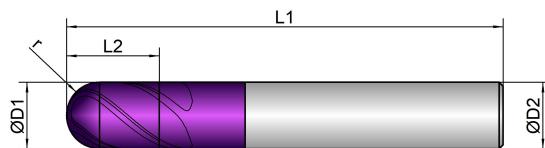
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
															80	

K202424	D1	D3	L2	L3	L1	D2	z	r	
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	°
4/0,3	4,0	3,8	11,0	20,0	58,0	6,0	4	0,30	40
4/1	4,0	3,8	11,0	20,0	58,0	6,0	4	1,00	40
5/0,3	5,0	4,8	13,0	20,0	58,0	6,0	4	0,30	40
5/1	5,0	4,8	13,0	20,0	58,0	6,0	4	1,00	40
6/0,3	6,0	5,8	13,0	20,0	58,0	6,0	4	0,30	40
6/1	6,0	5,8	13,0	20,0	58,0	6,0	4	1,00	40
8/0,3	8,0	7,7	19,0	25,0	63,0	8,0	4	0,30	40
8/1	8,0	7,7	19,0	25,0	63,0	8,0	4	1,00	40
10/0,3	10,0	9,7	22,0	32,0	73,0	10,0	4	0,30	40
10/1	10,0	9,7	22,0	32,0	73,0	10,0	4	1,00	40
10/2	10,0	9,7	22,0	32,0	73,0	10,0	4	2,00	40
12/0,3	12,0	11,6	26,0	38,0	85,0	12,0	4	0,30	40
12/1	12,0	11,6	26,0	38,0	85,0	12,0	4	1,00	40
12/2	12,0	11,6	26,0	38,0	85,0	12,0	4	2,00	40
16/0,3	16,0	15,5	32,0	44,0	93,0	16,0	4	0,30	40
16/1	16,0	15,5	32,0	44,0	93,0	16,0	4	1,00	40
16/2	16,0	15,5	32,0	44,0	93,0	16,0	4	2,00	40
20/0,3	20,0	19,5	38,0	54,0	104,0	20,0	4	0,30	40
20/1	20,0	19,5	38,0	54,0	104,0	20,0	4	1,00	40
20/2	20,0	19,5	38,0	54,0	104,0	20,0	4	2,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203383



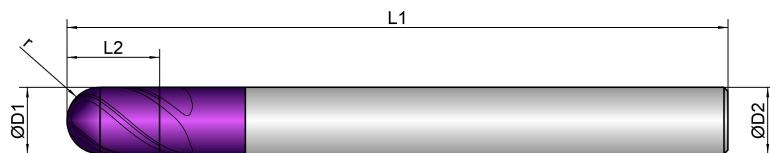
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe			
														CFK / GFK	Grafit

K203383	D1 mm Ø	L2 mm	L1 mm	D2 mm Ø	z #	r mm (R)	°
2	2,0	4,0	54,0	6,0	4	1,00	40
3	3,0	5,0	54,0	6,0	4	1,50	40
4	4,0	8,0	54,0	6,0	4	2,00	40
5	5,0	9,0	54,0	6,0	4	2,50	40
6	6,0	10,0	54,0	6,0	4	3,00	40
8	8,0	12,0	58,0	8,0	4	4,00	40
10	10,0	14,0	66,0	10,0	4	5,00	40
12	12,0	16,0	73,0	12,0	4	6,00	40
16	16,0	20,0	82,0	16,0	4	8,00	40

Kühlung	
Toleranz	f8
Beschichtung	TiSiN-α



HA K203388



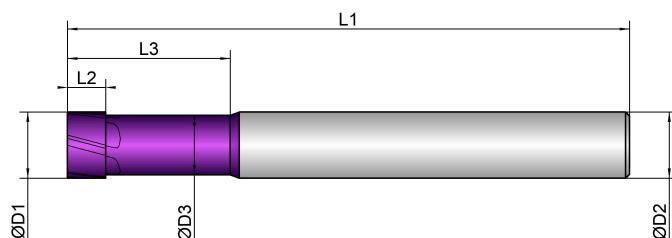
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe		CFK / GFK	Grafit	
															50	

K203388	D1	L2	L1	D2	z	r	
	mm Ø	mm	mm	mm Ø	#	mm	°
2	2,0	4,0	83,0	6,0	4	1,00	40
3	3,0	5,0	83,0	6,0	4	1,50	40
4	4,0	8,0	83,0	6,0	4	2,00	40
5	5,0	9,0	83,0	6,0	4	2,50	40
6	6,0	10,0	83,0	6,0	4	3,00	40
8	8,0	12,0	100,0	8,0	4	4,00	40
10	10,0	14,0	100,0	10,0	4	5,00	40
12	12,0	16,0	100,0	12,0	4	6,00	40
16	16,0	20,0	100,0	16,0	4	8,00	40

Kühlung	
Toleranz	h9
Beschichtung	TiSiN-α



HA K207033



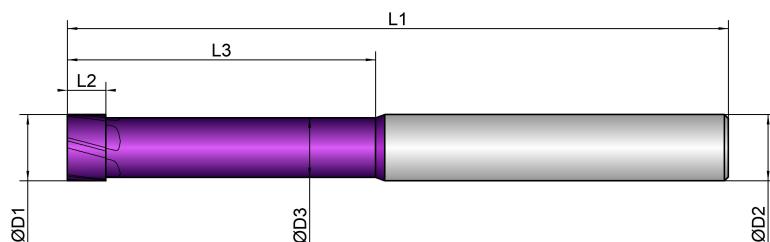
Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
														CFK / GFK	Grafit	120

K207033	D1	D3	L2	L3	L1	D2	z							
	mm Ø	mm Ø	mm	mm	mm	mm Ø	#	mm	mm max	°				
2	2,0	1,7	1,5	13,0	54,0	6,0	2	0,3	0,15	15				
3	3,0	2,7	1,5	15,0	54,0	6,0	2	0,3	0,20	15				
4	4,0	3,6	2,5	16,0	57,0	6,0	2	0,5	0,25	15				
5	5,0	4,6	3,5	18,0	67,0	6,0	4	0,5	0,35	15				
6	6,0	5,2	3,5	20,0	67,0	6,0	4	1,0	0,40	15				
8	8,0	7,0	4,8	24,0	70,0	8,0	5	1,5	0,50	15				
10	10,0	9,0	5,8	26,0	85,0	10,0	5	2,0	0,75	15				
12	12,0	11,0	6,8	30,0	93,0	12,0	5	2,0	0,80	15				
16	16,0	14,5	8,8	35,0	100,0	16,0	5	2,5	1,00	15				

Kühlung	
Toleranz	h9
Beschichtung	TiSiN- α



HA K207038



Stahl			Gehärteter Stahl				INOX (VA)	Guss	NE-Werkstoffe				Inconel	Abrasivmaterial	Titan	
< 850 N/mm	< 1100 N/mm	< 1400 N/mm	< 55 HRC	< 60 HRC	< 67 HRC	≤ 70 HRC			Alu	Kupfer	Mg	Kunststoffe				
														CFK / GFK	Grafit	100

K207038	D1	D3	L2	L3	L1	D2	z							
	mm \varnothing	mm \varnothing	mm	mm	mm	mm \varnothing	#	mm	mm max	°				
2	2,0	1,7	1,5	18,0	75,0	6,0	2	0,3	0,15	15				
3	3,0	2,7	1,5	20,0	75,0	6,0	2	0,3	0,20	15				
4	4,0	3,6	2,5	24,0	83,0	6,0	2	0,5	0,25	15				
5	5,0	4,6	3,5	28,0	100,0	6,0	4	0,5	0,35	15				
6	6,0	5,2	3,5	28,0	100,0	6,0	4	1,0	0,40	15				
8	8,0	7,0	4,8	40,0	100,0	8,0	5	1,5	0,50	15				
10	10,0	9,0	5,8	48,0	100,0	10,0	5	2,0	0,75	15				
12	12,0	11,0	6,8	56,0	119,0	12,0	5	2,0	0,80	15				
16	16,0	14,5	8,8	65,0	150,0	16,0	5	2,5	1,00	15				

ALLGEMEINE VERKAUFSBEDINGUNGEN

§ 1 Geltungsbereich

1. Die Verkaufsbedingungen gelten für alle Geschäftsbeziehungen zwischen der Fa. Hofmann & Vratny OHG (im Folgenden: „Hofmann & Vratny“) einerseits und deren Kunden (im Folgenden: „Besteller“) andererseits.

2. Die Verkaufsbedingungen gelten nur gegenüber Unternehmern, §§ 14, 310 Abs. 1 BGB, juristischen Personen des öffentlichen Rechts oder wenn der Besteller ein öffentlich-rechtliches Sondervermögen ist.

3. Die Verkaufsbedingungen gelten insbesondere für Verträge über den Verkauf und/oder die Lieferung beweglicher Sachen („Ware“), ohne Rücksicht darauf, ob Hofmann & Vratny die Ware selbst herstellt oder bei Zulieferern einkauft (§§ 433, 651 BGB). Sofern nichts anderes vereinbart ist, gelten die Allgemeinen Verkaufsbedingungen in der zum Zeitpunkt der Bestellung des Bestellers gültigen bzw. jedenfalls in der ihm zuletzt in Textform mitgeteilten Fassung als Rahmenvereinbarung auch für gleichartige künftige Verträge, ohne dass Hofmann & Vratny in jedem Einzelfall wieder auf sie hinweisen müsste.

4. Die Verkaufsbedingungen gelten ausschließlich. Entgegenstehende oder von den Verkaufsbedingungen von Hofmann & Vratny abweichende Bedingungen des Bestellers werden nicht anerkannt. Die Verkaufsbedingungen gelten auch dann, wenn Hofmann & Vratny in Kenntnis entgegenstehender oder von diesen vorliegenden Verkaufsbedingungen abweichender Bedingungen des Bestellers die Lieferung vorbehaltlos ausführen.

5. Sind im Einzelfall individuelle Vereinbarungen mit dem Besteller getroffen, haben diese Vorrang vor den Verkaufsbedingungen. Der Inhalt der individuellen Vereinbarung kann nur durch einen Vertrag in Schriftform oder durch schriftliche Bestätigung seitens Hofmann & Vratny nachgewiesen werden.

6. Rechtserhebliche Erklärungen und Anzeigen, die nach Vertragsschluss vom Besteller gegenüber Hofmann & Vratny abzugeben sind (z. B. Fristsetzungen, Mängelanzeigen, Erklärungen von Rücktritt oder Minderung etc.), bedürfen zu ihrer Wirksamkeit der Schriftform.

7. Soweit auf gesetzliche Vorschriften verwiesen wird, hat dies lediglich klarstellende Bedeutung. Auch ohne einen expliziten Verweis gelten die gesetzlichen Vorschriften, soweit sie in den Verkaufsbedingungen nicht unmittelbar abgeändert oder ausgeschlossen werden.

§ 2 Angebot und Annahme

1. Angebote von Hofmann & Vratny sind freibleibend und unverbindlich. Dies gilt auch, wenn Abbildungen, Zeichnungen, technische Dokumentationen, Kalkulationen, sonstige Unterlagen oder Produktbeschreibungen („Dokumente“) dem Besteller überlassen wurden, gleich in welcher Form.

2. Die Bestellung der Ware durch den Besteller stellt ein verbindliches Angebot dar. Hofmann & Vratny ist berechtigt, das Angebot innerhalb von 2 Wochen nach Zugang des Angebots anzunehmen, sofern sich aus der Bestellung nichts anderes ergibt.

3. Ein Angebot wird durch Hofmann & Vratny entweder schriftlich (z. B. durch eine Auftragsbestätigung) oder durch eine Auslieferung der Ware an den Besteller angenommen.

4. An Dokumenten behält Hofmann & Vratny Eigentums- und Urheberrechte vor. Dokumente, die als vertraulich bezeichnet sind, bedürfen vor ihrer Weitergabe an Dritte der ausdrücklichen schriftlichen Zustimmung durch Hofmann & Vratny.

§ 3 Lieferfrist und Lieferverzug

1. Die Lieferzeit wird individuell vereinbart bzw. von Hofmann & Vratny bei Annahme der Bestellung bzw. in der Auftragsbestätigung angegeben.

2. Die Einhaltung der Lieferverpflichtung setzt die rechtzeitige und ordnungsgemäße Erfüllung der Verpflichtungen des Bestellers, insbesondere die Beibringung der vom Besteller zu beschaffenden Unterlagen, Genehmigungen und Freigaben und den Eingang einer gegebenenfalls vereinbarten Anzahlung voraus. Kommt es insoweit zu Verzögerungen, so verlängert sich die Lieferzeit angemessen.

3. Sofern verbindliche Lieferfristen aus Gründen, die Hofmann & Vratny nicht zu vertreten hat, nicht eingehalten werden können (Nichtverfügbarkeit der Leistung), wird der Besteller hierüber unverzüglich informiert und gleichzeitig wird die voraussichtliche neue Lieferfrist mitgeteilt. Ist die Leistung auch innerhalb der neuen Lieferfrist nicht verfügbar, ist Hofmann & Vratny berechtigt, ganz oder teilweise vom Vertrag zurückzutreten. Eine bereits erbrachte Gegenleistung des Bestellers wird unverzüglich erstattet. Als Fall der Nichtverfügbarkeit der Leistung in diesem Sinne gilt insbesondere die nicht rechtzeitige Selbstbelieferung durch einen Zulieferer von Hofmann & Vratny, weder Hofmann & Vratny noch deren Zulieferer ein Verschulden trifft oder Hofmann & Vratny im Einzelfall zur Beschaffung nicht verpflichtet ist.

4. Ist die Nichteinhaltung der Lieferzeit auf höhere Gewalt, auf Arbeitskämpfe oder sonstige Ereignisse zurückzuführen, die außerhalb unseres Einschlussbereiches liegen, verlängert sich die Lieferzeit angemessen. Dies gilt auch dann, wenn die Umstände bei Unterlieferanten eintreten und nachweislich auf die Einhaltung der Lieferzeit von Einfluss waren. Hofmann & Vratny wird den Besteller über derartige Umstände unverzüglich informieren. Diese Ereignisse sind von Hofmann & Vratny auch dann nicht zu vertreten, wenn sie während eines bereits vorliegenden Verzuges auftreten. In diesem Fall ist der Verzug während des Ereignisses gehemmt.

5. Der Eintritt des Lieferverzuges bestimmt sich nach den gesetzlichen Vorschriften, in jedem Fall ist aber eine Mahnung durch den Besteller erforderlich.

6. Ist eine Lieferung auf Abruf vereinbart, kann Hofmann & Vratny die Kaufsache spätestens nach 12 Monaten seit Vertragsschluss („Abruffrist“) liefern und in Rechnung stellen, auch wenn der Abruf vom Besteller bis dahin noch nicht erfolgt ist. Nach Ablauf der Abruffrist kann Hofmann & Vratny seine Versandbereitschaft gegenüber dem Besteller anzeigen und ihn mit angemessener Frist zum Abruf auffordern. Ruft der Besteller die Ware nicht innerhalb der gesetzten Frist ab, kann Hofmann & Vratny zusätzlich eine pauschalierte Entschädigung für die Lagerkosten verlangen („Lagerpauschale“). Die Lagerpauschale beträgt für jede vollendete Woche 0,5 % des Nettowerts der Kaufsache. Dem Besteller bleibt der Nachweis vorbehalten, dass Hofmann & Vratny kein oder nur ein wesentlich geringerer Schaden als die Lagerpauschale entstanden ist. Erfolgt der Abruf nicht innerhalb der von Hofmann & Vratny gesetzten Frist, kann Hofmann & Vratny auch anderweitig über die Ware verfügen. Die gesetzlichen Vorschriften zum Rücktritt bleiben unberührt.

§ 4 Lieferung und Annahmeverzug

1. Soweit nichts anderes vereinbart ist, erfolgt die Lieferung ab Lager, wo auch der Erfüllungsort für die Lieferung und eine etwaige Nacherfüllung ist. Soweit nichts anderes vereinbart ist, wird die Ware auf Verlangen und Kosten des Bestellers an einen anderen Bestimmungsort versandt (Versandungskauf). Soweit nicht etwas anderes vereinbart ist, ist Hofmann & Vratny berechtigt, die Art der Versendung (insbesondere Transportunternehmen, Versandweg, Verpackung) selbst zu bestimmen.

2. Teillieferungen sind zulässig, soweit sie dem Besteller zumutbar sind.

3. Lieferungen sind, soweit dem Besteller zumutbar, von ihm auch dann entgegenzunehmen, wenn sie unwesentliche Mängel aufweisen.

4. Die Gefahr des zufälligen Untergangs und der zufälligen Verschlechterung der Ware geht spätestens mit der Übergabe auf den Besteller über. Beim Versandungskauf geht die Gefahr des zufälligen Übergangs und der zufälligen

Verschlechterung der Ware sowie die Verzögerungsgefahr bereits mit Auslieferung der Ware an den Spediteur, den Frachtführer oder die sonst zur Ausführung der Versendung bestimmten Person über.

Der Übergabe steht es gleich, wenn der Besteller in Annahmeverzug ist.

5. Kommt der Besteller in Annahmeverzug, unterlässt er eine Mitwirkungshandlung oder verzögert sich die Lieferung aus anderen, vom Besteller zu vertretenden Gründen, so ist Hofmann & Vratny berechtigt, Ersatz des hieraus entstehenden Schadens einschließlich Mehraufwendungen (z. B. Lagerkosten) zu verlangen.

§ 5 Zahlungsbedingungen

1. Sofern im Einzelfall nichts anderes vereinbart ist, gelten die jeweils zum Zeitpunkt des Vertragsschlusses aktuellen Preise von Hofmann & Vratny zuzüglich der jeweils gültigen Mehrwertsteuer. Die in den Katalogen von Hofmann & Vratny angegebenen Preise sind unverbindlich, Preisänderungen und Irrtümer bleiben vorbehalten.

2. Soweit nicht etwas anderes vereinbart ist, trägt der Besteller beim Versendungskauf die Kosten für die Verpackung und den Transport ab Lager und die Kosten einer gegebenenfalls vom Besteller gewünschten Transportversicherung. Etwaige Zölle, Gebühren, Steuern und sonstige öffentliche Abgaben trägt ebenfalls der Besteller, sofern nicht etwas anderes vereinbart ist. Transport- und sonstige Verpackungen nach der Verpackungsordnung gehen in das Eigentum des Bestellers über und werden von Hofmann & Vratny nicht zurückgenommen. Ausgenommen hiervon sind Paletten.

3. Sofern sich aus der Auftragsbestätigung nichts anderes ergibt, ist der Kaufpreis zuzüglich jeweils gültiger Mehrwertsteuer ohne jeden Abzug innerhalb von 14 Tagen ab Rechnungstellung und Lieferung bzw. Abnahme der Ware fällig und zu zahlen. Hofmann & Vratny ist jedoch, auch im Rahmen einer laufenden Geschäftsbeziehung, jederzeit berechtigt, eine Lieferung ganz oder teilweise nur gegen Vorkasse durchzuführen. Ein entsprechender Vorbehalt wird spätestens mit der Auftragsbestätigung erklärt. Mit Ablauf der vorstehenden Zahlungsfrist kommt der Besteller in Verzug. Der Kaufpreis ist während des Verzugs zum jeweils geltenden gesetzlichen Verzugszinssatz zu verzinsen. Die Geltendmachung eines weitergehenden Verzugsschadens wird vorbehalten.

4. Dem Besteller stehen Aufrechnungs- und Zurückbehaltungsrechte nur insoweit zu als sein Anspruch rechtskräftig festgestellt oder unbestritten ist. Die Rechte des Bestellers wegen Mängeln der Kaufsache (vgl. § 7) bleiben unberührt.

5. Wird nach Abschluss des Vertrages erkennbar, dass der Anspruch von Hofmann & Vratny auf den Kaufpreis durch mangelnde Leistungsfähigkeit des Bestellers gefährdet wird, ist Hofmann & Vratny nach den gesetzlichen Vorschriften zur Leistungsverweigerung und, gegebenenfalls nach Fristsetzung, zum Rücktritt vom Vertrag berechtigt. Bei Verträgen über die Herstellung unvertretbarer Sachen (z. B. Einzelanfertigungen), kann Hofmann & Vratny den Rücktritt sofort erklären, die gesetzlichen Regelungen über die Entbehrlichkeit der Fristsetzung bleiben unberührt.

§ 6 Eigentumsvorbehalt

1. Bis zur vollständigen Zahlung aller gegenwärtigen und künftigen Forderungen aus den Geschäftsverbindungen zwischen Hofmann & Vratny mit dem Besteller behält sich Hofmann & Vratny das Eigentum an der Ware vor. Bei vertragswidrigem Verhalten des Bestellers, insbesondere bei Zahlungsverzug, ist Hofmann & Vratny berechtigt, nach den gesetzlichen Vorschriften vom Vertrag zurückzutreten und die Ware heraus zu verlangen.

2. Die unter Eigentumsvorbehalt stehende Ware darf vor vollständiger Bezahlung durch den Besteller weder verpfändet noch zur Sicherheit übereignet werden. Der Besteller hat Hofmann & Vratny unverzüglich schriftlich zu benachrichtigen, wenn ein Antrag auf Eröffnung eines Insolvenzverfahrens gestellt wird oder soweit Zugriffe Dritter (z. B. Pfändungen) auf die Hofmann & Vratny gehörende Ware erfolgen.

3. Bei vertragswidrigem Verhalten des Bestellers, insbesondere bei Nichtzahlung des fälligen Kaufpreises, ist Hofmann & Vratny berechtigt, nach den gesetzlichen Vorschriften vom Vertrag zurückzutreten und die Ware aufgrund des Eigentumsvorbehalts und des Rücktritts heraus zu verlangen.

4. Der Besteller ist bis auf Widerruf befugt, die unter Eigentumsvorbehalt stehende Ware im ordnungsgemäßen Geschäftsgang weiter zu veräußern und/oder zu verarbeiten. In diesem Fall gelten ergänzend die nachfolgenden Bestimmungen.

a) Der Eigentumsvorbehalt erstreckt sich auf die durch Verarbeitung, Vermischung oder Verbindung der Ware entstehenden Erzeugnisse zu deren vollem Wert, wobei Hofmann & Vratny als Hersteller gilt. Bleibt bei einer Verarbeitung, Vermischung oder Verbindung mit Waren Dritter deren Eigentumsrecht bestehen, so erwirbt Hofmann & Vratny Miteigentum im Verhältnis der Rechnungswerte der verarbeiteten, vermischten oder verbundenen Waren. Im Übrigen gilt für das Entstehen der Erzeugnisse das Gleiche wie für die unter Eigentumsvorbehalt gelieferte Ware.

b) Die aus dem Weiterverkauf der Ware oder des Erzeugnisses entstehenden Forderungen gegen Dritte tritt der Besteller schon jetzt insgesamt bzw. in Höhe des etwaigen Miteigentumsanteils von Hofmann & Vratny gemäß vorstehendem Absatz zur Sicherheit an Hofmann & Vratny ab. Hofmann & Vratny nimmt die Abtretung an. Die in Absatz 2 genannten Pflichten des Bestellers gelten auch in Ansehung der abgetretenen Forderungen.

c) Zur Einziehung der Forderung bleibt der Besteller neben Hofmann & Vratny ermächtigt. Hofmann & Vratny verpflichtet sich, die Forderung nicht einzuziehen, solange der Besteller seinen Zahlungsverpflichtungen gegenüber Hofmann & Vratny nachkommt, kein Mangel seiner Leistungsfähigkeit vorliegt und Hofmann & Vratny den Eigentumsvorbehalt nicht durch Ausübung eines Rechtes gemäß Absatz 3 geltend macht. Ist dies aber der Fall, kann Hofmann & Vratny verlangen, dass der Besteller Hofmann & Vratny die abgetretenen Forderungen und Schuldner bekannt gibt, alle zum Einzug erforderlichen Angaben macht, die dazugehörigen Unterlagen aushändigt und den Schuldner (Dritten) die Abtretung mitteilt. Außerdem ist Hofmann & Vratny in diesem Fall berechtigt, die Befugnis des Bestellers zur weiteren Veräußerung und Verarbeitung der unter Eigentumsvorbehalt stehenden Ware zu widerrufen.

5. Hofmann & Vratny wird die Hofmann & Vratny zustehenden Sicherheiten auf Verlangen des Bestellers insoweit freigeben, als der realisierbare Wert der Sicherheiten die zu sichernden Forderungen um mehr als 10 % übersteigt, die Auswahl der frei zu gebenden Sicherheiten bleibt Hofmann & Vratny vorbehalten.

§ 7 Mängelhaftung und Mängelansprüche

1. Für die Rechte des Bestellers bei Sach- und Rechtsmängeln gelten die gesetzlichen Vorschriften, soweit nachfolgend nichts anderes bestimmt ist.

2. Die Mängelansprüche des Bestellers setzen voraus, dass dieser seinen gesetzlichen Untersuchungs- und Rügepflichten (§§ 377, 381 HGB) nachgekommen ist. Zeigt sich bei der Untersuchung oder später ein Mangel, ist Hofmann & Vratny hier von unverzüglich schriftlich Anzeige zu machen. Als unverzüglich gilt die Anzeige, wenn sie innerhalb von 2 Wochen erfolgt, wobei zur Fristwahrung die rechtzeitige Absendung der Anzeige genügt. Unabhängig von dieser Untersuchungs- und Rügepflicht hat der Besteller offensichtliche Mängel innerhalb von 2 Wochen ab Lieferung schriftlich anzuseigen, wobei auch hier zur Fristwahrung die rechtzeitige Absendung der Anzeige genügt. Versäumt der Besteller die ordnungsgemäße Untersuchung und/oder Mängelanzeige, ist eine Haftung von Hofmann & Vratny für den nicht angezeigten Mangel ausgeschlossen.

3. Ist die Ware mangelhaft, kann Hofmann & Vratny zunächst wählen, ob Nacherfüllung durch Beseitigung des Mangels (Nachbesserung) oder durch Lieferung einer mangelfreien Sache (Ersatzlieferung) geleistet wird. Das Recht, die Nacherfüllung unter den gesetzlichen Voraussetzungen zu verweigern, bleibt unberührt. Hofmann & Vratny ist dazu berechtigt, die geschuldete Nacherfüllung davon abhängig zu machen, dass der Besteller den fälligen Kaufpreis bezahlt. Der Besteller ist jedoch berechtigt, einen im Verhältnis zum Mangel angemessenen Teil des Kaufpreises zurückzubehalten. Der Besteller hat Hofmann & Vratny die

zur geschuldeten Nacherfüllung erforderliche Zeit und Gelegenheit zu geben, insbesondere die beanstandete Ware zu Prüfungszwecken zu übergeben. Im Falle der Ersatzlieferung hat der Besteller Hofmann & Vratny die mangelhafte Ware nach den gesetzlichen Vorschriften zurückzugeben. Die Nacherfüllung beinhaltet weder den Ausbau der mangelhaften Ware noch den erneuten Einbau, wenn Hofmann & Vratny ursprünglich nicht zum Einbau verpflichtet war.

4. Die zum Zweck der Prüfung und Nacherfüllung erforderlichen Aufwendungen, insbesondere Transport-, Wege-, Arbeits- und Materialkosten trägt Hofmann & Vratny, wenn tatsächlich ein Mangel vorliegt. Stellt sich jedoch ein Mangelbeseitigungsverlangen des Bestellers als unberechtigt heraus, kann Hofmann & Vratny die hieraus entstandenen Kosten vom Besteller ersetzt verlangen.

5. Verursacht die Nachbesserung unverhältnismäßigen Aufwand, ist der Anspruch auf Mangelbeseitigung ausgeschlossen.

6. Ansprüche des Bestellers auf Schadenersatz bzw. Ersatz vergeblicher Aufwendungen bestehen nur nach Maßgabe des § 9 und sind im Übrigen ausgeschlossen.

7. Die Verjährungsfrist für Mängelansprüche beträgt 1 Jahr gerechnet ab Gefahrtübergang. Dies gilt nicht, soweit nach § 438 Abs. 3 BGB (Arglist) längere Fristen vorgeschrieben sind.

§ 8 Sonstige Haftung

1. Soweit sich aus diesen Verkaufsbedingungen einschließlich der nachfolgenden Bestimmungen nichts anderes ergibt, haftet Hofmann & Vratny bei einer Verletzung von vertraglichen und außervertraglichen Pflichten nach den gesetzlichen Vorschriften.

2. Auf Schadenersatz haftet Hofmann & Vratny, gleich aus welchem Rechtsgrund und gleich ob bekannt oder unbekannt, bei Vorsatz und grober Fahrlässigkeit. Bei einfacher Fahrlässigkeit haftet Hofmann & Vratny nur für Schäden aus der Verletzung des Lebens, des Körpers oder der Gesundheit oder für Schäden aus der nicht unerheblichen Verletzung einer wesentlichen Vertragspflicht (also einer Verpflich-

tung, deren Erfüllung die ordnungsgemäße Durchführung des Vertrags überhaupt erst ermöglicht und auf deren Einhaltung der Vertragspartner regelmäßig vertraut und vertrauen darf);
in diesem Fall ist die Haftung von Hofmann & Vratny jedoch auf den Ersatz des vorhersehbaren, typischer Weise eintretenden Schadens begrenzt.

3. Die sich aus dem vorstehenden Absatz ergebende Haftungsbeschränkung gilt nicht, soweit Hofmann & Vratny einen Mangel arglistig verschwiegen oder eine Garantie für die Beschaffenheit der Ware/Kaufsache übernommen hat und für Ansprüche des Bestellers nach dem Produkthaftungsgesetz.

4. Wegen einer Pflichtverletzung, die nicht in einem Mangel besteht, kann der Besteller nur zurücktreten oder kündigen, wenn Hofmann & Vratny die Pflichtverletzung zu vertreten hat. Ein freies Kündigungsrecht des Bestellers besteht nicht. Im Übrigen gelten die gesetzlichen Voraussetzungen und Rechtsfolgen.

§ 9 Rechtswahl und Gerichtsstand

1. Für diese Verkaufsbedingungen und alle Rechtsbeziehungen zwischen Hofmann & Vratny und dem Besteller gilt das Recht der Bundesrepublik Deutschland unter Ausschluss der Bestimmungen über das internationale Privatrecht. Die Geltung des UN-Kaufrechts ist ausgeschlossen.

2. Für diese Verkaufsbedingungen und für alle sich aus dem Vertragsverhältnis mit dem Besteller unmittelbar oder mittelbar ergebenden Streitigkeiten ist ausschließlicher Gerichtsstand Aßling, wenn der Besteller Kaufmann ist. Hofmann & Vratny ist jedoch auch berechtigt, Klage am Erfüllungsort (vgl. § 4) oder am allgemeinen Gerichtsstand des Bestellers zu erheben.

Hofmann & Vratny OHG

Januar 2019

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