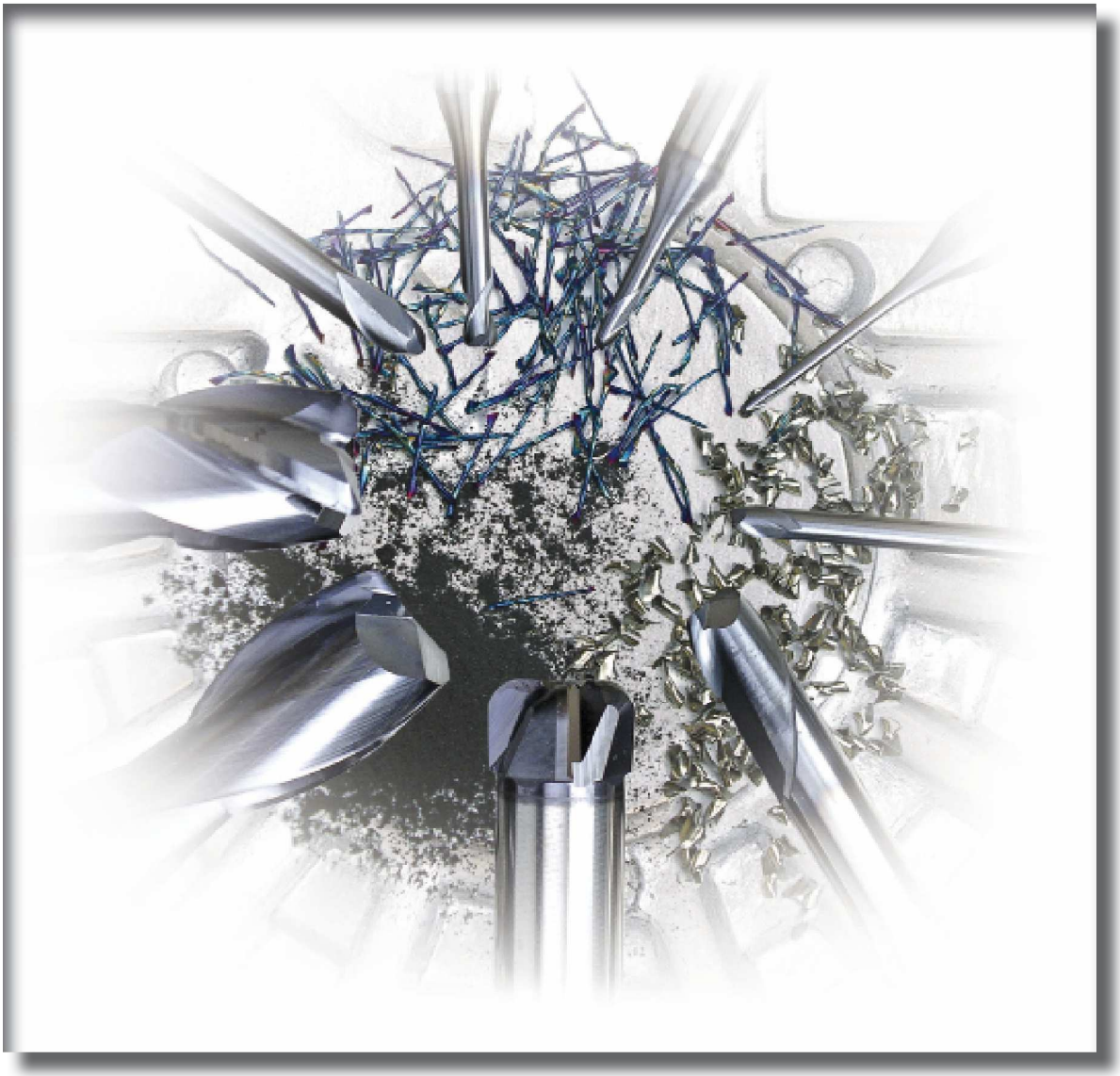
HAM PRÄZISION

# Precision Tools in Solid Carbide, Diamond, & Cermets for Drilling - Countersinking - Reaming

## Präzisionswerkzeuge in Vollhartmetall, Diamant & Cermets für Bohren - Senken - Reiben



www.hamprecision.com

Techincal Information

Technische Informationen

CERTIFIED VDA 6.4 DIN EN ISO 9001 QUALITY SYSTEM

ZERTIFIKAT

Die
DQS GmbH
Deutsche Gesellschaft zur Zertifizierung von Managementsystemen

bescheinigt hiermit, dass das Unternehmen

Hartmetallwerkzeugfabrik
Andreas Maier GmbH
Stegwiesen 2
88477 Schwendi-Hörenhausen

ein Qualitätsmanagementsystem eingeführt hat und anwendet.

Geltungsbereich:
Entwicklung, Herstellung und Vertrieb von Werkzeugsystemen, Standard- und Sonderwerkzeugen in Vollhartmetall-, Hartmetall-Composit, Cermet-, polykristallinen Diamant- und Keramikausführung, Dentalwerkzeuge, Zubehör und Dentalimplantaten

Durch ein Audit, dokumentiert in einem Bericht, wurde der Nachweis erbracht, dass das Managementsystem die Forderungen des folgenden Regelwerks erfüllt:

ISO 9001 : 2008

Zertifikat-Registrier-Nr. 002949 QM08
Zertifizierungsdatum 2009-11-03
Gültig bis 2012-11-02

Michael Drechsel, Geschäftsführer
Jan Böge, Geschäftsführer

August-Schanz-Straße 21, 60433 Frankfurt am Main

ZERTIFIKAT-ERGÄNZUNG

Die
DQS GmbH
Deutsche Gesellschaft zur Zertifizierung von Managementsystemen
zugelassen beim
VERBAND DER AUTOMOBILINDUSTRIE e.V. (VDA) / Z.-Nr. 08-QMC-6.4-006

bescheinigt hiermit, dass das Unternehmen

Hartmetallwerkzeugfabrik Andreas Maier GmbH
Stegwiesen 2
88477 Schwendi-Hörenhausen

für den Geltungsbereich
Entwicklung, Herstellung und Vertrieb von Werkzeugsystemen, Standard- und Sonderwerkzeugen in Vollhartmetall-, Cermet-, polykristallinen Diamant- und Keramikausführung
für die Automobilindustrie
ein
Qualitätsmanagementsystem nach VDA 6, Teil 4
2. Auflage 2005
- Produktionsmittel -
(mit Produktentwicklung)
anwendet.

Diese Zertifikatsergänzung ist nur gültig in Verbindung mit dem DQS-Zertifikat, Registrier-Nr. 002949 QM08. Sie bestätigt, dass das QM-System durch Erfüllung der in VDA 6, Teil 4 gegenüber ISO 9001:2008 erweiterten Forderungen zusätzlich qualifiziert ist. Der Nachweis wurde im Rahmen des Zertifizierungsaudits, Bericht-Nr. 002949, erbracht.

| | |
|---|---|
| Zertifizierungsaudit | 2009-09-23 – 2009-09-25 |
| Zertifizierungsentscheidung | 2009-11-03 |
| Dieses Zertifikatsergänzung ist gültig bis | 2012-11-02 |
| Registrier-Nr. | 002949 A4 |
| VDA QMC-Nr. | 0001270 |
| Frankfurt am Main | 2009-11-03 |

Ass. iur. M. Drechsel
Dipl.-Bw. J. Böge
GESCHÄFTSFÜHRER

DQS GmbH Frankfurt am Main, August-Schanz-Straße 21
(Tel. +49-69-95 42 70)

*HAM Develops and Manufactures Tools and Tooling-Systems for the Worldwide Market.*

*HAM – Your Competent Partner in the Precision Technology*

- *Solid Carbide, Cermets, Ceramic Tools for Drilling, Countersinking, Milling and Reaming*
- *Carbide, Diamond and CBN Tools with all modular Interfaces as Monoblock Tools, Indexable Inserts and Cartridge Tools (adjustable rough and precisely) for Drilling and Countersinking, for Milling and for Pre- and Precise Machining*
- *Project Planning and Project Engineering*
- *Worldwide TCM-partner for Tool Management Systems in Automotive and Aerospace Industry and their Suppliers*
- *Solid Carbide Drilling and Routing Tools for PCB Industry*

*HAM is certified acc. to DIN EN ISO 9001, VDA 6.4. and DIN EN ISO 13485*

CERTIFIED
VDA 6.4
DIN EN ISO 9001
QUALITY SYSTEM

HAM Entwickelt und Produziert Werkzeuge und Werkzeug-Systeme für den Weltweiten Markt.

HAM – Ihr kompetenter Partner in der Präzisionswerkzeug-Technologie

- Vollhartmetall, Cermets, Keramik-Werkzeuge zum Bohren, Senken, Fräsen und Reiben
- Hartmetall, Diamant- und CBN-Werkzeuge mit allen modularen Schnittstellen als Monoblockwerkzeuge, Wendeplatten- und Kassettenwerkzeuge (grob und fein einstellbar) zum Bohren und Senken, zum Fräsen und für die Vor und Feinstbearbeitung
- Projektplanung und Projekt-Engineering
- Weltweiter TCM-Partner für Tool Management Systeme in der Automobil und Flugzeug-industrie und ihren Zulieferbetrieben
- Vollhartmetall-Bohr und Fräswerkzeuge für die Leiterplattenindustrie

HAM ist zertifiziert nach DIN EN ISO 9001, VDA 6.4. und DIN EN ISO 13485

# Explanation of Pictograms
*Piktogramm-Übersicht*

## Cutting Material
*Schneidstoff*

- VHM — Solid Carbide Ultra Micro Grain *Feinstkorn Vollhartmetall*
- HM — Carbide Edge *Hartmetall-Schneide*
- Cermet — Cermet Edge *Cermet-Schneide*
- PKD — PCD Cutting Edge *PKD-Schneide*

## Type
*Typ*

- Typ N — Normal *Normal*
- Typ W — For Soft Materials *Für Weiche Werkstoffe*
- Typ H — For Hard Materials *Für Harte Werkstoffe*
- Typ Werk — HAM Standard *Werksnorm*

## Number of Flutes
*Zähnezahl*

- Z 2 — 2 Flutes *2 Flöten*
- Z 3 — 3 Flutes *3 Flöten*
- Z 4 — 4 Flutes *4 Flöten*
- Z 3–4 — 3-4 Flutes *3-4 Flöten*
- Z 4–8 — 4-8 Flutes *4-8 Flöten*

## Standard
*Norm*

- Werk Norm — HAM Standard *Werksnorm*
- DIN 6539
- DIN 6539E
- DIN 6537

## Cutting Length
*Schneidlänge*

- 3 x D — 3 x Diameter *3 x Durchmesser*
- 5 x D — 5 x Diameter *5 x Durchmesser*
- 7 x D — 7 x Diameter *7 x Durchmesser*
- 8 x D — 8 x Diameter *8 x Durchmesser*
- 12 x D — 12 x Diameter *12 x Durchmesser*
- 15 x D — 15 x Diameter *15 x Durchmesser*
- 20 x D — 20 x Diameter *20 x Durchmesser*
- 25 x D — 25 x Diameter *25 x Durchmesser*
- 30 x D — 30 x Diameter *30 x Durchmesser*
- 40 x D — 40 x Diameter *40 x Durchmesser*

## *Shank*
*Shaft*

- HA — Cylindrical Shank acc. DIN *Zylinderschaft nach DIN*
- HE — Clamping Fixture Weldon *Spannfläche Weldnon*
- HE — Clamping Fixture Whistle Notch *Spannfläche Whistle Notch*
- HA — Cylindrical Shank *Zylinderschaft*
- HA IC — Shank HA with IC *Shaft HA with IC*
- HB IC — Shank HB with IC *Shaft HB with IC*
- HE IC — Shank HE with IC *Shaft HE with IC*
- SHRINK FIT — Shrink Fit *Für Schrumpffutter Geeignet*

## Helix Angle
*Spiralwinkel*

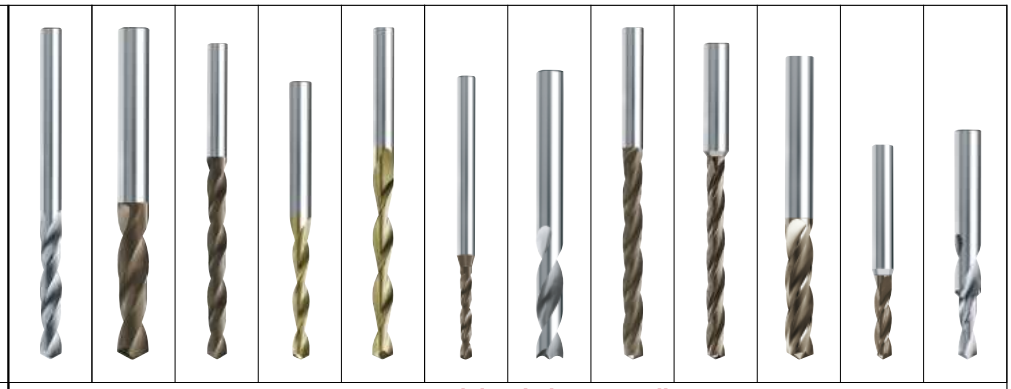
- 0° Rechts — 0° Helix *0° Rechtsspirale*
- 15° rechts — 15° Right Hand Helix *15° Rechtsspirale*
- 30° rechts — 30° Right Hand Helix *30° Rechtsspirale*
- 45° rechts — 45° Right Hand Helix *45° Rechtsspirale*
- 30° links — 20° Left Hand Helix *30° Linksspirale*
- 6°-8° IL — 6-8° Left Hand Helix *6-8° Linksspirale*

## Point Angle
*Spitzenwinkel*

- 120°
- 130°
- 137°
- 140°

## Application
*Anwendung*

- Form B — Web Thinning *Ausspitzung*
- Interior Coolant *Innenkühlung*
- h6 — Tolernance *Toleranz*
- H 7 — Tolernance *Toleranz*
- HPC — High Performance Cutting
- Step Drill *Stufenbohrer*
- 45° — Corner Chamfer *Eckenfase*
- MMS — Mist Coolant External *Spraykühlung*
- Max. — Thru Coolant *Kühlmittel Durch*
- None — No Coolant *Keine Kühlmittel*

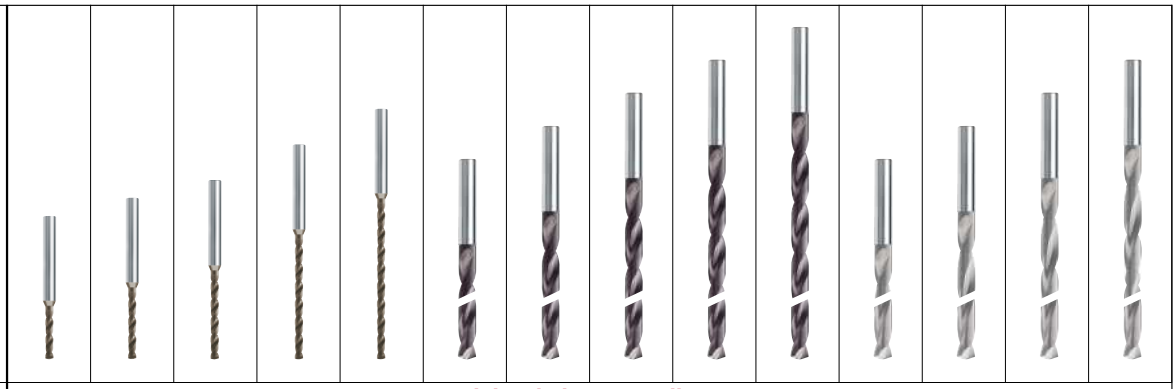


| Drill Description ▶ | Solid Carbide Twist Drill | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIN ▶ | HAM | 6539 | 338 | HAM | 338 | HAM | 6539 | 338 | HAM | HAM | HAM | HAM |
| Drill Length ▶ | — | — | — | — | — | — | — | — | — | — | — | — |
| **Part Number** | 30-1000 | 30-1081 | 30-1121 | 30-1161 | 30-1201 | 30-1301 | 30-1320 | 30-1361 | 30-1401 | 30-1441 | 30-1481 | 30-1520 |
| **HAM Type** | 300 | 304 | 310 | 313 | 314 | — | 342 | 322 | 323 | 326 | 385 | 328 |
| **Page Number** | 10 | 11 | 12 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| **Drill Type** | N | N | N | W | W | N | N | N | N | N | N | N |
| **Material** | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide |
| **Flutes** | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 2 |
| **Coating** | — | TA | TA | TA-AL | TA-AL | TA | — | TA | TA | TA | TA | — |
| **Ø in mm** | 0.5 – 3.0 | 0.5 – 20.0 | 1.0 – 16.0 | 0.5 – 3.0 | 1.0 – 10.0 | 0.1 – 3.0 | 3.0 – 16.0 | 3.0 – 16.0 | 4.0 – 16.0 | 3.0 – 20.0 | 0.5 – 3.175 | 2.5 – 15.1 |
| **Ø in mm** | .02 - .12 | .02 - .79 | .04 - .63 | .02 - 12 | .04 - .39 | .004 - .12 | .12 - .63 | .12 - .63 | .16 - .63 | .12 - .79 | .02 - .13 | .10 - .59 |
| **Internal Coolant** | — | — | — | — | — | — | — | — | IC | — | — | — |
| **Direction of Cut** | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right |
| **Flute Style** | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral |
| techn. Ausführung ▶ | | | | | | | | | | | | |
| **Point Angle** | 120° | 120° | 120° | 130° | 130° | 130° | | 140° | 140° | 140° | 130° | 120° |
| | Form A | Form A | Form A | Form A | Form B | Form C | Kevlar | Werk | Werk | Werk | Werk | Form A |
| | | | | | | | | | | | | 90° |
| ▼ **Material Group** | | | | | | | | | | | | |
| **Alumunim** | ● | ○ | ○ | ● | ● | | ● | ● | ● | ● | ○ | ● |
| **Aluminum > 9% Si** | ○ | ○ | ○ | ● | ● | | ○ | ● | ● | ● | ○ | ○ |
| **Steel < 23 HRC** | ○ | ● | ● | ○ | ○ | ● | | ● | ● | ● | ● | ● |
| **Steel < 38 HRC** | ○ | ● | ● | ○ | ○ | ● | | ● | ● | ● | ○ | ● |
| **Steel < 48 HRC** | ○ | ○ | ○ | | | ● | | ○ | ○ | ○ | | ○ |
| **Steel < 55 HRC** | | | | | | ○ | | | | | | |
| **Steel < 60 HRC** | | | | | | | | | | | | |
| **Steel < 66 HRC** | | | | | | | | | | | | |
| **SST < 23 HRC** | ○ | ○ | ○ | ○ | ○ | ● | | ○ | ○ | ○ | | ○ |
| **SST > 23 HRC** | ○ | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | | ○ |
| **Cast Iron** | ○ | ● | ● | ○ | ○ | ● | | ● | ● | ● | | ● |
| **Nodular, Ductile Iron** | ○ | ● | ● | | | ○ | | ● | ● | ● | ● | ○ |
| **Iconel,Hayes,Alloy** | | | | | | | | ○ | ○ | ○ | ○ | |
| **Titanium** | | | | ○ | ○ | ● | | ○ | ○ | ○ | | |
| **Copper,Non-Ferrous** | ● | ○ | ○ | ● | ● | | ● | ● | ● | ● | | ● |
| **Graphite,Composites** | | | | ○ | ○ | | ● | | | | | |
| **UNI** | | | | | | | | | | | | |

● very suitable ○ suitable

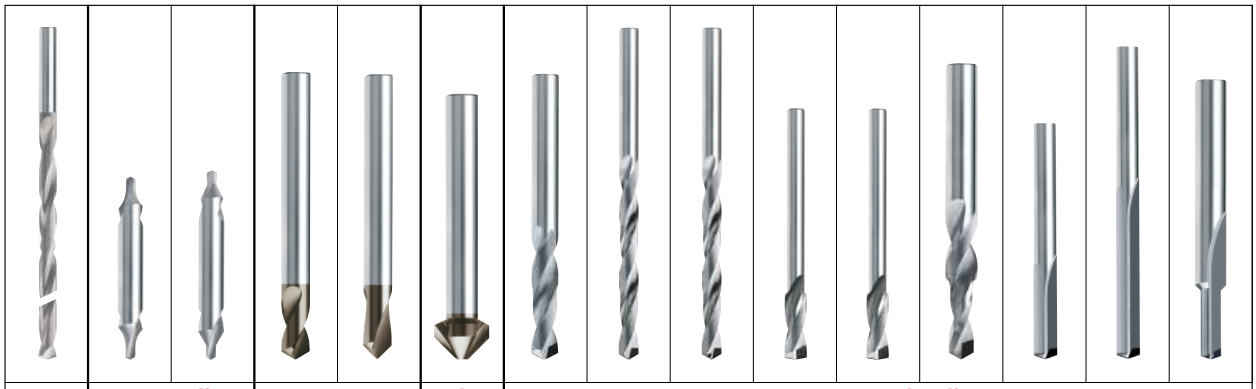
| HAM Superdrill | | | | | | HAM Nirodrill | | | HAM Multidrill | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6537 K | 6537 | 6537 K | 6537 | HAM | HAM | 6537 K | 6537 | HAM | HAM | HAM | HAM | HAM | HAM |
| 3 x D | 5 x D | 3 x D | 5 x D | 8 x D | 12 x D | 3 x D | 5 x D | 8 x D | 3 x D | 5 x D | 7 x D | 12 x D | — |
| 30-1621 | 30-1701 | 30-1741 | 30-1781 | 30-1821 | 30-1861 | 30-1891 | 30-1901 | 30-1941 | 30-1961 | 30-2001 | 30-2041 | 30-2081 | 30-2120 |
| 280 | 283 | 285 | 286 | 292 | 293 | — | 270 | 271 | 297 | 298 | 299 | 294 | 296 |
| 24 | 25 | 27 | 29 | 31 | 32 | 34 | 35 | 37 | 40 | 41 | 42 | 43 | 44 |
| HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM |
| Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| TA-C | TA-C | TA-C | TA-C | TA-C | TA-C | TA-CN | TA-CN | TA-CN | TA | TA | TA | TA | — |
| 2.8 – 20.0 | 3.0 – 16.0 | 3.0 – 22.0 | 3.0 – 20.0 | 3.0 – 20.0 | 3.0 – 12.0 | 2.8 – 16.0 | 3.0 – 16.0 | 3.0 – 16.0 | 4.0 – 20.0 | 6.8 – 20.0 | 4.0 – 20.0 | 4.0 – 16.0 | 3.3 – 18.9 |
| .11 - .79 | .12 - .63 | .12 - .87 | .12 - .79 | .12 - .79 | .12 - .47 | .11 - .63 | .12 - .63 | .12 - .63 | .16 - .79 | .27 - .79 | .16 - .79 | .16 - .63 | .13 - .74 |
| — | — | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC |
| Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right |
| Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | None | None | None | None | None |
| 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° | 140° |
| Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk |
| | | | | | | | | | | | | | 90° |
| | | | | | | | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● | ● | ● | ● |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| ● | ● | ● | ● | ● | ● | | | | | | | | |
| ● | ● | ● | ● | ● | ● | | | | | | | | |
| ● | ● | ● | ● | ● | ● | | | | | | | | |
| ● | ● | ● | ● | ● | ● | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | | | | | |
| ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ● | ● | ● | ● | ● |
| ○ | ○ | ● | ● | ● | ● | | | | ○ | ○ | ○ | ○ | ○ |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | | |
| ○ | ○ | ○ | ○ | ○ | ○ | ● | ● | ● | | | | | |
| | | | | | | ● | ● | ● | ● | ● | ● | ● | ● |
| | | | | | | ○ | ○ | ○ | | | | | |
| | | | | | | | | | | | | | |

● very suitable ○ suitable



| Drill Description ▶ | Solid Carbide Twist Drill | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIN ▶ | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM |
| Drill Depth ▶ | 5 x D | 8 x D | 12 x D | 15 x D | 20 x D | 15 x D | 20 x D | 25 x D | 30 x D | 40 x D | 15 x D | 20 x D | 25 x D | 30 x D |
| **Part Number** | 30-2181 | 30-2221 | 30-2261 | 30-2301 | 30-2341 | 30-2381 | 30-2421 | 30-2461 | 30-2501 | 30-2541 | 30-2580 | 30-2620 | 30-2660 | 30-2700 |
| HAM Type | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| **Page Number** | 47 | 48 | 49 | 50 | 51 | 52 | 52 | 53 | 53 | 54 | 54 | 55 | 55 | 56 |
| Drill Type | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM | HAM |
| Material | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | Carbide |
| Flutes | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Coating | TA | TA | TA | TA | TA | TA-C | TA-C | TA-C | TA-C | TA-C | — | — | — | — |
| Ø in mm | 1.0 – 3.0 | 1.0 – 3.0 | 1.0 – 3.0 | 1.0 – 3.0 | 1.0 – 3.0 | 3.0 – 14.0 | 3.0 – 12.0 | 3.0 – 10.0 | 3.0 – 8.0 | 4.0 – 5.0 | 3.0 – 14.0 | 3.0 – 12.0 | 3.0 – 10.0 | 3.0 – 7.0 |
| **Ø in in** | .04 - .12 | .04 - .12 | .04 - .12 | .04 - .12 | .04 - .12 | .12 - .55 | .12 - .47 | .12 - .39 | .12 - .31 | .16 - .20 | .12 - .55 | .12 - .47 | .12 - .39 | .12 - .28 |
| Internal Coolant | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC | IC |
| Direction of Cut | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right |
| Flute Style | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral |
| Techn. Application ▶ | | | | | | | | | | | | | | |
| Point Angle | 140° | 140° | 140° | 140° | 140° | 137° | 137° | 137° | 137° | 137° | 137° | 137° | 137° | 137° |
| | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | Werk | ä. Form A | ä. Form A | ä. Form A | ä. Form A |
| ▼ **Material Group** | | | | | | | | | | | | | | |
| Aluminum | | | | | | | | | | | ● | ● | ● | ● |
| Aluminum > 9% Si | | | | | | | | | | | ● | ● | ● | ● |
| Steel < 23 HRC | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| Steel < 38 HRC | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| Steel < 48 HRC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| Steel < 55 HRC | | | | | | | | | | | | | | |
| Steel < 60 HRC | | | | | | | | | | | | | | |
| Steel < 66 HRC | | | | | | | | | | | | | | |
| SST < 23 HRC | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| SST > 23 HRC | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| Cast Iron | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| Nodular, Ductile Iron | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| Inconel,Hayes,Alloy | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| Titanium | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| Copper,Non-Ferrous | | | | | | | | | | | ● | ● | ● | ● |
| Graphite,Composites | | | | | | | | | | | | | | |
| UNI | | | | | | | | | | | | | | |

● very suitable ○ suitable



| | Center Drill | | NC-Center | | Sinker | Diamond Drill | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HAM | 333 R | 333 A | HAM | HAM | 335 C | 6539 | 338 | 338 | HAM | HAM | HAM | HAM | HAM | HAM |
| 40 x D | — | — | — | — | — | — | — | — | — | — | — | 3 x D | 5 x D | — |
| 30-2740 | 30-2760 | 30-2800 | 30-2841 | 30-2881 | 30-2921 | 33-1000 | 33-1040 | 33-1080 | 33-1IC | 33-1160 | 33-IC0 | 33-1240 | 33-1280 | 33-1320 |
| — | 329 | 330 | 331 | 332 | 337 | 3304 | 3310 | 3311 | 3270 | 3380 | 3328 | 3297 | 3298 | 3296 |
| 56 | 58 | 58 | 59 | 59 | 60 | 62 | 63 | 64 | 64 | 66 | 67 | 67 | 68 | 68 |
| HAM | N | N | N | N | HAM | N | N | N | N | N | N | HAM | HAM | HAM |
| Carbide | Carbide | Carbide | Carbide | Carbide | Carbide | PCD | PCD | PCD | PCD | PCD | PCD | PCD | PCD | PCD |
| 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| — | — | — | TA | TA | TA | — | — | — | — | — | — | — | — | — |
| 4.0 – 5.0 | 0.5 – 6.3 | 0.5 – 6.3 | 5.0 – 20.0 | 5.0 – 20.0 | 6.3 – 31.0 | 3.0 – 20.0 | 3.0 – 20.0 | 8.0 – 20.0 | 2.5 – 6.35 | 0.5 – 3.175 | 3.3 – 13.2 | 4.0 – 12.0 | 4.0 – 12.0 | 4.2 – 13.2 |
| .16 - .20 | .02 - .25 | .02 - .25 | .20 - .79 | .20 - .79 | .25 - 1.22 | .12 - .79 | .12 - .79 | .31 - .79 | .10 - .25 | .02 - .13 | .13 - .52 | .16 - .47 | .16 - .47 | .17 - .52 |
| IC | — | — | — | — | — | — | — | IC | — | — | — | IC | IC | IC |
| Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right | Right |
| Spiral | Spiral | Spiral | Spiral | Spiral | None | Spiral | Spiral | Spiral | Spiral | Spiral | Spiral | None | None | None |
| 137° | 120° | 120° | 120° | 90° | 90° | 120° | 120° | 120° | 120° | 130° | 120° | 140° | 140° | 140° |
| ä. Form A | | | | | | Form A | Form A | Form A | Form A | | Form A | Werk | Werk | Werk |
| | | | | | | | | | | | 90° | | | 90° |
| | | | | | | | | | | | | | | |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | ● | ● | ● | ● | ● | | | | | | | | | |
| | ● | ● | ● | ● | ● | | | | | | | | | |
| | ● | ● | ○ | ○ | ● | | | | | | | | | |
| | | | | | ● | | | | | | | | | |
| | | | | | ● | | | | | | | | | |
| | | | | | ○ | | | | | | | | | |
| | ○ | ○ | ○ | ○ | ○ | | | | | | | | | |
| | ○ | ○ | ○ | ○ | ○ | | | | | | | | | |
| | ● | ● | ● | ● | ● | | | | | | | | | |
| | ● | ● | ● | ● | ● | | | | | | | | | |
| | ○ | ○ | ○ | ○ | ○ | | | | | | | | | |
| | ○ | ○ | ○ | ○ | ○ | | | | | | | | | |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | | | | ○ | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | | | | | | | | | | | | | |

● very suitable ○ suitable

# HAM 300

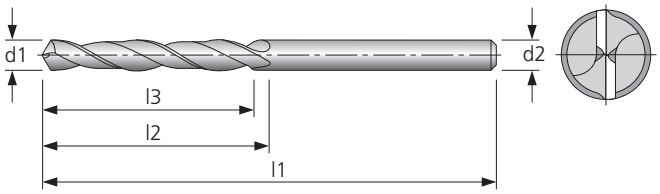
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | Werk Norm | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1000 | ● | ○ | ○ | ○ | ○ | | | | ○ | ○ | ○ | ○ | | | ● | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,5 - 0,9 | 0,95 - 1,5 | 1,55 - 3 |
|---|---|---|---|---|
| Alu | Vc [m/min] | 100 | 100 | 100 |
| | f [mm/U] | 0,03 | 0,05 | 0,09 |
| | vf [mm/min] | 1370 | 1230 | 1240 |
| | n [1/min] | 45500 | 24500 | 13800 |
| Alu > 9 % Si | Vc [m/min] | 80 | 80 | 80 |
| | f [mm/U] | 0,02 | 0,04 | 0,08 |
| | vf [mm/min] | 730 | 780 | 890 |
| | n [1/min] | 36400 | 19600 | 11100 |
| Stahl < 800 N/mm² | Vc [m/min] | 70 | 70 | 70 |
| | f [mm/U] | 0,02 | 0,03 | 0,06 |
| | vf [mm/min] | 640 | 510 | 580 |
| | n [1/min] | 31800 | 17100 | 9700 |
| Stahl < 1200 N/mm² | Vc [m/min] | 60 | 60 | 60 |
| | f [mm/U] | 0,01 | 0,02 | 0,05 |
| | vf [mm/min] | 270 | 290 | 420 |
| | n [1/min] | 27300 | 14700 | 8300 |
| Stahl < 1600 N/mm² | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,01 | 0,01 | 0,03 |
| | vf [mm/min] | 230 | 120 | 210 |
| | n [1/min] | 22700 | 12200 | 6900 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 |
| | vf [mm/min] | 180 | 200 | 170 |
| | n [1/min] | 18200 | 9800 | 5500 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,01 | 0,01 | 0,02 |
| | vf [mm/min] | 140 | 70 | 80 |
| | n [1/min] | 13600 | 7300 | 4200 |
| GG | Vc [m/min] | 80 | 80 | 80 |
| | f [mm/U] | 0,02 | 0,03 | 0,06 |
| | vf [mm/min] | 730 | 590 | 670 |
| | n [1/min] | 36400 | 19600 | 11100 |
| GGG | Vc [m/min] | 55 | 55 | 55 |
| | f [mm/U] | 0,01 | 0,02 | 0,05 |
| | vf [mm/min] | 360 | 390 | 560 |
| | n [1/min] | 36400 | 19600 | 11100 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 120 | 120 | 120 |
| | f [mm/U] | 0,02 | 0,03 | 0,04 |
| | vf [mm/min] | 1090 | 880 | 660 |
| | n [1/min] | 54600 | 29400 | 16600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 304

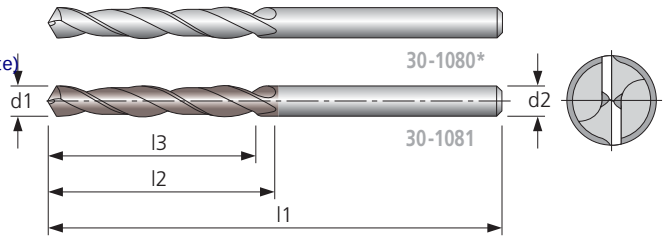
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | DIN 6539 | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1080* | ● | ○ | ○ | ○ | ○ | | | | ○ | ○ | ○ | ○ | | | ● | | | ● | | |
| 30-1081 | ○ | ○ | ● | ● | ○ | | | | ○ | ○ | ● | ● | | | ○ | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,5-0,9 | 0,95-1,5 | 1,6-3 | 3,1-3,3 | 3,4-3,7 | 3,8-4,2 | 4,3-4,7 | 4,8-5,3 | 5,4-6 | 6,1-6,7 | 6,8-7,5 | 7,6-8,5 | 8,6-9,5 | 10-10,5 | 11-11,5 | 12-13 | 14 | 15 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 |
| | f [mm/U] | 0,06 | 0,10 | 0,15 | 0,15 | 0,15 | 0,18 | 0,18 | 0,20 | 0,20 | 0,25 | 0,25 | 0,30 | 0,40 | 0,40 | 0,40 | 0,45 | 0,45 | 0,45 | 0,50 | 0,55 | 0,60 |
| | vf [mm/min] | 1200 | 2000 | 3000 | 3000 | 3000 | 3290 | 2930 | 2920 | 2520 | 2830 | 2550 | 2760 | 3240 | 2880 | 2600 | 2660 | 2340 | 2210 | 2300 | 2260 | 2220 |
| | n [1/min] | 20000 | 20000 | 20000 | 20000 | 20000 | 18300 | 16300 | 14600 | 12600 | 11300 | 10200 | 9200 | 8100 | 7200 | 6500 | 5900 | 5200 | 4900 | 4600 | 4100 | 3700 |
| Alu > 9 % Si | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,05 | 0,09 | 0,14 | 0,14 | 0,14 | 0,16 | 0,16 | 0,18 | 0,18 | 0,23 | 0,23 | 0,28 | 0,35 | 0,35 | 0,35 | 0,40 | 0,40 | 0,40 | 0,45 | 0,50 | 0,55 |
| | vf [mm/min] | 1000 | 1800 | 2800 | 2550 | 2200 | 2290 | 2030 | 2070 | 1780 | 2020 | 1840 | 2020 | 2240 | 1960 | 1790 | 1840 | 1640 | 1520 | 1620 | 1600 | 1600 |
| | n [1/min] | 20000 | 20000 | 20000 | 18200 | 15700 | 14300 | 12700 | 11500 | 9900 | 8800 | 8000 | 7200 | 6400 | 5600 | 5100 | 4600 | 4100 | 3800 | 3600 | 3200 | 2900 |
| Stahl < 800 N/ mm² | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,05 | 0,10 | 0,12 | 0,12 | 0,12 | 0,14 | 0,14 | 0,16 | 0,16 | 0,18 | 0,18 | 0,20 | 0,25 | 0,25 | 0,25 | 0,30 | 0,30 | 0,30 | 0,32 | 0,35 | 0,40 |
| | vf [mm/min] | 1000 | 2000 | 1380 | 1090 | 940 | 1010 | 900 | 910 | 780 | 790 | 720 | 720 | 800 | 700 | 650 | 690 | 600 | 570 | 580 | 560 | 560 |
| | n [1/min] | 20000 | 20000 | 11500 | 9100 | 7800 | 7200 | 6400 | 5700 | 4900 | 4400 | 4000 | 3600 | 3200 | 2800 | 2600 | 2300 | 2000 | 1900 | 1800 | 1600 | 1400 |
| Stahl < 1200 N/ mm² | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,03 | 0,06 | 0,07 | 0,07 | 0,07 | 0,09 | 0,09 | 0,12 | 0,12 | 0,14 | 0,14 | 0,16 | 0,18 | 0,18 | 0,18 | 0,20 | 0,20 | 0,20 | 0,25 | 0,32 | 0,35 |
| | vf [mm/min] | 600 | 1180 | 710 | 570 | 490 | 580 | 510 | 610 | 530 | 550 | 490 | 510 | 500 | 450 | 410 | 400 | 360 | 340 | 400 | 450 | 460 |
| | n [1/min] | 20000 | 19600 | 10200 | 8100 | 7000 | 6400 | 5700 | 5100 | 4400 | 3900 | 3500 | 3200 | 2800 | 2500 | 2300 | 2000 | 1800 | 1700 | 1600 | 1400 | 1300 |
| Stahl < 1600 N/ mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,02 | 0,05 | 0,05 | 0,05 | 0,05 | 0,07 | 0,07 | 0,09 | 0,09 | 0,12 | 0,12 | 0,14 | 0,15 | 0,15 | 0,15 | 0,17 | 0,17 | 0,17 | 0,20 | 0,25 | 0,3 |
| | vf [mm/min] | 400 | 740 | 380 | 310 | 260 | 340 | 290 | 340 | 300 | 350 | 320 | 340 | 320 | 290 | 260 | 260 | 240 | 220 | 240 | 240 | 240 |
| | n [1/min] | 20000 | 14700 | 7600 | 6100 | 5200 | 4800 | 4200 | 3800 | 3300 | 2900 | 2700 | 2400 | 2100 | 1900 | 1700 | 1500 | 1400 | 1300 | 1200 | 1100 | 1000 |
| INOX < 800 N/ mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,03 | 0,05 | 0,06 | 0,06 | 0,06 | 0,08 | 0,08 | 0,10 | 0,10 | 0,13 | 0,13 | 0,15 | 0,16 | 0,16 | 0,16 | 0,18 | 0,18 | 0,18 | 0,23 | 0,25 | 0,3 |
| | vf [mm/min] | 600 | 610 | 380 | 310 | 260 | 320 | 280 | 320 | 270 | 310 | 290 | 300 | 290 | 260 | 220 | 230 | 200 | 200 | 230 | 230 | 240 |
| | n [1/min] | 20000 | 12200 | 6400 | 5100 | 4400 | 4000 | 3500 | 3200 | 2700 | 2400 | 2200 | 2000 | 1800 | 1600 | 1400 | 1300 | 1100 | 1100 | 1000 | 900 | 800 |
| INOX > 800 N/ mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,02 | 0,03 | 0,04 | 0,04 | 0,04 | 0,06 | 0,06 | 0,08 | 0,08 | 0,10 | 0,10 | 0,13 | 0,14 | 0,14 | 0,14 | 0,16 | 0,16 | 0,16 | 0,20 | 0,22 | 0,25 |
| | vf [mm/min] | 340 | 290 | 200 | 160 | 140 | 190 | 170 | 200 | 180 | 200 | 180 | 210 | 200 | 170 | 150 | 160 | 140 | 130 | 160 | 130 | 140 |
| | n [1/min] | 17000 | 9800 | 5100 | 4000 | 3500 | 3200 | 2800 | 2500 | 2200 | 2000 | 1800 | 1600 | 1400 | 1200 | 1100 | 1000 | 900 | 800 | 800 | 700 | 600 |
| GG | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,05 | 0,07 | 0,10 | 0,10 | 0,10 | 0,12 | 0,12 | 0,15 | 0,15 | 0,17 | 0,17 | 0,18 | 0,23 | 0,23 | 0,23 | 0,28 | 0,28 | 0,28 | 0,30 | 0,35 | 0,37 |
| | vf [mm/min] | 1000 | 1400 | 1150 | 910 | 780 | 860 | 770 | 860 | 740 | 750 | 680 | 650 | 740 | 640 | 600 | 640 | 560 | 530 | 540 | 560 | 520 |
| | n [1/min] | 20000 | 20000 | 11500 | 9100 | 7800 | 7200 | 6400 | 5700 | 4900 | 4400 | 4000 | 3600 | 3200 | 2800 | 2600 | 2300 | 2000 | 1900 | 1800 | 1600 | 1400 |
| GGG | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,04 | 0,06 | 0,09 | 0,09 | 0,09 | 0,11 | 0,11 | 0,14 | 0,14 | 0,16 | 0,16 | 0,17 | 0,20 | 0,20 | 0,20 | 0,25 | 0,25 | 0,25 | 0,28 | 0,30 | 0,32 |
| | vf [mm/min] | 800 | 1030 | 800 | 640 | 550 | 620 | 550 | 630 | 530 | 540 | 500 | 480 | 500 | 440 | 400 | 450 | 400 | 380 | 390 | 380 | 390 |
| | n [1/min] | 20000 | 17100 | 8900 | 7100 | 6100 | 5600 | 5000 | 4500 | 3800 | 3400 | 3100 | 2800 | 2500 | 2200 | 2000 | 1800 | 1600 | 1500 | 1400 | 1200 | 1100 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,04 | 0,08 | 0,13 | 0,13 | 0,13 | 0,15 | 0,15 | 0,17 | 0,17 | 0,20 | 0,20 | 0,23 | 0,28 | 0,28 | 0,28 | 0,35 | 0,35 | 0,35 | 0,40 | 0,45 | 0,50 |
| | vf [mm/min] | 800 | 1600 | 2600 | 2370 | 2040 | 2150 | 1910 | 1960 | 1680 | 1760 | 1600 | 1660 | 1790 | 1570 | 1430 | 1610 | 1440 | 1330 | 1440 | 1440 | 1450 |
| | n [1/min] | 20000 | 20000 | 20000 | 18200 | 15700 | 14300 | 12700 | 11500 | 9900 | 8800 | 8000 | 7200 | 6400 | 5600 | 5100 | 4600 | 4100 | 3800 | 3600 | 3200 | 2900 |

** FUnbeschichtete Werkzeuge (30-1080): Vc 0,8 (ca.)*
** uncoated tools (30-1080): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 310

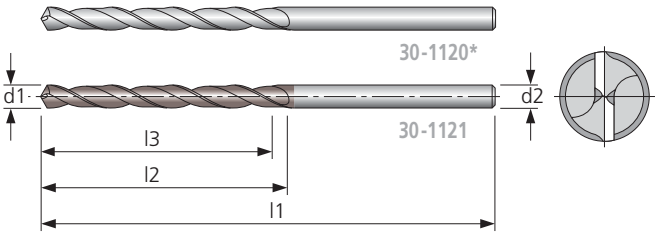
## Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

VHM | Z 2 | 30° rechts | DIN 338 | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1120* | ● | ○ | ○ | ○ | ○ | | | | ○ | ○ | ○ | ○ | | | ● | | | ● | | |
| 30-1121 | ○ | ○ | ● | ○ | ● | | | | ○ | ○ | ● | ● | | | ○ | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,5 | 1,6 - 3 | 3,1 - 3,3 | 3,4 - 3,7 | 3,8 - 4,2 | 4,3 - 4,7 | 4,8 - 5,3 | 5,4 - 6 | 6,1 - 6,5 | 6,8 - 7,5 | 7,6 - 8,5 | 8,6 - 9,5 | 10 - 10,5 | 11 - 11,5 | 12 - 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 |
| | f [mm/U] | 0,05 | 0,09 | 0,12 | 0,12 | 0,12 | 0,15 | 0,15 | 0,17 | 0,17 | 0,23 | 0,23 | 0,28 | 0,35 | 0,35 | 0,35 | 0,40 | 0,40 | 0,40 |
| | vf [mm/min] | 1000 | 1800 | 2400 | 2400 | 2200 | 2450 | 2190 | 2180 | 1970 | 2420 | 2120 | 2160 | 2450 | 2240 | 2070 | 2080 | 1960 | 1840 |
| | n [1/min] | 20000 | 20000 | 20000 | 20000 | 18300 | 16300 | 14600 | 12800 | 11600 | 10500 | 9200 | 7700 | 7000 | 6400 | 5900 | 5200 | 4900 | 4600 |
| Alu > 9 % Si | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,04 | 0,08 | 0,10 | 0,10 | 0,10 | 0,12 | 0,12 | 0,15 | 0,15 | 0,20 | 0,20 | 0,25 | 0,30 | 0,30 | 0,30 | 0,35 | 0,35 | 0,35 |
| | vf [mm/min] | 800 | 1600 | 1790 | 1640 | 1430 | 1520 | 1380 | 1520 | 1370 | 1640 | 1440 | 1500 | 1650 | 1500 | 1380 | 1440 | 1330 | 1260 |
| | n [1/min] | 20000 | 20000 | 17900 | 16400 | 14300 | 12700 | 11500 | 10100 | 9100 | 8200 | 7200 | 6000 | 5500 | 5000 | 4600 | 4100 | 3800 | 3600 |
| Stahl < 800 N/mm² | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,03 | 0,06 | 0,08 | 0,08 | 0,08 | 0,10 | 0,10 | 0,14 | 0,14 | 0,16 | 0,16 | 0,18 | 0,23 | 0,23 | 0,23 | 0,25 | 0,25 | 0,25 |
| | vf [mm/min] | 600 | 750 | 720 | 660 | 580 | 640 | 570 | 700 | 630 | 660 | 580 | 540 | 620 | 580 | 530 | 500 | 480 | 450 |
| | n [1/min] | 20000 | 12500 | 9000 | 8200 | 7200 | 6400 | 5700 | 5000 | 4500 | 4100 | 3600 | 3000 | 2700 | 2500 | 2300 | 2000 | 1900 | 1800 |
| Stahl < 1200 N/mm² | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,02 | 0,05 | 0,06 | 0,06 | 0,06 | 0,07 | 0,07 | 0,10 | 0,10 | 0,12 | 0,12 | 0,14 | 0,15 | 0,15 | 0,15 | 0,20 | 0,17 | 0,17 |
| | vf [mm/min] | 390 | 560 | 480 | 440 | 380 | 400 | 360 | 450 | 400 | 430 | 380 | 380 | 360 | 330 | 300 | 360 | 290 | 270 |
| | n [1/min] | 19600 | 11100 | 8000 | 7300 | 6400 | 5700 | 5100 | 4500 | 4000 | 3600 | 3200 | 2700 | 2400 | 2200 | 2000 | 1800 | 1700 | 1600 |
| Stahl < 1600 N/mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,01 | 0,03 | 0,04 | 0,04 | 0,04 | 0,05 | 0,05 | 0,07 | 0,07 | 0,09 | 0,09 | 0,10 | 0,12 | 0,12 | 0,12 | 0,15 | 0,15 | 0,15 |
| | vf [mm/min] | 150 | 250 | 240 | 220 | 190 | 210 | 190 | 240 | 210 | 240 | 220 | 200 | 220 | 200 | 180 | 210 | 200 | 180 |
| | n [1/min] | 14700 | 8300 | 6000 | 5500 | 4800 | 4200 | 3800 | 3400 | 3000 | 2700 | 2400 | 2000 | 1800 | 1700 | 1500 | 1400 | 1300 | 1200 |
| INOX < 800 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,02 | 0,03 | 0,04 | 0,04 | 0,04 | 0,05 | 0,05 | 0,08 | 0,08 | 0,10 | 0,10 | 0,12 | 0,14 | 0,14 | 0,14 | 0,16 | 0,16 | 0,16 |
| | vf [mm/min] | 240 | 210 | 200 | 180 | 160 | 180 | 160 | 220 | 200 | 230 | 200 | 200 | 210 | 200 | 180 | 180 | 180 | 160 |
| | n [1/min] | 12200 | 6900 | 5000 | 4500 | 4000 | 3500 | 3200 | 2800 | 2500 | 2300 | 2000 | 1700 | 1500 | 1400 | 1300 | 1100 | 1100 | 1000 |
| INOX > 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 | 0,03 | 0,03 | 0,04 | 0,04 | 0,05 | 0,05 | 0,08 | 0,08 | 0,10 | 0,12 | 0,12 | 0,12 | 0,14 | 0,14 | 0,14 |
| | vf [mm/min] | 100 | 110 | 120 | 110 | 100 | 110 | 100 | 110 | 100 | 140 | 130 | 130 | 140 | 130 | 120 | 130 | 110 | 110 |
| | n [1/min] | 9800 | 5500 | 4000 | 3600 | 3200 | 2800 | 2500 | 2200 | 2000 | 1800 | 1600 | 1300 | 1200 | 1100 | 1000 | 900 | 800 | 800 |
| GG | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,03 | 0,06 | 0,07 | 0,07 | 0,07 | 0,08 | 0,08 | 0,11 | 0,11 | 0,15 | 0,15 | 0,15 | 0,20 | 0,20 | 0,20 | 0,23 | 0,23 | 0,23 |
| | vf [mm/min] | 600 | 750 | 630 | 570 | 500 | 510 | 460 | 550 | 500 | 620 | 540 | 450 | 540 | 500 | 460 | 460 | 440 | 410 |
| | n [1/min] | 20000 | 12500 | 9000 | 8200 | 7200 | 6400 | 5700 | 5000 | 4500 | 4100 | 3600 | 3000 | 2700 | 2500 | 2300 | 2000 | 1900 | 1800 |
| GGG | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,02 | 0,05 | 0,06 | 0,06 | 0,06 | 0,07 | 0,07 | 0,08 | 0,08 | 0,13 | 0,13 | 0,15 | 0,18 | 0,18 | 0,18 | 0,23 | 0,23 | 0,23 |
| | vf [mm/min] | 340 | 490 | 420 | 380 | 340 | 350 | 320 | 310 | 280 | 420 | 360 | 350 | 380 | 340 | 320 | 370 | 350 | 320 |
| | n [1/min] | 17100 | 9700 | 7000 | 6400 | 5600 | 5000 | 4500 | 3900 | 3500 | 3200 | 2800 | 2300 | 2100 | 1900 | 1800 | 1600 | 1500 | 1400 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,03 | 0,08 | 0,08 | 0,08 | 0,08 | 0,11 | 0,11 | 0,12 | 0,12 | 0,18 | 0,18 | 0,20 | 0,25 | 0,25 | 0,25 | 0,30 | 0,30 | 0,30 |
| | vf [mm/min] | 600 | 1600 | 1430 | 1310 | 1140 | 1400 | 1270 | 1210 | 1090 | 1480 | 1300 | 1200 | 1380 | 1250 | 1150 | 1230 | 1140 | 1080 |
| | n [1/min] | 20000 | 20000 | 17900 | 16400 | 14300 | 12700 | 11500 | 10100 | 9100 | 8200 | 7200 | 6000 | 5500 | 5000 | 4600 | 4100 | 3800 | 3600 |

** Unbeschichtete Werkzeuge (30-1120): Vc 0,8 (ca.)*
** uncoated tools (30-1120): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 313

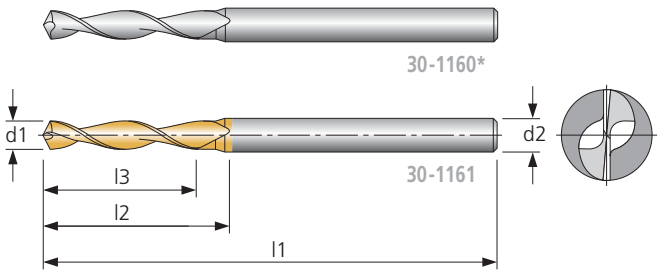
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | Werk Norm | Typ W | 130° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1160* | ● | ● | ○ | ○ | | | | | ○ | ○ | ○ | | | ○ | ● | ○ | ○ | ● | | |
| 30-1161 | ● | ● | ○ | ○ | | | | | ○ | ○ | ○ | | | ○ | ● | ○ | ○ | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,5 - 0,6 | 0,65 - 0,7 | 0,75 - 0,85 | 0,90- 1,15 | 1,2 - 1,9 | 2 - 3 |
|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,100 | 0,150 |
| | vf [mm/min] | 1000 | 1500 | 2000 | 2500 | 3980 | 3680 |
| | n [1/min] | min. 50000 | min. 50000 | min. 50000 | min. 50000 | 39800 | 24500 |
| Alu > 9 % Si | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,040 | 0,080 | 0,100 |
| | vf [mm/min] | 750 | 1000 | 1500 | 2000 | 2860 | 2200 |
| | n [1/min] | min. 50000 | min. 50000 | min. 50000 | min. 50000 | 35800 | 22000 |
| Stahl < 800 N/mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,010 | 0,015 | 0,020 | 0,025 | 0,030 | 0,050 |
| | vf [mm/min] | 350 | 410 | 480 | 440 | 360 | 370 |
| | n [1/min] | 34700 | 27300 | 23900 | 17400 | 11900 | 7300 |
| Stahl < 1200 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,015 | 0,020 | 0,040 |
| | vf [mm/min] | 290 | 230 | 200 | 220 | 200 | 240 |
| | n [1/min] | 28900 | 22700 | 19900 | 14500 | 9900 | 6100 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,012 | 0,045 |
| | vf [mm/min] | 230 | 180 | 160 | 120 | 100 | 220 |
| | n [1/min] | 23100 | 18200 | 15900 | 11600 | 8000 | 4900 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,012 | 0,040 |
| | vf [mm/min] | 170 | 140 | 120 | 90 | 70 | 150 |
| | n [1/min] | 17400 | 13600 | 11900 | 8700 | 6000 | 3700 |
| GG | Vc [m/min] | 65 | 65 | 65 | 65 | 65 | 65 |
| | f [mm/U] | 0,010 | 0,012 | 0,015 | 0,017 | 0,020 | 0,060 |
| | vf [mm/min] | 380 | 360 | 390 | 320 | 260 | 480 |
| | n [1/min] | 37600 | 29600 | 25900 | 18800 | 12900 | 8000 |
| Titan | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,005 | 0,007 | 0,007 | 0,008 | 0,010 | 0,040 |
| | vf [mm/min] | 100 | 110 | 100 | 80 | 70 | 170 |
| | n [1/min] | 20300 | 15900 | 13900 | 10100 | 7000 | 4300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,015 | 0,017 | 0,020 | 0,022 | 0,025 | 0,080 |
| | vf [mm/min] | 750 | 850 | 1000 | 950 | 750 | 1470 |
| | n [1/min] | min. 50000 | min. 50000 | min. 50000 | 43400 | 29800 | 18400 |
| Graphit Faserverbund | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,045 |
| | vf [mm/min] | 520 | 550 | 600 | 520 | 480 | 330 |
| | n [1/min] | 34700 | 27300 | 23900 | 17400 | 11900 | 7300 |

** Unbeschichtete Werkzeuge (30-1160): Vc 0,8 (ca.)*
** uncoated tools (30-1160):Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 314

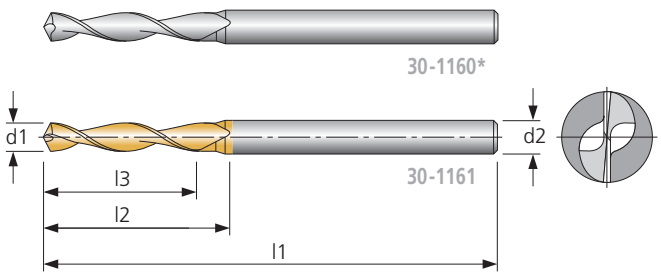
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | DIN 338 | Typ W | 130° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1200* | ● | ● | ○ | ○ | | | | | ○ | ○ | ○ | | | ○ | ● | ○ | ○ | ● | | |
| 30-1201 | ● | ● | ○ | ○ | | | | | ○ | ○ | ○ | | | ○ | ● | ○ | ○ | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,9 | 2 - 3 | 3,1 - 3,7 | 3,8 - 4,2 | 4,3 - 4,7 | 4,8 - 5,3 | 5,4 - 6 | 6,5 - 7 | 8 - 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,020 | 0,080 | 0,100 | 0,120 | 0,140 | 0,160 | 0,180 | 0,250 | 0,300 |
| | vf [mm/min] | 850 | 1890 | 1820 | 1910 | 1970 | 2000 | 1980 | 2280 | 2130 |
| | n [1/min] | 42400 | 23600 | 18200 | 15900 | 14100 | 12500 | 11000 | 9100 | 7100 |
| Alu > 9 % Si | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,020 | 0,080 | 0,100 | 0,120 | 0,140 | 0,160 | 0,180 | 0,250 | 0,300 |
| | vf [mm/min] | 760 | 1700 | 1640 | 1720 | 1780 | 1790 | 1780 | 2050 | 1920 |
| | n [1/min] | 38200 | 21200 | 16400 | 14300 | 12700 | 11200 | 9900 | 8200 | 6400 |
| Stahl < 800 N/mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,020 | 0,070 | 0,090 | 0,100 | 0,110 | 0,130 | 0,160 | 0,180 | 0,200 |
| | vf [mm/min] | 250 | 500 | 500 | 480 | 460 | 480 | 530 | 490 | 420 |
| | n [1/min] | 12700 | 7100 | 5500 | 4800 | 4200 | 3700 | 3300 | 2700 | 2100 |
| Stahl < 1200 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,012 | 0,045 | 0,060 | 0,080 | 0,100 | 0,120 | 0,140 | 0,160 | 0,180 |
| | vf [mm/min] | 130 | 270 | 270 | 320 | 350 | 370 | 380 | 370 | 320 |
| | n [1/min] | 10600 | 5900 | 4500 | 4000 | 3500 | 3100 | 2700 | 2300 | 1800 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,009 | 0,035 | 0,045 | 0,050 | 0,055 | 0,065 | 0,080 | 0,095 | 0,110 |
| | vf [mm/min] | 80 | 160 | 160 | 160 | 150 | 160 | 180 | 170 | 150 |
| | n [1/min] | 8500 | 4700 | 3600 | 3200 | 2800 | 2500 | 2200 | 1800 | 1400 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,010 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | vf [mm/min] | 60 | 110 | 110 | 120 | 130 | 130 | 130 | 130 | 110 |
| | n [1/min] | 6400 | 3500 | 2700 | 2400 | 2100 | 1900 | 1600 | 1400 | 1100 |
| GG | Vc [m/min] | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| | f [mm/U] | 0,018 | 0,050 | 0,080 | 0,090 | 0,100 | 0,120 | 0,150 | 0,160 | 0,200 |
| | vf [mm/min] | 250 | 390 | 470 | 470 | 460 | 490 | 540 | 480 | 460 |
| | n [1/min] | 13800 | 7700 | 5900 | 5200 | 4600 | 4100 | 3600 | 3000 | 2300 |
| Titan | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,007 | 0,030 | 0,040 | 0,042 | 0,045 | 0,055 | 0,065 | 0,075 | 0,080 |
| | vf [mm/min] | 50 | 120 | 130 | 120 | 110 | 120 | 120 | 120 | 100 |
| | n [1/min] | 7400 | 4100 | 3200 | 2800 | 2500 | 2200 | 1900 | 1600 | 1200 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,015 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,130 | 0,160 | 0,200 |
| | vf [mm/min] | 480 | 1060 | 950 | 950 | 950 | 940 | 1070 | 1090 | 1060 |
| | n [1/min] | 31800 | 17700 | 13600 | 11900 | 10600 | 9400 | 8200 | 6800 | 5300 |
| Graphit Faserverbund | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,045 | 0,050 | 0,055 | 0,060 |
| | vf [mm/min] | 190 | 140 | 140 | 140 | 170 | 170 | 160 | 150 | 130 |
| | n [1/min] | 12738 | 7077 | 5459 | 4777 | 4246 | 3746 | 3294 | 2729 | 2123 |

** Unbeschichtete Werkzeuge (30-1200): Vc 0,8 (ca.)*
** uncoated tools (30-1200): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

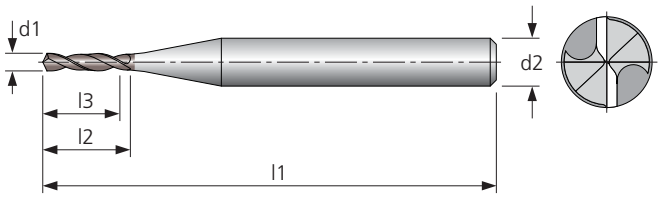
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | Werk Norm | Typ N | 130° | HA | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1301 | | | ● | ● | ● | ○ | | | ● | ○ | ● | ○ | | ● | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,1 - 0,35 | 0,4 - 0,65 | 0,7 - 0,95 | 1 - 1,15 | 1,2 - 1,45 | 1,5 -1,95 | 2 - 2,45 | 2,50 - 3 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,050 | 0,070 | 0,090 | 0,120 | 0,150 |
| | vf [mm/min] | 750 | 1000 | 1010 | 1300 | 1480 | 1480 | 1500 | 1530 |
| | n [1/min] | min. 50000 | min. 50000 | 33700 | 26000 | 21200 | 16400 | 12500 | 10200 |
| Stahl < 1200 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,050 | 0,070 | 0,090 | 0,120 | 0,150 |
| | vf [mm/min] | 750 | 810 | 790 | 1020 | 1160 | 1140 | 1160 | 1200 |
| | n [1/min] | min. 50000 | 40500 | 26200 | 20300 | 16500 | 12700 | 9700 | 8000 |
| Stahl < 1600 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 |
| | vf [mm/min] | 750 | 580 | 560 | 730 | 710 | 730 | 690 | 680 |
| | n [1/min] | min. 50000 | 28900 | 18700 | 14500 | 11800 | 9100 | 6900 | 5700 |
| Stahl < 55 HRC | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 |
| | vf [mm/min] | 750 | 410 | 330 | 300 | 330 | 320 | 290 | 280 |
| | n [1/min] | min. 50000 | 20300 | 13100 | 10100 | 8300 | 6400 | 4800 | 4000 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,010 | 0,010 | 0,020 | 0,025 | 0,030 | 0,050 | 0,060 | 0,070 |
| | vf [mm/min] | 500 | 230 | 300 | 290 | 280 | 370 | 330 | 320 |
| | n [1/min] | min. 50000 | 23100 | 15000 | 11600 | 9400 | 7300 | 5500 | 4500 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,010 | 0,010 | 0,018 | 0,020 | 0,025 | 0,040 | 0,050 | 0,060 |
| | vf [mm/min] | 480 | 170 | 200 | 170 | 180 | 220 | 210 | 200 |
| | n [1/min] | 47700 | 17400 | 11200 | 8700 | 7100 | 5500 | 4200 | 3400 |
| GG | Vc [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,050 | 0,070 | 0,090 | 0,120 | 0,150 |
| | vf [mm/min] | 750 | 1000 | 1350 | 1740 | 1980 | 1960 | 1990 | 2040 |
| | n [1/min] | min. 50000 | min. 50000 | 44900 | 34700 | 28300 | 21800 | 16600 | 13600 |
| GGG | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,050 | 0,070 | 0,090 | 0,120 | 0,150 |
| | vf [mm/min] | 750 | 1000 | 1010 | 1300 | 1480 | 1480 | 1500 | 1530 |
| | n [1/min] | min. 50000 | min. 50000 | 33700 | 26000 | 21200 | 16400 | 12500 | 10200 |
| Titan | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 |
| | vf [mm/min] | 1000 | 690 | 600 | 580 | 560 | 510 | 440 | 450 |
| | n [1/min] | min. 50000 | 23100 | 15000 | 11600 | 9400 | 7300 | 5500 | 4500 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 342

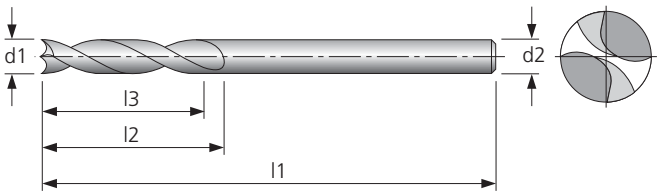
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | DIN 6539 | Typ N | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1320 | ● | ○ | | | | | | | | | | | | | ● | ● | ● | ● | ● | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 - 3,7 | 4- 4,7 | 5 - 5,3 | 5,50- 6 | 6,5 - 7,5 | 8 - 9,5 | 10 - 10,5 | 11 - 11,5 | 12 - 13 | 14 - 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,18 | 0,23 | 0,27 | 0,35 | 0,40 | 0,45 | 0,50 | 0,55 | 0,65 | 0,65 |
| | vf [mm/min] | 3280 | 3240 | 3240 | 3710 | 3640 | 3200 | 3050 | 3030 | 3190 | 2730 |
| | n [1/min] | 18200 | 14100 | 12000 | 10600 | 9100 | 7100 | 6100 | 5500 | 4900 | 4200 |
| Alu > 9 % Si | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,12 | 0,15 | 0,18 | 0,23 | 0,25 | 0,30 | 0,35 | 0,40 | 0,45 | 0,45 |
| | vf [mm/min] | 1630 | 1590 | 1620 | 1840 | 1700 | 1590 | 1580 | 1680 | 1670 | 1440 |
| | n [1/min] | 13600 | 10600 | 9000 | 8000 | 6800 | 5300 | 4500 | 4200 | 3700 | 3200 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,170 | 0,200 | 0,240 | 0,270 | 0,300 | 0,300 |
| | vf [mm/min] | 730 | 710 | 720 | 800 | 770 | 700 | 720 | 760 | 720 | 630 |
| | n [1/min] | 9100 | 7100 | 6000 | 5300 | 4500 | 3500 | 3000 | 2800 | 2400 | 2100 |
| Graphit Faserverbund | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,045 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,120 | 0,150 | 0,150 |
| | vf [mm/min] | 250 | 210 | 220 | 220 | 220 | 190 | 180 | 200 | 230 | 200 |
| | n [1/min] | 5500 | 4200 | 3600 | 3200 | 2700 | 2100 | 1800 | 1700 | 1500 | 1300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 322

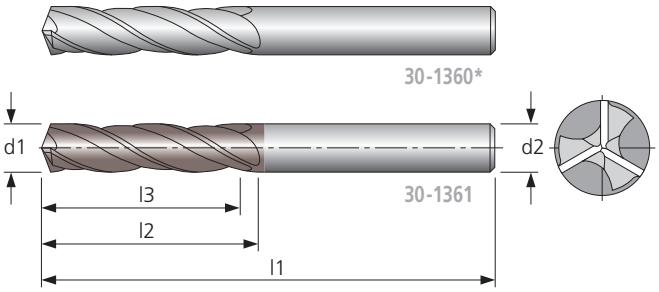
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 3 | 30° rechts | DIN 338 | Typ N | 140° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1360* | ● | ● | ● | ○ | ○ | | | | ○ | ○ | ○ | ○ | ○ | ○ | ● | | ● | ● | | |
| 30-1361 | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 - 4 | 4,5 - 6 | 6,5 - 7,5 | 8 - 10 | 10,2 - 12 | 13 - 16 |
|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,150 | 0,180 | 0,250 | 0,300 | 0,350 | 0,430 |
| | vf [mm/min] | 2040 | 1710 | 1700 | 1590 | 1510 | 1380 |
| | n [1/min] | 13600 | 9500 | 6800 | 5300 | 4300 | 3200 |
| Alu > 9 % Si | Vc [m/min] | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | vf [mm/min] | 1420 | 1250 | 1180 | 1150 | 1140 | 980 |
| | n [1/min] | 11800 | 8300 | 5900 | 4600 | 3800 | 2800 |
| Stahl < 800 N/mm² | Vc [m/min] | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,240 | 0,280 | 0,340 |
| | vf [mm/min] | 980 | 860 | 820 | 770 | 730 | 650 |
| | n [1/min] | 8200 | 5700 | 4100 | 3200 | 2600 | 1900 |
| Stahl < 1200 N/mm² | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,075 | 0,100 | 0,120 | 0,140 | 0,170 | 0,200 |
| | vf [mm/min] | 550 | 510 | 430 | 390 | 390 | 340 |
| | n [1/min] | 7300 | 5100 | 3600 | 2800 | 2300 | 1700 |
| Stahl < 1600 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,075 | 0,095 | 0,110 | 0,130 | 0,160 |
| | vf [mm/min] | 380 | 340 | 300 | 280 | 260 | 240 |
| | n [1/min] | 6400 | 4500 | 3200 | 2500 | 2000 | 1500 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,040 | 0,050 | 0,070 | 0,090 | 0,110 | 0,140 |
| | vf [mm/min] | 140 | 130 | 130 | 130 | 130 | 110 |
| | n [1/min] | 3600 | 2500 | 1800 | 1400 | 1200 | 800 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,035 | 0,045 | 0,055 | 0,075 | 0,090 | 0,120 |
| | vf [mm/min] | 90 | 90 | 80 | 80 | 80 | 70 |
| | n [1/min] | 2700 | 1900 | 1400 | 1100 | 900 | 600 |
| GG | Vc [m/min] | 85 | 85 | 85 | 85 | 85 | 85 |
| | f [mm/U] | 0,090 | 0,120 | 0,160 | 0,200 | 0,230 | 0,280 |
| | vf [mm/min] | 690 | 650 | 620 | 600 | 580 | 500 |
| | n [1/min] | 7700 | 5400 | 3900 | 3000 | 2500 | 1800 |
| GGG | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,075 | 0,100 | 0,130 | 0,160 | 0,200 | 0,250 |
| | vf [mm/min] | 550 | 510 | 470 | 450 | 460 | 430 |
| | n [1/min] | 7300 | 5100 | 3600 | 2800 | 2300 | 1700 |
| hochwarmfeste Legierungen | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,040 | 0,050 | 0,075 | 0,100 | 0,120 | 0,140 |
| | vf [mm/min] | 130 | 110 | 120 | 120 | 120 | 100 |
| | n [1/min] | 3200 | 2200 | 1600 | 1200 | 1000 | 700 |
| Titan | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,040 | 0,050 | 0,075 | 0,100 | 0,120 | 0,140 |
| | vf [mm/min] | 70 | 70 | 70 | 70 | 70 | 60 |
| | n [1/min] | 1800 | 1300 | 900 | 700 | 600 | 400 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,180 | 0,220 | 0,280 |
| | vf [mm/min] | 1090 | 910 | 830 | 760 | 770 | 700 |
| | n [1/min] | 10900 | 7600 | 5500 | 4200 | 3500 | 2500 |

** Unbeschichtete Werkzeuge (30-1360): Vc 0,8 (ca.)*
** uncoated tools (30-1360): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 323

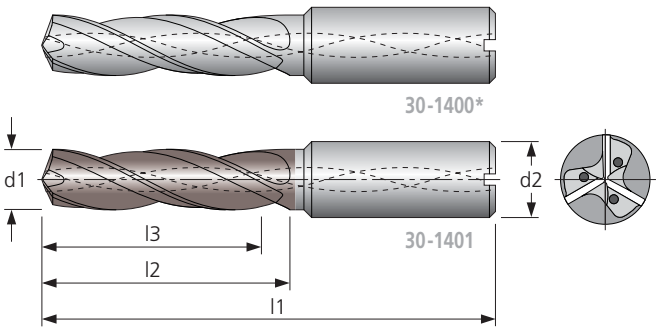
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 3 | 30° rechts | Werk Norm | Typ N | 140° | DIN 6535 HAK | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1400* | ● | ● | ● | ○ | ○ | | | | ○ | ○ | ○ | ○ | ○ | ○ | ● | | ● | ● | | |
| 30-1401 | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 - 6 | 6,5 - 8 | 8,5 - 10,5 | 11 - 13 | 14 - 16 |
|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,220 | 0,300 | 0,360 | 0,420 | 0,520 |
| | vf [mm/min] | 2790 | 2730 | 2300 | 2230 | 2180 |
| | n [1/min] | 12700 | 9100 | 6400 | 5300 | 4200 |
| Alu > 9 % Si | Vc [m/min] | 170 | 170 | 170 | 170 | 170 |
| | f [mm/U] | 0,180 | 0,240 | 0,300 | 0,360 | 0,420 |
| | vf [mm/min] | 1940 | 1850 | 1620 | 1620 | 1510 |
| | n [1/min] | 10800 | 7700 | 5400 | 4500 | 3600 |
| Stahl < 800 N/mm² | Vc [m/min] | 115 | 115 | 115 | 115 | 115 |
| | f [mm/U] | 0,180 | 0,240 | 0,290 | 0,340 | 0,410 |
| | vf [mm/min] | 1310 | 1250 | 1070 | 1050 | 980 |
| | n [1/min] | 7300 | 5200 | 3700 | 3100 | 2400 |
| Stahl < 1200 N/mm² | Vc [m/min] | 105 | 105 | 105 | 105 | 105 |
| | f [mm/U] | 0,120 | 0,140 | 0,170 | 0,200 | 0,240 |
| | vf [mm/min] | 800 | 670 | 560 | 560 | 530 |
| | n [1/min] | 6700 | 4800 | 3300 | 2800 | 2200 |
| Stahl < 1600 N/mm² | Vc [m/min] | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,090 | 0,110 | 0,130 | 0,160 | 0,190 |
| | vf [mm/min] | 510 | 450 | 380 | 380 | 360 |
| | n [1/min] | 5700 | 4100 | 2900 | 2400 | 1900 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 |
| | vf [mm/min] | 150 | 140 | 130 | 130 | 120 |
| | n [1/min] | 2500 | 1800 | 1300 | 1100 | 800 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,050 | 0,070 | 0,090 | 0,110 | 0,140 |
| | vf [mm/min] | 100 | 100 | 90 | 90 | 80 |
| | n [1/min] | 1900 | 1400 | 1000 | 800 | 600 |
| GG | Vc [m/min] | 110 | 110 | 110 | 110 | 110 |
| | f [mm/U] | 0,140 | 0,190 | 0,240 | 0,280 | 0,340 |
| | vf [mm/min] | 980 | 950 | 840 | 810 | 780 |
| | n [1/min] | 7000 | 5000 | 3500 | 2900 | 2300 |
| GGG | Vc [m/min] | 105 | 105 | 105 | 105 | 105 |
| | f [mm/U] | 0,120 | 0,160 | 0,190 | 0,240 | 0,300 |
| | vf [mm/min] | 800 | 770 | 630 | 670 | 660 |
| | n [1/min] | 6700 | 4800 | 3300 | 2800 | 2200 |
| hochwarmfeste Legierungen | Vc [m/min] | 45 | 45 | 45 | 45 | 45 |
| | f [mm/U] | 0,065 | 0,090 | 0,110 | 0,140 | 0,170 |
| | vf [mm/min] | 190 | 180 | 150 | 170 | 170 |
| | n [1/min] | 2900 | 2000 | 1400 | 1200 | 1000 |
| Titan | Vc [m/min] | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,060 | 0,090 | 0,110 | 0,140 | 0,170 |
| | vf [mm/min] | 100 | 100 | 90 | 100 | 90 |
| | n [1/min] | 1600 | 1100 | 800 | 700 | 500 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,140 | 0,180 | 0,220 | 0,260 | 0,340 |
| | vf [mm/min] | 1330 | 1220 | 1060 | 1040 | 1090 |
| | n [1/min] | 9500 | 6800 | 4800 | 4000 | 3200 |

** Unbeschichtete Werkzeuge (30-1400): Vc 0,8 (ca.)*
** uncoated tools (30-1400): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 326

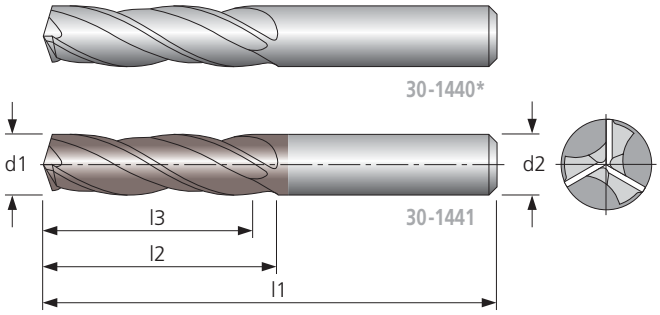
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 3 | 30° rechts | Werk Norm | Typ N | 140° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **30-1440*** | ● | ● | ● | ○ | ○ | | | | ○ | ○ | ● | ○ | ○ | ○ | ● | | ● | ● | ○ | |
| **30-1441** | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ○ | ○ | ○ | ● | | ● | ● | ○ | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 - 4,2 | 4,50 - 6 | 6,5 - 8,5 | 9 - 10,5 | 10,8 - 13 | 14 - 16 | 18 - 20 |
|---|---|---|---|---|---|---|---|---|
| **Alu** | Vc [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,170 | 0,200 | 0,280 | 0,330 | 0,390 | 0,470 | 0,470 |
| | vf [mm/min] | 2790 | 2300 | 2020 | 1980 | 1870 | 1790 | 1410 |
| | n [1/min] | 16400 | 11500 | 7200 | 6000 | 4800 | 3800 | 3000 |
| **Alu > 9 % Si** | Vc [m/min] | 155 | 155 | 155 | 155 | 155 | 155 | 155 |
| | f [mm/U] | 0,130 | 0,170 | 0,220 | 0,280 | 0,330 | 0,390 | 0,390 |
| | vf [mm/min] | 1830 | 1680 | 1360 | 1460 | 1350 | 1290 | 1010 |
| | n [1/min] | 14100 | 9900 | 6200 | 5200 | 4100 | 3300 | 2600 |
| **Stahl < 800 N/mm²** | Vc [m/min] | 110 | 110 | 110 | 110 | 110 | 110 | 110 |
| | f [mm/U] | 0,130 | 0,170 | 0,220 | 0,260 | 0,310 | 0,370 | 0,370 |
| | vf [mm/min] | 1300 | 1190 | 970 | 960 | 900 | 850 | 670 |
| | n [1/min] | 10000 | 7000 | 4400 | 3700 | 2900 | 2300 | 1800 |
| **Stahl < 1200 N/mm²** | Vc [m/min] | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| | f [mm/U] | 0,080 | 0,110 | 0,130 | 0,150 | 0,190 | 0,220 | 0,220 |
| | vf [mm/min] | 690 | 660 | 490 | 480 | 480 | 440 | 350 |
| | n [1/min] | 8600 | 6000 | 3800 | 3200 | 2500 | 2000 | 1600 |
| **Stahl < 1600 N/mm²** | Vc [m/min] | 85 | 85 | 85 | 85 | 85 | 85 | 85 |
| | f [mm/U] | 0,070 | 0,080 | 0,100 | 0,120 | 0,140 | 0,180 | 0,180 |
| | vf [mm/min] | 540 | 430 | 340 | 340 | 320 | 320 | 250 |
| | n [1/min] | 7700 | 5400 | 3400 | 2800 | 2300 | 1800 | 1400 |
| **INOX < 800 N/mm²** | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,045 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,150 |
| | vf [mm/min] | 160 | 150 | 130 | 130 | 130 | 120 | 110 |
| | n [1/min] | 3600 | 2500 | 1600 | 1300 | 1100 | 800 | 700 |
| **INOX > 800 N/mm²** | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,040 | 0,050 | 0,070 | 0,090 | 0,110 | 0,140 | 0,140 |
| | vf [mm/min] | 110 | 100 | 80 | 90 | 90 | 80 | 70 |
| | n [1/min] | 2700 | 1900 | 1200 | 1000 | 800 | 600 | 500 |
| **GG** | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,100 | 0,130 | 0,180 | 0,220 | 0,250 | 0,310 | 0,310 |
| | vf [mm/min] | 910 | 830 | 720 | 750 | 680 | 650 | 530 |
| | n [1/min] | 9100 | 6400 | 4000 | 3400 | 2700 | 2100 | 1700 |
| **GGG** | Vc [m/min] | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| | f [mm/U] | 0,080 | 0,110 | 0,140 | 0,170 | 0,200 | 0,250 | 0,250 |
| | vf [mm/min] | 690 | 660 | 530 | 540 | 500 | 500 | 400 |
| | n [1/min] | 8600 | 6000 | 3800 | 3200 | 2500 | 2000 | 1600 |
| **hochwarmfeste Legierungen** | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,045 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,150 |
| | vf [mm/min] | 160 | 150 | 130 | 130 | 130 | 120 | 110 |
| | n [1/min] | 3600 | 2500 | 1600 | 1300 | 1100 | 800 | 700 |
| **Titan** | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,045 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,150 |
| | vf [mm/min] | 100 | 100 | 80 | 80 | 80 | 80 | 60 |
| | n [1/min] | 2300 | 1600 | 1000 | 800 | 700 | 500 | 400 |
| **NE-Metalle Cu-Leg.** | Vc [m/min] | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,110 | 0,130 | 0,170 | 0,200 | 0,240 | 0,310 | 0,310 |
| | vf [mm/min] | 1400 | 1160 | 950 | 940 | 890 | 930 | 710 |
| | n [1/min] | 12700 | 8900 | 5600 | 4700 | 3700 | 3000 | 2300 |

** Unbeschichtete Werkzeuge (30-1440): Vc 0,8 (ca.)*
** uncoated tools (30-1440): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 385

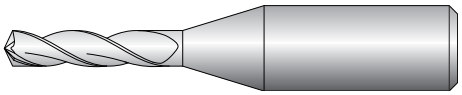
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 3 | 30° rechts | Werk Norm | Typ N | 130° | HA | SHRINK FIT

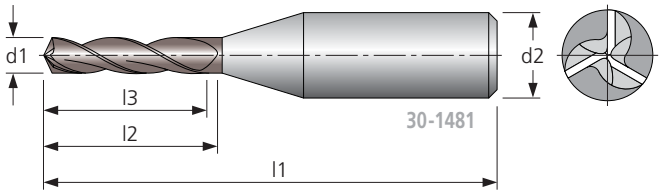
Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4



30-1480*




30-1481

| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **30-1480*** | ○ | ○ | ● | ● | | | | | | | ● | ○ | | | | | ● | ● | ○ | |
| **30-1481** | ○ | ○ | ● | ● | | | | | | | ● | ○ | | | | | ● | ● | ○ | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,5 - 0,85 | 0,9 - 1,25 | 1,3 - 1,6 | 1,7 - 2,5 | 2,6- 3,175 |
|---|---|---|---|---|---|---|
| **Alu** | Vc [m/min] | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,030 | 0,060 | 0,070 | 0,080 | 0,100 |
| | vf [mm/min] | 1370 | 1910 | 1480 | 1100 | 1060 |
| | n [1/min] | 45500 | 31800 | 21200 | 13800 | 10600 |
| **Alu > 9 % Si** | Vc [m/min] | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,025 | 0,050 | 0,060 | 0,070 | 0,080 |
| | vf [mm/min] | 910 | 1280 | 1020 | 780 | 680 |
| | n [1/min] | 36400 | 25500 | 17000 | 11100 | 8500 |
| **Stahl < 800 N/mm²** | Vc [m/min] | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,020 | 0,050 | 0,050 | 0,060 | 0,070 |
| | vf [mm/min] | 640 | 1120 | 750 | 580 | 520 |
| | n [1/min] | 31800 | 22300 | 14900 | 9700 | 7400 |
| **Stahl < 1200 N/mm²** | Vc [m/min] | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,020 | 0,050 | 0,050 | 0,060 | 0,070 |
| | vf [mm/min] | 550 | 960 | 640 | 500 | 450 |
| | n [1/min] | 27300 | 19100 | 12700 | 8300 | 6400 |
| **GG** | Vc [m/min] | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,040 | 0,050 | 0,070 | 0,080 | 0,100 |
| | vf [mm/min] | 1820 | 1590 | 1480 | 1100 | 1060 |
| | n [1/min] | 45500 | 31800 | 21200 | 13800 | 10600 |
| **GGG** | Vc [m/min] | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,030 | 0,050 | 0,060 | 0,070 | 0,080 |
| | vf [mm/min] | 1230 | 1430 | 1150 | 880 | 760 |
| | n [1/min] | 40900 | 28600 | 19100 | 12500 | 9500 |

** Unbeschichtete Werkzeuge (30-1480): Vc 0,8 (ca.)*
** uncoated tools (30-1480): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 328

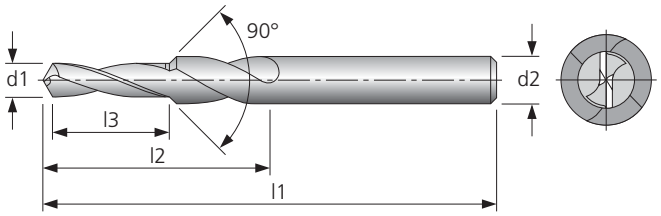
## Vollhartmetall-Stufenbohrer
## *solid carbide step drill*

VHM | Z 2 | 30° rechts | Werk Norm | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1520 | ● | ○ | ● | ● | ○ | | | | ○ | ○ | ● | ○ | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | M3 | M4 - M5 | M6 - M8 | M10-M12 | M14-M16 |
|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,100 | 0,200 | 0,250 | 0,300 | 0,350 |
| | vf [mm/min] | 1270 | 1520 | 1080 | 930 | 810 |
| | n [1/min] | 12700 | 7600 | 4300 | 3100 | 2300 |
| Alu > 9 % Si | Vc [m/min] | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,100 | 0,200 | 0,250 | 0,300 | 0,350 |
| | vf [mm/min] | 1020 | 1220 | 850 | 750 | 630 |
| | n [1/min] | 10200 | 6100 | 3400 | 2500 | 1800 |
| Stahl < 800 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 |
| | vf [mm/min] | 890 | 800 | 600 | 550 | 480 |
| | n [1/min] | 8900 | 5300 | 3000 | 2200 | 1600 |
| Stahl < 1200 N/mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 |
| | vf [mm/min] | 610 | 450 | 390 | 380 | 350 |
| | n [1/min] | 7600 | 4500 | 2600 | 1900 | 1400 |
| Stahl < 1600 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,050 | 0,080 | 0,120 | 0,150 | 0,200 |
| | vf [mm/min] | 320 | 300 | 260 | 240 | 220 |
| | n [1/min] | 6400 | 3800 | 2200 | 1600 | 1100 |
| INOX < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,050 | 0,080 | 0,120 | 0,150 | 0,200 |
| | vf [mm/min] | 260 | 240 | 200 | 180 | 180 |
| | n [1/min] | 5100 | 3000 | 1700 | 1200 | 900 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,040 | 0,070 | 0,100 | 0,120 | 0,150 |
| | vf [mm/min] | 150 | 160 | 130 | 110 | 110 |
| | n [1/min] | 3800 | 2300 | 1300 | 900 | 700 |
| GG | Vc [m/min] | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,060 | 0,100 | 0,150 | 0,200 | 0,300 |
| | vf [mm/min] | 610 | 610 | 510 | 500 | 540 |
| | n [1/min] | 10200 | 6100 | 3400 | 2500 | 1800 |
| GGG | Vc [m/min] | 55 | 55 | 55 | 55 | 55 |
| | f [mm/U] | 0,040 | 0,080 | 0,100 | 0,150 | 0,200 |
| | vf [mm/min] | 280 | 340 | 240 | 260 | 260 |
| | n [1/min] | 7000 | 4200 | 2400 | 1700 | 1300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,080 | 0,120 | 0,180 | 0,220 | 0,350 |
| | vf [mm/min] | 1220 | 1090 | 940 | 810 | 950 |
| | n [1/min] | 15300 | 9100 | 5200 | 3700 | 2700 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 280 Superdrill

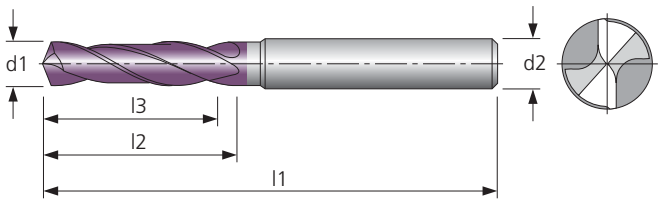
Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

VHM | Z 2 | 30° rechts | DIN 6537K | 3 x D | Typ Werk | 140° | DIN 6535 HA | HPC | SHRINK FIT | DIN 6535 HB | DIN 6535 HE

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1621 | | | ● | ● | ● | ● | | | ○ | ○ | ● | ○ | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 | 0,450 | 0,500 |
| | $v_f$ [mm/min] | 800 | 900 | 860 | 800 | 750 | 720 | 700 | 600 | 600 | 590 | 600 |
| | n [1/min] | 8000 | 6000 | 4800 | 4000 | 3000 | 2400 | 2000 | 1700 | 1500 | 1300 | 1200 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 | 0,450 | 0,500 |
| | $v_f$ [mm/min] | 640 | 720 | 680 | 640 | 600 | 570 | 560 | 490 | 480 | 500 | 500 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 | 1400 | 1200 | 1100 | 1000 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,120 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,300 | 0,350 | 0,400 | 0,450 |
| | $v_f$ [mm/min] | 420 | 480 | 480 | 490 | 400 | 400 | 390 | 330 | 350 | 360 | 360 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 | 900 | 800 |
| Stahl < 55 HRC | $V_c$ [m/min] | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | f [mm/U] | 0,010 | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 10 | 20 | 20 | 20 | 30 | 20 | 20 | 20 | 20 | 20 | 20 |
| | n [1/min] | 1300 | 1000 | 800 | 600 | 500 | 400 | 300 | 300 | 200 | 200 | 200 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,130 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 100 | 110 | 110 | 120 |
| | n [1/min] | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 | 900 | 800 | 700 | 600 | 600 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,130 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 70 | 80 |
| | n [1/min] | 2700 | 2000 | 1600 | 1300 | 1000 | 800 | 700 | 600 | 500 | 400 | 400 |
| GG | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,250 | 0,350 | 0,450 | 0,500 | 0,600 | 0,650 | 0,700 |
| | $v_f$ [mm/min] | 740 | 670 | 680 | 740 | 700 | 770 | 860 | 800 | 840 | 780 | 770 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 |
| GGG | $V_c$ [m/min] | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| | f [mm/U] | 0,060 | 0,100 | 0,120 | 0,130 | 0,180 | 0,200 | 0,250 | 0,250 | 0,250 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 410 | 520 | 490 | 440 | 470 | 420 | 430 | 380 | 330 | 310 | 300 |
| | n [1/min] | 6900 | 5200 | 4100 | 3400 | 2600 | 2100 | 1700 | 1500 | 1300 | 1100 | 1000 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | f [mm/U] | 0,030 | 0,040 | 0,040 | 0,050 | 0,070 | 0,100 | 0,120 | 0,130 | 0,140 | 0,150 | 0,160 |
| | $v_f$ [mm/min] | 140 | 140 | 120 | 120 | 130 | 140 | 140 | 130 | 130 | 120 | 110 |
| | n [1/min] | 4800 | 3600 | 2900 | 2400 | 1800 | 1400 | 1200 | 1000 | 900 | 800 | 700 |
| Titan | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,100 | 0,110 | 0,120 |
| | $v_f$ [mm/min] | 50 | 60 | 60 | 70 | 60 | 60 | 60 | 60 | 50 | 40 | 50 |
| | n [1/min] | 2700 | 2000 | 1600 | 1300 | 1000 | 800 | 700 | 600 | 500 | 400 | 400 |

**Bei den Werkstoffgruppen INOX < 800 N/mm², INOX > 800 N/mm² und Titan empfehlen wir den Einsatz unseres HAM Nirodrill.**
***We recommend to use our solid carbide high perfomance drill HAM Nirodrill for material INOX < 800 N/mm², INOX > 800 N/mm² and Titan.***

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 283 Superdrill

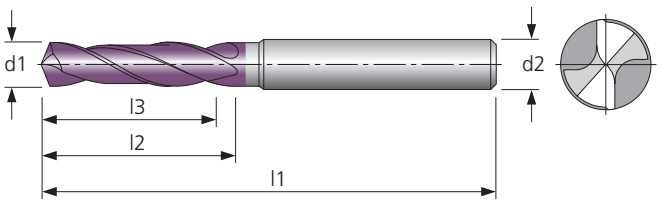
## Vollhartmetall-Spiralbohrer
## *solid carbide twist drill*

VHM | Z 2 | 30° rechts | DIN 6537 | 5 x D | Typ Werk | 140° | DIN 6535 HA | HPC | SHRINK FIT | DIN 6535 HB | DIN 6535 HE

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1701 | | | ● | ● | ● | ● | | | ○ | ○ | ● | ○ | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 |
| | $v_f$ [mm/min] | 800 | 900 | 860 | 800 | 750 | 720 | 700 | 600 | 600 |
| | n [1/min] | 8000 | 6000 | 4800 | 4000 | 3000 | 2400 | 2000 | 1700 | 1500 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 |
| | $v_f$ [mm/min] | 640 | 720 | 680 | 640 | 600 | 570 | 560 | 490 | 480 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 | 1400 | 1200 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,120 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 |
| | $v_f$ [mm/min] | 420 | 480 | 480 | 490 | 400 | 400 | 390 | 390 | 350 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |
| Stahl < 55 HRC | $V_c$ [m/min] | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 | 0,04 | 0,05 | 0,06 | 0,07 | 0,08 | 0,09 |
| | $v_f$ [mm/min] | 10 | 20 | 20 | 20 | 30 | 20 | 20 | 20 | 20 |
| | n [1/min] | 1300 | 1000 | 800 | 600 | 500 | 400 | 300 | 300 | 200 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,130 | 0,150 |
| | $v_f$ [mm/min] | 110 | 110 | 110 | 110 | 110 | 110 | 110 | 100 | 110 |
| | n [1/min] | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 | 900 | 800 | 700 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,130 | 0,150 |
| | $v_f$ [mm/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | n [1/min] | 2700 | 2000 | 1600 | 1300 | 1000 | 800 | 700 | 600 | 500 |
| GG | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,250 | 0,350 | 0,450 | 0,500 | 0,600 |
| | $v_f$ [mm/min] | 740 | 670 | 680 | 740 | 700 | 770 | 860 | 800 | 840 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 |
| GGG | $V_c$ [m/min] | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| | f [mm/U] | 0,060 | 0,100 | 0,120 | 0,130 | 0,180 | 0,200 | 0,250 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 410 | 520 | 490 | 440 | 470 | 420 | 430 | 380 | 330 |
| | n [1/min] | 6900 | 5200 | 4100 | 3400 | 2600 | 2100 | 1700 | 1500 | 1300 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | f [mm/U] | 0,030 | 0,040 | 0,040 | 0,050 | 0,070 | 0,100 | 0,120 | 0,130 | 0,140 |
| | $v_f$ [mm/min] | 140 | 140 | 120 | 120 | 130 | 140 | 140 | 130 | 130 |
| | n [1/min] | 4800 | 3600 | 2900 | 2400 | 1800 | 1400 | 1200 | 1000 | 900 |
| Titan | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 50 | 60 | 60 | 70 | 60 | 60 | 60 | 50 | 50 |
| | n [1/min] | 2700 | 2000 | 1600 | 1300 | 1000 | 800 | 700 | 600 | 500 |

**Bei den Werkstoffgruppen INOX < 800 N/mm², INOX > 800 N/mm² und Titan empfehlen wir den Einsatz unseres HAM Nirodrill.**
***We recommend to use our solid carbide high perfomance drill HAM Nirodrill for material INOX < 800 N/mm², INOX > 800 N/mm² and Titan.***

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 285 Superdrill

Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

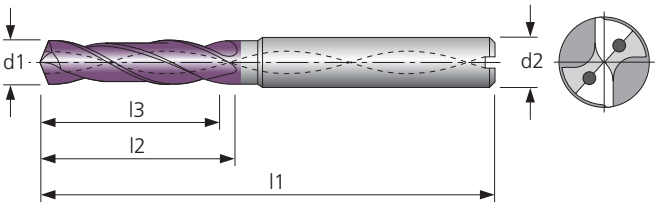
**3 x D**

VHM | Z 2 | 30° rechts | DIN 6537 K | 3 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1741 | | | ● | ● | ● | ● | | | ○ | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,120 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,370 | 0,400 | 0,450 | 0,500 | 0,550 | 0,600 |
| | $v_f$ [mm/min] | 1660 | 1750 | 1660 | 1520 | 1400 | 1310 | 1260 | 1200 | 1170 | 1150 | 1160 | 1140 |
| | n [1/min] | 13800 | 10300 | 8300 | 6900 | 5200 | 4100 | 3400 | 3000 | 2600 | 2300 | 2100 | 1900 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,120 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,370 | 0,400 | 0,450 | 0,500 | 0,550 | 0,600 |
| | $v_f$ [mm/min] | 1140 | 1220 | 1140 | 1060 | 970 | 930 | 890 | 800 | 810 | 800 | 770 | 780 |
| | n [1/min] | 9500 | 7200 | 5700 | 4800 | 3600 | 2900 | 2400 | 2000 | 1800 | 1600 | 1400 | 1300 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,140 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,350 | 0,370 | 0,400 | 0,470 | 0,500 |
| | $v_f$ [mm/min] | 740 | 780 | 770 | 740 | 620 | 590 | 610 | 560 | 520 | 480 | 520 | 500 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 | 1000 |
| Stahl < 55 HRC | $V_c$ [m/min] | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 | 0,04 | 0,05 | 0,06 | 0,07 | 0,08 | 0,09 | 0,1 | 0,12 | 0,14 |
| | $v_f$ [mm/min] | 20 | 20 | 30 | 30 | 30 | 30 | 30 | 20 | 30 | 30 | 20 | 30 |
| | n [1/min] | 1600 | 1200 | 1000 | 800 | 600 | 500 | 400 | 300 | 300 | 300 | 200 | 200 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,110 | 0,120 | 0,140 | 0,160 | 0,200 |
| | $v_f$ [mm/min] | 130 | 130 | 130 | 130 | 110 | 100 | 110 | 100 | 100 | 100 | 100 | 120 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 | 900 | 800 | 700 | 600 | 600 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 | 500 | 500 | 400 |
| GG | $V_c$ [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,120 | 0,140 | 0,170 | 0,220 | 0,270 | 0,370 | 0,450 | 0,500 | 0,620 | 0,650 | 0,720 | 0,750 |
| | $v_f$ [mm/min] | 1520 | 1330 | 1290 | 1410 | 1300 | 1410 | 1440 | 1350 | 1490 | 1370 | 1370 | 1280 |
| | n [1/min] | 12700 | 9500 | 7600 | 6400 | 4800 | 3800 | 3200 | 2700 | 2400 | 2100 | 1900 | 1700 |
| GGG | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,060 | 0,100 | 0,120 | 0,130 | 0,180 | 0,200 | 0,250 | 0,250 | 0,250 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 570 | 720 | 680 | 620 | 650 | 580 | 600 | 500 | 450 | 400 | 420 | 460 |
| | n [1/min] | 9500 | 7200 | 5700 | 4800 | 3600 | 2900 | 2400 | 2000 | 1800 | 1600 | 1400 | 1300 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,090 | 0,120 | 0,140 | 0,150 | 0,160 | 0,170 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 210 | 200 | 190 | 190 | 180 | 190 | 180 | 170 | 160 | 150 | 140 | 140 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 | 900 | 800 | 700 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 | 500 | 500 | 400 |

**Bei den Werkstoffgruppen INOX < 800 N/mm², INOX > 800 N/mm² und Titan empfehlen wir den Einsatz unseres HAM Nirodrill.**
***We recommend to use our solid carbide high perfomance drill HAM Nirodrill for material INOX < 800 N/mm², INOX > 800 N/mm² and Titan.***

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 286 Superdrill

Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

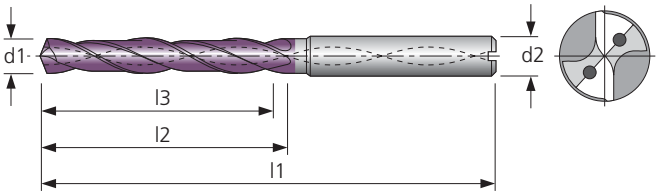
**5 x D**

VHM | Z 2 | 30° rechts | DIN 6537 | 5 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1781 | | | ● | ● | ● | ● | | | ○ | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,120 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,370 | 0,400 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 1660 | 1750 | 1660 | 1520 | 1400 | 1310 | 1260 | 1200 | 1170 | 1150 | 1160 |
| | n [1/min] | 13800 | 10300 | 8300 | 6900 | 5200 | 4100 | 3400 | 3000 | 2600 | 2300 | 2100 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,120 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,370 | 0,400 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 1140 | 1220 | 1140 | 1060 | 970 | 930 | 890 | 800 | 810 | 800 | 770 |
| | n [1/min] | 9500 | 7200 | 5700 | 4800 | 3600 | 2900 | 2400 | 2000 | 1800 | 1600 | 1400 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,140 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,350 | 0,370 | 0,400 | 0,470 |
| | $v_f$ [mm/min] | 740 | 780 | 770 | 740 | 620 | 590 | 610 | 560 | 520 | 480 | 520 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 |
| Stahl < 55 HRC | $V_c$ [m/min] | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 | 0,04 | 0,05 | 0,06 | 0,07 | 0,08 | 0,09 | 0,1 | 0,12 |
| | $v_f$ [mm/min] | 10 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | n [1/min] | 1100 | 800 | 600 | 500 | 400 | 300 | 300 | 200 | 200 | 200 | 200 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,110 | 0,120 | 0,140 | 0,160 |
| | $v_f$ [mm/min] | 130 | 130 | 130 | 130 | 110 | 100 | 110 | 100 | 100 | 100 | 100 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 | 900 | 800 | 700 | 600 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 | 500 | 500 |
| GG | $V_c$ [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,120 | 0,140 | 0,170 | 0,220 | 0,270 | 0,370 | 0,450 | 0,500 | 0,620 | 0,650 | 0,720 |
| | $v_f$ [mm/min] | 1520 | 1330 | 1290 | 1410 | 1300 | 1410 | 1440 | 1350 | 1490 | 1370 | 1370 |
| | n [1/min] | 12700 | 9500 | 7600 | 6400 | 4800 | 3800 | 3200 | 2700 | 2400 | 2100 | 1900 |
| GGG | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,060 | 0,100 | 0,120 | 0,130 | 0,180 | 0,200 | 0,250 | 0,250 | 0,250 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 570 | 720 | 680 | 620 | 650 | 580 | 600 | 500 | 450 | 400 | 420 |
| | n [1/min] | 9500 | 7200 | 5700 | 4800 | 3600 | 2900 | 2400 | 2000 | 1800 | 1600 | 1400 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,090 | 0,120 | 0,140 | 0,150 | 0,160 | 0,170 | 0,180 |
| | $v_f$ [mm/min] | 210 | 200 | 190 | 190 | 180 | 190 | 180 | 170 | 160 | 150 | 140 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 | 900 | 800 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 | 500 | 500 |

**Bei den Werkstoffgruppen INOX < 800 N/mm², INOX > 800 N/mm² und Titan empfehlen wir den Einsatz unseres HAM Nirodrill.**
***We recommend to use our solid carbide high perfomance drill HAM Nirodrill for material INOX < 800 N/mm², INOX > 800 N/mm² and Titan.***

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 292 Superdrill

Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

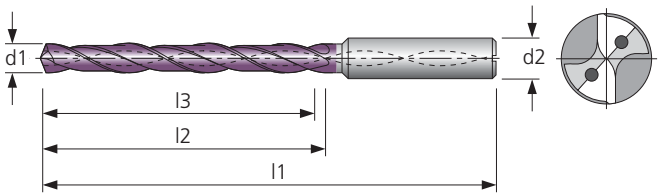
**8 x D**

VHM | Z 2 | 30° rechts | Werk Norm | 8 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1821 | | | ● | ● | ● | ● | | | ○ | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,120 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,370 | 0,400 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 1660 | 1750 | 1660 | 1520 | 1400 | 1310 | 1260 | 1200 | 1170 | 1150 | 1160 |
| | n [1/min] | 13800 | 10300 | 8300 | 6900 | 5200 | 4100 | 3400 | 3000 | 2600 | 2300 | 2100 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,120 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,370 | 0,400 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 1140 | 1220 | 1140 | 1060 | 970 | 930 | 890 | 800 | 810 | 800 | 770 |
| | n [1/min] | 9500 | 7200 | 5700 | 4800 | 3600 | 2900 | 2400 | 2000 | 1800 | 1600 | 1400 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,140 | 0,170 | 0,200 | 0,220 | 0,270 | 0,320 | 0,350 | 0,370 | 0,400 | 0,470 |
| | $v_f$ [mm/min] | 740 | 780 | 770 | 740 | 620 | 590 | 610 | 560 | 520 | 480 | 520 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 |
| Stahl < 55 HRC | $V_c$ [m/min] | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 | 0,04 | 0,05 | 0,06 | 0,07 | 0,08 | 0,09 | 0,1 | 0,12 |
| | $v_f$ [mm/min] | 10 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | n [1/min] | 1100 | 800 | 600 | 500 | 400 | 300 | 300 | 200 | 200 | 200 | 200 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,110 | 0,120 | 0,140 | 0,160 |
| | $v_f$ [mm/min] | 130 | 130 | 130 | 130 | 110 | 100 | 110 | 100 | 100 | 100 | 100 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 | 900 | 800 | 700 | 600 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 | 500 | 500 |
| GG | $V_c$ [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,120 | 0,140 | 0,170 | 0,220 | 0,270 | 0,370 | 0,450 | 0,500 | 0,620 | 0,650 | 0,720 |
| | $v_f$ [mm/min] | 1520 | 1330 | 1290 | 1410 | 1300 | 1410 | 1440 | 1350 | 1490 | 1370 | 1370 |
| | n [1/min] | 12700 | 9500 | 7600 | 6400 | 4800 | 3800 | 3200 | 2700 | 2400 | 2100 | 1900 |
| GGG | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,060 | 0,100 | 0,120 | 0,130 | 0,180 | 0,200 | 0,250 | 0,250 | 0,250 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 570 | 720 | 680 | 620 | 650 | 580 | 600 | 500 | 450 | 400 | 420 |
| | n [1/min] | 9500 | 7200 | 5700 | 4800 | 3600 | 2900 | 2400 | 2000 | 1800 | 1600 | 1400 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,090 | 0,120 | 0,140 | 0,150 | 0,160 | 0,170 | 0,180 |
| | $v_f$ [mm/min] | 210 | 200 | 190 | 190 | 180 | 190 | 180 | 170 | 160 | 150 | 140 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 | 900 | 800 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,015 | 0,020 | 0,025 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 | 500 | 500 |

**Bei den Werkstoffgruppen INOX < 800 N/mm², INOX > 800 N/mm² und Titan empfehlen wir den Einsatz unseres HAM Nirodrill.**
***We recommend to use our solid carbide high perfomance drill HAM Nirodrill for material INOX < 800 N/mm², INOX > 800 N/mm² and Titan.***

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 293 Superdrill

Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

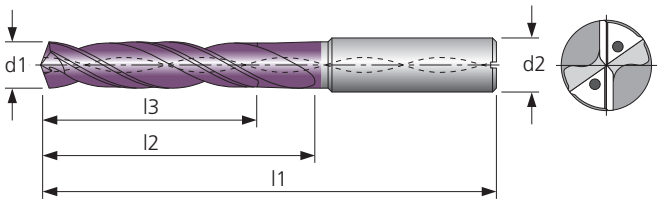
**12 x D**

VHM | Z 2 | 30° rechts | Werk Norm | 12 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1861 | | | ● | ● | ● | ● | | | ○ | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| | f [mm/U] | 0,090 | 0,135 | 0,160 | 0,180 | 0,220 | 0,270 | 0,300 |
| | $v_f$ [mm/min] | 1100 | 1240 | 1170 | 1100 | 1010 | 1000 | 930 |
| | n [1/min] | 12200 | 9200 | 7300 | 6100 | 4600 | 3700 | 3100 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,090 | 0,135 | 0,160 | 0,180 | 0,220 | 0,270 | 0,300 |
| | $v_f$ [mm/min] | 770 | 860 | 820 | 760 | 700 | 680 | 630 |
| | n [1/min] | 8500 | 6400 | 5100 | 4200 | 3200 | 2500 | 2100 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,070 | 0,100 | 0,130 | 0,160 | 0,180 | 0,220 | 0,270 |
| | $v_f$ [mm/min] | 450 | 480 | 490 | 510 | 430 | 420 | 430 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 |
| Stahl < 55 HRC | $V_c$ [m/min] | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | f [mm/U] | 0,01 | 0,02 | 0,03 | 0,04 | 0,05 | 0,06 | 0,07 |
| | $v_f$ [mm/min] | 10 | 20 | 20 | 20 | 20 | 20 | 20 |
| | n [1/min] | 1100 | 800 | 600 | 500 | 400 | 300 | 300 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,025 | 0,035 | 0,045 | 0,050 | 0,070 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 90 | 100 | 100 | 100 | 100 | 100 | 90 |
| | n [1/min] | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 | 900 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,025 | 0,035 | 0,045 | 0,050 | 0,070 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | n [1/min] | 2700 | 2000 | 1600 | 1300 | 1000 | 800 | 700 |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,090 | 0,100 | 0,130 | 0,180 | 0,220 | 0,300 | 0,400 |
| | $v_f$ [mm/min] | 950 | 800 | 830 | 950 | 880 | 960 | 1080 |
| | n [1/min] | 10600 | 8000 | 6400 | 5300 | 4000 | 3200 | 2700 |
| GGG | $V_c$ [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,050 | 0,090 | 0,100 | 0,110 | 0,160 | 0,180 | 0,220 |
| | $v_f$ [mm/min] | 430 | 580 | 510 | 460 | 510 | 450 | 460 |
| | n [1/min] | 8500 | 6400 | 5100 | 4200 | 3200 | 2500 | 2100 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | f [mm/U] | 0,020 | 0,030 | 0,030 | 0,040 | 0,060 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 100 | 110 | 90 | 100 | 110 | 130 | 120 |
| | n [1/min] | 4800 | 3600 | 2900 | 2400 | 1800 | 1400 | 1200 |
| Titan | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,018 | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 |
| | $v_f$ [mm/min] | 50 | 40 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 2700 | 2000 | 1600 | 1300 | 1000 | 800 | 700 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM Nirodrill

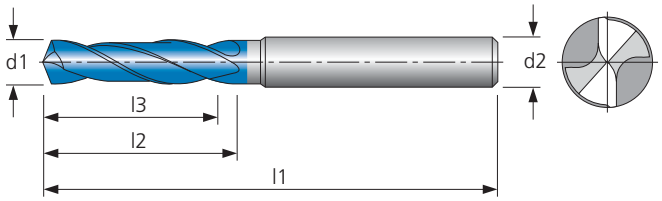
## Vollhartmetall-Spiralbohrer *solid carbide twist drill* 3 x D

VHM | Z 2 | 30° rechts | DIN 6537 K | 3 x D | Typ Werk | 140° | DIN 6535 HA | HPC | SHRINK FIT | DIN 6535 HB | DIN 6535 HE

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1891 | ● | ○ | | | | | | | ● | ● | ○ | | ○ | ● | ● | ○ | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,090 | 0,120 | 0,150 | 0,180 | 0,240 | 0,300 | 0,360 | 0,420 | 0,480 |
| | $v_f$ [mm/min] | 1720 | 1720 | 1730 | 1710 | 1730 | 1710 | 1730 | 1720 | 1730 |
| | n [1/min] | 19100 | 14300 | 11500 | 9500 | 7200 | 5700 | 4800 | 4100 | 3600 |
| Alu > 9% Si | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,080 | 0,110 | 0,140 | 0,170 | 0,230 | 0,290 | 0,350 | 0,410 | 0,470 |
| | $v_f$ [mm/min] | 1100 | 1130 | 1160 | 1170 | 1200 | 1190 | 1190 | 1230 | 1220 |
| | n [1/min] | 13800 | 10300 | 8300 | 6900 | 5200 | 4100 | 3400 | 3000 | 2600 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,040 | 0,050 | 0,055 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 210 | 200 | 180 | 160 | 160 | 160 | 160 | 170 | 200 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,025 | 0,030 | 0,035 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 80 | 70 | 70 | 60 | 70 | 80 | 80 | 80 | 90 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 |
| GG | $V_c$ [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,090 | 0,120 | 0,150 | 0,180 | 0,240 | 0,300 | 0,360 | 0,420 | 0,470 |
| | $v_f$ [mm/min] | 770 | 770 | 770 | 760 | 770 | 750 | 760 | 760 | 750 |
| | n [1/min] | 8500 | 6400 | 5100 | 4200 | 3200 | 2500 | 2100 | 1800 | 1600 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,030 | 0,045 | 0,050 | 0,060 | 0,080 | 0,090 | 0,110 | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 100 | 110 | 100 | 100 | 100 | 90 | 90 | 80 | 90 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 100 | 100 | 100 | 100 | 80 | 80 | 80 | 80 | 80 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,220 | 0,260 | 0,300 | 0,400 |
| | $v_f$ [mm/min] | 1020 | 950 | 910 | 960 | 860 | 840 | 830 | 810 | 960 |
| | n [1/min] | 12700 | 9500 | 7600 | 6400 | 4800 | 3800 | 3200 | 2700 | 2400 |
| Graphit Faserverbund | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 160 | 140 | 130 | 130 | 120 | 120 | 120 | 130 | 120 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 | 800 | 700 | 600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 270 Nirodrill

Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

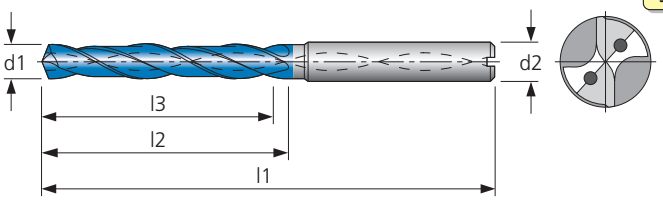
**5 x D**

VHM | Z 2 | 30° rechts | DIN 6537 | 5 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1901 | ● | ○ | | | | | | | ● | ● | ○ | | ○ | ● | ● | ○ | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 |
| | f [mm/U] | 0,120 | 0,180 | 0,200 | 0,250 | 0,300 | 0,400 | 0,500 | 0,600 | 0,800 |
| | $v_f$ [mm/min] | 2800 | 3150 | 2800 | 2930 | 2640 | 2800 | 2900 | 3000 | 3520 |
| | n [1/min] | 23300 | 17500 | 14000 | 11700 | 8800 | 7000 | 5800 | 5000 | 4400 |
| Alu > 9% Si | $V_c$ [m/min] | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,250 | 0,300 | 0,350 | 0,400 | 0,500 | 0,600 |
| | $v_f$ [mm/min] | 1860 | 2090 | 2000 | 2330 | 2100 | 1960 | 1840 | 2000 | 2100 |
| | n [1/min] | 18600 | 13900 | 11100 | 9300 | 7000 | 5600 | 4600 | 4000 | 3500 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,040 | 0,050 | 0,055 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 300 | 280 | 250 | 220 | 220 | 220 | 230 | 240 | 280 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | f [mm/U] | 0,025 | 0,030 | 0,035 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 120 | 110 | 100 | 100 | 110 | 110 | 120 | 120 | 140 |
| | n [1/min] | 4800 | 3600 | 2900 | 2400 | 1800 | 1400 | 1200 | 1000 | 900 |
| GG | $V_c$ [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,420 | 0,500 |
| | $v_f$ [mm/min] | 1270 | 1430 | 1370 | 1280 | 1200 | 1140 | 1120 | 1130 | 1200 |
| | n [1/min] | 12700 | 9500 | 7600 | 6400 | 4800 | 3800 | 3200 | 2700 | 2400 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,030 | 0,045 | 0,050 | 0,060 | 0,080 | 0,090 | 0,110 | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 160 | 180 | 160 | 160 | 160 | 140 | 140 | 130 | 150 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |
| Titan | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 160 | 160 | 160 | 160 | 140 | 130 | 130 | 130 | 140 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,220 | 0,260 | 0,300 | 0,400 |
| | $v_f$ [mm/min] | 1270 | 1190 | 1140 | 1200 | 1080 | 1060 | 1040 | 1020 | 1200 |
| | n [1/min] | 15900 | 11900 | 9500 | 8000 | 6000 | 4800 | 4000 | 3400 | 3000 |
| Grapihit Faserverbund | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 270 | 240 | 220 | 220 | 200 | 190 | 200 | 200 | 200 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 271 Nirodrill

Vollhartmetall-Spiralbohrer
*solid carbide twist drill*

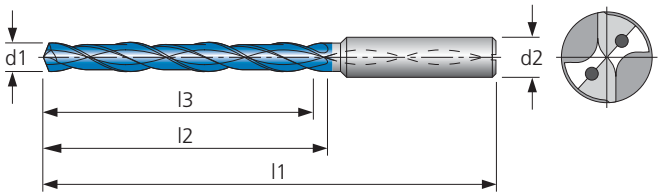
**8 x D**

VHM | Z 2 | 30° rechts | Werk Norm | 8 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1941 | ● | ○ | | | | | | | ● | ● | ○ | | ○ | ● | ● | ○ | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 | 220 |
| | f [mm/U] | 0,120 | 0,180 | 0,200 | 0,250 | 0,300 | 0,400 | 0,500 | 0,600 | 0,800 |
| | $v_f$ [mm/min] | 2800 | 3150 | 2800 | 2930 | 2640 | 2800 | 2900 | 3000 | 3520 |
| | n [1/min] | 23300 | 17500 | 14000 | 11700 | 8800 | 7000 | 5800 | 5000 | 4400 |
| Alu > 9% Si | $V_c$ [m/min] | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,250 | 0,300 | 0,350 | 0,400 | 0,500 | 0,600 |
| | $v_f$ [mm/min] | 1860 | 2090 | 2000 | 2330 | 2100 | 1960 | 1840 | 2000 | 2100 |
| | n [1/min] | 18600 | 13900 | 11100 | 9300 | 7000 | 5600 | 4600 | 4000 | 3500 |
| INOX < 800 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,040 | 0,050 | 0,055 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 300 | 280 | 250 | 220 | 220 | 220 | 230 | 240 | 280 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 |
| INOX > 800 N/mm² | $V_c$ [m/min] | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | f [mm/U] | 0,025 | 0,030 | 0,035 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 120 | 110 | 100 | 100 | 110 | 110 | 120 | 120 | 140 |
| | n [1/min] | 4800 | 3600 | 2900 | 2400 | 1800 | 1400 | 1200 | 1000 | 900 |
| GG | $V_c$ [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,300 | 0,350 | 0,420 | 0,500 |
| | $v_f$ [mm/min] | 1270 | 1430 | 1370 | 1280 | 1200 | 1140 | 1120 | 1130 | 1200 |
| | n [1/min] | 12700 | 9500 | 7600 | 6400 | 4800 | 3800 | 3200 | 2700 | 2400 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,030 | 0,045 | 0,050 | 0,060 | 0,080 | 0,090 | 0,110 | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 160 | 180 | 160 | 160 | 160 | 140 | 140 | 130 | 150 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |
| Titan | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 160 | 160 | 160 | 160 | 140 | 130 | 130 | 130 | 140 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,220 | 0,260 | 0,300 | 0,400 |
| | $v_f$ [mm/min] | 1270 | 1190 | 1140 | 1200 | 1080 | 1060 | 1040 | 1020 | 1200 |
| | n [1/min] | 15900 | 11900 | 9500 | 8000 | 6000 | 4800 | 4000 | 3400 | 3000 |
| Graphit Faserverbund | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 270 | 240 | 220 | 220 | 200 | 190 | 200 | 200 | 200 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 | 1000 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 297 Multidrill

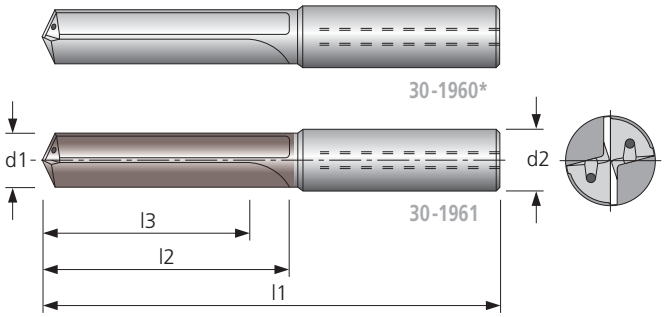
Vollhartmetall-Bohrer
*solid carbide drill*

**3 x D**

VHM | Z 2 | 0° Nut | Werk Norm | 3 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

**Konstruktions-Daten**
- 4-Flächenanschliff
- gerade genutet
- zur Bearbeitung kurzspanender Werkstoffe

***Engineering data***
- *4-facet ground*
- *straight fluted*
- *for machining of short chipping materials*




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-1960* | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |
| 30-1961 | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 2870 | 2870 | 3180 | 2980 | 2850 | 2800 | 2380 | 2700 | 2650 | 2640 |
| | n [1/min] | 23900 | 19100 | 15900 | 11900 | 9500 | 8000 | 6800 | 6000 | 5300 | 4800 |
| Alu > 9% Si | $V_c$ [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 | 0,450 |
| | $v_f$ [mm/min] | 1190 | 1140 | 1200 | 1200 | 1200 | 1200 | 1190 | 1050 | 1080 | 1080 |
| | n [1/min] | 11900 | 9500 | 8000 | 6000 | 4800 | 4000 | 3400 | 3000 | 2700 | 2400 |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,220 | 0,230 | 0,250 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 640 | 640 | 640 | 600 | 580 | 590 | 530 | 500 | 500 | 480 |
| | n [1/min] | 8000 | 6400 | 5300 | 4000 | 3200 | 2700 | 2300 | 2000 | 1800 | 1600 |
| GGG | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,170 | 0,180 | 0,200 | 0,220 | 0,250 |
| | $v_f$ [mm/min] | 340 | 360 | 370 | 340 | 330 | 320 | 290 | 280 | 260 | 280 |
| | n [1/min] | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,220 | 0,250 | 0,250 | 0,280 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 1030 | 1250 | 1240 | 1040 | 900 | 850 | 750 | 730 | 640 | 630 |
| | n [1/min] | 10300 | 8300 | 6900 | 5200 | 4100 | 3400 | 3000 | 2600 | 2300 | 2100 |

** Unbeschichtete Werkzeuge (30-1960): Vc 0,8 (ca.)*
** uncoated tools (30-1960): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 298 Multidrill

Vollhartmetall-Bohrer
*solid carbide drill*

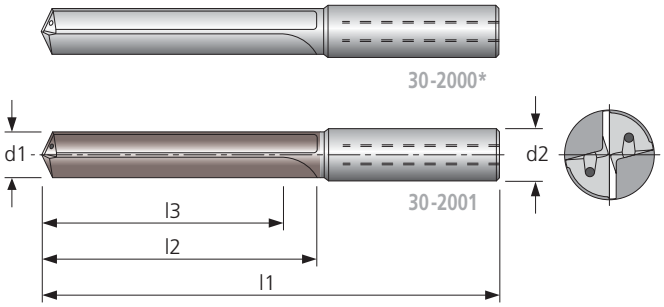
**5 x D**

VHM | Z 2 | 0° Nut | Werk Norm | 5 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2000* | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |
| 30-2001 | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 7 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| | f [mm/U] | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 2720 | 2980 | 2850 | 2800 | 2380 | 2700 | 2650 | 2640 |
| | n [1/min] | 13600 | 11900 | 9500 | 8000 | 6800 | 6000 | 5300 | 4800 |
| Alu > 9% Si | $V_c$ [m/min] | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| | f [mm/U] | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 | 0,450 |
| | $v_f$ [mm/min] | 1710 | 1980 | 2000 | 1980 | 2000 | 1750 | 1760 | 1800 |
| | n [1/min] | 11400 | 9900 | 8000 | 6600 | 5700 | 5000 | 4400 | 4000 |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,120 | 0,150 | 0,180 | 0,220 | 0,230 | 0,250 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 540 | 600 | 580 | 590 | 530 | 500 | 500 | 480 |
| | n [1/min] | 4500 | 4000 | 3200 | 2700 | 2300 | 2000 | 1800 | 1600 |
| GGG | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,170 | 0,180 | 0,200 | 0,220 | 0,250 |
| | $v_f$ [mm/min] | 320 | 340 | 330 | 320 | 290 | 280 | 260 | 280 |
| | n [1/min] | 3200 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,180 | 0,200 | 0,220 | 0,250 | 0,250 | 0,280 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 1060 | 1040 | 900 | 850 | 750 | 730 | 640 | 630 |
| | n [1/min] | 5900 | 5200 | 4100 | 3400 | 3000 | 2600 | 2300 | 2100 |

** Unbeschichtete Werkzeuge (30-2000): Vc 0,8 (ca.)*
** uncoated tools (30-2000): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 299 Multidrill

Vollhartmetall-Bohrer
*solid carbide drill*

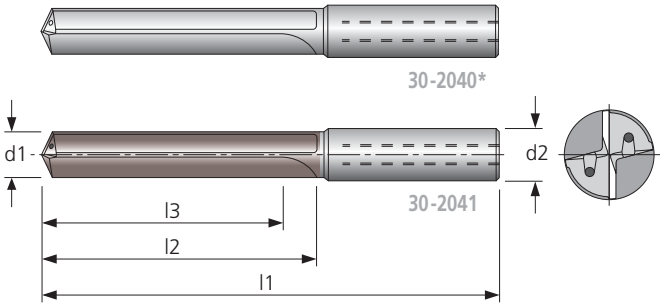
**7 x D**

VHM | Z 2 | 0° Nut | Werk Norm | 7 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2040* | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |
| 30-2041 | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 2870 | 2870 | 3180 | 2980 | 2850 | 2800 | 2380 | 2700 | 2650 | 2640 |
| | n [1/min] | 23900 | 19100 | 15900 | 11900 | 9500 | 8000 | 6800 | 6000 | 5300 | 4800 |
| Alu > 9% Si | $V_c$ [m/min] | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,350 | 0,400 | 0,450 |
| | $v_f$ [mm/min] | 1990 | 1910 | 2000 | 1980 | 2000 | 1980 | 2000 | 1750 | 1760 | 1800 |
| | n [1/min] | 19900 | 15900 | 13300 | 9900 | 8000 | 6600 | 5700 | 5000 | 4400 | 4000 |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,220 | 0,230 | 0,250 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 640 | 640 | 640 | 600 | 580 | 590 | 530 | 500 | 500 | 480 |
| | n [1/min] | 8000 | 6400 | 5300 | 4000 | 3200 | 2700 | 2300 | 2000 | 1800 | 1600 |
| GGG | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,170 | 0,180 | 0,200 | 0,220 | 0,250 |
| | $v_f$ [mm/min] | 340 | 360 | 370 | 340 | 330 | 320 | 290 | 280 | 260 | 280 |
| | n [1/min] | 5600 | 4500 | 3700 | 2800 | 2200 | 1900 | 1600 | 1400 | 1200 | 1100 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,100 | 0,150 | 0,180 | 0,200 | 0,220 | 0,250 | 0,250 | 0,280 | 0,280 | 0,300 |
| | $v_f$ [mm/min] | 1030 | 1250 | 1240 | 1040 | 900 | 850 | 750 | 730 | 640 | 630 |
| | n [1/min] | 10300 | 8300 | 6900 | 5200 | 4100 | 3400 | 3000 | 2600 | 2300 | 2100 |

** Unbeschichtete Werkzeuge (30-2040): Vc 0,8 (ca.)*
** uncoated tools (30-2040): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 294 Multidrill

Vollhartmetall-Bohrer
*solid carbide drill*

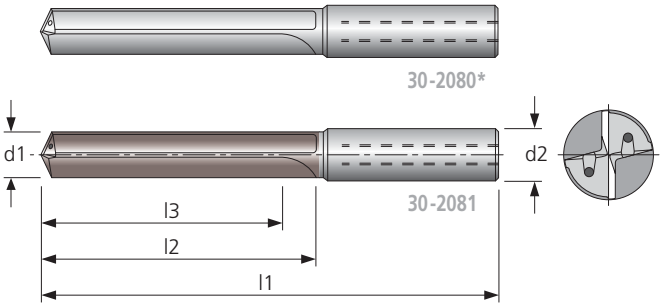
**12 x D**

VHM | Z 2 | 0° Nut | Werk Norm | 12 x D | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2080* | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |
| 30-2081 | ● | ● | | | | | | | | | ● | ○ | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 285 | 285 | 285 | 285 | 285 | 285 | 285 | 285 |
| | f [mm/U] | 0,110 | 0,140 | 0,190 | 0,230 | 0,280 | 0,330 | 0,380 | 0,420 |
| | $v_f$ [mm/min] | 2500 | 2530 | 2870 | 2600 | 2550 | 2510 | 2470 | 2390 |
| | n [1/min] | 22700 | 18100 | 15100 | 11300 | 9100 | 7600 | 6500 | 5700 |
| Alu > 9% Si | $V_c$ [m/min] | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| | f [mm/U] | 0,090 | 0,110 | 0,140 | 0,190 | 0,230 | 0,280 | 0,330 | 0,330 |
| | $v_f$ [mm/min] | 1720 | 1680 | 1780 | 1810 | 1750 | 1790 | 1820 | 1580 |
| | n [1/min] | 19100 | 15300 | 12700 | 9500 | 7600 | 6400 | 5500 | 4800 |
| GG | $V_c$ [m/min] | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| | f [mm/U] | 0,050 | 0,090 | 0,110 | 0,140 | 0,170 | 0,200 | 0,210 | 23,000 |
| | $v_f$ [mm/min] | 380 | 540 | 550 | 530 | 510 | 500 | 460 | 43700 |
| | n [1/min] | 7600 | 6000 | 5000 | 3800 | 3000 | 2500 | 2200 | 1900 |
| GGG | $V_c$ [m/min] | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| | f [mm/U] | 0,050 | 0,070 | 0,090 | 0,110 | 0,140 | 0,160 | 0,170 | 0,190 |
| | $v_f$ [mm/min] | 260 | 290 | 310 | 290 | 290 | 270 | 260 | 250 |
| | n [1/min] | 5200 | 4100 | 3400 | 2600 | 2100 | 1700 | 1500 | 1300 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| | f [mm/U] | 0,090 | 0,140 | 0,170 | 0,190 | 0,200 | 0,230 | 0,230 | 0,260 |
| | $v_f$ [mm/min] | 890 | 1120 | 1120 | 950 | 800 | 760 | 640 | 650 |
| | n [1/min] | 9900 | 8000 | 6600 | 5000 | 4000 | 3300 | 2800 | 2500 |

** Unbeschichtete Werkzeuge (30-2080): Vc 0,8 (ca.)*
** uncoated tools (30-2080): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 296 Multidrill

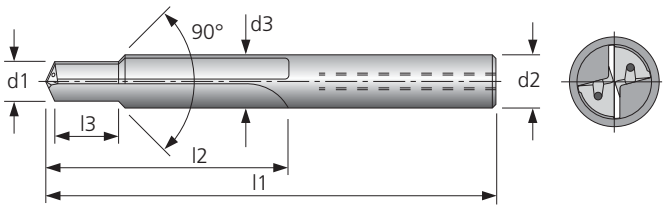
## Vollhartmetall-Stufenbohrer
## *solid carbide step drill*

VHM | Z 2 | 0° Nut | Werk Norm | Typ Werk | 140° | DIN 6535 HAK | HPC | SHRINK FIT | DIN 6535 HBK | DIN 6535 HEK

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2120 | ● | ● | | | | | | | | | ● | ○ | | ● | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | M4 - M5 | M6 - M8 | M10-M12 | M14-M16 | M18-M20 |
|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 300 | 300 | 300 | 300 | 300 |
| | f [mm/U] | 0,100 | 0,150 | 0,200 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 2270 | 1940 | 1880 | 2040 | 1860 |
| | n [1/min] | 22700 | 12900 | 9400 | 6800 | 5300 |
| Alu > 9% Si | $V_c$ [m/min] | 250 | 250 | 250 | 250 | 250 |
| | f [mm/U] | 0,100 | 0,150 | 0,200 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 1890 | 1620 | 1560 | 1710 | 1540 |
| | n [1/min] | 18900 | 10800 | 7800 | 5700 | 4400 |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,200 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 610 | 430 | 620 | 580 | 540 |
| | n [1/min] | 7600 | 4300 | 3100 | 2300 | 1800 |
| GGG | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,100 | 0,150 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 320 | 300 | 330 | 320 | 300 |
| | n [1/min] | 5300 | 3000 | 2200 | 1600 | 1200 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 130 | 130 | 130 | 130 | 130 |
| | f [mm/U] | 0,100 | 0,150 | 0,200 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 990 | 840 | 820 | 900 | 810 |
| | n [1/min] | 9900 | 5600 | 4100 | 3000 | 2300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

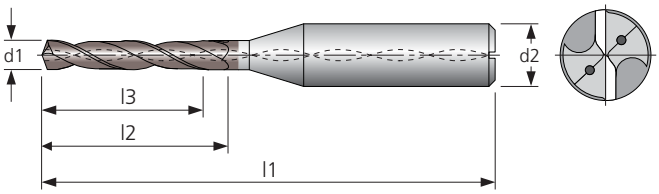
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 5 x D

VHM | Z 2 | 30° rechts | Werk Norm | 5 x D | Typ Werk | 140° | HA | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2181 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,2 | 1,25 - 1,45 | 1,5 - 1,7 | 1,75 - 1,95 | 2 - 2,2 | 2,25 - 2,45 | 2,5 - 2,7 | 2,75 - 3 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,120 | 0,140 | 0,160 |
| | $v_f$ [mm/min] | 1450 | 1420 | 1590 | 1720 | 1820 | 1620 | 1710 | 1760 |
| | n [1/min] | 28900 | 23600 | 19900 | 17200 | 15200 | 13500 | 12200 | 11000 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,030 | 0,040 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 610 | 660 | 560 | 720 | 850 | 950 | 1030 | 1080 |
| | n [1/min] | 20300 | 16500 | 13900 | 12000 | 10600 | 9500 | 8600 | 7700 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | f [mm/U] | 0,030 | 0,060 | 0,060 | 0,080 | 0,080 | 0,100 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 480 | 780 | 650 | 760 | 660 | 740 | 670 | 720 |
| | n [1/min] | 15900 | 13000 | 10900 | 9500 | 8300 | 7400 | 6700 | 6000 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | | |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,018 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 1730 | 1890 | 1990 | 2060 | 2280 | 240 | 2440 | 2750 |
| | n [1/min] | 28900 | 23600 | 19900 | 17200 | 15200 | 13500 | 12200 | 11000 |
| GGG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 1040 | 1130 | 1190 | 1240 | 1370 | 1460 | 1460 | 1650 |
| | n [1/min] | 17400 | 14100 | 11900 | 10300 | 9100 | 8100 | 7300 | 6600 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,020 | 0,020 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 230 | 190 | 320 | 350 | 370 | 430 | 490 | 530 |
| | n [1/min] | 11600 | 9400 | 8000 | 6900 | 6100 | 5400 | 4900 | 4400 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 170 | 210 | 240 | 260 | 270 | 290 | 300 | 330 |
| | n [1/min] | 8700 | 7100 | 6000 | 5200 | 4500 | 4100 | 3700 | 3300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

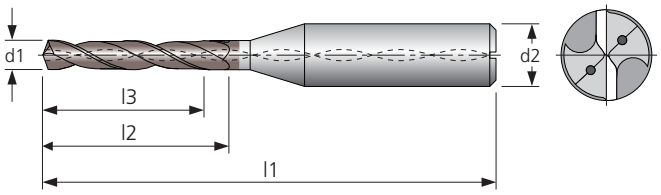
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 8 x D

VHM | Z 2 | 30° rechts | Werk Norm | 8 x D | Typ Werk | 140° | HA | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2221 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,2 | 1,25 - 1,45 | 1,5 - 1,7 | 1,75 - 1,95 | 2 - 2,2 | 2,25 - 2,45 | 2,5 - 2,7 | 2,75 - 3 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,120 | 0,140 | 0,160 |
| | $v_f$ [mm/min] | 1450 | 1420 | 1590 | 1720 | 1820 | 1620 | 1710 | 1760 |
| | n [1/min] | 28900 | 23600 | 19900 | 17200 | 15200 | 13500 | 12200 | 11000 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,030 | 0,040 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 610 | 660 | 560 | 720 | 850 | 950 | 1030 | 1080 |
| | n [1/min] | 20300 | 16500 | 13900 | 12000 | 10600 | 9500 | 8600 | 7700 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | f [mm/U] | 0,030 | 0,060 | 0,060 | 0,080 | 0,080 | 0,100 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 480 | 780 | 650 | 760 | 660 | 740 | 670 | 720 |
| | n [1/min] | 15900 | 13000 | 10900 | 9500 | 8300 | 7400 | 6700 | 6000 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | | |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,018 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 1730 | 1890 | 1990 | 2060 | 2280 | 240 | 2440 | 2750 |
| | n [1/min] | 28900 | 23600 | 19900 | 17200 | 15200 | 13500 | 12200 | 11000 |
| GGG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 1040 | 1130 | 1190 | 1240 | 1370 | 1460 | 1460 | 1650 |
| | n [1/min] | 17400 | 14100 | 11900 | 10300 | 9100 | 8100 | 7300 | 6600 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,020 | 0,020 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 230 | 190 | 320 | 350 | 370 | 430 | 490 | 530 |
| | n [1/min] | 11600 | 9400 | 8000 | 6900 | 6100 | 5400 | 4900 | 4400 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 170 | 210 | 240 | 260 | 270 | 290 | 300 | 330 |
| | n [1/min] | 8700 | 7100 | 6000 | 5200 | 4500 | 4100 | 3700 | 3300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

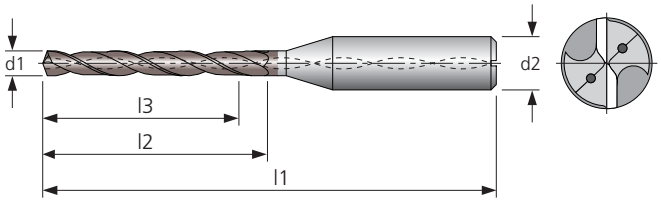
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 12 x D

VHM | Z 2 | 30° rechts | Werk Norm | 12 x D | Typ Werk | 140° | HA | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2261 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,2 | 1,25 - 1,45 | 1,5 - 1,7 | 1,75 - 1,95 | 2 - 2,2 | 2,25 - 2,45 | 2,5 - 2,7 | 2,75 - 3 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 | 0,120 | 0,140 | 0,160 |
| | $v_f$ [mm/min] | 1450 | 1420 | 1590 | 1720 | 1820 | 1620 | 1710 | 1760 |
| | n [1/min] | 28900 | 23600 | 19900 | 17200 | 15200 | 13500 | 12200 | 11000 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,030 | 0,040 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 610 | 660 | 560 | 720 | 850 | 950 | 1030 | 1080 |
| | n [1/min] | 20300 | 16500 | 13900 | 12000 | 10600 | 9500 | 8600 | 7700 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | f [mm/U] | 0,030 | 0,060 | 0,060 | 0,080 | 0,080 | 0,100 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 480 | 780 | 650 | 760 | 660 | 740 | 670 | 720 |
| | n [1/min] | 15900 | 13000 | 10900 | 9500 | 8300 | 7400 | 6700 | 6000 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung Please contact us if you use material INOX | | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | | |
| GG | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,018 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 1730 | 1890 | 1990 | 2060 | 2280 | 240 | 2440 | 2750 |
| | n [1/min] | 28900 | 23600 | 19900 | 17200 | 15200 | 13500 | 12200 | 11000 |
| GGG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 1040 | 1130 | 1190 | 1240 | 1370 | 1460 | 1460 | 1650 |
| | n [1/min] | 17400 | 14100 | 11900 | 10300 | 9100 | 8100 | 7300 | 6600 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,020 | 0,020 | 0,040 | 0,050 | 0,060 | 0,080 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 230 | 190 | 320 | 350 | 370 | 430 | 490 | 530 |
| | n [1/min] | 11600 | 9400 | 8000 | 6900 | 6100 | 5400 | 4900 | 4400 |
| Titan | $V_c$ [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 170 | 210 | 240 | 260 | 270 | 290 | 300 | 330 |
| | n [1/min] | 8700 | 7100 | 6000 | 5200 | 4500 | 4100 | 3700 | 3300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

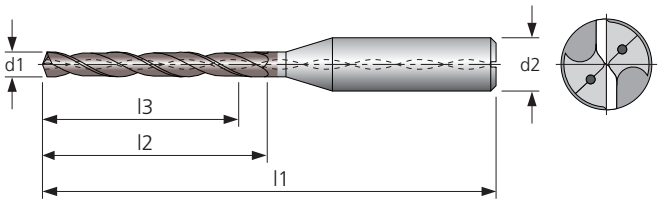
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 15 x D

VHM | Z 2 | 30° rechts | Werk Norm | 15 x D | Typ Werk | 140° | HA | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2301 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,2 | 1,25 - 1,45 | 1,5 - 1,7 | 1,75 - 1,95 | 2 - 2,2 | 2,25 - 2,45 | 2,5 - 2,7 | 2,75 - 3 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| | f [mm/U] | 0,040 | 0,050 | 0,070 | 0,090 | 0,110 | 0,110 | 0,130 | 0,150 |
| | $v_f$ [mm/min] | 1100 | 1120 | 1320 | 1470 | 1580 | 1420 | 1510 | 1560 |
| | n [1/min] | 27500 | 22400 | 18900 | 16300 | 14400 | 12900 | 11600 | 10400 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |
| | f [mm/U] | 0,025 | 0,035 | 0,035 | 0,050 | 0,070 | 0,090 | 0,110 | 0,130 |
| | $v_f$ [mm/min] | 470 | 540 | 450 | 560 | 690 | 790 | 880 | 920 |
| | n [1/min] | 18800 | 15300 | 12900 | 11200 | 9900 | 8800 | 8000 | 7100 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,025 | 0,035 | 0,035 | 0,050 | 0,070 | 0,090 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 360 | 410 | 350 | 430 | 530 | 610 | 610 | 660 |
| | n [1/min] | 14500 | 11800 | 9900 | 8600 | 7600 | 6800 | 6100 | 5500 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | | |
| GG | $V_c$ [m/min] | 95 | 95 | 95 | 95 | 95 | 95 | 95 | 95 |
| | f [mm/U] | 0,050 | 0,070 | 0,100 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 1380 | 1570 | 1890 | 1630 | 1730 | 1940 | 2090 | 2080 |
| | n [1/min] | 27500 | 22400 | 18900 | 16300 | 14400 | 12900 | 11600 | 10400 |
| GGG | $V_c$ [m/min] | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | f [mm/U] | 0,050 | 0,070 | 0,100 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | $v_f$ [mm/min] | 800 | 910 | 1090 | 950 | 1000 | 1110 | 1210 | 1200 |
| | n [1/min] | 15900 | 13000 | 10900 | 9500 | 8300 | 7400 | 6700 | 6000 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,015 | 0,018 | 0,030 | 0,040 | 0,050 | 0,070 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 150 | 150 | 210 | 240 | 270 | 330 | 390 | 380 |
| | n [1/min] | 10100 | 8300 | 7000 | 6000 | 5300 | 4700 | 4300 | 3800 |
| Titan | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,040 | 0,050 | 0,060 | 0,070 | 0,090 |
| | $v_f$ [mm/min] | 110 | 120 | 150 | 170 | 190 | 200 | 220 | 240 |
| | n [1/min] | 7200 | 5900 | 5000 | 4300 | 3800 | 3400 | 3100 | 2700 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

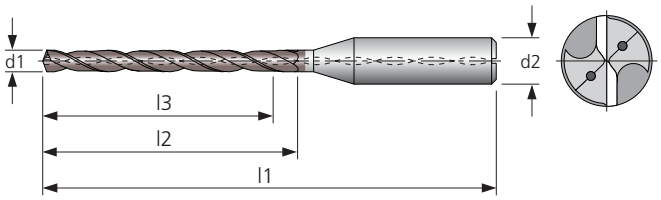
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 20 x D

VHM | Z 2 | 30° rechts | Werk Norm | 20 x D | Typ Werk | 140° | HA | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2341 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 1 - 1,2 | 1,25 - 1,45 | 1,5 - 1,7 | 1,75 - 1,95 | 2 - 2,2 | 2,25 - 2,45 | 2,5 - 2,7 | 2,75 - 3 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,040 | 0,050 | 0,070 | 0,090 | 0,100 | 0,100 | 0,120 | 0,140 |
| | $v_f$ [mm/min] | 1040 | 1060 | 1250 | 1400 | 1360 | 1220 | 1320 | 1390 |
| | n [1/min] | 26000 | 21200 | 17900 | 15500 | 13600 | 12200 | 11000 | 9900 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,025 | 0,036 | 0,036 | 0,050 | 0,070 | 0,090 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 440 | 510 | 430 | 520 | 640 | 730 | 730 | 790 |
| | n [1/min] | 17400 | 14100 | 11900 | 10300 | 9100 | 8100 | 7300 | 6600 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,025 | 0,035 | 0,035 | 0,050 | 0,070 | 0,090 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 360 | 410 | 350 | 430 | 530 | 610 | 550 | 550 |
| | n [1/min] | 14500 | 11800 | 9900 | 8600 | 7600 | 6800 | 6100 | 5500 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | | |
| GG | $V_c$ [m/min] | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| | f [mm/U] | 0,050 | 0,070 | 0,090 | 0,100 | 0,130 | 0,150 | 0,180 | 0,220 |
| | $v_f$ [mm/min] | 1300 | 1480 | 1610 | 1550 | 1770 | 1830 | 1980 | 2180 |
| | n [1/min] | 26000 | 21200 | 17900 | 15500 | 13600 | 12200 | 11000 | 9900 |
| GGG | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,050 | 0,070 | 0,090 | 0,100 | 0,130 | 0,150 | 0,180 | 0,220 |
| | $v_f$ [mm/min] | 730 | 830 | 890 | 860 | 990 | 1020 | 1100 | 1210 |
| | n [1/min] | 14500 | 11800 | 9900 | 8600 | 7600 | 6800 | 6100 | 5500 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,018 | 0,018 | 0,035 | 0,040 | 0,050 | 0,070 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 180 | 150 | 250 | 240 | 270 | 330 | 390 | 380 |
| | n [1/min] | 10100 | 8300 | 7000 | 6000 | 5300 | 4700 | 4300 | 3800 |
| Titan | $V_c$ [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,018 | 0,027 | 0,035 | 0,045 | 0,050 | 0,060 | 0,070 | 0,090 |
| | $v_f$ [mm/min] | 130 | 160 | 180 | 190 | 190 | 200 | 220 | 240 |
| | n [1/min] | 7200 | 5900 | 5000 | 4300 | 3800 | 3400 | 3100 | 2700 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

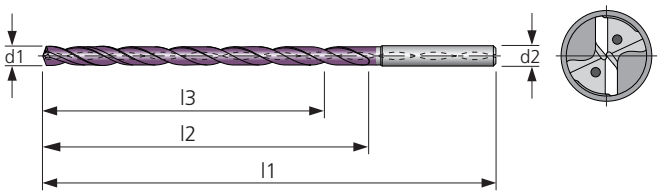
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 15 x D

VHM | Z 2 | 30° rechts | Werk Norm | 15 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2381 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 14 |
|---|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,450 |
| | $v_f$ [mm/min] | 510 | 480 | 570 | 640 | 600 | 570 | 560 | 630 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 | 1400 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,450 |
| | $v_f$ [mm/min] | 420 | 400 | 480 | 540 | 500 | 480 | 460 | 500 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,450 |
| | $v_f$ [mm/min] | 340 | 320 | 380 | 420 | 400 | 390 | 390 | 410 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 | 900 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | | |
| GG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,450 |
| | $v_f$ [mm/min] | 510 | 480 | 570 | 640 | 600 | 570 | 560 | 630 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 | 1400 |
| GGG | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,450 |
| | $v_f$ [mm/min] | 420 | 400 | 480 | 540 | 500 | 480 | 460 | 500 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 | 1100 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,450 |
| | $v_f$ [mm/min] | 340 | 320 | 380 | 420 | 400 | 390 | 390 | 410 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 | 900 |
| Titan | $V_c$ [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,110 |
| | $v_f$ [mm/min] | 80 | 80 | 80 | 80 | 60 | 50 | 50 | 60 |
| | n [1/min] | 2100 | 1600 | 1300 | 1100 | 800 | 600 | 500 | 500 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

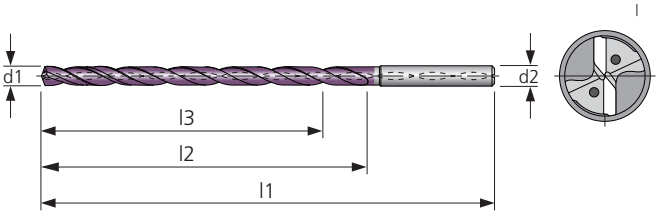
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 20 x D

VHM | Z 2 | 30° rechts | Werk Norm | 20 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2421 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 510 | 480 | 570 | 640 | 600 | 570 | 560 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 420 | 400 | 480 | 540 | 500 | 480 | 460 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 340 | 320 | 380 | 420 | 400 | 390 | 390 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung Please contact us if you use material INOX | | | | | | | |
| INOX > 800 N/mm² | | | | | | | | |
| GG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,400 |
| | $v_f$ [mm/min] | 510 | 720 | 760 | 800 | 720 | 670 | 640 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2400 | 1900 | 1600 |
| GGG | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 | 0,400 |
| | $v_f$ [mm/min] | 420 | 600 | 640 | 680 | 600 | 560 | 520 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 | 1300 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 340 | 320 | 380 | 420 | 400 | 390 | 390 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 | 1100 |
| Titan | $V_c$ [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 |
| | $v_f$ [mm/min] | 80 | 80 | 80 | 80 | 60 | 50 | 50 |
| | n [1/min] | 2100 | 1600 | 1300 | 1100 | 800 | 600 | 500 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

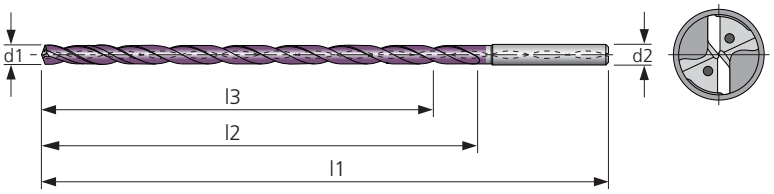
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 25 x D

VHM | Z 2 | 30° rechts | Werk Norm | 25 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2461 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 - 4,5 | 5 - 5,5 | 6 - 6,5 | 8 | 10 |
|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 510 | 480 | 570 | 640 | 680 | 570 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2700 | 1900 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 420 | 400 | 480 | 540 | 580 | 480 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2300 | 1600 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 340 | 320 | 380 | 420 | 450 | 390 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1800 | 1300 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | |
| INOX > 800 N/mm² | | | | | | | |
| GG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 510 | 720 | 760 | 800 | 810 | 670 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 2700 | 1900 |
| GGG | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 | 0,250 | 0,300 | 0,350 |
| | $v_f$ [mm/min] | 420 | 600 | 640 | 680 | 690 | 560 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2300 | 1600 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 340 | 320 | 380 | 420 | 450 | 390 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 1800 | 1300 |
| Titan | $V_c$ [m/min] | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 |
| | $v_f$ [mm/min] | 80 | 80 | 80 | 80 | 70 | 50 |
| | n [1/min] | 2100 | 1600 | 1300 | 1100 | 900 | 600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

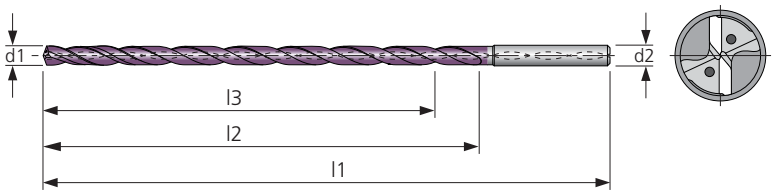
# HAM Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 30 x D

VHM | Z 2 | 30° rechts | Werk Norm | 30 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2501 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 - 4,5 | 5 - 5,5 | 6 - 6,5 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 510 | 450 | 560 | 640 | 680 | 600 |
| | n [1/min] | 6400 | 4500 | 3700 | 3200 | 2700 | 2400 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 420 | 380 | 470 | 540 | 580 | 500 |
| | n [1/min] | 5300 | 3800 | 3100 | 2700 | 2300 | 2000 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 340 | 300 | 360 | 420 | 450 | 400 |
| | n [1/min] | 4200 | 3000 | 2400 | 2100 | 1800 | 1600 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | | | | | |
| INOX > 800 N/mm² | | | | | | | |
| GG | $V_c$ [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 | 0,250 | 0,300 | 0,300 |
| | $v_f$ [mm/min] | 510 | 680 | 740 | 800 | 810 | 720 |
| | n [1/min] | 6400 | 4500 | 3700 | 3200 | 2700 | 2400 |
| GGG | $V_c$ [m/min] | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 | 0,250 | 0,300 | 0,300 |
| | $v_f$ [mm/min] | 420 | 570 | 620 | 680 | 690 | 600 |
| | n [1/min] | 5300 | 3800 | 3100 | 2700 | 2300 | 2000 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,200 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 340 | 300 | 360 | 420 | 450 | 400 |
| | n [1/min] | 4200 | 3000 | 2400 | 2100 | 1800 | 1600 |
| Titan | $V_c$ [m/min] | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,040 | 0,050 | 0,060 | 0,070 | 0,080 | 0,080 |
| | $v_f$ [mm/min] | 80 | 80 | 70 | 80 | 70 | 60 |
| | n [1/min] | 2100 | 1500 | 1200 | 1100 | 900 | 800 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

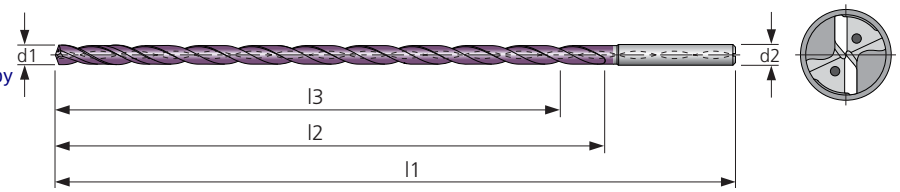
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 40 x D

VHM | Z 2 | 30° rechts | Werk Norm | 40 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2541 | | | ● | ● | ○ | | | | ● | ○ | ● | ● | ○ | ○ | | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 5 |
|---|---|---|---|
| Stahl < 800 N/mm² | $V_c$ [m/min] | 60 | 60 |
| | f [mm/U] | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 380 | 380 |
| | n [1/min] | 4800 | 3800 |
| Stahl < 1200 N/mm² | $V_c$ [m/min] | 50 | 50 |
| | f [mm/U] | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 320 | 320 |
| | n [1/min] | 4000 | 3200 |
| Stahl < 1600 N/mm² | $V_c$ [m/min] | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 260 | 250 |
| | n [1/min] | 3200 | 2500 |
| INOX < 800 N/mm² | Bitte setzen Sie sich beim Einsatz von INOX mit uns in Verbindung<br>Please contact us if you use material INOX | | |
| INOX > 800 N/mm² | | | |
| GG | $V_c$ [m/min] | 60 | 60 |
| | f [mm/U] | 0,080 | 0,150 |
| | $v_f$ [mm/min] | 380 | 570 |
| | n [1/min] | 4800 | 3800 |
| GGG | $V_c$ [m/min] | 50 | 50 |
| | f [mm/U] | 0,080 | 0,150 |
| | $v_f$ [mm/min] | 320 | 480 |
| | n [1/min] | 4000 | 3200 |
| hochwarmfeste Legierungen | $V_c$ [m/min] | 40 | 40 |
| | f [mm/U] | 0,080 | 0,100 |
| | $v_f$ [mm/min] | 260 | 250 |
| | n [1/min] | 3200 | 2500 |
| Titan | $V_c$ [m/min] | 20 | 20 |
| | f [mm/U] | 0,040 | 0,050 |
| | $v_f$ [mm/min] | 60 | 70 |
| | n [1/min] | 1600 | 1300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

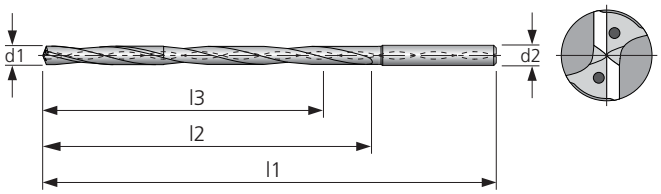
# HAM Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 15 x D

VHM | Z 2 | 15° rechts | Werk Norm | 15 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2580 | ● | ● | | | | | | | | | | | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 4,5 | 5 | 5,5 | 6 | 6,5 | 7 | 8 | 8,5 | 10 | 12 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 135 | 135 | 135 | 180 | 180 | 220 | 220 | 220 | 250 | 250 | 250 | 250 | 250 |
| | f [mm/U] | 0,120 | 0,150 | 0,150 | 0,180 | 0,180 | 0,200 | 0,200 | 0,200 | 0,300 | 0,300 | 0,350 | 0,400 | 0,500 |
| | $v_f$ [mm/min] | 1720 | 1610 | 1430 | 2070 | 1870 | 2340 | 2160 | 2000 | 2970 | 2820 | 2800 | 2640 | 2850 |
| | n [1/min] | 14300 | 10700 | 9500 | 11500 | 10400 | 11700 | 10800 | 10000 | 9900 | 9400 | 8000 | 6600 | 5700 |
| Alu > 9% Si | $V_c$ [m/min] | 100 | 100 | 100 | 150 | 150 | 180 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,300 | 0,400 | 0,400 | 0,550 |
| | $v_f$ [mm/min] | 1060 | 960 | 850 | 1900 | 1740 | 2380 | 2200 | 2050 | 2160 | 2010 | 2280 | 1920 | 2260 |
| | n [1/min] | 10600 | 8000 | 7100 | 9500 | 8700 | 9500 | 8800 | 8200 | 7200 | 6700 | 5700 | 4800 | 4100 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 120 | 120 | 120 | 180 | 180 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,100 | 0,100 | 0,100 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,300 | 0,400 | 0,400 | 0,550 |
| | $v_f$ [mm/min] | 1270 | 950 | 850 | 2300 | 2080 | 2650 | 2450 | 2280 | 2400 | 2250 | 2560 | 2120 | 2480 |
| | n [1/min] | 12700 | 9500 | 8500 | 11500 | 10400 | 10600 | 9800 | 9100 | 8000 | 7500 | 6400 | 5300 | 4500 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

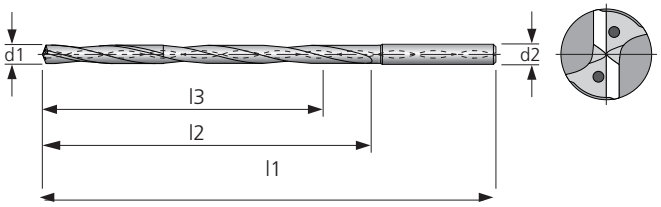
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 20 x D

VHM | Z 2 | 15° rechts | Werk Norm | 20 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2620 | ● | ● | | | | | | | | | | | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 4,5 | 5 | 5,5 | 6 | 6,5 | 7 | 8 | 8,5 | 10 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 135 | 135 | 135 | 180 | 180 | 220 | 220 | 220 | 250 | 250 | 250 | 250 |
| | f [mm/U] | 0,120 | 0,150 | 0,150 | 0,180 | 0,180 | 0,200 | 0,200 | 0,200 | 0,300 | 0,300 | 0,350 | 0,400 |
| | $v_f$ [mm/min] | 1720 | 1610 | 1430 | 2070 | 1870 | 2340 | 2160 | 2000 | 2970 | 2820 | 2800 | 2640 |
| | n [1/min] | 14300 | 10700 | 9500 | 11500 | 10400 | 11700 | 10800 | 10000 | 9900 | 9400 | 8000 | 6600 |
| Alu > 9% Si | $V_c$ [m/min] | 100 | 100 | 100 | 150 | 150 | 180 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,300 | 0,400 | 0,400 |
| | $v_f$ [mm/min] | 1060 | 960 | 850 | 1900 | 1740 | 2380 | 2200 | 2050 | 2160 | 2010 | 2280 | 1920 |
| | n [1/min] | 10600 | 8000 | 7100 | 9500 | 8700 | 9500 | 8800 | 8200 | 7200 | 6700 | 5700 | 4800 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 120 | 120 | 120 | 180 | 180 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,100 | 0,100 | 0,100 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,300 | 0,400 | 0,400 |
| | $v_f$ [mm/min] | 1270 | 950 | 850 | 2300 | 2080 | 2650 | 2450 | 2280 | 2400 | 2250 | 2560 | 2120 |
| | n [1/min] | 12700 | 9500 | 8500 | 11500 | 10400 | 10600 | 9800 | 9100 | 8000 | 7500 | 6400 | 5300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

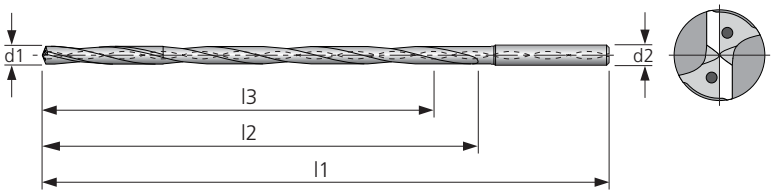
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 25 x D

VHM | Z 2 | 15° rechts | Werk Norm | 25 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2660 | ● | ● | | | | | | | | | | | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 4,5 | 5 | 5,5 | 6 | 6,5 | 7 | 8 | 8,5 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 135 | 135 | 135 | 180 | 180 | 220 | 220 | 220 | 250 | 250 | 250 |
| | f [mm/U] | 0,120 | 0,150 | 0,150 | 0,180 | 0,180 | 0,200 | 0,200 | 0,200 | 0,300 | 0,350 | 0,350 |
| | $v_f$ [mm/min] | 1720 | 1610 | 1430 | 2070 | 1870 | 2340 | 2160 | 2000 | 2970 | 2800 | 2800 |
| | n [1/min] | 14300 | 10700 | 9500 | 11500 | 10400 | 11700 | 10800 | 10000 | 9900 | 8000 | 8000 |
| Alu > 9% Si | $V_c$ [m/min] | 100 | 100 | 100 | 150 | 150 | 180 | 180 | 180 | 180 | 180 | 180 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,400 | 0,400 |
| | $v_f$ [mm/min] | 1060 | 960 | 850 | 1900 | 1740 | 2380 | 2200 | 2050 | 2160 | 2280 | 2280 |
| | n [1/min] | 10600 | 8000 | 7100 | 9500 | 8700 | 9500 | 8800 | 8200 | 7200 | 5700 | 5700 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 120 | 120 | 120 | 180 | 180 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,100 | 0,100 | 0,100 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,400 | 0,400 |
| | $v_f$ [mm/min] | 1270 | 950 | 850 | 2300 | 2080 | 2650 | 2450 | 2280 | 2400 | 2560 | 2560 |
| | n [1/min] | 12700 | 9500 | 8500 | 11500 | 10400 | 10600 | 9800 | 9100 | 8000 | 6400 | 6400 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM

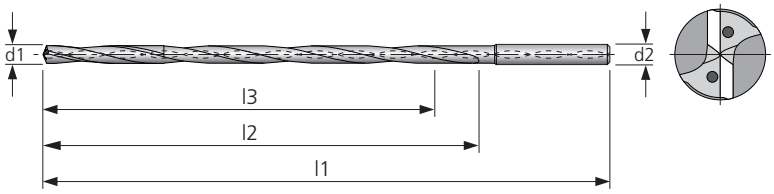
## Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 30 x D

VHM | Z 2 | 15° rechts | Werk Norm | 30 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2700 | ● | ● | | | | | | | | | | | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 4,5 | 5 | 5,5 | 6 | 6,5 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 135 | 135 | 135 | 180 | 180 | 220 | 220 | 220 |
| | f [mm/U] | 0,120 | 0,150 | 0,150 | 0,180 | 0,180 | 0,200 | 0,200 | 0,200 |
| | $v_f$ [mm/min] | 1720 | 1610 | 1430 | 2070 | 1870 | 2340 | 2160 | 2000 |
| | n [1/min] | 14300 | 10700 | 9500 | 11500 | 10400 | 11700 | 10800 | 10000 |
| Alu > 9% Si | $V_c$ [m/min] | 100 | 100 | 100 | 150 | 150 | 180 | 180 | 180 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 1060 | 960 | 850 | 1900 | 1740 | 2380 | 2200 | 2050 |
| | n [1/min] | 10600 | 8000 | 7100 | 9500 | 8700 | 9500 | 8800 | 8200 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 120 | 120 | 120 | 180 | 180 | 200 | 200 | 200 |
| | f [mm/U] | 0,100 | 0,100 | 0,100 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 |
| | $v_f$ [mm/min] | 1270 | 950 | 850 | 2300 | 2080 | 2650 | 2450 | 2280 |
| | n [1/min] | 12700 | 9500 | 8500 | 11500 | 10400 | 10600 | 9800 | 9100 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

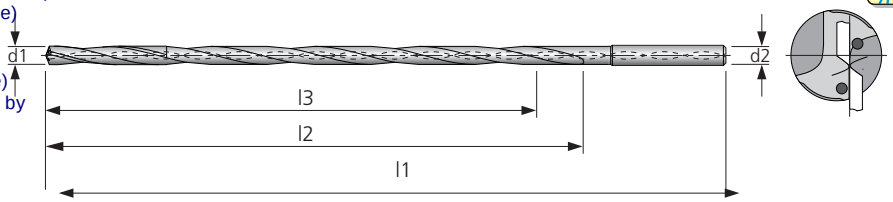
# HAM Vollhartmetall-Tieflochbohrer *solid carbide deep hole drill* 40 x D

VHM | Z 2 | 15° rechts | Werk Norm | 40 x D | Typ Werk | 137° | DIN 6535 HAK | HPC | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2740 | ● | ● | | | | | | | | | | | | | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 5 |
|---|---|---|---|
| Alu | $V_c$ [m/min] | 135 | 135 |
| | f [mm/U] | 0,120 | 0,150 |
| | $v_f$ [mm/min] | 1280 | 1290 |
| | n [1/min] | 10700 | 8600 |
| Alu > 9% Si | $V_c$ [m/min] | 100 | 100 |
| | f [mm/U] | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 800 | 770 |
| | n [1/min] | 8000 | 6400 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 120 | 120 |
| | f [mm/U] | 0,100 | 0,100 |
| | $v_f$ [mm/min] | 950 | 760 |
| | n [1/min] | 9500 | 7600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 329

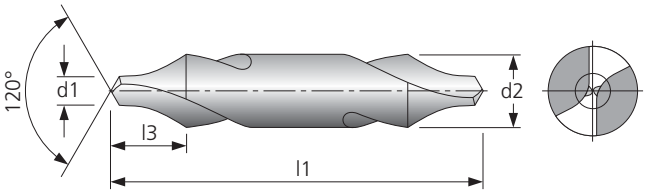
## Vollhartmetall-Zentrierbohrer
## *solid carbide center drill*

VHM | Z 2 | rechts | DIN 333 R | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2760 | ● | ● | ● | ● | ● | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,5 | 0,8 | 1 | 1,25 | 1,6 | 2 | 2,5 | 3,15 | 4 | 5 | 6,3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,020 | 0,020 | 0,020 | 0,020 | 0,030 | 0,030 | 0,060 |
| | vf [mm/min] | 500 | 400 | 320 | 260 | 400 | 320 | 250 | 200 | 240 | 190 | 310 |
| | n [1/min] | min. 50000 | 39800 | 31800 | 25500 | 19900 | 15900 | 12700 | 10100 | 8000 | 6400 | 5100 |
| Alu > 9 % Si | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,020 | 0,020 | 0,020 | 0,020 | 0,030 | 0,030 | 0,060 |
| | vf [mm/min] | 500 | 320 | 260 | 200 | 320 | 250 | 200 | 160 | 190 | 150 | 240 |
| | n [1/min] | min. 50000 | 31800 | 25500 | 20400 | 15900 | 12700 | 10200 | 8100 | 6400 | 5100 | 4000 |
| Stahl < 800 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,020 | 0,020 | 0,030 | 0,030 | 0,080 | 0,080 | 0,100 | 0,100 | 0,150 | 0,150 | 0,200 |
| | vf [mm/min] | 890 | 560 | 670 | 530 | 1110 | 890 | 890 | 710 | 840 | 680 | 700 |
| | n [1/min] | 44600 | 27900 | 22300 | 17800 | 13900 | 11100 | 8900 | 7100 | 5600 | 4500 | 3500 |
| Stahl < 1200 N/mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,010 | 0,010 | 0,020 | 0,020 | 0,070 | 0,070 | 0,080 | 0,080 | 0,100 | 0,100 | 0,150 |
| | vf [mm/min] | 380 | 240 | 380 | 310 | 830 | 670 | 610 | 490 | 480 | 380 | 450 |
| | n [1/min] | 38200 | 23900 | 19100 | 15300 | 11900 | 9500 | 7600 | 6100 | 4800 | 3800 | 3000 |
| Stahl < 1600 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,015 | 0,015 | 0,020 | 0,020 | 0,025 | 0,030 | 0,040 |
| | vf [mm/min] | 320 | 200 | 160 | 130 | 150 | 120 | 130 | 100 | 100 | 100 | 100 |
| | n [1/min] | 31800 | 19900 | 15900 | 12700 | 9900 | 8000 | 6400 | 5100 | 4000 | 3200 | 2500 |
| INOX < 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,025 | 0,025 | 0,030 | 0,030 | 0,040 | 0,050 | 0,070 |
| | vf [mm/min] | 190 | 120 | 100 | 80 | 150 | 120 | 110 | 90 | 100 | 100 | 110 |
| | n [1/min] | 19100 | 11900 | 9500 | 7600 | 6000 | 4800 | 3800 | 3000 | 2400 | 1900 | 1500 |
| INOX > 800 N/mm² | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,020 | 0,020 | 0,025 | 0,025 | 0,030 | 0,040 | 0,050 |
| | vf [mm/min] | 160 | 100 | 80 | 60 | 100 | 80 | 80 | 60 | 60 | 60 | 70 |
| | n [1/min] | 15900 | 9900 | 8000 | 6400 | 5000 | 4000 | 3200 | 2500 | 2000 | 1600 | 1300 |
| GG | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,010 | 0,010 | 0,030 | 0,030 | 0,060 | 0,060 | 0,080 | 0,080 | 0,100 | 0,100 | 0,150 |
| | vf [mm/min] | 450 | 280 | 670 | 530 | 830 | 670 | 710 | 570 | 560 | 450 | 530 |
| | n [1/min] | 44600 | 27900 | 22300 | 17800 | 13900 | 11100 | 8900 | 7100 | 5600 | 4500 | 3500 |
| GGG | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,010 | 0,010 | 0,020 | 0,020 | 0,050 | 0,050 | 0,070 | 0,070 | 0,100 | 0,100 | 0,120 |
| | vf [mm/min] | 380 | 240 | 380 | 310 | 600 | 480 | 530 | 430 | 480 | 380 | 360 |
| | n [1/min] | 38200 | 23900 | 19100 | 15300 | 11900 | 9500 | 7600 | 6100 | 4800 | 3800 | 3000 |
| hochwarmfeste Legierungen | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,015 | 0,015 | 0,020 | 0,020 | 0,025 | 0,030 | 0,040 |
| | vf [mm/min] | 160 | 100 | 80 | 60 | 80 | 60 | 60 | 50 | 50 | 50 | 50 |
| | n [1/min] | 15900 | 9900 | 8000 | 6400 | 5000 | 4000 | 3200 | 2500 | 2000 | 1600 | 1300 |
| Titan | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,015 | 0,015 | 0,020 | 0,020 | 0,025 | 0,030 | 0,035 |
| | vf [mm/min] | 130 | 80 | 60 | 50 | 60 | 50 | 50 | 40 | 40 | 40 | 40 |
| | n [1/min] | 12700 | 8000 | 6400 | 5100 | 4000 | 3200 | 2500 | 2000 | 1600 | 1300 | 1000 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,030 | 0,030 | 0,050 |
| | vf [mm/min] | 500 | 500 | 480 | 380 | 300 | 240 | 190 | 150 | 360 | 290 | 380 |
| | n [1/min] | min. 50000 | min. 50000 | 47700 | 38200 | 29800 | 23900 | 19100 | 15200 | 11900 | 9500 | 7600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 330

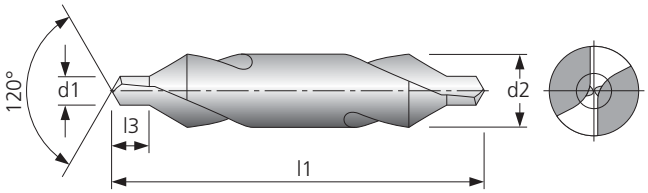
## Vollhartmetall-Zentrierbohrer
## *solid carbide center drill*

VHM | Z 2 | rechts | DIN 333 A | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2800 | ● | ● | ● | ● | ● | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 0,5 | 0,8 | 1 | 1,25 | 1,6 | 2 | 2,5 | 3,15 | 4 | 5 | 6,3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,020 | 0,020 | 0,020 | 0,020 | 0,030 | 0,030 | 0,060 |
| | vf [mm/min] | 500 | 400 | 320 | 260 | 400 | 320 | 250 | 200 | 240 | 190 | 310 |
| | n [1/min] | min. 50000 | 39800 | 31800 | 25500 | 19900 | 15900 | 12700 | 10100 | 8000 | 6400 | 5100 |
| Alu > 9 % Si | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,020 | 0,020 | 0,020 | 0,020 | 0,030 | 0,030 | 0,060 |
| | vf [mm/min] | 500 | 320 | 260 | 200 | 320 | 250 | 200 | 160 | 190 | 150 | 240 |
| | n [1/min] | min. 50000 | 31800 | 25500 | 20400 | 15900 | 12700 | 10200 | 8100 | 6400 | 5100 | 4000 |
| Stahl < 800 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,020 | 0,020 | 0,030 | 0,030 | 0,080 | 0,080 | 0,100 | 0,100 | 0,150 | 0,150 | 0,200 |
| | vf [mm/min] | 890 | 560 | 670 | 530 | 1110 | 890 | 890 | 710 | 840 | 680 | 700 |
| | n [1/min] | 44600 | 27900 | 22300 | 17800 | 13900 | 11100 | 8900 | 7100 | 5600 | 4500 | 3500 |
| Stahl < 1200 N/mm² | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,010 | 0,010 | 0,020 | 0,020 | 0,070 | 0,070 | 0,080 | 0,080 | 0,100 | 0,100 | 0,150 |
| | vf [mm/min] | 380 | 240 | 380 | 310 | 830 | 670 | 610 | 490 | 480 | 380 | 450 |
| | n [1/min] | 38200 | 23900 | 19100 | 15300 | 11900 | 9500 | 7600 | 6100 | 4800 | 3800 | 3000 |
| Stahl < 1600 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,015 | 0,015 | 0,020 | 0,020 | 0,025 | 0,030 | 0,040 |
| | vf [mm/min] | 320 | 200 | 160 | 130 | 150 | 120 | 130 | 100 | 100 | 100 | 100 |
| | n [1/min] | 31800 | 19900 | 15900 | 12700 | 9900 | 8000 | 6400 | 5100 | 4000 | 3200 | 2500 |
| INOX < 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,025 | 0,025 | 0,030 | 0,030 | 0,040 | 0,050 | 0,070 |
| | vf [mm/min] | 190 | 120 | 100 | 80 | 150 | 120 | 110 | 90 | 100 | 100 | 110 |
| | n [1/min] | 19100 | 11900 | 9500 | 7600 | 6000 | 4800 | 3800 | 3000 | 2400 | 1900 | 1500 |
| INOX > 800 N/mm² | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,020 | 0,020 | 0,025 | 0,025 | 0,030 | 0,040 | 0,050 |
| | vf [mm/min] | 160 | 100 | 80 | 60 | 100 | 80 | 80 | 60 | 60 | 60 | 70 |
| | n [1/min] | 15900 | 9900 | 8000 | 6400 | 5000 | 4000 | 3200 | 2500 | 2000 | 1600 | 1300 |
| GG | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,010 | 0,010 | 0,030 | 0,030 | 0,060 | 0,060 | 0,080 | 0,080 | 0,100 | 0,100 | 0,150 |
| | vf [mm/min] | 450 | 280 | 670 | 530 | 830 | 670 | 710 | 570 | 560 | 450 | 530 |
| | n [1/min] | 44600 | 27900 | 22300 | 17800 | 13900 | 11100 | 8900 | 7100 | 5600 | 4500 | 3500 |
| GGG | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,010 | 0,010 | 0,020 | 0,020 | 0,050 | 0,050 | 0,070 | 0,070 | 0,100 | 0,100 | 0,120 |
| | vf [mm/min] | 380 | 240 | 380 | 310 | 600 | 480 | 530 | 430 | 480 | 380 | 360 |
| | n [1/min] | 38200 | 23900 | 19100 | 15300 | 11900 | 9500 | 7600 | 6100 | 4800 | 3800 | 3000 |
| hochwarmfeste Legierungen | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,015 | 0,015 | 0,020 | 0,020 | 0,025 | 0,030 | 0,040 |
| | vf [mm/min] | 160 | 100 | 80 | 60 | 80 | 60 | 60 | 50 | 50 | 50 | 50 |
| | n [1/min] | 15900 | 9900 | 8000 | 6400 | 5000 | 4000 | 3200 | 2500 | 2000 | 1600 | 1300 |
| Titan | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,015 | 0,015 | 0,020 | 0,020 | 0,025 | 0,030 | 0,035 |
| | vf [mm/min] | 130 | 80 | 60 | 50 | 60 | 50 | 50 | 40 | 40 | 40 | 40 |
| | n [1/min] | 12700 | 8000 | 6400 | 5100 | 4000 | 3200 | 2500 | 2000 | 1600 | 1300 | 1000 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,010 | 0,030 | 0,030 | 0,050 |
| | vf [mm/min] | 500 | 500 | 480 | 380 | 300 | 240 | 190 | 150 | 360 | 290 | 380 |
| | n [1/min] | min. 50000 | min. 50000 | 47700 | 38200 | 29800 | 23900 | 19100 | 15200 | 11900 | 9500 | 7600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 331

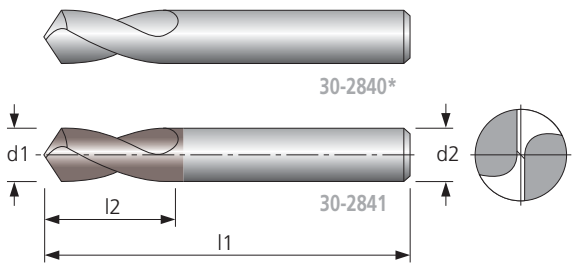
## Vollhartmetall-NC-Anbohrer
## *solid carbide NC-center drill*

VHM | Z 2 | 30° rechts | Werk Norm | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2840* | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |
| 30-2841 | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 5 | 6 | 8 | 10 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,220 | 0,250 | 0,300 |
| | vf [mm/min] | 1270 | 1270 | 1200 | 1280 | 1170 | 1000 | 960 |
| | n [1/min] | 12700 | 10600 | 8000 | 6400 | 5300 | 4000 | 3200 |
| Alu > 9 % Si | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,220 | 0,250 | 0,300 |
| | vf [mm/min] | 950 | 960 | 900 | 960 | 880 | 750 | 720 |
| | n [1/min] | 9500 | 8000 | 6000 | 4800 | 4000 | 3000 | 2400 |
| Stahl < 800 N/mm² | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,220 |
| | vf [mm/min] | 510 | 530 | 480 | 480 | 490 | 400 | 350 |
| | n [1/min] | 6400 | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 |
| Stahl < 1200 N/mm² | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,220 |
| | vf [mm/min] | 410 | 420 | 380 | 380 | 380 | 320 | 290 |
| | n [1/min] | 5100 | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 |
| Stahl < 1600 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | vf [mm/min] | 270 | 300 | 280 | 260 | 290 | 250 | 220 |
| | n [1/min] | 4500 | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 |
| INOX < 800 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | vf [mm/min] | 130 | 160 | 160 | 160 | 160 | 150 | 140 |
| | n [1/min] | 3200 | 2700 | 2000 | 1600 | 1300 | 1000 | 800 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | vf [mm/min] | 80 | 100 | 100 | 100 | 100 | 90 | 90 |
| | n [1/min] | 1900 | 1600 | 1200 | 1000 | 800 | 600 | 500 |
| GG | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | vf [mm/min] | 270 | 300 | 280 | 260 | 290 | 250 | 220 |
| | n [1/min] | 4500 | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 |
| GGG | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | vf [mm/min] | 150 | 190 | 190 | 190 | 190 | 180 | 180 |
| | n [1/min] | 3800 | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 |
| hochwarmfeste Legierungen | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,030 | 0,050 | 0,070 | 0,090 | 0,100 | 0,120 | 0,150 |
| | vf [mm/min] | 60 | 80 | 80 | 90 | 80 | 70 | 80 |
| | n [1/min] | 1900 | 1600 | 1200 | 1000 | 800 | 600 | 500 |
| Titan | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,020 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 |
| | vf [mm/min] | 30 | 40 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 1300 | 1100 | 800 | 600 | 500 | 400 | 300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,220 |
| | vf [mm/min] | 510 | 530 | 480 | 480 | 490 | 400 | 350 |
| | n [1/min] | 6400 | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 |

** Unbeschichtete Werkzeuge (30-2840): Vc 0,8 (ca.)*
** uncoated tools (30-2840): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 332

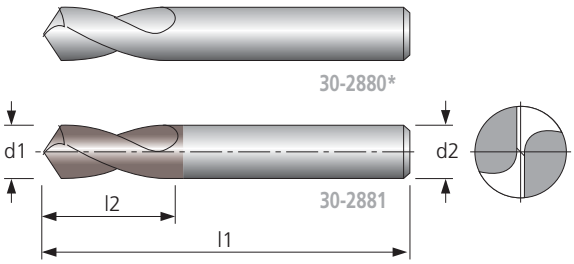
## Vollhartmetall-NC-Anbohrer
## *solid carbide NC-center drill*

VHM | Z 2 | 20° rechts | Werk Norm | Typ N | 90° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2880* | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |
| 30-2881 | ● | ● | ● | ● | ○ | | | | ○ | ○ | ● | ● | ○ | ○ | ● | | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 5 | 6 | 8 | 10 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,220 | 0,250 | 0,300 |
| | vf [mm/min] | 1270 | 1270 | 1200 | 1280 | 1170 | 1000 | 960 |
| | n [1/min] | 12700 | 10600 | 8000 | 6400 | 5300 | 4000 | 3200 |
| Alu > 9 % Si | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,100 | 0,120 | 0,150 | 0,200 | 0,220 | 0,250 | 0,300 |
| | vf [mm/min] | 950 | 960 | 900 | 960 | 880 | 750 | 720 |
| | n [1/min] | 9500 | 8000 | 6000 | 4800 | 4000 | 3000 | 2400 |
| Stahl < 800 N/mm² | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,220 |
| | vf [mm/min] | 510 | 530 | 480 | 480 | 490 | 400 | 350 |
| | n [1/min] | 6400 | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 |
| Stahl < 1200 N/mm² | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,220 |
| | vf [mm/min] | 410 | 420 | 380 | 380 | 380 | 320 | 290 |
| | n [1/min] | 5100 | 4200 | 3200 | 2500 | 2100 | 1600 | 1300 |
| Stahl < 1600 N/mm² | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | vf [mm/min] | 270 | 300 | 280 | 260 | 290 | 250 | 220 |
| | n [1/min] | 4500 | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 |
| INOX < 800 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | vf [mm/min] | 130 | 160 | 160 | 160 | 160 | 150 | 140 |
| | n [1/min] | 3200 | 2700 | 2000 | 1600 | 1300 | 1000 | 800 |
| INOX > 800 N/mm² | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | vf [mm/min] | 80 | 100 | 100 | 100 | 100 | 90 | 90 |
| | n [1/min] | 1900 | 1600 | 1200 | 1000 | 800 | 600 | 500 |
| GG | Vc [m/min] | 70 | 70 | 70 | 70 | 70 | 70 | 70 |
| | f [mm/U] | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 |
| | vf [mm/min] | 270 | 300 | 280 | 260 | 290 | 250 | 220 |
| | n [1/min] | 4500 | 3700 | 2800 | 2200 | 1900 | 1400 | 1100 |
| GGG | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | vf [mm/min] | 150 | 190 | 190 | 190 | 190 | 180 | 180 |
| | n [1/min] | 3800 | 3200 | 2400 | 1900 | 1600 | 1200 | 1000 |
| hochwarmfeste Legierungen | Vc [m/min] | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| | f [mm/U] | 0,030 | 0,050 | 0,070 | 0,090 | 0,100 | 0,120 | 0,150 |
| | vf [mm/min] | 60 | 80 | 80 | 90 | 80 | 70 | 80 |
| | n [1/min] | 1900 | 1600 | 1200 | 1000 | 800 | 600 | 500 |
| Titan | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,020 | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 | 0,150 |
| | vf [mm/min] | 30 | 40 | 50 | 50 | 50 | 50 | 50 |
| | n [1/min] | 1300 | 1100 | 800 | 600 | 500 | 400 | 300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 | 0,200 | 0,220 |
| | vf [mm/min] | 510 | 530 | 480 | 480 | 490 | 400 | 350 |
| | n [1/min] | 6400 | 5300 | 4000 | 3200 | 2700 | 2000 | 1600 |

** Unbeschichtete Werkzeuge (30-2880): Vc 0,8 (ca.)*
** uncoated tools (30-2880): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 337

## Vollhartmetall-Dreischneidensenker
## *solid carbide three fluted countersinker*

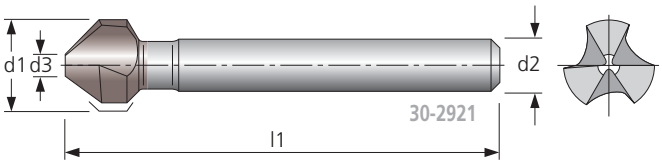
VHM | Z 3 | 0° Nut | DIN 335 C | Typ Werk | 90° | HA

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4

30-2920*




30-2921

| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30-2920* | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ● | ● | ○ | ○ | ● | ○ | ● | ● | | |
| 30-2921 | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ● | ● | ○ | ○ | ● | ○ | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 6,3 | 8,3 | 10,4 | 12,4 | 15 | 16,5 | 20,5 | 25 | 31 |
|---|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,170 | 0,180 | 0,190 | 0,200 | 0,210 | 0,220 | 0,230 | 0,240 | 0,250 |
| | vf [mm/min] | 1290 | 1040 | 870 | 780 | 670 | 640 | 530 | 460 | 380 |
| | n [1/min] | 7600 | 5800 | 4600 | 3900 | 3200 | 2900 | 2300 | 1900 | 1500 |
| Alu > 9 % Si | Vc [m/min] | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,150 | 0,160 | 0,180 | 0,190 | 0,200 | 0,210 | 0,220 | 0,230 | 0,240 |
| | vf [mm/min] | 920 | 740 | 670 | 590 | 500 | 480 | 420 | 350 | 290 |
| | n [1/min] | 6100 | 4600 | 3700 | 3100 | 2500 | 2300 | 1900 | 1500 | 1200 |
| Stahl < 800 N/mm² | Vc [m/min] | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | f [mm/U] | 0,120 | 0,130 | 0,140 | 0,160 | 0,170 | 0,180 | 0,190 | 0,200 | 0,210 |
| | vf [mm/min] | 340 | 270 | 240 | 220 | 200 | 200 | 170 | 140 | 130 |
| | n [1/min] | 2800 | 2100 | 1700 | 1400 | 1200 | 1100 | 900 | 700 | 600 |
| Stahl < 1200 N/mm² | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 | 0,140 | 0,150 | 0,160 |
| | vf [mm/min] | 200 | 170 | 150 | 140 | 130 | 130 | 110 | 90 | 80 |
| | n [1/min] | 2500 | 1900 | 1500 | 1300 | 1100 | 1000 | 800 | 600 | 500 |
| Stahl < 1600 N/mm² | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 |
| | vf [mm/min] | 70 | 60 | 60 | 50 | 50 | 50 | 40 | 40 | 40 |
| | n [1/min] | 1300 | 1000 | 800 | 600 | 500 | 500 | 400 | 300 | 300 |
| Stahl < 55 HRC | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,030 | 0,040 | 0,045 | 0,050 | 0,055 | 0,060 | 0,070 | 0,075 | 0,080 |
| | vf [mm/min] | 50 | 50 | 50 | 50 | 40 | 40 | 40 | 30 | 30 |
| | n [1/min] | 1800 | 1300 | 1100 | 900 | 700 | 700 | 500 | 400 | 400 |
| Stahl < 60 HRC | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,020 | 0,030 | 0,040 | 0,045 | 0,050 | 0,055 | 0,060 | 0,065 | 0,070 |
| | vf [mm/min] | 30 | 30 | 30 | 30 | 30 | 30 | 20 | 20 | 20 |
| | n [1/min] | 1300 | 1000 | 800 | 600 | 500 | 500 | 400 | 300 | 300 |
| Stahl < 66 HRC | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,015 | 0,020 | 0,030 | 0,040 | 0,045 | 0,050 | 0,055 | 0,057 | 0,060 |
| | vf [mm/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 10 |
| | n [1/min] | 1000 | 800 | 600 | 500 | 400 | 400 | 300 | 300 | 200 |
| INOX < 800 N/mm² | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 |
| | vf [mm/min] | 90 | 80 | 80 | 70 | 60 | 70 | 60 | 50 | 50 |
| | n [1/min] | 1800 | 1300 | 1100 | 900 | 700 | 700 | 500 | 400 | 400 |
| INOX > 800 N/mm² | Vc [m/min] | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| | f [mm/U] | 0,030 | 0,040 | 0,045 | 0,050 | 0,055 | 0,600 | 0,070 | 0,075 | 0,080 |
| | vf [mm/min] | 40 | 40 | 40 | 30 | 30 | 300 | 30 | 20 | 20 |
| | n [1/min] | 1300 | 1000 | 800 | 600 | 500 | 500 | 400 | 300 | 300 |
| GG | Vc [m/min] | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | f [mm/U] | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 | 0,140 | 0,150 | 0,160 |
| | vf [mm/min] | 160 | 140 | 120 | 110 | 100 | 100 | 80 | 80 | 60 |
| | n [1/min] | 2000 | 1500 | 1200 | 1000 | 800 | 800 | 600 | 500 | 400 |
| GGG | Vc [m/min] | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 |
| | vf [mm/min] | 90 | 80 | 80 | 70 | 60 | 70 | 60 | 50 | 50 |
| | n [1/min] | 1800 | 1300 | 1100 | 900 | 700 | 700 | 500 | 400 | 400 |
| hochwarmfeste Legierungen | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,030 | 0,040 | 0,045 | 0,050 | 0,055 | 0,060 | 0,070 | 0,075 | 0,080 |
| | vf [mm/min] | 30 | 30 | 30 | 30 | 20 | 20 | 20 | 20 | 20 |
| | n [1/min] | 1000 | 800 | 600 | 500 | 400 | 400 | 300 | 300 | 200 |
| Titan | Vc [m/min] | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | f [mm/U] | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 | 0,140 | 0,150 | 0,160 |
| | vf [mm/min] | 80 | 70 | 60 | 60 | 50 | 50 | 40 | 50 | 30 |
| | n [1/min] | 1000 | 800 | 600 | 500 | 400 | 400 | 300 | 300 | 200 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 |
| | f [mm/U] | 0,120 | 0,130 | 0,140 | 0,160 | 0,170 | 0,180 | 0,190 | 0,200 | 0,210 |
| | vf [mm/min] | 520 | 430 | 360 | 350 | 310 | 290 | 250 | 220 | 190 |
| | n [1/min] | 4300 | 3300 | 2600 | 2200 | 1800 | 1600 | 1300 | 1100 | 900 |
| Graphit Faserverbund | Vc [m/min] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| | f [mm/U] | 0,050 | 0,060 | 0,070 | 0,080 | 0,090 | 0,100 | 0,110 | 0,120 | 0,130 |
| | vf [mm/min] | 130 | 110 | 110 | 100 | 100 | 100 | 90 | 70 | 70 |
| | n [1/min] | 2500 | 1900 | 1500 | 1300 | 1100 | 1000 | 800 | 600 | 500 |

** Unbeschichtete Werkzeuge (30-2920): Vc 0,8 (ca.)*
** uncoated tools (30-2920): Vc 0,8 (ca.)*

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

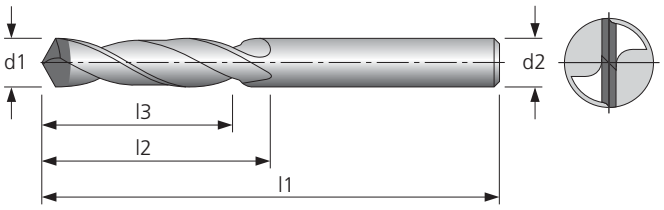
# HAM 3304 Diamant-Vollhartmetall-Spiralbohrer
## *diamond solid carbide twist drill*

PKD | Z 2 | 25° rechts | DIN 6539 | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1000 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,180 | 0,180 | 0,250 | 0,250 | 0,300 | 0,350 | 0,400 | 0,450 | 0,500 | 0,600 |
| | $v_f$ [mm/min] | 4000 | 4770 | 5730 | 5720 | 4910 | 5980 | 5300 | 5730 | 6090 | 6360 | 6120 | 5950 | 5700 |
| | n [1/min] | min. 50000 | 47700 | 38200 | 31800 | 27300 | 23900 | 21200 | 19100 | 17400 | 15900 | 13600 | 11900 | 9500 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,300 | 0,400 | 0,400 | 0,550 |
| | $v_f$ [mm/min] | 4240 | 3820 | 3060 | 4240 | 3640 | 3980 | 3530 | 3180 | 3480 | 3180 | 3640 | 3200 | 3520 |
| | n [1/min] | 42400 | 31800 | 25500 | 21200 | 18200 | 15900 | 14100 | 12700 | 11600 | 10600 | 9100 | 8000 | 6400 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,300 | 0,350 | 0,400 | 0,450 | 0,500 | 0,550 | 0,600 | 0,650 |
| | $v_f$ [mm/min] | 2540 | 2390 | 2540 | 2650 | 2730 | 2400 | 2490 | 2560 | 2610 | 2650 | 2480 | 2400 | 2080 |
| | n [1/min] | 21200 | 15900 | 12700 | 10600 | 9100 | 8000 | 7100 | 6400 | 5800 | 5300 | 4500 | 4000 | 3200 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,050 | 0,080 | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,280 | 0,300 | 0,350 | 0,400 | 0,450 | 0,500 |
| | $v_f$ [mm/min] | 750 | 890 | 890 | 1110 | 1150 | 1120 | 1250 | 1260 | 1230 | 1300 | 1280 | 1260 | 1100 |
| | n [1/min] | 14900 | 11100 | 8900 | 7400 | 6400 | 5600 | 5000 | 4500 | 4100 | 3700 | 3200 | 2800 | 2200 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

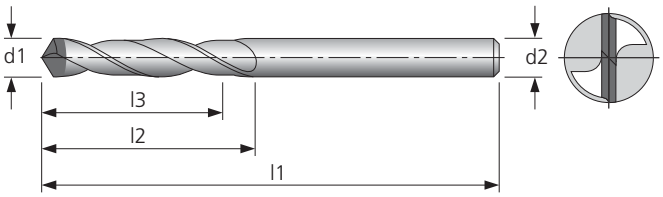
# HAM 3310 Diamant-Vollhartmetall-Spiralbohrer
## *diamond solid carbide twist drill*

PKD | Z 2 | 25° rechts | DIN 338 | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1040 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 16 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,180 | 0,180 | 0,250 | 0,250 | 0,300 | 0,350 | 0,400 | 0,450 | 0,500 | 0,600 |
| | $v_f$ [mm/min] | 4000 | 4770 | 5730 | 5720 | 4910 | 5980 | 5300 | 5730 | 6090 | 6360 | 6120 | 5950 | 5700 |
| | n [1/min] | min. 50000 | 47700 | 38200 | 31800 | 27300 | 23900 | 21200 | 19100 | 17400 | 15900 | 13600 | 11900 | 9500 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 | 0,250 | 0,250 | 0,300 | 0,300 | 0,400 | 0,400 | 0,550 |
| | $v_f$ [mm/min] | 4240 | 3820 | 3060 | 4240 | 3640 | 3980 | 3530 | 3180 | 3480 | 3180 | 3640 | 3200 | 3520 |
| | n [1/min] | 42400 | 31800 | 25500 | 21200 | 18200 | 15900 | 14100 | 12700 | 11600 | 10600 | 9100 | 8000 | 6400 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,300 | 0,350 | 0,400 | 0,450 | 0,500 | 0,550 | 0,600 | 0,650 |
| | $v_f$ [mm/min] | 2540 | 2390 | 2540 | 2650 | 2730 | 2400 | 2490 | 2560 | 2610 | 2650 | 2480 | 2400 | 2080 |
| | n [1/min] | 21200 | 15900 | 12700 | 10600 | 9100 | 8000 | 7100 | 6400 | 5800 | 5300 | 4500 | 4000 | 3200 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,050 | 0,080 | 0,100 | 0,150 | 0,180 | 0,200 | 0,250 | 0,280 | 0,300 | 0,350 | 0,400 | 0,450 | 0,500 |
| | $v_f$ [mm/min] | 750 | 890 | 890 | 1110 | 1150 | 1120 | 1250 | 1260 | 1230 | 1300 | 1280 | 1260 | 1100 |
| | n [1/min] | 14900 | 11100 | 8900 | 7400 | 6400 | 5600 | 5000 | 4500 | 4100 | 3700 | 3200 | 2800 | 2200 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

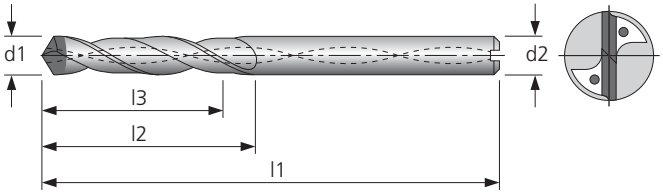
# HAM 3311 Diamant-Vollhartmetall-Spiralbohrer
## *diamond solid carbide twist drill*

PKD | Z 2 | 25° rechts | DIN 338 | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1080 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,250 | 0,300 | 0,400 | 0,450 | 0,500 | 0,550 | 0,600 |
| | $v_f$ [mm/min] | 5980 | 5730 | 6360 | 6120 | 5950 | 5830 | 5700 |
| | n [1/min] | 23900 | 19100 | 15900 | 13600 | 11900 | 10600 | 9500 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,250 | 0,250 | 0,300 | 0,400 | 0,450 | 0,500 | 0,550 |
| | $v_f$ [mm/min] | 3980 | 3180 | 3180 | 3640 | 3600 | 3550 | 3520 |
| | n [1/min] | 15900 | 12700 | 10600 | 9100 | 8000 | 7100 | 6400 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,300 | 0,400 | 0,500 | 0,550 | 0,600 | 0,620 | 0,650 |
| | $v_f$ [mm/min] | 2400 | 2560 | 2650 | 2480 | 2400 | 2170 | 2080 |
| | n [1/min] | 8000 | 6400 | 5300 | 4500 | 4000 | 3500 | 3200 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,200 | 0,250 | 0,300 | 0,350 | 0,380 | 0,450 | 0,500 |
| | $v_f$ [mm/min] | 1120 | 1130 | 1110 | 1120 | 1060 | 1130 | 1100 |
| | n [1/min] | 5600 | 4500 | 3700 | 3200 | 2800 | 2500 | 2200 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

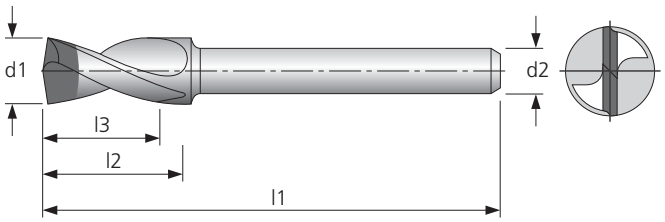
# HAM 3270 Diamant-Vollhartmetall-Spiralbohrer
## *diamond solid carbide twist drill*

PKD | Z 2 | 25° rechts | Werk Norm | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1120 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 2,5 | 3 | 3,5 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 | 0,180 | 0,180 | 0,250 |
| | $v_f$ [mm/min] | 4000 | 5000 | 7500 | 8590 | 6880 | 7950 |
| | n [1/min] | min. 50000 | min. 50000 | min. 50000 | 47700 | 38200 | 31800 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 | 0,200 | 0,200 | 0,250 |
| | $v_f$ [mm/min] | 5000 | 5090 | 4370 | 6360 | 5100 | 5300 |
| | n [1/min] | min. 50000 | 42400 | 36400 | 31800 | 25500 | 21200 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 | 0,250 | 0,300 | 0,300 |
| | $v_f$ [mm/min] | 3060 | 3180 | 3640 | 3980 | 3810 | 3180 |
| | n [1/min] | 25500 | 21200 | 18200 | 15900 | 12700 | 10600 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,050 | 0,080 | 0,100 | 0,120 | 0,150 | 0,180 |
| | $v_f$ [mm/min] | 890 | 1190 | 1270 | 1330 | 1340 | 1330 |
| | n [1/min] | 17800 | 14900 | 12700 | 11100 | 8900 | 7400 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

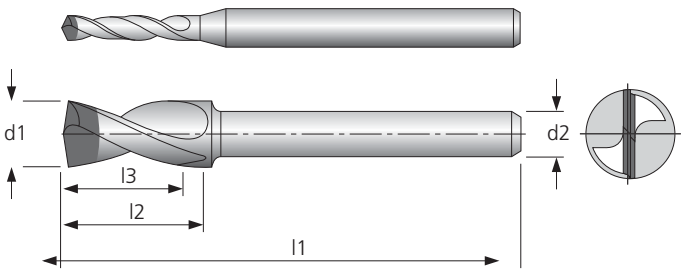
# HAM 3380 Diamant-Vollhartmetall-Spiralbohrer
## *diamond solid carbide twist drill*

PKD | Z 2 | 25° rechts | Werk Norm | Typ N | 130° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1160 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | ≤ 1,00 | ≤ 2,00 | 2,50 | 3,00 | 3,175 |
|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,04 | 0,06 | 0,080 | 0,100 | 0,150 |
| | $v_f$ [mm/min] | 2000 | 3000 | 4000 | 5000 | 7500 |
| | n [1/min] | min. 50000 | min. 50000 | min. 50000 | min. 50000 | min. 50000 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,06 | 0,08 | 0,100 | 0,120 | 0,120 |
| | $v_f$ [mm/min] | 3000 | 4000 | 5000 | 5090 | 4810 |
| | n [1/min] | min. 50000 | min. 50000 | min. 50000 | 42400 | 40100 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,08 | 0,10 | 0,120 | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 4000 | 4240 | 3060 | 3180 | 4020 |
| | n [1/min] | min. 50000 | 42400 | 25500 | 21200 | 20100 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,03 | 0,05 | 0,070 | 0,090 | 0,110 |
| | $v_f$ [mm/min] | 1500 | 1490 | 1250 | 1340 | 1540 |
| | n [1/min] | min. 50000 | 29700 | 17800 | 14900 | 14000 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

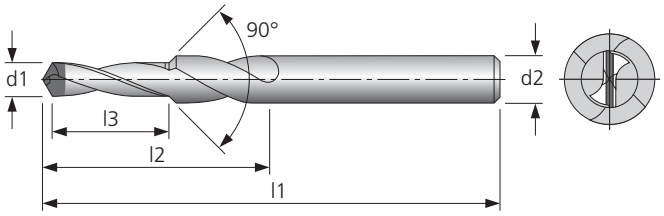
# HAM 3328 Diamant-Vollhartmetall-Stufenbohrer
## *diamond solid carbide step drill*

PKD | Z 2 | 25° rechts | Werk Norm | Typ N | 120° | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1200 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | M4-M5 | M6-M8 | M10-M14 |
|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 |
| | f [mm/U] | 0,080 | 0,100 | 0,150 |
| | $v_f$ [mm/min] | 3640 | 2580 | 2810 |
| | n [1/min] | 45500 | 25800 | 18700 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 |
| | f [mm/U] | 0,100 | 0,120 | 0,120 |
| | $v_f$ [mm/min] | 3030 | 2060 | 1500 |
| | n [1/min] | 30300 | 17200 | 12500 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 |
| | f [mm/U] | 0,120 | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 1820 | 1290 | 1240 |
| | n [1/min] | 15200 | 8600 | 6200 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 |
| | f [mm/U] | 0,080 | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 850 | 900 | 880 |
| | n [1/min] | 10600 | 6000 | 4400 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

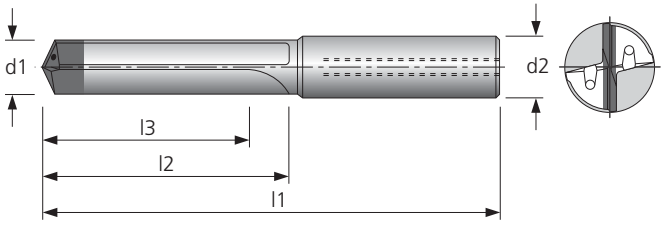
# HAM 3297 Diamant-Vollhartmetall-Multidrill *diamond solid carbide multidrill* 3 x D

PKD | Z 2 | 0° Nut | Werk Norm | 3 x D | Typ Werk | 140° | DIN 6535 HAK | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1240 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,100 | 0,180 | 0,250 | 0,300 | 0,400 |
| | $v_f$ [mm/min] | 4770 | 5720 | 5980 | 5730 | 6360 |
| | n [1/min] | 47700 | 31800 | 23900 | 19100 | 15900 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,120 | 0,200 | 0,250 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 3820 | 4240 | 3980 | 3180 | 3180 |
| | n [1/min] | 31800 | 21200 | 15900 | 12700 | 10600 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,150 | 0,250 | 0,300 | 0,400 | 0,500 |
| | $v_f$ [mm/min] | 2390 | 2650 | 2400 | 2560 | 2650 |
| | n [1/min] | 15900 | 10600 | 8000 | 6400 | 5300 |
| Graphit Faserverbund | $V_c$ [m/min] | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 320 | 320 | 320 | 320 | 320 |
| | n [1/min] | 8000 | 5300 | 4000 | 3200 | 2700 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

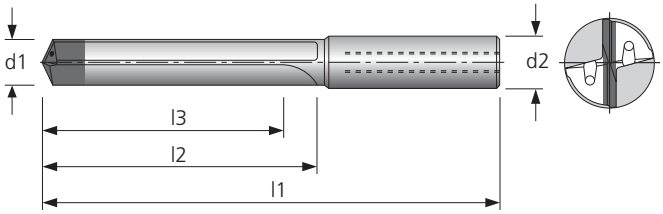
# HAM 3298 Diamant-Vollhartmetall-Multidrill *diamond solid carbide multidrill* 5 x D

PKD | Z 2 | 0° Nut | Werk Norm | 5 x D | Typ Werk | 140° | DIN 6535 HAK | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1280 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 | 600 | 600 | 600 |
| | f [mm/U] | 0,100 | 0,180 | 0,250 | 0,300 | 0,400 |
| | $v_f$ [mm/min] | 4770 | 5720 | 5980 | 5730 | 6360 |
| | n [1/min] | 47700 | 31800 | 23900 | 19100 | 15900 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 | 400 | 400 | 400 |
| | f [mm/U] | 0,120 | 0,200 | 0,250 | 0,250 | 0,300 |
| | $v_f$ [mm/min] | 3820 | 4240 | 3980 | 3180 | 3180 |
| | n [1/min] | 31800 | 21200 | 15900 | 12700 | 10600 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,150 | 0,250 | 0,300 | 0,400 | 0,500 |
| | $v_f$ [mm/min] | 2390 | 2650 | 2400 | 2560 | 2650 |
| | n [1/min] | 15900 | 10600 | 8000 | 6400 | 5300 |
| Graphit Faserverbund | $V_c$ [m/min] | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,040 | 0,060 | 0,080 | 0,100 | 0,120 |
| | $v_f$ [mm/min] | 440 | 440 | 450 | 450 | 440 |
| | n [1/min] | 11100 | 7400 | 5600 | 4500 | 3700 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

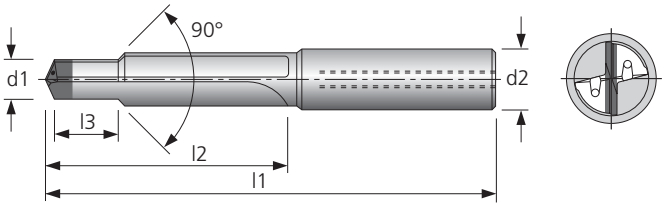
# HAM 3296 Diamant-Vollhartmetall-Multi-Step-Drill
## *diamond solid carbide multi step drill*

PKD | Z 2 | 0° Nut | Werk Norm | Typ Werk | 140° | DIN 6535 HAK | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33-1320 | ● | ● | | | | | | | | | | | | | ● | ● | ● | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | M5-M6-M8 | M10-M14 |
|---|---|---|---|
| Alu | $V_c$ [m/min] | 600 | 600 |
| | f [mm/U] | 0,100 | 0,150 |
| | $v_f$ [mm/min] | 2580 | 2810 |
| | n [1/min] | 25800 | 18700 |
| Alu > 9% Si | $V_c$ [m/min] | 400 | 400 |
| | f [mm/U] | 0,120 | 0,120 |
| | $v_f$ [mm/min] | 2060 | 1500 |
| | n [1/min] | 17200 | 12500 |
| NE-Metalle Cu-Leg. | $V_c$ [m/min] | 200 | 200 |
| | f [mm/U] | 0,150 | 0,200 |
| | $v_f$ [mm/min] | 1290 | 1240 |
| | n [1/min] | 8600 | 6200 |
| Graphit Faserverbund | $V_c$ [m/min] | 100 | 100 |
| | f [mm/U] | 0,080 | 0,150 |
| | $v_f$ [mm/min] | 340 | 470 |
| | n [1/min] | 4300 | 3100 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 510

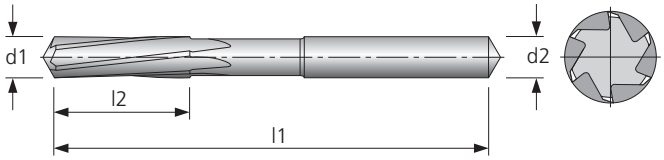
## Vollhartmetall-Maschinenreibahlen
## *solid carbide chucking reamer*

VHM | Z 4–6 | 6°– 8° li | Werk Norm | Typ Werk | H 7 | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50-1040 | ● | ● | ● | ● | ○ | ● | | | ○ | ○ | ● | ● | ○ | ● | ● | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | < 5 | < 10 | < 15 |
|---|---|---|---|---|
| Alu | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,15 | 0,25 | 0,30 |
| | vf [mm/min] | 480 | 400 | 330 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Alu > 9 % Si | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,15 | 0,25 | 0,3 |
| | vf [mm/min] | 360 | 300 | 240 |
| | n [1/min] | 2400 | 1200 | 800 |
| Stahl < 800 N/mm² | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,10 | 0,15 | 0,20 |
| | vf [mm/min] | 240 | 180 | 160 |
| | n [1/min] | 2400 | 1200 | 800 |
| Stahl < 1200 N/mm² | Vc [m/min] | 25 | 25 | 25 |
| | f [mm/U] | 0,1 | 0,15 | 0,2 |
| | vf [mm/min] | 200 | 150 | 140 |
| | n [1/min] | 2000 | 1000 | 700 |
| Stahl < 1600 N/mm² | Vc [m/min] | 20 | 20 | 20 |
| | f [mm/U] | 0,05 | 0,1 | 0,15 |
| | vf [mm/min] | 80 | 80 | 80 |
| | n [1/min] | 1600 | 800 | 500 |
| Stahl < 55 HRC | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,03 | 0,09 | 0,14 |
| | vf [mm/min] | 40 | 50 | 60 |
| | n [1/min] | 1200 | 600 | 400 |
| INOX < 800 N/mm² | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| INOX > 800 N/mm² | Vc [m/min] | 8 | 8 | 8 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 10 | 20 | 20 |
| | n [1/min] | 600 | 300 | 200 |
| GG | Vc [m/min] | 20 | 20 | 20 |
| | f [mm/U] | 0,1 | 0,15 | 0,3 |
| | vf [mm/min] | 160 | 120 | 150 |
| | n [1/min] | 1600 | 800 | 500 |
| GGG | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 100 | 80 | 100 |
| | n [1/min] | 1200 | 600 | 400 |
| hochwarmfeste Legierungen | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| Titan | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 260 | 220 | 280 |
| | n [1/min] | 3200 | 1600 | 1100 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 516

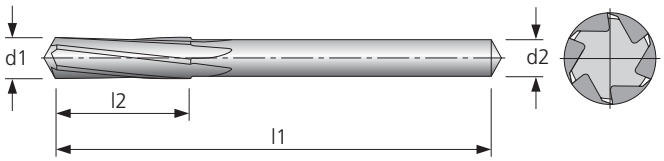
## Vollhartmetall-Automaten-Reibahlen
## *solid carbide chucking reamer*

VHM | Z 6–8 | 6°– 8° re | Werk Norm | Typ Werk | H 7 | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50-1080 | ● | ● | ● | ● | ● | ● | | | ○ | ○ | ● | ● | ○ | ● | ● | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | < 5 | < 10 | < 15 |
|---|---|---|---|---|
| Alu | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,15 | 0,25 | 0,30 |
| | vf [mm/min] | 480 | 400 | 330 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Alu > 9 % Si | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,15 | 0,25 | 0,3 |
| | vf [mm/min] | 360 | 300 | 240 |
| | n [1/min] | 2400 | 1200 | 800 |
| Stahl < 800 N/mm² | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,10 | 0,15 | 0,20 |
| | vf [mm/min] | 240 | 180 | 160 |
| | n [1/min] | 2400 | 1200 | 800 |
| Stahl < 1200 N/mm² | Vc [m/min] | 25 | 25 | 25 |
| | f [mm/U] | 0,1 | 0,15 | 0,2 |
| | vf [mm/min] | 200 | 150 | 140 |
| | n [1/min] | 2000 | 1000 | 700 |
| Stahl < 1600 N/mm² | Vc [m/min] | 20 | 20 | 20 |
| | f [mm/U] | 0,05 | 0,1 | 0,15 |
| | vf [mm/min] | 80 | 80 | 80 |
| | n [1/min] | 1600 | 800 | 500 |
| Stahl < 55 HRC | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,03 | 0,09 | 0,14 |
| | vf [mm/min] | 40 | 50 | 60 |
| | n [1/min] | 1200 | 600 | 400 |
| Stahl < 60 HRC | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| INOX < 800 N/mm² | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| INOX > 800 N/mm² | Vc [m/min] | 8 | 8 | 8 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 10 | 20 | 20 |
| | n [1/min] | 600 | 300 | 200 |
| GG | Vc [m/min] | 20 | 20 | 20 |
| | f [mm/U] | 0,1 | 0,15 | 0,3 |
| | vf [mm/min] | 160 | 120 | 150 |
| | n [1/min] | 1600 | 800 | 500 |
| GGG | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 100 | 80 | 100 |
| | n [1/min] | 1200 | 600 | 400 |
| hochwarmfeste Legierungen | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| Titan | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 260 | 220 | 280 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Graphit Faserverbund | $V_c$ [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,08 | 0,16 | 0,24 |
| | $v_f$ [mm/min] | 320 | 320 | 310 |
| | n [1/min] | 4000 | 2000 | 1300 |



Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 533

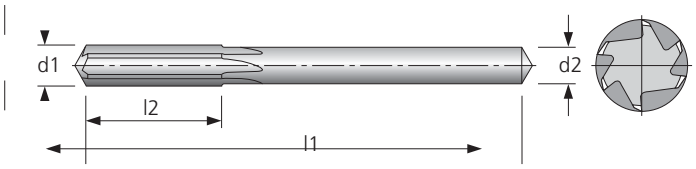
## Vollhartmetall-Automaten-Reibahlen
*solid carbide chucking reamer*

VHM | Z 6–8 | 0° Nut | Werk Norm | Typ Werk | H 7 | HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50-1120 | ○ | ○ | ● | ● | ● | ● | | | ○ | ○ | ● | ● | ○ | ● | ● | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | < 5 | < 10 | < 15 |
|---|---|---|---|---|
| Alu | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,08 | 0,15 | 0,25 |
| | vf [mm/min] | 320 | 300 | 330 |
| | n [1/min] | 4000 | 2000 | 1300 |
| Alu > 9 % Si | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,08 | 0,15 | 0,25 |
| | vf [mm/min] | 260 | 240 | 280 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Stahl < 800 N/mm² | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,06 | 0,12 | 0,18 |
| | vf [mm/min] | 140 | 140 | 140 |
| | n [1/min] | 2400 | 1200 | 800 |
| Stahl < 1200 N/mm² | Vc [m/min] | 25 | 25 | 25 |
| | f [mm/U] | 0,06 | 0,12 | 0,18 |
| | vf [mm/min] | 120 | 120 | 130 |
| | n [1/min] | 2000 | 1000 | 700 |
| Stahl < 1600 N/mm² | Vc [m/min] | 20 | 20 | 20 |
| | f [mm/U] | 0,05 | 0,1 | 0,15 |
| | vf [mm/min] | 80 | 80 | 80 |
| | n [1/min] | 1600 | 800 | 500 |
| Stahl < 55 HRC | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,03 | 0,09 | 0,14 |
| | vf [mm/min] | 40 | 50 | 60 |
| | n [1/min] | 1200 | 600 | 400 |
| INOX < 800 N/mm² | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,1 | 0,15 | 0,3 |
| | vf [mm/min] | 240 | 180 | 240 |
| | n [1/min] | 2400 | 1200 | 800 |
| INOX > 800 N/mm² | Vc [m/min] | 20 | 20 | 20 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 130 | 110 | 130 |
| | n [1/min] | 1600 | 800 | 500 |
| GG | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| GGG | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 20 | 20 |
| | n [1/min] | 800 | 400 | 300 |
| hochwarmfeste Legierungen | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 260 | 220 | 280 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Titan | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,08 | 0,16 | 0,24 |
| | vf [mm/min] | 320 | 320 | 310 |
| | n [1/min] | 4000 | 2000 | 1300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 260 | 220 | 280 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Graphit Faserverbund | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,08 | 0,16 | 0,24 |
| | vf [mm/min] | 320 | 320 | 310 |
| | n [1/min] | 4000 | 2000 | 1300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 540

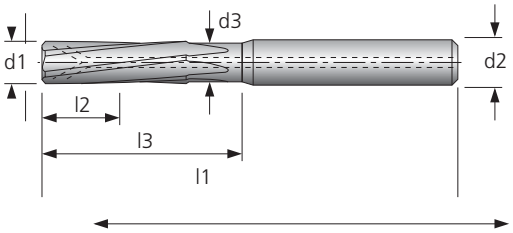
## Vollhartmetall-Maschinenreibahlen
*solid carbide chucking reamer*

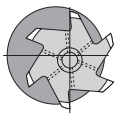
VHM | Z 4–6 | 6°– 8° li | Werk Norm | Typ Werk | H 7 | DIN 6535 HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4



| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50-1160 | ● | ● | ● | ● | ● | ○ | | | ○ | ○ | ● | ● | ○ | ● | ● | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | < 5 | < 10 | < 12 |
|---|---|---|---|---|
| Alu | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,16 | 0,30 | 0,35 |
| | vf [mm/min] | 640 | 600 | 460 |
| | n [1/min] | 4000 | 2000 | 1300 |
| Alu > 9 % Si | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,16 | 0,3 | 0,35 |
| | vf [mm/min] | 510 | 480 | 390 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Stahl < 800 N/mm² | Vc [m/min] | 40 | 40 | 40 |
| | f [mm/U] | 0,12 | 0,18 | 0,25 |
| | vf [mm/min] | 380 | 290 | 280 |
| | n [1/min] | 3200 | 1600 | 1100 |
| Stahl < 1200 N/mm² | Vc [m/min] | 35 | 35 | 35 |
| | f [mm/U] | 0,12 | 0,18 | 0,25 |
| | vf [mm/min] | 340 | 250 | 230 |
| | n [1/min] | 2800 | 1400 | 900 |
| Stahl < 1600 N/mm² | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,05 | 0,1 | 0,15 |
| | vf [mm/min] | 120 | 120 | 120 |
| | n [1/min] | 2400 | 1200 | 800 |
| Stahl < 55 HRC | Vc [m/min] | 25 | 25 | 25 |
| | f [mm/U] | 0,03 | 0,1 | 0,15 |
| | vf [mm/min] | 60 | 100 | 110 |
| | n [1/min] | 2000 | 1000 | 700 |
| INOX < 800 N/mm² | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,02 | 0,06 | 0,1 |
| | vf [mm/min] | 20 | 40 | 40 |
| | n [1/min] | 1200 | 600 | 400 |
| INOX > 800 N/mm² | Vc [m/min] | 10 | 10 | 10 |
| | f [mm/U] | 0,02 | 0,06 | 0,10 |
| | vf [mm/min] | 20 | 20 | 30 |
| | n [1/min] | 800 | 400 | 300 |
| GG | Vc [m/min] | 30 | 30 | 30 |
| | f [mm/U] | 0,1 | 0,15 | 0,3 |
| | vf [mm/min] | 240 | 180 | 240 |
| | n [1/min] | 2400 | 1200 | 800 |
| GGG | Vc [m/min] | 25 | 25 | 25 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 160 | 140 | 180 |
| | n [1/min] | 2000 | 1000 | 700 |
| hochwarmfeste Legierungen | Vc [m/min] | 15 | 15 | 15 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 30 | 30 |
| | n [1/min] | 1200 | 600 | 400 |
| Titan | Vc [m/min] | 12 | 12 | 12 |
| | f [mm/U] | 0,02 | 0,05 | 0,08 |
| | vf [mm/min] | 20 | 30 | 20 |
| | n [1/min] | 1000 | 500 | 300 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 320 | 280 | 330 |
| | n [1/min] | 4000 | 2000 | 1300 |
| Graphit Faserverbund | Vc [m/min] | 50 | 50 | 50 |
| | f [mm/U] | 0,08 | 0,16 | 0,24 |
| | vf [mm/min] | 320 | 320 | 310 |
| | n [1/min] | 4000 | 2000 | 1300 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

# HAM 512

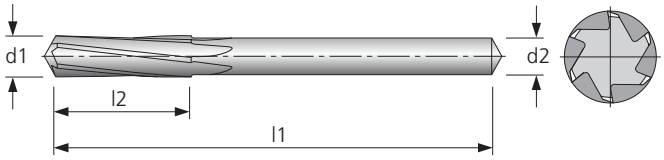
## Cermet-Reibahlen
## *cermets reamer*

Cermet | Z 6 | 6°– 8° re | Werk Norm | Typ Werk | H 7 | HA

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4




| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52-1000 | | | ● | ● | | | | | | | ● | ● | | | | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | < 7 | < 10 | < 12 |
|---|---|---|---|---|
| Stahl < 800 N/mm² | Vc [m/min] | 150 | 150 | 150 |
| | f [mm/U] | 0,06 | 0,12 | 0,18 |
| | vf [mm/min] | 480 | 580 | 720 |
| | n [1/min] | 8000 | 4800 | 4000 |
| Stahl < 1200 N/mm² | Vc [m/min] | 120 | 120 | 120 |
| | f [mm/U] | 0,06 | 0,12 | 0,18 |
| | vf [mm/min] | 380 | 460 | 580 |
| | n [1/min] | 6400 | 3800 | 3200 |
| GG | Vc [m/min] | 80 | 80 | 80 |
| | f [mm/U] | 0,1 | 0,15 | 0,3 |
| | vf [mm/min] | 420 | 380 | 630 |
| | n [1/min] | 4200 | 2500 | 2100 |
| GGG | Vc [m/min] | 60 | 60 | 60 |
| | f [mm/U] | 0,08 | 0,14 | 0,25 |
| | vf [mm/min] | 260 | 270 | 400 |
| | n [1/min] | 3200 | 1900 | 1600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

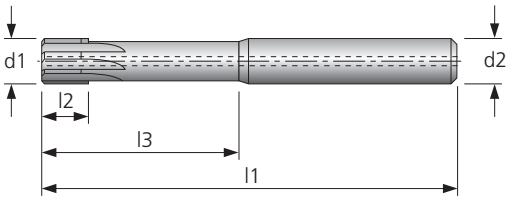
# HAM 6913 Cermet-Reibahlen mit Innenkühlung
## *cermets reamer with interior coolant*

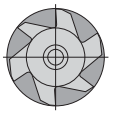
Cermet | Z 4–6 | 0° Nut | Werk Norm | Typ Werk | H 7 | DIN 6535 HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4



| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52-1040 | | | ● | ● | | | | | | | ● | ● | | | | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,05 | 0,12 | 0,20 | 0,25 | 0,28 | 0,35 |
| | vf [mm/min] | 400 | 720 | 960 | 1000 | 1120 | 1400 |
| | n [1/min] | 8000 | 6000 | 4800 | 4000 | 4000 | 4000 |
| Stahl < 1200 N/mm² | Vc [m/min] | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,05 | 0,12 | 0,2 | 0,25 | 0,28 | 0,35 |
| | vf [mm/min] | 320 | 580 | 760 | 800 | 900 | 1120 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 3200 | 3200 |
| GG | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,1 | 0,15 | 0,25 | 0,3 | 0,35 | 0,4 |
| | vf [mm/min] | 420 | 480 | 630 | 630 | 740 | 840 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 2100 | 2100 |
| GGG | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,1 | 0,15 | 0,25 | 0,3 | 0,35 | 0,4 |
| | vf [mm/min] | 320 | 360 | 480 | 480 | 560 | 640 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1600 | 1600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

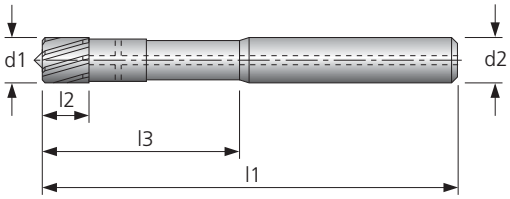
# HAM 6917 Cermet-Reibahlen mit Innenkühlung
## *cermets reamer with interior coolant*

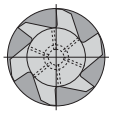
Cermet | Z 4–6 | 7° links | Werk Norm | Typ Werk | H 7 | DIN 6535 HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4



| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52-1080 | | | ● | ● | | | | | | | ● | ● | | | | | | ● | | |

● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

| Werkstoffgruppe Material group | ø | 6 | 8 | 10 | 12 | 14 | 16 |
|---|---|---|---|---|---|---|---|
| Stahl < 800 N/mm² | Vc [m/min] | 150 | 150 | 150 | 150 | 150 | 150 |
| | f [mm/U] | 0,05 | 0,12 | 0,20 | 0,25 | 0,28 | 0,35 |
| | vf [mm/min] | 400 | 720 | 960 | 1000 | 1120 | 1400 |
| | n [1/min] | 8000 | 6000 | 4800 | 4000 | 4000 | 4000 |
| Stahl < 1200 N/mm² | Vc [m/min] | 120 | 120 | 120 | 120 | 120 | 120 |
| | f [mm/U] | 0,05 | 0,12 | 0,2 | 0,25 | 0,28 | 0,35 |
| | vf [mm/min] | 320 | 580 | 760 | 800 | 900 | 1120 |
| | n [1/min] | 6400 | 4800 | 3800 | 3200 | 3200 | 3200 |
| GG | Vc [m/min] | 80 | 80 | 80 | 80 | 80 | 80 |
| | f [mm/U] | 0,1 | 0,15 | 0,25 | 0,3 | 0,35 | 0,4 |
| | vf [mm/min] | 420 | 480 | 630 | 630 | 740 | 840 |
| | n [1/min] | 4200 | 3200 | 2500 | 2100 | 2100 | 2100 |
| GGG | Vc [m/min] | 60 | 60 | 60 | 60 | 60 | 60 |
| | f [mm/U] | 0,1 | 0,15 | 0,25 | 0,3 | 0,35 | 0,4 |
| | vf [mm/min] | 320 | 360 | 480 | 480 | 560 | 640 |
| | n [1/min] | 3200 | 2400 | 1900 | 1600 | 1600 | 1600 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

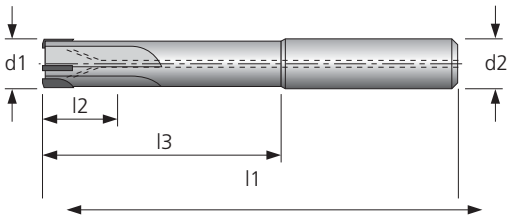
# HAM 3552 PKD-Diamantreibahlen *PCD diamond reamer*

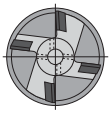
PKD | Z 4 | 0° Nut | Werk Norm | Typ Werk | H 7 | DIN 6535 HA | SHRINK FIT

Conversion to Inch:

* To convert VC (meters per minute) to SFM (surface feet per minute) multiply VC by 3.28

* To convert f (mm per minute) to IPR (inches per rev.) divide f by 25.4



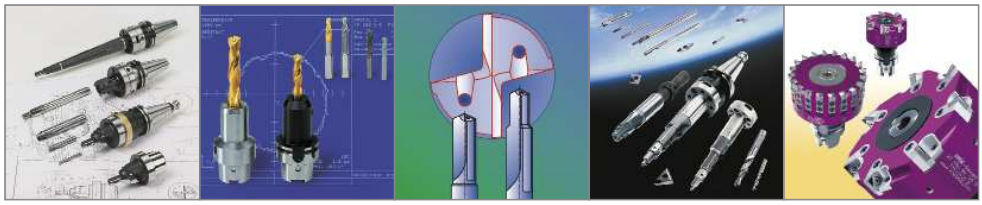
| Material | Alu | Alu > 9% Si | Stahl < 800 N/mm² | Stahl < 1200 N/mm² | Stahl < 1600 N/mm² | Stahl < 55 HRC | Stahl < 60 HRC | Stahl < 66 HRC | INOX < 800 N/mm² | INOX > 800 N/mm² | GG | GGG | hochw. Legier-ungen | Titan | NE Metalle Cu-Leg. | Graphit Faser-verbund | MMS | max. | ohne | AIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 53-1000 | ● | ● | | | | | | | | | | | | ○ | ● | ● | | ● | | |

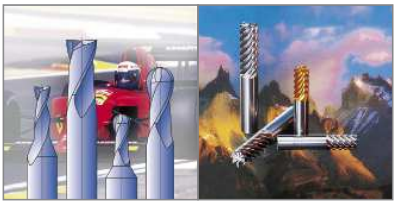
● sehr gut geeignet/*very suitable* ○ geeignet/*suitable*

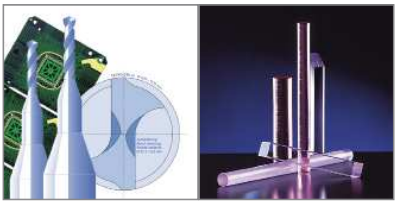
| Werkstoffgruppe Material group | ø | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 |
|---|---|---|---|---|---|---|---|---|---|
| Alu | Vc [m/min] | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |
| | f [mm/U] | 0,08 | 0,12 | 0,18 | 0,24 | 0,28 | 0,32 | 0,36 | 0,40 |
| | vf [mm/min] | 4000 | 4780 | 5720 | 6360 | 6360 | 6370 | 6370 | 6360 |
| | n [1/min] | min. 50000 | 39800 | 31800 | 26500 | 22700 | 19900 | 17700 | 15900 |
| Alu > 9 % Si | Vc [m/min] | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 800 |
| | f [mm/U] | 0,08 | 0,12 | 0,18 | 0,24 | 0,28 | 0,32 | 0,36 | 0,4 |
| | vf [mm/min] | 3390 | 3820 | 4590 | 5090 | 5100 | 5090 | 5080 | 5080 |
| | n [1/min] | 42400 | 31800 | 25500 | 21200 | 18200 | 15900 | 14100 | 12700 |
| Titan | Vc [m/min] | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | f [mm/U] | 0,05 | 0,08 | 0,12 | 0,16 | 0,2 | 0,24 | 0,28 | 0,3 |
| | vf [mm/min] | 270 | 320 | 380 | 430 | 460 | 480 | 500 | 480 |
| | n [1/min] | 5300 | 4000 | 3200 | 2700 | 2300 | 2000 | 1800 | 1600 |
| NE-Metalle Cu-Leg. | Vc [m/min] | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | f [mm/U] | 0,08 | 0,12 | 0,18 | 0,24 | 0,28 | 0,32 | 0,36 | 0,4 |
| | vf [mm/min] | 850 | 960 | 1150 | 1270 | 1260 | 1280 | 1260 | 1280 |
| | n [1/min] | 10600 | 8000 | 6400 | 5300 | 4500 | 4000 | 3500 | 3200 |
| Graphit Faserverbund | Vc [m/min] | 140 | 140 | 140 | 140 | 140 | 140 | 140 | 140 |
| | f [mm/U] | 0,05 | 0,08 | 0,12 | 0,16 | 0,2 | 0,24 | 0,28 | 0,3 |
| | vf [mm/min] | 370 | 450 | 540 | 590 | 640 | 670 | 700 | 660 |
| | n [1/min] | 7400 | 5600 | 4500 | 3700 | 3200 | 2800 | 2500 | 2200 |

Note: Feed rates listed are starting points. With proper setup, machine tools and holding technique, higher feeds can be achieved with excellent results.

| Distributor | Agent | Address |
| --- | --- | --- |
| | | |





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