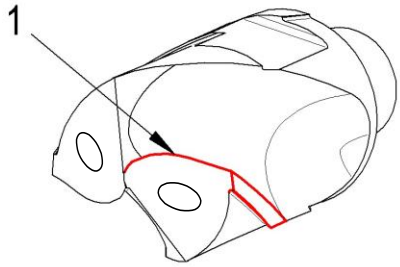
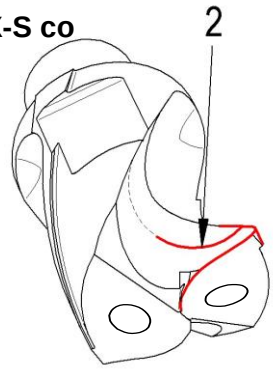
1 VEX / 新型可换式钻头
VEX / The cutting geometry

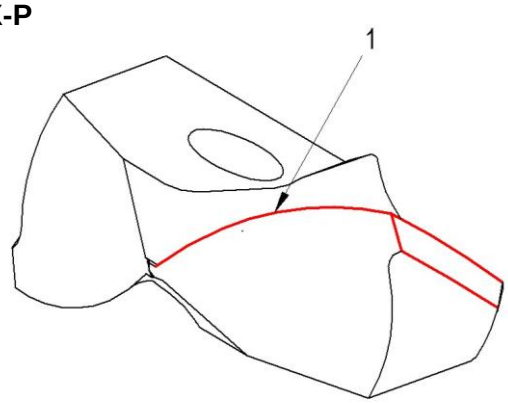
VEX-S / VEX-S IK



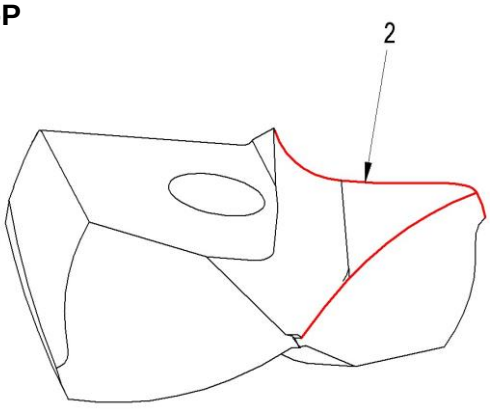
VEX-S / VEX-S co



VEX-P



VEX-P



随着专利产品VEX型钻头的研发成功，瑞士好优利刀具公司正在孔加工领域树立新的标准。

VEX型钻头加工时产生的短屑，能够确保刀具使用时具有较高的钻削性能。

归功于凸面的切削刃（1）与其后融为一体的凹面排屑槽（2）设计，使得加工过程中产生的切屑较短，即使工件材质特性是会产生长屑的；而较大的排屑槽能够确保排屑的最佳效果。

新型的VEX型钻头具有自定心能力，提高了孔加工的精确性。

我公司新型的VEX-S型麻花钻及VEX-P型可换式钻头都提供了这种新型的几何结构。

With the patented VEX cutting geometry HEULE is setting new benchmarks in the field of drilling technology.

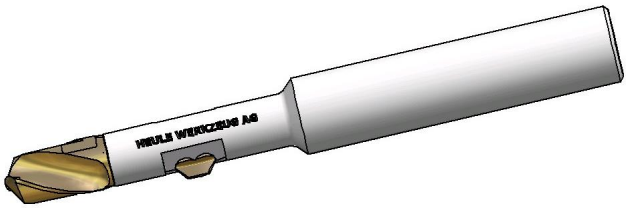
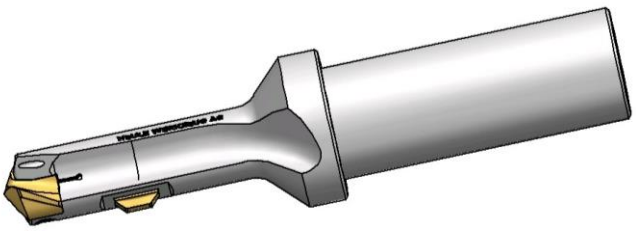
The VEX cutting geometry guarantees a high drilling performance with short chips.

Due to the convex cutting edge **(1)** which merges into a concave chip angle **(2)** short chips are guaranteed even when machining a long chipping material. A large chip channel also optimises swarf evacuation.

The VEX geometry is self-centring and guarantees an accurate bore.

Our replaceable VEX-S twist drill and the replaceable drill insert VEX-P are both provided with the new cutting geometry.

2 VEX-S组合刀具 / VEX-P组合刀具
VEX-S Combi / VEX-P Combi

VEX-S	VEX-P
	

瑞士好优利刀具公司的SNAP倒角产品系列工具为日益增长的生产需求提供了简单而灵活的解决方案。

新的SNAP组合刀具系统第一次成功的将多组工序整合在一起，提供更高的生产效率。

现在只需使用一把稳定易用的SNAP组合刀具，即可完成几乎所有的孔加工要求，特别是对正反向倒角的加工要求。

SNAP刀具系统的稳定性给人留下深刻的印象，其完全归功于十分紧凑的SNAP倒角机构，并且所有的组合刀具都可配内冷却功能。

总之，全新的SNAP刀具带来了一种简单易用的针对于孔加工过程中正反向倒角的全新解决方案。

The SNAP product line is HEULE's answer to the increasing requirement for simpler and more flexible manufacturing solutions.

The new SNAP system is the first to successfully allow the combination of a number of operations to be incorporated into single convenient cycle.

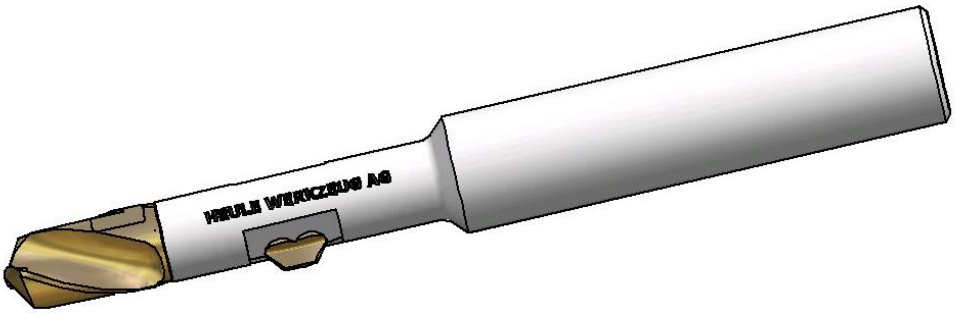
Many drill/chamfering operations can now be completed in one operation by **combining drilling with front and/or back deburring in one stable and easy to use tool.**

Due to the very compact SNAP deburring mechanism the tool stability is still maintained and tools can be supplied with or without through tool coolant supply.

The simplicity of the design along with the technical ability of the new SNAP system results in a very easy to use forward and backward deburring system.

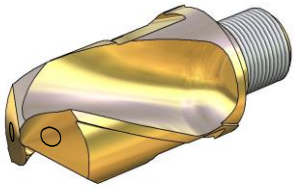
3 VEX-S组合刀具 / VEX-S / VEX-S co Combi

3.1 特色 / Features



VEX-S组合刀具由既有的SNAP倒角系统结合一支高性能的麻花钻头构成。（请参阅第29页的关于SNAP系统的描述） 配合这种系统，在单工序内即可完成钻孔及正反向倒角的操作。 这种系统特别适用在小尺寸孔径的加工场合。 同时，VEX-S麻花钻头是可更换设计，且VEX结构提供了高性能的自定心功能，而且用户可以非常容易的对钻头迆行重新研磨，反复使用。	The VEX-S Combi combines a replaceable high performance twist drill with our proven SNAP deburring system. (See description SNAP system on page 29). With this system drilling, front and back deburring in one single operation is possible. This system is especially suited to the machining of smaller diameter holes. The VEX twist drill is replaceable and incorporates VEX, the self-centring high performance cutting geometry. It can also be easily re-ground and recoated ensuring optimum cost effectiveness.

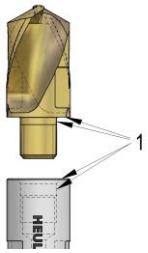
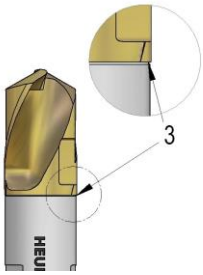
3.2 VEX-S / VEX-S 麻花钻
VEX-S / VEX-S co twist drill



VEX-S麻花钻可以带或不带冷却液，是可更换的高性能钻头，其材质通常为高品质的硬质合金。 VEX-S麻花钻提供冷却液直达底部，然后直接进入孔内。 一个特别设计的钻头底座将钻头与刀杆连接在一起。这个装置能够保证刀具在旋转过程中，能够有效地将动力传递到钻头部分，且能够方便快速的更换VEX-S钻头。	The VEX-S twist drill is with or without trough coolant available is a replaceable high performance product, manufactured from high quality solid carbide in different coatings. VEX-S twist drill provides the coolant onto the end flank and therefore directly into the borehole. The specially developed connecting system ensures robust and accurate connection with the tool body, facilitates good transmission of power and also allows quick and easy replacement of the VEX-S twist drill.

3.3 安装 / 拆除VEX-S麻花钻头
Assembly / Dismantling of VEX-S twist drill

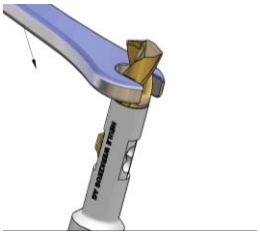
3.3.1 安装/ Assembly

1. 清理VEX-S麻花钻头与刀杆之间的接触面。		1. Clean the surfaces between the VEX-S twist drill and the tool body.
2. 用扳手将VEX-S钻头紧紧地固定在刀杆上。（关于扭矩及扳手请参阅第11页）		2. Screw tightly the VEX-S drill insert with a flat wrench to the tool body. (For Torque/torque spanner see page 11)
3. 钻头拧紧后钻头与刀杆之间应该无缝的过 渡，不应有间隙存在。		3. There should be a seamless transition between drill insert and tool body after the tightening of the drill insert. No split between tool body and drill insert.

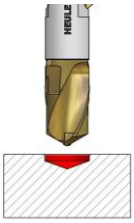
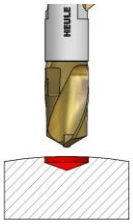
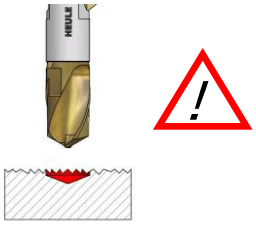
间隙存在的原因及解决方法/ Reasons for a split and how to correct

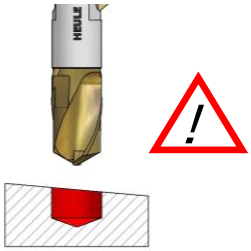
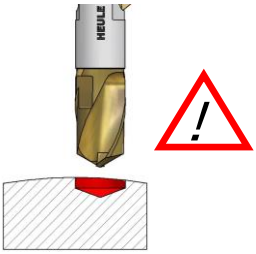
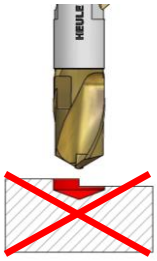
原因 解决方案	原因 解决方案	Reason	Solution
在钻头与刀杆之间有污垢存在	拆除后重新清理	Dirt between drill and tool body.	Dismantle and clean.
VEX-S麻花钻并没有被拧紧	将VEX-S麻花钻重新拧紧	VEX-S twist drill is not tighten enough.	Tighten VEX-S twist drill.
配合区域已经损坏	更换VEX-S麻花钻或者更换刀杆	Adaption areas are damaged.	Exchange VEX-S twist drill and/or VEX-S tool body.

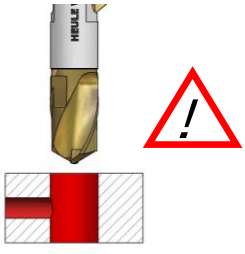
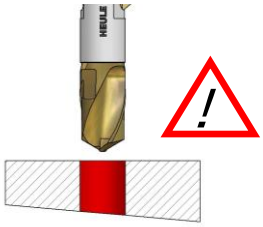
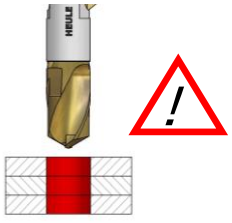
3.3.2 拆除/ Dismantling

使用扳手沿逆时针方向将VEX-S麻花钻从刀杆上松开。		Unfasten the VEX-S twist drill with a flat wrench in anticlockwise direction from the tool body.

3.4 应用范围 / Application range

 ok	 ok	
在平整的加工面上钻孔	在凸面的中心钻孔 1)	在不平整表面钻孔 必要时需要降低转速1)
Drilling of even machined surfaces.	**Drilling of central or convex surfaces. 1)**	**Drilling on uneven surfaces.** If necessary reduce feed-rate. 1)

		
在倾斜的加工面上钻孔 1)	在凸面的非中心面上钻孔 1)	在带棱角的铸铁或段铁上钻孔： 禁止使用
仅适用于加工深度小于二倍径、斜面小于6° 的情况 降低进给量：2° 降低至80%，5° 降低至70%，6° 降低至50%		
Drilling on slant surfaces. 1)	**Drilling on not central or convex, concave surfaces. 1)**	**Drilling on an angle, forged or cast iron:** Not possible.
Only for tool < 2xD to max. 6° Reduce feed-rate 2° to 80%, 5° to 70%, 6° to 50%		

		
钻透相贯孔 相贯孔的直径应小于0.5倍钻孔直径 必要时需要降低进给量2)	**在钻孔的出口面为倾斜表面** 将进给量降低至50-60%左右1)	**钻透多层材质** 要求工件必须为无缝结合
Drilling through a cross-hole. Ø cross-hole max. 0.5x Ø bore. If necessary reduce feed-rate. 2)	**Slant exit of the bore.** Reduce feed-rate to about 50-60%. 1)	**Drilling through several layers.** Seamless fitting of the different workpieces is necessary.

1) 注意：倒角不会被清除
2) 注意：刀具可能会损坏！倒角的刀片会被相贯孔卡住（在刀具没有转速的情况下通过孔）.
Note: Chamfer won't be clean.
Note: Tool can break! Blade for deburring can get stuck in the cross-hole (drive through the bore with no rotation of the tool!)

3.5 VEX-S硬质合金麻花钻的切削参数
Cutting values VEX-S for HM twist drill

请注意： 切削参数只是建立在假定的理想切削环境、推荐值的基础上，只能作为指导性使用。根据实际案例，加工环境以及材质特性，切削参数需要进行必要的调整以适应不同的情况。	**Please note:** Stated cutting data is for guidance only and based on **recommended values**, assuming ideal conditions. Cutting data may need to be adjusted subject to the application settings, machine or consistency of the workpiece.

对于最大孔深（**T**）**< 2×d** 情况下**VEX-S**钻头的推荐参数

Recommended data for carbide VEX-S drill for max. bore-depth (T) < 2xd

标准涂层为HELICA	Standard coating HELICA
针对铝制工件的涂层为DLC	Coating for aluminium work pieces DLC

材质	Material	特性	Features	抗张强度 Tensile strength (N/mm2)	硬度 Hardness HB	Vc (m/min)	F （毫米/转） (mm/rev.)
普通钢料	Unalloyed steel			<500	<150	100-130	0.15-0.25
铸钢	Cast steel			500-850	150-250	90-110	0.15-0.25
易切钢	Free machining steel						
		加硬处理	hardened	850-1000	250-300	70-90	0.12-0.20
低合金钢	Low-alloy steel	退火处理	annealed	<850	<250	80-130	0.15-0.25
铸钢	Cast steel	加硬处理	hardened	850-1000	250-300	70-110	0.15-0.25
		加硬处理	hardened	>1000-1200	>300-350	40-70	0.12-0.20
高合金钢	High-alloy steel	退火处理	annealed	<850	<250	40-70	0.12-0.20
工具钢	Tool steel	加硬处理	hardened	850-1100	250-320	35-50	0.12-0.15
不锈钢	Stainless steel	铁素体	ferritic	450-650	130-190	30-50	0.08-0.12
		奥氏体	austenitic	650-900	190-270	30-40	0.08-0.12
		马氏体	martensitic	500-700	150-200	20-30	0.08-0.12
淬硬钢	Hardened steel						
冷铸	Chilled castings					20-25	0.08-0.10
超合金材料	Super alloys						
（镍合金，…）	(Inconel, …)			<1200	<350	20-25	0.06-0.10
灰口铸铁	Grey cast iron			<500	<150	90-180	0.20-0.35
球墨铸铁	Nodular cast iron			300-800	90-240	90-160	0.15-0.30
锻铝合金	Aluminium-forging alloys					120-250	0.25-0.35
铸铝合金	Aluminium-casting alloys					120-250	0.25-0.35
铜合金	Cupper alloys	黄铜	Brass			140-200	0.25-0.35
		青铜	Bronze				
		短屑	short-chipping			60-100	0.20-0.30
		青铜	Bronze				
		长屑	long-chipping			40-60	0.15-0.25

针对去毛刺/倒角的切削参数请参阅第 33页 Cutting data for deburring / chamfering see page 33

3.6 VEX-S 编程信息/ VEX-S programming

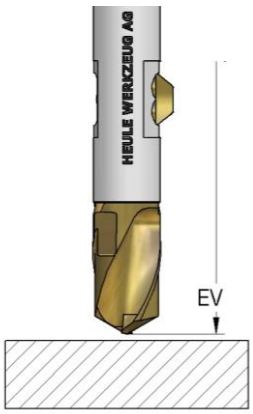
在加工过程中不需要改变主轴转向或停转主轴。
AV: 向前工进 **AR:** 向后工退
EV: 向前快进 **ER:** 向后快退

It is not necessary to change the direction of rotation or stop the spindle.
AV: Working feed, forward **AR:** Working feed, backward
EV: Rapid feed, forward **ER:** Rapid feed, backward

1. EV
将刀具快进至工件的上方。
注意：离工件距离！

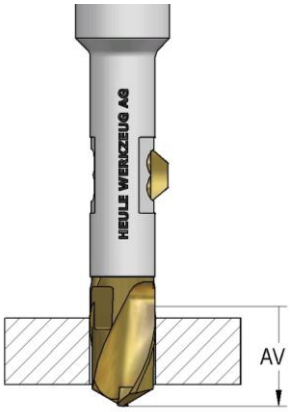
1. EV
Rapid traverse of the tool to just above the top of the work piece.

Note: Clearance distance.



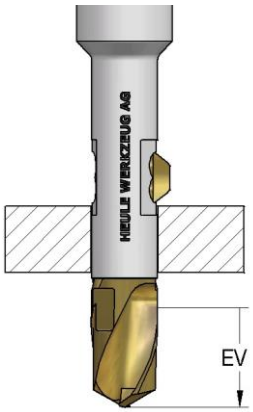
2. AV
在工进的过程中孔被加工出来，保持刀具的工进速度直至钻头完全钻透孔。

2. AV
In forward linear feed the hole is produced. Continue in working feed until the spade drill insert is completely clear of the hole.



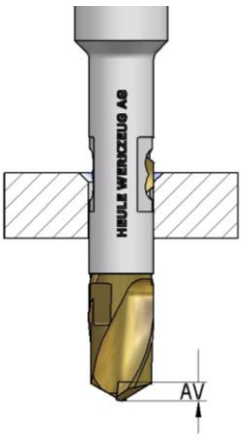
3. EV
快进至接近SNAP刀片的位置，然后工进直至SNAP刀片位于工件毛刺上方。

3. EV
Position tool with SNAP blade in rapid feed, forward slightly above the top material surface of bore or burr.



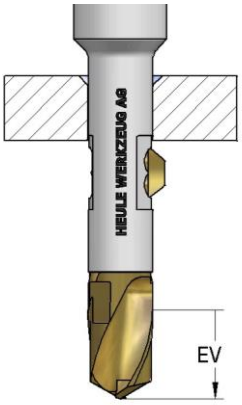
4. AV
在工进的过程中倒角被加工完成，继续向前直至刀片完全缩回刀杆内部。

4. AV
In linear feed forward (AV) the chamfer is generated. Continue in linear feed until the blade is completely retracted into the tool.



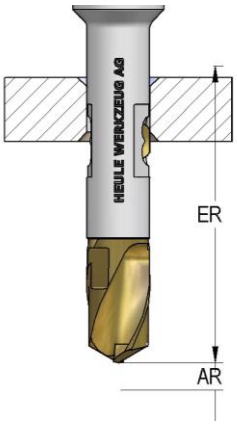
5. EV
刀杆能够以快进的方式通过孔，直至SNAP刀片通过整个孔并且完全弹出。

5. EV
The tool can be passed through the hole in rapid feed forward until the SNAP blade clears the hole and is fully extended.



6. AR / ER
反倒角在工退的过程中加工完成（不需要改变主轴转向）。当SNAP刀片完全收入刀杆内的时候，刀能够以快退的方式退出工件。

6. AR / ER
The back chamfer is machined by linear feed backward (no change of spindle rotation). As soon as the SNAP blade is completely retracted into the tool, the tool can travel out of the hole in rapid feed backward ER.



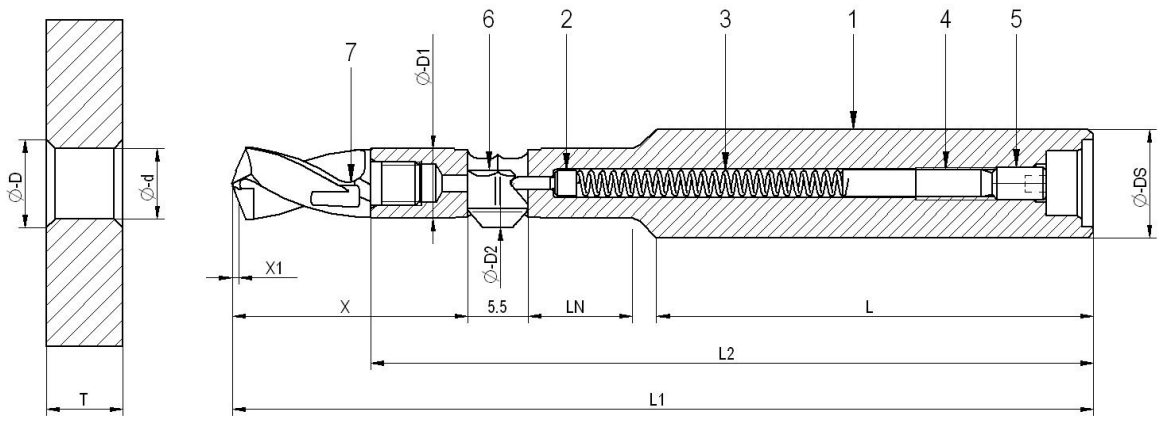
3.7 如何解决钻孔过程中的问题

积屑瘤	排屑槽堵塞	孔在退出过程中产生毛刺	加工精度不稳定	内表面质量较差	有震纹	主切削刃磨损	横刃磨损	倒角磨损	后刀面磨损	刀刃破裂	钻尖破损	解决方案
√					√	√				√		提高切削速度
		√			√			√	√			降低切削速度
				√	√							提高进给速度
	√		√	√	√	√	√	√		√	√	降低进给速度
√	√	√	√	√	√	√	√	√	√	√	√	提高冷却液压力
			√	√	√			√				检查转速
			√			√	√	√		√	√	检查主轴的稳定性及设置
		√		√								更换磨损的刀片
	√			√								改进钻削速度
√												更换刀片涂层

How to solve drill problems

Built-up edge	Chip jam	Burr formation on the exit of the bore	Variable precision	Bad quality of surface	Chatter	Wearing of major cutting edge	Wearing of cross cutting edge	Wearing of major chamfer	Wearing of clearance surface	Breakout of cutting edge	Breakout of the top of the drillbit	**Solution**
√					√	√				√		Raise cutting speed
		√			√			√	√			Reduce cutting speed
				√	√							Raise feed rate
	√		√	√	√	√	√	√		√	√	Reduce feed rate
√	√	√	√	√	√	√	√	√	√	√	√	Raise coolant pressure
			√	√	√			√				Check rotation
			√			√	√	√		√	√	Check stability of spindle and setting
		√		√								Exchange worn indexable drill insert
	√			√								Improve drilling cycle
√												Coating

3.8 VEX-S 组合刀具/ VEX-S Combi



ø D2 = ø D + 0.6mm	
最大倒角直径D = 最小基孔直径d + 2.0mm	Max. chamfer ø D = min. bore ø + 2.0mm

备件/ **Spare parts:**

Pos.	说明	Description	Best. Nr.	Order No.
1	刀杆：请查阅下面的表格	Tool body see table below		
2	控制梢Ø 1.2	Control bolt Ø 1.2	GH-Q-E-0008	
3	弹簧 Ø 2.35 x Ø 0.35 x 31.5	Spring Ø 2.35 x Ø 0.35 x 31.5	GH-H-F-0019	
4	距离销订：请查阅下面的表格	Distance pin see table below		
5	调节螺钉 M3x5 DIN913	Set. screw M3x5 DIN913	GH-H-S-0127	
	扳手 Pos. 5*	Wrench for pos. 5*	GH-H-S-2101	
6	SNAP 刀片：请查阅第 34页	SNAP blade; see page 34		
7	VEX-S 麻花钻：请查阅第 11页	VEX-S twist drill; see page 11		
	平板手 Pos. 7* 扭力扳手：请查阅第 11 页	Flat wrench for pos. 7* Torque spanner see page 11		

* Pos.5 / Pos.7处的扳手需要另外订. / Wrench for pos. 5 / Pos. 7 to be ordered separately.

1倍径孔深/ **Bore-depth 1xd**

孔径	孔深	系列	订货号	仅刀杆，不带倒角刀片，不带VEX-S钻头								Pos. 1 刀杆 订货号	Pos. 4 距离销钉
Bore range	Bore-depth	Series	Order No.	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		GH-Q-O-	ØD1	X	X1	LN	L1	L2	ØDS	L	GH-Q-G-	GH-Q-E-
5.00-5.49	5.5	B	4000	4.9	18.9	1.0	7.5	70.1	60.3	8	36	4000	0052
5.50-5.99	6.0		4001	5.4	19.8	1.1	8.0	71.6	60.5	8	36	4001	
6.00-6.49	6.5	C	4002	5.9	20.6	1.2	8.5	77.7	66.0	10	40	4002	0043
6.50-6.99	7.0		4003	6.4	21.6	1.3	9.0	78.9	66.3	10	40	4003	
7.00-7.49	7.5	D	4004	6.9	23.8	1.4	9.5	81.4	67.8	10	40	4004	
7.50-7.99	8.0		4005	7.4	24.6	1.5	10.0	82.4	68.0	10	40	4005	
8.00-8.49	8.5		4006	7.9	25.4	1.6	10.5	89.5	74.3	12	45	4006	0048
8.50-8.99	9.0	E	4007	8.4	26.6	1.7	11.0	90.9	74.8	12	45	4007	
9.00-9.49	9.5		4008	8.9	27.4	1.8	11.5	91.9	75.0	12	45	4008	
9.50-9.99	10.0		4009	9.4	28.3	1.9	12.0	93.1	75.3	12	45	4009	
10.00-10.49	10.5		4010	9.9	29.1	1.9	12.5	95.1	76.5	14	45	4010	
10.50-10.99	11.0	F	4011	10.4	30.1	2.1	13.0	96.4	77.3	14	45	4011	
11.00-11.49	11.5		4012	10.9	30.9	2.1	13.5	97.4	77.5	14	45	4012	

如果需要其他尺寸，请来电查询。

对刀具或刀杆需要带平侧固柄(HB)或者斜侧固柄(HE)的，
请在订货号后面增加-HB或者-HE。

例如:

VEX-S ø6.0 / T=6.5mm 带平侧固柄

订货号.: GH-Q-O-4002-HB

Other sizes on request!

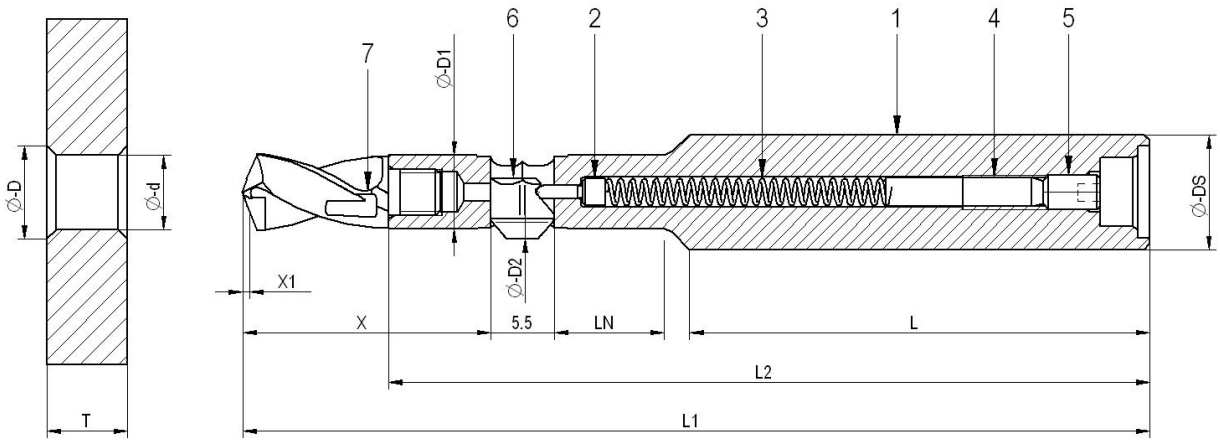
For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.

For example:

VEX-S ø6.0 / T=6.5 mm with weldon shank

Order No.: GH-Q-O-4002-**HB**

2倍径孔深 / Bore-depth 2xd



ø D2 = ø D + 0.6mm	
最大倒角直径**D =** 最小基孔直径**d + 2.0mm**	**Max. chamfer ø D = min. bore ø + 2.0mm**

孔径	孔深	系列	订货号	仅刀杆，不带倒角刀杆，不带VEX-S钻头								**Pos. 1** 刀杆 订货号	**Pos. 4** 距离销钉
Bore range	**Bore-depth**	**Series**	**Order No.**	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		**GH-Q-O-**	ØD1	X	X1	LN	L1	L2	ØDS	L	GH-Q-G-	GH-Q-E-
5.00-5.49	11	**B**	**4050**	4.9	24.7	1.0	13	81.8	65.8	8	36	4050	0043
5.50-5.99	12		**4051**	5.4	26.1	1.1	14	83.9	66.5	8	36	4051	
6.00-6.49	13	**C**	**4052**	5.9	27.3	1.2	15	90.8	72.4	10	40	4052	0048
6.50-6.99	14		**4053**	6.4	28.9	1.3	16	93.3	73.3	10	40	4053	
7.00-7.49	15	**D**	**4054**	6.9	31.6	1.4	17	96.7	75.3	10	40	4054	
7.50-7.99	16		**4055**	7.4	32.9	1.5	18	98.7	76.0	10	40	4055	
8.00-8.49	17		**4056**	7.9	33.3	1.6	19	106.8	82.8	12	45	4056	0039
8.50-8.99	18	**E**	**4057**	8.4	35.8	1.7	20	109.1	83.7	12	45	4057	
9.00-9.49	19		**4058**	8.9	37.2	1.8	21	111.2	84.5	12	45	4058	
9.50-9.99	20		**4059**	9.4	38.6	1.9	22	113.3	85.2	12	45	4059	
10.00-10.49	21		**4060**	9.9	39.9	1.9	23	116.4	87.0	14	45	4060	
10.50-10.99	22	**F**	**4061**	10.4	41.2	2.1	24	118.5	88.3	14	45	4061	
11.00-11.49	23		**4062**	10.9	42.5	2.2	24	120.5	89.0	14	45	4062	

如果需要其他尺寸，请来电查询。

对刀具或刀杆需要带平侧固柄(HB)或者斜柄(HE)的，请在订货号后面增加-HB或者-HE。

例如：
VEX-S ø9.0 / T=19mm 带平侧固柄
订货号: GH-Q-O-4058**-HB**

Other sizes on request!

For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add **-HB** or **-HE** to the order No.

For example:
VEX-S ø9.0 / T=19 mm with weldon shank
Order No.: GH-Q-O-4058**-HB**

3.9 VEX-S 钻头的选型
Selection of VEX-S replaceable drill insert

1 系列 / Series

孔径Ø d Bore range Ø d	系列 Series
5.00 – 5.99	**B**
6.00 – 6.99	**C**
7.00 – 8.49	**D**
8.50 – 10.49	**E**
10.50 – 11.49	**F**

2 孔深 T / Bore-depth T

1 x d	**2**
2 x d	**4**

3 孔径 / Bore diameter d

在该位置标明孔径尺寸
例如： 9.50 = 0950
标准尺寸：0.1mm

Indicate the bore diameter at this place.
For example: Ø 9.50 = 0950
Standard size each 0,1 mm.

4 刀片材质Cutting material

Hartmetall / Carbide K20-K30	**1**

5 刀片涂层Coating

Helica*: / honed cutting edge 0.03	**H**
DLC (用于铝件) (recommended for Aluminium)	**D**

* Standard / 标准品

订货号:
Order number example:

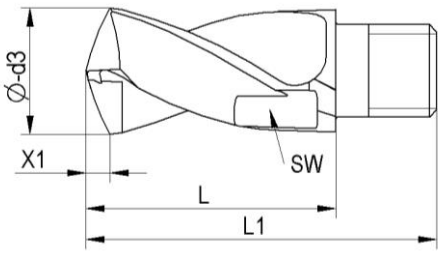
P- S- 1 2-3333-4 5

1 = 系列 / Series
2 = 孔深T / Bore-depth T
3 = 孔径-Ø d / Bore-Ø d
4 = 刀片材质 / Cutting material
5 = Beschichtung / Coating

订货举例 / Example for an order:

孔径Ø d	Bore-Ø d	= 9.50mm
硬质合金	Carbide-Quality	= K20-K30
刀片涂层	Coating	= Helica
孔深 T	Bore-depth T	= 9.50 mm 1 x d

订货号:
Order No: P-S-E2-0950-1H



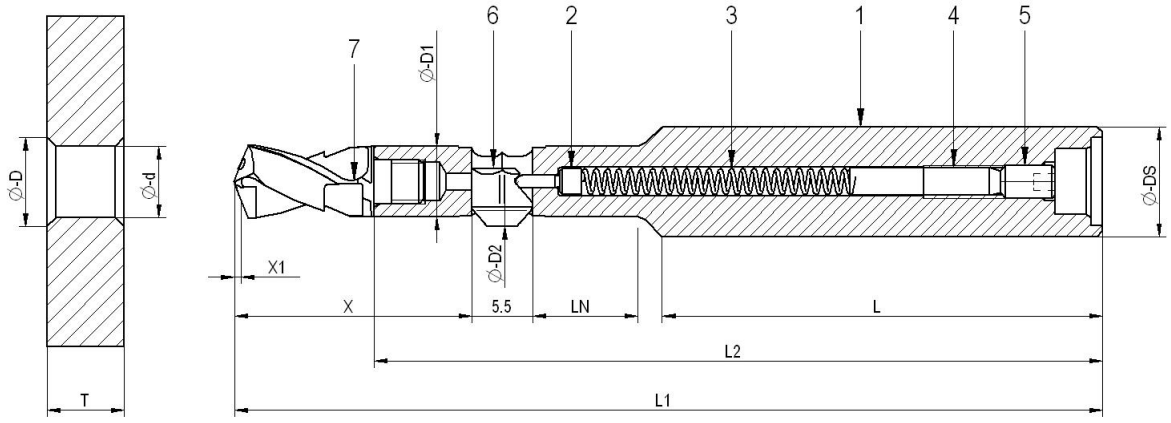
尺寸 / Dimensions

孔径	系列		孔深				孔深				扳手型号	紧固扭矩	平扳手		
Bore range	**Series**		**Bore-depth**				**Bore-depth**				**Wrench size**	**Tight-ening torque**	**Flat-wrench**	**Torque key Insert**	**Torque Screw-driver**
Ø d3		X1		T	L	L1		T	L	L1	SW	Ncm	**GH-H-S-**	**GH-H-S-**	**GH-H-S-**
5.0-5.49	B	1.00	**1 x d**	5.5	10.2	14.7	**2 x d**	11	16.0	20.5	4	170	**2301**	2331	2401
5.5-5.99		1.10		6.0	11.1	15.6		12	17.4	21.9	4	170	**2301**	2331	2401
6.0-6.49	C	1.20		6.5	11.7	16.2		13	18.4	22.9	5	250	**2301**	2332	2401
6.5-6.99		1.30		7.0	12.7	17.2		14	20.0	24.5	5	250	**2301**	2332	2401
7.0-7.49	D	1.35		7.5	13.6	19.1		15	21.4	26.9	6	400	**2302**	2333	2402
7.5-7.99		1.45		8.0	14.4	19.9		16	22.7	28.2	6	400	**2302**	2333	2402
8.0-8.49		1.55		8.5	15.2	20.7		17	24.0	29.5	7	400	**2302**	2334	2402
8.5-8.99	E	1.65		9.0	16.1	21.6		18	25.4	30.9	7	600	**2302**	2334	2402
9.0-9.49		1.75		9.5	16.9	22.4		19	26.7	32.2	8	600	**2303**	2335	2402
9.5-9.99		1.85		10.0	17.8	23.3		20	28.1	33.6	8	600	**2303**	2335	2402
10.0-10.49		1.90		10.5	18.6	24.1		21	29.4	34.9	9	600	**2303**	2336	2402

如果需要其他尺寸，请来电查询。

Other sizes on request!

3.10 VEX-S 带冷却液的组合刀具
VEX-S Combi with through coolant



ø D2 = ø D + 0.6mm	
最大倒角直径**D =** 最小基孔直径**d + 2.0mm**	**Max. chamfer ø D = min. bore ø + 2.0mm**

备件 / Spare parts:

Pos.	说明	**Description**	**Best. Nr.** **Order No.**
1	刀杆：请查阅下面的表格	Tool body see table below	
2	控制销 Ø 1.2	Control bolt Ø 1.2	GH-Q-E-0008
3	弹簧 Ø 2.35 x Ø 0.35 x 31.5	Spring Ø 2.35 x Ø 0.35 x 31.5	GH-H-F-0019
4	距离销钉：请查阅下面的表格	Distance pin see table below	
5	调节螺钉 M3x5 DIN913	Set. screw M3x5 DIN913	GH-H-S-0127
	扳手 Pos. 5*	Wrench for pos. 5*	GH-H-S-2101
6	SNAP刀片; 请查阅第34页	SNAP blade; see page 34	
7	VEX-S 麻花钻;请查阅第14页	VEX-S twist drill; see page 14	
	平扳手 Pos. 7* 扭力扳手：请查阅第14页	Flat wrench for pos. 7* Torque spanner see page 14	

* Schlüssel zu Pos. 5 / Pos. 7 处的扳手需要另外订货. / Wrench for pos. 5 / Pos. 7 to be ordered separately.

1倍径孔深 / Bore-depth 1xd

孔径	孔深	系列	订货号.	仅刀杆，不带倒角刀片，不带钻头								**Pos. 1** 刀杆 订货号	**Pos. 4** 距离 销钉
Bore range	**Bore-depth**	**Series**	**Order No.**	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		**GH-Q-O-**	ØD1	X	X1	LN	L1	L2	ØDS	L	GH-Q-G-	GH-Q-E-
6.00-6.49	6.5	**C**	**4022**	5.9	20.6	1.2	8.5	77.7	66.0	10	40	4022	0043
6.50-6.99	7.0		**4023**	6.4	21.6	1.3	9.0	78.9	66.3	10	40	4023	
7.00-7.49	7.5	**D**	**4024**	6.9	23.8	1.4	9.5	81.4	67.8	10	40	4024	
7.50-7.99	8.0		**4025**	7.4	24.6	1.5	10.0	82.4	68.0	10	40	4025	
8.00-8.49	8.5		**4026**	7.9	25.4	1.6	10.5	89.5	74.3	12	45	4026	0048
8.50-8.99	9.0	**E**	**4027**	8.4	26.6	1.7	11.0	90.9	74.8	12	45	4027	
9.00-9.49	9.5		**4028**	8.9	27.4	1.8	11.5	91.9	75.0	12	45	4028	
9.50-9.99	10.0		**4029**	9.4	28.3	1.9	12.0	93.1	75.3	12	45	4029	
10.00-10.49	10.5		**4030**	9.9	29.1	1.9	12.5	95.1	76.5	14	45	4030	
10.50-10.99	11.0	**F**	**4031**	10.4	30.1	2.1	13.0	96.4	77.3	14	45	4031	
11.00-11.49	11.5		**4032**	10.9	30.9	2.1	13.5	97.4	77.5	14	45	4032	

如果需要其他尺寸，请来电查询

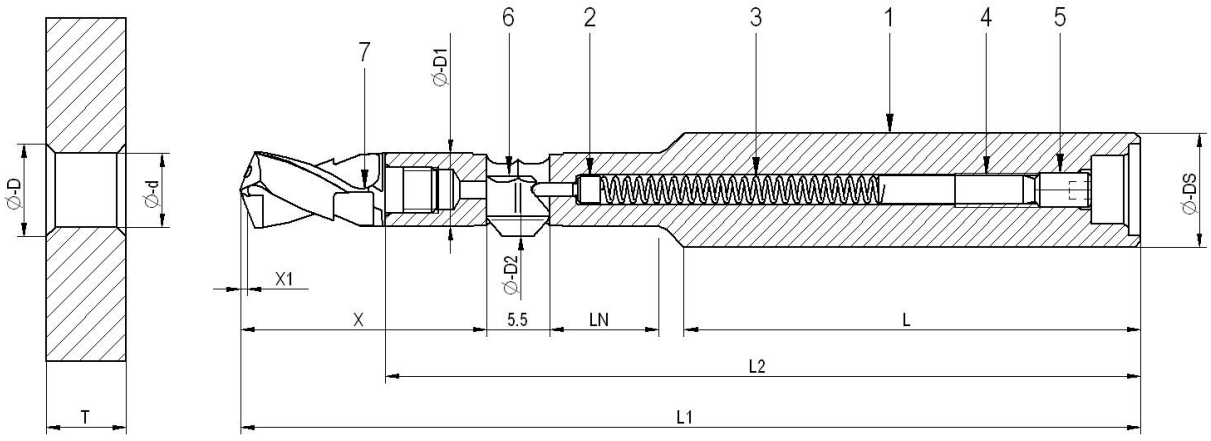
对刀具或刀杆需要带平侧固柄(HB)或者斜侧固柄(HE)的，
请在订货号后面增加**-HB或者-HE**。

例如：SNAP5 VEX-S ø6.0 / T=6.5mm 带平侧固柄
订货号：GH-Q-O-4022-**HB**

Other sizes on request!

For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.
For example:
VEX-S ø6.0 / T=6.5 mm with weldon shank
Order No.: GH-Q-O-4022-**HB**

2倍径孔深 / Bore-depth 2xd



ø D2 = ø D + 0.6mm	
最大倒角直径**D =** 最小基孔直径**d + 2.0mm**	**Max. chamfer ø D = min. bore ø + 2.0mm**

孔径	孔深	系列	订货号	仅刀杆，不带倒角刀片，不带钻头								**Pos. 1** 刀杆 订货号	**Pos. 4** 距离 销钉
Bore range	**Bore-depth**	**Series**	**Order No.**	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		**GH-Q-O-**	ØD1	X	X1	LN	L1	L2	ØDS	L	GH-Q-G-	GH-Q-E-
6.00-6.49	13	**C**	**4072**	5.9	27.3	1.2	15	90.8	72.4	10	40	4072	0048
6.50-6.99	14		**4073**	6.4	28.9	1.3	16	93.3	73.3	10	40	4073	
7.00-7.49	15	**D**	**4074**	6.9	31.6	1.4	17	96.7	75.3	10	40	4074	
7.50-7.99	16		**4075**	7.4	32.9	1.5	18	98.7	76.0	10	40	4075	
8.00-8.49	17		**4076**	7.9	33.3	1.6	19	106.8	82.8	12	45	4076	0039
8.50-8.99	18	**E**	**4077**	8.4	35.8	1.7	20	109.1	83.8	12	45	4077	
9.00-9.49	19		**4078**	8.9	37.2	1.8	21	111.2	84.5	12	45	4078	
9.50-9.99	20		**4079**	9.4	38.6	1.9	22	113.3	85.3	12	45	4079	
10.00-10.49	21		**4080**	9.9	39.9	1.9	23	116.4	87.0	14	45	4080	
10.50-10.99	22	**F**	**4081**	10.4	41.2	2.1	24	118.5	88.3	14	45	4081	
11.00-11.49	23		**4082**	10.9	42.5	2.2	24	120.5	89.0	14	45	4082	

如果需要其他尺寸，请来电查询.

Other sizes on request!

对刀具或刀杆需要带平侧固柄(HB)或者斜侧固柄(HE)的，请在订货号后面增加**-HB**或者**-HE**。
例如：
SNAP5 VEX-S ø9.0 / T=19mm 带平侧固柄
订货号：GH-Q-O-4078-**HB**

For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.

For example:
VEX-S ø9.0 / T=19 mm with weldon shank
Order No.: GH-Q-O-4078-**HB**

3.11 VEX-S 内冷钻头的选型
Selection of VEX-S co replaceable drill insert

1 系列 / Series

孔径Ø d Bore range Ø d	系列 Series
6.00 – 6.99	**C**
7.00 – 8.49	**D**
8.50 – 10.49	**E**
10.50 – 11.49	**F**

2 孔深 T / Bore-depth T

1 x d	**2**
2 x d	**4**

3 孔径 d / Bore diameter d

在该位置标明孔径尺寸
例如: Ø 9.50 = 0950
标准尺寸 0.1 mm.

Indicate the bore diameter at this place.
For example: Ø 9.50 = 0950
Standard size each 0,1 mm.

4 刀片材质 / Cutting material

Hartmetall / Carbide K20-K30	**1**

5 刀片涂层/ Coating

Helica*: / honed cutting edge 0.03	**H**
DLC (推荐用于铝产品) recommended for Aluminium)	**D**

* Standard /标准品

订货号举例:
Order number example:

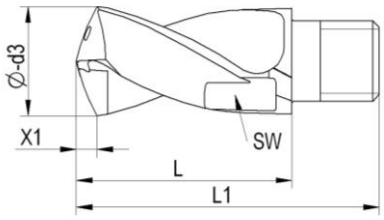
P- SK- 1 2-3333-4 5

1 = 系列 / Series
2 = 孔深 T / Bore-depth T
3 = 孔径Ø d / Bore-Ø d
4 = 刀片材质 / Cutting material
5 = Beschichtung / Coating

订货举例 / Example for an order:

孔径-Ø d	Bore-Ø d	= 9.50mm
硬质合金	Carbide-Quality	= K20-K30
刀片涂层	Coating	= Helica
孔深 T	Bore-depth T	= 9.50 mm 1 x d

订货号Order No: P-SK-E2-0950-1H



尺寸/ Dimensions

孔径	系列		孔深				孔深				板手型号	坚固扭矩	平板手		
Bore range	**Series**		**Bore-depth**				**Bore-depth**				**Wrench size**	**Tight-ening torque**	**Flat-wrench**	**Torque key Insert**	**Torque Screw-driver**
Ø d3		X1		T	L	L1		T	L	L1	SW	Ncm	**GH-H-S-**	**GH-H-S-**	**GH-H-S-**
6.0-6.49	C	1.20	**1 x d**	6.5	11.7	16.2	**2 x d**	13	18.4	22.9	5	250	**2301**	2332	2401
6.5-6.99		1.30		7.0	12.7	17.2		14	20.0	24.5	5	250	**2301**	2332	2401
7.0-7.49	D	1.35		7.5	13.6	19.1		15	21.4	26.9	6	400	**2302**	2333	2402
7.5-7.99		1.45		8.0	14.4	19.9		16	22.7	28.2	6	400	**2302**	2333	2402
8.0-8.49		1.55		8.5	15.2	20.7		17	24.0	29.5	7	400	**2302**	2334	2402
8.5-8.99	E	1.65		9.0	16.1	21.6		18	25.4	30.9	7	600	**2302**	2334	2402
9.0-9.49		1.75		9.5	16.9	22.4		19	26.7	32.2	8	600	**2303**	2335	2402
9.5-9.99		1.85		10.0	17.8	23.3		20	28.1	33.6	8	600	**2303**	2335	2402
10.0-10.49		1.90		10.5	18.6	24.1		21	29.4	34.9	9	600	**2303**	2336	2402
10.5-10.99	F	2.10		11.0	19.1	24.6		22	30.2	35.7	9	600	**2303**	2336	2402
11.0-11.49		2.20		11.5	19.9	25.4		23	31.5	37.0	9	600	**2303**	2336	2402

如需其它尺寸请来电查阅!

Other sizes on request!

3.12 关于冷却 / Cooling

内冷却能够帮助刀具更有效地排屑。 只有在加工深度小于1xD并且降低进给的情况下，才可以使用外冷却系统。 对于最大尺寸为3xD的情况下冷却液压力至少要8bar，流量在5-20升/分钟。	Through tool coolant is necessary for the optimum swarf evacuation. Use external cooling only up to max. 1xD and with reduced feed-rate. Coolant pressure for max. 2xD at least 8 bar. Flow rate 5 to 20 Litre/min.

3.13 关于重磨 / Re-grinding

所有的VEX-S钻头都可以重磨，最大范围在1-2毫米，我们建议按以下参数进行：

前角：140°
后角：8°
顶端磨量：重磨少许

请注意：重磨会改变VEX-S顶端的几何外形。在多次重磨后，尺寸最大变化只能在1-2毫米的范围内。重磨为原始几何形状只能在好优利总公司完成。

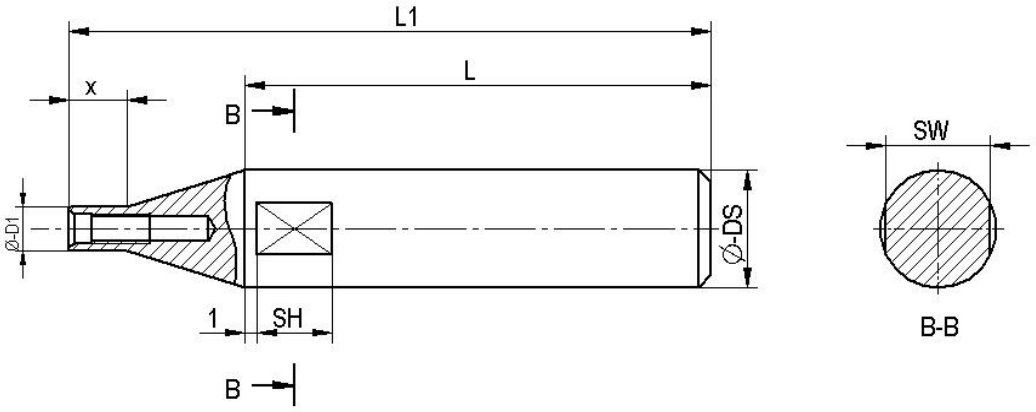
为了对VEX-S麻花钻的重磨，我们制造了以下的重磨装置。

All VEX-S drills can be re-ground to a maximum of 1-2 mm. We recommend the following parameter:

Nose angle: 140°
Clearance angle: 8°
Point thinning: regrind a little

Please note that the re-grinding will change the original VEX-S point geometry and therefore we recommend that only to 1-2 mm maximum be removed over multiple regrinds. The original grind form can only be re-produced by HEULE.

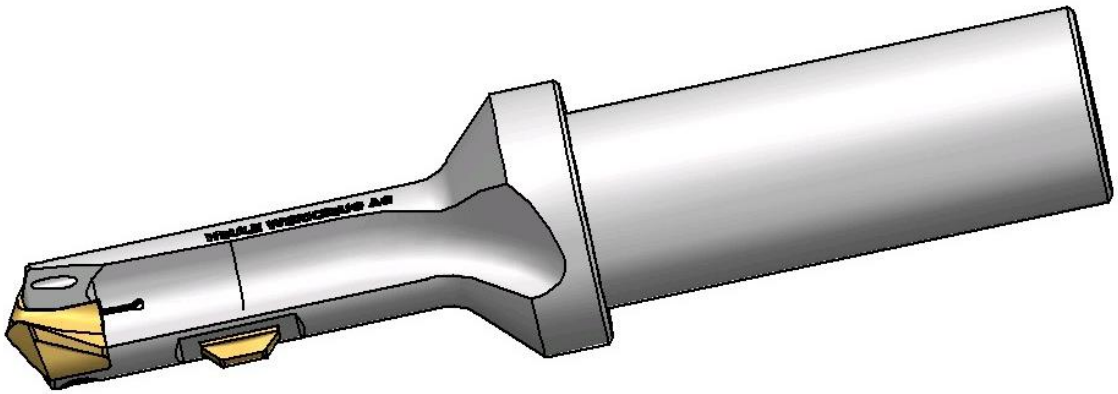
For the re-grinding of the VEX-S twist drill we have created the following re-grinding device.



系列/Series	螺纹/Thread	ØD1	ØDS	x	L	L1	SW	SH	订货号/Order No.
B	M3*0.35	4.8	10	5	40	55.4	9	6.5	**GH-V-V-0052**
C	M4*0.5	5.8	10	5	40	55.8	9	6.5	**GH-V-V-0053**
D	M5*0.5	6.8	10	5	40	56.0	9	6.5	**GH-V-V-0054**
E	M6*0.75	8.3	16	8	50	70.6	14	7.0	**GH-V-V-0055**

4 VEX-P 组合刀具 / VEX-P Combi

4.1 特色 / Features



瑞士好优利刀具公司的VEX-P组合刀具由现有的SNAP倒角系统整合新型的专利产品VEX-P可更换式钻头构成。

独特的钻头装载及螺钉紧固方式，保证了在VEX-P钻头与钻杆之间具有充足且稳定的动力传动性能，使得刀具在工作中能够获得较高的钻削力。

同时，所有的VEX-P组合刀具都能提供内冷却方式。

较强的断屑能力、优秀的钻削性能，是这种组合刀具的主要优势所在。在VEX-P钻头及刀杆上，这种独特的排屑通道能够确保排屑的最佳效果；而完美的钻削导向保证精确的孔加工精度。

HEULE's VEX-P Combi is a combination of the approved SNAP deburring system with the patented VEX-P replaceable drill insert.

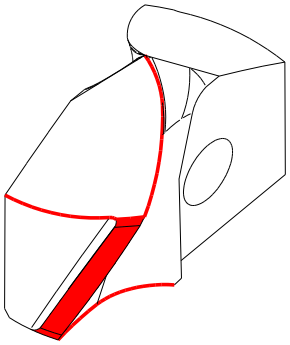
The unique insert mounting and screw fixing guarantees a robust and stable connection between the VEX-P drill insert and tool body, which enables the tool to readily absorb the high cutting forces experienced during drilling.

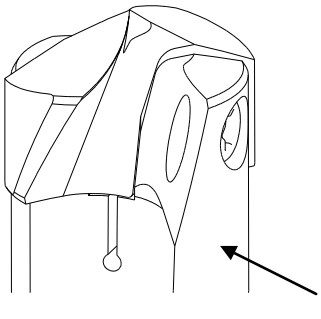
All VEX-P Combi tools are supplied with through-tool coolant supply.

Optimum drilling performance, with short chip formation is a major advantage of this combination tool. The unique chip channel on the VEX-P replaceable drill insert and the corresponding channel on the tool body allow for optimum swarf evacuation.

Accurate hole production is assured as a result of the unique guiding heel at the replaceable drill insert.

4.2 VEX-P可更换式钻头/ VEX-P replaceable drill insert





VEX-P可更换式钻头是一种高性能钻头，钻头的材质为高品质的硬质合金。特别设计的排屑槽完美的将凸面的主切削刃与刀杆上的较大的排屑槽连接在一起。

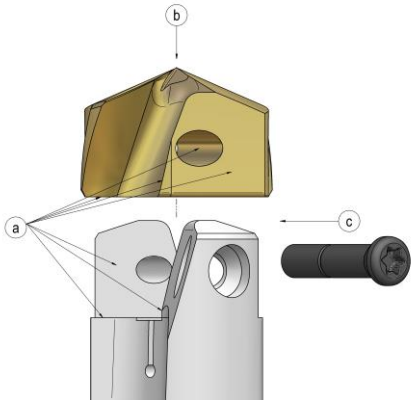
独特的刀片螺钉紧固方式，保证了从刀杆到VEX-P钻头之间，具有充足且稳定的动力传动性能，使得刀具获得较高的钻削力，并且钻头本身带有自定心的能力。

The VEX-P replaceable drill insert is a robust high performance drilling product manufactured from high quality carbide. The special designed chip channel is the transition of the strong convex main cutting edge and the large concave chip groove and corresponding intersection in the tool body. The unique sandwich-like fixing of the VEX-P replaceable insert with its screw connection guarantees a secure mounting and steady transmission of power from the VEX-P drill insert to the tool body. The drill insert is self-centring by design.

4.3 安装/拆除VEX-P可更换式钻头 Assembly / Dismantling of VEX-P replaceable drill insert

a)
清理刀片、刀杆以及螺钉之间的接触面。检查所有配件（必须没有任何损伤，假如紧固螺钉，刀杆或刀片有损伤，请更换一个新的配件）

a)
Clean contact surface between drill insert, tool body and clamping screw. Check the components (No hard particles, if clamping screw, tool body or drill insert is deformed exchange with a new one.)



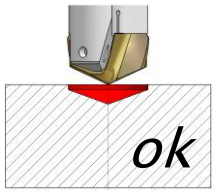
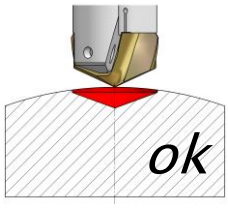
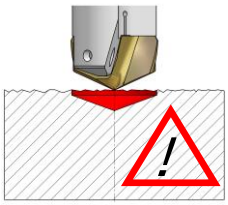
b)
插入新的刀片

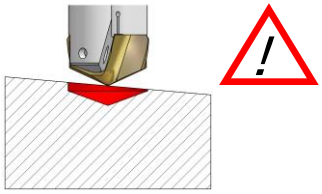
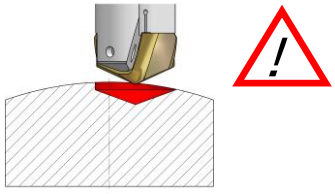
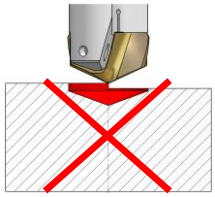
b)
Insert new drill insert.

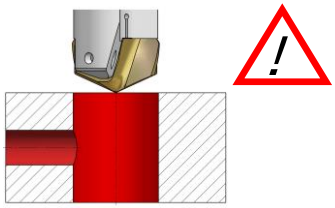
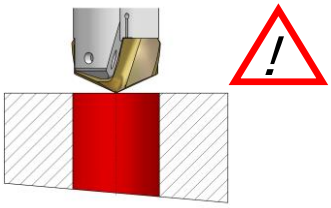
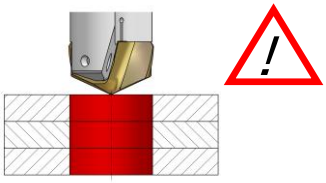
c)
插入螺钉，并使用扳手并其扭紧。请注意此刻的用力。关于扭矩及扳手，请查阅第27页.

c)
Fit screw and tighten with a torx-screw driver or torque spanner. Note the moment of force. For torque and torque spanner see page 27.

4.4 应用范围 / Application range

		
在平整的加工面上钻孔	在凸面的中心钻孔 1)	在不平整表面钻孔 必要时需要降低转速1)
Drilling of even machined surfaces.	**Drilling of central or convex surfaces. 1)**	**Drilling on uneven surfaces.** If necessary reduce feed-rate.

		
在倾斜的加工面上钻孔 **1)**	在凸面的非中心面上钻孔1)	在带棱角的铸铁或段铁上钻孔： 禁止使用
仅适用于加工深度小于二倍径、斜面小于6°的情况。 降低进给量：2°降低至80%，5°降低至70%，6°降低至50%		
Drilling on slant surfaces. 1)	**Drilling on not central or convex, concave surfaces. 1)**	**Drilling on an angle, forged or cast iron:** Not possible.
Only for tool < 2xD to max. 6° Reduce feed-rate 2° to 80%, 5° to 70%, 6° to 50%		

		
钻透相贯孔 相贯孔的直径应小于0.5倍钻孔直径 必要时需要降低进给量2)	在钻孔的出口面为倾斜表面 将进给量降低至50-60%左右1)	钻透多层材质 要求工件必须为无缝结合
Drilling through a cross-hole. Ø cross-hole max. 0.5x Ø bore. If necessary reduce feed-rate. 2)	**Slant exit of the bore.** Reduce feed-rate to about 50-60%. 1)	**Drilling through several layers.** Seamless fitting of the different workpieces is necessary.

1) 注意：倒角不会被清除 / **Note:** Chamfer won't be clean.
2) 注意：刀具可能会损坏！去毛刺的刀片会被相贯孔卡住（在刀具没有转速的情况下通过孔）
Note: Tool can break! Blade for deburring can get stuck in the cross-hole (drive through the bore with no rotation of the tool!)

4.5 VEX-P 硬质合金钻头的切削参数
Cutting values for VEX-P HM replaceable drill insert

请注意： 切削参数只是建立在假定的理想切削环境、推荐值的基础上，只能作为指导性使用。根据实际案例，加工环境以及材质特性，切削参数需要迚行必要的调整以适应不同的情况。	**Please note:** Stated cutting data is for guidance only and based on **recommended values**, assuming ideal conditions. Cutting data may need to be adjusted subject to the application settings, machine or consistency of the workpiece.

对于最大孔深（**T**）**< 2×d** 情况下**VEX-P**钻头的推荐参数
Recommended data for carbide VEX-P-drill for max. bore-depth (T) < 2xd

标准涂层为HELICA	Standard coating HELICA
针对铝制工件的涂层为DLC	Coating for aluminium work pieces DLC

材质	Material	特性	Features	扩张强度 Tensile strength (N/mm2)	硬度 Hardness HB	Vc (m/min)	F (毫米/转) (mm/rev.)
普通钢	Unalloyed steel			<500	<150	100-130	0.20-0.30
铸钢	Cast steel			500-850	150-250	90-110	0.20-0.30
易切削钢	Free machining steel						
		加硬处理	hardened	850-1000	250-300	70-90	0.15-0.25
纸合金钢	Low-alloy steel	退火处理	annealed	<850	<250	80-130	0.20-0.30
铸钢	Cast steel	加硬处理	hardened	850-1000	250-300	70-110	0.20-0.30
		加硬处理	hardened	>1000-1200	>300-350	40-70	0.15-0.25
高合金钢	High-alloy steel	退火处理	annealed	<850	<250	40-70	0.15-0.25
工具钢	Tool steel	加硬处理	hardened	850-1100	250-320	35-50	0.15-0.20
不锈钢	Stainless steel	铁素体	ferritic	450-650	130-190	30-50	0.12-0.15
		奥氏体	austenitic	650-900	190-270	30-40	0.12-0.15
		马氏体	martensitic	500-700	150-200	20-30	0.12-0.15
淬硬钢	Hardened steel						
冷铸	Chilled castings					20-25	0.10-0.12
超合金	Super alloys						
(镍合金, …)	(Inconel, …)			<1200	<350	20-25	0.10-0.12
灰口铸铁	Grey cast iron			<500	<150	90-180	0.30-0.40
球墨铸铁	Nodular cast iron			300-800	90-240	90-160	0.25-0.35
锻铝合金	Aluminium-forging alloys					120-250	0.30-0.40
铸铝合金	Aluminium-casting alloys					120-250	0.30-0.40
铜合金	Cupper alloys	黄铜	Brass			140-200	0.30-0.40
		青铜	Bronze				
		短屑	short-chipping			60-100	0.25-0.35
		青铜	Bronze				
		长屑	long-chipping			40-60	0.20-0.30

去毛刺/倒角的切削数据请参阅第 33页　　Cutting data for deburring / chamfering see page 33

4.6 VEX-P 编程信息/ VEX-P programming

在加工过程中不需要改变主轴转向或停转主轴。

AV: 向前工进 **AR:** 向后工退
EV: 向前快进 **ER:** 向后快退

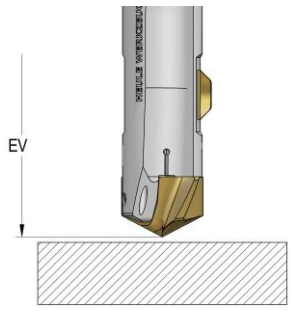
It is not necessary to change the direction of rotation or stop the spindle.

AV: Working feed, forward **AR:** Working feed, backward
EV: Rapid feed, forward **ER:** Rapid feed, backward

1. EV
将刀具快进至工件的上方。
注意：离工件距离！

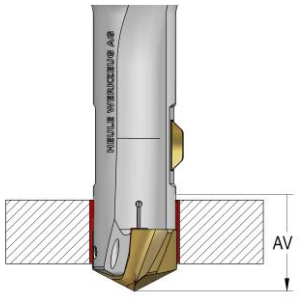
1. EV
Rapid traverse of the tool to just above the top of the work piece.

Note: Clearance distance.



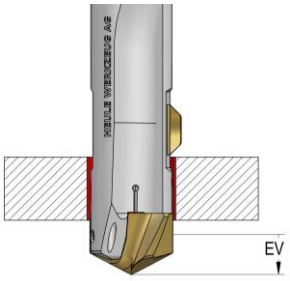
2. AV
在工进的过程中孔被加工出来，保持刀具的工进速度直至钻头完全钻透孔。

2. AV
In forward linear feed the bore is produced. Continue in linear feed until the spade drill insert is completely clear of the bore.



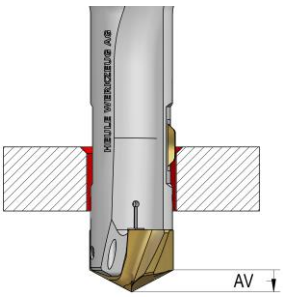
3. EV
快进至接近SNAP刀片的位置，直至SNAP刀片位于工件毛刺上方。

3. EV
Position tool with SNAP blade in rapid feed, forward slightly above the top material surface of bore or burr.



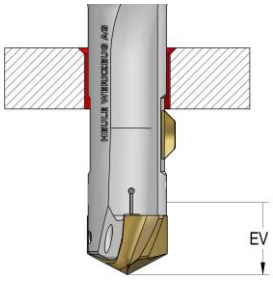
4. AV
在工进的过程中倒角被加工完成，继续向前直至刀片完全缩回刀杆内部。

4. AV
In linear feed forward (AV) the chamfer is generated. Continue in linear feed until the blade is completely retracted into the tool.



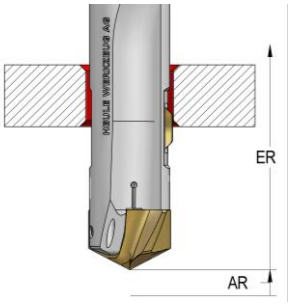
5. EV
刀杆能够以快进的方式通过孔，直至SNAP刀片通过整个孔并且完全弹出。

5. EV
The tool can be passed through the hole in rapid feed forward until the SNAP blade is clears the hole and is fully extended.



6. AR / ER
反倒角在工退的过程中加工完成（不需要改变主轴转向）。当SNAP刀片完全收入刀杆内的时候，刀能够以快退的方式退出工件。

6. AR / ER
The back chamfer is machined by linear feed backward (no change of spindle rotation). As soon as the SNAP blade is completely retracted into the tool, the tool can travel out of the hole in rapid feed backward ER.



4.7 如何解决钻孔过程中的问题

积屑瘤	排屑槽堵塞	孔在退出过程中产生毛刺	加工精度不稳定	内表面质量较差	有震纹	主切削刃磨损	横刃磨损	倒角磨损	后刀面磨损	刀刃破裂	钻尖破损	解决方案
√					√	√				√		提高切削速度
		√			√			√	√			降低切削速度
				√	√							提高进给速度
	√		√	√	√	√	√	√		√	√	降低进给速度
√	√	√	√	√	√	√	√	√	√	√	√	提高冷却液压力
			√	√	√			√				检查转速
			√			√	√	√		√	√	检查主轴的稳定性及设置
		√		√								更换磨损的刀片
	√			√								改进钻削速度
√												更换刀片涂层

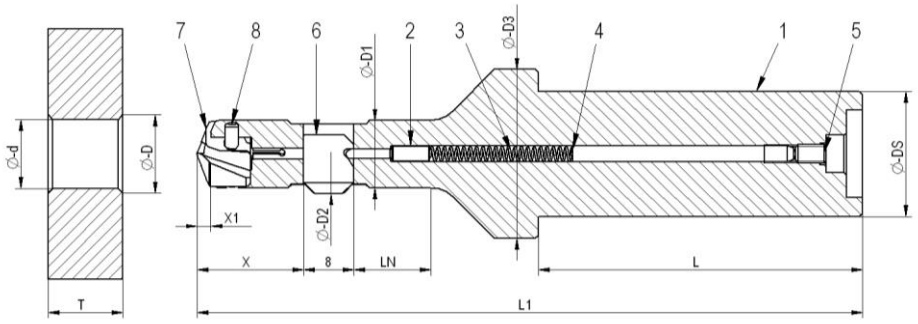
How to solve drill problems

Built-up edge	Chip jam	Burr formation on the exit of the bore	Variable precision	Bad quality of surface	Chatter	Wearing of major cutting edge	Wearing of cross cutting edge	Wearing of major chamfer	Wearing of clearance surface	Breakout of cutting edge	Breakout of the top of the drillbit	Solution
√					√	√				√		Raise cutting speed
		√			√			√	√			Reduce cutting speed
				√	√							Raise feed rate
	√		√	√	√	√	√	√		√	√	Reduce feed rate
√	√	√	√	√	√	√	√	√	√	√	√	Raise coolant pressure
			√	√	√			√				Check rotation
			√			√	√	√		√	√	Check stability of spindle and setting
		√		√								Exchange worn drill head
	√			√								Improve drilling cycle
√												Coating

4.8 VEX-P 组合刀具(系列 C) / VEX-P Combi (serie C)

(所有的VEX-P标准组合刀具都带有内冷却方式)

(All standard VEX-P Combi are provided with through-tool-coolant supply)



ø D2 = ø D + 0.6mm	
最大倒角直径 D =最小基孔直径 d + 1.5mm (Serie C)	**Max. chamfer ø D = min. bore ø + 1.5mm (serie C)**

备件 / Spare parts:

Pos.	说明	Description	订货号 Order No.
1	刀杆：请查阅下面的表格	Tool body; see table below	
2	控制销 ø1.5	Control bolt ø1,5	GH-Q-E-0078
3	弹簧 ø2.35xø0.35x30	Spring ø2.35xø0.35x30	GH-H-F-0019
4	距离销钉：请查阅下面的表格	Distance pin; see table below	
5	调节螺钉 M3x5 DIN 913	Set screw M3x5 DIN 913	GH-H-S-0127
	扳手 Pos. 5*	Wrench for pos. 5*	GH-H-S-2101
6	SNAP 刀片：请查阅第35-36 页	SNAP blade; see pages 35-36	
7	钻头：请查阅第27页	Drill insert; see page 27	
8	紧固螺钉：第27页	Clamp screw see page 27	
	平扳手 Pos. 8* 扭力扳手：请查阅第27页	Wrench for pos. 8* Torque spanner see page 27	

* Pos.5 / Pos.8处的扳手需要另外订货. / Wrench for pos. 5 / Pos. 8 to be ordered separately.

1倍径孔深 / Bore depth 1xd

孔径 Bore range	孔深 Bore-depth	系列 Series	订货号 Order No.	仅刀杆，不带倒角刀片，不带钻头 Tool without blade, without drill insert								Pos. 1 刀杆订货号 Tool body Order No.	Pos. 4 距离销钉 Distance pin
ø d	T		GH-Q-O-	ØD1	X	X1	LN	L1	ØDS	ØD3	L	GH-Q-G-	GH-Q-E-
11.00-11.49	11.5	C	**4126**	10.8	17.1	2.5	11.5	106.7	20	27	52	4126	0049
11.50-11.99	12.0		**4127**	11.3	17.1	2.6	12	107.0	20	27	52	4127	
12.00-12.49	12.5		**4200**	11.8	17.6	2.7	12.5	107.7	20	27	52	4200	
12.50-12.99	13.0		**4201**	12.3	17.6	2.8	13	108.0	20	27	52	4201	
13.00-13.49	13.5		**4202**	12.8	18.1	2.9	13.5	108.7	20	27	52	4202	
13.50-13.99	14.0		**4203**	13.3	18.1	3.0	14	109.0	20	27	52	4203	

当加工孔深大于1倍孔径时，请使用冷却！ / Use cooling when bore-depth bigger than 1xd!

对刀具或刀杆需要带平侧固柄**(HB)**或者斜侧固柄 **(HE)**的,请在订货事情后面添加 **-HB** 或者**-HE** .

例如:
VEX-P ø12.50 / T=13.0mm 带平侧固柄
订货号: GH-Q-O-4201**-HB**

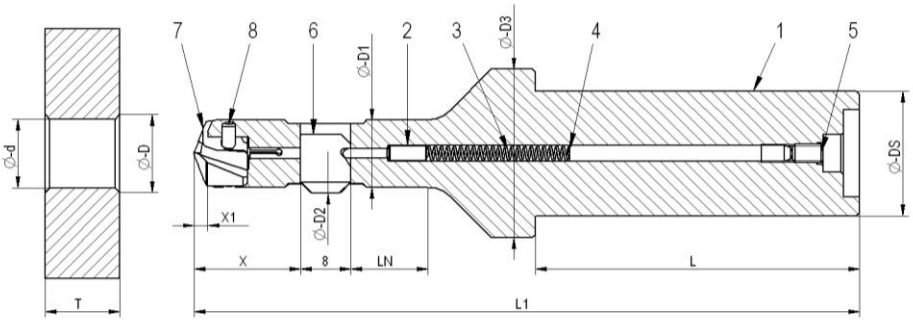
For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.

For example:
VEX-P ø12.50 / T=13.0 mm with weldon shank
Order No.: GH-Q-O-4201**-HB**

VEX-P 组合刀具 (系列 C) / VEX-P Combi (serie C)

(所有的VEX-P标准组合刀具都带有内冷却方式)

(All standard VEX-P Combi are provided with through-tool-coolant supply)



ø D2 = ø D + 0.6mm	
最大倒角直径 D = 最小基孔直径d + 1.5mm (Serie C)	**Max. chamfer ø D = min. bore ø + 1.5mm (serie C)**

2倍径孔深 / Bore depth 2xd

孔径	孔深	系列	订货号	仅刀杆，不带倒角刀片，不带钻头								**Pos. 1** 刀杆 订货号	**Pos. 4** 距离销钉
Bore range	**Bore-depth**	**Series**	**Order No.**	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		**GH-Q-O-**	ØD1	X	X1	LN	L1	ØDS	ØD3	L	GH-Q-G-	GH-Q-E
11.00-11.49	23	**C**	**4146**	10.8	17.1	2.5	23	118.2	20	27	52	4146	0041
11.50-11.99	24		**4147**	11.3	17.1	2.6	24	119	20	27	52	4147	
12.00-12.49	25		**4220**	11.8	17.6	2.7	25	120.2	20	27	52	4220	
12.50-12.99	26		**4221**	12.3	17.6	2.8	26	121.0	20	27	52	4221	
13.00-13.49	27		**4222**	12.8	18.1	2.9	27	122.2	20	27	52	4222	
13.50-13.99	28		**4223**	13.3	18.1	3.0	28	123.0	20	27	52	4223	

当加工孔深大于1倍孔径时，请使用冷却！/ Use cooling when bore-depth bigger than 1xd!

对刀具或刀杆需要带 平侧固柄**(HB)**或者斜侧固柄 **(HE)**的,请在订货事情后面添加 **-HB** 或者**-HE** .

例如：
VEX-P ø12.50 / T=26.0mm带平侧固柄
订货号.: GH-Q-O-4221**-HB**

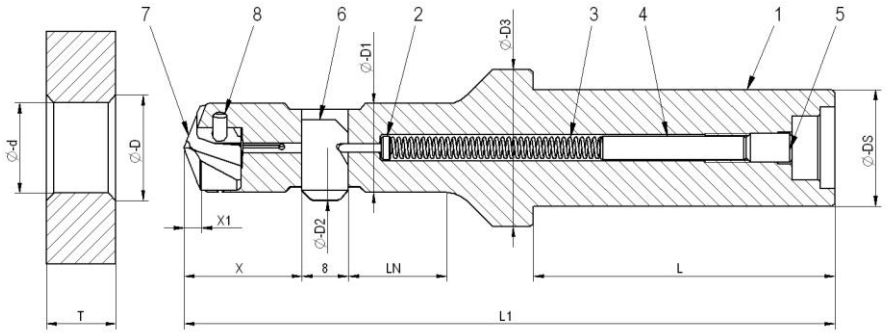
For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.

For example:
VEX-P ø12.50 / T=26.0 mm with weldon shank
Order No.: GH-Q-O-4221**-HB**

4.9 VEX-P 组合刀具 (系列 D)/ VEX-P Combi (serie D)

(所有的VEX-P标准组合刀具都带有内冷却方式)

(All standard VEX-P Combi are provided with through-tool-coolant supply)



ø D2 = ø D + 0.7mm	
最大倒角直径 D = 最小基孔直径 d + 2.0mm (系列D)	**Max. chamfer ø D = min. bore ø + 2.0mm (serie D)**

备件 / Spare parts:

Pos.	说明	Description	订货号 Order No.
1	刀杆：请查阅下面的表格	Tool body; see table below	
2	控制销 ø1.5	Control bolt ø1,5	GH-Q-E-0002
3	弹簧 ø3.7xø0.5x48	Spring ø3.7xø0.5x48	GH-H-F-0007
4	距离销钉：请查阅下面的表格	Distance pin; see table below	
5	调节螺钉： M5x8 DIN 913	Set screw M5x8 DIN 913	GH-H-S-0119
	扳手 Pos. 5*	Wrench for pos. 5*	GH-H-S-2100
6	SNAP 刀片： 请查阅第37-38页	SNAP blade; see pages 37-38	
7	钻头：请查阅第27页	Drill insert; see page 27	
8	紧固螺钉：请查阅第27页	Clamp screw see page 27	
	平扳手 Pos. 8* 扭力扳手：请查阅第27页	Wrench for pos. 8* Torque spanner see page 27	

* Pos.5 / Pos.8处的扳手需要另外订货. / Wrench for pos. 5 / Pos. 8 to be ordered separately.

1倍径孔深 / Bore depth 1xd

孔径	孔深	系列	订货号	仅刀杆，不带倒角刀片，不带钻头								Pos. 1 刀杆 订货号	Pos. 4 距离销钉
Bore range	Bore-depth	Series	Order No.	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		GH-Q-O-	ØD1	X	X1	LN	L1	ØDS	ØD3	L	GH-Q-G-	GH-Q-E-
14.00-14.49	14.5	D	**4204**	13.8	19.8	3.1	14.5	110.9	20	27	52	4204	0023
14.50-14.99	15.0		**4205**	14.3	19.8	3.2	15.0	111.2	20	27	52	4205	
15.00-15.49	15.5		**4206**	14.8	20.3	3.3	15.5	111.9	20	27	52	4206	
15.50-15.99	16.0		**4207**	15.3	20.3	3.4	16.0	112.2	20	27	52	4207	
16.00-16.49	16.5		**4208**	15.8	21.3	3.5	16.5	113.4	20	27	52	4208	
16.50-16.99	17.0		**4209**	16.3	21.3	3.5	17.0	113.7	20	27	52	4209	

当加工孔深大于1倍孔径时，请使用冷却！ / Use cooling when bore-depth bigger than 1xd!

对刀具或刀杆需要带平Weldon侧固柄**(HB)**或者斜侧固柄**(HE)**的,请在订货事情后面添加 **-HB** 或者**-HE** .

例如

VEX-P ø14.50 / T=15.0mm 带平侧固柄

订货号: GH-Q-O-4205-**HB**

For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.

For example:

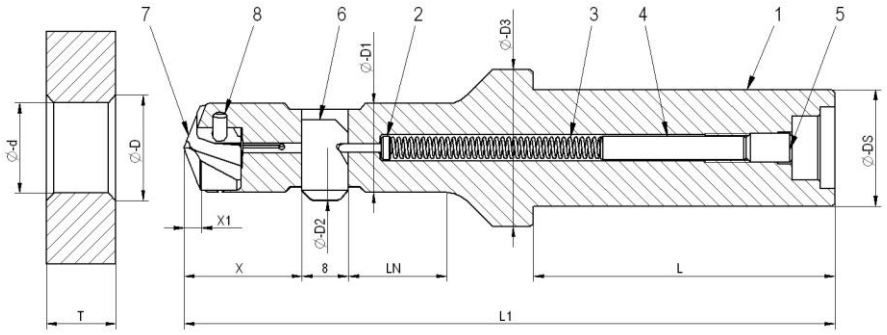
VEX-P ø14.50 / T=15.0 mm with weldon shank

Order No.: GH-Q-O-4205-**HB**

VEX-P 组合刀具 (系列 D) / VEX-P Combi (serie D)

(所有的VEX-P标准组合刀具都带有内冷却方式)

(All standard VEX-P Combi are provided with through-tool-coolant supply)



ø D2 = ø D + 0.7mm	
最大倒角直径D = 最小基孔直径d + 2.0mm (系列 D)	**Max. chamfer ø D = min. bore ø + 2.0mm (serie D)**

2倍径孔深 / Bore depth 2xd

孔径	孔深	系列	订货号	仅刀杆，不带倒角刀片，不带钻头								**Pos. 1** 刀杆订货号	**Pos. 4** 距离销钉
Bore range	**Bore-depth**	**Series**	**Order No.**	Tool without blade, without drill insert								Tool body Order No.	Distance pin
ø d	T		**GH-Q-O-**	ØD1	X	X1	LN	L1	ØDS	ØD3	L	GH-Q-G-	GH-Q-E
14.00-14.49	29	**D**	**4224**	13.8	19.8	3.1	29	125.4	20	27	52	4224	0026
14.50-14.99	30		**4225**	14.3	19.8	3.2	30	126.2	20	27	52	4225	
15.00-15.49	31		**4226**	14.8	20.3	3.3	31	127.4	20	27	52	4226	
15.50-15.99	32		**4227**	15.3	20.3	3.4	32	128.2	20	27	52	4227	
16.00-16.49	33		**4228**	15.8	21.3	3.5	33	129.9	20	27	52	4228	
16.50-16.99	34		**4229**	16.3	21.3	3.5	34	130.7	20	27	52	4229	

当加工孔深大于1倍孔径时，请使用冷却！/ Use cooling when bore-depth bigger than 1xd!

对刀具或刀杆需要带平侧固柄**(HB)**或者斜侧固柄**(HE)**的,请在订货事情后面添加 **-HB** 或者**-HE** .

例如:
VEX-P ø14.50 / T=30.0mm 带平侧固柄
订货号: GH-Q-O-4225**-HB**

For tools or tool bodies with weldon shank **(HB)** or whistle notch shank **(HE),** add -**HB** or **-HE** to the order No.

For example:
VEX-P ø14.50 / T=30.0 mm with weldon shank
Order No.: GH-Q-O-4225**-HB**

4.10 VEX-P 钻头的选型
Selection of VEX-P replaceable drill insert

1 系列 / Series

孔径d Bore range Ø d	系列 Series
11.00 – 13.99	**C**
14.00 – 16.99	**D**

订货号举例说明:
Order number example:

P- P- 1 2222 - 3 - 4

1 = 系列 / Series

2 = 孔径Ø d / Bore-Ø d

3 = 刀片材质 / Cutting material

4 = Beschichtung / Coating

2 孔径 / Bore diameter d

在该位置标明孔径尺寸
例如: Ø 15.10 = 1510
标准尺寸 0,1 mm.

Indicate die bore diameter at this place.
For example: Ø 15.10 = 1510
Standard size each 0,1 mm.

订货举例 / Example for an order:

孔径Ø d	Bore-Ø d	= 14.50mm
硬质合金牌号	Carbide-Quality	= K20-K30
刀片涂层	Coating	= Helica

订货号:
Order No: P-P-D-1450-1H

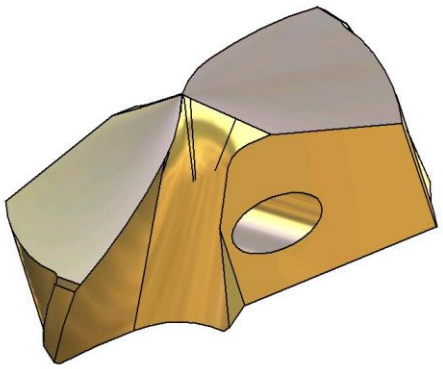
3 刀片材质 / Cutting material

Hartmetall / Carbide K20-K30	**1**

4 刀片涂层/ Coating

Helica*: 亚光切削刃0.03 / honed cutting edge 0.03	**H**
Helica: 亚光切削刃0.03 / 带排屑角5° / honed cutting edge 0.03 / with chip angle 5°	**K**
DLC	**D**

* Standard / 标准品



孔径 Ø Bore Ø Ø d	系列 Series	紧固螺钉说明	Clamp screw Description	订货号 Order No. GH-H-S-	扭紧刀矩 Tightening torque Nm	梅花扳手 Torx-key GH-H-S	扭力扳手 Torque spanner GH-H-S	GH-H-S-
11.00 – 13.99	C	M2.2 x 10.2 T7		0038	1.1	2001	2400	2352
14.00 – 16.99	D	M2.5 x 12 T8		0035	1.2	2002	2400	2353

4.11 关于冷却 / Cooling

内冷却能够帮助刀具更有效地排屑。 只有在加工深度小于1xD并且降低进给的情况下，才可以使用外冷却系统。 对于最大尺寸为3xD的情况下冷却液压力至少要8bar，流量在5-20升/分钟。	Through tool coolant is necessary for the optimum swarf evacuation. Use external cooling only up to max. 1xD and with reduced feed-rate. Coolant pressure for max. 2xD at least 8 bar. Flow rate 5 to 20 Litre/min.

4.12 钻头磨损—更换钻头
Insert Wear – Replacing of drill insert

当出现以下类型的情况时，您应当更换您的VEX-P钻头以便重新获得加工精度： 当后刀面磨损：> 0.2-0.3mm. 当机床功率增加（与使用新钻头时相比）：> 25 % 与标称孔径的差值：> 0.15毫米或< 0.05 毫米	The following indicates types of wear associated to the VEX-P replaceable drill insert and as to when the drill insert should be replaced: Wear on the insert clearance face or flank face > 0.2-0.3mm. Increase in required driving power > 25 % more than with a new drill insert. Deviation of hole nominal diameter > 0.15 mm and < 0.05 mm

5 SNAP 倒角系统 / SNAP deburring system

5.1 功能 / Function

功能

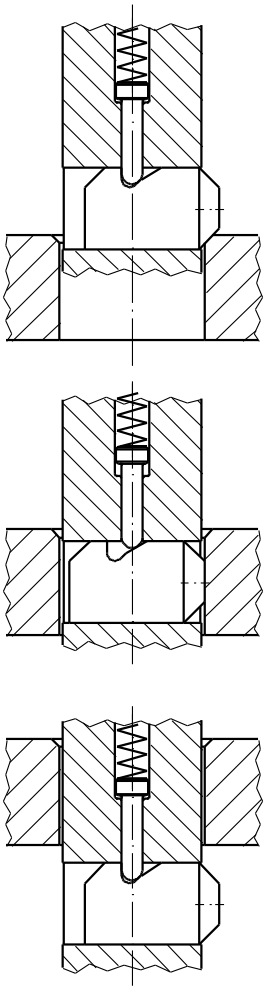
在弹簧压力的作用下，控制销将刀片推入刀杆内部。

一个特制的双向切削刀片在其进入孔的过程中加工出所要求的倒角。

一旦获得期望的倒角尺寸，刀片会继续向前并同时收入刀杆内部。

依靠特别设计的圆弧表面，刀片在通过被加工孔的同时不会对孔造成破坏，甚至是铰削过后的孔也不会产生任何破坏。刀片本身有一个特别斜面，该部分与控制销能够紧密地配合，以保证刀片在离开孔以后能够被带回到初始位置。

在工退过程中完成反倒角的加工，而无需停止主轴或者转变主轴的转速。在完成反倒角的加工后，刀具能够以快退的方式回到起始位置。通过这种加工方式便能顺利地完成正反向去毛刺或倒角操作。



Function

The deburring blade is moved in the tool body via a control bolt returned under spring pressure.

A specially ground front and back cutting deburring blade produces the required chamfer whilst the tool enters the bore.

Once the chamfer size is attained, the deburring blade continuously retract into the tool body.

On a specially designed gliding radii, the blade passes through the hole without damaging it. Even reamed bores can be passed through without any damage. The deburring blade has a special recess which the control bolt engages and after exiting the hole brings the blade back into its starting position.

Linear feed backward facilitates the cutting of the back chamfer, without the necessity to stop or change the direction of spindle rotation. On completion of the back chamfer the tool can be returned to the starting position in rapid feed.

A smooth deburring or chamfering operation forwards and backwards is the result of this machining operation.

5.2 刀片选型 / Blade selection

对于SNAP产品线，可以有两种型号的刀片进行选择：

- **GH-S 型刀片**
- **DEFA-型刀片**

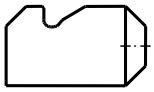
对于外形尺寸以及订货号，请查阅第34-38页的刀片表格。

Two blade types are available for the SNAP tool line:

- **Blade with GH-S geometry**
- **Blade with DEFA geometry**

For dimensions and order numbers please see blade table on pages 34-38.

5.2.1 GH-S型刀片 / Blade with GH-S geometry



GH-S型刀片是一种通用型的刀片，其适用大多数的去毛刺加工以及较为简单的倒角加工。该型号的刀片同样适用于加工轻微不平整表面的工件。

正反向倒角通过正向及反向进给获得，而倒角尺寸会根据进给量的变化而变化。如果只需进行反向切削，而不需正面倒角，双向切削刀片仍然可以被使用，只需要以快进方式通过其孔即可，不会损害孔的边缘或影响刀片的寿命。

只有在严格要求正向孔边缘没有去毛刺或倒角操作的情况下，才有必要使用专门的背向切削的刀片。

关于刀片信息请查阅第34,35,37页。

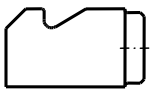
The blade with the GH-S geometry is an universal blade suitable for most deburring and easy chamfering operations. This blade type can also be used in applications where there is slight unevenness on the surface of the component.

Front and back chamfering is achieved by linear feed forward and backward and the size of chamfer may be varied by the relative feed-rate applied. For back cutting only a front and back cutting blade can be used, by traversing through the relative hole in rapid feed without causing damage to either the front edge of the hole or the tool.

Only when no deburring or chamfering is required on the front of the hole is it necessary to use **back cutting only** blades.

Blades, see pages 34,35,37.

5.2.2 DEFA型刀片 / Blade with DEFA geometry



该型号的刀片是为了满足各类机加工环境，例如：加工稳定性，工件和刀具的夹装，除此以外还有机床主轴的稳定性等等。

DEFA-型刀片主要使用在预定尺寸或有公差要求以及要求倒角尺寸一致的场合。

该刀片不能够使用双向切削刀片以快进的方式穿过孔来获得单向切削的效果，如果不能有正向倒角的产生，则必须使用背向切削刀片。

DEFA型刀片的进给速度为0.03毫米/转到0.1毫米/转，上限速度不能够超过该值，否则会导致刀片的破损。

关于刀片信息请查阅第36,38页。

This blade type is responsive to the conditions of the machine, i.e. stability, clamping of work piece and tool in addition to stable machine spindle, etc.

The DEFA blade is mainly used when a defined, toleranced or more consistent chamfer size is required.

It prohibits the passing of **forward and backward** cutting blades through the hole in rapid feed. If no front chamfer is required, a **back cutting only blade** has to be used.

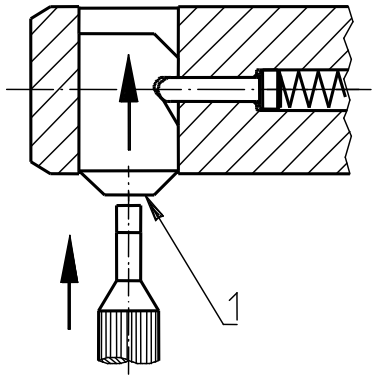
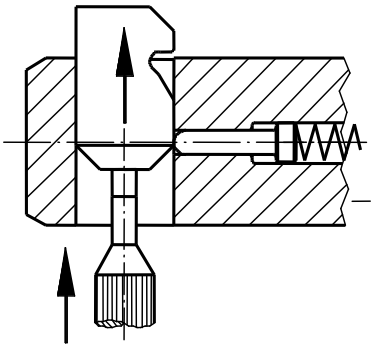
The **feed rate** for DEFA geometry blades is **from 0.03 to 0.1mm/rev**. The upper value should not be exceeded as blade breakage may result.

Blades, see pages 36,38.

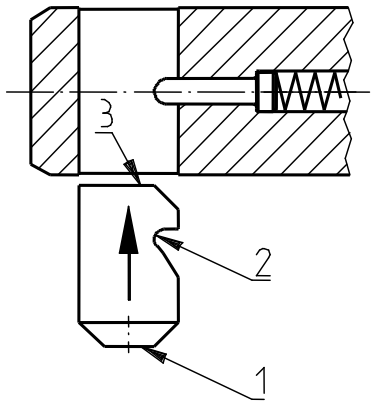
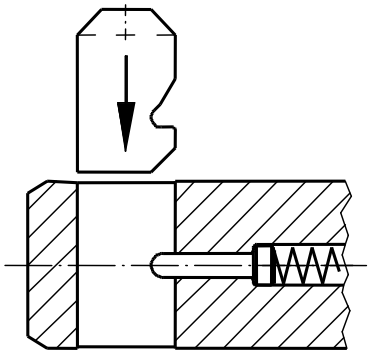
6 SNAP倒角系统的使用说明
Instructions for using the SNAP deburring system

6.1 更换刀片 / Changing the blades

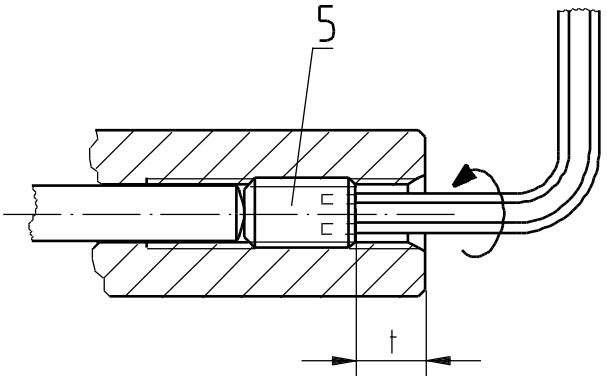
1. 拆除刀片 / Blade removal

1.	2.
	
SNAP刀片可以使用一个没有尖刃的物体(例如小螺丝刀)从刀体中推出，该物体需接触在刀片的圆弧面上(1)。	
The SNAP blade can be pushed through the tool with an edgeless object (e.g. small screw driver). The screw driver is put on at the blade head (1).	

2. 安装刀片 / Inserting the blade

1.	2.
	
首先将刀片的背部(3)推入刀杆的槽口中，直至相配合为止。同时请注意刀片斜槽(2)应指向刀柄方向。刀片在两个方向均可装入刀杆。 装好刀片之后，刀具就可以用于生产加工了。	
The deburring blade is pushed with its back (3) first into the blade recess (blade window) of the tool until it engages. Please make sure it is aligned with the groove (2) in the direction of the tool shank. The blade can be inserted into the tool from both sides. The tool is now ready for operation.	

6.1.1 设定刀片力/ Setting the blade force



刀片力可以通过刀杆尾端的调节螺钉进行调节。

扭转调节螺钉（顺时针方向）
⇒ **增强刀片力**

在孔口上有铁屑时，必须有足够的力来将刀片推出刀杆。

通过改变DEFA型刀片的刀片力，是无法改变倒角尺寸的大小 (请参阅 6.3.2)。

在使用GH-S型刀片时，建议根据工件的材质（钢/铝）、倒角的尺寸或者切削参数（进给量）来调节刀片力。

另外，通过改变GH-S型刀片（标准型）的刀片力，只能够较小范围的调整倒角尺寸。

采用正确的刀片力进行切削，能够有效地提高刀片的寿命以及提供更高的倒角质量。假如需要更强的刀片力，可以使用更硬的弹簧。

SNAP5 更硬的弹簧是： GH-H-F-0041
SNAP12 更硬的弹簧是： GH-H-F-0011

The blade force can be adjusted with the set screw (5) in rear of the shank.

Screw in set screw (turn clockwise):
⇒ **increased blade force**

The blade force has to be sufficient to enable the blade to extend outwards in the event of swarf ingress.

Changing the blade force of DEFA blades **does not** influence the chamfer size (see 6.3.2).

Using blades having the GH-S cutting geometry, it is recommended to adjust the blade force depending on the material (steel, alu), chamfer size or cutting values (feed). By changing the blade force of GH-S blades (standard) the chamfer size can be minimal adjusted only.

Working with the correct blade pressure increases the blade life and improves the chamfer quality. If a very strong blade force is required, the harder spring can be inserted into the tools of SNAP5 and SNAP12 groups (not standard).
Harder spring for SNAP5 is GH-H-F-0041
Harder spring for SNAP12 is GH-H-F-0011

6.2 SNAP切削参数 / SNAP cutting data

6.2.1 SNAP系列 GH-S型刀片 / SNAP blade with GH-S geometry

标准值 / Standard values

材质 **Material**	切削速度 v (m/min.) **Cutting speed** v (m/min.) for			**进给量** s (mm/U) **Feed** s (mm/rev.)
	HM carbide	HM TiN carbide TiN	HM TiAlN carbide TiAlN	
钢及合金刚 Steel, steel alloys	45 - 65	45 - 70	45 - 70	0.1 - 0.2
铸件及铸铁材料 Cast, cast iron materials	45 - 65	45 - 70	45 - 70	0.1 - 0.3
有色金属 Non-ferrous metals	65 - 105	65 - 120	65 - 120	0.1 - 0.3

6.2.2 SNAP 系列 DEFA型刀片 / SNAP blade with DEFA geometry

标准值/ Standard values

材质 **Material**	切削速度 v (m/min.) **Cutting speed** v (m/min.) for			**进给量** s (mm/U) **Feed** s (mm/rev.)
	HM carbide	HM TiN carbide TiN	HM TiAlN carbide TiAlN	
钢及合金刚 Steel, steel alloys	45 - 65	45 - 70	45 - 70	0.03 - 0.1
铸件及铸铁材料 Cast, cast iron materials	45 - 65	45 - 70	45 - 70	
有色金属 Non-ferrous metals	65 - 105	65 - 120	65 - 120	

6.3 设定倒角尺寸 / Setting the chamfer size

6.3.1 SNAP系列GH-S型刀片 / SNAP blade with GH-S geometry

倒角尺寸主要由使用的刀片来确定（刀片的长度）。不同尺寸的刀片决定了不同的倒角尺寸。

最大的倒角尺寸由最大倒角直径确定（请查看第34,35,37的表格）。

The chamfer size is basically determinded by the blade (length of blade). Each blade creates a specific chamfer size.

The maximum possible chamfer size is determined by the maximum chamfer diameter D (see blade table pages 34,35,37).

可以根据工件材质来调节合适的刀片力（6.1.1）。适当的刀片力能够有效地提高去毛刺或者倒角的性能。

By changing the blade force (6.1.1) you can adapt the tool according to the work piece material. A good tool set up (blade force) is increasing the deburr- or chamfering result.

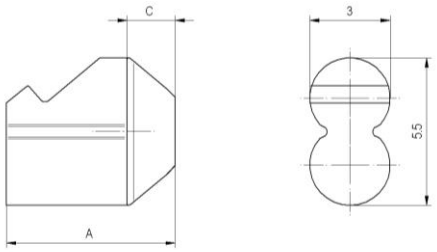
6.3.2 SNAP系列DEFA型刀片 / SNAP blade with DEFA geometry

SNAP 系列的DEFA 型刀片的倒角尺寸完全由倒角直径来决定（请查阅刀片表格）。这就意味着即使改变进给量或刀片力都不会影响其倒角的尺寸。这类刀片的进给量应该在0.03-0.1mm/rev。刀片力必须足够，以便在有铁屑干扰的情况下刀片能够正常的被弹出。

The chamfer size of SNAP blades with DEFA geometry is **solely** determined by the chamfer diameter (see blade table). This means that neither changing the feed rate nor changing the blade force has an effect on the chamfer size. The feed rate for this blade type should be **between 0.03 and 0.1mm/rev**. The blade force has to be sufficient to ensure that the blade extends outwards in the event of swarf ingress.

7 VEX系列配套倒角刀片 Blade types for VEX Combi tools

7.1 与VEX-S配合的GH-S型硬质合金刀片 VEX-S carbide blades with GH-S geometry



最小基孔直径 d = 最大倒角直径D - 2mm	Min. bore ø d = max. chamfer ø D - 2mm

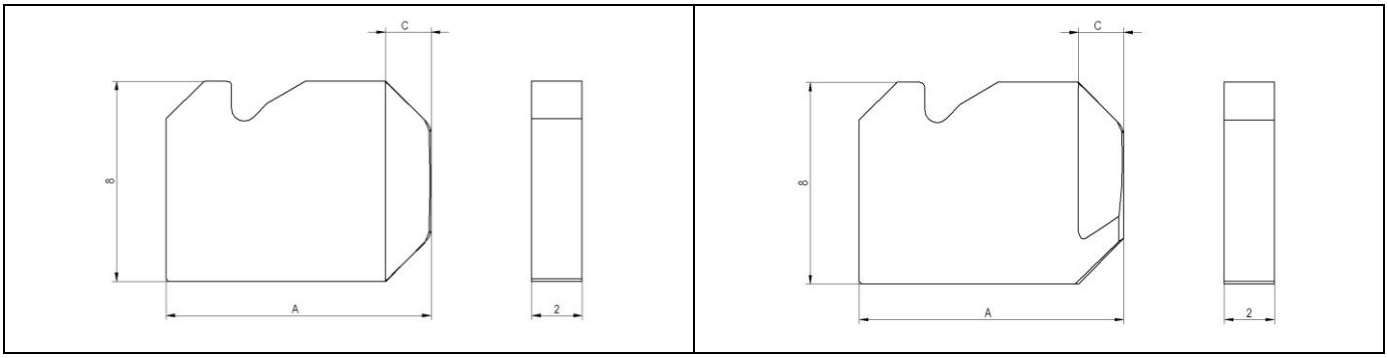
最大倒角直径 Maximum chamfer ø D	90°倒角 / Chamfer angle 90° SNAP5刀片（正反切削刃）订货号 Order No. for SNAP5 blades forward and backward cutting		90°倒角/ Chamfer angle 90° SNAP5刀片(仅反向切削刃)订货号 Order No. for SNAP5 blades backward cutting only		刀片尺寸 Dimensions	
	TiAlN GH-Q-M-	DLC GH-Q-M-	TiAlN GH-Q-M-	DLC GH-Q-M-	A	C
5.5	30204	30404	31204	31404	4.40	0.8
6.0	30205	30405	31205	31405	4.85	1.3
6.5	30206	30406	31206	31406	4.90	1.6
7.0	30207	30407	31207	31407	4.85	1.6
7.5	30208	30408	31208	31408	5.20	1.6
8.0	30209	30409	31209	31409	5.70	1.7
8.5	30210	30410	31210	31410	5.80	1.7
9.0	30211	30411	31211	31411	6.30	1.7
9.5	30212	30412	31212	31412	6.80	1.7
10.0	30213	30413	31213	31413	7.30	1.7
10.5	30214	30414	31214	31414	7.80	1.7
11.0	30215	30415	31215	31415	7.80	1.8
11.5	30216	30416	31216	31416	8.05	1.8
12.0	30217	30417	31217	31417	8.30	1.8
12.5	30218	30418	31218	31418	8.55	1.8
13.0	30219	30419	31219	31419	8.80	1.8
13.5	30220	30420	31220	31420	9.05	1.8

如果需要其他尺寸、涂层以及特定角度的倒角，请来电查询！ Other sizes, coatings and chamfer angles available on request!

7.2 与VEX-P配合的 SNAP8系列GH-S型硬质合金刀片
VEX-P series C carbide blades SNAP8 with GH-S geometry

正反向切削刃
forward and backward cutting

仅反向切削刃
backward cutting only



最小基孔直径d =最大倒角直径 D – 1.5mm	Min. bore ø d = max. chamfer ø D – 1.5mm

最大倒角直径 **Maximum chamfer** **ø D**	90°倒角 / Chamfer angle 90° **SNAP8刀片（正反向切削刃）订货号** **Order No. for SNAP8 blades forward and backward cutting** TiN GH-Q-M-	标准 **TiAlN GH-Q-M-**	DLC	90°倒角/ Chamfer angle 90° **SNAP8刀片（仅反向切削刃）订货号** **Order No. for SNAP8 blades backward cutting only** TiN GH-Q-M-	TiAlN GH-Q-M-	DLC	刀片尺寸 Dimensions A	C
11.5	03726	**03826**	13526	05726	05826	15526	9.0	1.8
12.0	03727	**03827**	13527	05727	05827	15527	9.4	1.8
12.5	03728	**03828**	13528	05728	05828	15528	9.8	1.8
13.0	03729	**03829**	13529	05729	05829	15529	10.2	1.8
13.5	03730	**03830**	13530	05730	05830	15530	10.5	1.8
14.0	03731	**03831**	13531	05731	05831	15531	11.0	1.8
14.5	03732	**03832**	13532	05732	05832	15532	11.5	1.8
15.0	03733	**03833**	13533	05733	05833	15533	12.0	1.8
15.5	03734	**03834**	13534	05734	05834	15534	12.5	1.8

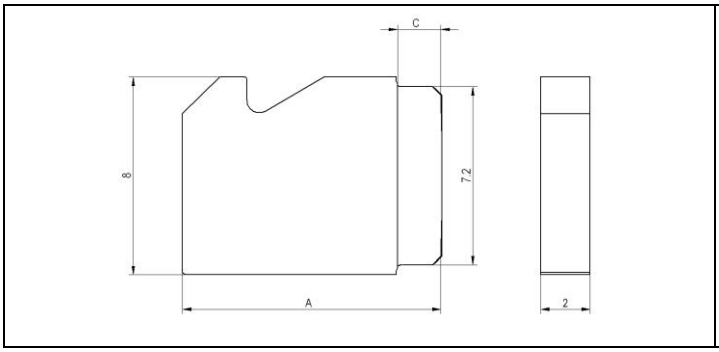
如果需要其他尺寸、涂层以及特定角度的倒角，请来电查询！

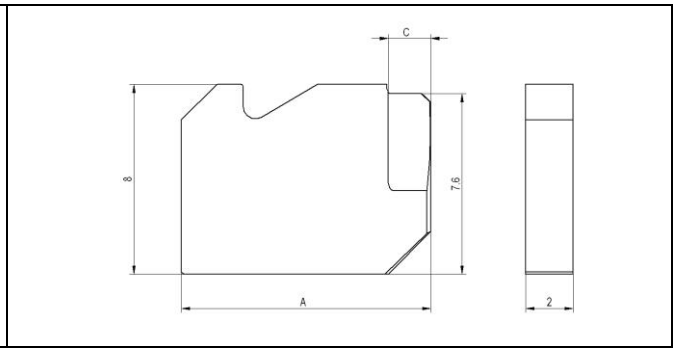
Other sizes, coatings and chamfer angles available on request!

7.3 VEX-P 系列C 配合 SNAP8系列DEFA型刀片
VEX-P series C carbide blades SNAP8 with DEFA geometry

正反向切削刃
forward and backward cutting

仅反向切削刃
backward cutting only





最小基孔直径d =最大倒角直径D – 1.5mm	Min. bore ø d = max. chamfer ø D – 1.5mm

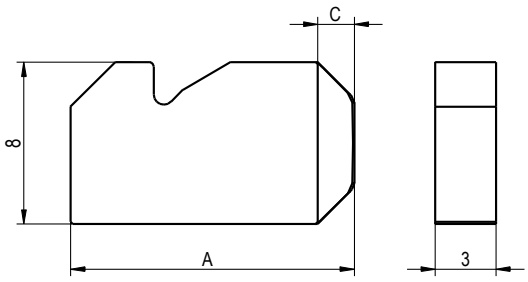
最大倒角直径 **Maximum chamfer** **ø D**	90°倒角 / Chamfer angle 90° **SNAP8刀片（正反向切削刃）订货号** **Order No. for SNAP8 blades forward and backward cutting** TiN GH-Q-M-	**标准 TiAlN GH-Q-M-**	DLC	90°倒角/ Chamfer angle 90° **SNAP8刀片（仅反向切削刃）订货号** **Order No. for SNAP8 blades backward cutting only** TiN GH-Q-M-	TiAlN GH-Q-M-	DLC	刀片尺寸 Dimensions A	C
11.5	03126	**03226**	13526	05126	**05226**	15326	9.0	1.7
12.0	03127	**03227**	13527	05127	**05227**	15327	9.4	1.7
12.5	03128	**03228**	13528	05128	**05228**	15328	9.8	1.7
13.0	03129	**03229**	13529	05129	**05229**	15329	10.2	1.7
13.5	03130	**03230**	13530	05130	**05230**	15330	10.5	1.7
14.0	03131	**03231**	13531	05131	**05231**	15331	11.5	1.5
14.5	03132	**03232**	13532	05132	**05232**	15332	12.0	1.5
15.0	03133	**03233**	13533	05133	**05233**	15333	12.5	1.5
15.5	03134	**03234**	13534	05134	**05234**	15334	13.0	1.5

如果需要其他尺寸、涂层以及特定角度的倒角，请来电查询！

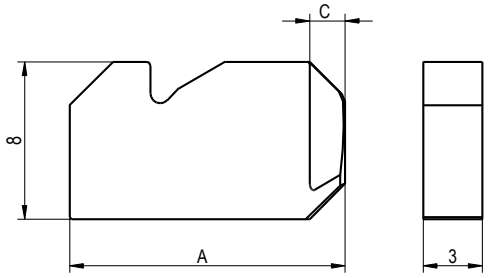
Other sizes, coatings and chamfer angles available on request!

7.4 VEX-P 系列 D配合SNAP12系列 GH-S型硬质合金刀片
VEX-P series D carbide blades SNAP12 with GH-S geometry

正反向切削刃
forward and backward cutting



仅反向切削刃
backward cutting only



最小基孔直径d =最大倒角直径 D - 2.0mm	Min. bore ø d = max. chamfer ø D - 2.0mm

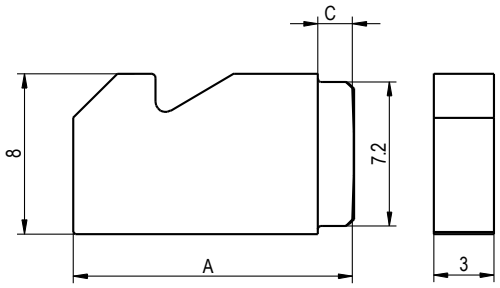
最大倒角直径 **Maximum chamfer** **ø D**	90°倒角 / Chamfer angle 90° **SNAP12刀片（正反向切削刃）订货号** **Order No. for SNAP12 blades forward and backward cutting** TiN GH-Q-M-	**标准 TiAlN GH-Q-M-**	DLC	90°倒角/ Chamfer angle 90° **SNAP12刀片（仅反向切削）刃订货号** **Order No. for SNAP12 blades backward cutting only** TiN GH-Q-M-	TiAlN GH-Q-M-	DLC	刀片尺寸 Dimensions A	C
14.5	03744	**03844**	13544	05744	05844	15544	12.0	1.8
15.0	03745	**03845**	13545	05745	05845	15545	12.5	1.8
15.5	03746	**03846**	13546	05746	05846	15546	12.8	1.8
16.0	03747	**03847**	13547	05747	05847	15547	13.0	1.8
16.5	03748	**03848**	13548	05748	05848	15548	13.2	1.8
17.0	03749	**03849**	13549	05749	05849	15549	13.6	1.8
17.5	03750	**03850**	13550	05750	05850	15550	14.0	1.8
18.0	03751	**03851**	13551	05751	05851	15551	14.2	1.8
18.5	03752	**03852**	13552	05752	05852	15552	14.5	1.8
19.0	03753	**03853**	13553	05753	05853	15553	14.8	1.8

如果需要其他尺寸、涂层以及特定角度的倒角，请来电查询！

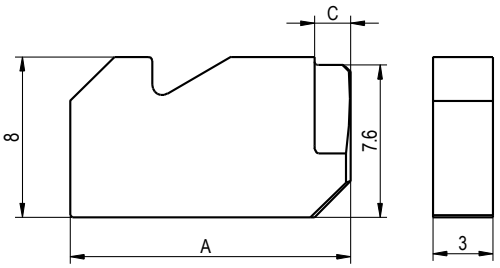
Other sizes, coatings and chamfer angles available on request!

7.5 VEX-P 系列 D 配合SNAP12 系列 DEFA型硬质合金刀片
VEX-P series D carbide blades SNAP 12 with DEFA geometry

正反向切削刃
forward and backward cutting



仅反向切削刃
backward cutting only



最小基孔直径d =最大倒角直径D - 2.0mm	**Min. bore ø d = max. chamfer ø D - 2.0mm**

最大倒角直径	90°倒角 / Chamfer angle 90°			90°倒角/ Chamfer angle 90°			刀片尺寸	
	SNAP12刀片（正反向切削刃）订货号			**SNAP12刀片（仅反向切削刃）订货号**				
Maximum chamfer	**Order No. for SNAP12 blades forward and backward cutting**			**Order No. for SNAP12 blades backward cutting only**			Dimensions	
	TiN	**标准 TiAlN**	DLC	TiN	TiAlN	DLC		
ø D	GH-Q-M-	**GH-Q-M-**		GH-Q-M-	GH-Q-M-		A	C
14.5	03144	**03244**	13344	05144	05244	15344	12.0	1.8
15.0	03145	**03245**	13345	05145	05245	15345	12.5	1.8
15.5	03146	**03246**	13346	05146	05246	15346	12.8	1.8
16.0	03147	**03247**	13347	05147	05247	15347	13.0	1.8
16.5	03148	**03248**	13348	05148	05248	15348	13.2	1.8
17.0	03149	**03249**	13349	05149	05249	15349	13.6	1.8
17.5	03150	**03250**	13350	05150	05250	15350	14.0	1.8
18.0	03151	**03251**	13351	05151	05251	15351	14.2	1.8
18.5	03152	**03252**	13352	05152	05252	15352	14.5	1.8
19.0	03153	**03253**	13353	05153	05253	15353	14.8	1.8

如果需要其他尺寸、涂层以及特定角度的倒角，请来电查询！

Other sizes, coatings and chamfer angles available on request!

8 如何解决去毛刺和倒角过程中产生的问题

问题现象	产生原因	解决方法
倒角尺寸太小 毛刺没有被去除	• 选择的刀片型号太小 • 倒角刀片尺寸过小或根本没有倒角	⇒ 选择更大的倒角刀片型号 (请参阅第34–38页表格).
倒角没有被加工出来	• 刀片力太小了 • 刀片太钝了 • 毛刺大多	⇒ 当使用SNAP的GH-S型刀片时，可以通过顺时针旋转调节螺钉（6）来增加刀片力。 ⇒ 更换新的刀片 ⇒ 更换钻削刀具
倒角尺寸太大	• 进给量太小 • 选择的刀片型号太大 • 刀片力太强	⇒ 当使用SNAP的GH-S型刀片时，可以增加进给速度（例如0.2毫米/转） ⇒ 选较小号的刀片型号 (请参阅第34 – 38页). ⇒ 当使用SNAP的GH-S型刀片时，可以通过逆时针旋转调节螺钉（6）来减小刀片力。
正向倒角和反向倒角的尺寸不一致	• 前向进给量和后向进给量不一致 • 前后毛刺厚度不同	⇒ 当使用SNAP的GH-S型刀片时，选用恒定正向和反向进给量 ⇒ 当使用SNAP的GH-S型刀片时，可以在倒角尺寸过小的一侧减小进给量 ⇒ 当使用SNAP的GH-S型刀片时，可以在倒角尺寸过大的一侧增加进给量
倒角面上出现振痕	• 工件或者刀具固定强度不够 • 刀具处于不稳定状态 • 转速太高	⇒ 确保工件及刀具已固定稳妥 ⇒ 增大刀具的进给量并且检查刀片力是否合适 ⇒ 降低转速
倒角尺寸不一致	• 进给量有变化 • 刀片力不够导致每次刀片伸出的时候不能回复到初始位置 • 刀具处于不稳定状态	⇒ 选用恒定的进给量 ⇒ 顺时针旋转调节螺钉(6)来增加刀片力 ⇒ 增加刀片力及进给量
刀片使用寿命太短	• 工件或者刀具固定强度不够 • 加工机械不够稳定（轴向磨损等等）	⇒ 确保工件及刀具都已固定 ⇒ 修理/调整机器故障

How to solve deburring and chamfer problems

Problem	Reasons	Solution
Chamfer too small Burr is not ground away	• Selected blade too small. • See below point: chamfer too small or no chamfer at all.	⇒ Choose blade for larger chamfer (see table page 34 – 38)
No chamfer at all	• Blade force too small • Blade is blunt. • Too large burr formation.	⇒ Turn set screw (5) clockwise to increase blade force, only possible when using SNAP GH-S blades. ⇒ Put in new blade. ⇒ Replace drilling tool.
Chamfer too large	• Feed rate too small. • Selected blade too large. • Blade force too high.	⇒ Increase feed rate (e.g. 0.2mm/rev.) only possible when using SNAP GH-S blades. ⇒ Choose blade for small chamfer (see table page 34 – 38) ⇒ Turn set screw (5) counter-clockwise to reduce blade force, only possible when using SNAP GH-S blades.
Different chamfer size at the front and the back side	• Feed rate varies from the front side to the back side. • Varying burr formation forwards and backwards.	⇒ Select constant feed rate forwards and backwards, only possible when using SNAP GH-S blades. ⇒ Reduce feed rate on the side with too small chamfer, only possible when using SNAP GH-S blades. ⇒ Increase feed rate on the side with too large chamfer, only possible when using SNAP GH-S blades.
Chamfer with chatter marks	• Workpiece or tool not secured properly. • Tool in unstable condition. • Speed rate too high.	⇒ Ensure workpiece or tool is properly secured. ⇒ Increase feed rate of tool and check blade force. ⇒ Reduce speed rate.
No constant chamfer size	• Varying feed rates. • Blade force insufficient not allowing blade to extend fully to starting position every time. • Tool in unstable condition	⇒ Choose constant feed rate. ⇒ Turn set screw (5) clockwise to increase blade force. ⇒ Increase blade force and feed rate
Poor blade life	• Workpiece or tool not secured properly. • Insufficient stability of machine (wear in of spindle, etc.).	⇒ Ensure workpiece or tool is properly secured. ⇒ Recondition/rectify machine faults.