

MASTER THE SMALLEST AND MOST PRECISE THREADED CONNECTIONS

nano



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SPEZIALWERKZEUGE NACH MASS

Manche Prozesse erfordern massgefertigte Spezialwerkzeuge. DC SWISS kann perfekt auf Ihre Anforderungen abgestimmte Gewindewerkzeuge herstellen.

Mit unserem Know-how können wir Spezialwerkzeuge herstellen, die besonders hohen Herstelleranforderungen gerecht werden.

Wir helfen Ihnen, mit den geeigneten Werkzeugen auch kühnste Vorhaben umzusetzen. Dazu bietet Ihnen DC SWISS nicht nur ihre Fachkompetenzen und langjährige Erfahrung an, sondern auch eine umfassende Werkzeugpalette und massgeschneiderte Lösungen - für jede Konfiguration, jeden Werkstoff und jede Produktionstechnik, form- und massunabhängig. Denn DC SWISS ist schon heute gut gerüstet für das, was in Zukunft immer wichtiger wird: die individuelle Fertigung.

**MEDIZINTECHNIK
MEDICAL**

**LUFT- UND RAUMFAHRT
AEROSPACE**

**SONDERLÖSUNGEN
CUSTOMISED SOLUTIONS**



SPECIAL TOOLS ON DEMAND

Some processes require special on demand tools. DC SWISS can create custom-made threading tools to meet your requirements.

With our expertise, we can create on demand tools that meet the highest market requirements.

To enable you to create the most audacious and varied assemblies that are best suited to every situation, DC SWISS offers you access to its extensive expertise. Tools are, after all, essential items. They need to adapt to every configuration, every material and all production techniques. Shapes and sizes are no longer constraining factors. DC SWISS develops tools as a matter of course, because custom-made orders are becoming increasingly commonplace.

AUTOMOTIVE
AUTOMOTIVE

UHRENINDUSTRIE
WATCHMAKING

nano



SPEZIFIZIERUNGEN — SPECIFICATIONS

TAN



TAZ



FA



- Erstklassisches Basismaterial HSSE-PM
- Genauigkeit und Wiederholbarkeit des Werkzeuges durch Fertigung in einer einzigen Aufspannung
- Reinigen, bürsten oder polieren von 100 % der Werkzeuge
- Optimale Beschichtung, angepasst an jede Geometrie
- Top quality HSSE-PM raw material
- Accuracy and repeatability of the tool by manufacturing in a single clamping operation
- Cleaning, brushing or polishing of 100 % of the tools
- Optimal coating adapted to each geometry

TAN40



- Für Durchgangslöcher $< 2 \times D$
- For through holes $< 2 \times D$

TAN50



- Für Sacklöcher $< 2 \times D$
- For blind holes $< 2 \times D$

Anwendung

Für leicht zu bearbeitende Werkstoffe, Stähle, Messing, Gelbgold, Silber

Application

For easy-to-machine materials, steels, brass, yellow gold, silver

TAN40VS



- Vielseitige "VS"-Verschleisschutzschicht für hohe Standzeiten in der Serienproduktion

- Versatile "VS" wear-protective coating for long tool life in series production

TAN50VS



TAZ40VS



- Für Durchgangslöcher $< 2 \times D$
- Mit einem langen, an die Steigung angepassten Anschnitt, für ein besseres Eindringen in das Material

- For through holes $< 2 \times D$
- With a long chamfer adapted to the pitch, for a better penetration into the material

TAZ50VS



- Für Sacklöcher $< 2 \times D$

- For blind holes $< 2 \times D$

Anwendung

Für zähe Werkstoffe wie Nickellegierungen, Titanlegierungen, legierte Edelmetalle

Application

For tough materials such as nickel alloys, titanium alloys, alloyed precious materials



- Spezifische "VS"-Beschichtung der neuesten Generation, angepasst an die Geometrie des Werkzeugs

- Specific "VS" coating of the latest generation adapted to the geometry of the tool

SPEZIFIZIERUNGEN — SPECIFICATIONS

FA80VS



- Für Durchgangs- und Sacklöcher $< 2.5 \times D$
- Mit extra-kurzem $1.5 \times P$ -Einlauf (für Gewinde bis nahe dem Bohrungsgrund)

- For through and blind holes $< 2.5 \times D$
- With extra-short chamfer $1.5 \times P$ (for threads close to the bottom of the core hole)

FA83VS



- Für Durchgangs- und Sacklöcher $< 2.5 \times D$
- Mit kurzem Anschnitt $2.5 \times P$

- For through and blind holes $< 2.5 \times D$
- With short chamfer $2.5 \times P$

Anwendung

- Für jede Art von Werkstoffen mit einer Bruchdehnung $> 5\%$
- Polygon mit 4 Druckstollen ab $\varnothing 0.5\text{ mm}$
- Verbesserte Ausreissfestigkeit des Gewindes

Application

- For any type of material with an elongation $> 5\%$
- Polygon made up of 4 lobes from $\varnothing 0.5\text{ mm}$
- Improved thread tensile strength



- Vielseitige "VS"-Verschleisschutzschicht für hohe Standzeiten in der Serienproduktion

- Versatile "VS" wear-protective coating for long tool life in series production

SPEZIFIZIERUNGEN — SPECIFICATIONS

CMS



CFA



- Hartmetallsorte angepasst für Härte und Torsionsfestigkeit
- Präzision und Wiederholgenauigkeit des Werkzeugs durch Fertigung in einer einzigen Aufspannung
- Unübertroffene Oberflächenqualität

- Hard Metal grade suitable for its hardness and torsional strength
- Precision and repeatability of the tool by manufacturing in a single clamping operation
- Unsurpassed surface quality

CMS50



- Für Durchgangs- und Sacklöcher $< 3 \times D$
- Mit revolutionärer Anschnittgeometrie für optimale Materialdurchdringung

- For through and blind holes $< 3 \times D$
- With a revolutionary chamfer geometry for optimal material penetration

CMS50VS



Anwendung

- Für spröde Werkstoffe wie Messing kurzspanend, Grauguss, Cube2, Aluminiumlegierung mit Si $> 5 \%$
- Spezifische "VS"-Beschichtung der neuesten Generation, angepasst an die Geometrie des Werkzeugs

Application

- For brittle materials like short chip brass, grey cast iron, Cube2, aluminium alloy with Si $> 5 \%$
- Specific "VS" coating of the latest generation adapted to the geometry of the tool



CFA80VS



- Für Durchgangs- und Sacklöcher $< 2.5 \times D$
- Mit extra-kurzem 1.5 x P-Einlauf (für Gewinde bis nahe dem Bohrungsgrund)

- For through and blind holes $< 2.5 \times D$
- With extra-short chamfer 1.5 x P (for threads close to the bottom of the core hole)

CFA83VS



- Für Durchgangs- und Sacklöcher $< 2.5 \times D$
- Mit kurzem Einlauf 2.5 x P

- For through and blind holes $< 2.5 \times D$
- With short chamfer 2.5 x P

Anwendung

- Für jede Art von Nichteisen-Metallen mit einer Bruchdehnung $> 3 \%$
- Für Werkstoffe wie Aluminium- und Kupferlegierungen, Gelb- und Rotgold, Silber, etc

Application

- For any type of non-ferrous material with an elongation $> 3 \%$
- For materials such as: aluminium and copper alloys, yellow and red gold, silver, etc



- Vielseitige "VS"-Verschleisschutzschicht für hohe Standzeiten in der Serienproduktion

- Versatile "VS" wear-protective coating for long tool life in series production

KODIERUNG — CODIFICATION

DC -Maschinen-Gewindebohrer nano

DC Machine taps nano

Beispiel - Example



Normale Werkstoffe	Normal materials	TAN			
Zähe Werkstoffe	Tough materials	TAZ			
Messing	Brass	CMS			
Spiralnuten mit Linksdrall < 27°	< 27° left-hand spiral flutes		40		
Spiralnuten mit Rechtsdrall < 27°	< 27° right-hand spiral flutes		50		
VS-Verschleisschutzschicht, generell	VS wear-protective coating, general			VS	
Spezialausführung	Special execution				SP

Baumasse nach DC-Werksnorm

General dimensions as per DC standards

Für den Einsatz gemäss DC-Anwendungstabelle für DC-Gewindebohrer nano

For use as per DC application chart for DC taps nano

DC -Maschinen-Gewindeformer nano

DC Machine thread formers nano

Beispiel - Example



Gewindeformer nano aus PM	Thread formers nano in PM	FA			
Gewindeformer nano aus Vollhartmetall	Thread formers nano in solid carbide	CFA			
Anschnitt Form E (1.5 - 2 Gewindegänge)	Lead form E (1.5 - 2 chamfered threads)		80		
Anschnitt Form C (2 - 3 Gewindegänge)	Lead form C (2 - 3 chamfered threads)		83		
VS-Verschleisschutzschicht, generell	VS wear-protective coating, general			VS	
Spezialausführung	Special execution				SP

Baumasse nach DC-Werksnorm

General dimensions as per DC standards

Für den Einsatz gemäss DC-Anwendungstabelle für DC-Gewindeformer nano

For use as per DC application chart for DC thread formers nano

PIKTOGRAMME NANO — PICTOGRAPHS NANO



Für Werkstoffgruppen gemäss **DC**-Anwendungstabelle
For material groups as per **DC** application chart

12	
1.0037	Si37-2 (S235JR)
1.0050	Si50-2 (E295)
1.0060	Si60-2 (E335)
1.5919	15CrNi6
1.7131	16MnCr5

22	
1.4301	X5CrNi18-10
1.4406	X2CrNiMoN17-12-2
1.4435	X2CrNiMo18-14-3
1.4541	X6CrNiTi18-10
1.4571	X6CrNiMoTi17-12-2



Verstärkter Schaft gemäss DIN 371
Reinforced shank as per DIN 371



DC

Verstärkter Schaft gemäss DC-Werksnorm
Reinforced shank as per DC standards



HSSE-PM
HSSE-PM



Lagerartikel
Stock item



Vollhartmetall
Solid Carbide



Kurzfristig lieferbar
Available at short notice



Anzahl Spannuten (Z)
Number of flutes (Z)



Ab Lager lieferbar solange Vorrat
Available from stock, while stock lasts



Spiralnuten mit 20° Linksdrill
20° left-hand spiral flutes



Spiralnuten mit 25° Rechtsdrill
25° right-hand spiral flutes



Gewindeformer
Thread former



Durchgangsloch < 2 x D, langspanende Werkstoffe
Through hole < 2 x D, long chipping materials



Sackloch < 2 x D, langspanende Werkstoffe
Blind hole < 2 x D, long chipping materials



Durchgangs- und Sackloch < 2.5 x D, kurzspanende Werkstoffe
Through / blind hole < 2.5 x D, short chipping materials



Durchgangs- und Sackloch < 3 x D, kurzspanende Werkstoffe
Through / blind hole < 3 x D, short chipping materials



2 - 3 Gewindegänge, Form C
2 - 3 chamfered threads, form C



3.5 - 5 Gewindegänge, Form D
3.5 - 5 chamfered threads, form D



1.5 - 2 Gewindegänge, Form E
1.5 - 2 chamfered threads, form E



Toleranzklasse 4H
Tolerance class 4H



Toleranzklasse ISO 2 6H
Tolerance class ISO 2 6H



DC-"VS"-Verschleisschutzschicht für den allgemeinen Einsatz
DC "VS" wear-protective coating for general use



DC-"VX"-Verschleisschutzschicht für rostfreie Stähle und Nickellegierungen
DC "VX" wear-protective coating for stainless steels and nickel alloys

GEWINDEBOHRER NANO

THREAD TAPS NANO

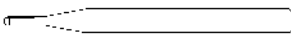
DC -Anwendungsgruppen

DC Material classification

Werkstoff-Gruppen Material groups		Werkstoffbezeichnung	Material designation	Härte Hardness (HB)	Festigkeit Tensile strength Rm (N/mm ²)	Dehnung Elongation A (%)
10 Stahl Steels	11	Automatenstahl	Free-cutting steels	< 200	< 700	< 10
	12	Baustahl, Einsatzstahl	Structural, cementation steels	< 200	< 700	< 30
	13	Kohlenstoffstahl	Carbon steels	< 300	< 1000	< 20
	14	Stahl legiert < 850 N/mm ²	Alloy steels < 850 N/mm ²	< 250	< 850	< 30
	15	Stahl legiert / vergütet > 850 - < 1150 N/mm ²	Alloy steels hard. / temp. > 850 - < 1150 N/mm ²	> 250	> 850	< 30
	16	Hochfester Stahl ≤ 44 HRC	High tensile alloy steels ≤ 44 HRC	> 250	> 850	< 12
	17	Stahl vergütet > 44 - ≤ 54 HRC	Alloy steels tempered > 44 - ≤ 54 HRC	> 410	> 1400	< 2
	18	Stahl gehärtet > 54 - ≤ 63 HRC	Alloy steels hardened > 54 - ≤ 63 HRC	> 560	> 1980	< 2
20 Rostfreier Stahl Stainless steels	21	Rostfreier Stahl, geschwefelt	Free machining stainless steels	< 250	< 850	< 25
	22	Austenitisch	Austenitic stainless steels	< 250	< 850	> 20
	23	Ferritisch, martensitisch < 850 N/mm ²	Ferritic and martensitic < 850 N/mm ²	< 250	< 850	> 20
	24	Ferritisch, martensitisch > 850 - < 1150 N/mm ²	Ferritic and martensitic > 850 - < 1150 N/mm ²	> 250	> 850	> 15
30 Guss Cast iron	31	Grauguss	Cast iron	< 250	< 850	< 10
	32	Kugelgraphitguss, Temperguss	Spheroidal graphite + malleable cast iron	< 250	< 850	> 10
40 Titan Titanium	41	Reintitan	Pure titanium	< 250	< 850	> 20
	42	Titanlegierung	Titanium alloys	> 250	> 850	< 20
50 Nickel Nickel	51	Nickellegierung 1 ≤ 850 N/mm ²	Nickel alloys 1 ≤ 850 N/mm ²	< 250	< 850	> 25
	52	Nickellegierung 2 > 850 - ≤ 1150 N/mm ²	Nickel alloys 2 > 850 - ≤ 1150 N/mm ²	> 250	> 850	< 25
	53	Nickellegierung 3 > 1150 - ≤ 1600 N/mm ²	Nickel alloys 3 > 1150 - ≤ 1600 N/mm ²	> 340	> 1150	< 20
60 Kupfer Copper	61	Reinkupfer (Elektrolytkupfer)	Pure copper (electrolytic copper)	< 120	< 400	> 12
	62	Messing, Bronze, Rotguss (kurzspanend)	Short chip brass, phosphor bronze, gun metal	< 200	< 700	< 12
	63	Messing (langspanend)	Long chip brass	< 200	< 700	> 12
	64	Messing bleifrei	Lead free brass	< 220	< 700	> 15
70 Aluminium Magnesium Aluminium Magnesium	71	Al unlegiert	Al unalloyed	< 100	< 350	> 15
	72	Al legiert Si < 1.5 %	Al alloyed Si < 1.5 %	< 150	< 500	> 15
	73	Al legiert Si > 1.5 % - < 10 %	Al alloyed Si > 1.5 % - < 10 %	< 120	< 400	< 15
	74	Al legiert Si > 10 %, Mg-Legierungen	Al alloyed Si > 10 %, Mg-alloys	< 120	< 400	< 10
80 Kunststoff Plastic compounds	81	Thermoplaste	Thermoplastics	-	-	-
	82	Duroplaste	Duroplastics	-	-	-
	83	Faserverstärkte Kunststoffe	Glass fibre reinforced plastics	-	-	-
90 Edelmetalle Precious metals	91	Gelbgold	Yellow gold	-	-	-
	92	Rotgold	Red gold	-	-	-
	93	Weissgold	White gold	-	-	-
	94	Silber	Silver	-	-	-

CLASSIC
SYNCHRO



	TAN				TAZ	
Merkmale Characteristics		 VS		 VS		 VS
						
Lochart Hole type						
	TAN40	TAN40VS	TAN50	TAN50VS	TAZ40	TAZ40VS
M 4H / 6H ISO DIN 14 ISO DIN 13 DC ~DIN 371	338	338	338	338	339	339
MF 4H / 6H ISO DIN 13 DC ~DIN 371	341	341	341	341	342	342
UNC 2B ASME B1.1 DC ~DIN 371	344	344	344	344	345	345
3B ASME B1.1 DC ~DIN 371	344	344	344	344	345	345
UNF 2B ASME B1.1 DC ~DIN 371	347	347	347	347	348	348
3B ASME B1.1 DC ~DIN 371	347	347	347	347	348	348
S NIHS NIHS 06 - 10 DC	350	350	350	350	351	351
SF NIHS NIHS 06-10 Fine Thread DC	353	353	353	353	354	354
SL Safelock SL 15 - 01 DC	356	356	356	356	357	357



TAZ		CMS	
 R25	 R25  VS	 R12	 R12  VS
			
			
TAZ50	TAZ50VS	CMS50	CMS50VS
339	339	340	340
342	342	343	343
345	345	346	346
345	345	346	346
348	348	349	349
348	348	349	349
351	351	352	352
354	354	355	355
357	357	358	358

TAN

TAN40



62 63 91

TAN40VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN50



62 63 91

TAN50VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN40

TAN40VS

TAN50

TAN50VS

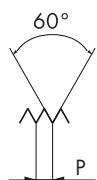
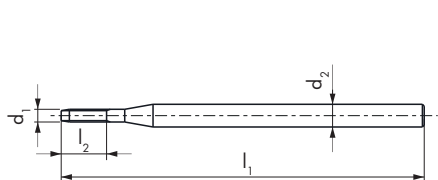


4H

4H

4H

4H



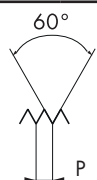
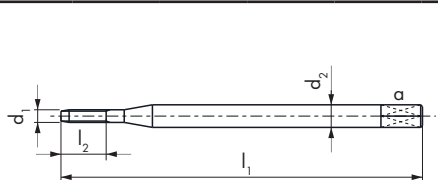
Ø d ₁ M	P mm	l ₁ mm	l ₂ mm	d ₂ mm		
0.5	0.125	25	1.5	2	3	Δ0.41
0.6	0.15	25	1.8	2	3	Δ0.5
0.7	0.175	25	2.1	2	3	Δ0.58
0.8	0.2	25	2.4	2	3	Δ0.66
0.9	0.225	25	2.7	2	3	Δ0.74
1	0.25	40	3.0	2.5	3	0.75
1.2	0.25	40	3.6	2.5	3	0.95
1.4	0.3	40	4.2	2.5	3	1.1

4H5H → 4H6H = +0.02 mm

≥ M1 - ≤ M1.4

ISO 1
4H

ID	ID	ID	ID
161817	161748	161818	161749
152512	152511	152545	151766
152516	152515	152548	152547
152520	152519	152552	152551
152524	152523	152555	152554
152528	152527	152558	151557
152531	151463	152562	152561
152534	151756	152565	151757



Ø d ₁ M	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1.6	0.35	40	4.8	2.5		3	1.25
1.8	0.35	40	5.4	2.5		3	1.45
2	0.4	45	8	2.8	2.1	3	1.6
2.3	0.4	45	9	2.8	2.1	3	1.9
2.5	0.45	50	10	2.8	2.1	3	2.05
2.6	0.45	50	10	2.8	2.1	3	2.15

ID

ID

ID

ID

152538	152537	152569	152568
193841	151461	193915	193952
152542	152541	152573	152572
193842	193878	193916	193953
193843	193879	193917	193954
193844	193880	193918	193955

ISO 2
6HISO 2
6HISO 2
6HISO 2
6H

TAZ

TAZ40



TAZ40VS



TAZ50



TAZ50VS

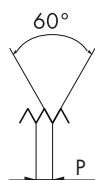
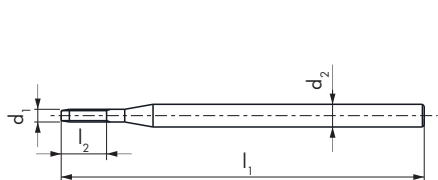


TAZ40

TAZ40VS

TAZ50

TAZ50VS



4H

4H

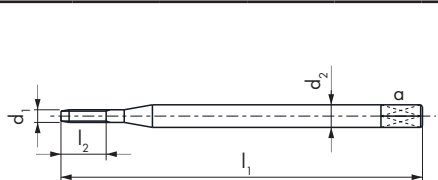
4H

4H

Ø d ₁ M	P mm	l ₁ mm	l ₂ mm	d ₂ mm		
0.5	0.125	25	1.5	2	3	Δ0.41
0.6	0.15	25	1.8	2	3	Δ0.5
0.7	0.175	25	2.1	2	3	Δ0.58
0.8	0.2	25	2.4	2	3	Δ0.66
0.9	0.225	25	2.7	2	3	Δ0.74
1	0.25	40	3	2.5	3	0.75
1.2	0.25	40	3.6	2.5	3	0.95
1.4	0.3	40	4.2	2.5	3	1.1

4H5H → 4H6H = +0.02 mm

≥ M1 - ≤ M1.4

ISO 1
4HISO 2
6HISO 2
6HISO 2
6HISO 2
6H

Ø d ₁ M	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1.6	0.35	40	4.8	2.5		3	1.25
1.8	0.35	40	5.4	2.5		3	1.45
2	0.4	45	8	2.8	2.1	3	1.6
2.3	0.4	45	9	2.8	2.1	3	1.9
2.5	0.45	50	10	2.8	2.1	3	2.05
2.6	0.45	50	10	2.8	2.1	3	2.15

ID

ID

ID

ID

• 193994	• 194059	• 194119	• 194182
• 193995	• 194060	• 194120	• 194183
• 193996	• 194061	• 194121	• 194184
• 193997	• 194062	• 194122	• 194185
• 193998	• 194063	• 194123	• 194186
• 193999	• 194064	• 194124	• 183753
• 194000	• 194065	• 194125	• 194187
• 194001	• 194066	• 194126	• 194188

CMS

CMS50



62 63 93

CMS50VS

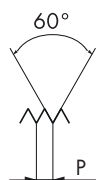
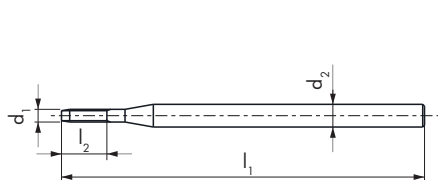


VS

31 62 63 73 74 83
93

CMS50

CMS50VS



4H

4H

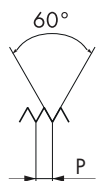
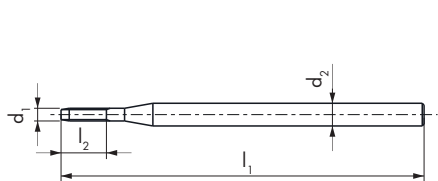
$\emptyset d_1$ M	P mm	l_1 mm	l_2 mm	d_2 h5 mm		
0.3	0.08	32	1.1	1.5	3	0.23
0.35	0.09	32	1.3	1.5	3	0.28
0.4	0.1	32	1.5	1.5	3	Δ 0.32
0.5	0.125	32	1.8	1.5	3	Δ 0.41
0.6	0.15	32	2.2	1.5	3	Δ 0.5
0.7	0.175	32	2.6	1.5	3	Δ 0.58
0.8	0.2	32	3	1.5	3	Δ 0.66
0.9	0.225	32	3.3	1.5	3	Δ 0.74
1	0.25	32	3.7	2	3	0.75
1.2	0.25	32	4.5	2	3	0.95
1.4	0.3	32	5.2	2	3	1.1

 4H5H $\rightarrow$ 4H6H = +0.02 mm

ID

ID

● 193639	● 193702
● 193640	● 193703
● 193641	● 193704
● 193642	● 193705
● 193643	● 193706
● 193644	● 193707
● 193645	● 193708
● 193646	● 193709
● 193647	● 193710
● 193648	● 193711
● 193649	● 193712

 $\geq M1 - \leq M1.4$ ISO 1
4HISO 2
6HISO 2
6H

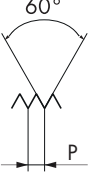
$\emptyset d_1$ M	P mm	l_1 mm	l_2 mm	d_2 h5 mm		
1.6	0.35	32	6	2	3	1.25
1.8	0.35	32	6.7	2	3	1.45
2	0.4	39	7.5	3	3	1.6
2.3	0.4	39	8.6	3	3	1.9
2.5	0.45	39	9.3	3	3	2.05
2.6	0.45	39	9.7	3	3	2.15

ID

ID

● 193650	● 193713
● 193651	● 193714
● 193652	● 193715
● 193653	● 193716
● 193654	● 193717
● 193655	● 193718

TAN								TAN40	TAN40VS	TAN50	TAN50VS
TAN40 TAN40VS TAN50 TAN50VS											
Ø d ₁ MF	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm			ID	ID	ID	ID
1.4	0.2	40	4.2	2.5		3	1.2	• 170390	• 193881	• 170393	• 156730
1.6	0.2	40	4.8	2.5		3	1.4	• 193845	• 193882	• 193919	• 193956
1.8	0.2	40	5.4	2.5		3	1.6	• 193846	• 193883	• 193920	• 180810
2	0.2	45	6	2.8	2.1	3	1.8	• 193847	• 193884	• 193921	• 184999
2	0.25	45	6	2.8	2.1	3	1.75	• 193848	• 193885	• 193922	• 182944
2.2	0.2	45	6.6	2.8	2.1	3	2	• 193849	• 193886	• 193923	• 179593
2.2	0.25	45	6.6	2.8	2.1	3	1.95	• 193850	• 193887	• 193924	• 193957
2.3	0.2	45	6.9	2.8	2.1	3	2.1	• 193851	• 193888	• 193925	• 193958
2.3	0.25	45	6.9	2.8	2.1	3	2.05	• 193852	• 193889	• 193926	• 193959
2.5	0.2	50	7.5	2.8	2.1	3	2.3	• 193853	• 193890	• 193927	• 193960
2.5	0.25	50	7.5	2.8	2.1	3	2.25	• 193854	• 193891	• 193928	• 193961
Ø d ₁ MF	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm			ID	ID	ID	ID
2.5	0.35	50	7.5	2.8	2.1	3	2.15	• 193855	• 193892	• 193929	• 193962
2.6	0.35	50	7.8	2.8	2.1	3	2.25	• 193856	• 193893	• 193930	• 193963

TAZ								TAZ40	TAZ40VS	TAZ50	TAZ50VS
TAZ40 TAZ40VS TAZ50 TAZ50VS											
     											
											
   											
Ø d ₁ MF	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm			ID	ID	ID	ID
1.4	0.2	40	4.2	2.5		3	1.2	● 194008	● 194950	● 194133	● 194194
1.6	0.2	40	4.8	2.5		3	1.4	● 194009	● 194072	● 194134	● 181665
1.8	0.2	40	5.4	2.5		3	1.6	● 194010	● 194073	● 194135	● 190047
2	0.2	45	6	2.8	2.1	3	1.8	● 194011	● 194949	● 194136	● 194195
2	0.25	45	6	2.8	2.1	3	1.75	● 194012	● 194948	● 194137	● 185307
2.2	0.2	45	6.6	2.8	2.1	3	2	● 194013	● 194074	● 194138	● 194196
2.2	0.25	45	6.6	2.8	2.1	3	1.95	● 194014	● 194075	● 194139	● 194197
2.3	0.2	45	6.9	2.8	2.1	3	2.1	● 194015	● 194076	● 194140	● 194198
2.3	0.25	45	6.9	2.8	2.1	3	2.05	● 194016	● 194077	● 194141	● 194199
2.5	0.2	50	7.5	2.8	2.1	3	2.3	● 194017	● 194078	● 194142	● 194200
2.5	0.25	50	7.5	2.8	2.1	3	2.25	● 194018	● 194951	● 194143	● 194201
											
Ø d ₁ MF	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm			ID	ID	ID	ID
2.5	0.35	50	7.5	2.8	2.1	3	2.15	● 194019	● 194079	● 194144	● 194202
2.6	0.35	50	7.8	2.8	2.1	3	2.25	● 194020	● 194080	● 194145	● 194203

CMS							CMS50	CMS50VS		
CMS50 CMS50VS										
$\emptyset d_1$ MF	P mm	l_1 mm	l_2 mm	d_2 h5 mm			ID	ID		
1.4	0.2	32	5.2	2	3	1.2	● 193656	● 193719		
1.6	0.2	32	6	2	3	1.4	● 193657	● 193720		
1.8	0.2	32	6.7	2	3	1.6	● 193658	● 193721		
2	0.2	39	7.5	3	3	1.8	● 193659	● 193722		
2	0.25	39	7.5	3	3	1.75	● 193660	● 193723		
2.2	0.2	39	8.2	3	3	2	● 193661	● 193724		
2.2	0.25	39	8.2	3	3	1.95	● 193662	● 193725		
2.3	0.2	39	8.6	3	3	2.1	● 193663	● 193726		
2.3	0.25	39	8.6	3	3	2.05	● 193664	● 193727		
2.5	0.2	39	9.3	3	3	2.3	● 193665	● 193728		
2.5	0.25	39	9.3	3	3	2.25	● 193666	● 193729		
$\emptyset d_1$ MF	P mm	l_1 mm	l_2 mm	d_2 h5 mm			ID	ID		
2.5	0.35	39	9.3	3	3	2.15	● 193667	● 193730		
2.6	0.35	39	9.7	3	3	2.25	● 193668	● 193731		

TAN

TAN40



62 63 91

TAN40VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN50



62 63 91

TAN50VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN40

TAN40VS

TAN50

TAN50VS

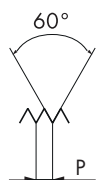
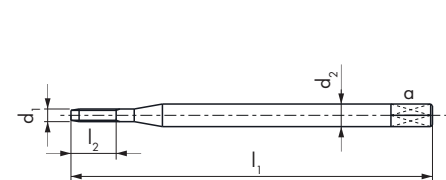


2B

2B

2B

2B



Ø d UNC	P TPI	d ₁ mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1	64	1.85	40	5.6	2.5		3	1.45
2	56	2.18	45	9	2.8	2.1	3	1.75
3	48	2.51	50	10	2.8	2.1	3	2

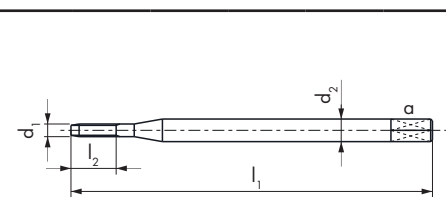
ID

ID

ID

ID

● 193857	● 193894	● 193931	● 193964
● 193858	● 193895	● 193932	● 193965
● 193859	● 193896	● 193933	● 193966



Ø d UNC(J)	P TPI	d ₁ mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1	64	1.85	40	5.6	2.5		3	1.45
2	56	2.18	45	9	2.8	2.1	3	1.75
3	48	2.51	50	10	2.8	2.1	3	2

ID

ID

ID

ID

● 193860	● 193897	● 193934	● 193967
● 193861	● 193898	● 193935	● 193968
● 193862	● 193899	● 193936	● 193969

TAZ

TAZ40



TAZ40VS



TAZ50



TAZ50VS



TAZ40

TAZ40VS

TAZ50

TAZ50VS



2B

2B

2B

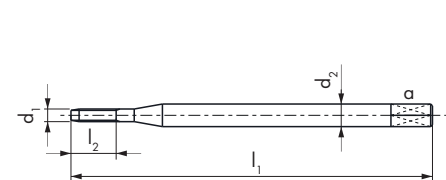
2B

ID

ID

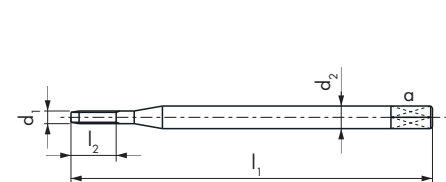
ID

ID



Ø d UNC	P TPI	d ₁ mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1	64	1.85	40	5.6	2.5		3	1.45
2	56	2.18	45	9	2.8	2.1	3	1.75
3	48	2.51	50	10	2.8	2.1	3	2

● 194021	● 194081	● 194146	● 194204
● 194022	● 194082	● 194147	● 194205
● 194023	● 194083	● 194148	● 194206



3B

3B

3B

3B

ID

ID

ID

ID

Ø d UNC(J)	P TPI	d ₁ mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1	64	1.85	40	5.6	2.5		3	1.45
2	56	2.18	45	9	2.8	2.1	3	1.75
3	48	2.51	50	10	2.8	2.1	3	2

● 194024	● 194084	● 194149	● 194207
● 194025	● 194085	● 194150	● 194208
● 194026	● 194086	● 194151	● 194209

CMS									CMS50	CMS50VS		
CMS50 62 63 93 CMS50VS 31 62 63 73 74 83 93												
									C 2.5 x P 2B	C 2.5 x P 2B		
$\emptyset d_1$ UNC	P TPI	d_1 mm	l_1 mm	l_2 mm	d_2 h5 mm				ID	ID		
1	64	1.85	32	6.9	2	3	1.45		● 193669	● 193732		
2	56	2.18	39	8.1	3	3	1.75		● 193670	● 193733		
3	48	2.51	39	9.4	3	3	2		● 193671	● 193734		
									3B	3B		
$\emptyset d_1$ UNC(J)	P TPI	d_1 mm	l_1 mm	l_2 mm	d_2 h5 mm				ID	ID		
1	64	1.85	32	6.9	2	3	1.45		● 193672	● 193735		
2	56	2.18	39	8.1	3	3	1.75		● 193673	● 193736		
3	48	2.51	39	9.4	3	3	2		● 193674	● 193737		

TAN

TAN40



62 63 91

TAN40VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN50



62 63 91

TAN50VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN40

TAN40VS

TAN50

TAN50VS



2B

2B

2B

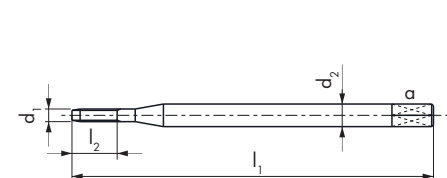
2B

ID

ID

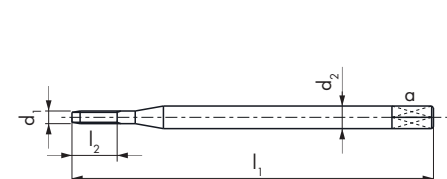
ID

ID



Ø d ₁ UNF	P TPI	d ₁ mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
0	80	1.52	40	4.6	2.5		3	1.2
1	72	1.85	40	5.6	2.5		3	1.5
2	64	2.18	45	9	2.8	2.1	3	1.8
3	56	2.51	50	10	2.8	2.1	3	2.1

● 193863	● 193900	● 193937	● 193970
● 193864	● 193901	● 193938	● 193971
● 193865	● 193902	● 193939	● 193972
● 193866	● 193903	● 193940	● 193973



Ø d ₁ UNF(J)	P TPI	d ₁ mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
0	80	1.52	40	4.6	2.5		3	1.2
1	72	1.85	40	5.6	2.5		3	1.5
2	64	2.18	45	9	2.8	2.1	3	1.8
3	56	2.51	50	10	2.8	2.1	3	2.1

3B

3B

3B

3B

ID

ID

ID

ID

● 193867	● 193904	● 193941	● 193974
● 193868	● 193905	● 193942	● 193975
● 193869	● 193906	● 193943	● 193976
● 193870	● 193907	● 193944	● 193977

TAZ

TAZ40



TAZ40VS



TAZ50



TAZ50VS



TAZ40

TAZ40VS

TAZ50

TAZ50VS



2B

2B

2B

2B

ID

ID

ID

ID

194027

194087

194152

194210

194028

194088

194153

194211

194029

194089

194154

194212

194030

194090

194155

194213

3B

3B

3B

3B

ID

ID

ID

ID

194031

194091

194156

194214

194032

194092

194157

194215

194033

194093

194158

194216

194034

194094

194159

194217

CMS

CMS50



62 63 93

CMS50VS

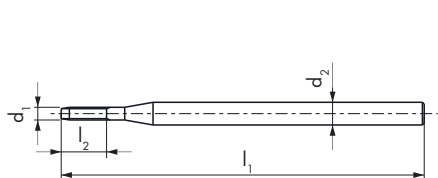


VS

31 62 63 73 74 83
93

CMS50

CMS50VS



2B

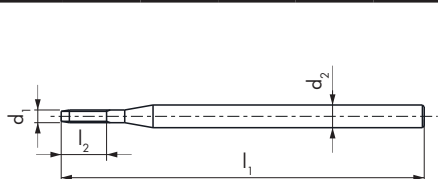
2B

$\emptyset d_1$ UNF	P TPI	d_1 mm	l_1 mm	l_2 mm	d_2 h5 mm		
0	80	1.52	32	5.7	2	3	1.2
1	72	1.85	32	6.9	2	3	1.5
2	64	2.18	39	8.1	3	3	1.8
3	56	2.51	39	9.4	3	3	2.1

ID

ID

● 193675	● 193738
● 193676	● 193739
● 193677	● 193740
● 193678	● 193741



3B

3B

$\emptyset d_1$ UNF(J)	P TPI	d_1 mm	l_1 mm	l_2 mm	d_2 h5 mm		
0	80	1.52	32	5.7	2	3	1.2
1	72	1.85	32	6.9	2	3	1.5
2	64	2.18	39	8.1	3	3	1.8
3	56	2.51	39	9.4	3	3	2.1

ID

ID

● 193679	● 193742
● 193680	● 193743
● 193681	● 193744
● 193682	● 193745



PM



DC

TAN

TAN40



62 63 91

TAN40VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN50



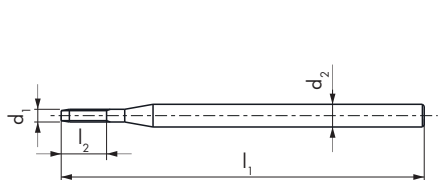
62 63 91

TAN50VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93



TAN40

TAN40VS

TAN50

TAN50VS



NIHS

NIHS

NIHS

NIHS

$\emptyset d_1$ S	P mm	l_1 mm	l_2 mm	d_2 mm		
0.5	0.125	25	1.5	2	3	$\Delta 0.41$
0.6	0.15	25	1.8	2	3	$\Delta 0.5$
0.7	0.175	25	2.1	2	3	$\Delta 0.58$
0.8	0.2	25	2.4	2	3	$\Delta 0.66$
0.9	0.225	25	2.7	2	3	$\Delta 0.74$
1	0.25	40	3	2.5	3	$\Delta 0.82$
1.2	0.25	40	3.6	2.5	3	$\Delta 1.02$
1.4	0.3	40	4.2	2.5	3	$\Delta 1.18$

Δ 4H5H $\rightarrow$ 4H6H = +0.02 mm

ID	ID	ID	ID
● 161816	● 157021	● 159301	● 158384
● 152510	● 152509	● 151567	● 152544
● 152514	● 152513	● 151768	● 152546
● 152518	● 152517	● 152550	● 152549
● 152522	● 152521	● 152553	● 151563
● 152526	● 152525	● 152557	● 152556
● 152530	● 152529	● 152560	● 152559
● 152533	● 152532	● 152564	● 152563

TAZ

TAZ40



TAZ40VS



VS



TAZ50



TAZ50VS



VS



TAZ40

TAZ40VS

TAZ50

TAZ50VS

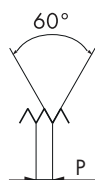
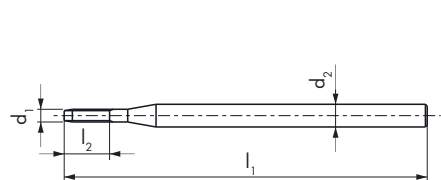


NIHS

NIHS

NIHS

NIHS



$\emptyset d_1$ S	P mm	l_1 mm	l_2 mm	d_2 mm		
0.5	0.125	25	1.5	2	3	$\Delta 0.41$
0.6	0.15	25	1.8	2	3	$\Delta 0.5$
0.7	0.175	25	2.1	2	3	$\Delta 0.58$
0.8	0.2	25	2.4	2	3	$\Delta 0.66$
0.9	0.225	25	2.7	2	3	$\Delta 0.74$
1	0.25	40	3	2.5	3	$\Delta 0.82$
1.2	0.25	40	3.6	2.5	3	$\Delta 1.02$
1.4	0.3	40	4.2	2.5	3	$\Delta 1.18$

Δ 4H5H $\rightarrow$ 4H6H = +0.02 mm

ID

ID

ID

ID

● 193978	● 194043	● 194103	● 194168
● 193979	● 194044	● 194104	● 194169
● 193980	● 194045	● 194105	● 194170
● 193981	● 194046	● 194106	● 188515
● 193982	● 194047	● 194107	● 188521
● 193983	● 194048	● 194108	● 194171
● 193984	● 194049	● 194109	● 194172
● 193985	● 194050	● 194110	● 194173

CMS							CMS50	CMS50VS		
CMS50 CMS50VS										
$\emptyset d_1$ S	P mm	l_1 mm	l_2 mm	d_2 h5 mm			ID	ID		
0.3	0.08	32	1.1	1.5	3	0.23	● 178257	● 193683		
0.35	0.09	32	1.3	1.5	3	0.28	● 178260	● 193684		
0.4	0.1	32	1.5	1.5	3	$\Delta 0.32$	● 178263	● 193685		
0.5	0.125	32	1.8	1.5	3	$\Delta 0.41$	● 178266	● 193686		
0.6	0.15	32	2.2	1.5	3	$\Delta 0.5$	● 178269	● 193687		
0.7	0.175	32	2.6	1.5	3	$\Delta 0.58$	● 178272	● 193688		
0.8	0.2	32	3	1.5	3	$\Delta 0.66$	● 178275	● 193689		
0.9	0.225	32	3.3	1.5	3	$\Delta 0.74$	● 178278	● 193690		
1	0.25	32	3.7	2	3	$\Delta 0.82$	● 178281	● 193691		
1.2	0.25	32	4.5	2	3	$\Delta 1.02$	● 178284	● 193692		
1.4	0.3	32	5.2	2	3	$\Delta 1.18$	● 178287	● 193693		
4H5H $\rightarrow$ 4H6H = +0.02 mm										

TAN

TAN40



62 63 91

TAN40VS



VS

 11 12 13 14 32 62
 63 71 72 73 74 81
 93

TAN50



62 63 91

TAN50VS



VS

 11 12 13 14 32 62
 63 71 72 73 74 81
 93

TAN40

TAN40VS

TAN50

TAN50VS

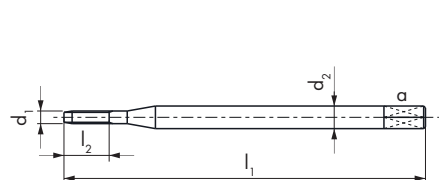


NIHS

NIHS

NIHS

NIHS



Ø d ₁ SF	P mm	l ₁ mm	l ₂ mm	d ₂ mm	a mm		
1.4	0.2	40	4.2	2.5		3	Δ 1.26
1.6	0.2	40	4.8	2.5		3	Δ 1.46
1.8	0.2	40	5.4	2.5		3	Δ 1.66
2	0.2	45	6	2.8	2.1	3	Δ 1.86
2.2	0.2	45	6.6	2.8	2.1	3	Δ 2.06
2.2	0.25	45	6.6	2.8	2.1	3	Δ 2.02
2.5	0.2	50	7.5	2.8	2.1	3	Δ 2.36
2.5	0.25	50	7.5	2.8	2.1	3	Δ 2.32

Δ 4H5H → 4H6H = +0.02 mm

ID

ID

ID

ID

● 193833	● 170491	● 169767	● 170492
● 193834	● 193871	● 193908	● 193945
● 193835	● 193872	● 193909	● 193946
● 193836	● 193873	● 193910	● 193947
● 193837	● 193874	● 193911	● 193948
● 193838	● 193875	● 193912	● 193949
● 193839	● 193876	● 193913	● 193950
● 193840	● 193877	● 193914	● 193951

TAZ								TAZ40	TAZ40VS	TAZ50	TAZ50VS
TAZ40  TAZ40VS          TAZ50  TAZ50VS         											
   											
   											
   											
   											
   											
   											
   											

CMS

CMS50



62 63 93

CMS50VS

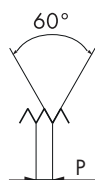
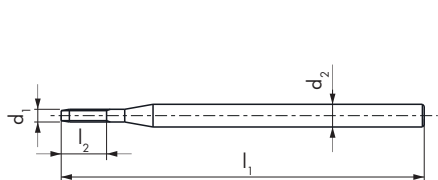


VS

31 62 63 73 74 83
93

CMS50

CMS50VS



NIHS

NIHS

Ø d ₁ SF	P mm	l ₁ mm	l ₂ mm	d ₂ h5 mm		
1.4	0.2	32	5.2	2	3	Δ 1.26
1.6	0.2	32	6	2	3	Δ 1.46
1.8	0.2	32	6.7	2	3	Δ 1.66
2	0.2	39	7.5	3	3	Δ 1.86
2.2	0.2	39	8.2	3	3	Δ 2.06
2.2	0.25	39	8.2	3	3	Δ 2.02
2.5	0.2	39	9.3	3	3	Δ 2.36
2.5	0.25	39	9.3	3	3	Δ 2.32

Δ 4H5H → 4H6H = +0.02 mm

ID

ID

● 180329	● 193694
● 193632	● 193695
● 193633	● 193696
● 193634	● 193697
● 193635	● 193698
● 193636	● 193699
● 193637	● 193700
● 193638	● 193701

TAN

TAN40



62 63 91

TAN40VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN50

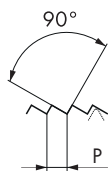
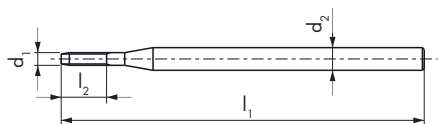


62 63 91

TAN50VS



VS

11 12 13 14 32 62
63 71 72 73 74 81
93

TAN40

TAN40VS

TAN50

TAN50VS



$\emptyset d_1$ SL	P mm	l_1 mm	l_2 mm	d_2 mm		
0.5	0.1	25	1.5	2	3	0.46
0.6	0.125	25	1.8	2	3	0.55
0.7	0.15	25	2.1	2	3	0.64
0.8	0.15	25	2.4	2	3	0.74
0.9	0.175	25	2.7	2	3	0.83
1	0.2	40	3	2.5	3	0.92
1.2	0.2	40	3.6	2.5	3	1.12
1.4	0.25	40	4.2	2.5	3	1.3

ID

ID

ID

ID

• 600065	• 600073	• 600081	• 600089
• 600066	• 600074	• 600082	• 600090
• 600067	• 600075	• 600083	• 600091
• 600068	• 600076	• 600084	• 600092
• 600069	• 600077	• 600085	• 600093
• 600070	• 600078	• 600086	• 600094
• 600071	• 600079	• 600087	• 600095
• 600072	• 600080	• 600088	• 600096

TAZ

TAZ40



TAZ40VS



TAZ50



TAZ50VS

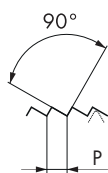
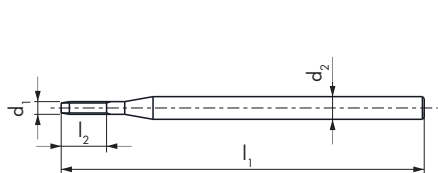


TAZ40

TAZ40VS

TAZ50

TAZ50VS



Ø d ₁ SL	P mm	l ₁ mm	l ₂ mm	d ₂ mm		
0.5	0.1	25	1.5	2	3	0.46
0.6	0.125	25	1.8	2	3	0.55
0.7	0.15	25	2.1	2	3	0.64
0.8	0.15	25	2.4	2	3	0.74
0.9	0.175	25	2.7	2	3	0.83
1	0.2	40	3	2.5	3	0.92
1.2	0.2	40	3.6	2.5	3	1.12
1.4	0.25	40	4.2	2.5	3	1.3

ID	ID	ID	ID
● 600210	● 600218	● 600194	● 600202
● 600211	● 600219	● 600195	● 600203
● 600212	● 600220	● 600196	● 600204
● 600213	● 600221	● 600197	● 600205
● 600214	● 600222	● 600198	● 600206
● 600215	● 600223	● 600199	● 600207
● 600216	● 600224	● 600200	● 600208
● 600217	● 600225	● 600201	● 600209

CMS

CMS50



62 63 93

CMS50VS

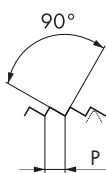
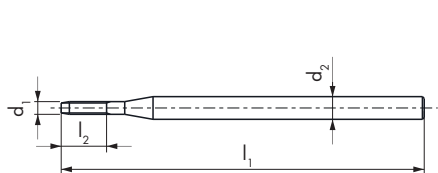


VS

31 62 63 73 74 83
93

CMS50

CMS50VS



Ø d ₁ SL	P mm	l ₁ mm	l ₂ mm	d ₂ h5 mm		
0.3	0.06	32	1.1	1.5	3	0.27
0.35	0.06	32	1.3	1.5	3	0.32
0.4	0.08	32	1.5	1.5	3	0.36
0.5	0.1	32	1.8	1.5	3	0.46
0.6	0.125	32	2.2	1.5	3	0.55
0.7	0.15	32	2.6	1.5	3	0.64
0.8	0.15	32	3	1.5	3	0.74
0.9	0.175	32	3.3	1.5	3	0.83
1	0.2	32	3.7	2	3	0.92
1.2	0.2	32	4.5	2	3	1.12
1.4	0.25	32	5.2	2	3	1.3

ID

ID

● 600097	● 600226
● 600098	● 600227
● 600099	● 600228
● 600039	● 600229
● 600040	● 600230
● 600041	● 600231
● 600042	● 600232
● 600043	● 600233
● 600044	● 600234
● 600045	● 600235
● 600046	● 600236