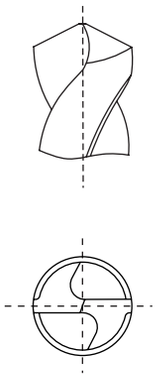
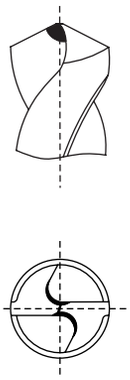
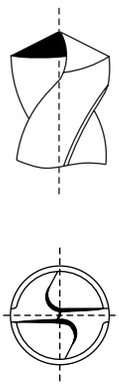
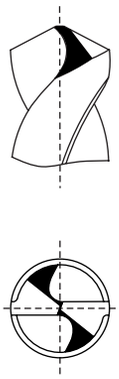
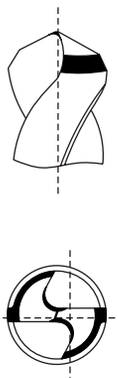
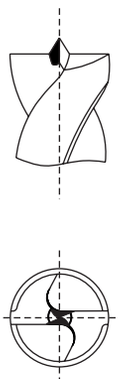
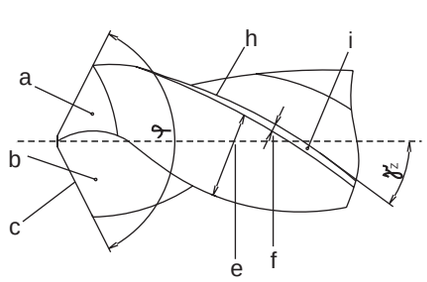
** ZA ODREĐIVANJE ODGOVARAJUĆIH ALATA*
** FÜR DIE BESTIMMUNG DES RICHTIGEN WERKZEUGES*
** TO DETERMINE PROPER TOOLS*

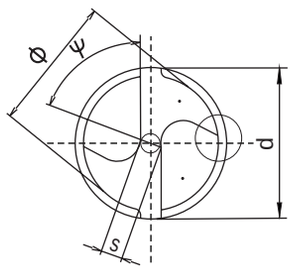
Standard	Serije Series Serien	Matrijal Material				Izrada Execution Ausfuhrung			Primjena / Application / Einsatzgebiete				
									METAL (R< *N/mm²)				
		HSS	CO 5%	CO 8%	CV	valjana rolled rollgewalzt	brušena ground geschliffen	glodana milled gefrast	željezo, čelik, metali iron, steel, metals Stahl, Mettale	legirani čelik, liveno željezo alloy steel, cast iron Legierten Stahl, Gußstahl		visoke performanse u legiranom čeliku i nerđajućem čeliku high performances in alloy steel and stainless steel hohe Ausfuhrungen im legierten und rostfreiem Stahl	
									*650	*800	*850	*1200	*1400
	BV 54	■					■			■			
	BV 55	■					■			■			
	BV 56		■				■					■	
	BV 51	■					■			■			
	BV 52	■					■			■			
	BV 53		■				■					■	
DIN 1897	BV 01	■				■			■				
	BV 02	■					■			■			
	BV 03	■					■			■			
	BV 04		■				■					■	
	BV 05	■					■			■			
	BV 11	■				■			■				
	BV 12	■				■			■				
	BV 13	■					■			■			
	BV 14	■					■			■			
	BV 15	■					■			■			
	BV 16	■					■			■			
DIN 338	BV 17	■					■			■			
	BV 18	■					■			■			
	BV 19	■					■			■			
	BV 22	■					■				■		
	BV 26		■				■					■	
	BV 27		■				■					■	
	BV 28			■			■						■
	BV 29			■			■						■
	BV 31	■				■			■				
DIN 340	BV 32	■					■			■			
	BV 33	■					■			■			
	BV 34		■				■					■	
DIN 1869/1	BV 41	■					■			■			
	BV 42	■					■			■			
DIN 1869/2	BV 44	■					■			■			
	BV 45	■					■			■			
DIN 1869/3	BV 47	■					■			■			
	BV 48	■					■			■			
	BK 01	■				■				■			
DIN 345	BK 02	■						■		■			
	BK 03	■						■		■			
	BK 05		■					■				■	
DIN 346	BK 11	■						■		■			
DIN 341	BK 15	■						■		■			
	BK 16	■						■		■			
DIN 1870/1	BK 21	■						■		■			
DIN 1870/2	BK 25	■						■		■			
DIN 8374/90°	BV 81	■						■		■			
DIN 8376/180°	BV 83	■						■		■			
DIN 8378/90°	BV 85	■								■			
DIN 8377/90°	BK 81	■						■		■			
DIN 8379/90°	BK 83	■						■		■			
DIN 8375/90°	BK 85	■						■		■			
	BV 68				■	■							
	BZ 01	■					■			■			
	BZ 02	■					■			■			
	BZ 03	■					■			■			
	BZ 04	■					■			■			
DIN 333	BZ 05	■					■			■			
	BZ 06	■					■			■			
	BZ 11	■					■			■			
	BZ 12	■					■			■			
	BZ 13	■					■			■			

OŠTRENJE SPIRALNIH BURGIJA

Normalan oblik vrha	A - Normalan oblik vrha sa odbrušenim jezgrom	B - Normalan oblik vrha sa odbrušenim jezgrom	C - Normalan oblik vrha sa krstasto odbrušenim jezgrom	D - Dvojno naoštren vrh	E - Poseban oblik vrha - BRAD POINT
					

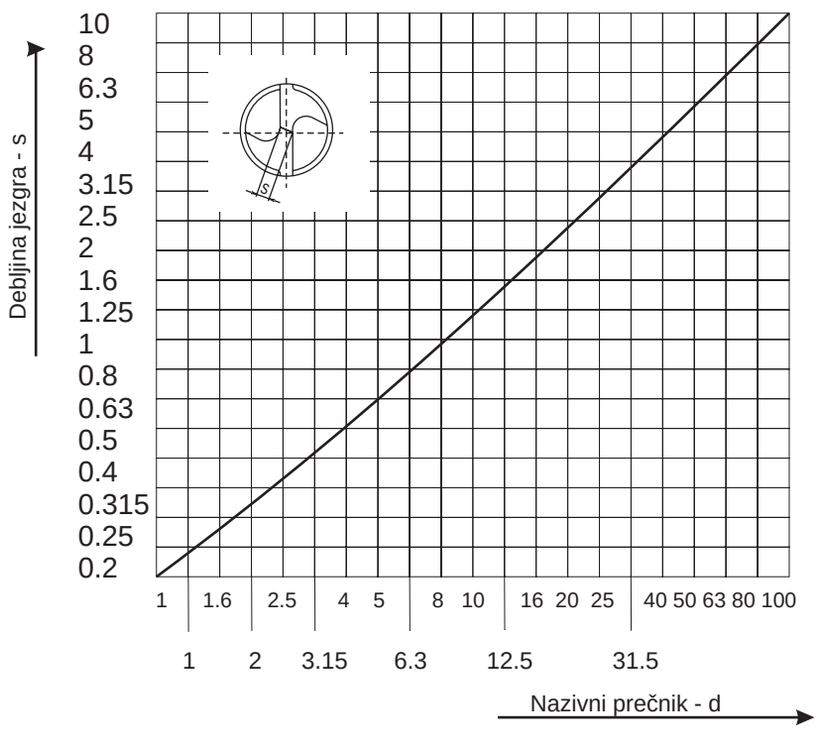
REZNI DIO





φ - ugao vrha
ψ - ugao poprečnog sječiva
γz - ugao zavojnice
b - grudna površina
a - leđna površina
c - glavno sječivo
e - širina zuba (zub)
f - širina ruba
g - pomoćno sjećivo
h - rezna ivica
i - rub
s - debljina jezgra
d - nazivni prečnik

JEZGRO BURGIJE

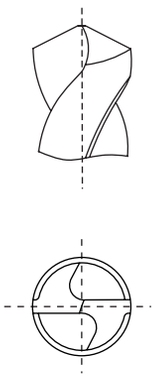
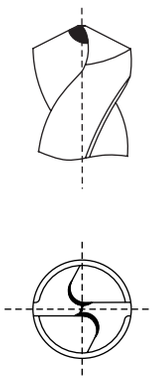
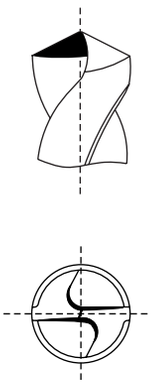
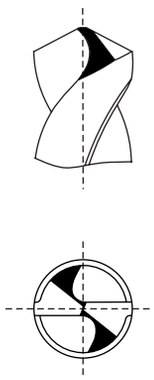
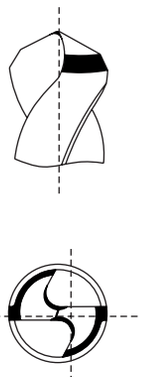
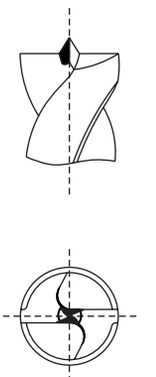


Radi veće stabilnosti burgije debljina jezgra se povećava idući od vrha ka dršci.

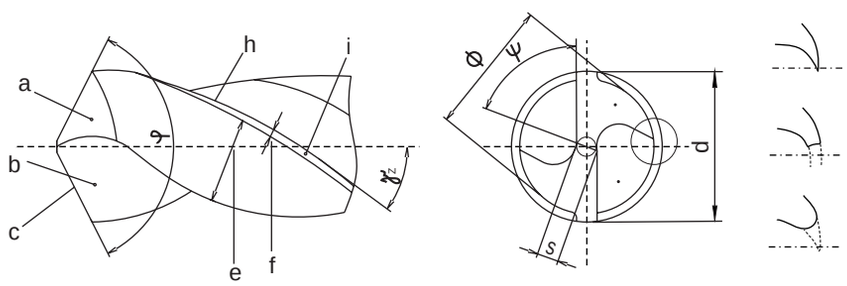
Tanje jezgro omogućava lakše prodiranje burgije u materijal, ali je zato burgija manje otporna.

Prema dijagramu date su preporuke za najmanju debljinu jezgra, mjerenu pri vrhu.

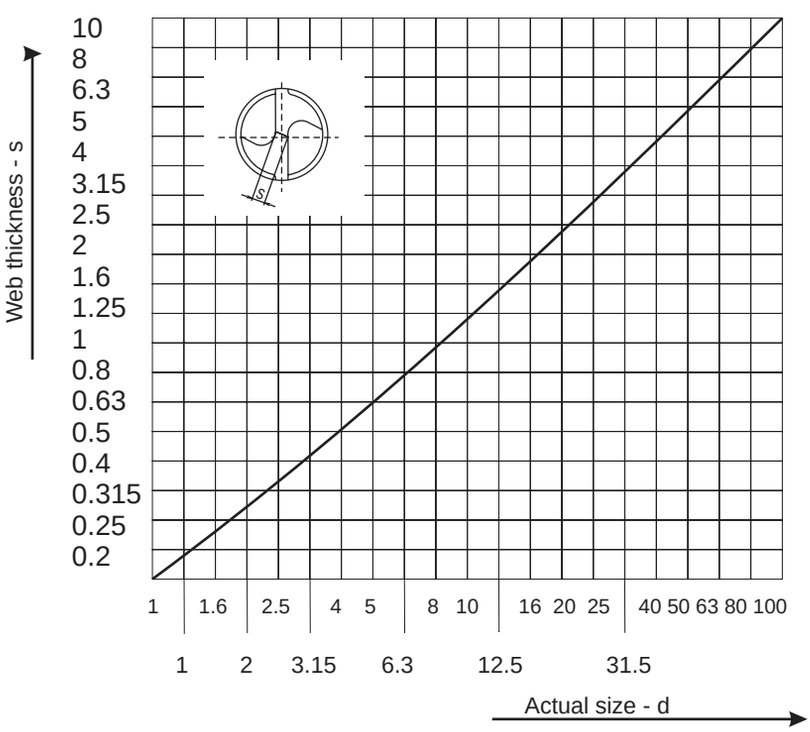
TWIST DRILL SHARPENING

Regular point shape	A - Regular point shape with ground off web	B - Regular point shape with ground off web	C - Regular point shape with split point ground off web	D - Double sharpened point	E - BRAD POINT
					

CUTTING SECTION



- φ - point angle
- ψ - chisel edge angle
- γ_z - helix angle
- b - face
- a - lip relief
- c - major cutting edge
- e - land width
- f - margin width
- g - secondary cutting edge
- h - cutting edge
- i - flange
- s - web thickness
- d - actual size



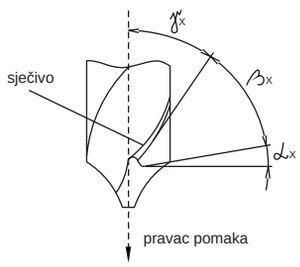
DRILL WEB

Web thickness increases from the point towards the shank to ensure greater stability.

Thinner web enables easier drilling into material but such drill is less stable.

The smallest web thickness values, measured at the point, are recommended in the shown diagram.

UGLOVI GLAVNOG SJEČIVA



α_x - leđni ugao

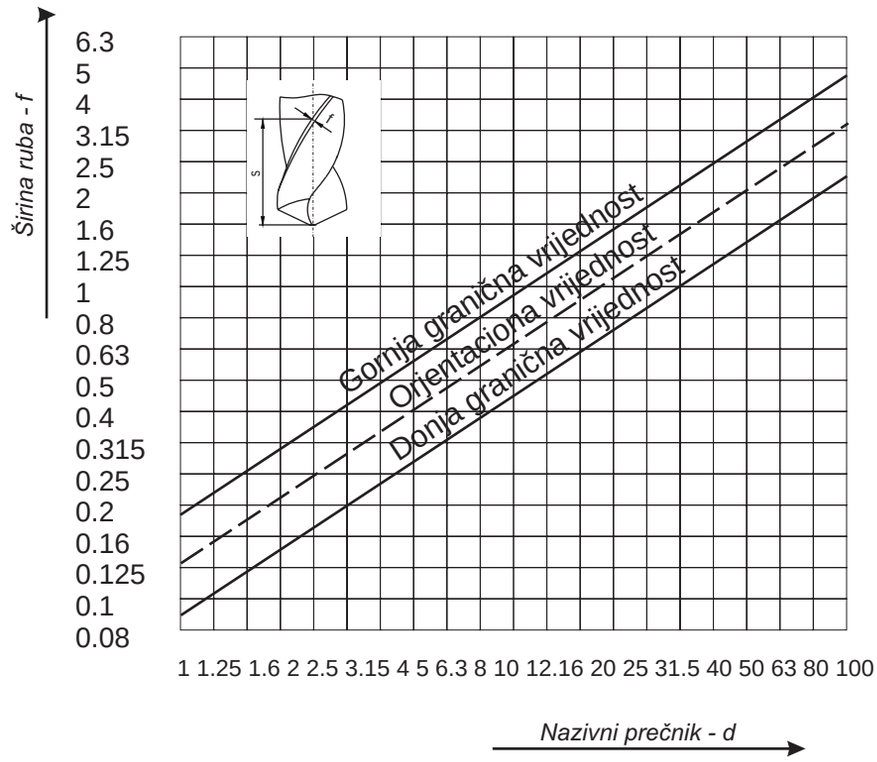
β_x - ugao klina

γ_x - grudni ugao

UGAO ZAVOJNICE ŽLJEBA

Prečnik burgije		Ugao uspona $\gamma^\circ z$		
		Tip		
iznad	do	N	T	M
1	3.2	$25^{\pm 3}$	$10^{\pm 2}$	$35^{\pm 3}$
3.2	5		$12^{\pm 3}$	
5	10	$27^{\pm 3}$	$13^{\pm 3}$	$40^{\pm 3}$
10	100	$30^{\pm 3}$		

Spiralne burgije valjkaste i konične izrađujemo sa desnim (D) I lijevim (L) usponom ugla zavojnice žljeba.

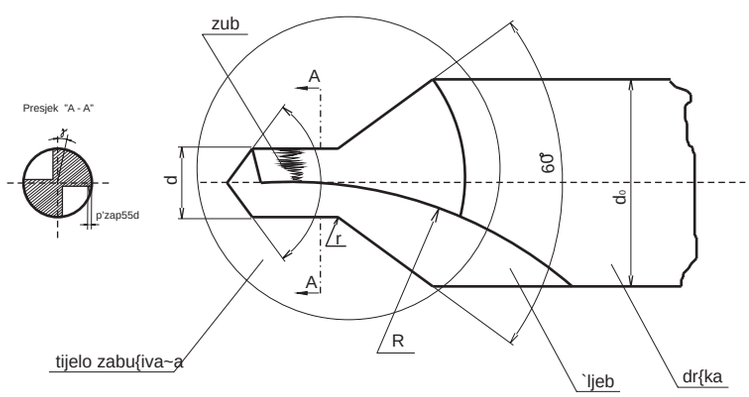


RUB BURGIJE

Rub burgije služi za vođenje burgije u izbušenom dijelu rupe.

Njegova širina ne smije da bude mala, jer bi poremetila stabilnost burgije, a ni velika da ne izaziva veće trenje. širina ruba se određuje prema dijagramu.

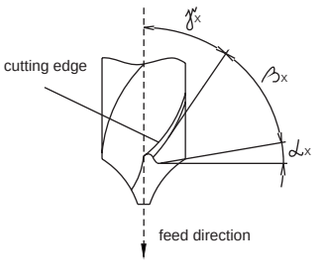
KONSTRUKTIVNI ELEMENTI ZABUŠIVAČA



do - prečnik drške zabušivača
d - nazivni prečnik
R - radius žljeba

r - radius na prelazu cilindričnog u konusni dio tijela
γ - grudni ugao
P - podrbušenje leđne površine

MAJOR CUTTING EDGE ANGLES



α X - lip clearance

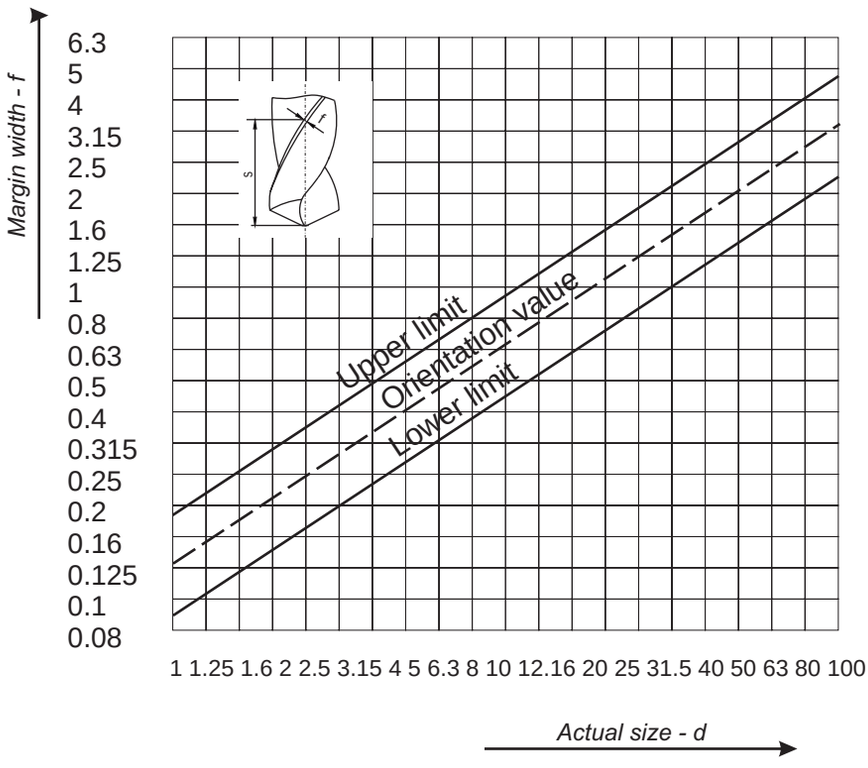
β X - wedge angle

γ X - rake angle

FLUTE HELIX ANGLE

Drill diameter		Lead angle $\gamma^{\circ}z$		
		Type		
over	up to	N	T	M
1	3.2	$25^{\pm3}$	$10^{\pm2}$	$35^{\pm3}$
3.2	5		$12^{\pm3}$	
5	10	$27^{\pm3}$	$13^{\pm3}$	$40^{\pm3}$
10	100	$30^{\pm3}$		

Straight and taper twist drills are made with right (R) and left (L) helix angle.

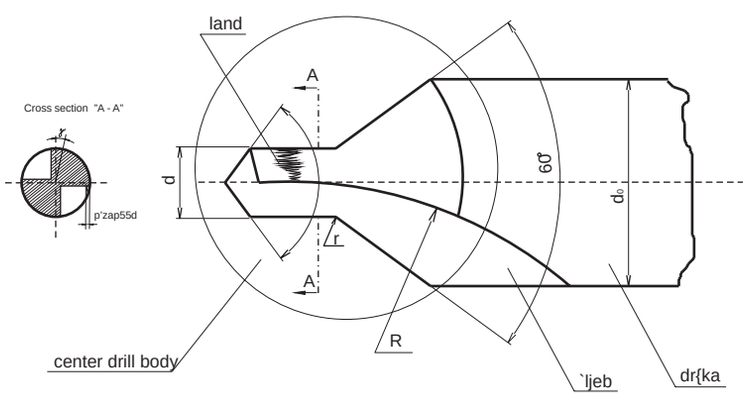


DRILL MARGIN

Margin leads the drill through drilled part of the hole.

It's width shouldn't be too narrow as it could have a negative impact on the drill stability, nor too wide, as to avoid excessive friction. Margin width is determined according to diagram.

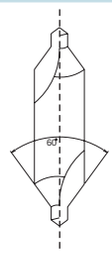
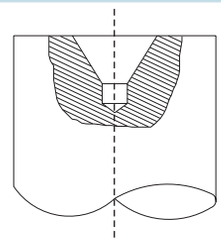
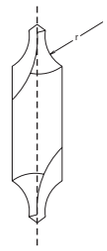
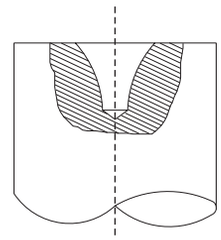
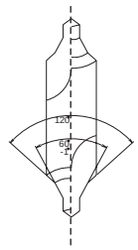
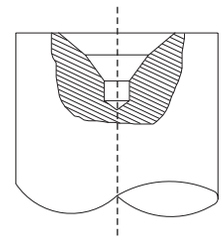
CENTER DRILL STRUCTURAL ELEMENTS



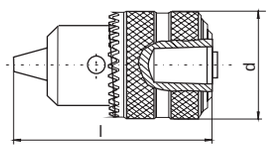
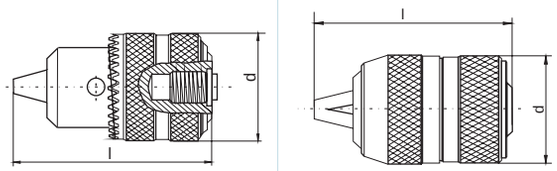
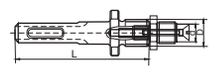
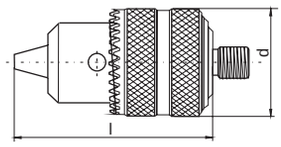
do - shank diameter
d - actual size
R - flute radius

r - radius at the transition section from straight to taper section
γ - rake angle
P - lip relief

TIPOVI ZABUŠIVAČA

60^0 , tip A		
60^0 , tip A sa zaravni		
60^0 , tip R		
60^0 , tip R sa zaravni		
60^0 / 120^0 , tip B		
60^0 / 120^0 , tip B sa zaravni		

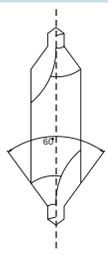
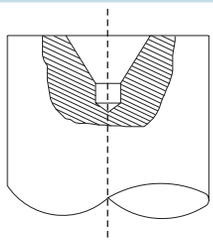
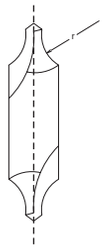
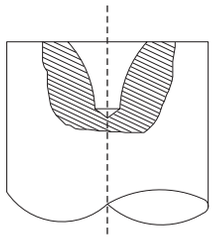
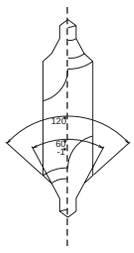
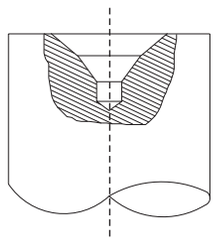
OBLIK STEZNE GLAVE

		KLJUČ	ADAPTER
A			/
B		/	
C			/

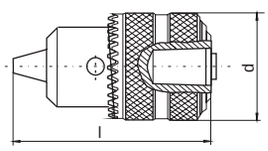
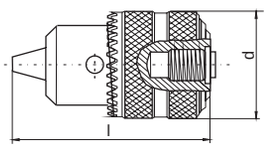
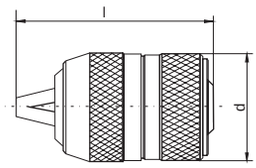
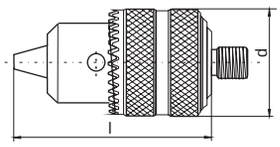
PREMA (IZRADI) NAMJENI

P	M	L
- Teška stezna glava (za stabilne bušilice - alatne mašine);	- Srednje teška stezna glava (za ručno vođene alatne mašine);	- Laka stezna glava (za ručne bušilice u domaćinstvu).

CENTER DRILL TYPES

60^0 , type A		
60^0 , type A plain		
60^0 , type R		
60^0 , type R plain		
60^0 / 120^0 , type B		
60^0 / 120^0 , type B plain		

DRILL CHUCK TYPE

A		
B	 	
C		

KEY

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ADAPTER

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	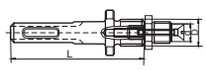
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TYPE ACCORDING TO APPLICATION

P	M	L
- Heavy duty drill chuck (for steady drilling machines - machine tools);	- Medium heavy duty drill chuck (for manually operated machine tools);	- Light duty drill chuck (for manual drilling machines for households).

Materijal obratka	Brzina v (m/min.)	Pomak s (mm/o) za prečnik (mm)								Tip burgije	Ugao vrha	Oblik vrha	Hladivo	Materijal obratka
		2	5	8	12	16	25	40	63					
Ugljenični čelik do 500 N/mm²	30...40	0,05	0,12	0,20	0,25	0,30	0,40	0,45	0,50	N	118	A	Emulzija	HSS
Ugljenični čelik do 700 N/mm²	25...30	0,05	0,12	0,20	0,25	0,30	0,40	0,45	0,50	N	118	A	Emulzija	HSS
Ugljenični čelik preko 700 N/mm²	20...25	0,04	0,10	0,15	0,20	0,25	0,30	0,35	0,40	N	118	A	Emulzija	HSS
Legirani čelik od 700...900 N/mm²	12...15	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	118	A	Emulzija	HSS
Legirani čelik od 900...1100 N/mm²	8...15	ručni	0,06	0,10	0,15	0,20	0,25	0,30	0,35	N	118	A	Emulzija	HSS
Legirani čelik preko 1100 N/mm²	5...8	ručni	0,04	0,06	0,08	0,10	0,12	0,16	0,18	N	130	A,B	Emulzija	HSSE
Nerđajući i hemijski otporan čelik	5...10	ručni	0,05	0,10	0,12	0,15	0,20	0,25	0,30	N	130	B	Ulje	HSSE
Vatrootporan čelik	5...10	0,02	0,06	0,09	0,12	0,15	0,20	0,25	0,27	N	130	B	Emulzija	HSSE
Čelik za opruge	3...6	ručni	0,04	0,06	0,08	0,10	0,12	0,16	0,18	N	130	B	Emulzija	HSSE
Manganski čelik	2...5	ručni	0,05	0,08	0,10	0,10	0,15	0,20	0,25	N	130	B	Emulzija	HSSE
Čelični liv do 520 N/mm²	20...25	0,03	0,09	0,14	0,19	0,25	0,30	0,38	0,43	N	118	A,B	Emulzija	HSS
Čelični liv preko 520 N/mm²	12...20	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	130	A,B	Emulzija	HSS
Sivi liv do 260 N/mm²	18...25	0,06	0,16	0,24	0,32	0,40	0,50	0,60	0,70	SI-N	118	E	Suvo	HSS
Sivi liv preko 260 N/mm²	5...15	0,05	0,14	0,20	0,30	0,35	0,45	0,50	0,60	SI-N	118	E	Suvo	HSS
Legirani sivi liv (tvrdi liv)	3...5	0,04	0,10	0,15	0,20	0,25	0,32	0,42	0,46	N	118	E	Suvo	HSS
Temper liv	18...25	0,07	0,12	0,20	0,30	0,40	0,50	0,60	0,60	N	118	A,E	Suvo	HSS
Liveni bakar	50...80	0,05	0,15	0,25	0,30	0,40	0,50	0,50	0,50	M	140	A	Emulzija	HSS
Elektrolitni bakar	25...35	0,05	0,12	0,20	0,25	0,30	0,40	0,40	0,50	N	140	A	Emulzija	HSS
Mesing krti (Ms 58)	65...100	0,08	0,20	0,25	0,30	0,40	0,50	0,60	0,70	T	118	A	Suvo	HSS
Mesing žilavi (Ms 63)	40...60	0,05	0,15	0,25	0,30	0,40	0,50	0,60	0,70	N	118	A	Emulzija	HSS
Specijalni mesing preko 400 N/mm²	20...40	0,05	0,15	0,20	0,30	0,35	0,45	0,55	0,60	N	118	A	Emulzija	HSS
Bronza meka (crveni liv)	20...30	0,04	0,10	0,15	0,20	0,25	0,32	0,42	0,46	N	118	B	Emulzija	HSS
Bronza tvrda	10...20	0,04	0,10	0,15	0,20	0,25	0,32	0,42	0,46	N	118	B	Emulzija	HSS
Aluminijska bronza preko 450 N/mm²	10...25	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	118	A	Emulzija	HSS
Aluminijum	50...120	0,07	0,20	0,30	0,40	0,50	0,60	0,80	0,90	Al-M	140	A	Emulzija	HSS
Silumin do 12% Si	50...80	0,06	0,16	0,24	0,32	0,40	0,50	0,60	0,70	Al-M	118	A	Emulzija	HSS
Silumin preko 12% Si	30...40	0,05	0,15	0,20	0,30	0,35	0,45	0,55	0,60	N	118	A	Emulzija	HSS
Magnezijumove legure (elektron)	80...180	0,07	0,20	0,30	0,40	0,50	0,60	0,80	0,90	T	118	A	Suvo	HSS
Cink	35...60	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	N	118	A	Emulzija	HSS
Titan i titanove legure	3...6	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	130	B,C,D	Emulzija	HSSE
Tvrda guma (ebonit)	15...35	0,06	0,12	0,20	0,28	0,35	0,45	0,50	0,50	T	80	A	Suvo	HSS
Plastične mase meke (pleksiglas)	20...50	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	T	140	A	Voda i vazd. (pritis.)	HSS
Plastične mase tvrde (bakelit)	10...20	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	T	80	A	Voda i vazd. (pritis.)	HSS
Plastične mase sa organskim punilima	15...25	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	M	130	A	Voda i vazd. (pritis.)	HSS
Plastične mase sa neorganskim punilima	10...20	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	M	130	A	Voda i vazd. (pritis.)	HSS

Workpiece material	Speed v (m/min.)	Feed s (mm/o) for diameter (mm)								Drill Type	Point angle	Point type	Coolant	Workpiece material
		2	5	8	12	16	25	40	63					
Carbon steel up to 500 N/mm²	30...40	0,05	0,12	0,20	0,25	0,30	0,40	0,45	0,50	N	118	A	Emulsion	HSS
Carbon steel up to 700 N/mm²	25...30	0,05	0,12	0,20	0,25	0,30	0,40	0,45	0,50	N	118	A	Emulsion	HSS
Carbon steel over 700 N/mm²	20...25	0,04	0,10	0,15	0,20	0,25	0,30	0,35	0,40	N	118	A	Emulsion	HSS
Alloy steel from 700...900 N/mm²	12...15	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	118	A	Emulsion	HSS
Alloy steel from 900...1100 N/mm²	8...15	ručni	0,06	0,10	0,15	0,20	0,25	0,30	0,35	N	118	A	Emulsion	HSS
Alloy steel over 1100 N/mm²	5...8	ručni	0,04	0,06	0,08	0,10	0,12	0,16	0,18	N	130	A,B	Emulsion	HSSE
Stainless and chemicals proof steel	5...10	ručni	0,05	0,10	0,12	0,15	0,20	0,25	0,30	N	130	B	Oil	HSSE
Fireproof steel	5...10	0,02	0,06	0,09	0,12	0,15	0,20	0,25	0,27	N	130	B	Emulsion	HSSE
Steel for springs	3...6	ručni	0,04	0,06	0,08	0,10	0,12	0,16	0,18	N	130	B	Emulsion	HSSE
Manganese steel	2...5	ručni	0,05	0,08	0,10	0,10	0,15	0,20	0,25	N	130	B	Emulsion	HSSE
Cast steel I up to 520 N/mm²	20...25	0,03	0,09	0,14	0,19	0,25	0,30	0,38	0,43	N	118	A,B	Emulsion	HSS
Cast steel over 520 N/mm²	12...20	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	130	A,B	Emulsion	HSS
Cast iron up to 260 N/mm²	18...25	0,06	0,16	0,24	0,32	0,40	0,50	0,60	0,70	SI-N	118	E	Dry	HSS
Cast iron over 260 N/mm²	5...15	0,05	0,14	0,20	0,30	0,35	0,45	0,50	0,60	SI-N	118	E	Dry	HSS
Alloy cast iron (hard)	3...5	0,04	0,10	0,15	0,20	0,25	0,32	0,42	0,46	N	118	E	Dry	HSS
Malleable cast iron	18...25	0,07	0,12	0,20	0,30	0,40	0,50	0,60	0,60	N	118	A,E	Dry	HSS
Cast copper	50...80	0,05	0,15	0,25	0,30	0,40	0,50	0,50	0,50	M	140	A	Emulsion	HSS
Electrolytic copper	25...35	0,05	0,12	0,20	0,25	0,30	0,40	0,40	0,50	N	140	A	Emulsion	HSS
Brass brittle (Ms 58)	65...100	0,08	0,20	0,25	0,30	0,40	0,50	0,60	0,70	T	118	A	Dry	HSS
Brass tough (Ms 63)	40...60	0,05	0,15	0,25	0,30	0,40	0,50	0,60	0,70	N	118	A	Emulsion	HSS
Special brass over 400 N/mm²	20...40	0,05	0,15	0,20	0,30	0,35	0,45	0,55	0,60	N	118	A	Emulsion	HSS
Bronze soft (red cast)	20...30	0,04	0,10	0,15	0,20	0,25	0,32	0,42	0,46	N	118	B	Emulsion	HSS
Bronze hard	10...20	0,04	0,10	0,15	0,20	0,25	0,32	0,42	0,46	N	118	B	Emulsion	HSS
Aluminum bronze over 450 N/mm²	10...25	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	118	A	Emulsion	HSS
Aluminum	50...120	0,07	0,20	0,30	0,40	0,50	0,60	0,80	0,90	Al-M	140	A	Emulsion	HSS
Silumina up to 12% Si	50...80	0,06	0,16	0,24	0,32	0,40	0,50	0,60	0,70	Al-M	118	A	Emulsion	HSS
Silumina over 12% Si	30...40	0,05	0,15	0,20	0,30	0,35	0,45	0,55	0,60	N	118	A	Emulsion	HSS
Magnesium alloys (electron)	80...180	0,07	0,20	0,30	0,40	0,50	0,60	0,80	0,90	T	118	A	Dry	HSS
Zinc	35...60	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	N	118	A	Emulsion	HSS
Titanium & titanium alloys	3...6	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	N	130	B,C,D	Emulsion	HSSE
Rubber hard (ebbonit)	15...35	0,06	0,12	0,20	0,28	0,35	0,45	0,50	0,50	T	80	A	Dry	HSS
Plastics soft (plexiglass)	20...50	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	T	140	A	Water/air (press.)	HSS
Plastics hard (backelite)	10...20	0,03	0,08	0,12	0,16	0,20	0,25	0,32	0,36	T	80	A	Water/air (press.)	HSS
Plastics with organic filling	15...25	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	M	130	A	Water/air (press.)	HSS
Plastics with inorganic filling	10...20	0,04	0,10	0,15	0,20	0,25	0,32	0,40	0,45	M	130	A	Water/air (press.)	HSS