

SADRŽAJ - CONTENTS - INHALTSVERZEICHNIS



**SPIRALNE BURGJE
TWIST DRILLS
SPIRALBORER**



**NAVOJNI ALAT
THREADING TOOLS
GEWINDESCHNEIDWERKZEUGE**



**SPECIJALNI ALAT
SPECIAL TOOLS
SPECIALWERKZEUGE**



**ALAT SA TVRDIM METALOM
CARBIDE TIPPED TOOLS
HARTMETALLWERKZEUGE**

















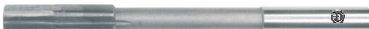



**KOMPLETI REZNOG ALATA
SETS OF THE CUTTING TOOL
SCHNEIDWERKZEUGESÄTZE**

OPIS SKRAĆENICA - DESCRIPTION - MERK

HSS	BRZOREZNI ČELIK Z GRUPE LEGIRANJA S 6-5-2	HIGH SPEED STEEL	SCHNELLARBEITSSTAHL
Co 5%	BRZOREZNI ČELIK IZ GRUPE LEGIRANJA S 6-5-2-5 - KOBALT 5 %	HIGH SPEED STEEL COBALT 5 %	SCHNELLARBEITSSTAHL MIT KOBALT 5 %
Co 8%	BRZOREZNI ČELIK IZ GRUPE LEGIRANJA S 2-10-1-8 - KOBALT 8 %	HIGH SPEED STEEL COBALT 8 %	SCHNELLARBEITSSTAHL MIT KOBALT 8 %
HM	TVRDI METAL	HARD METAL	HARTMETALL
R	DESNOREZNO	RIGHT	RECHTSSCHNEIDEND
L	LJEVOREZNO	LEFT	LINKSSCHNEIDEND
W	ZA RAD U MEKIM (M) MATERIJALIMA	WORK IN SOFT MATERIALS	BEARBEITUNG DER WEICHEN MATERIALE
N	ZA RAD U NORMALNIM (N) MATERIJALIMA	WORK IN NORMAL MATERIALS	BEARBEITUNG DER NORMALEN MATERIALE
H	ZA RAD U TVRDIM (T) MATERIJALIMA	WORK IN HARD MATERIALS	BEARBEITUNG DER HÄRTEN MATERIALE
ROLLED	VALJANE (TEHNOLOGIJA IZRADE)	ROLLED (EXECUTION)	GEROLLT (AUSFUHRUNG)
MILLED	GLODANE (TEHNOLOGIJA IZRADE)	GLODANE (EXECUTION)	GEFRÄST (AUSFUHRUNG)
GROUND	BRUŠENE (TEHNOLOGIJA IZRADE)	MILLED (EXECUTION)	GESCHLIFFEN (AUSFUHRUNG)
BRIGHT	SVIJETLO	BRIGHT (FINISH)	BLANK
BLACK	CRNO	BLACK (FINISH)	SCHWARZ
GOLD	ZLATNO	GOLD (FINISH)	GOLD
A	NORMALAN OBLIK VRHA SA ODBRUŠENIM JEZGROM	A - POINT ANGLE	A - FORM AUSGESPITZTE QUERSCHNEIDE
C	OBLIK VRHA SA KRSTASTO ODBRUŠENIM JEZGROM	C - POINT ANGLE	C - SPITZENFORM MIT KREUZANSCHLIFF
MT N°	VELIČINA KUPE	MORSETAPER	MORSEKONUS N°
BRAD	POSEBAN OBLIK VRHA	BRAD - POINT ANGLE	FORM ZENTRUMSPITZE
A	60° - ZABUŠIVAČI - OBLIK "A"	60° - CENTER DRILLS - TYPE "A"	60° - ZENTRIERBOHRER - FORM "A"
R	60° - ZABUŠIVAČI - OBLIK "R"	60° - CENTER DRILLS - TYPE "R"	60° - ZENTRIERBOHRER - FORM "R"
B	60°/120° - ZABUŠIVAČI - OBLIK "B"	60°/120° CENTER DRILLS - TYPE "B"	60°/120° - ZENTRIERBOHRER - FORM "B"
FLAT	FLEKA - ZARAVAN	TYPE - FLAT	FLÄCHE
INTERRUPTED	OBLIK - VADENI ZUB	TYPE - INTERRUPTED	FORM - AUSGESETZEN
ROLLING THREAD	OBLIK - UVALJIVAČ NAVOJA	TYPE - ROLLING THREAD	FORM - GEWINDEFORMER
SPIRAL ENTRY	OBLIK - KOŠA REZNA IVICA	TYPE - SPIRAL ENTRY	FORM - SCHELLANSCHNITT
STRAIGHT	OBLIK DRŠKE - VALJKASTA	TYPE - STRAIGHT SHANK	FORM - ZYLINDERSCHAFT
WELDON	OBLIK DRŠKE - SA FLEKOM	TYPE - WELDON SHANK	FORM - WELDON SCHAFT
SCREWED	OBLIK DRŠKE - SA NAVOJEM	TYPE - SCREWED SHANK	FORM - GEWINDE SCHAFT

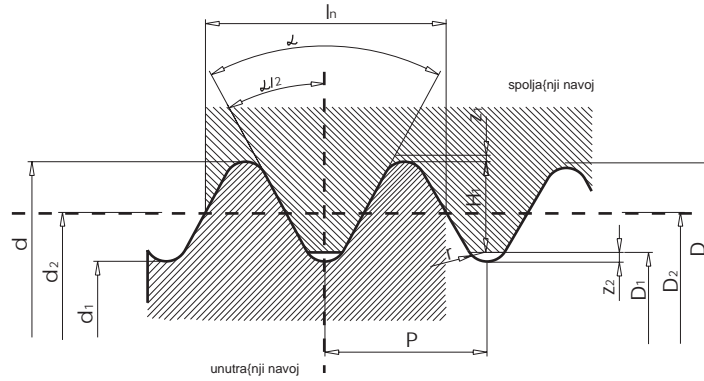
SADRŽAJ - CONTENTS - INHALTSVERZEICHNIS

<p>SPIRALNE BURGIJE VALJKASTE TWIST DRILLS STRAIGHT SHANK SPIRALBORER MIT YZLINDERSCHAFT</p>		<p>2B - 36B</p>
<p>SPIRALNE BURGIJE KUPASTE TWIST DRILLS MORSE TAPER SHANK SPIRALBORER MIT MORSEKEGELSCHAFT</p>		<p>21B - 35B</p>
<p>ZABUŠIVAČI COUNTERSINKS ZENTRIERBOHRER</p>		<p>37B</p>
<p>TROČELJUSNE STEZNE GLAVE, SA KLJUČEM THREE JAW DRILL CHUCKS, WITH KEY DREIBACKEN - BOHRFUTER, MIT SCHLUSSEL</p>		<p>38B - 40B</p>
<p>RUČNI UREZNICI HAND TAPS HANDGEWINDEBOHRER</p>		<p>3N - 10N</p>
<p>MAŠINSKI UREZNICI MACHINE TAPS MACHINENGEWINDEBOHRER</p>		<p>11N - 22N</p>
<p>MAŠINSKI UREZNICI, CIJEVNI NAVOJ 1:16 MACHINE TAPS, PIPE THREAD (1:16) MACHINENGEWINDEBOHRER ROHRGEWINDE (1:16)</p>		<p>23N</p>
<p>NAREZNICE OKRUGLE ROUND DIES RUNDE SCNEIDEISEN</p>		<p>24N - 28N</p>
<p>GLODALA END MILLS FRASER</p>		<p>3S - 12S</p>
<p>RAZVRTAČI REAMERS REIBAHLEN</p>		<p>13S - 20S</p>
<p>UPUŠTAČI COUNTERBORERS SENKER</p>		<p>21S - 35S</p>
<p>REDUCIR ČAURE TAPER SLEEVES VERLANGERUNGSHULSEN</p>		<p>36S - 37S</p>
<p>NOŽEVI TOOL BITS DREHLINGE</p>		<p>38S - 39S</p>
<p>STRUGARSKI NOŽEVI SA TM CT - TOOL BITS HM - DREHLINGE</p>		<p>2T - 4T</p>
<p>SPIRALNE BURGIJE SA TM CARBIDE TIPPED TWIST DRILLS HARTMETALL SPIRALBORER</p>		<p>5T - 11T</p>
<p>GLODALA SA TM CT - END MILLS HM - FRASER</p>		<p>12T - 13T</p>
<p>RAZVRTAČI SA TM CT - REAMERS HM - REIBAHLEN</p>		<p>14T - 19T</p>
<p>KOMPLETI REZNOG ALATA SETS OF THE CUTTING TOOL SCHNEIDWERKZEUGESATZE</p>		<p>1K - 6K</p>

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

INTERNAL THREAD FORMING TOOLS												
Standard	Navoj Thread Gewinde	Flute	Serije Series Serien	Matrijal Material		Izrada Execution Ausführung	Primjena	Application	Einsatzgebiete			
				HSS	CO 5%		METAL (R< *N/mm ²)					
							konstruktivni čelik, liveno željezo, čelik otporan na visoke temperature structural steel, malleable cast iron heat - treatable steel		legirani čelik, liveno željezo, obojeni metali alloy steel, malleable cast iron non ferous metal			
		*500	*700	*800	*850							
DIN 376	M	spiral	NM31									
		spiral	NM32									
		spiral	NM35									
		spiral	NM36									
	UNC	straight	NM51									
		straight	NM52									
straight		NM53										
straight		NM54										
straight		NM55										
straight		NM56										
DIN 2181	W	straight	NM47									
		straight	NM48									
		spiral	NM49									
		spiral	NM50									
DIN 2183	W	straight	NM57									
		straight	NM58									
		spiral	NM59									
		spiral	NM60									
DIN 374	Mf	straight	NM61									
		straight	NM62									
		straight	NM63									
		straight	NM64									
		straight	NM65									
		straight	NM66									
	Mf	spiral	NM67									
		spiral	NM68									
		spiral	NM69									
		spiral	NM70									
UNF	straight	NM81										
	straight	NM82										
	straight	NM83										
	straight	NM84										
	straight	NM85										
	straight	NM86										
DIN 5156 (374)	G (BSP)	straight	NM87									
		straight	NM88									
		spiral	NM89									
		spiral	NM90									
DIN 357	NUT TAPS	straight	NM91									
		straight	NM92									
		straight	NC01									
		straight	NC02									
		straight	NC03									
		straight	NC04									
		straight	NC08									
		straight	NC09									

NAVOJ

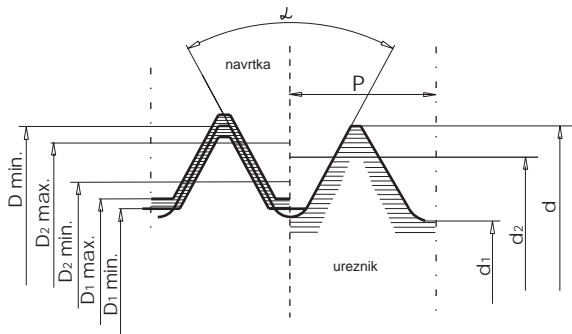


- | | | | |
|------------------------------|-------------------------------|--------------------------------|--|
| d, D - veliki pre nik | α - ugao profila | $\alpha/2$ - polugao profila | l_n - dužina nošenja |
| d_2, D_2 - srednji pre nik | r - zaobljenje na vrhu | H - teorijska visina profila | $l_r = l_n/d$ - relativna dužina nošenja |
| d_1, D_1 - mali pre nik | P - korak sa smjerom uspona | H_1 - dubina nošenja | |

Napomena: mala slova se odnose na spoljašnji navoj, a velika na unutrašnji navoj

Napomena: svi elementi navoja su standardizovani.

KONSTRUKTIVNI ELEMENTI UREZNIKA



- | | |
|---|--|
| D - veliki prečnik navoja | l_4 - dužina ulaznog dijela |
| D_1 - mali prečnik navoja | l_5 - dužina vrata |
| D_2 - srednji prečnik navoja | γ - grudni ugao |
| d - nazivni prečnik navoja | φ - ugao nagiba ulaznog dijela |
| d_1 - mali prečnik navoja ureznika | - ugao profila navoja |
| d_2 - srednji prečnik navoja ureznika | b - širina zuba (zub) |
| d_3 - prečnik drške | p_n - podbrušenje profila navoja |
| d_4 - prečnik ulaznog dijela | p_u - podbrušenje ulaznog dijela |
| d_5 - prečnik vrata | |
| d_6 - prečnik jezgra ureznika | |
| l - ukupna dužina | |
| l_1 - dužina četvrtke | |
| l_2 - dužina navojnog dijela | |
| l_3 - dužina kalibrirajućeg dijela | |

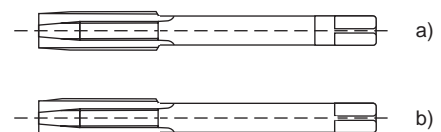
RUČNI - VIŠESTEPENI UREZNICI

UREZNICI U SLOGU

od 2 komada

1. STEPEN (6...8) P^*
2. STEPEN (2...3) P^*

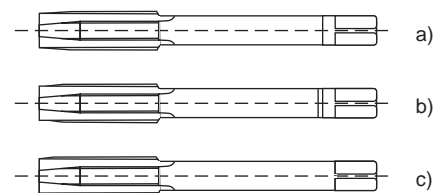
* P - korak navoja



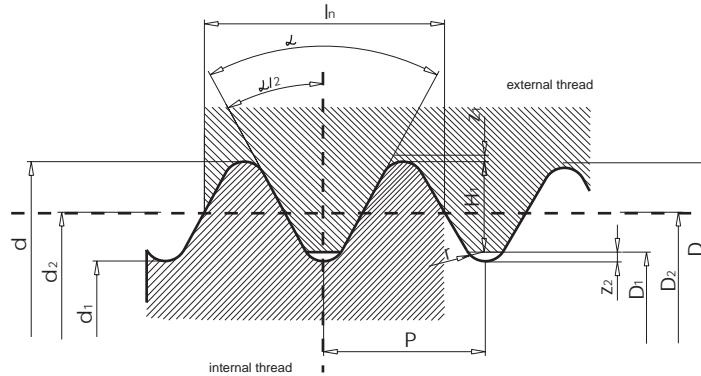
od 3 komada

1. STEPEN (6...8) P^*
2. STEPEN (4...5) P^*
3. STEPEN (2...3) P^*

* P - korak navoja



THREAD



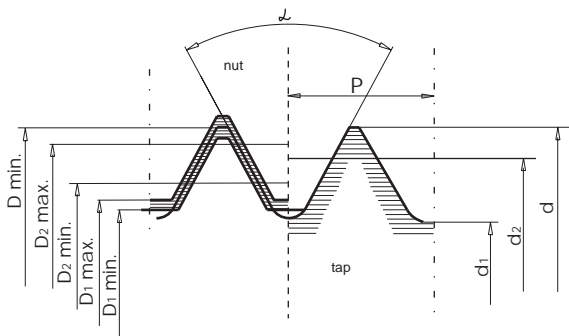
d, D - major diameter α - profile angle
 d_2, D_2 - pitch diameter r - crest (round)
 d_1, D_1 - minor diameter P - pitch (with lead direction)

$\alpha/2$ - profile halfangle l_n - thread length
 H - profile height(theoret.) $l_r = l_n/d$ - relative thread length
 H_1 - depth of thread

Note: small letters refer to external thread,
 capital letters to internal one

Note: all thread elements are standardized

STRUCTURAL ELEMENTS OF TAPS



D - major nut thread diameter
 D_1 - minor nut thread diameter
 D_2 - pitch nut thread diameter
 d - nominal tap thread diameter
 d_1 - minor tap thread diameter
 d_2 - pitch tap thread diameter
 d_3 - shank diameter
 d_4 - chamfer diameter
 d_5 - neck diameter
 d_o - tap web diameter
 l - overall length
 l_1 - square length
 l_2 - thread length
 l_3 - cutter length

l_4 - chamfer length
 l_5 - neck length
 γ - rake angle
 φ - chamfer angle
 α - thread profile angle

 b - land width
 p_n - thread profile relief

 p_v - chamfer relief

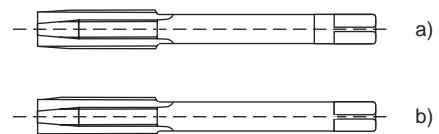
HAND TAPS

TAP SETS

of 2 pieces

1. STEP (6...8) P^*
2. STEP (2...3) P^*

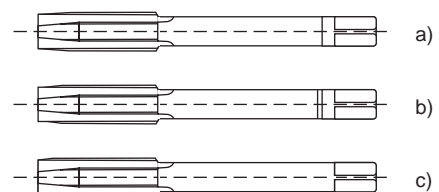
* P - thread pitch



of 3 pieces

1. STEP (6...8) P^*
2. STEP (4...5) P^*
3. STEP (2...3) P^*

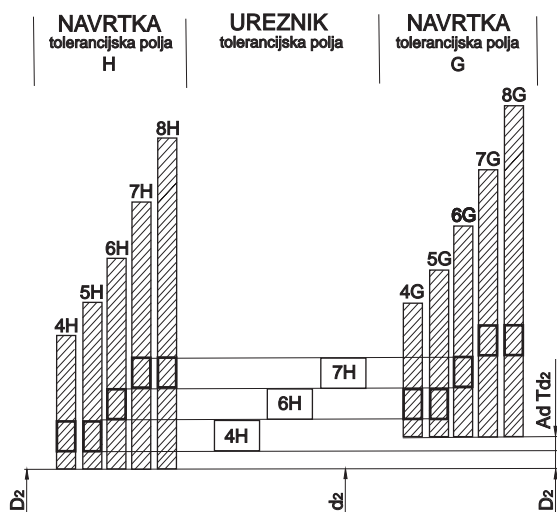
* P - thread pitch



VRSTE NAVOJA

NAVOJ PROFILA (UGAO)		STANDARD
M - metrički grubi navoj		DIN 352, 371, 376, 357, 223
Mf - metrički fini navoj		DIN 2181, 374, 223
UNC - -II- grubi navoj		DIN 352, 371, 376, 223
UNF - -II- fini navoj		DIN 2181, 371, 374, 223
UN - unificirani američki nacionalni standard ; normalni navoj		UN
Pg - navoj za oklopne cijevi		PG 40432, 40433, 40434
G - cijevni navoj - BSP (britanski standard)		DIN 5157, 5156, 24231
W - Witvort navoj - BSW (britanski navoj)		DIN 351, 2182, 2183, 223
BSF - britanski fini navoj		DIN 352, 2182, 2183 DIN 223
BSPT - britanski (G ili R) cijevni navoj (konični navoj)		BSPT
NPT - američki cijevni navoj (konusni)		NPT
NPTF - američki cijevni navoj - fini (konusni)		NPTF
NPS - američki cijevni navoj (cilindrični)		NPS
NPSF - američki cijevni navoj - fini (cilindrični)		NPSF

TOLERANCIJA NAVOJA UREZNIKA



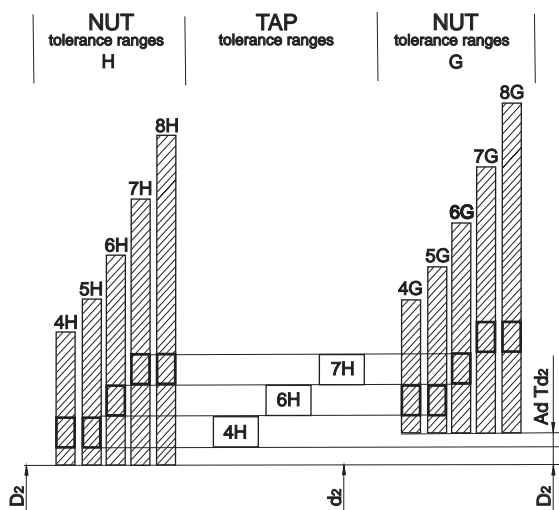
Tolerancijska polja ureznika	Tolerancijska polja navrtke				
4H (ISO1)*	4H	5H			
6H (ISO2)	4G	5G	6H		
7H (ISO3)			6G	7H	8H

*ISO 285173

THREAD TYPES

	PROFILE THREAD (ANGLE)		STANDARD
<i>M</i> - metric coarse thread	PROFILE THREAD (ANGLE)		DIN 352, 371, 376, 357, 223
<i>Mf</i> - metric fine thread			DIN 2181, 374, 223
<i>UNC</i> - II- coarse thread			DIN 352, 371, 376, 223
<i>UNF</i> - II- fine thread			DIN 2181, 371, 374, 223
<i>UN</i> - Unified American National Standard ; normal thread		UN	
<i>Pg</i> - gun pipe thread			PG 40432, 40433, 40434
<i>G</i> - pipe thread - BSP (British Standard)			DIN 5157, 5156, 24231
<i>W</i> - Whitworth thread - BSW (British thread)			DIN 351, 2182, 2183, 223
<i>BSF</i> - British fine thread			DIN 352, 2182, 2183 DIN 223
<i>BSPT</i> - British (G or R) pipe thread (taper thread)			BSPT
<i>NPT</i> - American Pipe Thread (taper)			NPT
<i>NPTF</i> - American Pipe Thread - fine (taper)			NPTF
<i>NPS</i> - American Pipe Thread (cylindrical)		NPS	
<i>NPSF</i> - American Pipe Thread - fine (cylindrical)		NPSF	

TAP THREAD TOLERANCES



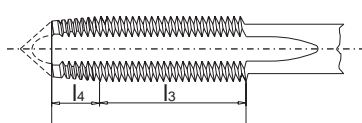
Tap tolerance ranges	Nut tolerance ranges				
4H (ISO1)*	4H	5H			
6H (ISO2)	4G	5G	6H		
7H (ISO3)			6G	7H	8H

*ISO 2857173

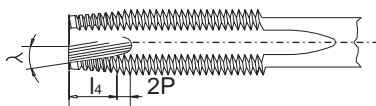
MAŠINSKI UREZNICI

VRSTE UREZNIKA (ULAZNI DIO)

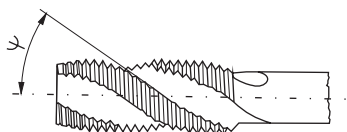
OBLIK A
sa $(6...8)P^*$
za prolazne rupe;



OBLIK B
sa $(4...5)P^*$
sa kosom reznom ivicom za prolazne i neprolazne rupe sa izlazom $1 > d$;



OBLIK C
sa $(2...3)P^*$
sa zavojnim žljebom od 15° i 35° za neprolazne rupe;



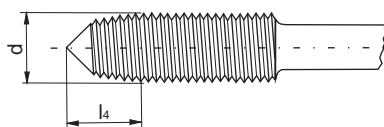
OBLIK ureznika sa vađenim zubima
za prolazne i neprolazne rupe;



OBLIK ureznika za navrtku sa dugim ulaznim dijelom od $20P^*$;



OBLIK uvaljivača za uvaljivanje navoja za neprolazne rupe;



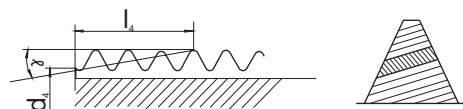
*P - korak navoja
1 - pravi žlijeb
2 - zavojni žlijeb
3 - kosa rezna ivica
 l_4 - dužina kalibrirajućeg dijela

λ - ugao kose rezne ivice
 ψ - ugao zavojnice žljeba (ψ)
 d - nazivni prečnik navoja
 l_4 - dužina ulaznog dijela

sa skidanjem ivera

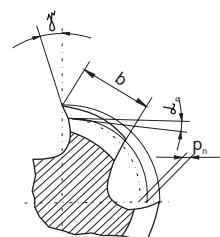
bez skidanja ivera

ULAZNI DIO



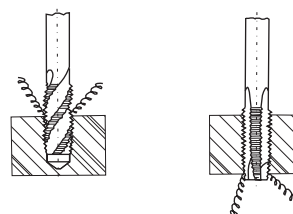
Ulazni dio ureznika vrši rezanje navoja, a kalibriraju i pro iš avanje. Svaki zub navoja ulaznog dijela skida sloj materijala odgovaraju eg oblika. Dužina ulaznog dijela l_4 izražava se brojem koraka P.

KALIBRIRAJUĆI DIO



Kalibriraju i dio ureznika isti i kalibrira navoj, vodi ureznik po koraku pri rezanju bez vo enjai služi kao rezerva za oštrenje po grudnoj i le noj površini. Smanjenje trenja i zme u ureznika i obratka postiže se smanjenjem pre nika navojnog dijela prema dršci sa 1:1000 i podbrušenjem po profilu navoja $\alpha_n = 10^\circ..15^\circ$.

ŽLJEB UREZNIKA



sl.1

sl.2

Osnovni elementi profila ureznika su: - broj žljebova z
- prečnik jezgra d_0
- širina zuba b
- grudni ugao λ
- ugao zavojnice žljeba ψ (kod ureznika sa zavojnim žljebovima)

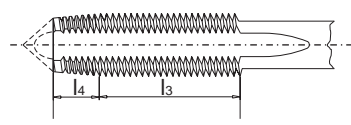
Za usmjeravanje ivera u željenom pravcu i bolje odvođenje, izrađuju se ureznici sa zavojnim žljebovima. Na prvoj slici prikazan je uticaj desnog zavojnog žljeba, a na drugoj slici uticaj kose rezne ivice, na smjer odvđenja ivera pri izradi desnog navoja. Ureznici sa zavojnim žljebovima preporučuju se za obradu mekog i žilavog materijala (dugoiverni) i za izradu navoja u rupama koje po obimu imaju podužne žljebove. U tabeli dati su ureznici sa brojem žljebova u nekoliko primjera.

UREZNICI	NAVOJ	BROJ ŽLJEBOVA			
		3	4	6	8
u slogu od 3 kom.	M	...M7	M8...M45	M48...M45	—
	UNC	...1/4	5/16...13/4	2...3	—
u slogu od 2 kom.	Mf	...M7	M8...M45	M48...M52	—
	R	...R1/4	R3/8...R13/8	R11/2...21/4	R21/2...R4
mašinski i za navrtku	M i Mf	...M16	M18...M45	M48...M68	—
	UNC	...5/8	3/4...13/4	2...3	—

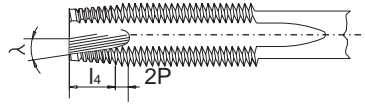
MACHINE TAPS

TAP TYPES (CHAMFER TYPES)

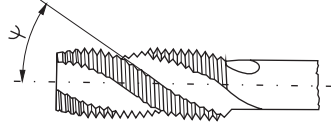
TYPE A
with $(6...8)P^*$
for thru
holes;



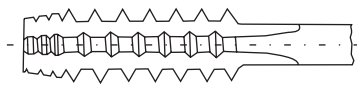
TYPE B
with $(4...5)P^*$
gun (spiral) point
for thru and
blind holes
recessed $1 > d$;



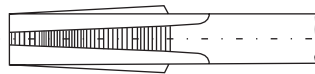
TYPE C
with $(2...3)P^*$
with spiral
flute
from 15° i 35° for
blind holes;



**INTERRUPTED
TAP TYPE**
for through
and blind holes;



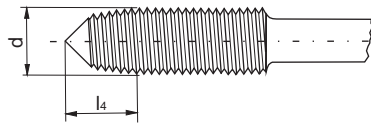
NUTTAP
with long
chamfer
of $20P^*$;



with chip removal

without chip removal

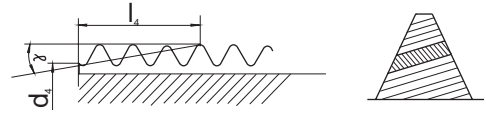
THREAD FORMING TAP
for blind holes;



*P - pitch
1 - straight flute
2 - helical flute
3 - gun point
 l_3 - thread length

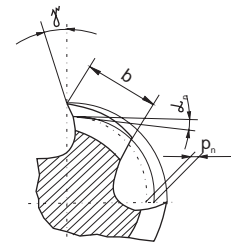
λ - bevel (shear) angle
 Ψ - flute helical angle (psi)
 d - nominal thread diameter
 l_4 - chamfer (ingate) length

CHAMFER



The tapering of the threads at the front end of each land or chaser of a tap by cutting away and relieving the crest of the first few teeth to distribute the cutting action over several teeth. Chamfer length l_4 is expressed by number of pitches P.

CUTTER PART



Thread is cleaned and calibrated by tap calibrating part which leads tap pitch during cutting operation with no leading and serves as additional stock removal for grinding both face and rake surface. Friction between tap and working piece is decreased by smaller thread diameter towards shank 1:1000 and chamfer along thread form $\alpha_n = 10^\circ..15^\circ$.

TAP FLUTE

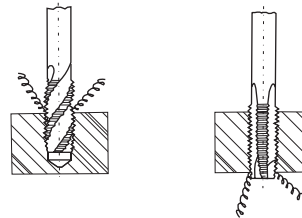


fig.1

fig.2

Basic flute elements are: - number of flutes z
- core diameter d_0
- land width b
- rake angle γ
- flute helical angle Ψ

The longitudinal channels formed in a tap to create cutting edges on the thread profile and to provide chip spaces and cutting fluid passages. For an impact of right hand flute helical angle at chip removal when producing right hand thread, see fig.1. and for gun point impact - see fig.2. Taps with helical flutes are recommended for soft and tough materials (long chip form) and for threads in holes with number of flutes in several examples.

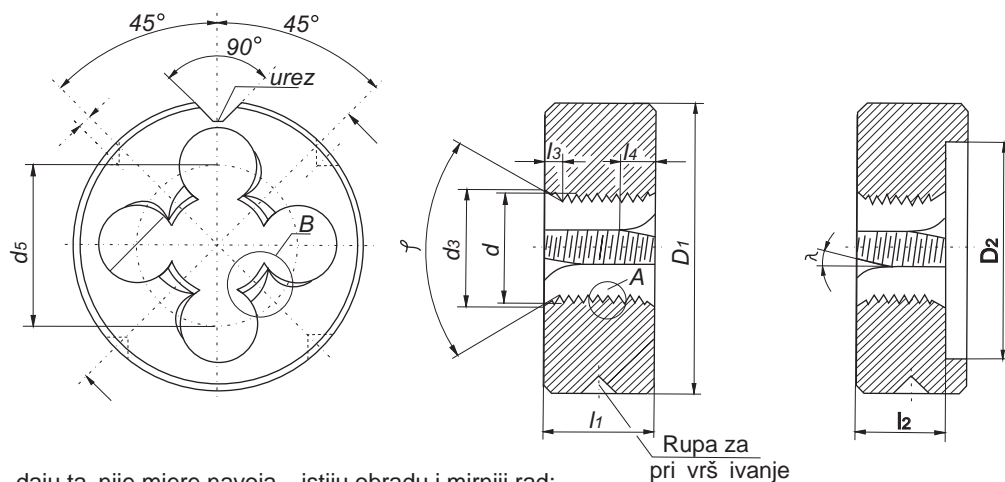
TAPS	THREAD	NUMBER OF FLUTES			
		3	4	6	8
in sets of 3 pcs.	M	...M7	M8...M45	M48...M45	—
	UNC	...1/4	5/16...1 3/4	2...3	—
in sets of 2 pcs.	Mf	...M7	M8...M45	M48...M52	—
	R	...R1/4	R3/8...R1 3/8	R1 1/2...2 1/4	R2 1/2...R4
machine and nut taps	M i Mf	...M16	M18...M45	M48...M68	—
	UNC	...5/8	3/4...1 3/4	2...3	—

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

EXTERNAL THREAD FORMING TOOLS							
Standard	Navoj Thread Gewinde	Flute	Serije Series Serien	Matrijal Material	Izrada Execution Ausführung	Primjena Application Einsatzgebiete	
				HSS	brušena ground geschliffen	METAL (R< *N/mm ²)	
						*700	*800
EN 22568 (DIN223)	M	straight	NN01				
		spiral	NN02				
	UNC	straight	NN05				
		spiral	NN06				
	Mf	straight	NN03				
		spiral	NN04				
	UNF	straight	NN07				
		spiral	NN08				
	W	straight	NN09				
		spiral	NN10				
	BSF	straight	NN11				
		spiral	NN12				
DIN 40434	Pg	straight	NN15				
		spiral	NN16				
EN 24231	BSP (Pg)	straight	NN13				
		spiral	NN14				
	1:16	straight	NN21				
		spiral	NN22				
		straight	NN23				
		spiral	NN24				

KONSTRUKTIVNI ELEMENTI NAREZNICA

OBLIK B - ZATVORENE



-daju ta nije mjere navoja, istiju obradu i mirniji rad;

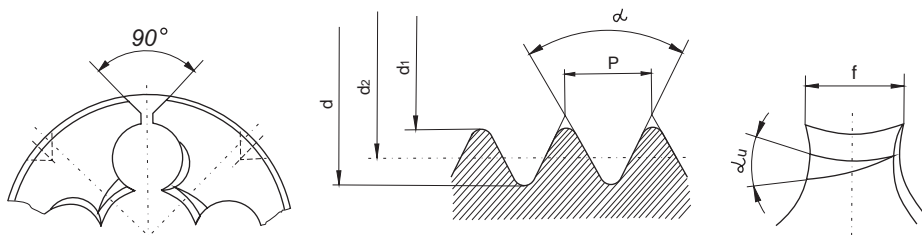
d - nazivni prečnik;
 d - mali prečnik navoja nareznice;
 d_2 - srednji prečnik navoja nareznice;

D_1 - prečnik nareznice;
 D_2 - prečnik upusta;

d_3 - prečnik ulaznog dijela;
 d_5 - prečnik rupa za iver;
 d_6 - podioni prečnik rupa za iver;

f - širina zuba;
 p - korak navoja;

OBLIK A - OTVORENE

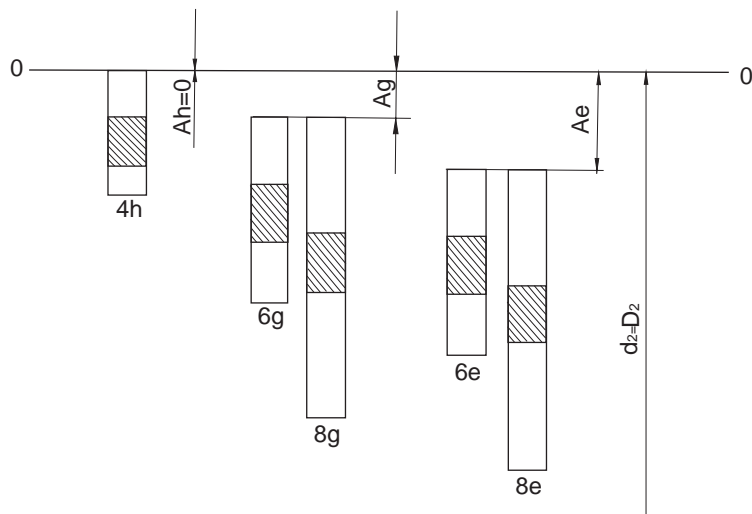


-imaju mogu nost manjeg podešavanja za rezanje navoja razli itih spojeva.

l_1 - širina nareznice;
 l_2 - širina reznog dijela;
 l_3 - dužina ulaznog dijela;
 l_4 - dužina kose rezne ivice (KRI);

\angle - ugao profila navoja;
 γ - grudni ugao;
 \angle_u - leđni ugao = $4^\circ \dots 10^\circ$;
 φ - ugao rupe ulaznog dijela = 60° ;
 λ - ugao kose rezne ivice.

TOLERANCIJA IZRADE NAVOJA NAREZNICE

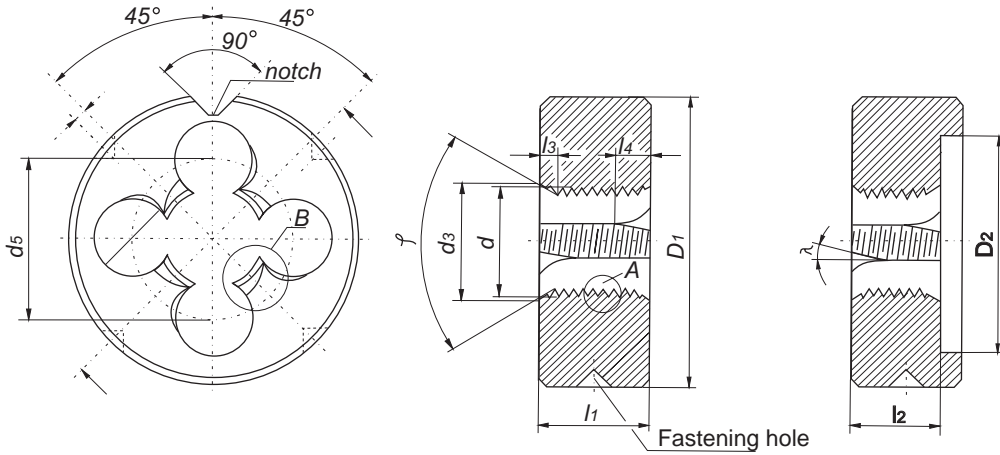


$0 - 0$ - linija srednjeg prečnika;
 \square - tolerancijsko polje vijka;
 \square - tolerancijsko polje nareznice;
 Ag, Ae - zazor vijka u odnosu na teorijski srednji prečnik;

Tolerancija izrade navoja nareznice zavisi od tolerancije navoja koji će ona obrađivati.
 Normalno izrađujemo I nareznice u granicama 6g.

DIE STRUCTURAL ELEMENTS

TYPE B - CLOSED



-more accurate thread, cleaner machining, steady, quiet work;

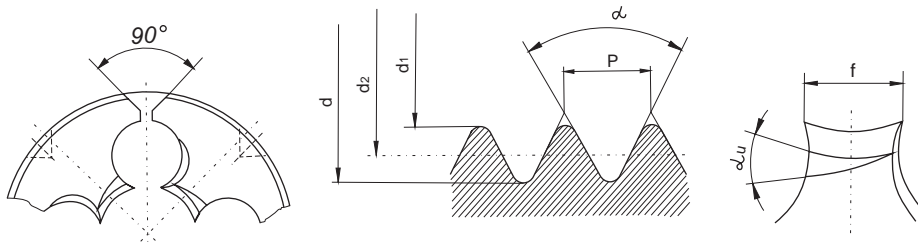
d - nominal size;
 d_1 - die thread minor diameter;
 d_2 - die thread pitch diameter ;

D_1 - major diameter;
 D_2 - notch diameter;

d_3 - chamfer diameter;
 d_4 - scrap hole diameter;
 d_5 - index scrap hole diameter;
 f - land width;
 p - thread pitch;

l_1 - die width;
 l_2 - cutting part width ;
 l_3 - ingate length ;
 l_4 - lip clearance length;

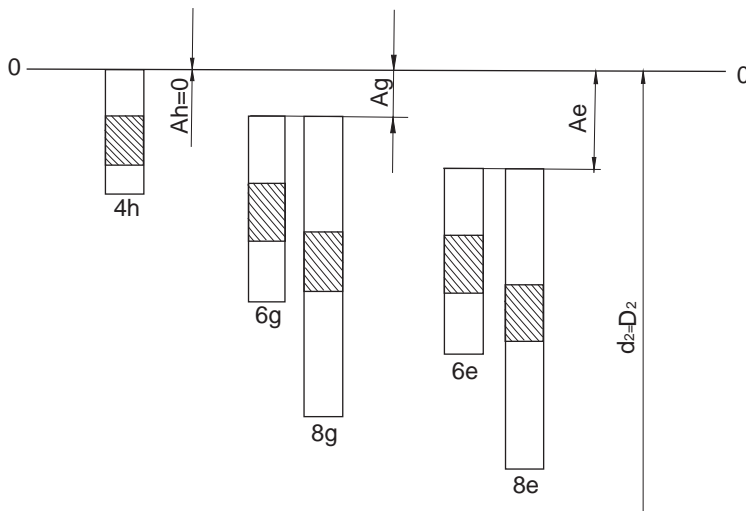
TYPE A - OPEN



- there is a possibility of setting for different kinds of joints.

α - thread profile angle;
 γ - rake angle;
 λ_u - relief angle =
 $= 4^\circ \dots 10^\circ$;
 φ - ingate hole angle
 $= 60^\circ$;
 λ - lip clearance angle

DIE THREAD TOLERANCE



0 - 0 - pitch diameter line;
 □ - screw tolerance range;
 ▨ - die tolerance range ;
 Ag, Ae - screw clearance v.s.
 theoretical pitch diameter;

Die thread tolerance depends upon
 tolerance of thread it makes.
 Normally we make dies within 6g limits.

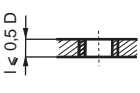
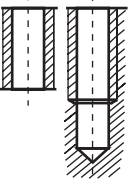
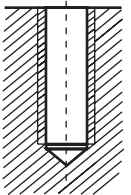
NAREZNICE - Preporuke za grudni ugao, brzinu rezanja i hladivo

Materijal	Grudni ugao γ	Brzina rezanja m/min	Hladivo
Nelegirani elik do 400 N/mm ²	12°...15°	6...8	D,A
Nelegirani elik do 750 N/mm ²	8°...12°	5...8	A,D
Legirani elik do 900 N/mm ²	6°...8°	2...5	A,C
Ner aju i elik	8°...12°	2...4	B,C
Vatrootporni elik	8°...10°	2...4	B,A
eli ni liv do 600 N/mm ²	8°...10°	2...5	A,C
Temper liv	6°...8°	3...5	D,A
Sivi liv do 200 HB	2°...3°	3...6	F,G,D
Sivi liv iznad 200 HB	0°...2°	2...5	G
Al - Si legure do 12 % Si	20°...25°	8...12	D
Al - Si legure iznad 12 % Si	15°...20°	5...8	D,C
Mesing krt	2°...4°	8...12	F,A
Mesing žilav	4°...6°	5...8	D,A
Bronza meka	6°...8°	5...10	D,A
Bronza tvrda	5°...6°	2...4	A,C
Bakar nelegiran	15°...20°	5...8	D,A
Bakar elektrolitni	10°...15°	4...6	C
Cink	15°...20°	5...8	D,A
Bakelit	2°...3°	2...4	E,F,C
Plasti ne mase	10°...18°	5...8	E

DIES - Recommended rake angle, cutting speed and coolant

Material	Rake angle γ	Cutting speed m/min	Coolant
Unalloy steel up to 400 N/mm ²	12°...15°	6...8	D,A
Unalloy steel up to 750 N/mm ²	8°...12°	5...8	A,D
Alloy steel up to 900 N/mm ²	6°...8°	2...5	A,C
Stainless steel	8°...12°	2...4	B,C
Heat resistant steel	8°...10°	2...4	B,A
Cast steel up to 600 N/mm ²	12°...15°	2...5	A,C
Malleable cast iron	6°...8°	3...5	D,A
Cast iron up to 200 HB	2°...3°	3...6	F,G,D
Cast iron over 200 HB	0°...2°	2...5	G
Al - Si alloys to 12 % Si	20°...25°	8...12	D
Al - Si alloys over 12 % Si	15°...20°	5...8	D,C
Brass brittle	2°...4°	8...12	F,A
Brass tough	4°...6°	5...8	D,A
Bronze soft	6°...8°	5...10	D,A
Bronze hard	5°...6°	2...4	A,C
Copper unalloy	15°...20°	5...8	D,A
Copper electrolytic	10°...15°	4...6	C
Zinc	15°...20°	5...8	D,A
Backelite (plastics hard)	2°...3°	2...4	E,F,C
Plastics	10°...18°	5...8	E

IZBOR UREZNIKA

Materijal obratka	Karakteristične vrste rupa								Grudni ugao γ	Brzina rezanja m/min	Hladivo				
					Preporučuje se oblik ureznika kat. br.										
	1	2	1	2	1	2	1	2							
Nelegirani elik do 400 N/mm ²	2.112 2.110B 2.134	NM02 NM05 NM08	2.102A B 2.133	NM21 NM24 NM22 NM25	2.110C 2.113C 15° 35° 2.134	NM03 NM06 NM11 NM12 NM15 NM16 Nm08	2.106C 35° 2.102C 2.133	NM32 NM36 NM23 NM26	12...15	12...15	D,A				
Nelegirani elik do 700 N/mm ²	2.112 2.110B	NM02 NM05	2.102 A,B	NM21 NM24 NM22 NM25	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 Nm16	2.106C 35° 2.102C	NM32 NM36 NM23 NM26	8...12	10...15	A,D				
Nelegirani elik iznad 700 N/mm ²	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 Nm16	2.106C 35°	NM32 NM36	6...8	6...10	A,C				
Legirani elik do 900 N/mm ²	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 Nm16	2.106C 35°	NM32 NM36	6...8	5...10	A,C				
Legirani elik iznad 900 N/mm ²	2.112 2.110B	NM02 NM05	2.106D 15° 2.102B 2.104B	NM22 NM25 NM27	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 Nm16	2.106C 35°	NM32 NM36	4...6	2...5	B,C				
Ner aju i elik	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.113C 35°	NM12 NM16	2.106C 35°	NM32 NM36	8...12	3...5	B,C				
Vatrootporni elik	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.113C 35°	NM12 NM16	2.106C 35°	NM32 NM36	8...10	4...5	B,C				
eli ni liv	2.112 2.110B	NM02 NM05	2.112 2.102B 2.104B	NM22 NM25 NM27	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 Nm16	2.106C 35° 15°	NM31 NM32 NM35 NM36	8...10	5...8	A,C				

* 1 - Kataloški broj iz Kataloga IAT

* 2 - Kataloški broj iz Cjenovnika N0^o IAT

* oznake iza kat.br. u kolonama 1 označavaju oblik ulaznog dijela i ugao zavojnog žljeba

* oznake A...G za hladivo (vidi objašnjenja na kraju T1)

TAP CHOICE

Working piece material	Typical hole types								Rake angle γ	Cutting speed m/min	Coolant				
															
	Recommended tap type cat. no.														
	1	2	1	2	1	2	1	2							
Unalloy steel to 400 N/mm ²	2.112 2.110B 2.134	NM02 NM05 NM08	2.102A B 2.133	NM21 NM24 NM22 NM25	2.101C 2.113C 15° 35° 2.134	NM03 NM06 NM11 NM12 NM16 NM08	2.106C 35° 2.102C 2.133	NM32 NM36 NM23 NM26	12...15	12...15	D,A				
Unalloy steel to 700 N/mm ²	2.112 2.110B	NM02 NM05	2.102 A,B	NM21 NM24 NM22 NM25	2.101C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM16 NM08	2.106C 35° 2.102C	NM32 NM36 NM23 NM26	8...12	10...15	A,D				
Unalloy steel over 700 N/mm ²	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.101C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM16 NM08	2.106C 35°	NM32 NM36	6...8	6...10	A,C				
Alloy steel to 900 N/mm ²	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.101C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM16 NM08	2.106C 35°	NM32 NM36	6...8	5...10	A,C				
Alloy steel over 900 N/mm ²	2.112 2.110B	NM02 NM05	2.106D 15° 2.102B 2.104B	NM22 NM25 NM27	2.101C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM16 NM08	2.106C 35°	NM32 NM36	4...6	2...5	B,C				
Stainless steel	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.113C 35°	NM12 NM16	2.106C 35°	NM32 NM36	8...12	3...5	B,C				
Heat resistant steel	2.112 2.110B	NM02 NM05	2.102B 2.104B	NM22 NM25 NM27	2.113C 35°	NM12 NM16	2.106C 35°	NM32 NM36	8...10	4...5	B,C				
Cast steel	2.112 2.110B	NM02 NM05	2.112 2.102B 2.104B	NM22 NM25 NM27	2.101C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM16 NM08	2.106C 15° 35°	NM31 NM32 NM35 NM36	8...10	5...8	A,C				

* 1 - Catalogue no. from SL IAT Catalogue

* 2 - Catalogue no. from SL IAT Price list N0⁸

* figures after cat.no.in columns 1 refer to shape of ingate and helix flute angle

* figures A...G for coolant (see explanations at the end of T1)

IZBOR UREZNIKA

Materijal obratka	Karakteristične vrste rupa								Grudni ugao γ	Brzina rezanja m/min	Hladivo
	1	2	1	2	1	2	1	2			
Temper liv	2.112 2.110B	NM02 NM05	2.112 2.102B 2.104B	NM22 NM25 NM27	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 NM16	2.106C 35° 15°	NM31 NM32 NM35 NM36	6...8	8...10	D,A
Sivi liv do 200 HB	2.103C 2.110B	NM02 NM05	2.103C 2.102B	NM22 NM25	2.103C 2.113C 15° 35°	NM11 NM12 NM15 NM16	2.103C 2.106C 35°	NM32 NM36	2...3	8...12	F,G D
Sivi liv iznad 200 HB	2.103C 2.110B	NM02 NM05	2.103C 2.102B	NM22 NM25	2.103C 2.113C 15° 35°	NM11 NM12 NM15 NM16	2.103 2.106 35°	NM32 NM36	0...2	4...8	G
Al - Si legure do 12% Si	2.112 2.134	NM08	2.105 2.102B 2.104B 2.133	NM22 NM25 NM27	2.113C 35° 15° 2.111C 2.134	NM11 NM12 NM15 NM16 NM07 NM08	2.106C 35° 15° 2.133	NM32 NM36	12...18	12...16	D
Al - Si legure iznad 12% Si	2.112 2.110B	NM02 NM05	2.102B 2.105	NM22 NM25	2.113C 35°	NM12 NM16	2.106 35°	NM32 NM36	10...12	10...12	D,C
Mesing krt	2.110C 2.112	NM03 NM06	2.102C 2.103C	NM23 NM26	2.110C 2.103C	NM03 NM06	2.102C 2.103C	NM23 NM26	2...4	6...12	F,A
Mesing žilav	2.112 2.134	NM08	2.105 2.102B 2.133	NM22 NM25	2.113C 15° 35° 2.134	NM11 NM12 NM15 NM16 NM08	2.106C 35° 2.133	NM32 NM36	4...6	10...16	D,A
Bronza meka	2.112 2.134	NM08	2.105 2.102B 2.133	NM22 NM25	2.110C 2.113C 15° 2.134	NM03 NM06 NM11 NM15 NM08	2.102C 35° 15° 2.133	NM23 NM26 NM31 NM32 NM35 NM36	6...10	8...12	D,A
Bronza tvrda	2.110B	NM02 Nm05	2.103C 2.102B	NM22 NM25	2.103C 2.113C	NM11 NM12 NM15 NM16	2.103C 2.106C	NM31 NM32 NM35 NM36	4...8	4...6	A,C
Bakar nelegirani	2.112 2.134	NM08	2.105 2.102B 2.133	NM22 NM25	2.107C 2.106C 2.134	NM31 NM32 NM35 NM36 NM08	2.107C 2.106C 2.133	NM31 NM32 NM35 NM36	15...20	10...16	D,A
Bakar elektrolitni	2.112 2.134	NM08	2.102B 2.133	NM22 NM25	2.113 35° C 2.134 35°	NM12 NM16 NM08	2.106 35° C 2.133 35°	NM32 NM36	10...15	8...12	C

TAP CHOICE

Working piece material	Typical hole types								Rake angle γ	Cutting speed m/min	Coolant
	Recommended tap type cat. no.										
	1	2	1	2	1	2	1	2			
Malleable cast iron	2.112 2.110B	NM02 NM05	2.112 2.102B 2.104B	NM22 NM25 NM27	2.110C 2.113C 15° 35°	NM03 NM06 NM11 NM12 NM15 NM16	2.106C 15° 35°	NM31 NM32 NM35 NM36	6...8	8...10	D,A
Cast iron to 200 HB	2.103C 2.110B	NM02 NM05	2.103C 2.102B	NM22 NM25	2.103C 2.113C 15° 35°	NM11 NM12 NM15 NM16	2.103C 2.106C 35°	NM32 NM36	2...3	8...12	F,G D
Cast iron over 200 HB	2.103C 2.110B	NM02 NM05	2.103C 2.102B	NM22 NM25	2.103C 2.113C 15° 35°	NM11 NM12 NM15 NM16	2.103 2.106 35°	NM32 NM36	0...2	4...8	G
Al - Si alloys to 12% Si	2.112 2.134	NM08	2.105 2.102B 2.104B 2.133	NM22 NM25 NM27	2.113C 35° 15° 2.111C 2.134	NM11 NM12 NM15 NM16 NM07 NM08	2.106C 35° 15° 2.133	NM32 NM36	12...18	12...16	D
Al - Si alloys over 12% Si	2.112 2.110B	NM02 NM05	2.102B 2.105	NM22 NM25	2.113C 35°	NM12 NM16	2.106 35°	NM32 NM36	10...12	10...12	D,C
Brass brittle	2.110C 2.112	NM03 NM06	2.102C 2.103C	NM23 NM26	2.110C 2.103C	NM03 NM06	2.102C 2.103C	NM23 NM26	2...4	6...12	F,A
Brass tough	2.112 2.134	NM08	2.105 2.102B 2.133	NM22 NM25	2.113C 15° 35° 2.134	NM11 NM12 NM15 NM16 NM08	2.106C 35° 2.133	NM32 NM36	4...6	10...16	D,A
Bronze soft	2.112 2.134	NM02 NM05	2.105 2.102B 2.133	NM22 NM25	2.110C 2.113C 15° 2.134	NM03 NM06 NM11 NM15 NM08	2.102C 35° 150 2.133	NM23 NM26 NM31 NM32 NM35 NM36	6...10	8...12	D,A
Bronze hard	2.110B	NM08	2.103C 2.102B	NM22 NM25	2.103C 2.113C	NM11 NM12 NM15 NM16	2.103C 2.106C	NM31 NM32 NM35 NM36	4...8	4...6	A,C
Copper unalloy	2.112 2.134	NM08	2.105 2.102B 2.133	NM22 NM25	2.107C 2.106C 2.134	NM31 NM32 NM35 NM36 NM08	2.107C 2.106C 2.133	NM31 NM32 NM35 NM36	15...20	10...16	D,A
Copper electrolytic	2.112 2.134	NM08	2.102B 2.133	NM22 NM25	2.113 35° C 2.134 35°	NM12 NM16 NM08	2.106 35° C 2.133 35°	NM32 NM36	10...15	8...12	C

IZBOR UREZNIKA

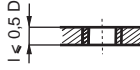
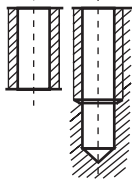

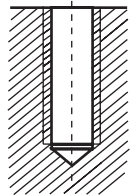
Materijal obratka	Karakteristične vrste rupa								Grudni ugao χ	Brzina rezanja m/min	Hladio
	1	2	1	2	1	2	1	2			
Cink - legure	2.112 2.134	NM08	2.112 2.102B 2.133	NM22 NM25	2.107C 2.113 35° C 2.110C 2.134	NM12 NM16 NM03 NM06 NM08	2.107C 2.106 C 35° 2.133	NM32 NM36	15...20	10...16	D,A
Bakelit	2.111C	NM07	2.104C	NM27	2.111C	NM07	2.104C 2.106 35° C	NM27 NM32 NM36	2...3	6...8	E,F C
Plasti ne mase (meke)	2.111B 2.112	NM08	2.102B	NM22 NM26	2.107C 2.113 35° C	NM12 NM16	2.107C 2.106 35° C	NM32 NM36	10...18	10...16	E

- * A - Ulje za rezanje bez posebnih dodataka
- * B - Ulje za rezanje sa posebnim dodacima za bolje podmazivanje
- * C - Ulje za rezanje visoke aktivnosti, kao i ista masna ulja
- * D - Emulzija za rezanje (1:10...1:15)
- * E - Vazduh pod pritiskom
- * F - Bez podmazivanja
- * G - Petroleum

Broj obrtaja u zavisnosti od brzine rezanja i prečnika navoja

Nazivni \varnothing navoja			Brzina rezanja (m/min)									
M	UNC	R	2	3	4	6	8	10	12	15	20	25
			Brzina obrtaja (o/min)									
3	N°5		212	318	420	636	850	1060	1270	1590	2120	2750
4	N°8		159	239	320	478	638	800	955	1195	1600	2000
5	N°10		122	191	260	382	510	635	764	955	1270	1590
6	1/4		106	159	212	318	425	535	636	800	1070	1335
8	5/16		80	119	160	240	318	400	478	600	800	1000
10	3/8	1/8	64	96	128	190	255	320	382	480	640	800
12	1/2	1/4	53	80	105	158	212	265	318	400	530	665
14	9/16		46	68	90	135	182	230	274	340	460	570
16	5/8	3/8	40	60	80	120	160	200	240	300	400	500
18			35	53	72	106	142	175	212	265	350	430
20	3/4	1/2	32	48	64	96	128	160	190	240	320	400
22	7/8	5/8	29	45	60	88	116	145	174	220	290	365
24			27	40	52	80	106	134	160	200	268	335
26	1"	3/4	24	37	48	74	98	124	146	185	248	310
28	1 1/8		22	35	46	68	90	114	138	170	228	285
30			21	32	44	64	85	106	128	160	212	270
32	1 1/4	1"	19	30	40	60	80	100	120	150	200	250
35	1 3/8		18	27	36	54	72	90	110	135	180	225
40	1 1/2	1 1/4	16	24	32	48	64	80	96	120	160	200
45	1 3/4	1 1/2	14	21	28	42	56	70	85	105	140	175
50	2"		13	19	26	38	50	64	76	95	128	160

TAP CHOICE

Working piece material	Typical hole types								Rake angle γ	Cutting speed m/min	Coolant
											
	Recommended tap type cat. no.										
1	2	1	2	1	2	1	2				
Zinc - alloys	2.112 2.134	NM08	2.112 2.102B 2.133	NM21 NM25	2.107C 2.113 35° C 2.110C 2.134	NM12 NM16 NM03 NM06 NM08	2.107C 2.106 C 35° 2.133	NM32 NM36	15...20	10...16	D,A
Bakelite	2.111C	NM07	2.104C	NM27	2.111C	NM07	2.104C 2.106 35° C	NM27 NM32 NM36	2...3	6...8	E,F C
Plastics (soft)	2.111B 2.112	NM08	2.102B	NM12 NM16	2.107C 2.113 35° C	NM12 NM16	2.107C 2.106 35° C	NM32 NM36	10...18	10...16	E

- * A - Cutting oil without any special additives
- * B - Cutting oil with special additives for better lubrication
- * C - Highly active cutting oil, as pure greasy/fat oils
- * D - Cutting emulsion (1:10...1:15)
- * E - Compressed air
- * F - Without lubrication
- * G - Petroleum

Number of revolutions depending on cutting speed and thread diameter

Nominal \varnothing thread			Cutting speed (m/min)									
M	UNC	R	2	3	4	6	8	10	12	15	20	25
			Revolution speed (rev/min)									
3	N°5		212	318	420	636	850	1060	1270	1590	2120	2750
4	N°8		159	239	320	478	638	800	955	1195	1600	2000
5	N°10		122	191	260	382	510	635	764	955	1270	1590
6	1/4		106	159	212	318	425	535	636	800	1070	1335
8	5/16		80	119	160	240	318	400	478	600	800	1000
10	3/8	1/8	64	96	128	190	255	320	382	480	640	800
12	1/2	1/4	53	80	105	158	212	265	318	400	530	665
14	9/16		46	68	90	135	182	230	274	340	460	570
10	5/8	3/8	40	60	80	120	160	200	240	300	400	500
18			35	53	72	106	142	175	212	265	350	430
20	3/4	1/2	32	48	64	96	128	160	190	240	320	400
22	7/8	5/8	29	45	60	88	116	145	174	220	290	365
24			27	40	52	80	106	134	160	200	268	335
26	1"	3/4	24	37	48	74	98	124	146	185	248	310
28	1 1/8		22	35	46	68	90	114	138	170	228	285
30			21	32	44	64	85	106	128	160	212	270
32	1 1/4	1"	19	30	40	60	80	100	120	150	200	250
35	1 3/8		18	27	36	54	72	90	110	135	180	225
40	1 1/2	1 1/4	16	24	32	48	64	80	96	120	160	200
45	1 3/4	1 1/2	14	21	28	42	56	70	85	105	140	175
50	2"		13	19	26	38	50	64	76	95	128	160

Preporučeni prečnici rupa (spiralne burgije) za navoj

M -navoj	Ø burgije	Mf -navoj	Ø burgije	Mf -navoj	Ø burgije	Mf -navoj	Ø burgije
1,2	0,95	1,4 x 0,25	1,15	10 x 1,25	8,8	18 x 2	16
1,4	1,1	2 x 0,25	1,75	12 x 1,25	10,8	20 x 2	18
1,6	1,25	2,2 x 0,25	1,95	14 x 1,25	12,8	22 x 2	20
1,8	1,45	2,5 x 0,35	2,15				
				12 x 1,5	10,5	24 x 2	22
2	1,6	3 x 0,35	2,65	14 x 1,5	12,5	25 x 2	23
2,2	1,75	3,5 x 0,35	3,15	15 x 1,5	13,5	27 x 2	25
2,5	2,05	4 x 0,5	3,5	16 x 1,5	14,5	28 x 2	26
3	2,5	4,5 x 0,5	4				
				17 x 1,5	15,5	30 x 2	28
3,5	2,9	5 x 0,5	4,5	18 x 1,5	16,5	32 x 2	30
4	3,3	5,5 x 0,5	5	20 x 1,5	18,5	33 x 2	31
4,5	3,7	6 x 0,75	5,2	22 x 1,5	20,5	36 x 2	34
5	4,2	7 x 0,75	6,2				
				24 x 1,5	22,5	39 x 2	37
6	5	8 x 0,75	7,2	25 x 1,5	23,5	40 x 2	38
7	6	9 x 0,75	8,2	26 x 1,5	24,5	42 x 2	40
8	6,8	10 x 0,75	9,2	27 x 1,5	25,5	45 x 2	43
9	7,8	11 x 0,75	10,2				
				28 x 1,5	26,5	48 x 2	46
10	8,5	8 x 1	7	30 x 1,5	28,5	50 x 2	48
11	9,5	9 x 1	8	32 x 1,5	30,5	52 x 2	50
12	10,2	10 x 1	9	33 x 1,5	31,5		
14	12	11 x 1	19			30 x 3	27
				35 x 1,5	33,5	33 x 3	30
16	14	12 x 1	11	36 x 1,5	34,5	36 x 3	33
18	15,5	14 x 1	13	38 x 1,5	36,5	39 x 3	36
20	17,5	15 x 1	14	39 x 1,5	37,5		
22	19,5	16 x 1	15			40 x 3	37
				40 x 1,5	38,5	42 x 3	39
24	21	17 x 1	16	42 x 1,5	40,5	45 x 3	42
27	24	18 x 1	17	45 x 1,5	43,5	48 x 3	45
30	26,5	20 x 1	19	48 x 1,5	46,5		
33	29,5	22 x 1	21			50 x 3	47
				50 x 1,5	48,5	52 x 3	49
36	32	24 x 1	23	52 x 1,5	50,5		
39	35	25 x 1	24			42 x 4	38
42	37,5	27 x 1	26			45 x 4	41
45	40,5	28 x 1	27			48 x 4	44
		30 x 1	29			52 x 4	48

Za M navoj (sa krupnim ili sitnim korakom) prečnik (burgije) rupe d , iznosi: $d_r = d - P$

gdje je : d - nazivni prečnik navoja
 P - korak navoja

Pri tome sljedeća 3 koraka treba zaokružiti: 0,75 na 0,8
 1,25 na 1,2
 1,75 na 1,8

Preporučeni prečnici rupa (spiralne burgije) za navoj

UNC -navoj	Ø burgije	UNF -navoj	Ø burgije	R -navoj	Ø burgije
N° 1-64	1,5	N° 0-80	1,25	1/8	8,8
N° 2-56	1,8	N° 1-72	1,5	1/4	11,8
N° 3-48	2,0	N° 2-64	1,8	3/8	15,25
N° 4-40	2,3	N° 3-56	2,1	1/2	19
N° 5-40	2,6	N° 4-48	2,4	5/8	21
N° 6-32	2,75	N° 5-44	2,65	3/4	24,5
N° 8-32	3,5	N° 6-40	2,9	7/8	28
N° 10-24	3,8	N° 8-36	3,5	1	30,75
N° 12-24	4,5	N° 10-32	4,1	1 1/8	35,5
1/4-20	5,1	N° 12-28	4,6	1 1/4	39,5
5/16-18	6,5	1/4-28	5,5	1 3/8	42
3/8-16	8	5/16-24	6,9	1 1/2	45,4
7/16-14	9,4	3/8-24	8,5	1 3/4	51,3
1/2-13	10,8	7/16-20	9,9	2	57
9/16-12	12,2	1/2-20	11,5	2 1/4	63,3
5/8-11	13,6	9/16-18	12,9	2 1/2	72,8
3/4-10	16,5	5/8-18	14,5	2 3/4	79,1
7/8-9	19,5	3/4-16	17,5	3	85,5
1-8	22,25	7/8-14	20,5	3 1/4	91,5
1 1/8-7	25	1-12	23,25	3 1/2	98
1 1/4-7	28	1 1/8-12	26,5	3 3/4	104,5
1 3/8-6	31	1 1/4-12	29,5	4	110,5
1 1/2-6	34,5	1 3/8-12	33		
1 3/4-5	40	1 1/2-12	36		
2-4,5	45				

Recommended hole diameters (twist drills) for thread

M -thread	Ø drill	Mf -thread	Ø drill	Mf -thread	Ø drill	Mf -thread	Ø drill
1,2	0,95	1,4 x 0,25	1,15	10 x 1,25	8,8	18 x 2	16
1,4	1,1	2 x 0,25	1,75	12 x 1,25	10,8	20 x 2	18
1,6	1,25	2,2 x 0,25	1,95	14 x 1,25	12,8	22 x 2	20
1,8	1,45	2,5 x 0,35	2,15				
				12 x 1,5	10,5	24 x 2	22
2	1,6	3 x 0,35	2,65	14 x 1,5	12,5	25 x 2	23
2,2	1,75	3,5 x 0,35	3,15	15 x 1,5	13,5	27 x 2	25
2,5	2,05	4 x 0,5	3,5	16 x 1,5	14,5	28 x 2	26
3	2,5	4,5 x 0,5	4				
				17 x 1,5	15,5	30 x 2	28
3,5	2,9	5 x 0,5	4,5	18 x 1,5	16,5	32 x 2	30
4	3,3	5,5 x 0,5	5	20 x 1,5	18,5	33 x 2	31
4,5	3,7	6 x 0,75	5,2	27 x 1,5	20,5	36 x 2	34
5	4,2	7 x 0,75	6,2				
				28 x 1,5	22,5	39 x 2	37
6	5	8 x 0,75	7,2	30 x 1,5	23,5	40 x 2	38
7	6	9 x 0,75	8,2	32 x 1,5	24,5	42 x 2	40
8	6,8	10 x 0,75	9,2	33 x 1,5	25,5	45 x 2	43
9	7,8	11 x 0,75	10,2				
				35 x 1,5	26,5	48 x 2	46
10	8,5	8 x 1	7	36 x 1,5	28,5	50 x 2	48
11	9,5	9 x 1	8	38 x 1,5	30,5	52 x 2	50
12	10,2	10 x 1	9	39 x 1,5	31,5		
14	12	11 x 1	19			30 x 3	27
				40 x 1,5	33,5	33 x 3	30
16	14	12 x 1	11	42 x 1,5	34,5	36 x 3	33
18	15,5	14 x 1	13	45 x 1,5	36,5	39 x 3	36
20	17,5	15 x 1	14	48 x 1,5	37,5		
22	19,5	16 x 1	15			40 x 3	37
				17 x 1	38,5	42 x 3	39
24	21	17 x 1	16	18 x 1	40,5	45 x 3	42
27	24	18 x 1	17	20 x 1	43,5	48 x 3	45
30	26,5	20 x 1	19	22 x 1	46,5		
33	29,5	22 x 1	21			50 x 3	47
				50 x 1,5	48,5	52 x 3	49
36	32	24 x 1	23	52 x 1,5	50,5		
39	35	25 x 1	24			42 x 4	38
42	37,5	27 x 1	26			45 x 4	41
45	40,5	28 x 1	27			48 x 4	44
		30 x 1	29			52 x 4	48

For M thread (with fine or coarse pitch) hole (drill) diameter d_i is: $d_i = d - P$

where : d - nominal thread size / diameter
 P - thread pitch

The three pitch sizes should be made round figures as follows: 0,75 to 0,8
 1,25 to 1,2
 1,75 to 1,8

Recommended hole diameters (twist drills) for thread

UNC -thread	Ø drill	UNF -thread	Ø drill	R -thread	Ø drill
Nº 1-64	1,5	Nº 0-80	1,25	1/8	8,8
Nº 2-56	1,8	Nº 1-72	1,5	1/4	11,8
Nº 3-48	2,0	Nº 2-64	1,8	3/8	15,25
Nº 4-40	2,3	Nº 3-56	1,2	1/2	19
Nº 5-40	2,6	Nº 4-48	2,4	5/8	21
Nº 6-32	2,75	Nº 5-44	2,65	3/4	24,5
Nº 8-32	3,5	Nº 6-40	2,9	7/8	28
Nº 10-24	3,8	Nº 8-36	3,5	1	30,75
Nº 12-24	4,5	Nº 10-32	4,1	1 1/8	35,5
1/4-20	5,1	Nº 12-28	4,6	1 1/4	39,5
5/16-18	6,5	1/4-28	5,5	1 3/8	42
3/8-16	8	5/16-24	6,9	1 1/2	45,4
7/16-14	9,4	3/8-24	8,5	1 3/4	51,3
1/2-13	10,8	7/16-20	9,9	2	57
9/16-12	12,2	1/2-20	11,5	2 1/4	63,3
5/8-11	13,6	9/16-18	12,9	2 1/2	72,8
3/4-10	16,5	5/8-18	14,5	2 3/4	79,1
7/8-9	19,5	3/4-16	17,5	3	85,5
1-8	22,25	7/8-14	20,5	3 1/4	91,5
1 1/8-7	25	1-12	23,25	3 1/2	98
1 1/4-7	28	1 1/8-12	26,5	3 3/4	104,5
1 3/8-6	31	1 1/4-12	29,5	4	110,5
1 1/2-6	34,5	1 3/8-12	33		
1 3/4-5	40	1 1/2-12	36		
2-4,5	45				