Sistemi sidrenja - Čavlanje tla
Soil Nailing System

GEO-MATERIAL

ARCO

SAMOBUŠIVA SIDRA
SELF-DRILLING BARS

Metoda koja se najviše koristi za stabilizaciju pokosa, labinih stijenskih pokosa i tunelogradnje je sistem čavlanja tla. Naša saznanja, istraživanja odnosno know-how u termičkoj obradi metala omogućio nam je komercijalizaciju šupljih sidara sa kontinuiranim navojem visoke nosivosti koje omogućiju :

Upoterbu kao samobušiva sidra sa krunom koja ostaje, no sprečava urušavanje bušotina kod perforiranja sipkih materijala.

- Mogučnošću upotrebe matice sa uškom za ukrižavanje čeličnom užadi.
- Injektiranje tiksotropnih mješavina sa mailm vodocemetnim faktorom.
- Injektiranjem monokomponentnih ili dvokomponentnih poliuretanskih ili silikatnih smola.
- Smanjenje troškova skladištenja, jer se sidra mogu skladištiti u maksimalnoj dužini te na gradilištu rezati na potrebnu mjeru.
- Nižom cijenom transporta, zahvaljujući manjoj težini u odnosu na konkurenciju.
- Lakšoj upotrebi na visinama i teško pristupačnim mjestima.
- Najveća ušteda se odnosi na nosivost sidara, te ukupnoj cijeni sistema. Naime, zahvaljujući većoj nosivosti sa manjim promjerom sidara u odnosu na konkurenciju postiže se ogromna razlika u potrošnji injektirane cementne ili epoxi mase, težini sidara, te korištenju lakših (slabijih) visinskih bušilica.

The “rock bolting” system is the most common used for rock mass stabilization, especially in tunneling and mining industry.

Thanks to our long experience in the steel heat treatment, we manufacture and distribute high resistance continuous threaded hollow bars, offering the following advantages:

- They can be used as self-drilling bolts with a disposable bit
- They can support an overhead anchor device
- Injection to pump thixotropic grout mixtures thanks to the continuous closed circuit for high pressure grout
- Injection of bi-component, silicate and polyurethane resins
- Lower stock costs as they can be stocked in the full length and cut on site to get the desired shorter length
- Lower weight, i.e.: lower handling costs and easier setting operations
- Easier handling even in precarious balance conditions
- Smaller diameter bars can be used under same load, due to extraordinary steel mechanical properties, i.e. lower cost of the structure components, such as bars, couplings and bits, easier drilling and setting, reduced mixture quantity and use of smaller rigs.

Sidro / Bar

Spojnica / Coupling

Matica / Nut

Pločica / Plate

Kruna / Bit

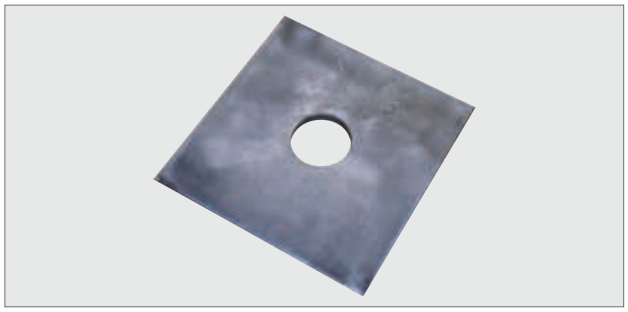
DODACI
ACCESSORIES

Centrator
Steel centralizers

Spojnice sa ili bez graničnika
Couplings with or without middle stop

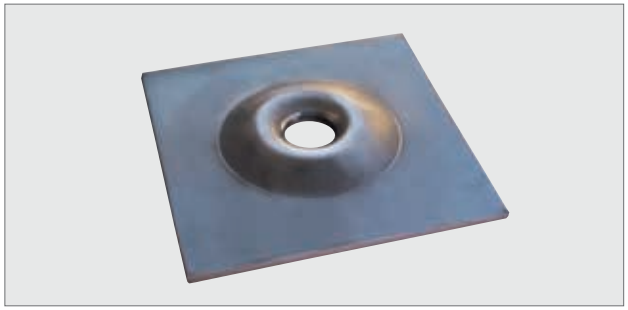
Matice / Matice sa uškom
Nuts and eye bolts

Bušeće glave - krune
All soils and ground drill bits

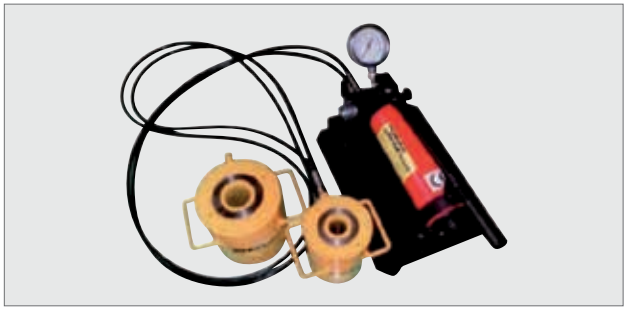


Ravne pločice
Flat plates

Dizne za Jet-Grouting
Jet-Grouting nozzles



Pločice zaobljene
Domed plates



Oprema za prednaprezanje i mjerenje
Tensile testing equipment

ZAŠTITA
PROTECTIONS

Za antikorozivnu zaštitu naša sidra mogu biti:

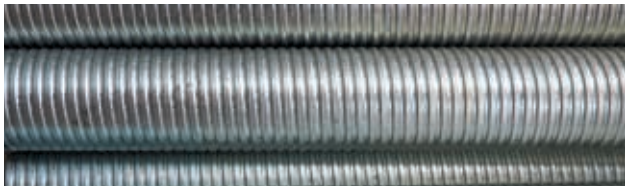
Our self-drilling bars can be:

TOPLO CINČANI
Shodno normi UNI-EN ISO 1461, debljina oko 55 micro-na cinka; maksimalna dužina sidara: 12 m

HOT DIP GALVANIZED
According to UNI-EN ISO 1461 rules, layer of zinc of about 55 microns; max treatable length is 12 m

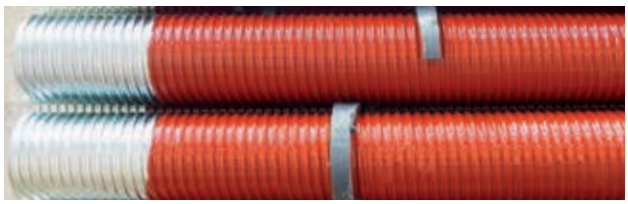
ELEKTO-CINJČANJE
Shodno normi UNI-EN ISO 2081, 4520, 4042, debljne cca 20 micron cinka; maksimalna dužina sidara: 4 m

ELECTRO-GALVANIZED
According to UNI-EN ISO 2081 4520, 4042 rules, layer of zinc of about 20 microns; max treatable length is 4 m



ZAŠTITA EPOXI PREMAZOM
Izvrsna otpornost na habanje te vanjske utjecaje pri-tom zadržavajući veliku flexibilost.

TREATED WITH BICOMPONENT EPOXY COATING
Without red solvents, to ensure excellent resistance to abrasion and chemicals, moderate flexibility



INJEKCIONE GLAVE
FLUSHING HEAD

Injekcione krune „RBS“ realizirane su isključivo za rotacijsko udarno bušenje sa dovodom vode i / ili cementa do maksimalnog radnog tlaka od 120 bar.

Naše krune za injektiranje sastoje se od šupljeg tijela koje ima 4 ventila sa nitrilnom opnom, 4 mazalice i jedim navojnim adapterom od 1''. Plutajuća osovina ima na jednoj strani navoj sidra a na drugoj prihvat stroja.
Periodičko i točno održavanje poboljšava brtvama vijek trajanja, koji se lako može zamijeniti ručno na licu mjesta.

In order to drill with self-drilling anchors by rotation and percussive energy, we manufacture a range of flushing heads called “RBS”, which can bear water/ cement injections up to 120 bar pressure.
Our flushing head consists of a hollow body with 4 nitrile gaskets with tight sealing lips, 4 grease nipples and one 1” threaded adaptor.
The floating shaft, with a bar thread on one end and a suitable machine thread on the other end, rotates inside the body.
A periodic and correct maintenance helps to improve gaskets lifetime, which can easily be replaced manually on site.

Tehničke karakteristike - Standard
Data sheets - standard range

Tipo barra Rod Type		R32			R38		R51		R76				R90		R114	
Debljina Thickness	mm	4,5	5,6	7,2	7,1	8,2	7,1	9,4	6,3	8,0	10,0	12,5	8,0	10,0	8,0	10,0
Sila loma Ultimate load rod	kN	250	300	400	440	600	620	800	850	1100	1300	1600	1250	1550	1650	2050
Sila istezanja $f_{y0,2}$ Yield point $f_{y0,2}$ rod	kN	210	240	320	360	450	500	630	680	850	1050	1300	1000	1250	1350	1650
Prosječni presjek Average cross section	mm^2	370	450	530	680	750	950	1150	1300	1690	2050	2500	1950	2400	2550	3180
Težina Weight	kg/mt	2,92	3,57	4,25	5,50	6,00	7,43	9,38	11,55	13,95	16,65	19,60	16,00	19,50	21,00	25,80
Nominalni diametar Nominal diameter	mm	32			38		51		76				90		114	
Navoj Thread type		Lijevi[1] Left hand			Lijevi[1] Left hand		Lijevi[1] Left hand		Desni[2] Right hand				Desni[2] Right hand		Desni[2] Right hand	
Br. sidara u pakovanju N° rods / bundle	N°	50			50		50		24				19		19	
Dužine Available lengths	mt	1, 2, 3, 4, 6 Mt. Ostale mjere po upitu - other lengths on request														

1. ISO Standard 2. ARCO Standard

Krajnji rubovi sidara su rezani / tokareni na 90° da bi omogućili optimalni prijenos udarnih sila i obrađene na 45° da bi omogućili optimalnu mogućnost spajanja.
Zadržavamo pravo izmjene nacrta, dimenzija i težina pojedinih proizvoda bez predhodne najave.
Rezultati mehaničkih mjerenja , rezultiraju shodno obavljenim testinm probama. Geometrijske mjere su matematičke.

Ends of all bars are lathed by 90° so as to ensure an optimal transmission of the percussive energy and bevelled by 45° to easen the spinning path.
We reserve the right to modify the design, dimensions and weights of our products without prior notice.
The value of the mechanical details derive from mechanical tests. The geometrical values are calculated.

Tehničke karakteristike - Termic
Data sheets - termic range

Tip sidara Rod Type		R32			R38			R51		R76			R90		R114	
Debljina Thickness	mm	4,5	5,2	7,2	5,2	7,1	8,2	7,1	9,4	6,3	8,0	10,0	8,0	10,0	8,0	10,0
Sila loma Ultimate load rod	kN	380	450	580	580	700	820	1000	1200	1400	1800	2200	2100	2500	2800	3450
Sila istezanja $f_{y0,2}$ Yield point $f_{y0,2}$ rod	kN	325	380	460	480	600	650	800	1000	1100	1400	1700	1600	2000	2100	2700
Prosječni presjek Average cross section	mm^2	370	430	530	530	680	750	950	1150	1300	1690	2050	1950	2400	2550	3180
Težina Weight	kg/mt	2,92	3,33	4,25	4,30	5,50	6,00	7,43	9,38	11,57	13,95	16,65	16,00	19,50	21,00	25,80
Nominalni diametar Nominal diameter	mm	32			38			51		76			90		114	
Navoj Thread type		Lijevi[1] Left hand			Lijevi[1] Left hand			Lijevi[1] Left hand		Desni[2] Right hand			Desni[2] Right hand		Desni[2] Right hand	
Br. sidara u pakovanju N° rods / bundle	N°	50			50			50		24			19		19	
Dužine Available lengths	mt	1, 2, 3, 4, 6 Mt. Ostale mjere po upitu - other lengths on request														

1. ISO Standard 2. ARCO Standard

Krajnji rubovi sidara su rezani / tokareni na 90° da bi omogućili optimalni prijenos udarnih sila i obrađene na 45° da bi omogućili optimalnu mogućnost spajanja.
Zadržavamo pravo izmjene nacrta, dimenzija i težina pojedinih proizvoda bez predhodne najave.
Rezultati mehaničkih mjerenja , rezultiraju shodno obavljenim testinm probama. Geometrijske mjere su matematičke.

Ends of all bars are lathed by 90° so as to ensure an optimal transmission of the percussive energy and bevelled by 45° to easen the spinning path.
We reserve the right to modify the design, dimensions and weights of our products without prior notice.
The value of the mechanical details derive from mechanical tests. The geometrical values are calculated.

SIDRA OD VISOKOVRIJEDNOG REBRASTOG ČELIKA SA KONTINUIRANIM NAVOJEM TOPLO VALJANE
CONTINUOUS THREADED HOT ROLLED BARS

Upotreba visokovrijednih čeličnih šipki sa kontinuiranim navojem nudi specifična rješenja za građevinski sektor u geotehničkom području, a osobito: klinove za stijene - sidrenje - mikropilotiranju - konstrukcijskih pojačanja u skladu s normom 14490.

Prednosti su mnoge, a posebno:

- Jednostavna ugradnja u teškim uvjetima rada
- Svestranost: kontinuirani navoj omogućuje prilagodbu duljine sidara prema potrebama gradilišta
- Optimalno prijanjanje sidara na cementni mort / smole koje se koriste za sidrenje

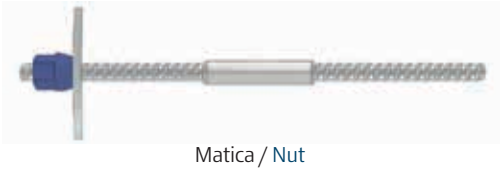
The use of highly resistant steel bars with thread offers specific solutions to the building sector in the geotechnical field, in particular: rock bolts - anchoring - micropiles - structural reinforcement in compliance with norm 14490.

The advantages are several, in particular:

- Easy installation in heavy duty conditions
- Versatility: the continuous thread allows the adaptation of the bar length according to the construction site needs
- Optimal gripping to the cement mortar / resin used for anchoring

Sidro / Bar

Spojnica / Coupling



Matica / Nut

Pločica / Plate

Tehničke karakteristike
Data Sheets

ČELIK - STEEL 500/550 N/mm²		L20S	L25S	L28S	L32S	L40S	L50S	L63,5S
Sila loma - Ultimate load ft	kN	175	270	340	440	690	1080	2215
Sila izduženja - Yield point fy 0,2	kN	160	245	310	405	630	980	1760
Diametar min/max - Min/max diameter	mm	20/23	25/29	28/32	32/36	40/45	50/56	63,5/70
Prosječni presjek - Average section	mm²	314	491	616	804	1.256	1.963	3.167
Teotretska težina - Theoretical weight	kg/mt	2,52	3,88	4,85	6,33	9,91	15,41	24,90
Lom R - Tensile Strength R	N/mm²	550						700
Izduženje Reh - Yield Stress Reh	N/mm²	500						550
Navoj - Thread type		Lijevi - Left hand thread						

ČELIK - STEEL 670/800 N/mm²		L20M	L25M	L28M	L32M	L40M	L50M	L63,6M
Sila loma - Ultimate load ft	kN	250	390	490	640	1010	1570	2540
Sila izduženja - Yield point fy 0,2	kN	210	330	410	540	845	1315	2120
Diametar min/max - Min/max diameter	mm	20/23	25/29	28/32	32/36	40/45	50/56	63,5/70
Prosječni presjek - Average section	mm²	314	491	616	804	1.260	1.963	3.167
Teotretska težina - Theoretical weight	kg/mt	2,52	3,88	4,85	6,33	9,91	15,41	24,90
Lom R - Tensile Strength R	N/mm²	800						
Izduženje Reh - Yield Stress Reh	N/mm²	670						
Navoj - Thread type		Lijevi - Left hand thread						

ČELIK - STEEL 900/1100 N/mm²		L20T	L25T	L28T	L32T	L40T	L50T	L63,5T
Sila loma - Ultimate load ft	kN	340	540	670	880	1380	2160	3480
Sila izduženja - Yield point fy 0,2	kN	280	440	550	720	1130	1770	2850
Diametar min/max - Min/max diameter	mm	20/23	25/29	28/32	32/36	40/45	50/56	63,5/70
Prosječni presjek - Average section	mm²	314	491	616	804	1.260	1.963	3.167
Teotretska težina - Theoretical weight	kg/mt	2,52	3,88	4,85	6,33	9,91	15,41	24,90
Lom R - Tensile Strength R	N/mm²	1100						
Izduženje Reh - Yield Stress Reh	N/mm²	900						
Navoj - Thread type		Lijevi - Left hand thread						

Zadržavamo pravo izmjene nacrta, dimenzija i težina pojedinih proizvoda bez predhodne najave.
We reserve the right to modify the design, dimensions and weights of our products without prior notice.

SIDRA OD VISOKOVRIJEDNOG REBRASTOG ČELIKA SA KONTINUIRANIM NAVOJEM TOPLO VALJANE SA DVOSTRUKOM ZAŠTITOM- PREINJEKTIRANI
PRE-INJECTED CONTINUOUS THREADED HOT ROLLED BARS

Pasivna sidra CTB (Sidra sa kontinuiranim navojem) su sidra sa dvostrukom zaštitom od korozije.

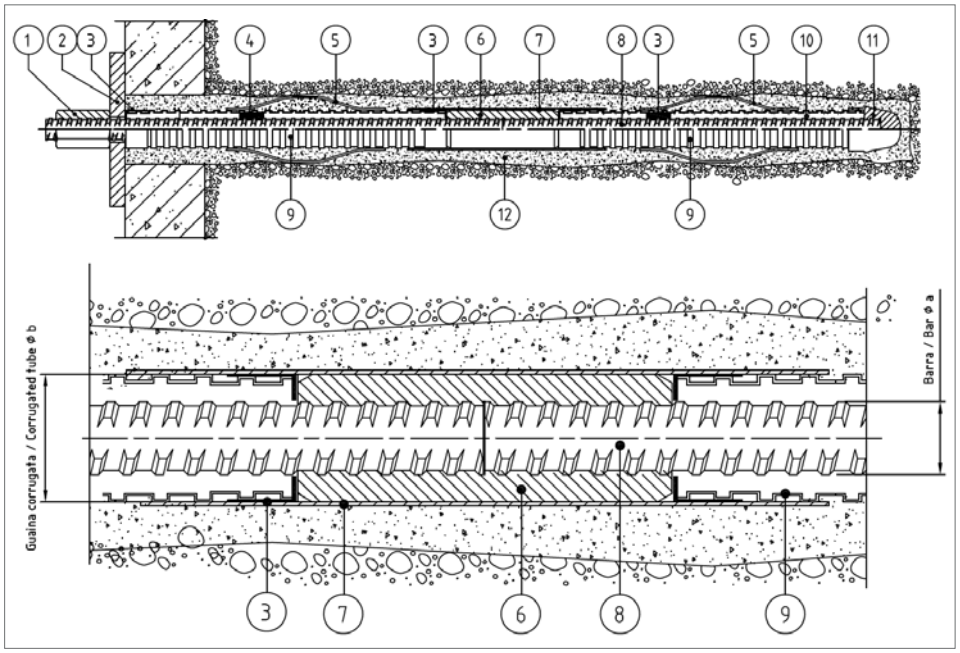
Cijeli je proces proizvodnje odvija se u našim pogonima, a se sastoji od:

- Sidra sa kontinuiranim navojem, birajući među širokom rasponu naših proizvoda,
- HDPE valovitog omotača odgovarajućeg promjera,rebrastog kako bi se omogućio optimalni prijenos vlačnih sila na injektirani mort, a zatim na tlo.
- Pre-ubrizgavanje cementnog morta odgovarajuće smjese

CTB (Continuous Threaded Bars) soil nailing is a double corrosion protection anchor made with controlled crack width.

The entire production process, fulfilled in our production site, consists of:

- A continuous threaded bar, chosen among our wide range of steel grades and diameters
- A corrugated sheath made of HDPE, having an appropriate diameter and adequate grooves and shoulders over the full length, so to transfer the pile load into the underground by the exterior cement grout, then to the soil
- The gap between the bar and the sheath is pre-injected with a grout mixture



Shema za sidro sa dvojnom zaštitom od korozije shodno normi EN 1537
Scheme for passive bar with double protection against corrosion according to EN 1537:

1. Matica
   Hexagonal nut
2. Pločica
   Plate
3. Tampon zaštite navoja
   Thread cover plug
4. Untarnji graničnik
   Internal spacer
5. Vanjski graničnik
   Outer spacer
6. Spojnica
   Coupling
7. Tremička zaštita
   Shrunk-on hose
8. Sidro sa kontinuianim navojem
   Continuous threaded bar
9. HDPE cijev
   Corrugated tube in HDPE
10. Injeciona masa-tvornički prefabricirana
    Cement mortar pre-injected c/o factory
11. Termo navlaka
    Thermo-shrinking cap
12. Injekciona masa
    Grouted mixture

SN-ŠTAPNA SIDRA
SN-ANCHORS

SIDERENE ŠIPKE
ANCHORS

Vrsta čelika Steel quality		B500—Grade C—EN 10080		
Diametar Diameter	mm	25	32	40
Izduženje Yield load, steel	MPa	> 500	> 500	> 500
Lom Ultimate load, steel	MPa	> 550	> 550	> 550
Težina* Bolt weight*	kg/mt	3,85	6,31	10
Dužina Bolt length		Po upitu On request		
Navoj 100mm-150mm Thread at one end x100mm		M24	M33	M42

*bez pločice i matice *without plate and nut

HEKSAGONALNA MATICA KLASE 8 ISO METRIČKI NAVOJ
HEXAGONAL NUT CLASS 8 ISO METRIC THREAD

Vrsta čelika Steel quality		UNI 3740—ISO 898-2		
Dimenzije Dimensions	mm	36x19	50x26	65x34
Navoj Thread		3,0	3,5	4,5
Težina Weight	kg	0,11	0,29	0,65

PLOČICA
PLATE

Vrsta čelika Steel quality		S355JR—EN 10025-2		
Diametar matice Bolt diameter	mm	25	32	40
Dimenzije Dimensions	mm	200x200x15	200x200x15	200x200x15
Oblik Shape		ravna flat	ravna flat	ravna flat
Diametar centralne rupe Central hole diameter	mm	28	35	43
Težina Weight	kg	4,8	4,8	4,8
Opcije Optional		Prilagođena rupa za injekcionu cijev hole for injection tube		

Štapna SN sidra koriste se u cijelom svijetu u građevinarstvu i rudarstvu.

Najraširenije je sidro od rebraste armature sa metričkim navojem na jednoj strani.

Za ugradnju i injektiranje mogu se koristiti cementni mortovi i smole.

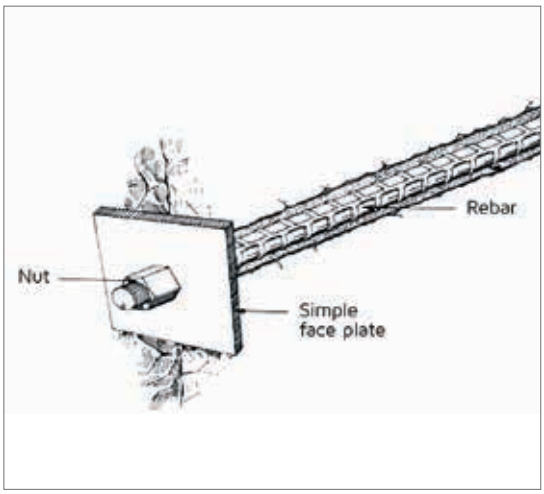
Za primjene koje zahtijevaju vertikalno umetanje sidara, poželjno je korištenje smola koje pružaju trenutačno skrućivanje (npr. tunelogradnja).

Grouted rockbolts have been commonly used worldwide in mining and civil engineering applications.

The most commonly used grouted rockbolt is the fully grouted rebar or threaded bar made of steel.

Cement or resin are used as grouting agent.

For the application where the rockbolt has to be vertically inserted, it is advisable to use the resins that grant an immediate curing (i.e. mining roof).



GEO-MATERIAL

GEOLSA

Ciserano (BG) via Torino 3
tel. +39 035 48 10 112
fax +39 035 41 91 766
info@geolsa.com
www.geolsa.com

GEO-MATERIAL d.o.o.

M.Barača 19, 51000 Rijeka, Hrvatska
Tel. +385 51 688 270 Fax. +385 51 262 721
Area manager +385 99 317 6558
info@geo-material.com
www.geo-material.com