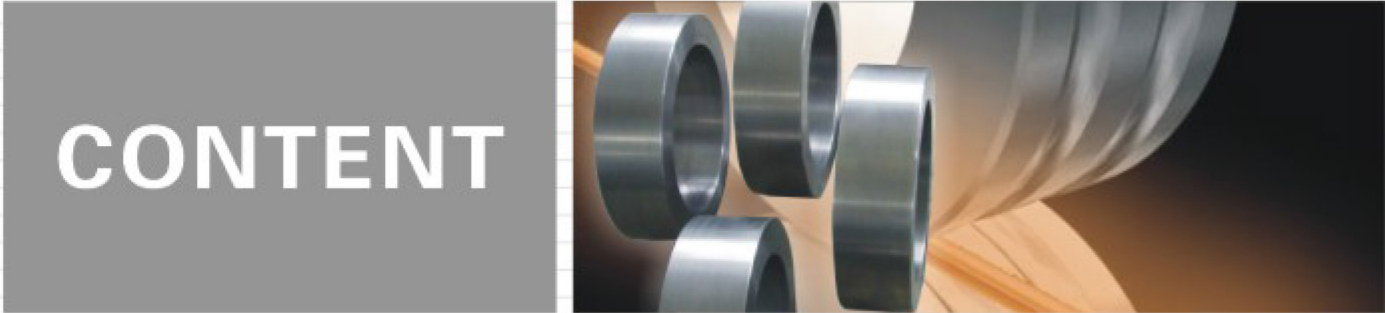


Our products go global from here





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» Cemented carbide roll-rings for high-speed wire rod mill

Cemented carbide roll-rings used on high-speed-wire rod mill we produced has excellent wear resistance, high impact resistance and good anti-fatigue toughness. They are distinguished from conventional carbide rolls by the following characteristics;

- ★ Suitable for high speed wire rolling speed higher than 100m/s, without problems such as cracks, broken and peeling-off.
- ★ Suitable for the high-speed wire rolling of both common carbon steel and alloyed steels.
- ★ Longer service life time, Less downtime and regrinding.
- ★ Suitable for high speed, low temperature rolling process.

» Grades and properties

The materials of ZY and ZY-A serials are able to satisfy customers' different requirements.

The ZY serial grade contain acid corrosion-proof metal elements Ni and Cr in the binder, so that they are suitable for the cooling water of both that $\text{PH} \geq 7.2$ and $\text{PH} < 7.2$.

According to the customers' special requirements and actual working condition, we can offer ZY-A grades, and also develop the special grades for extra use. The grades of ZY-A serials have the properties of high hardness, good toughness and excellent thermal crack resistance, and are suitable for the use in the large force condition, but the cooling water should be alkaline with $\text{PH} \geq 7.2$.

Grades	Binder (wt.%)	WC Grain-Size	Physical Properties			Mechanical Properties		
			*Density 20°C g/cm ³	Thermal Conductivity W/(m·K)	Average Thermal Expansion Coefficient 10 ⁻⁶ /K	*Hardness 20°C (HRA)	*Transverse Rupture Strength TRS 20°C Mpa	Compressive Strength ≥ Mpa
ZY27T	30	Extra-Coarse	12.73	60	5.8~7.0	79.0	2560	2700
ZY27	30	Medium-Coarse	12.65	60	5.8~7.0	79.0	2626	2800
ZY26	27.5	Medium-Coarse	12.85	65	5.6~6.8	79.8	2653	2800
ZY28T	25	Extra-Coarse	13.00	70	5.5~6.5	80.3	2750	2800
ZY28	25	Medium-Coarse	13.04	70	5.5~6.5	80.8	2625	3000
ZY29	22	Coarse	13.36	70	5.5~6.5	81.8	2840	3000
ZY30	20	Coarse	13.48	80	5.2~6.0	82.3	2742	3200
ZY31	18	Coarse	13.68	90	5.0~5.8	83.3	2802	3200
ZY32	16	Coarse	13.77	90	5.0~5.8	83.8	2872	3200
ZY32C	17.5	Coarse	13.66	90	5.0~5.8	84.5	2856	3100
ZY33	15	Coarse	13.98	100	5.0~5.8	84.5	2872	3200
ZY34	13	Coarse	14.17	100	4.8~5.6	85.5	2875	3400
ZY35	10	Coarse	14.43	100	4.8~5.6	86.5	2753	3500
ZY36	8	Extra-Coarse	14.69	110	4.5~5.4	86.8	2406	4000
ZY37	6	Extra-Coarse	14.87	110	4.5~5.4	87.5	2358	4100
ZY27A	30	Medium-Coarse	12.70	60	5.8~7.0	79.5	2780	2900
ZY28A	25	Medium-Coarse	13.15	70	5.5~6.5	81.2	2675	3000
ZY29A	22	Coarse	13.38	70	5.5~6.5	82.2	2750	3000
ZY30A	20	Coarse	13.50	80	5.2~6.0	84.0	2586	3100
ZY31A	18	Coarse	13.65	90	5.0~5.8	84.0	2806	3100
ZY33A	15	Coarse	13.92	90	5.0~5.8	85.5	2790	3200
ZY35A	10	Coarse	14.45	100	4.8~5.6	86.8	2456	3500
ZY36A	8	Extra-Coarse	14.69	110	4.8~5.6	87.0	2460	4000
ZY37A	6	Extra-Coarse	14.87	110	4.5~5.5	88.0	2386	4100

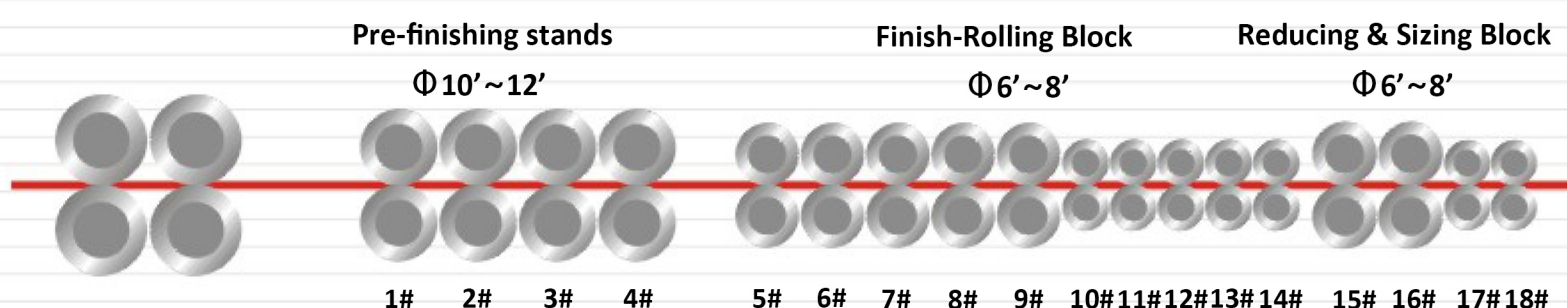
typical value

» Recommended applications

Grades	Recommended applications
ZY37 ZY37A	High hardness and thermal conductivity, best wear resistance and good thermal fatigue and shock resistance Used in the last two stands of high-speed finish-rolling block and sizing stands.
ZY36 ZY36A	High hardness excellent wear resistance, good impact resistance Used in the last two stands of high-speed finish-rolling block and sizing stands.
ZY35 ZY35A	High hardness excellent wear resistance, good impact resistance Used in the last two stands of high-speed finish-rolling block or sizing stands.
ZY34 ZY34A	High hardness good wear and impact resistance Used in the last two stands of high-speed finish-rolling block or sizing stands.
ZY33 ZY33A	Moderate wear resistance and impact resistance, good for general purpose use Used in the rear stands of high-speed wire rod mill.
ZY32	Moderate wear resistance and impact resistance, good for general purpose use Used in the rear stands of high-speed wire rod mill.
ZY32C	Moderate wear resistance and impact resistance, good for general purpose use Used in the finish rolling stands of high-speed wire rod mill.
ZY31 ZY31A	Good wear resistance and better impact resistance Used in the front stands of high-speed wire rod mill. Also used in the rear stands of the finish rolling under unstable operation.
ZY30 ZY30A	Moderate toughness and thermal cracking resistance Used in the first and second or reducing stands of finish rolling. Also used in the front stands of the finish rolling under unstable operation.
ZY29 ZY29A	Good toughness and thermal cracking resistance Used in the first and second or reducing stands of finish rolling. And also used for rolling rebar.
ZY28 ZY28A	Good toughness and thermal cracking resistance Used in the pre-finish rolling stands and also for rolling rebar.
ZY26	Good toughness and thermal cracking resistance Used in the pre-finish rolling stands and also for rolling rebar.
ZY27 ZY27A	Excellent toughness and impact resistance, good thermal cracking resistance Used in the pre-finish rolling stands and also for rolling rebar.
ZY27T	Best toughness and impact resistance Used in the finish rolling stands of wire rod mill and bar mill for rolling deformed bar and rebar Also used in the intermediate stands of high speed wire rod mill.

» Recommended grades for each stand

Is must be correctly selected according to the actual work condition. We will recommend the proper grades to our customers after detailed studying all of the rolling parameters provided by them, such as equipment type, stability, rolling load, cooling condition, processing temperature and steel grades etc.. Generally, the grade of high binder content with good strength and toughness should be chosen when the mill aggregate shocked heavy and the pressing down amount is very big, contrary, the grade of low binder content with high hardness and good wear resistance should be chosen when the mill aggregate is working stably with small pressing down amount in high rolling speed.



Grades	Pre-finishing stands				Finish-Rolling Block										Reducing & Sizing Block			
	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#	16#	17#	18#
ZY27 / ZY27A	■	■	■	■														
ZY26	▲	▲	▲	▲														
ZY28 / ZY28A	●	●	●	●														
ZY29 / ZY29A					■	■	■	■										
ZY30 / ZY30A					▲	▲	▲	▲							■	■		
ZY31 / ZY31A					●	●	●	●							▲	▲		
ZY32									■	■	■	■			●	●		
ZY33 / ZY33A									▲	▲	▲	▲	■	■				
ZY34 / ZY34A									●	●	●	●	▲	▲				
ZY35 / ZY35A													●	●			■	■
ZY36 / ZY36A																	▲	▲
ZY37 / ZY37A																	●	●

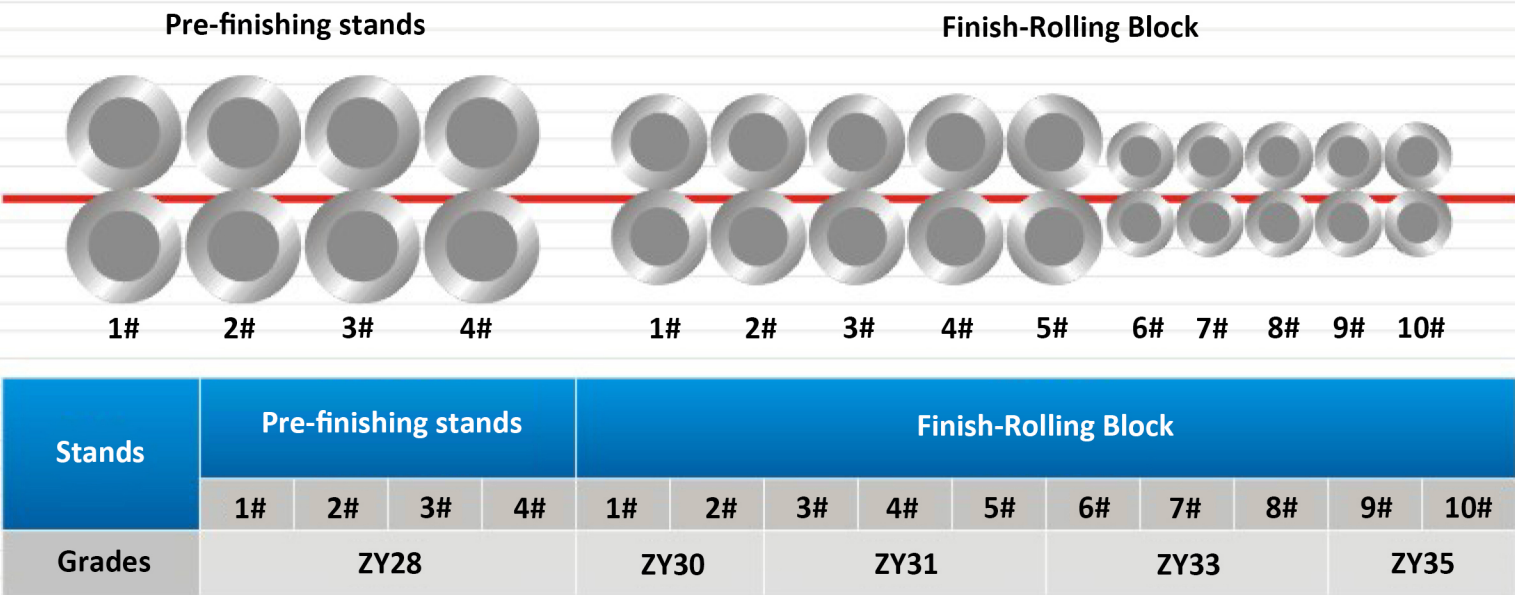
Note: Recommended when work condition is good .
 Recommended when work condition is comparatively good.
 Recommended when work condition is bad.

>>

Examples

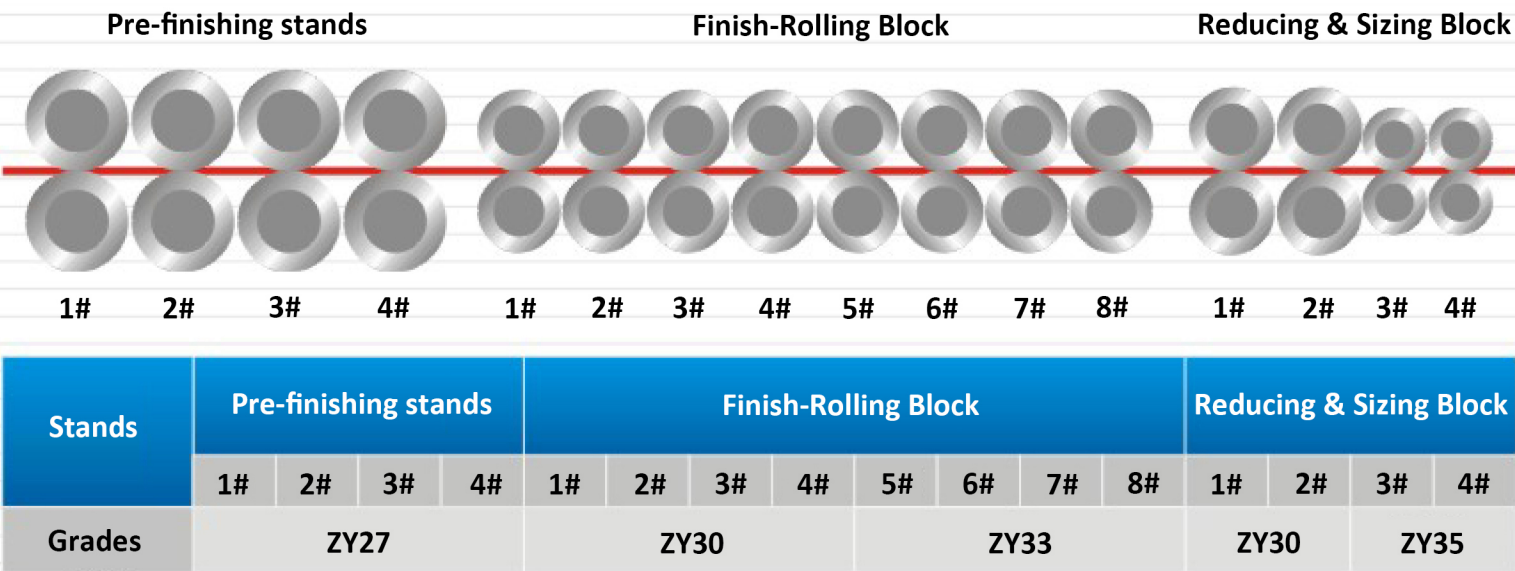
★

The finishing mill is a domestically-produced imitation of Morgan's fifth-generation rolling mill. The pre-finishing and finishing mills are arranged in a 4+10 configuration, with a final rolling speed of 90~105 m/s. The primary rolled steel grade is plain carbon steel, and the final rolling temperature ranges from 1000~1100°C. The configuration of hard alloy roll ring grades is as follows:

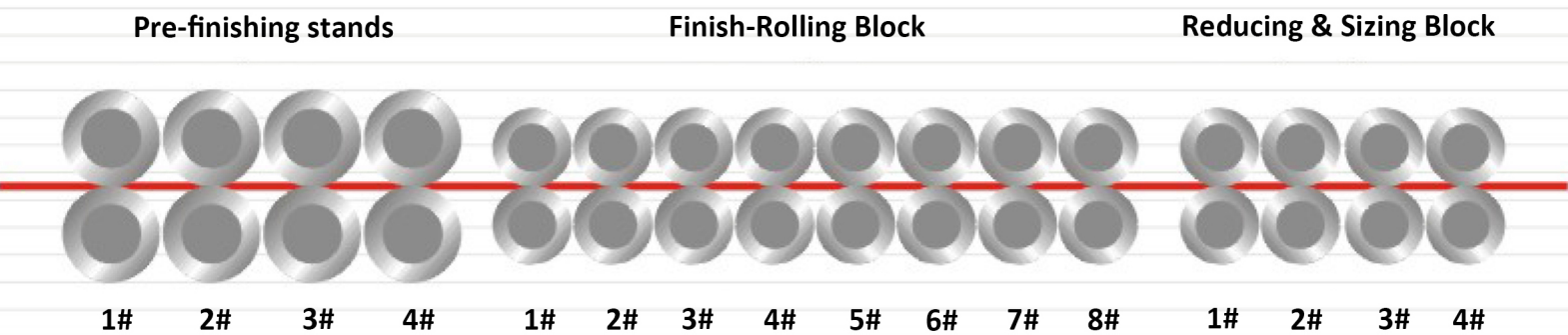


★

The finishing mill is an imported Morgan rolling mill. The pre-finishing and finishing mills are arranged in a 4+8+4 configuration, with a final rolling speed of 105~120 m/s. The primary rolled steel grades are specialty steels, and the configuration of hard alloy roll ring grades is as follows:

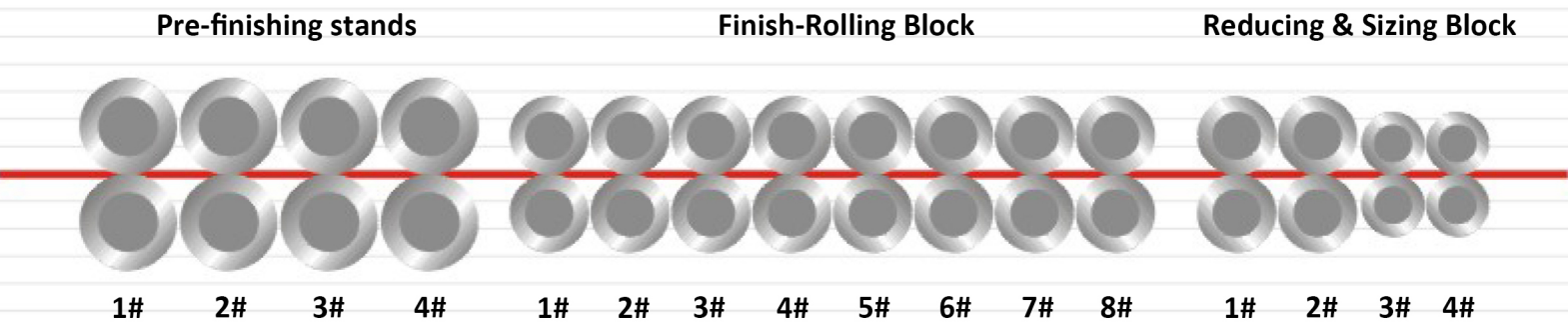


★ The finishing mill is an imported Danieli rolling mill. The pre-finishing and finishing mills are arranged in a 4+8+4 configuration, with a final rolling speed of 105~120 m/s. The primary rolled steel grade is high-carbon wire rod steel, and the final rolling temperature ranges from 800~850°C. The configuration of hard alloy roll ring grades is as follows:



Stands	Pre-finishing stands				Finish-Rolling Block								Reducing & Sizing Block			
	1#	2#	3#	4#	1#	2#	3#	4#	5#	6#	7#	8#	1#	2#	3#	4#
Grades	ZY27				ZY30				ZY33				ZY32		ZY36	

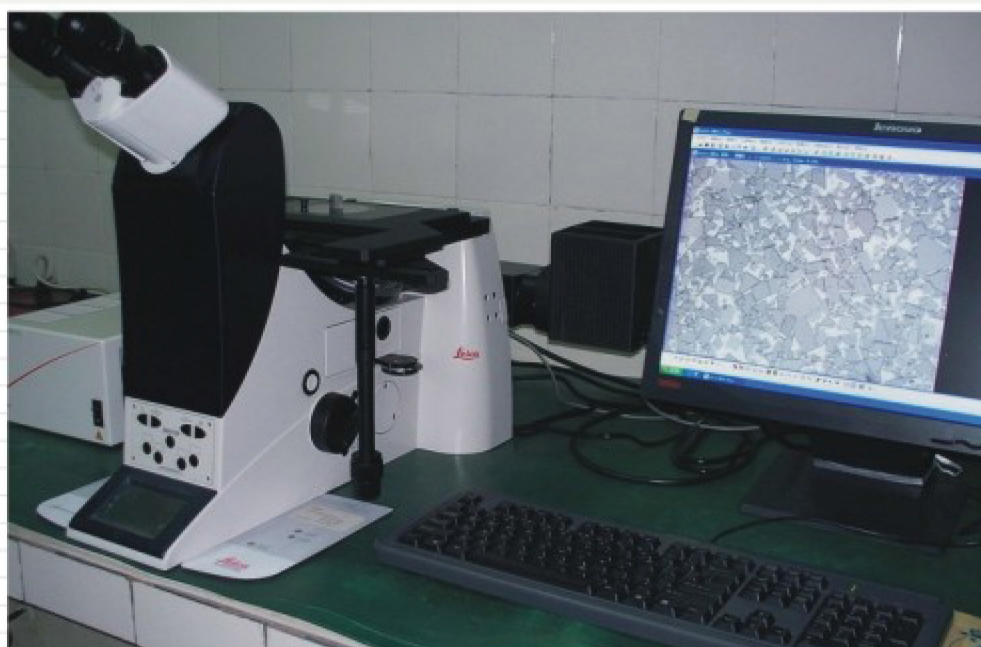
★ The finishing mill is an imported Danieli rolling mill. The pre-finishing and finishing mills are arranged in a 4+8+4 configuration, with a final rolling speed of 105~120 m/s. The primary rolled steel grade is stainless steel, and the configuration of hard alloy roll ring grades is as follows:



Stands	Pre-finishing stands				Finish-Rolling Block								Reducing & Sizing Block			
	1#	2#	3#	4#	1#	2#	3#	4#	5#	6#	7#	8#	1#	2#	3#	4#
Grades	ZY27A				ZY29A		ZY31A		ZY33A		ZY32A		ZY35A			



Optics projection apparatus



Microscope for microstructure analyzing



C-S analyzing system



Magnetic saturation analyzing system

Advanced R&D

Precision manufacturing

Strict quality inspection

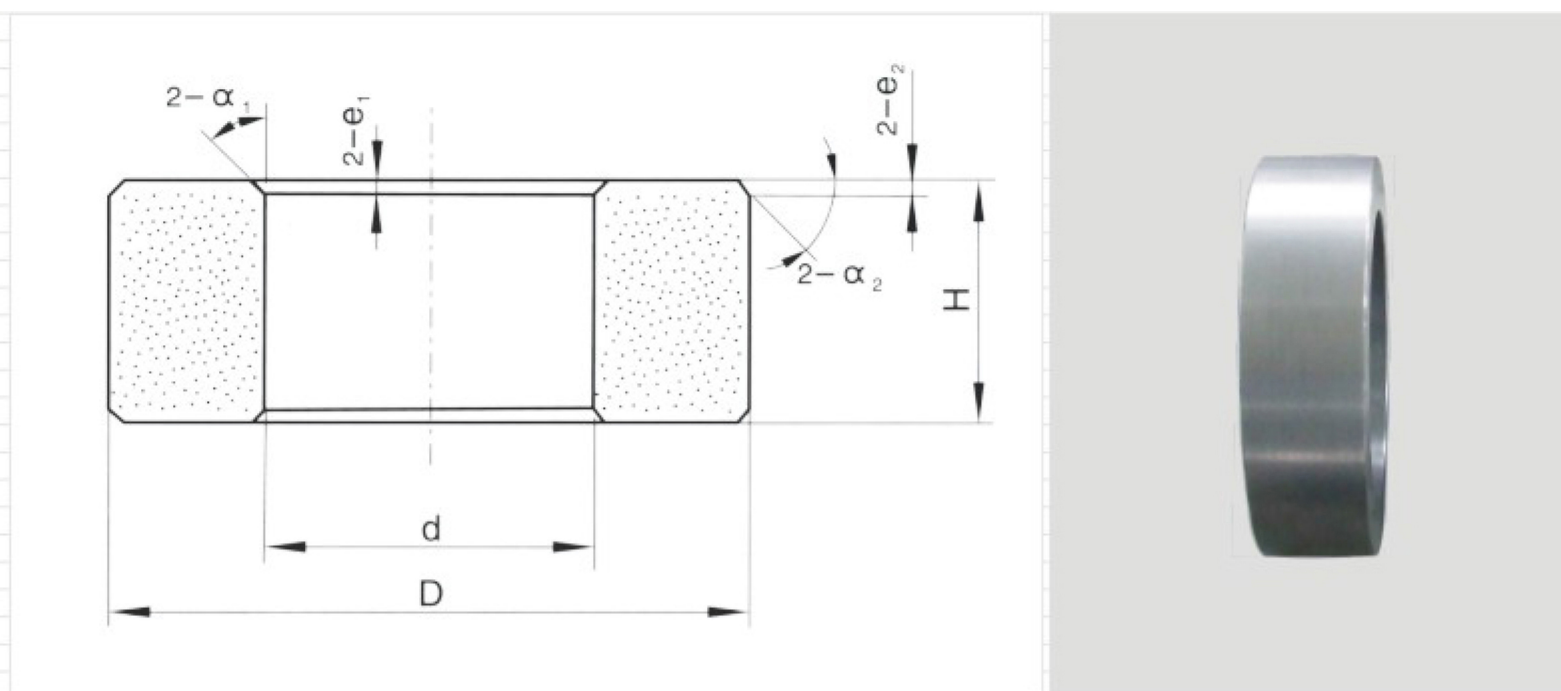


S-3000N (SEM)

» Specification for finish groud roll-rings

◆ Dimensions and accuracy of finished roll rings

Dimensions tolerance of O.D.I.D.and height according to specifications in 《Table of dimensions and accuracy of finished rolls》 or as required by contract.



◆ Dimension range of finished roll rings

Outside diameter (OD)	inside diameter (ID)	Height (H)
140~500mm	80~300mm	10~250mm

◆ Tolerance permitted for od, id and height of finished roll rings

Accuracy Class	Class I	Class II	Class III	Class IV	
Outside diameter	±0.02	±0.05	±0.10	±0.15	Special request
inside diameter	+IT 5	+IT 6	+IT 7	+IT 8	
Height	±0.015	±0.050	±0.100	±0.250	

Note: Specialized products can be manufactured as per the drawing supplied by customers.

◆ Permitted deviations of finished roll rings

Items	Outside $D \leq 200\text{mm}$	Outside $D > 200\text{mm}$
Coaxiality	$\leq 0.02\text{mm}$	$\leq 0.03\text{mm}$
End facerun -out	$\leq 0.01\text{mm}$	$\leq 0.015\text{mm}$
End face parallelism	$\leq 0.01\text{mm}$	$\leq 0.015\text{mm}$
End face flatness	$\leq 0.01\text{mm}$	$\leq 0.01\text{mm}$
Cylindriaty and roundness of inner hole	$0.006 \sim 0.008\text{mm}$	$0.008 \sim 0.01\text{mm}$

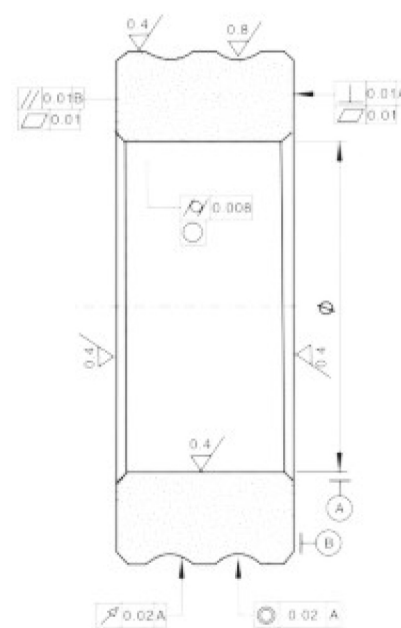
◆ Roughness of finished roll rings

Roughness of inner hole $\leq 0.4\mu\text{m}$

Roughness of outer circle $\leq 0.4\mu\text{m}$

Roughness of end face $\leq 0.4\mu\text{m}$

Roughness of groove face $\leq 0.80\mu\text{m}$



Schematic of Permitted Deviation of Shape and Position



» How to use

Hard alloy roll rings are critical components used in rolling mills, composed of tungsten carbide (WC), cobalt (Co), nickel (Ni), and trace rare metal elements. They exhibit exceptional properties such as high strength, high hardness, wear resistance, and thermal fatigue resistance. To fully leverage the advantages of hard alloy roll rings during rolling, the following considerations must be noted in the rational selection of material grades, usage, and maintenance of the roll rings:



◆ Selection of the grades

When using hard alloy roll rings, the groove profiles, rolling speeds, reduction rates, and stress conditions vary across different mill stands. Therefore, the selection of hard alloy roll ring grades must be based on a holistic consideration of equipment specifications, rolling processes, and the steel grades being rolled (refer to the previously introduced grades).

◆ Installation of roll-rings

1.Pre-installation checks:

- ★ Inspect and verify the dimensional accuracy of the roll rings according to the process design specifications.
- ★ Examine the assembly condition of the taper sleeves and roll shafts.
- ★ Thoroughly clean the mating surfaces of the roll rings, taper sleeves, and roll shafts using alcohol or acetone.

2.Installation requirements:

- ★ Ensure a proper fit between the roll rings, roll shafts, and taper sleeves, avoiding excessive tightness or looseness.
- ★ Excessive tightness: During rolling, temperature increases may subject the roll rings to high tensile stress. Slight fluctuations in rolling force can induce radial cracks, leading to ring fracture.
- ★ Excessive looseness: Relative sliding between components may cause wear or scoring on contact surfaces, potentially damaging taper sleeves, roll shafts, or causing ring fragmentation.

3.Additional requirements:

- ★ To avoid compromising dynamic balance due to density variations, use roll rings from the same manufacturer and grade within the same mill stand.
- ★ Prohibit the use of roll rings with significant defects (e.g., cracks, chips).

◆ Cooling of roll-rings

Roll rings experience localized contact with hot steel at their grooves during operation. Without adequate cooling or with ineffective cooling, the overall temperature, peak temperature, and temperature gradient of the roll rings will rapidly increase. Combined with cyclic stress from thermal shock (repeated heating-cooling cycles), the groove surface becomes prone to networked thermal fatigue cracks. As these cracks propagate, they can cause alloy spalling or even catastrophic ring fragmentation.

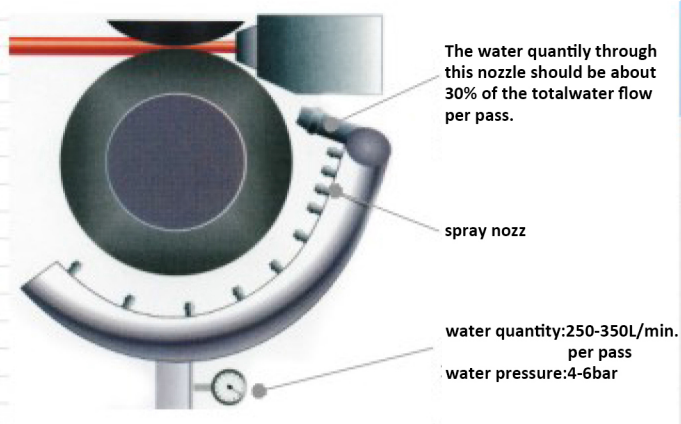
To prevent ring failure, reduce thermal corrosion at high temperatures, delay crack growth, and extend groove lifespan, roll rings must be cooled to maintain their surface temperature below 50°C.

Cooling water pressure:0.4–0.6 MPa (typical range for high-speed wire rod finishing mills).

Minimum water flow rate:250–300 L/min per stand (optimal flow rates vary by application; refer to the table below).

Cooling water spray angle and nozzle layout: (as illustrated in the diagram).

◆ Recommended design for water cooling



Stands		Water flow quantity (L/min.pass)
Pre-finishing Mill		480~500
Finishing Mill	1~2#	480~500
	3~4#	400~450
	5~8#	300~350
	9~10#	250~300
Reducing and Sizing Mill (RSM)		200~250

The cooling water quality

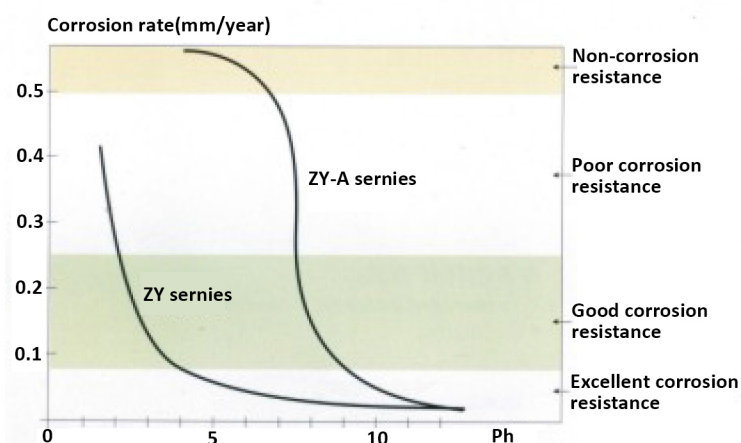
The quality of cooling water includes three factors as below;

★ The PH value of cooling water: The PH value of cooling water has a large influence of the corrosion on the roll-rings. When the PH < 7.2, the corrosion of cobalt could be dramatically increased, therefore, Co+Ni+Cr based ZY series grades should be selected.

★ Solid particles content in cooling water. The solid particles in cooling water acts as an abrasive during rolling. Therefore sedimentation and purification of cooling water are required to reduce solid particle content to less than 15mg/L.

★ Cooling effect. Water temperature should be controlled no higher than 35°C to ensure the cooling effect.

◆ Corrosion resistance of cemented-carbide-roll grades



◆ Rolling rate and dressing of roll rings

When the thermal micro-crack extends to certain depth, generally 0.2~0.4mm, the roll needs to be dressed. Normally, the feed rate during routine dressing should be controlled to 0.02~0.03mm/round. The rolling rate is related to the kind of rolling steel, rolling process and rolling condition, It is suggested that for rolling common carbon steels as below;

- ★ Pre-finishing stands: 4000~6000 tons
- ★ Finishing stands No.1~4: 2500~4000 tons
- ★ Finishing stands No.5~8: 1500~2500 tons
- ★ Finishing stands No.9~10: 800~2000 tons
- ★ RSM: 800~2000 tons

And it is recommended that:

For roll-rings used in the last 1~2 stands of the finishing mill: 0.4~0.8mm;

For roll-rings used in the other 8 stands of the finishing mill: 0.6~1.2mm;

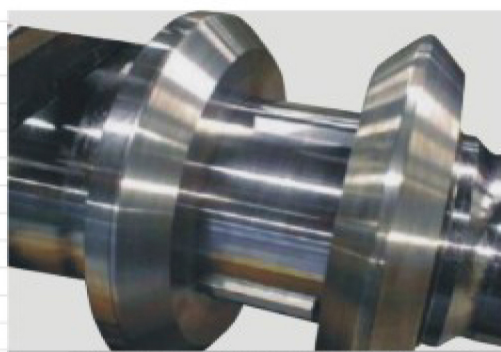
For roll-rings used in the pre-finishing mill: 1.2~2.0mm;

◆ Storage of roll rings

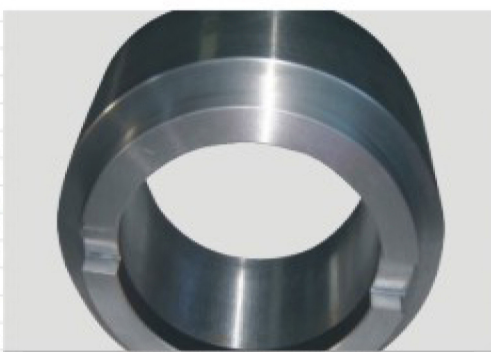
Cemented carbide roll-rings are fragile products and tend to crack easily. Therefore, it should be handled carefully to prevent them from damage.

» Composite rolls and combine roll-rings for bar mill

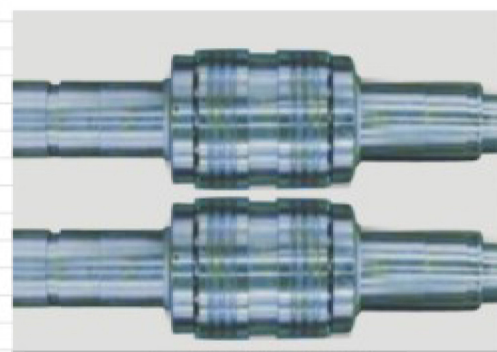
Composite cemented carbide rolls and roll rings are mainly used for high speed wire rolling mill aggregate in the interim stands and for 250,300,350,400 profile steel rolling mill in the middle and final stands. The lifetime is 20~30times longer than common cast iron roll for hot rolling steel wire, rebar, round steel rod, narrow strip steel and angle steel with better product quality and dimension precision. Simple tuning process can be employed to machine the slots in the carbide roll, using CBN or PCD insert. Grades available are as follows.



Combine roll for profile mill

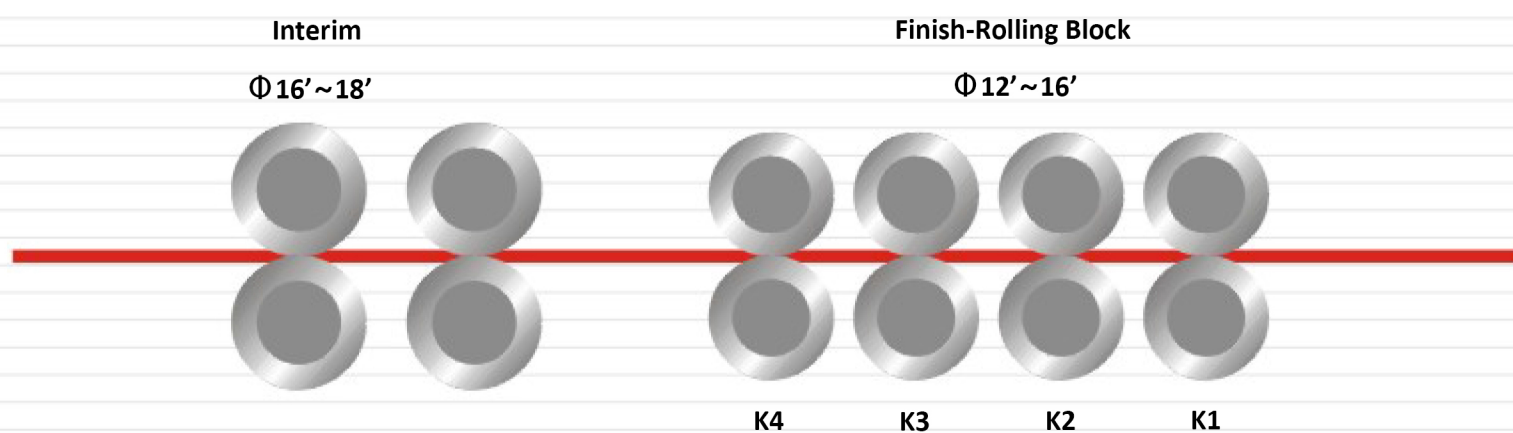


Composite roll for strip steel rolling



Combine roll for bar mill

» Recommended grades selection



Items	K4	K3	K2	K1
Forrolling rebar	ZY27T	ZY27T	ZY27T / ZY28T	ZY27T
Forrolling bar steel	ZY27T	ZY27T	ZY27T / ZY28T	ZY27T / ZY28T
Forrolling profilesteel	ZY27T	ZY27T	ZY27T / ZY28T	ZY27T / ZY28T

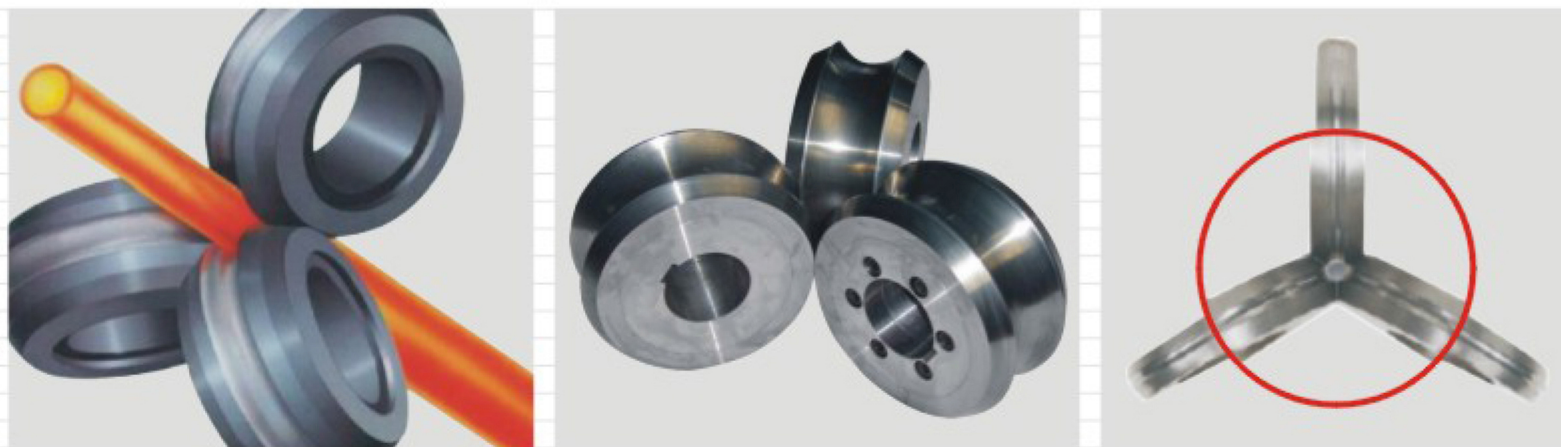
» Grades properties

Grades	Binder (wt%)	WC grain size	Physical properties			Mechanical properties			
			Density g/cm	Thermal Conductivity W/(m.K)	Average Thermal Expansion Coefficient 10 ⁻⁶ /K	Hardness 20°C (HRA)	TRS 20°C Mpa	Compressive strength ≥ Mpa	Fracture toughness K _{IC} Mpa.m ^{1/2}
ZY27T	30	Extra-Coarse	12.73	60	5.8~7.0	79.0	2560	2700	28.2
ZY28T	25	Extra-Coarse	13.00	70	5.5~6.5	80.3	2750	2800	24.3

typical value

» 3d-carbide rolls for kocks mill

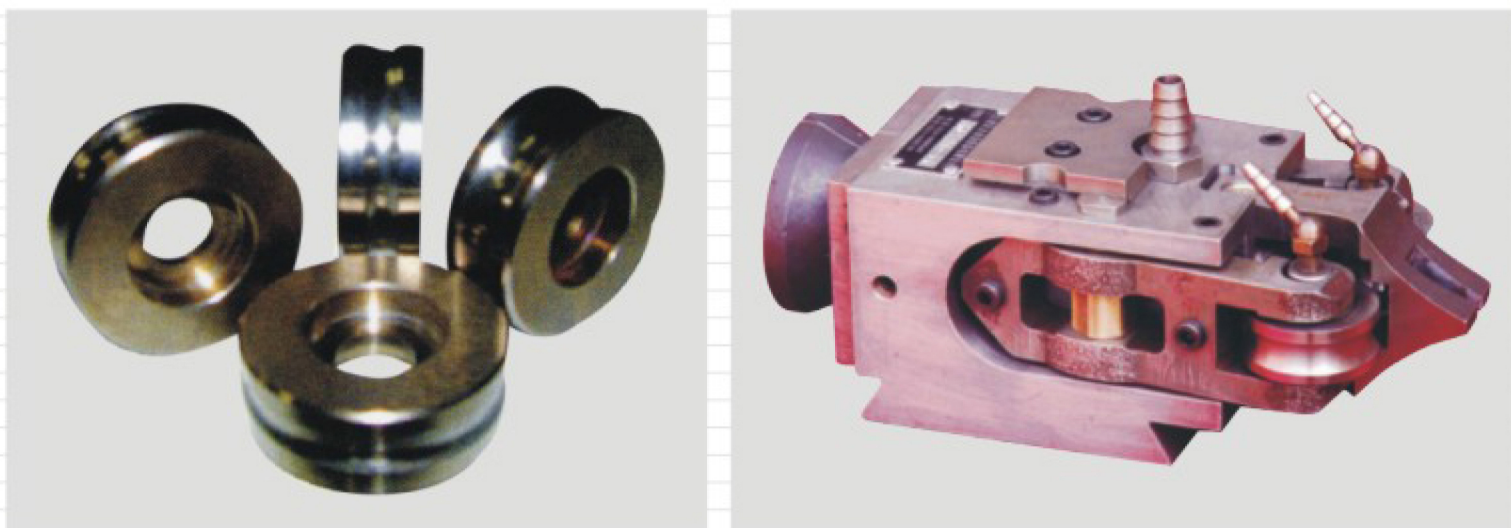
The 3D carbide rolls use in the KOCKS style MILL for rolling bar and seamless-tube we produce features high precision of groove, less downtime and long service time. We are also able to provide solid carbide rolls or cemented-steel combined rolls according to the customers' requirements. Grades available are as follows;



Grades	Binder (wt%)	WC grain size	Physical properties			Mechanical properties		
			Density g/cm	Thermal Conductivity W/(m.K)	Average Thermal Expansion Coefficient 10 ⁻⁶ /K	Hardness 20°C (HRA)	TRS 20°C Mpa	Compressive strength ≥ Mpa
ZY27T	30	Extra-Coarse	12.73	60	5.8~7.0	79.0	2560	2700
ZY28T	25	Extra-Coarse	13.00	70	5.5~6.5	80.3	2750	2800
ZY30	20	Coarse	13.48	80	5.2~6.0	82.3	2742	3200

typical value

» TiC-based cermet guide roller (new)



» Grades and properties

Grades	Density g/cm ³	Hardness (HRA)	TRS(B sample) Mpa	E modulus KN/mm ²	Average Thermal Coefficient 10 ⁻⁶ /K
ZYT05	6.50	87.0	1830	380	6.0
ZYT10	8.06	86.8	1750	380	6.0
ZYT40	6.48	85.3	1987	360	6.2

typical value

» Features

- ★ Lighter than WC-Co roll, Better acceleration, good for increasing the life time of bearings.
- ★ Better wear resistance than alloy steel, with a service life 20~50 times that of the latter.
- ★ Superior high temperature corrosion resistance , not easily tend to crack.
- ★ Non-magnetic, high chemical stability at high temperature, no affinity to steel. Not easy to be adhered by metal scraps.
- ★ Excellent wear resistance, Can be repeatedly used after dressing, low cost per ton steel.
- ★ Less mill down time by utilized together with high productivity with cemented carbide rolls.

» Applications

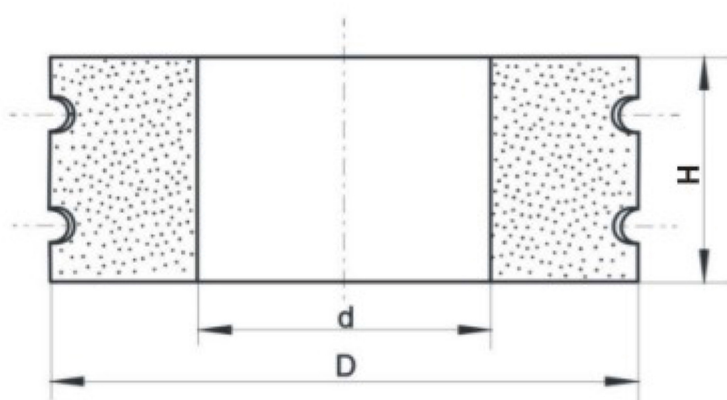
Guide roller is a main wear part on the wire rod and bar rolling mill. It may be utilized with cemented carbide rolls, to ensure the steel to move smoothly into the grooves of the rolls to avoid winding and swing of the steel.

» Cemented carbide roll-rings for cold rolling

Our company is a key enterprise engaged in manufacturing all kinds of rolls for cold rolling.All rolls feature:

- 1.Improved-mechanical properties;
- 2.Good surface finish and corrosion-resistance;
- 3.Longer tool life and possible to 600-ton rebar, suitable for repeated use.

» Cold rolling plate for continuous rolling mills



Type	Name	Dimension		
		D	d	H
GL180.*K1	Two-groove rolls	180	110	55
GL180.*K2	Two-groove carved rolls	180	110	55

Rolled product range: $\Phi 8 \sim \Phi 12$ reinforced bars

Type example: GL180.10K2 represents a $\Phi 180$ two -groove carved roll for rolling $\Phi 10$ reinforced bars.

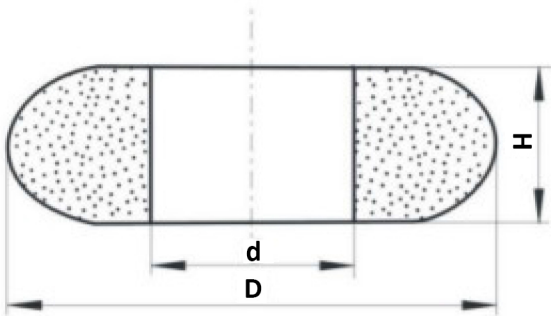
*Represents the diameter of rolled reinforced bars.

» Forming roller

Rolled productrange: $\Phi 4\sim\Phi 10$ cold rolled twisted rebars.

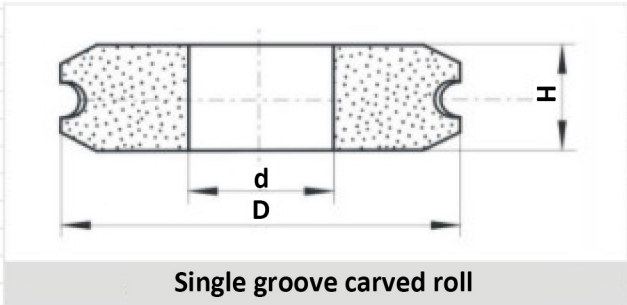
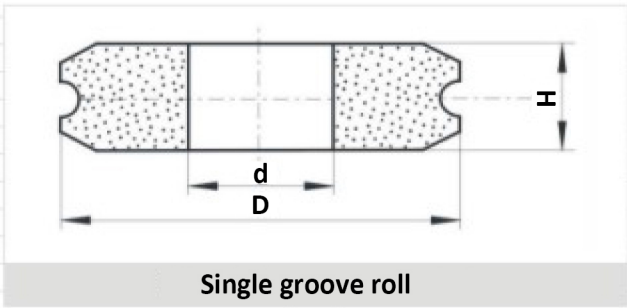
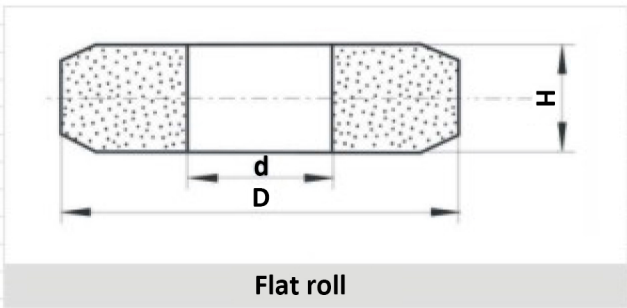
Type example: GL160.082

Shows a $\Phi 162$ 2# forming roller for rolling of $\Phi 8$ cold twisted steel.



Type	Name	Dimension		
		D	d	H
GL160.***	Two-groove roll	160	105	20

» Cold rolling plate for continuous rolling mills



Type	Name	Dimension		
		D	d	H
GL130.*K5 GL145.*K5 GL150.*K5	Flat roll	130 145 150	82 95 96	16 15 16
GL130.*K3 GL145.*K3 GL150.*K3	Single groove roll	130 145 150	82 95 96	16 15 16
GL130.*K6 GL145.*K6 GL150.*K6	Single groove carved roll	130 145 150	82 95 96	16 15 16

Polled product range: $\Phi 4\sim\Phi 8$ reinforced bars.

Type example: GL145.4K3

Shows a $\Phi 145$ 3" stand single groove roll for rolling $\Phi 4$ reinforced bars.

Note: non-standard rolls are available upon request.

» Inspection, marking and packing of finished rolls

Inspection as specified by Q/62071126-8 108.1-2011;

Marking: brand, specification, type and date of production are engraved on one of the surface by laser or mark as customer's required.

Grade, specifications, weight, shape of groove and customer's name are indicated on the wooden package.

» How to order

- ★ Pls. read this manual carefully to learn the recommended scope of application before ordering;
- ★ Pls. fill in contract according to the requirements when ordering;
- ★ If you have any special requirements, pls. contact our Sales Service Dept.or Technical Dept. for help;
- ★ The specifications is subject to change without notice.