



CARBIDE ROLL

How to find us

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● **A Name to Count On** >>>

As a high-quality Carbide Rolls supplier, EUROLOY working together with reputable well-known worldwide steel and iron manufacturers to optimize the use of Carbide Rolls in their high-speed rolling mills. Based upon our deep understanding of high-speed milling industry & carbide material, through perfect roll material selection & non-stop service spirit, we are now having a very good market share in more than 20 countries in Middle East, East Asia, South America & North America, Europe and enjoying almost a 100% repeated order ratio.

EUROLOY is fully committed to servicing your every need, every step of your growth. we provide tailor made solutions to our valuable and esteemed end users.



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02

Main grades of carbide rolls

Grade	Chemical Composition %	Hardness (HRA)	Density (g/cm ³)	Transverse Rupture Strength (N/mm ²)	Compressive Strength (N/mm ²)
	Co				
EZ060C	6	88.5	14.91	2620	3700
EZ080C	8	87.8	14.71	2870	3500
EZ150C	15	84.8	13.99	2870	3300
EZ200C	20	83.6	13.55	2840	3100
EH200C	20	83	13.60	2600	3300
EZ260C	26	82.1	13.03	2700	3000
EZ300C	30	80.8	12.72	2730	3000
	Co+Ni+Cr				
EZ150M	15	84.2	13.98	2900	3200
EZ200M	20	81.7	13.52	2720	3000
EZ260M	26	79.5	13.01	2630	2800
EZ300M	30	79.1	12.71	2630	2600
EH300M	30	79	12.70	2500	2800

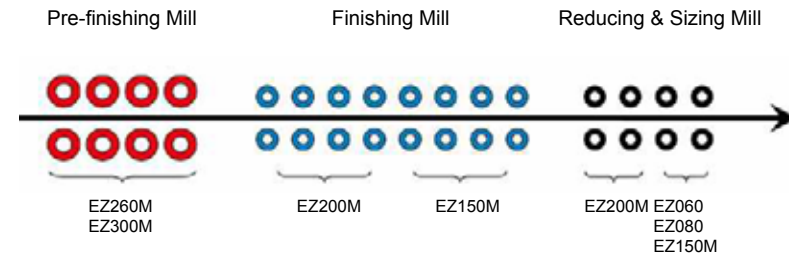
Note: The above property data are typical.

Popular sizes of carbide rolls

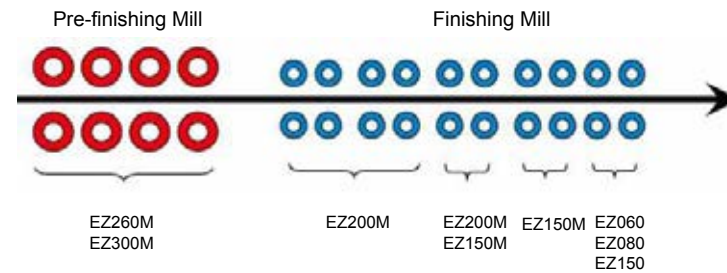
O. D.	I. D.	Thickness
145 - 450	87 - 280	62 - 210

Recommended applications of carbide roll grades

1. Rolling mills with reducing & sizing mill



2. Rolling mills without reducing & sizing mill



3. The grades EZ260M and EZ300M are also for hot rolling rebars

Carbide rolls for hot rolling of seamless tubes

The lifetime of carbide roll is 50-80 times that of conventional cast iron roll when they are used at tension tube reducing machines for hot rolling of seamless tubes, and the surface quality and dimensional precision is substantially improved.

Based on the conditions of tension tube reducing machines (rolling force, speed, tube diameter), either integrated or composite rolls can be workable.

Suggested carbide grades are EZ260M an EZ300M.



Titanium carbide guide roller



Grade	Chemical Composition	Mechanical Properties		
		Hardness HRA	Transverse Rupture Strength MPa	Density g/cm ³
EZT35	Fe+TiC	86.5	1450	6.43

RECOMMENDATION



Carbide Roll material grades must be correctly recommended according to customers' actual working condition. EUROLOY can recommend the proper grades to customers after the detailed studying all of the rolling parameters provided by them, such as equipment type, stability, rolling load, cooling condition, rolling temperature and steel grades etc.. Generally speaking, the grades 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. On the contrary, the grades 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.



COMPOSITE ROLL

ON-LINE CONTROL



- After the Carbide Roll installed on production line, one should check cooling water pipe and position of the Roll and then connect the incoming hose to dedicated pipe. The hose connector must be fixed tightly after connecting to prevent the Rolls in a state of no cooling water due to the connector off and cause serious consequences (Roll shell destruction).
- The water cooling for Carbide Roll is a very important method in the process of usage, the better of cooling condition, and the higher of the rolling Tonnage is, otherwise the groove is easy to be cracked. So, check the cooling water before rolling operation; in rolling process, each production team should check the location of the dedicated water pipe, the blocking of pipe nozzle every 4 hours, and then start the rolling operation.
- It suggests that the water pipe of the rolling mill is connected from the control cooling water pipe and install water pressure gauge and pressure alarm device to ensure the water flow, water quality and water pressure of the Roll, the mill should be stopped immediately in case of alarm, and started after the water pressure is adjusted to normal level. The operator should ensure the water pressure of dedicated cooling water pipe of finishing stands within the scope of 4 to 6 bar. If it was exceeded this scope, the operator should adjust the water pressure to the above scope according to the requirements.
- In the process of rolling, one should pay close attention to the running condition of the bearing housing, and stop the machine for maintenance once an abnormal condition is found.
- In shifting of duty, the operator should carefully inspect the wear condition of rolling grooves for slight cracks, in case of the above situation, please report it to the control center and quality supervisor, and then replace the groove after confirmation.
- In the process of rolling, the roll gap adjustment shall not be zero clearance, that is to say, sticking to the Roll while rolling is not accepted.
- If there is abnormal product found in sample room, one should stop the machine immediately for inspection. In case of several phenomena such as screw loosening, slight cracks on the groove, etc., the groove and roll should be replaced then.
- If there are anomalies found on roll product surface (such as surface marks on steel products surface due to slight cracks of the groove), the groove or roll should be replaced timely.
- The axial fracture of Carbide Roll caused by overheat of the bearing should be avoided in the process of rolling.
- During the usage of Carbide Roll, in case of water-break and water pipe offset, the machine should be stopped immediately, so as not to cause burning loss, cracks, and chip off, etc. of the groove.
- The rolling Tonnage of single groove should be determined according to the actual situation (reasonable rolling Tonnage is varies with the different working conditions), and the machine should be operated in accordance with the rated capacity strictly, and excessive rolling is strictly prohibited, so as to avoid causing cracks on the Roll.
- In case of steel blocked or piled up, the cooling on Roll should be continued, and raise the Roll up quickly as well, after the temperature of the rolled steel piece decreased, one can cut off the water supply for processing.
- If the Roll was operated for a period of time under the condition of no cooling water due to the accident, one should stop the machine immediately and unload the Roll and chill it naturally. The Roll can only be put into use again after cooling or grinding. Attention: The Roll would be cracked if one pouring the cooling water directly on the Roll.

◆ HOW TO USE

▶ Selection of Grades

Choose the appropriate Grades for different stands according to the work condition, such as rolling process, rolling speed, rolling loads, rolled products type & size, cooling conditions etc.

▶ Installation

Steel-Case mounting and assembly of Carbide Roll should be strictly operated according to the precision required by the design process. Proper fitting is needed for the Carbide Roll, Mandrel and Conical Sleeves, which cannot be over tight or loose. When it is too tight, the Carbide Rolls are in a tensile state and more fluctuation of rolling force will make the Carbide Rolls broken. When it is too loose, it causes leads the Carbide Rolls, Mandrel and Conical Sleeves to slide relatively during rolling, which scratches Conical Sleeves and Mandrel so resulting in cracks. Before running the mill, make a check if the assembling faces of the Conical Sleeves and Mandrel needed to be cleaned. It is forbidden to knock at the Carbide Rolls with a hammer or other hard materials when running the mill.

▶ Cooling

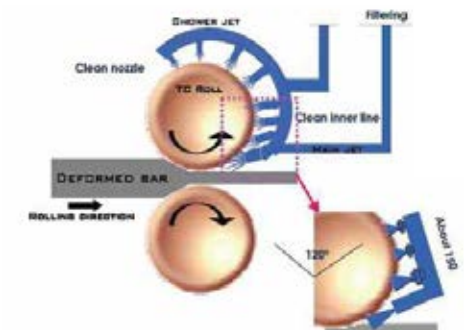
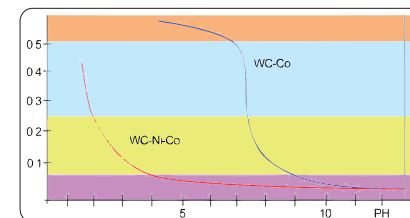
Cooling must be effectively to prevent thermal fatigue crack and to prolong the service life. 4-6bar Cooling Water Pressure is recommended for finishing stands, and a minimum flow of 250~300L/min per groove (and it is best to satisfy the requirement in the table below) is required to ensure the temperature of the Carbide Rolls surface less than 50°C.

Stands		Cooling Water Flow L/min.Groove
Pre-finishing		480~500
Finishing	1~2#	480~500
	3~4#	400~450
	5~8#	300~350
	9~10#	250~300
Reducing & Sizing		200~250

◆ COOLING WATER

- The PH Value of Cooling Water, has a large influence of the corrosion on the Carbide Rolls. When the PH value <7.2, the corrosion of cobalt could be dramatically increased. Therefore, Co+Ni+Cr based GMR series grades should be selected.
- Solid Particles Content in Cooling Water, acts as an abrasive during rolling process. Thus 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 rate (mm/Year)



◆ **DEFINITION**

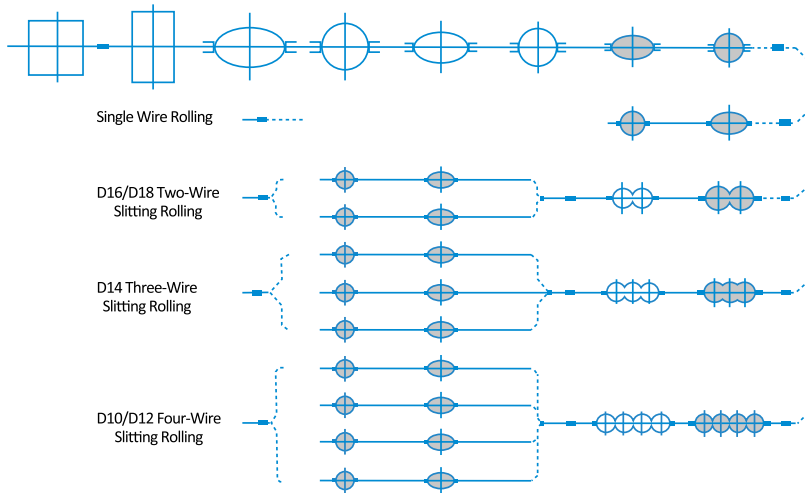
The Composite Roll is the Carbide Roll compounded or integrated with the matching steel shaft in a special way, which is used to produce Round Bar, Rebar, Square Steel, Flat Steel, Angle Steel and other Section Bars.

◆ **APPLICATION**

Composite Roll is applied to Traditional Bar Mill & Coil Bar Mill, and the Intermediate Stands of high speed Wire Rod mill with a rolling speed of 2~50m/s.

▶ **Traditional Bar Mill**

For Intermediate, Pre-slitting and Finishing stands.



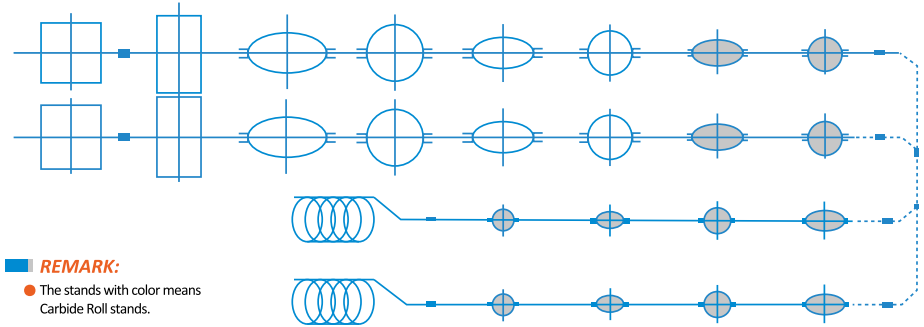
■ **REMARK:**

● The stands with color means Carbide Roll stands.

◆ **APPLICATION**

▶ **Coil Rod Mill**

Finishing & Intermediate Stands of Coil Rod mill.



■ **REMARK:**

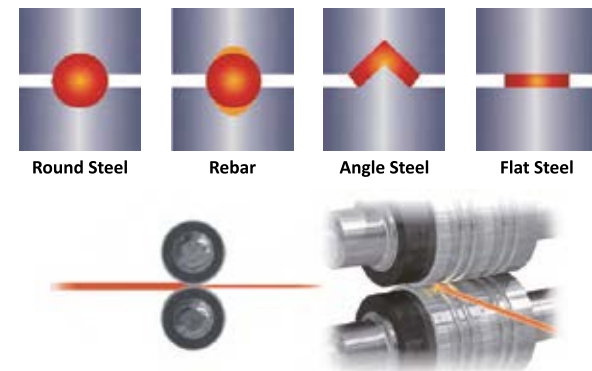
● The stands with color means Carbide Roll stands.

▶ **High-Speed Wire Rod Mill**

It is applied to the intermediate stands of high speed wire rod mill.

▶ **Small Profile Steel Mill**

Pre-finishing Stands and Finishing Stands for Angle Steel, Square Steel and Flat Steel.



◆ TONNAGE & DRESSING

When the thermal micro-crack extends to certain depth, generally 0.2~0.4mm, the Carbide Rolls need to be Dressed. Normally the feed rate during routine Dressing should be controlled to 0.02~0.03mm/round. The rolling Tonnage is related to the kind of rolling steel, rolling process and rolling condition. Tonnage for common carbon steel is suggested as below:

- Pre-finishing Stands: 4000~6000 tons
- Finishing Stands 5~8#: 1500~2500 tons
- Reducing & Sizing Stands: 800~2000 tons
- Recommended Dressing rate:
 - In the last 1~2 stands of Finishing Mill: 0.4~0.8mm
 - In the Pre-finishing Mill: 1.2~2.0mm
- Finishing Stands 1~4#: 2500~4000 tons
- Finishing Stands 9~10#: 800~2000 tons
- In the other 8 stands of the Finishing Mill: 0.6~1.2mm

◆ STORAGE

Carbide Rolls are fragile and tend to crack easily. It is forbidden for the Carbide Rolls to impact each other (or with other hard materials) during the transportation & storage process. Carbide Rolls should be stored into solid wooden package.

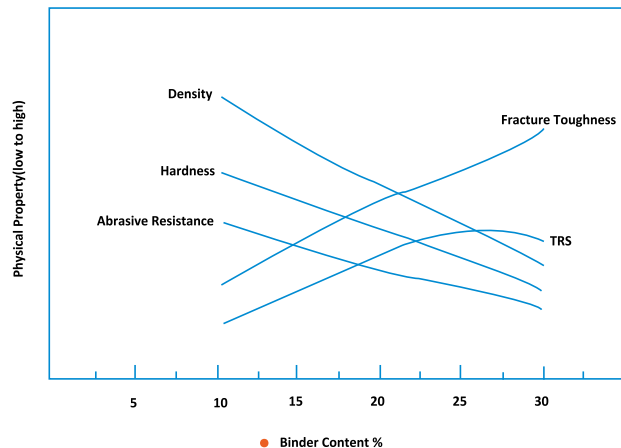
◆ ADVANTAGES

- Promote the quality of steel product, the quality of products surface and tolerance received thoroughly improved, and negative deviation control is very accurate.
- Reduce the changing frequency of grooves and Roll and downtime, thus alleviate the labor intensity of the staff in rolling workshop, and improve the utilization rate of rolling mill and production, so the mill can create greater economic benefits at the same period.
- To improve the finished product rate;
- The per ton steel cost is lower that is an efficient path of cost decreasing and benefit increasing for the producer

◆ GRADE

The main components of the carbide are tungsten carbide particles and metal binder (often as cobalt), when required, adding nickel, chromium, etc, to improve its thermal cracking tendency and corrosion resistance, etc. Different carbide grades are formed due to different binder content and corresponding WC particle size. Our company has series of carbide roll grades that are suitable for different rolling mill and stands.

The general relationship between the physical mechanical property of carbide grades and the metal binder content:



Operational suggestions for carbide rolls

Carbide roll is a kind of tool material which consists of tungsten carbide and binder with high hardness and excellent wear resistance. To take advantage of good wear resistance, longer lifetime and high efficiency of carbide roll during the high speed rolling, some tips are suggested as follows when purchasing and using carbide rolls.

A. Grade selection

An overall understanding of the properties of carbide grades is a basis for correctly selecting the grades for rolls used in the stands of rolling mills, and an optimal combination of grades is required for the various stands of rolling mills to get best rolling performance.

B. Roll installation

1. Rolls matching: Outside diameters of the pairs of rolls in one stand must be finished within $\pm 0.05\text{mm}$ of the same diameter.
2. Before mounting, rolls and conical sleeves should be kept in a 25-30°C isothermal case, at the same time, pour hot water on the shafts or free run about 20-30 minutes to pre-heat them.
3. Proper fitting is needed for the rolls, shafts for stands and conical sleeves, which can not be over tight or loose. When it is too tight, the rolls are in a tensile state and more fluctuation of rolling force will make the rolls break; when it is too loose, it causes the rolls, shafts and conical sleeves to slide relatively during rolling, which scratches conical sleeves and shafts resulting in cracks.
4. Before running the mill, make a check if the rolls meet the needs, and the rolls, the assembling faces of the conical sleeves and the shafts need to be cleaned. It is forbidden to knock at the rolls with a hammer or other hard materials when mounting and to impact each other during the transportation and installation to prevent rolls from damage.

C. Cooling requirement

Cooling is intended to reduce the influence on the thermal corrosion of rolls, fatigue and stress during rolling. It can prevent the rolls from cracking and slow down the diffusion of cracks, prolonging the life time of grooves. It plays an important role in optimizing the performances of rolls.

The reference data for cooling are as follows:

It is better that the temperature of cooling water does not exceed the ambient temperature by more than 6°C, usually less than 30-35°C, pressure of cooling water is 4-6 bar with a water volume of 350-400l/min (last two stands) and 250-350l/min (other stands). The water is jetted in a radial direction and the angle between the water jet and the rotating direction of rolls is 15-30 degrees. The width of the water column is about 2 times that of the groove and the water should be jetted directly into the grooves and the water should not be scattering or misty, the main nozzle should pour about 30% of water volume on the bar exit, the nozzle is about 20mm away from roll surface.

The solid particles in water work as abrasive grains when rolling and this would decrease rolls life time. After stopping rolling, the pass surface temperature should not exceed the ambient temperature by more than 20°C.

D. Reasonable rolled tonnage per pass

During rolling microcracks in grooves can not be avoided, and they need to be reground when they are at a certain depth (about 0.2-0.4mm based on experience). Excess rolling causes the depth of microcracks to extend rapidly and dangers of crushed rolls increase, which should be prevented.

The rolled tonnage normally after each regrinding is suggested as follows for wire rods in high speed rolling mills which may vary depending on different rolling conditions.

- Stands of pre-finishing mill: 3,500-4,000 tons
- 1-2 stands of finishing mill: 3,000-4,000 tons
- 3-4 stands of finishing mill: 3,000-4,000 tons
- 5-6 stands of finishing mill: 2,000-3,000 tons
- 7-8 stands of finishing mill: 2,000-3,000 tons
- 9-10 stands of finishing mill: 1,000-1,800 tons
- Stands for reducing and sizing mill: 600-1,200 tons

E. Regrinding of grooves

Normally microcracks will occur after the rolling of the groove for some time and when the microcracks extend to about 0.2-0.4mm the roll has to be reground. Microcracks must be reground thoroughly when regrinding, otherwise the unground microcracks will extend more rapidly during next rolling and probably make the roll crack. Rolls of all grades would be ground by diamond wheel but the YGR55 and YGR60 rolls may be turned.

The recommended amount of regrinding after normal rolling is as follows:

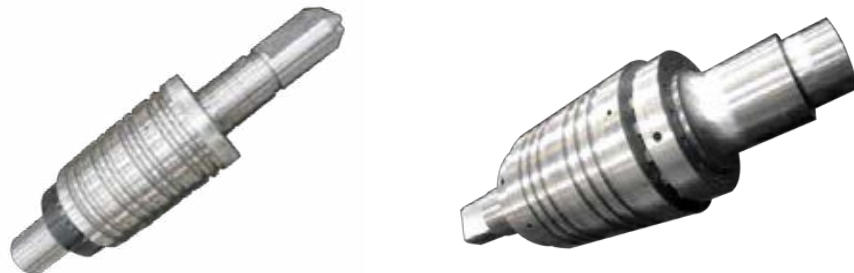
- Rolls for stands 9-10 of finishing mill (0.4-0.6)mm
- Rolls for stands 1-8 of finishing mill (0.7-1.2)mm
- Rolls for stands of pre-finishing mill (1.2-2.0)mm

Composite rolls for hot rolling

For rolling rebars and bars (round, flat and angle bars), composite rolls can substantially reduce the times of pass changes and roll changes, reduce labor intensity, increase productivity, improve surface quality and yield of rolled steel.

With hydraulic nut locking system and in-feed of oil with a huge pressure, the hydraulic nut creates an axial pre-tightening force and fasten the carbide rolls to the shafts. The system is practical and reliable and ensures higher performances of composite carbide rolls under the protection of a proper preload stress.

Mechanical assembly system is also available as per customer's need.

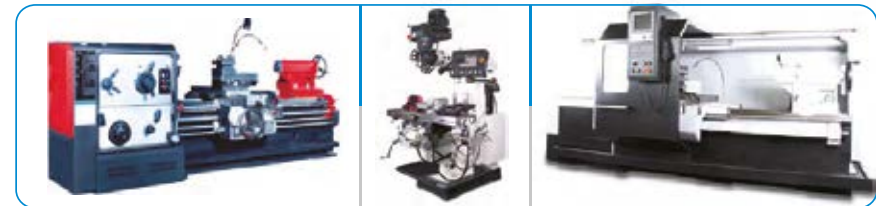


◆ OTHER PRODUCTS WE CAN OFFER

▶ Cutting Tools



▶ Lathe & Milling & Notching Machines



▶ Alloy Rolls & Rings & Rollers

