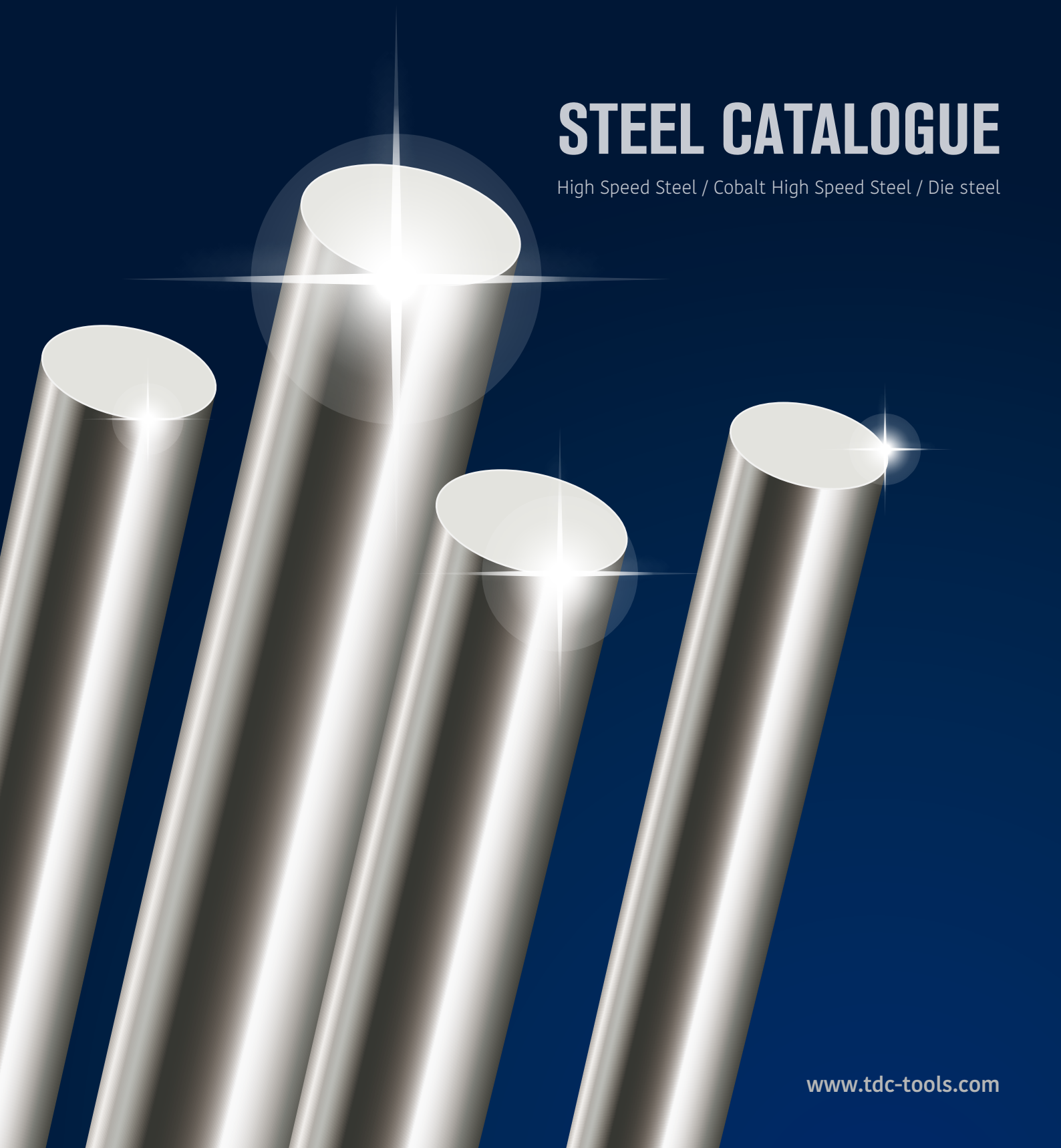


TDC

STEEL CATALOGUE

High Speed Steel / Cobalt High Speed Steel / Die steel



www.tdc-tools.com

TDC Cutting Tools' growth and development are inseparable from the success and support we gain in partnership with our global customers. This mutually beneficial cooperation allows us to deliver high-quality products which generates value and supports customer innovation.



Established in 1995, TDC Cutting Tools is the core business of the Top-Eastern Group. After 20 years of unremitting effort and several overseas mergers and acquisitions, TDC has developed into the world's high-speed steel tool leader with a comprehensive supply chain, state of the art equipment, and dominant market position. Additionally, TDC owns a large number of internationally renowned brands and patented intellectual property: from raw materials to manufacturing and through distribution services, until coming full circle with our recycling program and utilization of recovered resources.

The critical link in the high-speed steel industry is raw

material processing. At TDC, we employ a continuous quality management system that combines in-process testing and control, allowing for on-time scheduling and enhanced productivity. Our quality process is in place at every stage of production; from melting, computerized re-melting, computer controlled forging and hot rolling, cold drawn material, and in all grades of polished product.

TDC has earned and maintains ISO 9001 international certification and has received numerous provincial best practice accreditations. We are proud of the recognition we received when TDC was awarded the Dalian 3A-class Enterprise certificate.

Experienced: TDC has more than 20 years history of high-speed steel tool production. Our experience translates to your increased value.



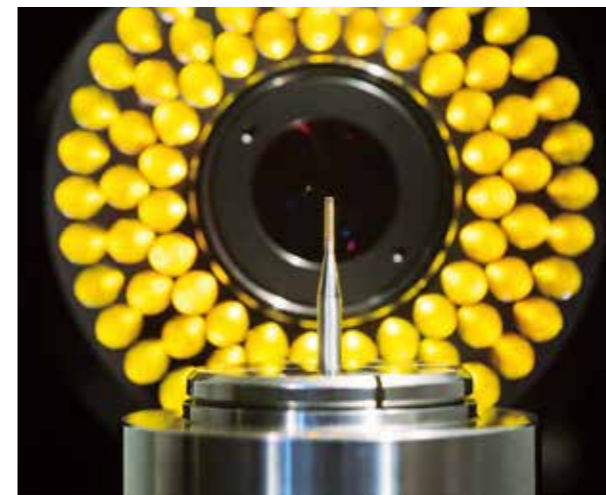
High standards and high quality

Using state of the art Western production equipment and processes, we exceed National standards and provide the highest purity, highest quality steel.



Quality guaranteed

Utilizing the latest international testing equipment, and in accordance with ISO 9001 Quality management system, TDC has a robust in-process continuous quality management system.



Professional and experienced

TDC has more than 20 years history of high-speed steel tool production. We value our reputation for high quality and on-time dependability. The backbone of our quality is our steel production facilities.



Continuous improvement, upgrade

TDC's Continuous Quality Management principles depend on the latest testing equipment and our global expertise. This is our core competency and we leverage this into our R&D activities; in materials, work flow processes, tool development, and production technologies.

First-class Manufacturing Equipment, Scientific Process Control

Our main production equipment is imported from the United States, Germany, Japan, and others. Our multi-step melting and refining process is world class and produces high purity and consistency.

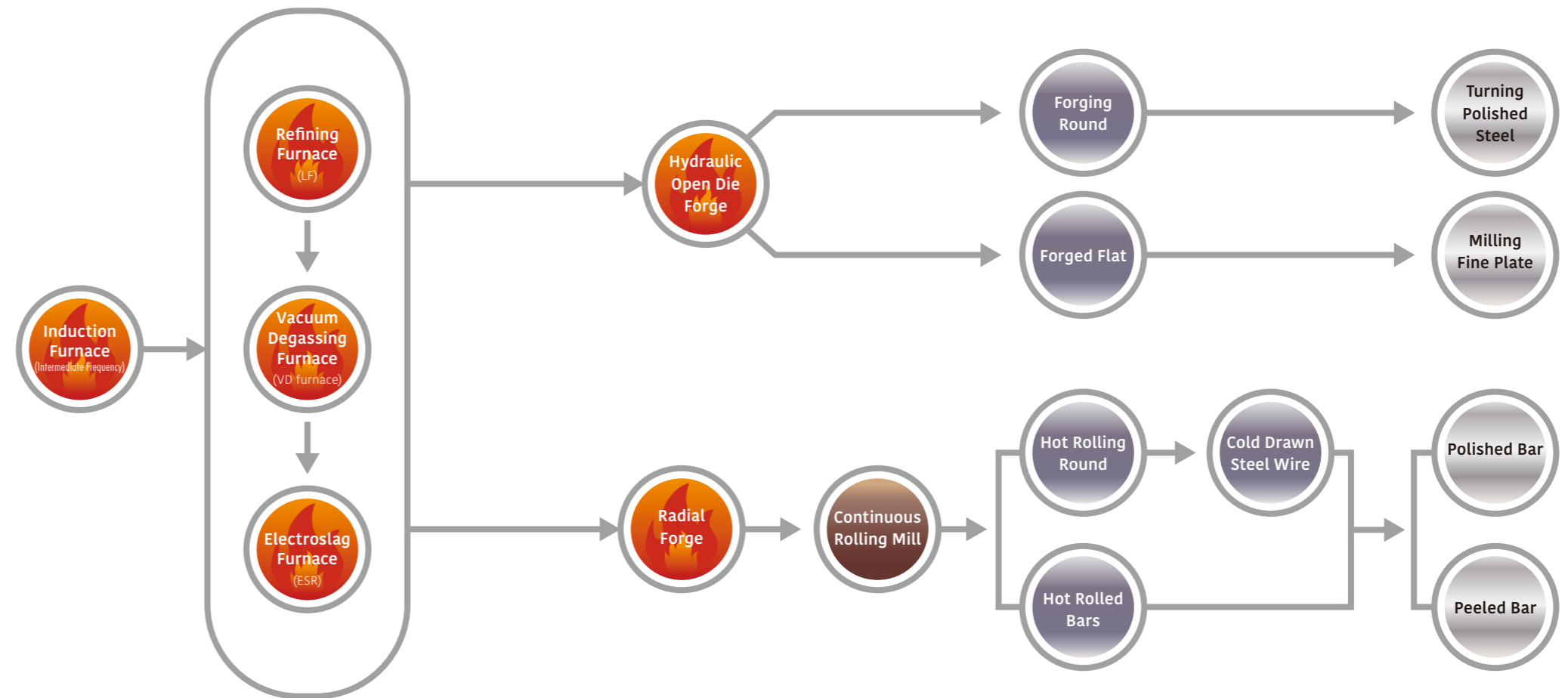
Each step is computer controlled and material analyzed for purity.

Process Standards Certificates and recycling: Our quality control center is responsible for generating mill certifications and recycling documents.

Production Cycle: each melt is analyzed for proper alloy specifications and adjusted if required.

In-Process Verification: Our quality inspectors work with a strict internal protocol to ensure tight technical standards, document production processes, and perform final inspections.

Supervision and Continual improvement: Our Quality department documents each process and is in charge of certification and record keeping. We have implemented a monthly review process, shared practices, and random audits.



▲ **1600T Hydraulic Open Die Forge**

1600T, Forging ingot weight is 0.5T -3T, forged round bar diameter is ϕ 100mm- ϕ 200mm; Slab and square ϕ 60mm- ϕ 150mm, width is ϕ 200mm- ϕ 350mm.



▲ **SX-35 Radial Forge**

600T, forging the MAX diameter is 240mm, weight is 360kgs, forged round bar size ϕ 80mm- ϕ 150mm is available.



▲ **SMX Radial Forge**

180T, forging the MAX diameter is 190mm, weight is 200kgs, forged round bar size ϕ 55mm- ϕ 80mm is available.



▲ **Bar & Wire mill group**

Belgian rolling mill * 3 set
Flat vertical alternating tandem mill * 14 set
Apex angle 45°morgan mill * 6 set
Hot rolled straight ϕ 16mm- ϕ 55mm is available;
Hot rolling wire rod ϕ 5.5mm- ϕ 15mm is available;

High Speed Tool Steel

Steel Type		Main Chemical Composition						Heat Treatment			Hardness		Application																						
Category	Similar Grade					C	Cr	W	Mo	V	Co	Quenching Temperature(°C)		Tempering temperature(°C)	Annealing (HB)	Quenching and tempering (HRC)	Metal Working Cutting Tools								Wood Working Tool	Industrial Cutting Tool	Abrasive Grinding Plate	Pin, Punch	Rolling Tool	Wear-resistant Mechanical Parts	Blade	Mandrel	Stop pin	Forming Roll	High Temperature Bearings
	TDC GRADE	GB9943	ISO 4957	AISI	JIS							Salt Bath Furnace	Box Type Furnace				Tool	Drill	Reamer	vertical milling cutter	End Mills	Gear cutter	Broach	Saw Blade											
TDC High Performance	M2T	W6Mo5Cr4V2				0.83~0.90	3.85~4.40	5.65~6.75	4.65~5.50	1.80~2.20	—	1200~1220	1210~1230	540~560	235	64	*	**	**		**	**	**	**	**	**	**	**	*	**	**				
	CM2T	CW6Mo5Cr4V2	HS6-5-2C	CM2		0.86~0.90	3.85~4.20	5.90~6.30	4.80~5.20	1.85~2.10	—	1200~1220	1210~1230	540~560	235	64	*	**	**		**	**	**	**	**	**	**	**	*	**	*				
	M2T+	/				0.86~0.90	3.85~4.40	5.80~6.50	4.70~5.50	1.75~2.20	0.80~1.20	1200~1220	1210~1230	540~560	235	64	*	**	**		**	**	**	**	**	**	**	*	**	*					
	M42T	W2Mo9Cr4VCo8				1.05~1.15	3.50~4.25	1.15~1.85	9.00~10.00	0.95~1.35	7.75~8.75	1170~1190	1180~1200	540~560	255	66	**			**		*	**		*										
	M35T	W6Mo5Cr4V2Co5				0.89~0.95	3.80~4.50	6.00~6.70	4.80~5.20	1.75~2.10	4.50~5.50	1190~1210	1200~1220	540~560	255	65	*	**	**	*	**	**	**		*	*									
TDC Normal Type	W4	W4Mo3Cr4VSi				0.83~0.93	3.80~4.40	3.50~4.50	2.50~3.50	1.20~1.80	—	1170~1190	1180~1200	540~560	255	63	*	**	**		**	**	**	**	**	**	**	*	**	*					
	M2	W6Mo5Cr4V2	HS6-5-2	M2	SKH51	0.82~0.90	3.80~4.40	5.50~6.75	4.50~5.50	1.75~2.20	—	1200~1220	1210~1230	540~560	255	64	*	**	**		**	**	**	**	**	**	**	*	**	*					
	M35	W6Mo5Cr4V2Co5	HS6-5-2-5	M35	SKH55	0.87~0.95	3.80~4.50	5.90~6.70	4.70~5.20	1.70~2.10	4.50~5.50	1190~1210	1200~1220	540~560	269	64	*	**	**	*	**	**	**		*	*									
	M42	W2Mo9Cr4VCo8	HS2-9-1-8	M42	SKH59	1.05~1.15	3.50~4.25	1.15~1.85	9.00~10.00	0.95~1.35	7.75~8.75	1170~1190	1180~1200	540~560	255	66	**			**		*	**		*										
	W9	W9Mo3Cr4V				0.77~0.87	3.80~4.40	8.50~9.50	2.70~3.30	1.30~1.70	—	1200~1220	1210~1230	540~560	255	64	*	**	**		**	**	**	**	**	**	**	*	**	*					
	W18	W18Cr4V	HS18-0-1	T1	SKH2	0.73~0.83	3.80~4.50	17.20~18.70	—	1.00~1.20	—	1250~1270	1260~1280	550~570	255	63	*								*				*						
	M7	W2Mo9Cr4V2	HS2-9-2	M7	SKH58	0.95~1.05	3.50~4.50	1.50~2.10	8.20~9.20	1.75~2.20	—	1190~1210	1200~1220	540~560	255	64									*	*	*	*							
	M1	W2Mo9Cr4V				0.78~0.88	3.50~4.00	1.40~2.10	8.20~9.20	1.00~1.35	—	1190~1210	1200~1220	540~560	255	63									*	*	*	*							
	M3-I	CW6Mo5Cr4V3	HS6-5-3C			1.05~1.10	3.80~4.50	5.00~6.70	4.70~5.20	2.25~2.75	—	1190~1210	1200~1220	540~560	262	64				*	*	*	*	*	*	*	*								
	M3-II	W6Mo5Cr4V3	HS6-5-3	M3-2	SKH53	1.15~1.25	3.75~4.50	5.00~6.70	4.70~5.20	2.70~3.20	—	1190~1210	1200~1220	540~560	262	64				*	*	*	*	*	*	*	*								
M52	/				0.85~0.95	3.50~4.30	0.75~1.50	4.00~4.90	1.65~2.25	—	1140~1160	1150~1170	540~560	255	63	*	*	*	*	*	*			*	*										
M50	/				0.78~0.88	3.75~4.50	/	3.90~4.75	0.8~1.25	—	1140~1160	1150~1170	540~560	255	61	*	*	*	*	*	*			*	*										



ESR



Continuous Rolling Mill Room



Annealing Center



Grinding



Product Specifications

Product specifications and standards				
Product	Specification range	Implementation of standards	surface condition	Delivery standards
	mm			
ESR Ingot	Φ190~Φ500mm	GB/9943-2008	Black	Table 1
Forging Round	Φ51~Φ250mm	TDC-QJB-SP-03 3.10 2	Black, Peeled Bright Bar	
Forging Block	20~250*100~500*L	GB/T 908-2008	TDC Standard	
Hot Rolling Round	Φ5.5~Φ15mm	TDC-QJB-SP-03 3.10 3	Black, Peeled Bright Bar	Table 2
Hot Rolled Bars	Φ16.0~Φ55.0mm	GB/T 908-2008	Black, Peeled Bright Bar	Table 3
Cold Drawn Steel Wire	Φ1.0~Φ14.0mm	TDC-QJB-SP-03 3.10	Black, Peeled Bright Bar	Table 4

Silver Steel Implementation of Standards	Specification range	Implementation of standards	Delivery standards
Silver Steel	Polished	Φ1.0~Φ14.0mm	Table 5
	Turning	Φ15.0~Φ70.0mm	Table 6
	Peeled	Φ71~Φ200mm	Table 7
		TDC-QJB-SP-03 3.10 7	

Table 1: Ingot size

Diameter/mm	Length/mm
Φ190	960
Φ245	960
Φ320	1100
Φ400	1100
Φ500	1100

Comment: Please indicate the special tolerance requirements in the contract, Tolerance zone in absolute terms, except steel ingot.

Table 2: Hot Rolling Wire Rod

Diameter/mm	Tolerance/mm	Ellipticity/mm
5.5	+0.2	0.15
6.5	-0.1"	
8.0		
8.5		
9.5		
10.5	+0.25	0.18
11.5	-0.1"	
12.5		
13.5		
14.5		
9.0		0.20
10.0		
11.0	+0.3	
12.0	-0.1"	
13.0		
14.0		
15.0		

Comment: in case of inconsistency on size, shape and allowable deviation, please measure at 4000 mm from wire rod end.

Table 3: Hot Rolled Straight

Diameter/mm	Tolerance/mm	Ellipticity/mm	Length/mm	Tolerance/mm	Curvature
16~24	±0.3	0.4	2000/3000/4000/6000	±100	Maximum 0.5 mm per meter
25~50	±0.4	0.5			
51~55	±0.6	0.91			

Comment: Hot rolled straight total bending shall not be greater than 0.2% of the total length.

Table 4: Cold Drawn Wire

Diameter/mm	Tolerance/mm	Ellipticity/mm	Length/mm	Tolerance/mm	Curvature
≥1.0~3.2	+0.04/-0	0.02	2500	±100	Maximum 0.2mm per meter
> 3.2~4.6	+0 -0.05"	0.025	2500		
> 4.6~6.0	+0 -0.05"	0.025	3000		
> 6.0~6.5	+0 -0.06"	0.03	3000		
> 6.5~10.0	+0 -0.06"	0.03	3000/ 3500		
> 10.0~12.0	+0 -0.06"	0.03	3000/ 4000		
> 12.0~14.0	+0 -0.07"	0.035	3000/ 4000		

Comment: Cold drawn wire total bending shall not be greater than 0.2% of the total length.

Table 5: Grinding Polished Bar Steel

Diameter/mm	Tolerance/mm							Length/mm		Ellipticity ≤/mm
	TDC Standard		Special Requirements					Size	Tolerance	
	h11	k11	h10	k10	h9	k9	"ASTM A600"			
≥1.0~4.6	+0 -0.075"	+0.075 -0"	+0 -0.048"	+0.048 -0"	+0 -0.030"	+0.030 -0"	+0.076 -0"	2500	±100	Half of the Tolerance
> 4.6~6.0	+0 -0.075"	+0.075 -0"	+0 -0.048"	+0.048 -0"	+0 -0.030"	+0.030 -0"	+0.076 -0"	3000		
> 6.0~6.5	+0 -0.090"	+0.090 -0"	+0 -0.058"	+0.058 -0"	+0 -0.036"	+0.036 -0"	+0.076 -0"	3000		
> 6.5~10.0	+0 -0.090"	+0.090 -0"	+0 -0.058"	+0.058 -0"	+0 -0.036"	+0.036 -0"	+0.076 -0"	"3000~3500"		
> 10.0~14.0	+0 -0.110"	+0.110 -0"	+0 -0.070"	+0.070 -0"	+0 -0.043"	+0.043 -0"	+0.076 -0"	"3000~4000"		

Comment: The diameter deviation as above limited allowed to the part which from the end more than 100mm.

Table 6: Peeled Polished

Diameter/mm	Tolerance/mm							Length/mm		Ellipticity ≤/mm
	TDC Standard		Special Requirements					Size	Tolerance	
	h11	k11	h10	k10	h9	k9	"ASTM A600"			
> 15.0~15.8	+0 -0.110"	+0.110 -0"	+0 -0.070"	+0.070 -0"	+0 -0.043"	+0.043 -0"	+0.076 -0"	3000~4000; 6000	±100	Half of the Tolerance
> 15.8~18.0	+0 -0.110"	+0.110 -0"	+0 -0.070"	+0.070 -0"	+0 -0.043"	+0.043 -0"	+0.100 -0"			
> 18.0~30.0	+0 -0.130"	+0 -0.084"	+0 -0.084"	+0.084 -0"	+0 -0.052"	+0.052 -0"	+0.100 -0"			
> 30.0~50.0	+0 -0.160"	+0 -0.100"	+0 -0.100"	+0.100 -0"	+0 -0.062"	+0.062 -0"	+0.100 -0"			
> 50.0~53.0	+0 -0.190"	+0 -0.120"	+0 -0.120"	+0.120 -0"	+0 -0.074"	+0.074 -0"	+0.100 -0"			
> 53.0~59.0	+0 -0.190"	+0.190 -0"	+0 -0.120"	+0.120 -0"	/	/	+0.100 -0"	"2000~6000"	±200	
> 60.0~70.0	+0 -0.190"	+0.190 -0"	+0 -0.120"	+0.120 -0"	/	/	+0.150 -0"			

Comment: ①The diameter deviation as above limited allowed to the part which from the end more than 100mm, ②Outside diameter more than 53.0mm is forging steel bar.

Table 7: Ground Polished

Diameter/mm	Tolerance/mm							Length/mm		Ovality ≤/mm
	TDC Standard		Special Requirements					Size	Tolerance	
	h11	k11	h10	k10	h9	k9	"ASTM A600"			
> 53.0~77.6	+0 -0.190"	+0.190 -0"	+0 -0.120"	+0.120 -0"	/	/	+0.100 -0"	"2000~6000"	±200	Half of the Tolerance
> 77.6~80.0	+0 -0.190"	+0.190 -0"	+0 -0.120"	+0.120 -0"	/	/	+0.150 -0"			
> 80.0~103.0	+0 -0.220"	+0.220 -0"	+0 -0.140"	+0.140 -0"	/	/	+0.150 -0"			
> 103.0~120.0	+0 -0.220"	+0.220 -0"	+0 -0.140"	+0.140 -0"	/	/	+0.780 -0"			
> 120.0~180.0	+0 -0.250"	+0.250 -0"	+0 -0.160"	+0.160 -0"	/	/	+0.780 -0"			
> 180.0~220.0	+0 -0.290"	+0.290 -0"	+0 -0.185"	+0.185 -0"	/	/	+0.780 -0"			

Comment: Turning silver bar steel total bending shall not be greater than 0.5% of the total length.

Die Steel

Product Specifications	Forged Steel	Round Bar Steel	100mm~650mm
		Module	Thick 120mm~600mm * Width200mm~1000mm
	Light Surface Steel	Polishing Steel	5.5mm~100mm
		Rough Turning Steel	110mm~650mm

Type	Similar Grade				Main Chemical Composition				Main Chemical Composition					Delivery Status	Main Application
	GB	ASTM	DIN	JIS	C	Cr	Mo	V	Si	S	P	Mn	Ni		
Hot-worked Die Steel	4Cr5MoSiV1	H13	1.2344	SKD61	0.32~0.45	4.75~5.50	1.10~1.50	0.80~1.20	0.80~1.20	≤0.010	≤0.020			≤235HB	Hot pressing abrasive steel, Hot extrusion abrasive, Heat abrasive, Hot scissors
Cold-worked Die Steel	Cr12Mo1V1	D2	1.2379	SKD11	1.40~1.60	11.50~13.00	0.70~13.00	0.50~1.20		0.010~1.10	≤0.030			≤255HB	Cold stamping abrasive, Cold extrusion abrasive, Cold scissors, High performance test set
	3Cr2MnNiMo	P20+Ni	1.2738		0.35~0.45	1.80~2.10	0.15~0.25		0.20~0.40	≤0.010	≤0.025	1.30~1.50	0.90~1.20	Pre-hardened 32-37HRC	Large plastic abrasive steel, Cover pieces of abrasive, Die casting
	Cr8Mo2VSi				0.90~1.05	7.50~8.50	1.80~2.10	0.15~0.35	0.80~1.10	≤0.020	≤0.030			≤255HB	Precision cold stamping abrasive, Rolling abrasive, Deep drawing abrasive, Cold forging abrasive, Punching machine
Glass Tool Steel	14Cr17Ni2 mod	431	1.2787		0.15~0.25	16.00~18.00			≤0.50	≤0.010	≤0.025	≤0.50	1.50~2.50	Pre-hardened 28-34HRC	Optical glass abrasive, Glass abrasive, Corrosion resistant plastic abrasive
Anti-corrosion Tool Steel	4Cr13	420	1.2083		0.35~0.42	12.5~13.50				≤0.010	≤0.025			≤235HB	Corrosion resistant plastic abrasive, CD abrasive, Mirror abrasive, Medical instruments



▲ Preheat



▲ Forging Stock



▲ Radial Forging



▲ Radial Forging Control Room



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