



Eberle

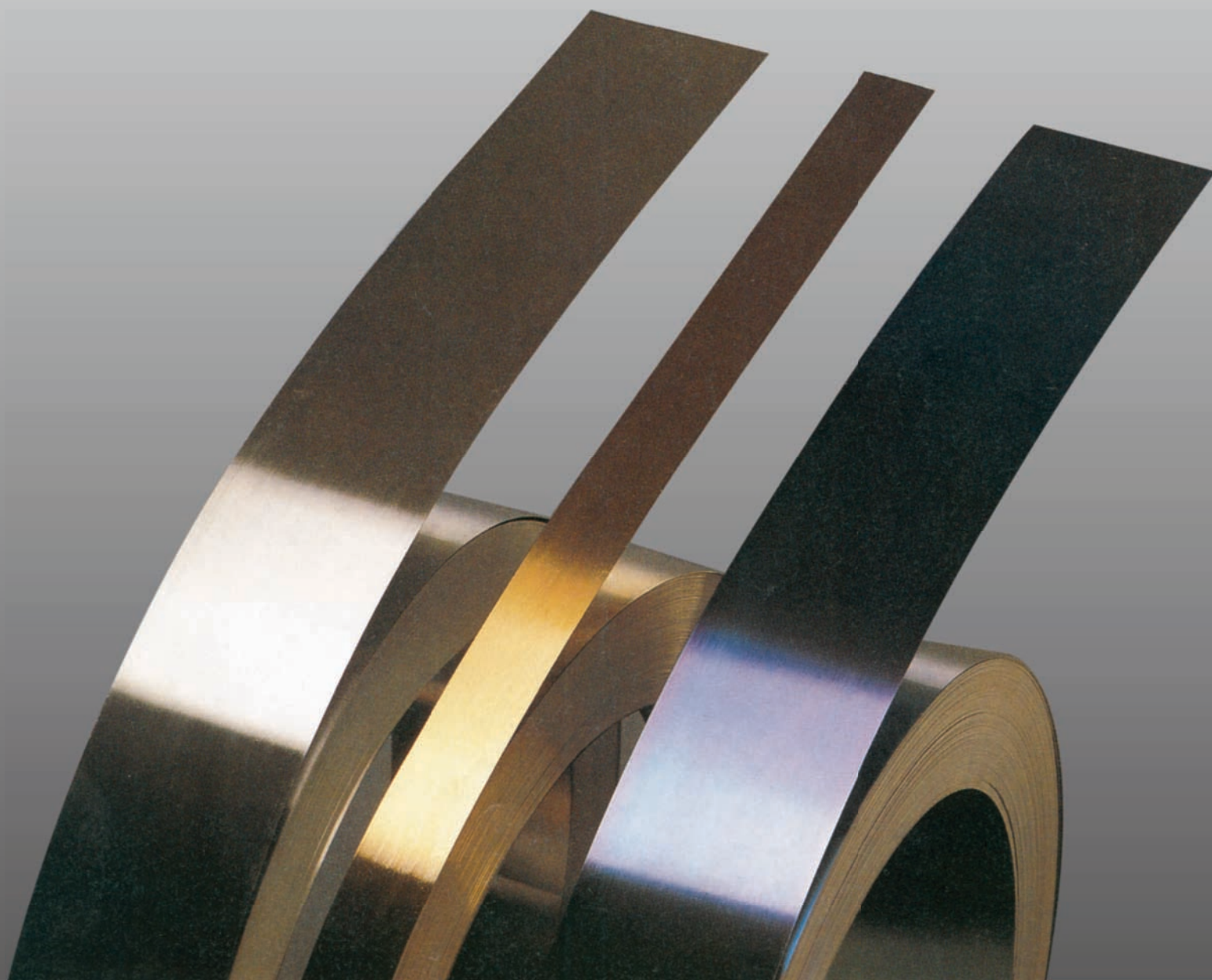


技术信息
Technical Information

尖端的质量始于1836年
德国制造

Quality since 1836
Made in Germany

精密带钢 Precision Strip Steel





埃贝尔带钢有什么特别之处？

埃贝尔精密带钢为您量身制造

埃贝尔带钢是由超纯度原材料经过特殊工艺冶炼而成的高等级钢种

在生产各个环节均采用先进的设备和工艺，以保证产品质量的精密性和稳定性。同时，经过 DIN EN ISO 9001 认证的严格的质量管理体系亦确保了严谨的生产过程。

精密钢材与普通的钢材的不同之处，在于它的几何尺寸上的精度和机械性能上的优异。这些特性体现在产品的表面光洁度，直线度，平面度，厚度公差和抗拉强度，从而保证了最终产品的品质。

埃贝尔精密带钢毫无例外的具有均匀一致的性质，因而成为制作最高标准的各类专业产品的最理想选择。

埃贝尔提供的精密带钢产品如下：

- 照相机快门
- 油墨刮刀
- 涂布刮刀
- 压缩机阀片
- 减震器阀片
- 硬质刀锯
- 手风琴簧片
- 纺织机械部件
- 弹簧
- 切纸刀
- 回转滑片
- 带刀
- 塞尺
- 研磨片

双金属带钢产品如下：

- 带锯条
- 手锯条
- 开孔锯条
- 往复式锯条
- 线锯条

精密带钢的应用举例



What is so special about EBERLE-Strip Steel?

EBERLE precision strip steel is tailor made for you..

EBERLE Strip Steel is a high grade steel from a special melt of extremely clean raw material.

A highly developed manufacturing system ensures constant process control and supervision during all phases of production. This care in manufacturing is coupled with rigorous Quality Management System, certified according to DIN EN ISO 9001.

Precision steel differs from other steel grades in that its geometric and mechanical properties exhibit greater uniformity. This homogeneity in properties such as surface finish, straightness, flatness, thickness tolerances and tensile strength help to ensure a quality end product.

EBERLE precision strip steels possess uniform properties without exception thus representing the best alternative when dealing with specialty products of the highest standard.

EBERLE offers precision strip steel for products such as:

- Camera shutters
- Doctor blades for rotogravure printing
- Coater blades
- Flapper valves
- Shock absorber valves
- Crystal saws and slurry blades
- Accordion reeds
- Textile machine parts
- Springs
- Crepping blades
- Rotor slides
- Band knives
- Feeler gauges
- Lapping carrier

Bimetal strip steel for products such as:

- Metal band saw blades
- Hand hack saw blades
- Hole saw blades
- Reciprocating saw blades
- Jig saw blades

Typical applications of our Precision Strip Steel





埃贝尔精密带钢所涉及的行业

Where is EBERLE Strip Steel used?

用途首选以下行业:

- 印刷机械工业
- 油墨刮刀制造
- 涂布刮刀制造
- 纺织机械工业
- 精密机械
- 摄影和光学工业
- 弹簧制造
- 压缩机阀片制造
- 乐器工业
- 冲压件制造
- 制表业
- 汽车工业
- 测量和控制仪器制作
- 塞尺制造
- 手锯制造
- 半导体制造中的石英和硅的处理
- 造纸业

Preferred in industries such as:

- Printing machinery industry
- Doctor blade manufacture
- Coater blade manufacture
- Textile machine industry
- Precision machinery
- Photographic and optical industry
- Spring manufacture
- Compressor valve manufacture
- Musical instruments industry
- Punched parts manufacture
- Watch making
- Automotive industry
- Measuring and control instrument construction
- Feeler gauge manufacture
- Hand- and band saw manufacture
- Quartz- and Silicon processing for semiconductors
- Cardboard and paper mills

精密带钢规格范围

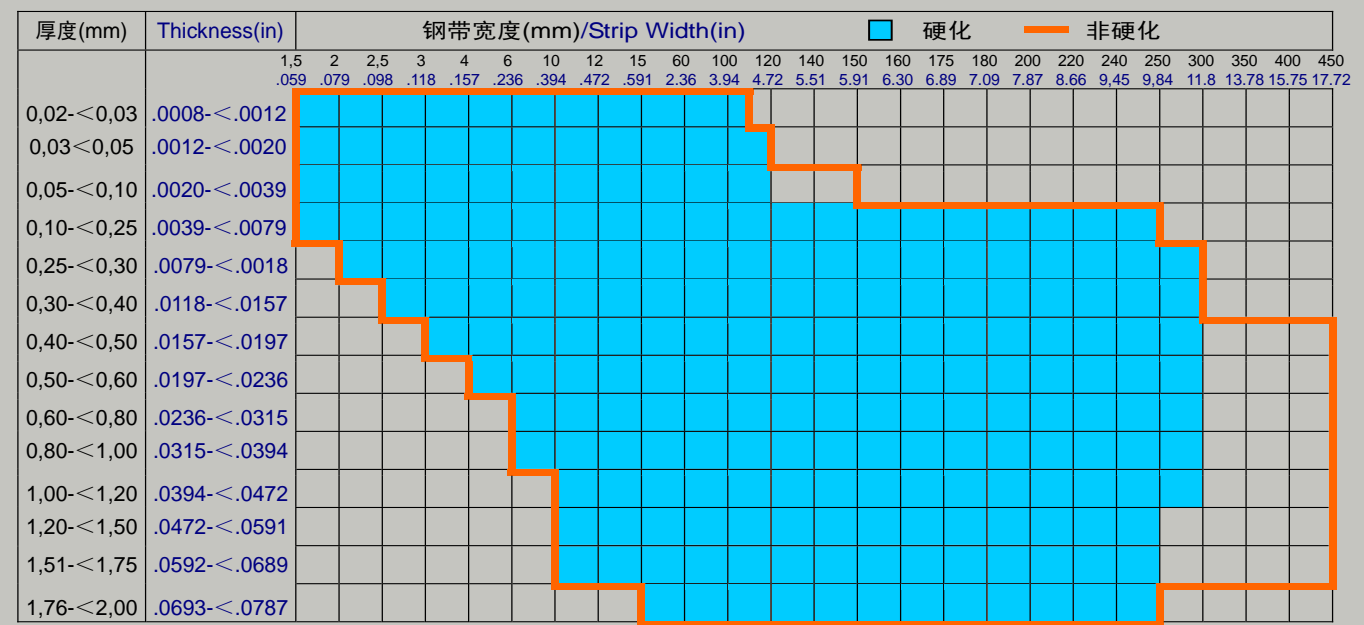
Range of Dimensions for Precision Strip Steel

埃贝尔带钢规格取决于其加工过程，其极限值根据交货状态要求硬化或非硬化而定。

The dimensions of EBERLE Strip Steel depend on the conditions under which the steel is processed. The limiting values vary according to whether the strip steel is supplied in the hardened or unhardened condition.

下表为剪切边缘的冷轧的埃贝尔精密带钢尺寸。

The diagram shows the dimensions of cold-rolled EBERLE Precision Strip Steel with slit edges.



埃贝尔精密带钢 / 产品范围

EBERLE-Precision Strip Steel/Product Range

产品牌号 Works Grade	Chemical composition [%] 化学成分 (名义百分比)						
	C	Si	Mn	Pmax	Smax	Cr	其它
Eberle 13	0,75	0,25	0,70	0,020	0,020	-	-
Eberle 15	0,85	0,25	0,40	0,020	0,020	-	-
Eberle 18	1,00	0,25	0,40	0,015	0,012	-	-
Eberle 18ER	1,00	0,25	0,40	0,015	0,004	-	-
Eberle 22	1,25	0,25	0,40	0,020	0,018	0,15 (0,35)	-
Eberle 13S	0,65	1,70	0,80	0,020	0,020	0,15	-
Eberle 15N2	0,75	0,30	0,40	0,015	0,012	0,15	Ni 2,0

埃贝尔精密带钢和国际通行标准钢号对应

Comparison of Norms for EBERLE Precision Strip Steels

产品牌号相当于 Works Grade similar to	Eberle 13	Eberle 15	Eberle 18	Eberle 22
DIN-Bez.	Ck 75	Ck 85	Ck 101	125 Cr1
Werkstoff-Nr.	1.1248	1.1269	1.1274	1.2002
US-Norm	AISI 1074 AISI 1078	AISI 1085 -	AISI 1095 -	- -

埃贝尔双金属

EBERLE Bimetal

埃贝尔双金属

埃贝尔产品还包括下面的高级合金的双金属结构，用以生产高效手锯和带锯。要了解更多信息，请参阅专业介绍手册。

EBERLE’ s product range also includes the following high-alloy bimetal combinations for the production of heavy duty hand- and bandsaws. For more information, please request our special bimetal brochure.

合金组合 Alloy Combinations	标准比较 Comparison of Norms						
		M2	Matrix 2	M42	M51	50CrV4	D6A
M2-50cRv4 Matrix 2-D6A M42-X32CrMoV41 M51-X32CrMoV41	DIN	S6-5-2		S2-10-1-8	S10-4-3-10		
	Werk-Stoff-Nr.	1.3343		1.3247	1.3207	1.8159	1.2390
	AISI	M2	Matrix 2	M42	M51	6150	D6A

表面处理和轧制条件

表面处理和轧制条件

Surface Finish And Rolling Condition

按照最终使用要求，我们提供如下表面处理的埃
贝尔精密带钢。

We supply EBERLE precision strip steels with the
following surface finishes depending on the end-use.

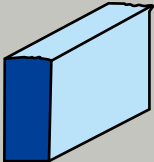
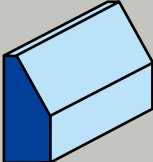
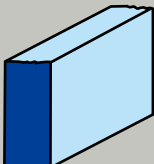
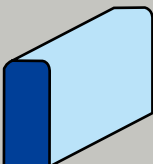
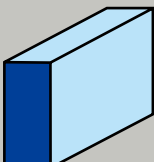
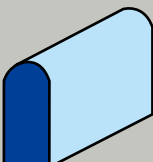
	代码 Code	
光亮退火	GB	bright annealed
光亮表面，超软化轧制	WB	bright extra soft rolled
光亮表面，软化轧制	WE	bright soft rolled
钝化处理	WM	dull rolled
调质，不抛光	H+UP	hardened + tempered, unpolished
调质，银灰表面	H+S	hardened + tempered, silvergrey
调质，钝化	H+M	hardened + tempered, dull
调质，抛光	H+PW	hardened + tempered, bright polished
调质，表面黄色	H+PG	hardened + tempered, polished yellow
调质，表面棕色	H+PBR	hardened + tempered, brown
调质，表面发兰	H+PBL	hardened + tempered, polished blue

边缘处理

Edge finish

埃贝尔精密钢带可以按以下边缘加工状态交货。

We supply EBERLE Precision Strip Steel with the
following edges:

标号	示意图	说明	标号	示意图	说明
KG		纵切状态 Slit	K2		边缘角形圆整 Angular Bevel 最小厚度: 0.30mm Thickness min. 0.30mm 角度≥45° Angle 45°
KE		去毛刺 Deburred	K3		倒角圆整 Rectangular 最小厚度: 0.30mm Thickness min. 0.30mm 最小宽度: 4mm Width min. 4mm, 最大宽度: 200mm max. 200 mm
K1		方角圆整 Rectangular 最小厚度: 0.30mm Thickness min. 0.30mm 最小宽度: 4mm width min. 4 mm, 最大宽度: 200mm max. 200 mm	K4		圆边圆整 Rounded 最小厚度: 0.06mm Thickness min. 0.06mm 最小宽度: 2mm Width min. 2mm



四棍冷轧车间

Four high cold rolling mill





厚度公差
thickness tolerances

埃贝尔生产的精密带钢厚度公差可达到最高国际标准。公差级别为 T1 到 T5，包含所有边缘处理。下表为不同公差等级的参数值。

钢带厚度(mm) S Strip Thickness(in.)	公差级别 Toler. Class	钢带宽度(mm) S Strip Width(in.)	
		到300 ±0.01mm	To 12 in ±0.01
0.020-0.089mm 0.0008-0.0035in	T1	0.004	.00016
	T2	0.003	.00012
	T3	0.002	.00008
	T4	0.0015	.00006
	T5	—	—
0.090-0.162mm 0.0035-0.0064in	T1	0.005	.00020
	T2	0.004	.00016
	T3	0.003	.00012
	T4	0.002	.00008
	T5	—	—
0.163-0.299mm 0.0064-0.0118in	T1	0.006	.00024
	T2	0.005	.00020
	T3	0.004	.00016
	T4	0.003	.00012
	T5	—	—
0.300-0.424mm 0.0118-0.0167in	T1	0.007	.00028
	T2	0.005	.00020
	T3	0.004	.00016
	T4	0.003	.00012
	T5	—	—
0.425-0.599mm 0.0167-0.0236in	T1	0.009	.00035
	T2	0.006	.00024
	T3	0.005	.00020
	T4	0.004	.00016
	T5	—	—
0.600-0.999mm 0.0236-0.0394in	T1	0.010	.00039
	T2	0.007	.00028
	T3	0.005	.00020
	T4	0.004	.00016
	T5	—	—
1.000-1.249mm 0.0394-0.0491in	T1	0.011	.00043
	T2	0.008	.00031
	T3	0.006	.00024
	T4	0.004	.00016
	T5	—	—
1.250-1.599mm 0.0492-0.0629in	T1	0.013	.00051
	T2	0.009	.00035
	T3	0.007	.00028
	T4	0.005	.00020
	T5	0.004	.00016

EBERLE achieves thickness tolerances for precision strip steel which meet the highest international standards. The tolerance classes, T1 to T5, are applicable for all of our precision strip regardless of the edge finish. The numerical data for the different tolerance classes are contained in the following table.

钢带厚度(mm) S Strip Thickness(in.)	公差级别 Toler. Class	钢带宽度(mm) S Strip Width(in.)	
		到300 ±0.01mm	To 12 in ±0.01
0.315-0.399mm 0.0124-0.0157in	T1	0.015	.00059
	T2	0.011	.00043
	T3	0.008	.00031
	T4	0.006	.00024
	T5	0.004	.00016
0.400-0.499mm 0.0158-0.0196in	T1	0.017	.00067
	T2	0.012	.00047
	T3	0.009	.00035
	T4	0.006	.00024
	T5	0.004	.00016
0.500-0.629mm 0.0197-0.0247in	T1	0.020	.00079
	T2	0.014	.00055
	T3	0.010	.00039
	T4	0.007	.00028
	T5	0.005	.00020
0.630-0.799mm 0.0248-0.0314in	T1	0.023	.00091
	T2	0.017	.00067
	T3	0.012	.00047
	T4	0.008	.00031
	T5	0.006	.00024
0.800-0.999mm 0.0315-0.0393in	T1	0.027	.00106
	T2	0.019	.00075
	T3	0.013	.00051
	T4	0.009	.00035
	T5	0.007	.00028
1.000-1.249mm 0.0394-0.0491in	T1	0.034	.00134
	T2	0.024	.00094
	T3	0.017	.00067
	T4	0.012	.00047
	T5	0.008	.00035
1.250-1.599mm 0.0492-0.0629in	T1	0.039	.00154
	T2	0.028	.00110
	T3	0.020	.00079
	T4	0.014	.00055
	T5	0.009	.00035
1.600-2.000mm 0.063-0.079in	T1	0.046	.0018
	T2	0.033	.0013
	T3	0.023	.0009
	T4	0.017	.0007
	T5	0.011	.0004



宽度公差
Width Tolerances

我们制造的冷轧精密带钢符合瑞典公差等级 B1 到 B3:

厚度 mm	宽度 mm	公差等级 (±mm)		
		B1	B2	B3
<0.25	<20	0.07	0.05	0.03
	20 – <50	0.10	0.07	0.05
	50 – <125	0.15	0.11	0.07
	≥ 125	0.20	0.15	0.10
0.25 – 0.50	<20	0.10	0.07	0.05
	20 – <50	0.15	0.11	0.07
	50 – <125	0.20	0.15	0.10
	≥ 125	0.25	0.20	0.15
0.50 – 1.00	<20	0.15	0.11	0.07
	20 – <50	0.20	0.15	0.10
	50 – <125	0.25	0.20	0.15
	≥ 125	0.30	0.25	0.15
1.00 – 1.60	<20	0.20	0.15	0.10
	20 – <50	0.25	0.20	0.15
	50 – <125	0.30	0.25	0.15
	≥ 125	0.35	0.25	0.20
1.60 – 2.00	<20	0.25	0.20	0.15
	20 – <50	0.30	0.20	0.15
	50 – <125	0.35	0.30	0.20
	≥ 125	0.40	0.30	0.20

We manufacture cold-rolled precision strip steel according to the Swedish tolerance groups B1 to B3:

厚度 mm	宽度 mm	公差等级 (±mm)		
		B1	B2	B3
<.0098	< .79	.003	.002	.001
	.79 – <1.97	.004	.003	.002
	1.97 – <4.92	.006	.004	.003
	≥ 4.92	.008	.006	.004
.0098 – .0197	< .79	.004	.003	.002
	.79 – <1.97	.006	.004	.003
	1.97 – <4.92	.008	.006	.004
	≥ 4.92	.010	.008	.006
.0197 – .0394	< .79	.006	.004	.003
	.79 – <1.97	.008	.006	.004
	1.97 – <4.92	.010	.008	.006
	≥ 4.92	.012	.010	.006
.0394 – .0629	< .79	.008	.006	.004
	.79 – <1.97	.010	.008	.006
	1.97 – <4.92	.012	.010	.006
	≥ 4.92	.014	.010	.008
.0629 – .0787	< .79	.010	.008	.006
	.79 – <1.97	.012	.008	.006
	1.97 – <4.92	.014	.012	.008
	≥ 4.92	.016	.012	.008

纵切线 Slitting Line





精密带钢：标准抗拉强度 N/mm²

Precision Strip Steel:Standard Tensile Strengths In psi(× 1000)

硬化 Hardened

厚度 mm	范围 L	范围 M	范围 H	EBERLE 偏差(±)	Thickness (in)	Range L	Range M	Range H	EBERLE Tolerance(±)
0,02 -0,099	—	HV630	—	HV25	.008 -.0039	—	HV630	—	HV25
0,100-0,124	1800	2100	2300	50	.0039-.0049	260	303	331	7
0,125-0,174	1800	2050	2250	50	.005-.007	260	297	325	7
0,175-0,224	1750	2000	2200	50	.007-.009	254	290	320	7
0,225-0,274	1750	1950	2200	50	.009-.011	254	283	320	7
0,275-0,374	1700	1900	2150	50	.011-.015	247	275	312	7
0,375-0,424	1650	1850	2100	50	.015-.017	240	268	305	7
0,425-0,474	1600	1800	2050	50	.017-.019	232	260	297	7
0,475-0,524	1550	1750	2000	50	.019-.021	225	254	290	7
0,525-0,624	1550	1750	2000	50	.021-.025	225	254	290	7
0,625-0,724	1500	1700	1950	50	.025-.029	218	247	283	7
0,725-0,824	1500	1700	1950	50	.029-.032	218	247	283	7
0,825-0,924	1450	1650	1900	50	.032-.036	210	240	275	7
0,925-1,024	1450	1650	1900	50	.036-.040	210	240	275	7
1,025-1,149	1450	1650	1900	50	.040-.045	210	240	275	7
1,150-1,249	1400	1600	1850	50	.045-.049	203	232	268	7
1,250-1,349	1400	1600	1850	50	.049-.053	203	232	268	7
1,350-1,574	1400	1600	1850	50	.053-.062	203	232	268	7
1,575-1,749	1350	1550	1800	50	.062-.069	195	225	260	7
1,750-2,000	1300	1500	1750	50	.069-.079	189	218	254	7
非标准值可按要求提供					Non-standard values upon request.				

非硬化 Unhardened

EBERLE 产品牌号	光亮 退火 (GB)	超软 化 轧制	软化 轧制	半软 化 轧制	硬化 轧制	超硬 化 轧制	EBERLE works grade	bright annealed (GBK)	extra soft rolled	soft rolled	semi- hard rolled	hard rolled	extra hard rolled
EBERLE 13	530	550	590	680	780	880	EBERLE 13	77	78	86	99	113	128
EBERLE 15	560	570	610	700	800	900	EBERLE 15	81	83	88	102	116	131
EBERLE 18	590	600	640	730	830	930	EBERLE 18	86	87	93	106	120	135
EBERLE 22	640	670	700	790	910	1030	EBERLE 22	93	97	102	114	132	149
偏差范围	±70	±70	±70	±70	±70	±100	tolerance range	±10	±10	±10	±10	±10	±14



平整度
Flatness

经过硬化处理的埃贝尔精密带钢，其平整度在各种机械零件中成为重要的参数。埃贝尔的生产过程确保所有的最终产品具有精确的平整度。

The flatness of hardened EBERLE precision strip steel is an important parameter in the production of many different types of machine parts. The production process at EBERLE ensures the correct flatness for the large variety of end products.

定购材料时，请用有效代码指明您想要的公差等级			When ordering a material, please specify the desired tolerance with the available code.		
厚度/mm	Thickness/in	代码 Code	厚度/mm	Thickness/in	代码 Code
0,02-0,04	.0008-.0019	P60 P40 P30 P20	0,05-0,09	.0020-.0034	P60 P40 P30 P20
0,10-0,14	.0035-.0054	P60 P45 P35 P20	0,15-0,19	.0055-.0074	P60 P40 P30 P20
0,20-0,25	.0075-.0097	P45 P35 P25 P15	0,26-0,35	.0098-.0137	P40 P30 P20 P15
0,36-0,49	.0138-.0192	P35 P25 P15 P10	0,50-1,00	.0193-.0392	P30 P20 P10
1,01-1,50	.0393-.0591	P25 P15 P10	>1,50	>.0591	P40 P30 P20 P10
非标准值可按要求提供			Non-standard values upon request.		
非标准值可按要求提供			Non-standard values upon request.		



边缘直线度

Edge Straightness

埃贝尔提供非常广泛的直线度公差范围，以适应各种产品的需要。任何要求高标准的直线度的产品，亦可在我们的公差范围内得到满足。

如有特殊的公差，请在要求之中注明。

变量 长度 (m)	钢带宽度 (mm)				
	<10	10~<25	25~<40	40~<125	≥125
1	5,0	4,0	3,0	2,0	1,5
	2,5	1,5	1,25	1,0	0,75
	1,5	0,75	0,5	0,37	0,25
	1,0	0,5	0,25	0,25	0,25
	-	-	-	0,06	-
3	45,0	36,0	27,0	18,0	13,5
	22,5	13,5	11,25	9,0	6,75
	13,5	6,75	4,50	3,35	2,25
	9,0	4,50	2,25	2,25	2,25
	-	-	-	0,60	-
订购材料时，请用代码G注明您想要的确切公差 举例：G0,6/3=直线度偏差0,6mm/3m					

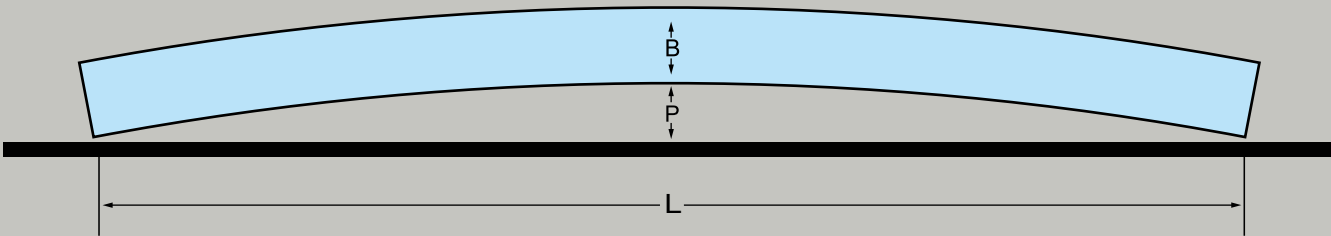
EBERLE offers a wide range of straightness tolerances to meet various products requirements. For applications with a high demand on straightness our upper level tolerances are among the best available anywhere.

Please note that special tolerances are available upon request.

Measured Length(ft)	Strip Width in.in.				
	<.400	<.400~<1.00	1.0~<1.6	1.6~<5.00	>5.00
10	1.772	1.417	1.063	.709	.531
	.886	.531	.443	.354	.266
	.531	.266	.177	.133	.089
	.354	.177	.089	.089	.089
	-	-	-	.024	-
When ordering material, please specify the desired Tolerance directly with the code G. G. For example, G.024/10= Straightness deviation of .024 in./10 ft.					

直线度的测量

Measurement of Straightness



B 带宽

P 直线度偏差

L 度量长度

求直线度偏差可以用下面的公式，从已给定长度的直线度偏差换算而得到：

$$P_1 = P_2 \left(\frac{L_1}{L_2} \right)^2$$

这里 P_2 = 给定长度 L_2 上的偏差

P_1 = 长度 L_1 上的未知偏差

B Strip width

P Straightness deviation

L Measured length

For conversion of straightness deviation from a given length to another, the following formula can be used:

$$P_1 = P_2 \left(\frac{L_1}{L_2} \right)^2$$

where P_2 = given deviation over the length L_2

and P_1 = unknown deviation over the length L_1

包装

Packing

埃贝尔为中国地区的客户运送的精密带钢，均采用标准防潮、防锈的海运包装。并置于合成木制纤维托架上。

所有盘卷涂防护油

外径 > 800mm 需要特别制作的货盘

固定长度 > 1200mm 不用货盘或网格箱

标准包装示例如下：



EBERLE precision strip steel that be delivered to customers of chinese region,adopt the standard sea transportation of moistureproof and antirust packing.and be plaled on the synthesize bracket of wood fiber.

A thin coating of protective oil is applied to all coils.

Outer diameter >37 in available only on specially ordered pallets.

Fixed lengths>4 ft. not available on pallets or in wire-lattice containers.

Packing standards illustrated as follows:



订单信息
Ordering Information

下面的表格会帮助您完善您的订单。把下列信息提供给我们，以确保您收到适合您的产品需求的精密带钢。
请记住提供合适的代码。

The following chart is provided to assist you in developing your material order .Providing us with the following information helps to ensure that you receive exactly the correct precision strip steel for your production needs.
Please remember to provide the code where applicable.

产品或材料项目	您的订单信息/编码 Your ordering information/code	Product/Material application
埃贝尔牌号或美国标准牌号		EBERLE grade or AISI Norm
厚度和公差		Thickness and Tolerance
宽度和公差		Width and Tolerance
硬化或非硬化		Unhardened or hardened
抗拉强度		Tensile strength
表面处理		Surface finish
边缘处理		Edge finish
平整度		Flatness
直线度		Straightness
数量		Quantity
卷重		Coil Weight
包装		Packing form
举例：带钢热处理，表面发蓝，方形圆整边缘，平面度偏差24um/mm 带宽，直线度偏差0,6mm/m 4H,PBL,N3, P20, G0,6/3 加上4位数包装代码		



技术服务
technical service

埃贝尔的工程技术人员和销售人员都非常愿意回答您的任何问题，包括材料选择以及后续的问题。
埃贝尔的技术人员同时帮助您选择合适的材料，以适合您的应用，并且我们接下来的服务也可以确保我们的精密带钢能够平稳的经济的转变为你产品。

Ederle’ s Engineering and sales staff will be glad to answer any specific questions you might have both during your material selection and afterwards.
Ederle’ s technicians help you to select the proper material for the desired application and our follow-up service is then available to ensure a smooth and economical introduction of our precision strip into your production.



所有的产品
complete product range

双金属产品:

BIMETAL FOR:

带锯条
band saw blades
手锯条
hand hack saw blades
开孔锯条
hole saw blades
线锯条
jig saw blades

精密带钢产品:

PRECISION STRIP STEEL FOR:

带刀
band knives
压缩机阀片
flapper valves
弹簧
spring
塞尺
feeler gauges
照相机快门
camera shutters
裁纸刀
crepping blades
硬质刀锯
crystal saws and slurry blades
游星片
lapping carriers
手风琴簧片
accordion reeds
油墨刮刀
doctor blades for rotogravure printing
减振器阀片
shock absorber valves
涂布刮刀
coater blades
纺织机械部件
textile machine parts
簧片刀
reed blades

Eberle — 埃贝尔中国总代理:

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Shanghai Eborl International Trading Co., Ltd.

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