



PRODUCT CATALOGUE

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About us

Dear Sirs,

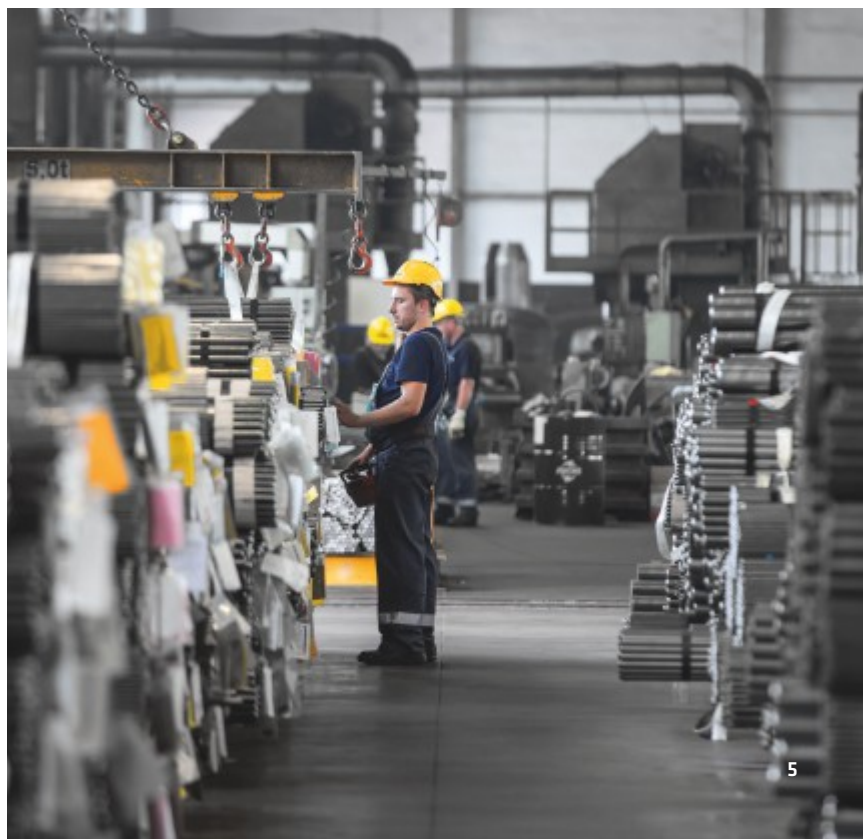
Stalma is the company with established market position in production of bright bars—cold drawn, peeled and ground. We work with leading European steel manufacturers.

Stalma offers products of the highest quality parameters, highest precision performance of cross section tolerance and with superior degree of surface finish.

On account of quick order realization, attractive prices, own transport fleet along with integrity and reliability of our employees we have earned the trust of our customers in Poland and abroad.

We invite you to cooperation.





Production technology:

Drawing

Drawing is a process of cold metal forming, in which the processed material moves through a suitably shaped hole that is a special tool called a drawing die.

The aim of drawing is obtaining products in the form of bars or wire with very precise cross-sectional dimensions, smooth, bright surface and specific mechanical properties. As a result of the drawing process material is strengthened which means increase in strength properties and decrease in plastic properties.





Production technology:

Peeling

The process is performed on a special machine – peeling line. Rotating head equipped with knives of carbide blades ensures the removal of surface layer with common metallurgical defects. As a result of peeling one obtains a product with flawless surface and with high accuracy of diameter - class IT9. Mechanical properties do not change during peeling.

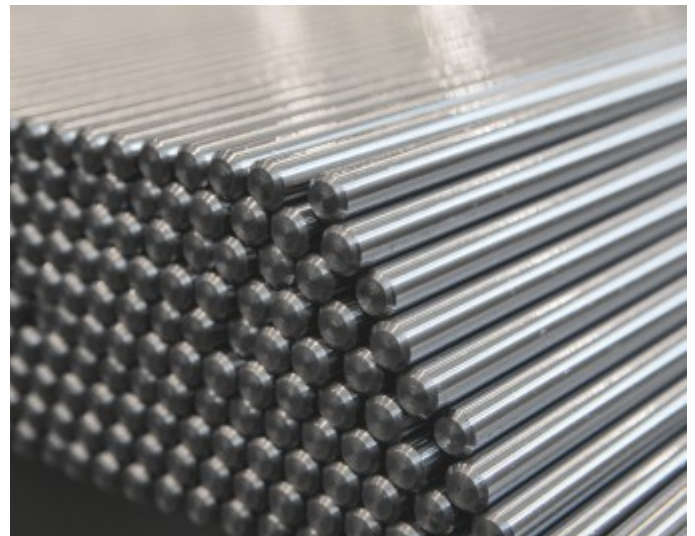




Production technology:

Grinding

Grinding is a precise reduction machining done with the use of grinding wheels on special machines that are centreless grinders. Ground bars are characterized by the highest quality among bright steel products and find the application in the production of the most responsible parts of the machinery. Ground bars can be processed from both half-products, drawn or peeled bars. Mechanical properties do not change during grinding.







Laboratory and logistics



LABORATORY

During all the processes there is constant supervision of the process parameters and properties of the products. We are equipped with modern crack detection machines based on eddy current method.

Our specialized research and development laboratory allows complex examination of the products. Thanks to having IATF 16949:2016 certificate we can cooperate with automotive companies which expect special quality requirements.



LOGISTICS

Bars are packed in bundles, tied with steel bands. Additionally they can be packed in a special crepe paper, anticorrosive foil or packed in wooden boxes. Ground bars can be separately protected by the cardboard tubes with appropriate diameter. Transport to the customers takes place on covered trucks in leak-proof conditions.





Offer

DRAWN BARS



ROUND	4 to 8 mm	> 8 to 40 mm	> 40 to 100 mm
Tolerance	h9 h10 h11	h9 h10 h11	h9 h10 h11
Length (mm)	3000	3000 to 6000	3000 or 6000
Length tolerances (mm)	+100	+100, +200	+200, +500



HEXAGONAL	4 to 8 mm	> 8 to 27 mm	> 30 to 70 mm
Tolerance	h11	h11	h11
Length (mm)	3000	3000 to 6000	3000 or 6000
Length tolerances (mm)	+100	+100	+200



SQUARE	4 to 8 mm	> 8 to 28 mm	> 30 to 80mm
Tolerance	h11	h11	h11
Length (mm)	3000	3000 or 6000	3000 or 6000
Length tolerances (mm)	+100	+100	+200

CALIBRATED BRIGHT STEEL BARS



ROUND	30 - 100 mm
HEXAGONAL	30 - 70 mm
SQUARE	30 - 80 mm

PEELED BARS



ROUND	18 or 100 mm
Tolerance	h9 h10 h11
Length (mm)	3000 or 6000
Length tolerances (mm)	+100, +200

GROUND BARS



ROUND	10 or 100 mm
Tolerance	h6 h7 h8
Length (mm)	3000 or 6000
Length tolerances (mm)	+100, +200

DRAWN WIRE



ROUND	4 or 12 mm
Tolerance	h9 h10 h11



HEXAGONAL	4 or 10 mm
Tolerance	h11



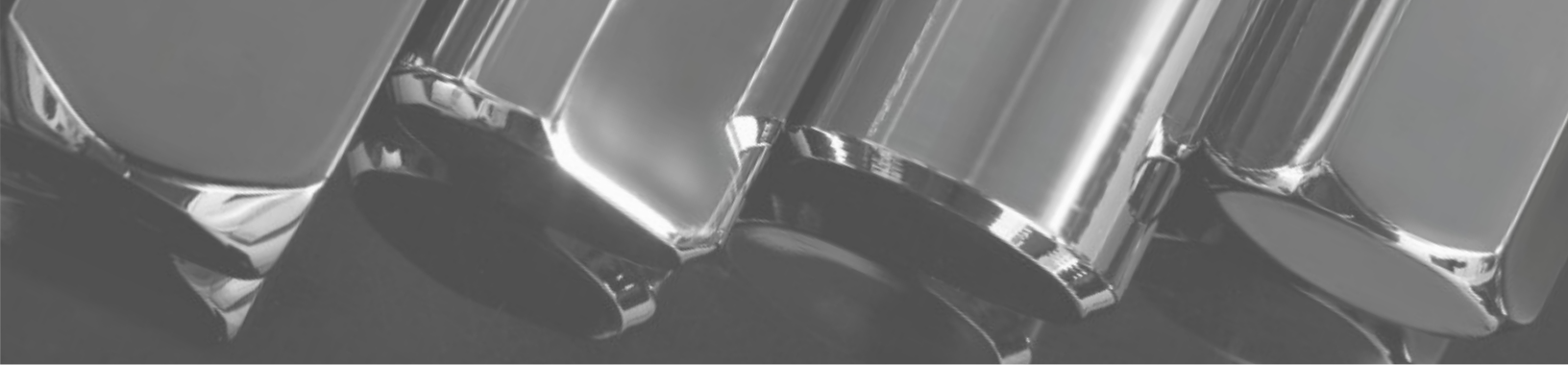
SQUARE	4 or 10 mm
Tolerance	h11

- Size of coils:
- Inner diameter min: - 650 mm
 - Outer diameter max: - 1200 mm
 - Weight: 100 + 250 kg

Production of the products with diferent dimensions and parameters requires agreement upon request



Standard technical conditions



Surface

Bar surfaces: ^{a) b)}

- drawn - class 1
- peeled - class 3
- ground - class 4

The surface can be inspected by the eddy current testing – scope and conditions of the inspection are to be agreed during ordering.

- a)** Acc. to EN 10277, rolling-mill scale removal before drawing by shot blasting,
b) Manufacturing to a higher class requires prior agreement

Bar ends

Bar ends:

- cut on a cutting machine
- one or two-sided cut on a saw
- chamfered and faced ends

Bars of cross-section dimensions from 8 mm to 90 mm can have chamfered ends and be faced on the ends. Size of chamfering $\sim 2/45^\circ \varnothing$. Bars made of free-cutting steel of diameters over 10 mm have chamfered ends as a standard. Colour marking of the ends requires agreement.

- c)** Other chamfers to be agreed

Packing – bundle weight

Bars are packed in bundles, weighing 1000 to 2000kg, tied with steel bands at several points of the bundle length. Ground bars can be packed in a special way – in crepe paper – wrapped individually or in bundles, protected by cardboard tubes or packed in wooden boxes.

Special methods of packing require agreement.

Delivery state

Standard bars are supplied as:

- drawn, hardened by drawing +C
- peeled, raw after rolling +SH
- ground after drawing +C+SL or after peeling +SH+SL

Delivery of bars in other manufacturing conditions can be agreed, e.g.:

- drawn: +A+C; +N+C
- peeled: +N+SH; +QT+SH
- ground: +N+SL; +QT+SL

Anti-corrosion protection

Bar surface is covered with anticorrosive oil, protecting it during transport in closed vehicles and during storage in covered warehouses throughout the normal storage period.

Any special anticorrosive protections require agreement.

Straightness

Bars are made as straightened, deviation value from straightness: max 1,0 mm/m. Higher straightness requires agreement.

Quality documents

Inspection Certificate 3.1 or 2.2 acc. to EN 10204

Cross section tolerances (acc. to EN 10278)

Nominal size	Accuracy class					
	h6	h7	h8	h9	h10	h11
[mm]						
from 4 to 6	-0,008	-0,012	-0,018	-0,030	-0,048	-0,075
over 6 to 10	-0,009	-0,015	-0,022	-0,036	-0,058	-0,090
over 10 to 18	-0,011	-0,018	-0,027	-0,043	-0,070	-0,110
over 18 to 30	-0,013	-0,021	-0,033	-0,052	-0,084	-0,130
over 30 to 50	-0,016	-0,025	-0,039	-0,062	-0,100	-0,160
over 50 to 80	-0,019	-0,030	-0,046	-0,074	-0,120	-0,190
over 80 to 100	-0,022	-0,035	-0,054	-0,087	-0,140	-0,220

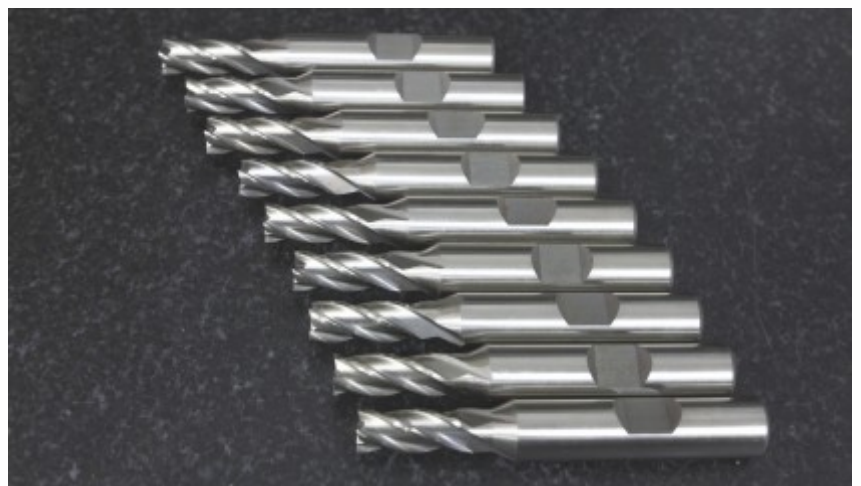
Production of the products with diferent dimensions and parameters requires agreement upon request.



Application

Products provided are widely applied in:

- automotive industry
- machine building industry
- tools production and precision devices
- fitting and furniture industry
- electro-technical industry
- production of pneumatic fittings and hydraulics
- fasteners production
- agriculture products
- rail industry
- mining industry
- production of home appliances



Technical specifications of chosen steel grades

Description applies to all the tables with the references:

- ① acc. to smelt analysis
- ② “as rolled + peeled” for non-alloy steels, “annealed + peeled” for alloy steels
- ③ approximate value from calculation
- ④ values in the table are for information only
- ⑤ increased carbon content applies to products with diameter exceeding 40mm
- ⑥ does not apply to +C state



Non-alloy engineering steels

- Chemical composition
- Mechanical properties–Impact test value KV
- Mechanical properties after peeling or drawing

01 Chemical composition^①

Standards	Designation	Steel No.	C	Mn	Si	P	S	N	Other
EN 10025-2 EN 10277-2	S235JR	1.0038	$\leq 0,17 / 0,20$ ⑤	$\leq 1,40$	-	max 0,040	max 0,040	$\leq 0,012$	Cu max 0,55
	S235J0	1.0114	$\leq 0,17$	$\leq 1,40$	-	max 0,035	max 0,035	$\leq 0,012$	Cu max 0,55
	S235J2	1.0117	$\leq 0,17$	$\leq 1,40$	-	max 0,030	max 0,030	-	Cu max 0,55
	S355JR	1.0045	$\leq 0,24$	$\leq 1,60$	$\leq 0,55$	max 0,040	max 0,040	$\leq 0,012$	Cu max 0,55
	S355J0	1.0553	$\leq 0,20 / 0,22$ ⑤	$\leq 1,60$	$\leq 0,55$	max 0,035	max 0,035	$\leq 0,012$	Cu max 0,55
	S355J2	1.0577	$\leq 0,20 / 0,22$ ⑤	$\leq 1,60$	$\leq 0,55$	max 0,030	max 0,030	-	Cu max 0,55
	E295	1.0050	-	-	-	max 0,045	max 0,045	$\leq 0,012$	-
	E335	1.0060	-	-	-	max 0,045	max 0,045	$\leq 0,012$	-
	E360	1.0070	-	-	-	max 0,045	max 0,045	$\leq 0,012$	-

02 Mechanical properties–Impact test value KV^⑥

Standard	Designation	Steel No.	Test temperature [°C]	Minimal impact test [J]
EN 10025-2	S235JR	1.0038	20	27
	S235J0	1.0114	0	27
	S235J2	1.0117	- 20	27
	S355JR	1.0045	20	27
	S355J0	1.0553	0	27
	S355J2	1.0577	- 20	27

03 Mechanical properties after peeling or drawing

Steel grade		As rolled (+AR) and peeled (+SH) ②					Drawn (+C)			
Designation	Steel No.	Size	R _{p0.2} min	R _m	A ₅ min	Hardness ④	Size	R _{p0.2} min	R _m	A ₅ min
		[mm]	[N/mm ²]	[N/mm ²]	[%]	[HB]	[mm]	[N/mm ²]	[N/mm ²]	[%]
S235JR S235J0 S235J2	1.0038 1.0114 1.0117	≤ 16	235	360-510	26	-	> 5 ≤ 10	355	470-840	8
							>10 ≤ 16	300	420-770	9
		> 16 ≤ 40	225	360-510	26	102-140	>16 ≤ 40	260	390-730	10
		> 40 ≤ 63	215	360-510	25	102-140	> 40 ≤ 63	235	380-670	11
		> 63 ≤ 80	215	360-510	24	102-140	> 63 ≤ 80	215	340-640	11
S355JR S355J0 S355J2	1.0045 1.0553 1.0577	≤ 16	355	470-630	22	-	> 5 ≤ 10	520	630-950	6
							>10 ≤ 16	450	580-880	7
		> 16 ≤ 40	345	470-630	22	146-187	>16 ≤ 40	350	530-850	8
		> 40 ≤ 63	335	470-630	21	146-187	> 40 ≤ 63	335	500-770	9
		> 63 ≤ 80	325	470-630	20	146-187	> 63 ≤ 80	315	470-740	9
E295	1.0050	≤ 16	295	470-610	20	-	> 5 ≤ 10	510	650-950	6
							>10 ≤ 16	420	600-900	7
		> 16 ≤ 40	285	470-610	20	140-181	>16 ≤ 40	320	550-850	8
		> 40 ≤ 63	275	470-610	19	140-181	> 40 ≤ 63	300	520-770	9
		> 63 ≤ 80	265	470-610	18	140-181	> 63 ≤ 80	255	470-740	9
E335	1.0060	≤ 16	335	570-710	16	-	> 5 ≤ 10	540	700-1050	5
							>10 ≤ 16	480	680-970	6
		> 16 ≤ 40	325	570-710	16	169-211	>16 ≤ 40	390	640-930	7
		> 40 ≤ 63	315	570-710	15	169-211	> 40 ≤ 63	340	620-870	8
		> 63 ≤ 80	305	570-710	14	169-211	> 63 ≤ 80	295	570-810	8

Free-cutting steels

- Chemical composition
- Mechanical properties after peeling or drawing
- Mechanical properties after heat-treatment

01 Chemical composition^①

Standards	Designation	Steel No.	C	Mn	Si	P	S	Other
FREE-CUTTING STEELS EN 10087 EN 10277-3	11SMn30	1.0715	≤ 0,14	0,90 1,30	≤ 0,05	max 0,11	0,27 0,33	-
	11SMnPb30	1.0718	≤ 0,14	0,90 1,30	≤ 0,05	max 0,11	0,27 0,33	Pb 0,20-0,35
	11SMn37	1.0736	≤ 0,14	1,00 1,50	≤ 0,05	max 0,11	0,34 0,40	-
	11SMnPb37	1.0737	≤ 0,14	1,00 1,50	≤ 0,05	max 0,11	0,34 0,40	Pb 0,20-0,35
FREE-CUTTING STEELS (intended for heat-treatment) EN 10087 EN 10277-3	35S20	1.0726	0,32 0,39	0,70 1,10	≤ 0,40	max 0,06	0,15 0,25	-
	35SPb20	1.0756	0,32 0,39	0,70 1,10	≤ 0,40	max 0,06	0,15 0,25	Pb 0,15-0,35
	46S20	1.0727	0,42 0,50	0,70 1,10	≤ 0,40	max 0,06	0,15 0,25	-
	46SPb20	1.0757	0,42 0,50	0,70 1,10	≤ 0,40	max 0,06	0,15 0,25	Pb 0,15-0,35

02 Mechanical properties after peeling or drawing

Steel grade		Size	As rolled (+AR) and peeled (+SH) ②		Drawn (+C)		
Designation	Steel No.		R _m	Hardness ④	R _{p0,2} min	R _m	A ₅ min
		[mm]	[N/mm ²]	[HB]	[N/mm ²]	[N/mm ²]	[%]
11SMn30 11SMnPb30 11SMn37 11SMnPb37	1.0715 1.0718 1.0736 1.0737	> 5 ≤ 10	380-570	-	440	510-810	6
		> 10 ≤ 16	380-570	-	410	490-760	7
		> 16 ≤ 40	380-570	112-169	375	460-710	8
		> 40 ≤ 63	370-570	112-169	305	400-650	9
		> 63 ≤ 80	360-520	107-154	245	360-630	9
35S20 35SPb20	1.0726 1.0756	> 5 ≤ 10	550-720	-	480	640-880	6
		> 10 ≤ 16	550-700	-	400	590-830	7
		> 16 ≤ 40	520-680	154-201	360	560-800	8
		> 40 ≤ 63	520-670	154-198	340	530-760	9
		> 63 ≤ 80	500-650	149-193	300	510-680	9
46S20 46SPb20	1.0727 1.0757	> 5 ≤ 10	590-800	-	570	740-980	5
		> 10 ≤ 16	590-780	-	470	690-930	6
		> 16 ≤ 40	590-760	175-225	400	640-880	7
		> 40 ≤ 63	580-730	172-216	380	610-850	8
		> 63 ≤ 80	560-710	166-211	340	580-820	8

03 Mechanical properties after heat-treatment

Steel grade		Size	Quenched and tempered and peeled (+QT+SH)		
Designation	Steel No.		R _{p 0,2} min	R _m	A ₅ min
			[mm]	[N/mm²]	[N/mm²]
35S20 35SPb20	1.0726 1.0756	> 5 ≤ 10	430	630-780	15
		> 10 ≤ 16	430	630-780	15
		> 16 ≤ 40	380	600-750	16
		> 40 ≤ 63	320	550-700	17
		> 63 ≤ 80	320	550-700	17
46S20 46SPb20	1.0727 1.0757	> 5 ≤ 10	490	700-850	12
		> 10 ≤ 16	490	700-850	12
		> 16 ≤ 40	430	650-800	13
		> 40 ≤ 63	370	630-780	14
		> 63 ≤ 80	370	630-780	14



Non-alloy steels for quenching and tempering

- Chemical composition
- Mechanical properties after peeling or drawing
- Mechanical properties after heat-treatment

01 Chemical composition^①

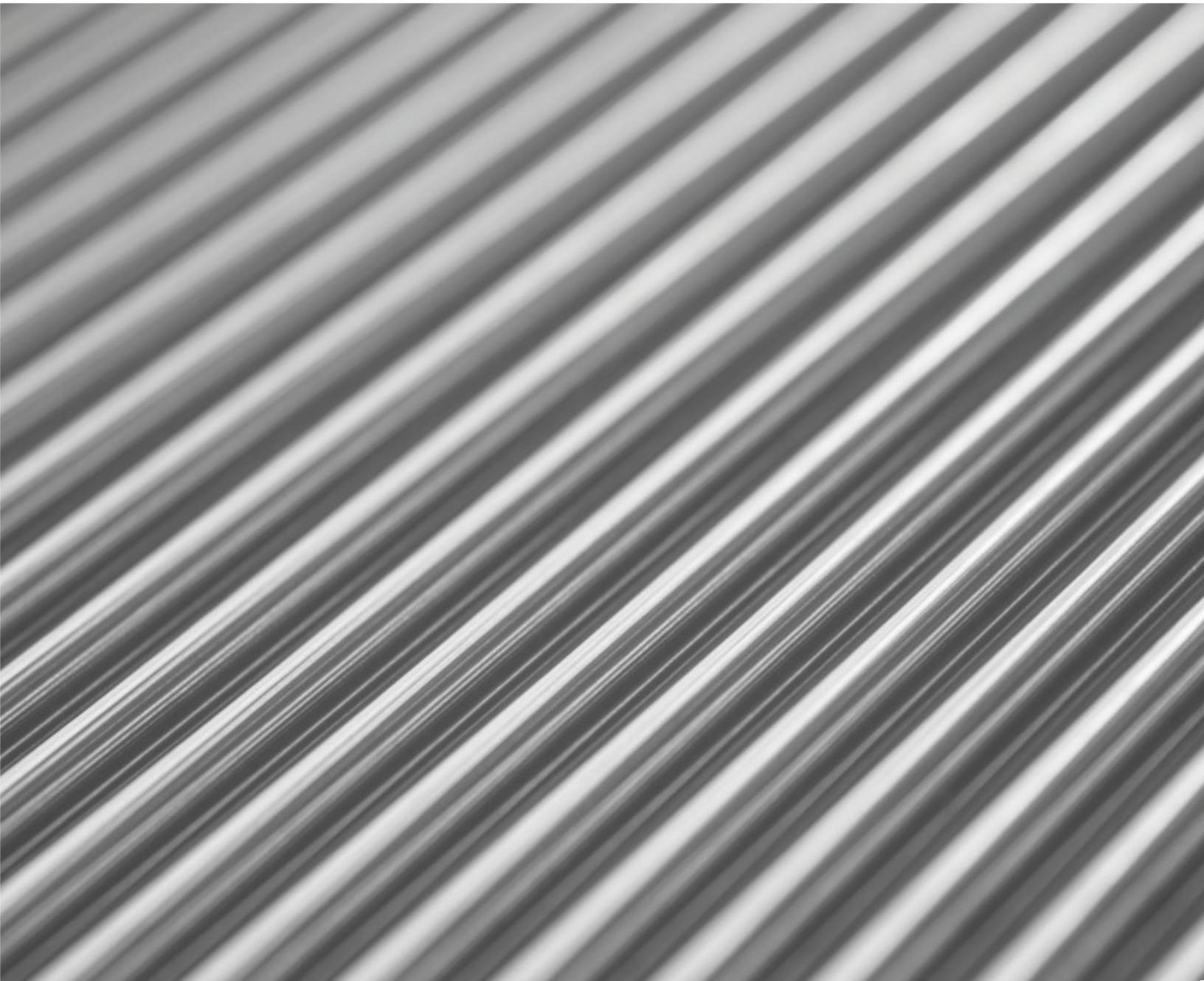
Standards	Designation	Steel No.	C	Mn	Si	P	S	Cr	Ni	Mo	Other
NON-ALLOY STEELS FOR QUENCHING AND TEMPERING EN 10083-2 EN 10277-5	C35	1.0501	0,32 0,39	0,50 0,80	≤ 0,40	max 0,045	max 0,045	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C35E	1.1181	0,32 0,39	0,50 0,80	≤ 0,40	max 0,030	max 0,035	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C35R	1.1180	0,32 0,39	0,50 0,80	≤ 0,40	max 0,030	0,020 0,040	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C45	1.0503	0,42 0,50	0,50 0,80	≤ 0,40	max 0,045	max 0,045	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C45E	1.1191	0,42 0,50	0,50 0,80	≤ 0,40	max 0,030	max 0,035	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C45R	1.1201	0,42 0,50	0,50 0,80	≤ 0,40	max 0,030	0,020 0,040	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C50E	1.1206	0,47 0,55	0,60 0,90	≤ 0,40	max 0,030	max 0,035	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C50R	1.1241	0,47 0,55	0,60 0,90	≤ 0,40	max 0,030	0,020 0,040	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63
	C55	1.0535	0,52 0,60	0,60 0,90	≤ 0,40	max 0,045	max 0,045	≤ 0,40	≤ 0,40	≤ 0,10	Cr+Mo+Ni ≤ 0,63

02 Mechanical properties after peeling or drawing

Steel grade		Size	As rolled (+AR) and peeled (+SH) ②		Drawn after annealing (+A+C)		
Designation	Steel No.		R _m	Hardness	R _{p0,2} min	R _m	A ₅ min
			[N/mm²]	[HB]	[N/mm²]	[N/mm²]	[%]
C35 C35E C35R	1.0501 1.1181 1.1180	> 5 ≤ 10	-	-	510	650-1000	6
		> 10 ≤ 16	-	-	420	600-950	7
		> 16 ≤ 40	520-700	154-207	320	580-880	8
		> 40 ≤ 63	520-700	154-207	300	550-840	9
		> 63 ≤ 80	520-700	154-207	270	520-800	9
C45 C45E C45R	1.0503 1.1191 1.1201	> 5 ≤ 10	-	-	565	750-1050	5
		> 10 ≤ 16	-	-	500	710-1030	6
		> 16 ≤ 40	580-820	172-242	410	650-1000	7
		> 40 ≤ 63	580-820	172-242	360	630-900	8
		> 63 ≤ 80	580-820	172-242	310	580-850	8

03 Mechanical properties after heat-treatment

Steel grade		Size	Quenched and tempered and peeled (+QT+SH)		
Designation	Steel No.		R _{p0.2} min	R _m	A ₅ min
		[mm]	[N/mm²]	[N/mm²]	[%]
C35 C35E C35R	1.0501 1.1181 1.1180	> 16 ≤ 40	380	600-750	19
		> 40 ≤ 80	320	550-700	20
C45 C45E C45R	1.0503 1.1191 1.1201	> 16 ≤ 40	430	650-800	16
		> 40 ≤ 80	370	630-780	17



Alloy steels for quenching and tempering

- Chemical composition
- Mechanical properties after peeling or drawing
- Mechanical properties after heat-treatment

01 Chemical composition^①

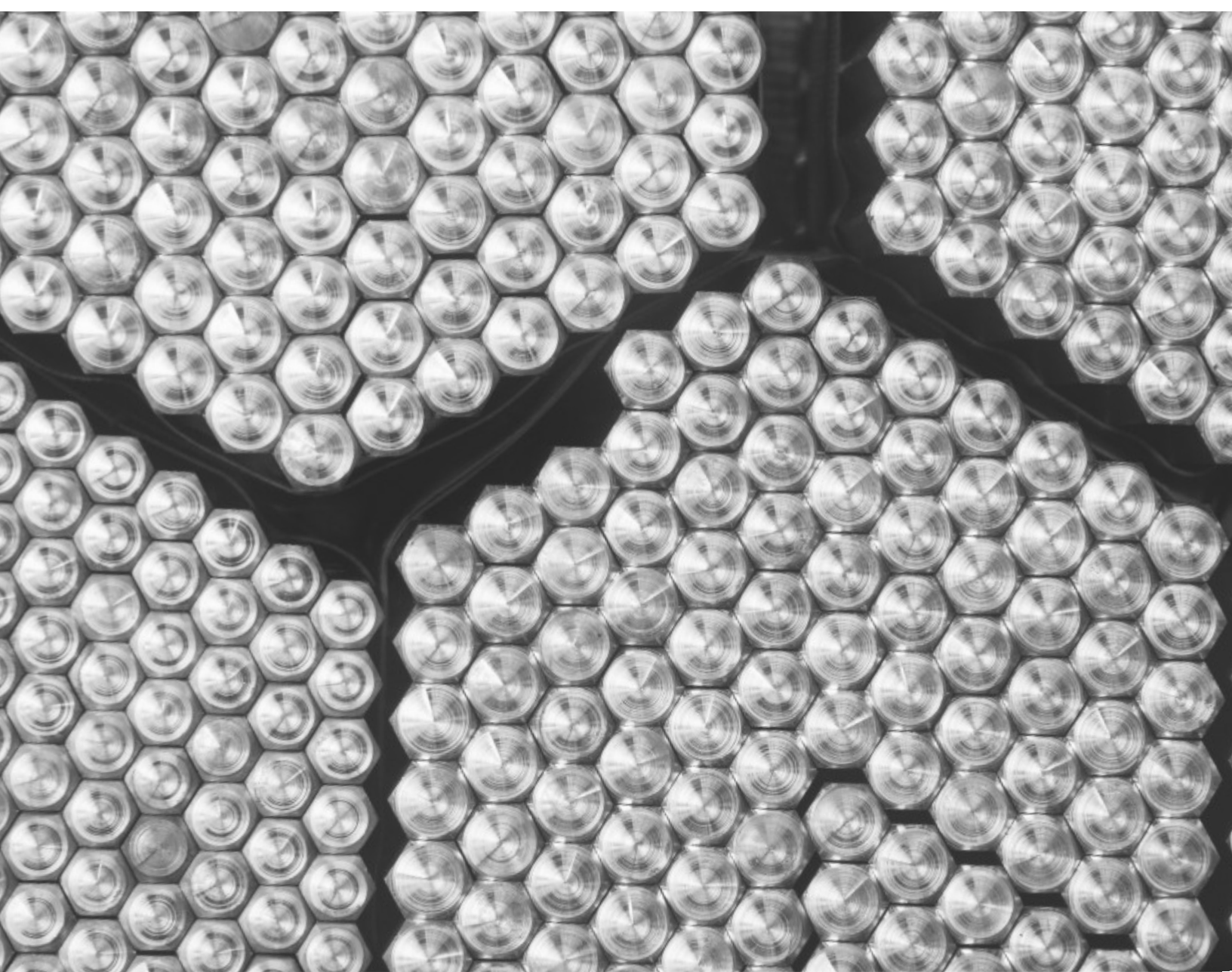
Standards	Designation	Steel No.	C	Mn	Si	P	S	Cr	Ni	Mo	Other
ALLOY STEELS FOR QUENCHING AND TEMPERING EN 10083-3 EN 10277-5	41Cr4	1.7035	0,38 0,45	0,60 0,90	≤ 0,40	max 0,025	max 0,035	0,90 1,20	-	-	-
	41CrS4	1.7039	0,38 0,45	0,60 0,90	≤ 0,40	max 0,025	0,020 0,040	0,90 1,20	-	-	-
	42CrMo4	1.7225	0,38 0,45	0,60 0,90	≤ 0,40	max 0,025	max 0,035	0,90 1,20	-	0,15 0,30	-
	42CrMoS4	1.7227	0,38 0,45	0,60 0,90	≤ 0,40	max 0,025	0,020 0,040	0,90 1,20	-	0,15 0,30	-
	51CrV4	1.8159	0,47 0,55	0,70 1,10	≤ 0,40	max 0,025	max 0,025	0,90 1,20	-	-	V 0,10-0,25

02 Mechanical properties after peeling or drawing

Steel grade		Size	As rolled (+AR) and peeled (+SH) ^②	Drawn after annealing (+A+C)
Designation	Steel No.		Hardness max	Hardness max
		[mm]	[HB]	[HB]
41Cr4 41CrS4	1.7035 1.7039	> 5 ≤ 10	-	295
		> 10 ≤ 16	-	285
		> 16 ≤ 40	241	280
		> 40 ≤ 63	241	270
		> 63 ≤ 80	241	270
42CrMo4 42CrMoS4	1.7225 1.7227	> 5 ≤ 10	-	300
		> 10 ≤ 16	-	290
		> 16 ≤ 40	241	285
		> 40 ≤ 63	241	280
		> 63 ≤ 80	241	280
51CrV4	1.8159	≤ 16	248	311
		> 16 ≤ 40	248	293
		> 40 ≤ 80	248	287

03 Mechanical properties after heat-treatment

Steel grade		Size	Quenched and tempered and peeled (+QT+SH)		
Designation	Steel No.		R _{p0.2} min	R _m	A ₅ min
		[mm]	[N/mm ²]	[N/mm ²]	[%]
41Cr4 41CrS4	1.7035 1.7039	> 16 ≤ 40	660	900-1100	12
		> 40 ≤ 80	560	800-950	14
42CrMo4 42CrMoS4	1.7225 1.7227	> 16 ≤ 40	750	1000-1200	11
		> 40 ≤ 80	650	900-1100	12
51CrV4	1.8159	> 16 ≤ 40	800	1000-1200	10
		> 40 ≤ 80	700	900-1100	12



Case hardening steels

- Chemical composition
- Required hardness after heat-treatment
- Mechanical properties after heat-treatment and after peeling or drawing (carbon steels)
- Mechanical properties after heat-treatment and after peeling or drawing (alloy steels)

01 Chemical composition^①

Standards	Designation	Steel No.	C	Mn	Si	P	S	Cr	Ni	Mo	Other
CASE HARDENING STEELS (non-alloy) EN 10084 EN 10277-4	C10E	1.1121	0,07 0,13	0,30 0,60	≤ 0,40	max 0,035	max 0,035	-	-	-	-
	C10R	1.1207	0,07 0,13	0,30 0,60	≤ 0,40	max 0,035	0,020 0,040	-	-	-	-
	C15E	1.1141	0,12 0,18	0,30 0,60	≤ 0,40	max 0,035	max 0,035	-	-	-	-
	C15R	1.1140	0,12 0,18	0,30 0,60	≤ 0,40	max 0,035	0,020 0,040	-	-	-	-
CASE HARDENING STEELS (alloy) EN 10084 EN 10277-4	16MnCr5	1.7131	0,14 0,19	1,00 1,30	≤ 0,40	max 0,025	max 0,035	0,80 1,10	-	-	-
	16MnCrS5	1.7139	0,14 0,19	1,00 1,30	≤ 0,40	max 0,025	0,020 0,040	0,80 1,10	-	-	-
	20MnCr5	1.7147	0,17 0,22	1,10 1,40	≤ 0,40	max 0,025	max 0,035	1,00 1,30	-	-	-
	20MnCrS5	1.7149	0,17 0,22	1,10 1,40	≤ 0,40	max 0,025	0,020 0,040	1,00 1,30	-	-	-

02 Required hardness after heat-treatment

Steel grade		State			
Designation	Steel No.	Soft annealed (+A)	Treated to hardness range (+TH)	Treated to ferrite-pearlite structure and hardness range (+FP)	Normalized (+N)
		Hardness [HB]			
C10E	1.1121	max 131	-	-	85-140
C10R	1.1207	max 131	-	-	85-140
C15E	1.1141	max 143	-	-	95-150
C15R	1.1140	max 143	-	-	95-150
16MnCr5	1.7131	max 207	156-207	140-187	138-187
16MnCrS5	1.7139	max 207	156-207	140-187	138-187
20MnCr5	1.7147	max 217	170-217	152-201	140-201
20MnCrS5	1.7149	max 217	170-217	152-201	140-201

03 Mechanical properties after heat-treatment and after peeling or drawing (carbon steels)

Steel grade		Size	As rolled (+AR) and peeled (+SH) ②		Drawn (+C)			Peeled after annealing {+A+SH}	Drawn after annealing (+A+C)
			Hardness	R _m	R _{p0.2} min	R _m	A ₅ min	Hardness	Hardness
Designation	Steel No.	[mm]	[HB]	[N/mm²]	[N/mm²]	[N/mm²]	[%]	[HB]	[HB]
C10E C10R	1.1121 1.1207	> 5 ≤ 10	-	-	350	460-760	8	-	225
		> 10 ≤ 16	-	-	300	430-730	9	-	216
		> 16 ≤ 40	92-163	310-550	250	400-700	10	131	207
		> 40 ≤ 63	92-163	310-550	200	350-640	12	131	190
		> 63 ≤ 80	92-163	310-550	180	320-580	12	131	172
C15E C15R	1.1141 1.1140	> 5 ≤ 10	-	-	380	500-800	7	-	238
		> 10 ≤ 16	-	-	340	480-780	8	-	231
		> 16 ≤ 40	98-178	330-600	280	430-730	9	143	216
		> 40 ≤ 63	98-178	330-600	240	380-670	11	143	198
		> 63 ≤ 80	98-178	330-600	215	340-600	12	143	1

Product accuracy

01 Classes of cross section tolerance and surface quality of bright steel products

Type of product		Cross - section tolerances						Surface quality class			
		IT11	IT10	IT9	IT8	IT7	IT6	1	2	3	4
Drawn bars		●	●	●				●	●	○	
		●						●	○		
		●						●	○		
Peeled bars		●	●	●				●	●	●	○
Ground bars				●	●	●	●	●	●	●	●

02 Straightness deviations acc. to EN 10278 ^{*)}

Product	Steel group	Nominal size [mm]	Max dimensional deviation [mm]
Round bars	< 0,25% C	-	1,0
	≥ 0,25% C, Alloy steels, quenched and tempered steels	-	1,5
	Stainless, tool and bearing steels	-	1,0
Square and hexagonal bars	<0,25% C	≤ 75 mm	1,0
	≥ 0,25% C, Alloy steels, quenched and tempered steels	≤ 75 mm	2,0
	Stainless, tool and bearing steels	≤ 75 mm	1,0

03 Surface quality classes

	Accuracy class ^①	
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Steel bars weight

Weight per metre (kg)

Size	Cross-section		
[mm]			
4	0,10	0,11	0,13
5	0,15	0,17	0,20
6	0,22	0,24	0,28
7	0,30	0,33	0,38
8	0,39	0,44	0,50
9	0,50	0,55	0,64
10	0,62	0,68	0,79
11	0,75	0,82	0,95
12	0,89	0,98	1,13
13	1,04	1,15	1,33
14	1,21	1,33	1,54
15	1,39	1,53	1,77
16	1,58	1,74	2,01
17	1,78	1,97	2,27
18	2,00	2,20	2,54
19	2,22	2,45	2,83
20	2,46	2,72	3,15
21	2,72	3,00	3,46
22	2,98	3,29	3,80
23	3,26	3,60	4,15
24	3,55	3,92	4,52
25	3,85	4,25	4,91
26	4,16	4,60	5,31
27	4,49	4,96	5,72
28	4,83	5,33	6,15
29	5,18	5,72	6,60
30	5,54	6,12	7,07
31	5,92	6,53	7,54
32	6,31	6,96	8,04
33	6,71	7,41	8,55
34	7,12	7,86	9,07
35	7,55	8,33	9,62
36	7,98	8,81	10,17
37	8,43	9,31	10,75
38	8,90	9,82	11,34
39	9,37	10,34	11,94

Size	Cross-section		
[mm]			
40	9,86	10,88	12,56
41	10,35	11,43	13,20
42	10,87	12,00	13,85
43	11,39	12,57	14,51
44	11,93	13,16	15,20
45	12,47	13,77	15,90
46	13,03	14,39	16,61
47	13,61	15,02	17,34
48	14,19	15,67	18,09
49	14,79	16,33	18,85
50	15,40	17,00	19,63
51	16,02	17,69	20,42
52	16,66	18,39	21,23
53	17,30	19,10	22,05
54	17,96	19,83	22,89
55	18,63	20,57	23,75
56	19,32	21,32	24,62
57	20,01	22,09	25,50
58	20,72	22,88	26,41
60	22,18	24,48	28,26
61	22,92	25,30	29,21
62	23,68	26,14	30,18
63	24,45	26,99	31,16
64	25,23	27,85	32,15
65	26,03	28,73	33,17
66	26,83	29,62	34,19
67	27,65	30,53	35,24
68	28,48	31,44	36,30
69	29,33	32,37	37,37
70	30,18	33,32	38,47
71	31,05	34,28	39,57
72	31,93	35,25	40,69
73	32,83	36,24	41,83
74	33,73	37,24	42,99
75	34,65	38,25	44,16
80	39,46	43,51	50,24

Quality



Standard: IATF 16949:2016

Scope: Production of cold drawn steel wires and bright steel bars, peeled and ground bars

Proof has been furnished by means of an audit that the requirements of IATF 16949:2016 are met.

Standard: ISO 9001:2015

Scope: Production of cold drawn steel wires and bright steel bars, peeled and ground bars

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

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