

 Hasçelik

Crombar

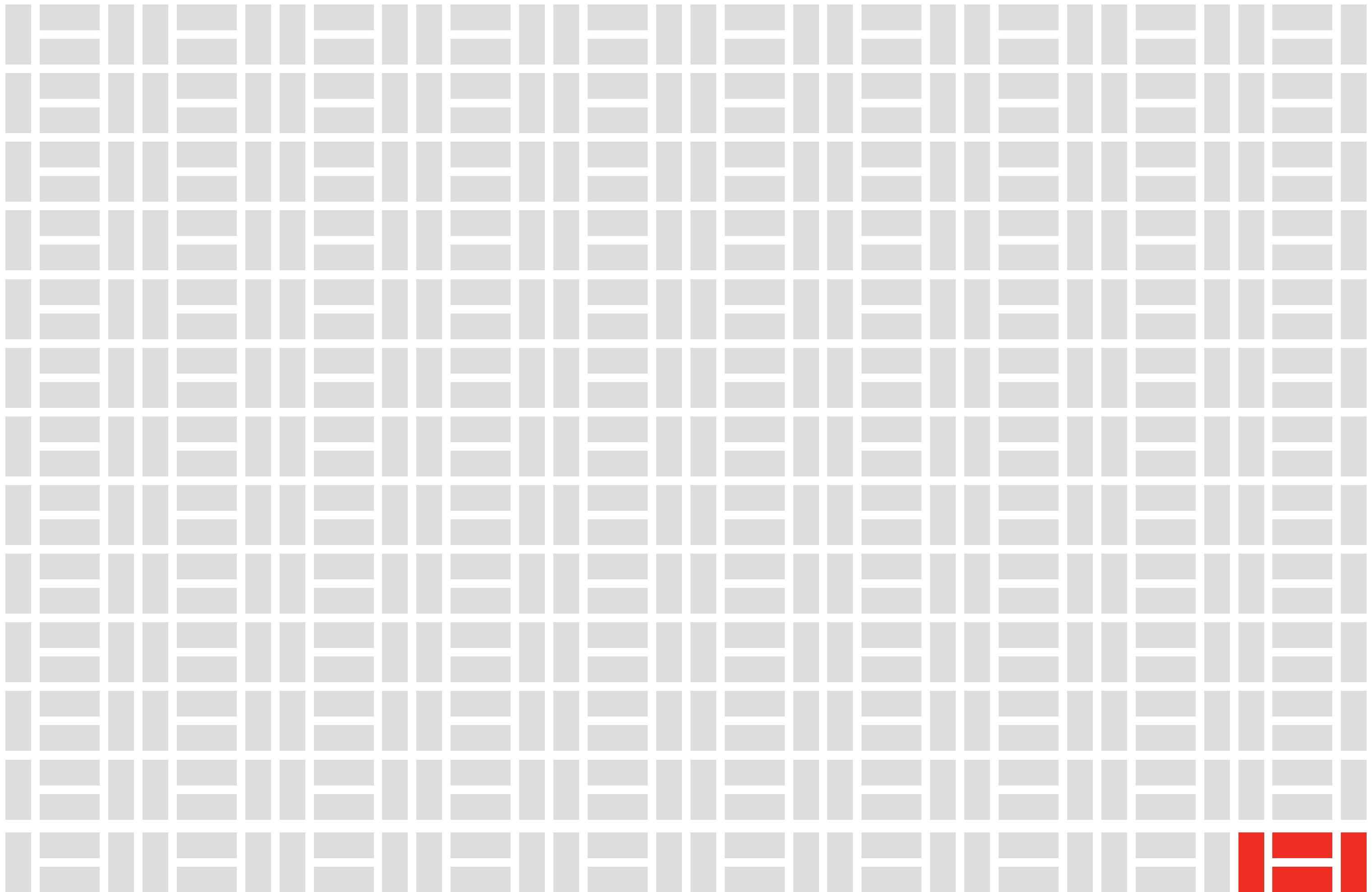
Value Journey of Steel



Visit Our
Production Plant

cbr Crom Plated Bar
cbi Induction Hardened, Tempered Chrome Plated Bar and Linear Shaft
tss H8 SRB/Honed Seamless Tube
tsw H8 SRB/Honed Welded Tube
tcp Chrome Plated Tube

tci Induction Hardened Chrome Plated Tube
tcs H9 Cold Drawn Seamless Tube // Suitable for Honing and SRB
tcw H9 Cold Drawn Welded Tube // Suitable for Honing and SRB
pbi Induction Hardened Ground Bar
tpi Induction Hardened Ground Tube



About Us

Our Story

Established in Konya in 1968, HASÇELİK has built a reputation in specializing in high-quality steel, precision cold-finished bright steel, and tubing. In 2023, with an investment surpassing 35 million Euros, we launched Turkey's first chrome plated bar and SRB (honed) tube facility that is both technologically advanced and compliant with Industry 4.0 standards. The Chrome Plated Bar Manufacturing Plant stands as a solitary provider capable of fulfilling the entire chrome plated bar demand of Turkey

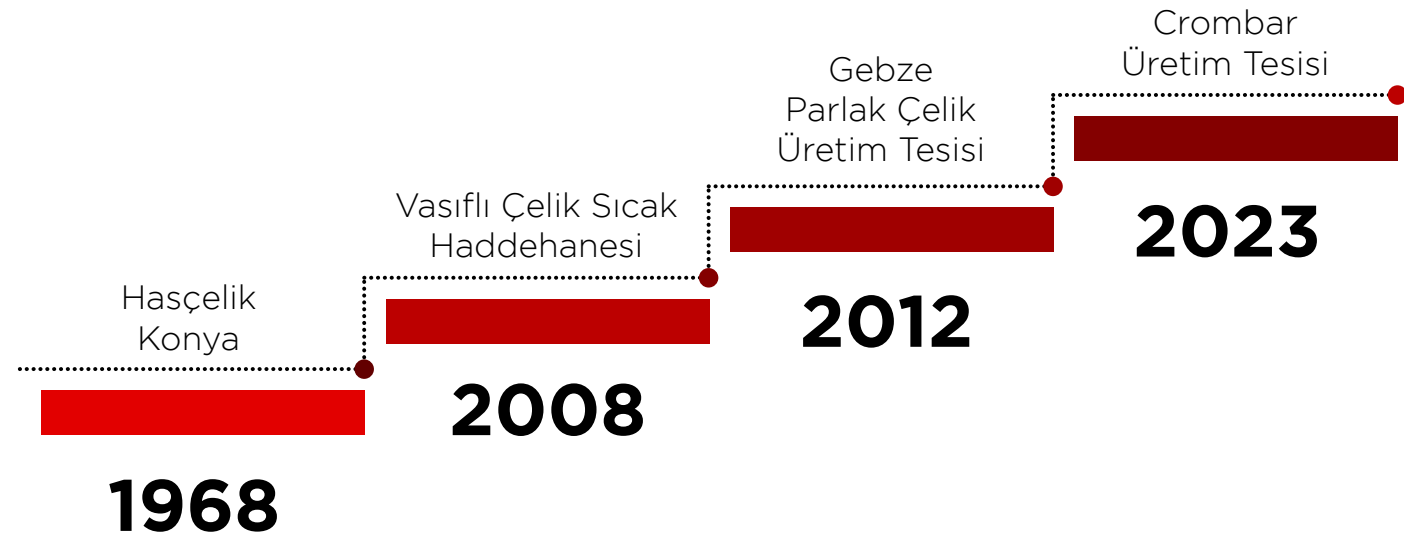
through domestic production. Spanning over a 55,000 square meter area with 40,000 square meters dedicated to indoor manufacturing, the plant significantly contributes to the local economy by directly employing over 200 individuals. Our manufacturing output serves a wide range of industries, notably in hydraulic, pneumatic, automotive, agriculture, and construction machinery sectors, addressing their critical material requirements.



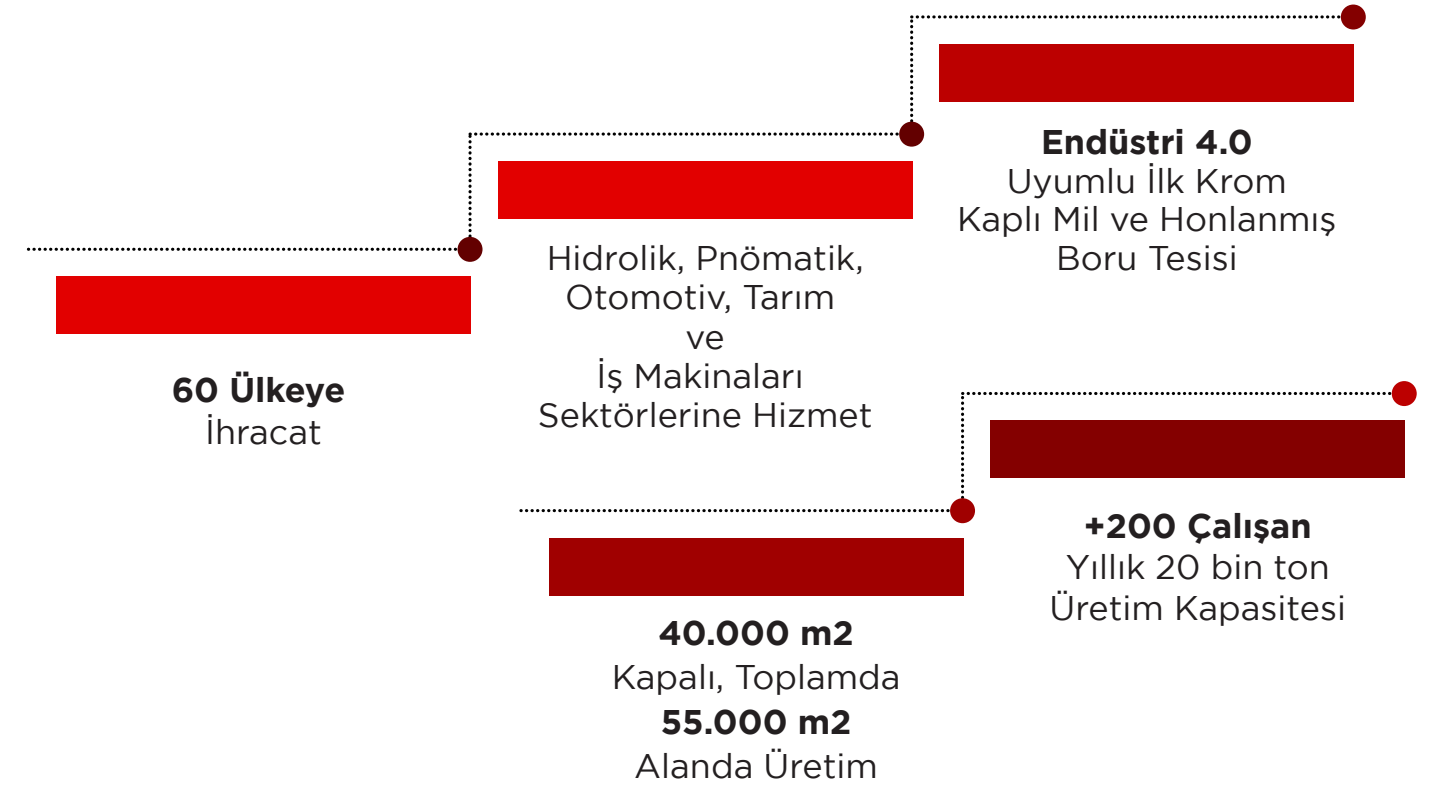
From 1968 to the Present...

A Half-Century of Expertise

Inception Phase

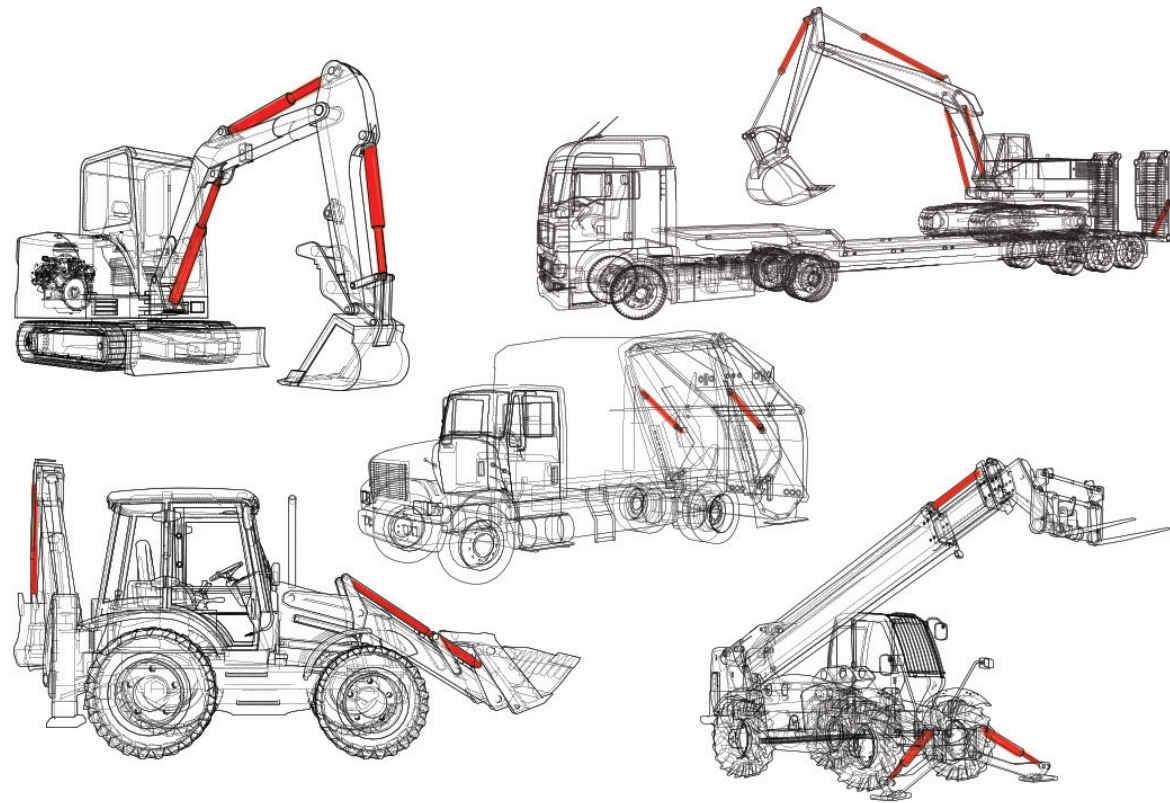


Crombar Plant Information



Areas of Application

- Shock Absorber
- Vehicle-Mounted Equipment
- Power Transmission Systems
- Energy
- Automotive
- Hydraulic
- Pneumatic
- Construction Machinery
- Linear Systems
- Machinery Manufacturing
- Marine
- Automation Systems
- Lifting & Handling Equipment
- Agricultural Machinery



Export

Crombar exports to **over 60 countries** across all five continents.

Exporting to
60+
Countries

High-Quality
Production

On-Time
Delivery

End-to-End
Tracking

We conduct
exports
across
all five
continents,
including
Asia,
Europe, the
Americas,
Africa, and
Australia.



Our Certifications

The Hasçelik Quality Policy sets the fundamental rules for operational methods. Within this framework, the established quality management systems ensure the achievement of quality objectives in every area of production. Hasçelik employees also work towards the defined goals...



We are certified with the ISO 9001 Quality Management System.



We are certified with the ISO 45001 Occupational Health and Safety Management System certification.



We are certified with the ISO 14001 Environmental Management System certification.



We are certified with the ISO 27001 Information Security Management certification.

Laboratory

Our laboratory is equipped with devices and equipment featuring the latest technology.

Within our laboratory, we conduct measurements and tests on the chrome plating layer and perform chemical analyses in chrome plating baths.

The inspection, measurement, and testing devices used in our Test Laboratory include:

- Salt Spray Test Device
- Hardness Tester
- Optical Microscope
- Sample Cutting, Bakelite Embedding, Sanding, and Polishing Devices
- Coulometric Coating Thickness Tester CMS2
- Coating Thickness Measurement Device
- Kocour Centrifuge
- Titrette Burette Titrator
- Portable Hardness Tester
- Portable Surface Roughness Measuring Device
- Portable Conductivity and pH Measurement Device



Pre-Chrome Plating Inspections

- Dimensional checks
- Straightness
- Surface roughness
- Inspection of visual defects
- Hardness depth in hardened surfaces

During Chrome Plating Inspections

- Temperature of the chrome baths
- Chromic acid concentration
- Monitoring of process parameters
- Control of chemicals in chrome baths

Post-Chrome Plating Inspections

- Coating thickness
- Surface roughness
- Visual inspection

Laboratory Controls

- Hardness of the coating after chrome plating
- Micro crack inspection
- Corrosion resistance testing
- Heat treatment hardness depth



*Chrome plated parts are subjected to salt testing in our laboratory according to ISO 9227 standard. The evaluation of salt testing is conducted according to ISO 10289 standard.

Crombar Product Lineup

cbr Chrome Plated Bar

cbi Induction Hardened, Tempered Chrome Plated Bar and Linear Shaft

tss H8 SRB/Honed Seamless Tube

tsw H8 SRB/Honed Welded Tube

tcp Chrome Plated Tube

tci Induction Hardened Chrome Plated Tube

tcs H9 Cold Drawn Seamless Tube / Suitable for Honing and SRB

tcw H9 Cold Drawn Welded Tube / / Suitable for Honing and SRB

tho HPL Tube Oiled EN 10305-4

thp HPL Tube Phosphated EN 10305-4

thg HPL Tube Galvanized EN 10305-4

pbi Induction Hardened Ground Bar

tpi Induction Hardened Ground Tube

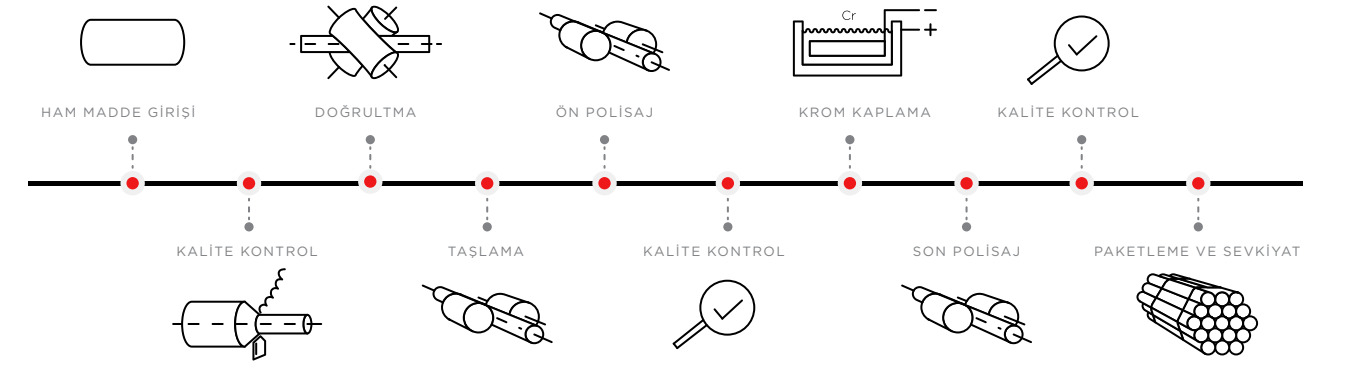
cbr Chrome Plated Bars



cbr Chrome Plated Bars

cbr Chrome Plated Bars

SHAPE	PRODUCT GROUP	SIZE	QUALITY
ROUND	Chrome Plated Bar	Ø 10-160 mm range	C35 C45 20MnV(S)6 38MnV(S)6 X20Cr13 42CrMo(S)4 42CrMo(S)4+QT 304-310-316



cbr 150 Chrome Plated Bar

STEEL GRADE

C35 - C45 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X20Cr13 - 42CrMo(S)4+QT- 304 - 310 - 316

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
42CrMo(S)4 42CrMo(S)4+QT	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70					0,08-0,20	≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035
X20Cr13	EN 10088	0,16-0,25	Max. 1	Max. 1,5	12-14					Max. 0,040	Max. 0,015
304	ASTM A240	≤ 0,07	≤ 0,75	≤ 2,00	17,5-19,0	8,0-10,5		≤ 0,10		Max. 0,045	≤ 0,030
310	ASTM A276	≤ 0,25	≤ 1,50	≤ 2,00	24,0-26,0	19,0-22,0				Max. 0,045	≤ 0,030
316	ASTM A240	≤ 0,08	≤ 0,75	≤ 2,00	16,0-18,0	10,0-14,0	2,00-3,00	≤ 0,10		Max. 0,045	≤ 0,030

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10083	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
		Ø≥100	≥ 275	≥ 560	≥ 16
C35	EN 10083	16≤Ø≤36	≥ 315	≥ 580	≥ 18
		36≤Ø≤100	≥ 275	≥ 560	≥ 19
42CrMo(S)4	EN 10083	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
42CrMo(S)4+QT	EN 10083	Ø≤16	min.900	1000-1200	≥ 9
		16≤Ø≤40	min.750	1000-1200	≥ 11
		40≤Ø≤100	min.650	900-1100	≥ 12
		100≤Ø≤160	min.550	800-950	≥ 13
20MnV(S)6	1.5217	Ø≤16	≥ 450	550-850	≥ 10
		18≤Ø≤20	≥ 450	550-850	≥ 17
		20≤Ø≤65	≥ 450	530-850	≥ 18
		65≤Ø≤160	≥ 390	max. 700	≥ 21
38MnV(S)6	EN 10267	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
X20Cr13	EN 10088	-	-	max. 700	15
304	ASTM A240	-	205	515	40
310	ASTM A276	-	205	515	40
316	ASTM A240	-	205	515	40

cbr 150 CHROME PLATED BAR VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C35, C45, 42CrMo(S)4, 20MnV(S)6, 38MnV(S)6, X20Cr13, 42CrMo(S)4+QT 304, 310, 316	10-160	f7	min. 12	HV _{0,1} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	150	300

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

cbr 250 Chrome Plated Bar

STEEL GRADE

C35 - C45 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X20Cr13 - 42CrMo(S)4+QT- 304 - 310 - 316

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
42CrMo(S)4 42CrMo(S)4+QT	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70					0,08-0,20	≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267:98	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035
X20Cr13	EN 10088	0,16-0,25	Max. 1	Max. 1,5	12-14					Max. 0,040	Max. 0,015
304	ASTM A240	≤ 0,07	≤ 0,75	≤ 2,00	17,5-19,0	8,0-10,5		≤ 0,10		Max. 0,045	≤ 0,030
310	ASTM A276	≤ 0,25	≤ 1,50	≤ 2,00	24,0-26,0	19,0-22,0				Max. 0,045	≤ 0,030
316	ASTM A240	≤ 0,08	≤ 0,75	≤ 2,00	16,0-18,0	10,0-14,0	2,00-3,00	≤ 0,10		Max. 0,045	≤ 0,030

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10083	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
		Ø≥100	≥ 275	≥ 560	≥ 16
C35	EN 10083	16≤Ø≤36	≥ 315	≥ 580	≥ 18
		36≤Ø≤100	≥ 275	≥ 560	≥ 19
42CrMo(S)4	EN 10083	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
42CrMo(S)4+QT	EN 10083	Ø≤16	min.900	1000-1200	≥ 9
		16≤Ø≤40	min.750	1000-1200	≥ 11
		40≤Ø≤100	min.650	900-1100	≥ 12
		100≤Ø≤160	min.550	800-950	≥ 13
20MnV(S)6	1.5217	Ø≤16	≥ 450	550-850	≥ 10
		18≤Ø≤20	≥ 450	550-850	≥ 17
		20≤Ø≤65	≥ 450	550-850	≥ 18
		65≤Ø≤160	≥ 390	530-850	≥ 21
38MnV(S)6	EN 10267	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
X20Cr13	EN 10088	-	-	max. 700	15
304	ASTM A240	-	205	515	40
310	ASTM A276	-	205	515	40
316	ASTM A240	-	205	515	40

cbr 250 CHROME PLATED BAR VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C35, C45, 42CrMo(S)4, 20MnV(S)6, 38MnV(S)6, X20Cr13, 42CrMo(S)4+QT 304, 310, 316	10-160	f7	min. 20	HV _{0,1} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	250	500

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

cbr 500 Chrome Plated Bar

STEEL GRADE

C35 - C45 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X20Cr13 - 42CrMo(S)4+QT- 304 - 310 - 316

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
42CrMo(S)4 42CrMo(S)4+QT	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70					0,08-0,20	≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267:98	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035
X20Cr13	EN 10088	0,16-0,25	Max. 1	Max. 1,5	12-14					Max. 0,040	Max. 0,015
304	ASTM A240	≤ 0,07	≤ 0,75	≤ 2,00	17,5-19,0	8,0-10,5		≤ 0,10		Max. 0,045	≤ 0,030
310	ASTM A276	≤ 0,25	≤ 1,50	≤ 2,00	24,0-26,0	19,0-22,0				Max. 0,045	≤ 0,030
316	ASTM A240	≤ 0,08	≤ 0,75	≤ 2,00	16,0-18,0	10,0-14,0	2,00-3,00	≤ 0,10		Max. 0,045	≤ 0,030

MECHANICAL PROPERTIES


Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10083	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
C35	EN 10083	Ø≤100	≥ 275	≥ 560	≥ 16
		36≤Ø≤100	≥ 275	≥ 560	≥ 19
42CrMo(S)4	EN 10083	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
42CrMo(S)4+QT	EN 10083	Ø≥100	500-550	750-950	≥ 16
		Ø≤16	min.900	1000-1200	≥ 9
42CrMo(S)4+QT	EN 10083	16≤Ø≤40	min.750	1000-1200	≥ 11
		40≤Ø≤100	min.650	900-1100	≥ 12
		100≤Ø≤160	min.550	800-950	≥ 13
20MnV(S)6	1.5217	Ø≤16	≥ 450	550-850	≥ 10
		18≤Ø≤20	≥ 450	550-850	≥ 17
		20≤Ø≤65	≥ 450	550-850	≥ 18
38MnV(S)6	EN 10267	65≤Ø≤160	≥ 390	530-850	≥ 21
		Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
X20Cr13	EN 10088	Ø≥100	500-550	750-950	≥ 16
		-	-	max. 700	15
304	ASTM A240	-	205	515	40
310	ASTM A276	-	205	515	40
316	ASTM A240	-	205	515	40

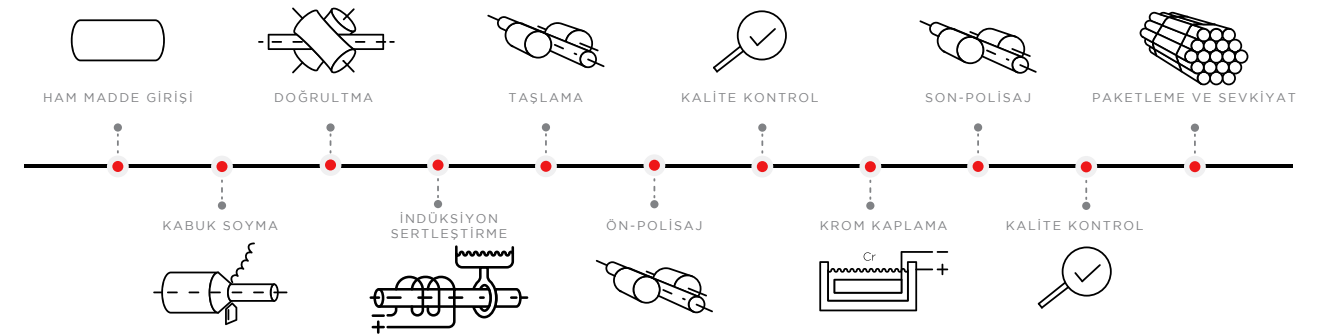
cbr 500 CHROME PLATED BAR VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C35, C45, 42CrMo(S)4, 20MnV(S)6, 38MnV(S)6, X20Cr13, 42CrMo(S)4+QT 304, 310, 316	10-160	f7	min. 30	HV _{0,1} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	500	1000

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

cbi Induction Hardened Chrome Plated Bar

SHAPE	PRODUCT GROUP	SIZE	QUALITY
ROUND 	Induction Hardened Chrome Plated Bar	Ø 10-160 mm range	C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13



cbi 150 Induction Hardened Chrome Plated Bar

STEEL GRADE

C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
Cf53	Cf53	0,50-0,57	0,15-0,35	0,40-0,70						≤ 0,025	≤ 0,035
C55	EN 10083	0,52-0,60	0,10-0,40	0,60-0,90	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,045	≤ 0,045
42CrMo(S)4	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70					0,08-0,20	≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035
X46Cr13	EN 10088	0,43-0,50	≤ 1,00	≤ 1,00	12,5-14,5					≤ 0,040	≤ 0,030

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10277	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
C35	EN 10277	Ø≥100	≥ 275	≥ 560	≥ 16
		16≤Ø≤36	≥ 315	≥ 580	≥ 18
Cf53	Cf53	36≤Ø≤100	≥ 275	≥ 560	≥ 19
		Ø≤16	≥ 510	740-880	≥ 12
C55	EN 10083	16≤Ø≤40	≥ 430	690-830	≥ 14
		40≤Ø≤100	≥ 400	640-780	≥ 15
42CrMo(S)4	EN 10277	Ø≤16	≥ 550	800-950	12
		16≤Ø≤40	≥ 490	750-900	14
20MnV(S)6	1.5217	40≤Ø≤100	≥ 420	700-850	15
		Ø≤16	≥ 900	1100-1300	≥ 14
38MnV(S)6	EN 10267	16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
X46Cr13+A	EN 10088	Ø≤16	≥ 450	550-850	≥ 17
		18≤Ø≤20	≥ 450	550-850	≥ 18
20MnV(S)6	1.5217	20≤Ø≤65	≥ 450	530-850	≥ 21
		65≤Ø≤160	≥ 390	max. 700	15
38MnV(S)6	EN 10267	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
X46Cr13+A	EN 10088	Ø≥100	500-550	750-950	≥ 16
		-	-	≤ 800	-

cbi 150 CHROME PLATED BAR VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13	10-160	f7	min. 12	HV _{0,05} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	150	300

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

INDUCTION HARDENING

Steel Grade	Hardness	Dimensional	Hardness Depth (mm)
C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13	42-62 HRC	Ø10	0,7-0,9
		Ø12-Ø18	0,9-1,1
		Ø20-Ø30	1,2-1,4
		Ø30-Ø60	1,4-2,5
		Ø60-Ø80	2,5-2,7
		Ø80-Ø160	3,2-5,0

cbi 250 Induction Hardened Chrome Plated Bar

STEEL GRADE

C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
Cf53	Cf53	0,50-0,57	0,15-0,35	0,40-0,70						≤ 0,025	≤ 0,035
C55	EN 10083	0,52-0,60	0,10-0,40	0,60-0,90	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,045	≤ 0,045
42CrMo(S)4	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70					0,08-0,20	≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035
X46Cr13	EN 10088	0,43-0,50	≤ 1,00	≤ 1,00	12,5-14,5					≤ 0,040	≤ 0,030

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10277	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
C35	EN 10277	Ø≥100	≥ 275	≥ 560	≥ 16
		16≤Ø≤36	≥ 315	≥ 580	≥ 18
Cf53	Cf53	36≤Ø≤100	≥ 275	≥ 560	≥ 19
		Ø≤16	≥ 510	740-880	≥ 12
C55	EN 10083	16≤Ø≤40	≥ 430	690-830	≥ 14
		40≤Ø≤100	≥ 400	640-780	≥ 15
42CrMo(S)4	EN 10277	Ø≤16	≥ 550	800-950	12
		16≤Ø≤40	≥ 490	750-900	14
20MnV(S)6	1.5217	40≤Ø≤100	≥ 420	700-850	15
		Ø≤16	≥ 900	1100-1300	≥ 14
38MnV(S)6	EN 10267	16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
X46Cr13+A	EN 10088	Ø≤16	≥ 450	550-850	≥ 17
		18≤Ø≤20	≥ 450	550-850	≥ 18
20MnV(S)6	1.5217	20≤Ø≤65	≥ 450	530-850	≥ 21
		65≤Ø≤160	≥ 390	max. 700	15
38MnV(S)6	EN 10267	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
X46Cr13+A	EN 10088	Ø≥100	500-550	750-950	≥ 16
		-	-	≤ 800	-

cbi 250 CHROME PLATED BAR VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13	10-160	f7	min. 20	HV _{0,05} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	250	500

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

INDUCTION HARDENING

Steel Grade	Hardness	Dimensional	Hardness Depth (mm)
C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13	42-62 HRC	Ø10	0,7-0,9
		Ø12-Ø18	0,9-1,1
		Ø20-Ø30	1,2-1,4
		Ø30-Ø60	1,4-2,5
		Ø60-Ø80	2,5-2,7
		Ø80-Ø160	3,2-5,0

cbi 500 Induction Hardened Chrome Plated Bar

STEEL GRADE

C35 - C45 - C55 - Cf53 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6 - X46Cr13

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
Cf53	Cf53	0,50-0,57	0,15-0,35	0,40-0,70						≤ 0,025	≤ 0,035
C55	EN 10083	0,52-0,60	0,10-0,40	0,60-0,90	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,045	≤ 0,045
42CrMo(S)4	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70				0,08-0,20		≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035
X46Cr13	EN 10088	0,43-0,50	≤ 1,00	≤ 1,00	12,5-14,5					≤ 0,040	≤ 0,030

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10277	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
		Ø≥100	≥ 275	≥ 560	≥ 16
C35	EN 10277	16≤Ø≤36	≥ 315	≥ 580	≥ 18
		36≤Ø≤100	≥ 275	≥ 560	≥ 19
Cf53	Cf53	Ø≤16	≥ 510	740-880	≥ 12
		16≤Ø≤40	≥ 430	690-830	≥ 14
		40≤Ø≤100	≥ 400	640-780	≥ 15
C55	EN 10083	Ø≤16	≥ 550	800-950	12
		16≤Ø≤40	≥ 490	750-900	14
		40≤Ø≤100	≥ 420	700-850	15
42CrMo(S)4	EN 10277	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
20MnV(S)6	1.5217	Ø≤16	≥ 450	550-850	≥ 17
		18≤Ø≤20	≥ 450	550-850	≥ 18
		20≤Ø≤65	≥ 450	530-850	≥ 21
38MnV(S)6	EN 10267	65≤Ø≤160	≥ 390	max. 700	15
		Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
X46Cr13+A	EN 10088	Ø≥100	500-550	750-950	≥ 16
		-	-	≤ 800	-

cbi 500 CHROME PLATED BAR VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C35, C45, 42CrMo(S)4, 20MnV(S)6, 38MnV(S)6, X46Cr13	10-160	f7	min. 30	HV _{0,1} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	500	1000

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

INDUCTION HARDENING

Steel Grade	Hardness	Dimensional	Hardness Depth (mm)
C35, C45, C55, 42CrMo(S)4, 20MnV(S)6, 38MnV(S)6, X46Cr13	42-62 HRC	Ø10	0,7-0,9
		Ø12-Ø18	0,9-1,1
		Ø20-Ø30	1,2-1,4
		Ø30-Ø60	1,4-2,5
		Ø60-Ø80	2,5-2,7
		Ø80-Ø160	3,2-5,0

cbi Linear Shaft

SHAPE	PRODUCT GROUP	SIZE	QUALITY
ROUND 	Linear Shaft	Ø 10-160 mm range	C45 - Cf53 - C55 - C60 - 42CrMo(S)4 - 50CrMo(S)4 - X46Cr13 - X90CrMoV18

STEEL GRADE

C45 - Cf53 - C55 - C60 - 42CrMo(S)4 - 50CrMo(S)4 - X46Cr13 - X90CrMoV18

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40				≤ 0,035	≤ 0,035
Cf53	Cf53	0,50-0,57	0,15-0,35	0,40-0,70						≤ 0,025	≤ 0,035
C55	EN 10083	0,52-0,60	0,10-0,40	0,60-0,90	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,045	≤ 0,045
C60	EN 10083	0,57-0,65	≤ 0,40	0,60-0,90	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,045	≤ 0,045
42CrMo(S)4	EN 10083	0,16-0,22	0,10-0,50	1,30-1,70				0,08-0,20		≤ 0,035	≤ 0,035
50CrMo(S)4	EN 10083	0,46-0,54	≤ 0,40	0,50-0,80	0,90-1,20		0,15-0,30			≤ 0,025	≤ 0,035
X46Cr13	EN 10088	0,43-0,50	≤ 1,00	≤ 1,00	12,5-14,5					≤ 0,040	≤ 0,030
X90CrMoV18	EN 10088	0,85-0,95	≤ 1,00	≤ 1,00	17-19		0,90-1,30		0,07-0,12	≤ 0,040	≤ 0,030

cbi Linear Shaft

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10083	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
		Ø≥100	≥ 275	≥ 560	≥ 16
Cf53	Cf53	Ø≤16	≥ 510	740-880	≥ 12
		16≤Ø≤40	≥ 430	690-830	≥ 14
		40≤Ø≤100	≥ 400	640-780	≥ 15
C55	EN 10083	Ø≤16	≥ 550	800-950	12
		16≤Ø≤40	≥ 490	750-900	14
		40≤Ø≤100	≥ 420	700-850	15
C60	EN 10083	Ø≤16	≥ 580	850-1000	11
		16≤Ø≤40	≥ 520	800-950	13
		40≤Ø≤100	≥ 450	750-900	14
42CrMo(S)4	EN 10083	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
50CrMo(S)4	EN 10083	Ø≤16	≥ 900	1100-1300	≥ 9
		16≤Ø≤40	≥ 780	1000-1200	≥ 10
		40≤Ø≤100	≥ 700	900-1100	≥ 12
		100≤Ø≤160	≥ 650	850-1000	≥ 13
X46Cr13+A	EN 10088	-	-	≤ 800	-
X90CrMoV18+A	EN 10088	Ø≤50	≥ 427	≥ 738	≥ 9

LINEAR SHAFT CHROME PLATING VALUES

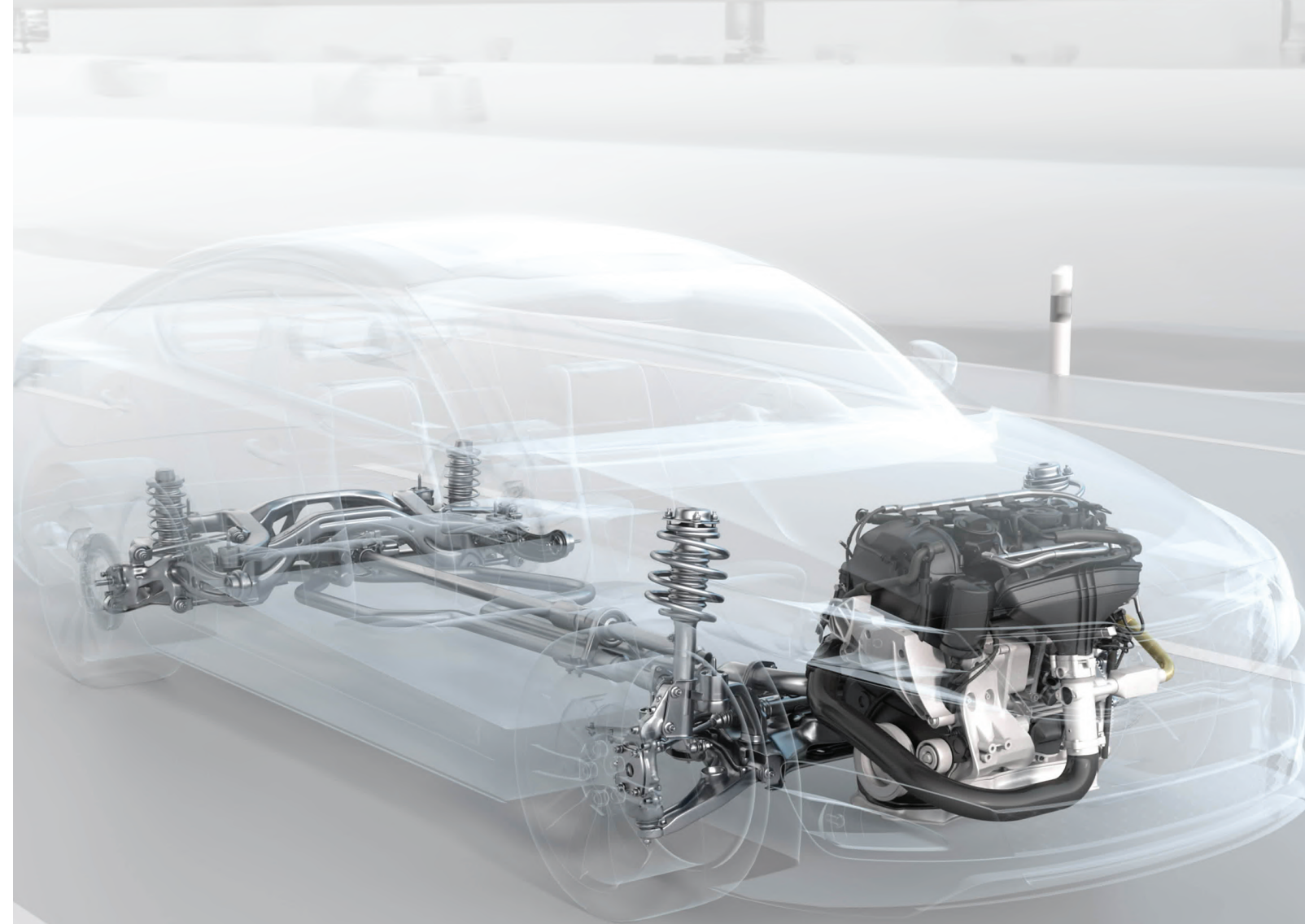
Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
C45 - Cf53 - C55 - C60 - 42CrMo(S)4 - 50CrMo(S)4 - X46Cr13 - X90CrMoV18	10-160	h6	min. 20	HV _{0,1} min.1000	Ra ≤0,10 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	250	500

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.

INDUCTION HARDENING

Steel Grade	Hardness	Dimensional	Hardness Depth (mm)
C45 - Cf53 - C55 - C60 - 42CrMo(S)4 - 50CrMo(S)4 - X46Cr13 - X90CrMoV18	42-62 HRC	Ø10	0,7-0,9
		Ø12-Ø18	0,9-1,1
		Ø20-Ø30	1,2-1,4
		Ø30-Ø60	1,4-2,5
		Ø60-Ø80	2,5-2,7
		Ø80-Ø160	3,2-5,0

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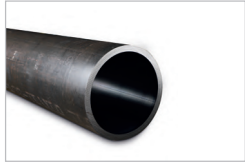
H8 SRB/Honed Tubes



tss H8 SRB/Honed Seamless Tube

Seamless tubes produced with SRB process according to EN 10305-1 standard, with H8 tolerance.

*SRB: Skived and Roller Burnished (a technique involving peeling and polishing by compression with balls)

SHAPE	PRODUCT GROUP	SIZE	QUALITY
ROUND 	H8 SRB/Honed Seamless Tube	[50-40] mm/ [270-220] mm	E355+SR

CHEMICAL COMPOSITION (IN % BY WEIGHT)

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	% Ni	Al Min	% P Max	% S Max
E355 + SR	EN 10305-1	max 0,22	max 0,55	max 1,60				0,020	0,025	0,025

MECHANICAL PROPERTIES


Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45*	EN 10083-2	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤100	≥ 305	≥ 580	≥ 16
		Ø≥100	≥ 275	≥ 560	≥ 16
42CrMo4	EN 10083-3 DIN EN ISO 683-2	Ø≤16	≥ 900	1100 - 1300	≥ 14
		16≤Ø≤100	650-750	900 - 1200	≥ 16
		Ø≥100	500-550	750 - 950	≥ 16
E355 + SR	EN 10305-1	-	≥ 450	≥ 580	10

Dimensional Tolerances	H8
Straightness	Max. 0,8 mm / m
Eccentricity	Max 4 %
Roughness	0,2µm or better
Roundness	Within the limits

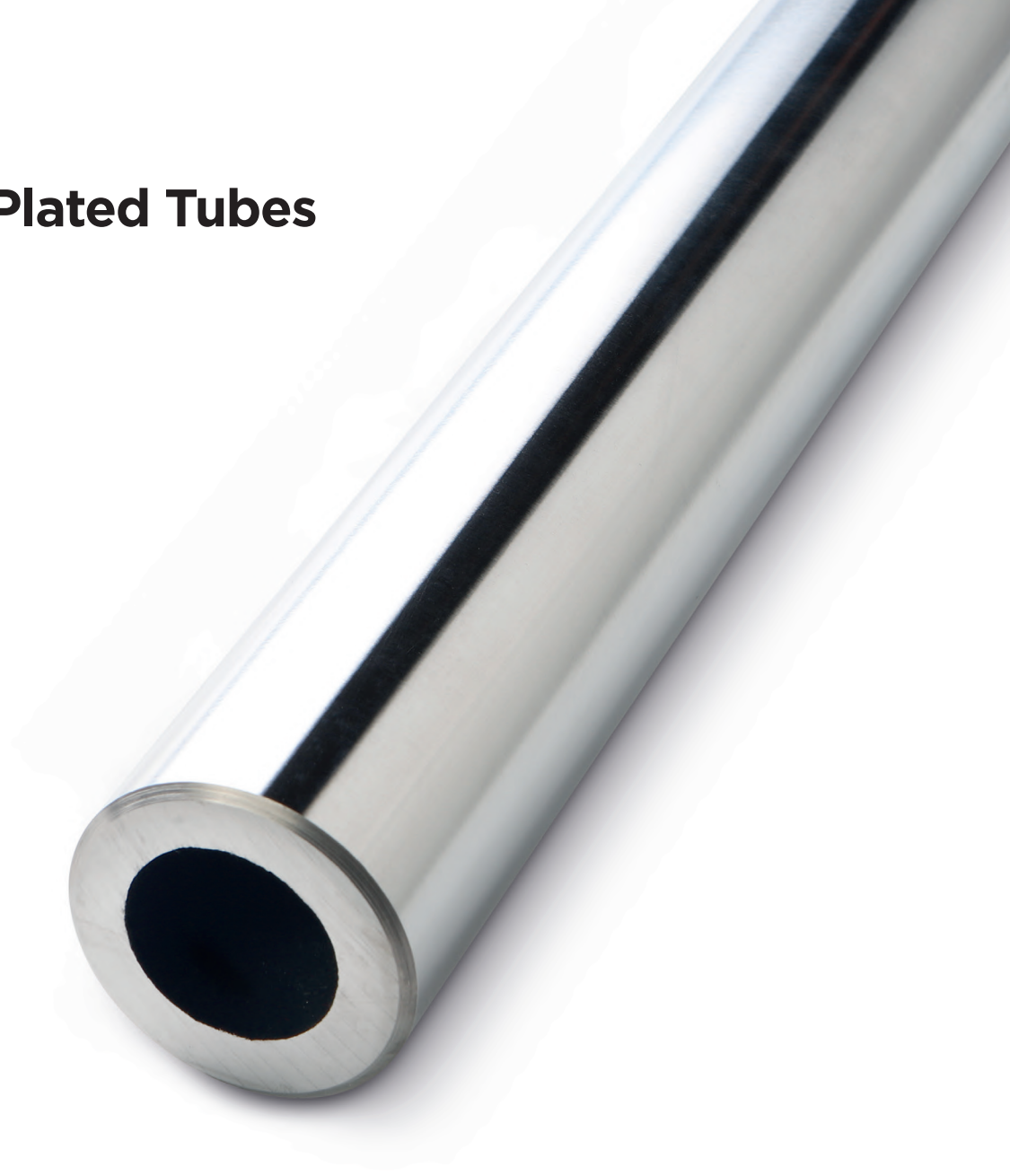
tws H8 SRB/Honed Welded Tube

Welded tubes produced with SRB process according to EN 10305-2 standard, with H8 tolerance.


*SRB: Skived and Roller Burnished (a technique involving peeling and polishing by compression with balls)

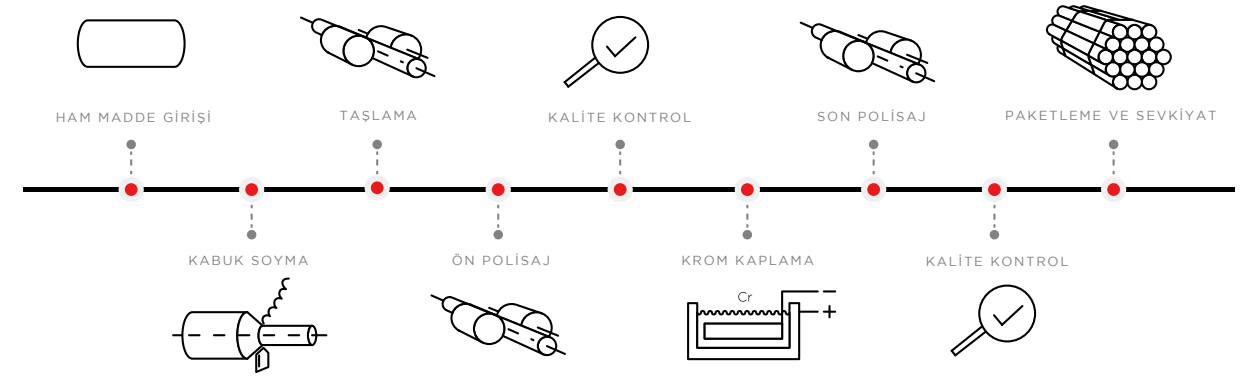
SHAPE	PRODUCT GROUP	SIZE	QUALITY
ROUND 	H8 SRB/Honed Welded Tube	[50-40] mm/ [270-220] mm	E355+SR

tcp Chrome Plated Tubes



tcp Chrome Plated Tubes

SHAPE	PRODUCT GROUP	SIZE	QUALITY
	Chrome Plated Tube	Outer Diameter: Between 35-160mm	E355+SR



CHROME PLATED TUBE VALUES

Steel Grade	Dia	Tolerance	Coating Thickness	Hardness	Surface Roughness	Ovality	Straightness	Number of Cracks	NSS Rating 10	NSS Rating 9
E355+SR	35-160	f7	min. 20	HV _{0,1} min.1000	Ra ≤0,1 Rt ≤1,00	Within 1/2 of the tolerance	≤ 0,2 mm / m	Min. 6000 microcracks /mm ²	250	500

The salt spray test is conducted according to ISO 9227 and its evaluation is in accordance with ISO 10289 standard.


CHEMICAL COMPOSITION (IN % BY WEIGHT)

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Mo	% Ni	% V	% P Max	% S Max
E355 + SR	EN 10305-1	max 0,22	max 0,55	max 1,60					0,025	0,025

MECHANICAL PROPERTIES

Steel Grade	Standart	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%) min
E355 + SR	EN 10305-1		≥450	≥580	10

tcı Induction Hardened Chrome Plated Tube

SHAPE	PRODUCT GROUP	SIZE	QUALITY
	Induction Hardened Chrome Plated Tube	Outer Diameter: Between 35-160mm	E355+SR

tcı Induction Hardened Chrome Plated Tube

İNDÜKSİYONLU KROM KAPLI BORU DEĞERLERİ

Çelik Kalitesi	Çap	Tolerans	Kaplama Kalınlığı	Kaplama Kalınlığı	Yüzey Pürüzlülüğü	Ovallık	Doğrusallık	Çatlak Sayısı	NSS Rating 10	NSS Rating 9
E355+SR	35-160	f7	min. 20	HV _{0,1} min.1000	Ra ≤0,1 Rt ≤1,00	Toleransın 1/2'si içinde	≤0,2 mm / m	En Az 6000 mikroçatlak /mm ²	250	500

Tuz testi ISO 9227 standardına ve değerlendirmesi ISO 10289 standardına göre yapılmaktadır.

INDUCTION HARDENING

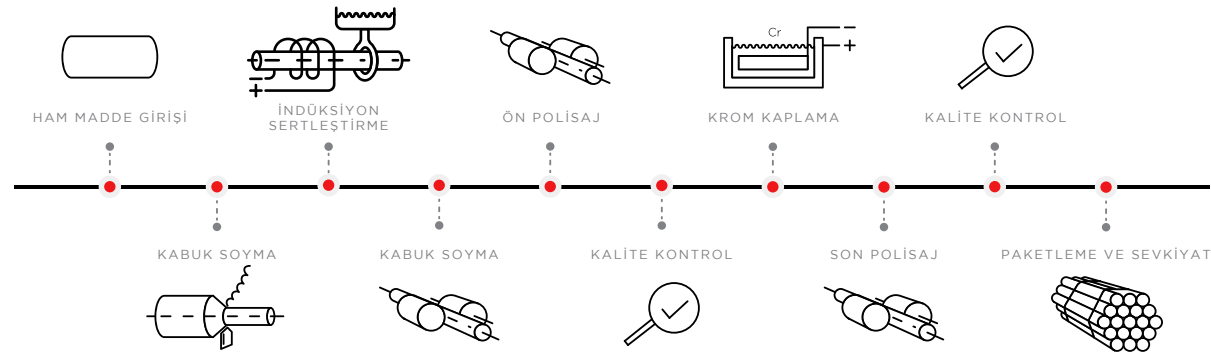
Steel Grade	Dimensional	Hardness Depth
E355+SR	Ø35-Ø60 Ø61-Ø80 Ø81-Ø160	1,4-2,5 2,5-2,7 3,2-5,0

CHEMICAL COMPOSITION (IN % BY WEIGHT)

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Mo	% Ni	% V	% P Max	% S Max
E355 + SR	EN 10305-1	max 0,22	max 0,55	max 1,60					0,025	0,025

MEKANİK ÖZELLİKLER


Çelik Kalitesi	Standart	Boyutsal Aralık (mm)	Akma Mukavemeti Rp0,2 (N/mm ²)	Çekme Mukavemeti Rm (N/mm ²)	Uzama (%)
E355 + SR	EN 10305-1		≥450	≥580	10




Cold Drawn Hydraulic Tubes




tcs H9 Cold Drawn Seamless Tube

	SHAPE	PRODUCT GROUP	SIZE	QUALITY
TUBE		H9 Cold Drawn Seamless Tube	[50-40] mm/ [270-220] mm	E355-tC E355+SR

tcs Suitable for Honing and SRB

	SHAPE	PRODUCT GROUP	SIZE	QUALITY
TUBE		SRB/Ready to Hone Cold Drawn Seamless	[50-40] mm/ [270-220] mm	E355+SR

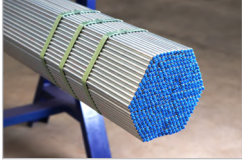
tcw H9 Cold Drawn Welded Tube

	SHAPE	PRODUCT GROUP	SIZE	QUALITY
TUBE		H9 Cold Drawn Welded Tube	[50-40] mm/ [270-220] mm	E355+SR

tcw Suitable for Honing and SRB


	SHAPE	PRODUCT GROUP	SIZE	QUALITY
TUBE		SRB/Ready to Hone Cold Drawn Welded Tubes	[50-40] mm/ [270-220] mm	E355+SR

HPL Tubes

SHAPE	PRODUCT GROUP	SIZE	QUALITY
	Tube Hydraulic Oiled (THO) Tube Hydraulic Galvanized (THG) Tube Hydraulic Phosphated (THP)	[4x1]/[80x12,50]	E235+N E355+N

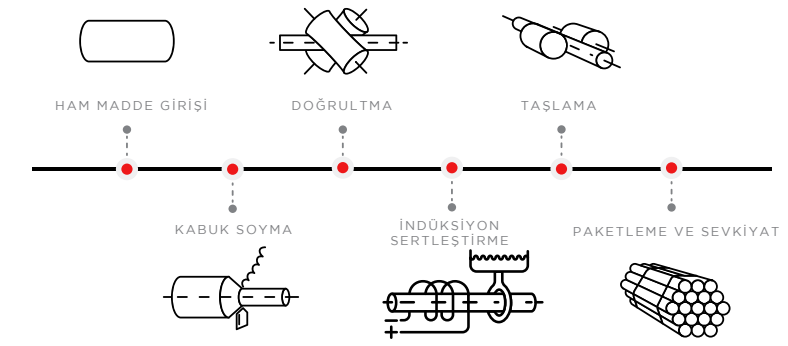
Induction Hardened Ground Bar/Tube



SHAPE	PRODUCT GROUP	SIZE	QUALITY
	Induction Hardened Ground	Ø 10-160 mm arası	C35 C45 20MnV(S)6 38MnV(S)6 42CrMo(S)4

pbi Induction Hardened Ground Bar

SHAPE	PRODUCT GROUP	SIZE	QUALITY
	Induction Hardened Ground Bar	Ø 10-160 mm arası	C35 C45 20MnV(S)6 38MnV(S)6 42CrMo(S)4



STEEL GRADE

C35 - C45 - 42CrMo(S)4 - 20MnV(S)6 - 38MnV(S)6

CHEMICAL COMPOSITION

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Ni	Mo	% N	% V	% P	% S
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
C35	EN 10083	0,32-0,39	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10			≤ 0,035	≤ 0,035
42CrMo(S)4	EN 10083	0,38-0,45	≤ 0,40	0,60-0,90	0,90-1,20		0,15-0,30			≤ 0,035	≤ 0,035
20MnV(S)6	1.5217	0,16-0,22	0,10-0,50	1,30-1,70					0,08-0,20	≤ 0,035	≤ 0,035
38MnV(S)6	EN 10267	0,34-0,41	0,15-0,80	1,20-1,60	≤ 0,30			0,010-0,020	0,08-0,20	≤ 0,025	≤ 0,035

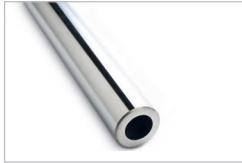
MECHANICAL PROPERTIES

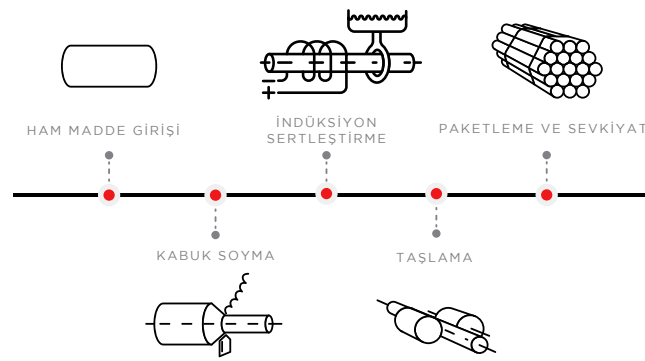
Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
C45	EN 10083	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
		Ø≥100	≥ 275	≥ 560	≥ 16
C35	EN 10083	16≤Ø≤36	≥ 315	≥ 580	≥ 18
		36≤Ø≤100	≥ 275	≥ 560	≥ 19
42CrMo(S)4	EN 10083	Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16
20MnV(S)6	1.5217	Ø≤16	≥ 450	550-850	≥ 10
		18≤Ø≤20	≥ 450	550-850	≥ 17
		20≤Ø≤65	≥ 450	550-850	≥ 18
38MnV(S)6	EN 10267	65≤Ø≤160	≥ 390	530-850	≥ 21
		Ø≤16	≥ 900	1100-1300	≥ 14
		16≤Ø≤100	650-750	900-1200	≥ 16
		Ø≥100	500-550	750-950	≥ 16

INDUCTION HARDENING

Steel Grade	Hardness	Tolerance	Dimensional	Hardness Depth (mm)
C35, C45, 42CrMo(S)4, 20MnV(S)6, 38MnV(S)6	42-62 HRC	f6 f7 h6 h7	Ø10	0,7-0,9
			Ø12-Ø18	0,9-1,1
			Ø20-Ø30	1,2-1,4
			Ø30-Ø60	1,4-2,5
			Ø60-Ø80	2,5-2,7
			Ø80-Ø160	3,2-5,0

tpi Induction Hardened Ground Tube

SHAPE	PRODUCT GROUP	SIZE	QUALITY
	Induction Hardened Chrome Plated Tube	Outer Diameter: Between 35-160mm	E355+SR C45 C60



STEEL GRADE
E355 - C45 - C60
CHEMICAL COMPOSITION (IN % BY WEIGHT)

Steel Grade	Standard	% C	% Si	% Mn	% Cr	% Mo	% Ni	% V	% P Max	% S Max
E355 + SR	EN 10305-1	max 0,22	max 0,55	max 1,60					0,025	0,025
C45	EN 10083	0,42-0,50	≤ 0,40	0,50-0,80	≤ 0,40	≤ 0,40	≤ 0,10		≤ 0,035	≤ 0,035
C60	EN 10083	0,57-0,65	≤ 0,40	0,60-0,90	≤ 0,40	≤ 0,40	≤ 0,10		≤ 0,045	≤ 0,045

MECHANICAL PROPERTIES

Steel Grade	Standard	Dimensional Range (mm)	Yield Strength Rp0,2 N/mm2	Tensile Strength Rm N/mm2	Elongation (%)
E355 + SR	EN 10305-1		≥ 450	≥ 580	≥ 10
C45	EN 10083	Ø≤16	≥ 340	≥ 620	≥ 14
		16≤Ø≤95	≥ 305	≥ 580	≥ 16
C60	EN 10083	Ø≥100	≥ 275	≥ 560	≥ 16
		Ø≤16	≥ 580	850-1000	≥ 11
		16≤Ø≤40	≥ 520	800-950	≥ 13
		40≤Ø≤100	≥ 450	750-900	≥ 14

INDUCTION HARDENING

Steel Grade	Hardness Value	Tolerance	Diameter	Hardness Depth
E355 - C45 - C60	32 - 62 HRC	f7	Ø10	0,7-0,9
			Ø12-Ø18	0,9-1,1
			Ø20-Ø30	1,2-1,4
			Ø30-Ø60	1,4-2,5
			Ø60-Ø80	2,5-2,7
			Ø80-Ø160	3,2-5,0

Additional Tables

STEEL GRADES

EN	DIN	AISI/SAE/ASTM	UNI	BS	JIS	W.NUMBER	GOST
C35	C35	1035	C35	070M36	S35C	10.501	35
C45E	Ck45	1045	C45	080M46	S45C	11.191	45
42CrMo4	42CrMo4	4140	42CrMo4	708M40	SCM440	17.725	35KHM
20MnV6	20MnV6	A572	-	55M	-	15.217	-
38MnVS6	38MnSiVS5	(15V41)*	-	-	-	11.303	40-45-50 KH

ÜLKE STANDARTLARI VE AÇIKLAMALARI

STANDART	STANDARTLARIN AÇIKLAMASI
ANSI	Amerikan Ulusal Standartları Enstitüsü
API	Amerikan Petrol Enstitüsü
ASME	Amerikan Makine Mühendisleri Derneği
ASTM	ASTM Uluslararası
BSI	İngiliz Standartları Kurumu
DIN	Alman Standartlar Enstitüsü
EN	Avrupa Standartları
GOST	Sovyet Devlet Standartları
JIS	Japon Endüstri Standartları
NF	Fransız Standartları

Heat Treatment Abbreviations and Descriptions

SEMBOL	AÇIKLAMA
+AR	İşlenmiş halde
+C	Soğuk işlem sertleştirilmiş
+N	Normalleştirilmiş
+QT	Sertleştirilmiş ve temperlenmiş
+SR	Gerilim giderilmiş

EN ISO 286-2 Diameter Tolerances (bar)

ROCKWELL			VICKERS	BRINELL
C	A	D	HV	HB
150 kg	60 kg	100 kg	10 kg	3000 kg 10 mm ball
20	60.5	40.1	238	226
21	61.0	40.9	243	231
22	61.5	41.6	248	237
23	62.0	42.1	254	243
24	62.4	43.1	260	247
25	62.8	43.8	266	253
26	63.3	44.6	272	258
27	63.8	45.2	279	264
28	64.3	46.1	286	271
29	64.6	47.0	294	279
30	65.3	47.7	302	286
31	65.8	48.4	310	294
32	66.3	49.2	318	301
33	66.8	50.0	327	311
34	67.4	50.8	336	319
35	67.9	51.5	345	327
36	68.4	52.3	354	336
37	68.9	53.1	363	344
38	69.4	53.8	372	353
39	69.9	54.6	382	362
40	70.4	55.4	392	371
41	70.9	56.2	402	381
42	71.5	56.9	412	390
43	72.0	57.7	423	400
44	72.5	58.5	434	409
45	73.1	59.2	446	421
46	73.6	60.0	458	432
47	74.1	60.8	471	443
48	74.7	61.4	484	455
49	75.2	62.1	498	469
50	75.9	63.1	513	481

ROCKWELL			VICKERS	BRINELL
C	A	D	HV	HB
150 kg	60 kg	100 kg	10 kg	3000 kg 10 mm ball
51	76.3	63.8	528	496
52	76.8	64.6	544	512
53	77.4	65.4	560	525
54	78.0	66.1	577	543
55	78.5	66.9	595	560
56	79.0	67.7	613	577
57	79.6	68.5	633	595
58	80.1	69.2	653	615
59	80.7	69.9	674	634
60	81.2	70.7	697	654
61	81.8	71.5	720	670
62	82.3	72.2	746	688
63	82.8	73.0	772	706
64	83.4	73.8	800	722
65	83.9	74.5	832	739
66	84.5	75.4	865	
67	85.0	76.1	900	
68	85.6	76.9	940	
69	86.0	78.0	1004	
70	86.5	78.5	1076	
71	87.0	79.5	1160	
72	88.0	80.0	1245	
73	88.5	81.0	1323	
74	89.0	81.5	1400	
75	89.5	82.5	1478	
76	90.0	83.0	1556	
77	90.5	84.0	1633	
78	91.0	84.5	1710	
79	91.5	85.5	1787	
80	92.0	86.5	1865	

N/A

Hardness Conversion Table

ROCKWELL			VICKERS	BRINELL
C	A	D	HV	HB
150 kg	60 kg	100 kg	10 kg	3000 kg 10 mm ball
20	60.5	40.1	238	226
21	61.0	40.9	243	231
22	61.5	41.6	248	237
23	62.0	42.1	254	243
24	62.4	43.1	260	247
25	62.8	43.8	266	253
26	63.3	44.6	272	258
27	63.8	45.2	279	264
28	64.3	46.1	286	271
29	64.6	47.0	294	279
30	65.3	47.7	302	286
31	65.8	48.4	310	294
32	66.3	49.2	318	301
33	66.8	50.0	327	311
34	67.4	50.8	336	319
35	67.9	51.5	345	327
36	68.4	52.3	354	336
37	68.9	53.1	363	344
38	69.4	53.8	372	353
39	69.9	54.6	382	362
40	70.4	55.4	392	371
41	70.9	56.2	402	381
42	71.5	56.9	412	390
43	72.0	57.7	423	400
44	72.5	58.5	434	409
45	73.1	59.2	446	421
46	73.6	60.0	458	432
47	74.1	60.8	471	443
48	74.7	61.4	484	455
49	75.2	62.1	498	469
50	75.9	63.1	513	481

ROCKWELL			VICKERS	BRINELL
C	A	D	HV	HB
150 kg	60 kg	100 kg	10 kg	3000 kg 10 mm ball
51	76.3	63.8	528	496
52	76.8	64.6	544	512
53	77.4	65.4	560	525
54	78.0	66.1	577	543
55	78.5	66.9	595	560
56	79.0	67.7	613	577
57	79.6	68.5	633	595
58	80.1	69.2	653	615
59	80.7	69.9	674	634
60	81.2	70.7	697	654
61	81.8	71.5	720	670
62	82.3	72.2	746	688
63	82.8	73.0	772	706
64	83.4	73.8	800	722
65	83.9	74.5	832	739
66	84.5	75.4	865	
67	85.0	76.1	900	
68	85.6	76.9	940	
69	86.0	78.0	1004	
70	86.5	78.5	1076	
71	87.0	79.5	1160	
72	88.0	80.0	1245	
73	88.5	81.0	1323	
74	89.0	81.5	1400	
75	89.5	82.5	1478	
76	90.0	83.0	1556	
77	90.5	84.0	1633	
78	91.0	84.5	1710	
79	91.5	85.5	1787	
80	92.0	86.5	1865	

N/A

Dimensions of Cold Drawn Precision Seamless Tubes (EN 10286-2 H8-H9)

Inside Diameter (mm)	Outside Diameter (mm)	H8 Min(mm)	H8 Max(mm)	H9 Min(mm)	H9 Max(mm)
40	50	40,000	40,039	40,000	40,062
50	60	50,000	50,039	50,000	50,062
50	65	50,000	50,039	50,000	50,062
60	70	60,000	60,046	60,000	60,074
60	75	60,000	60,046	60,000	60,074
60	80	60,000	60,046	60,000	60,074
63	73	63,000	63,046	63,000	63,074
63	75	63,000	63,046	63,000	63,074
63	78	63,000	63,046	63,000	63,074
65	75	65,000	65,046	65,000	65,074
70	80	70,000	70,046	70,000	70,074
70	85	70,000	70,046	70,000	70,074
70	90	70,000	70,046	70,000	70,074
70	100	70,000	70,046	70,000	70,074
75	90	75,000	75,046	75,000	75,074
75	95	75,000	75,046	75,000	75,074
80	90	80,000	80,046	80,000	80,074
80	95	80,000	80,046	80,000	80,074
80	100	80,000	80,046	80,000	80,074
85	100	85,000	85,054	85,000	85,087
90	105	90,000	90,054	90,000	90,087
90	110	90,000	90,054	90,000	90,087
100	115	100,000	100,054	100,000	100,087
100	120	100,000	100,054	100,000	100,087
100	125	100,000	100,054	100,000	100,087
100	132	100,000	100,054	100,000	100,087
110	125	110,000	110,054	110,000	110,087
110	130	110,000	110,054	110,000	110,087
110	135	110,000	110,054	110,000	110,087
115	135	115,000	115,054	115,000	115,087
120	140	120,000	120,054	120,000	120,087
120	145	120,000	120,054	120,000	120,087
125	150	125,000	125,063	125,000	125,100
125	160	125,000	125,063	125,000	125,100
130	150	130,000	130,063	130,000	130,100
135	150	135,000	135,063	135,000	135,100
140	160	140,000	140,063	140,000	140,100
140	165	140,000	140,063	140,000	140,100
140	170	140,000	140,063	140,000	140,100
145	175	145,000	145,063	145,000	145,100
150	170	150,000	150,063	150,000	150,100
160	180	160,000	160,063	160,000	160,100
160	185	160,000	160,063	160,000	160,100
160	190	160,000	160,063	160,000	160,100
160	200	160,000	160,063	160,000	160,100
170	200	170,000	170,063	170,000	170,100
170	210	170,000	170,063	170,000	170,100
175	215	175,000	175,063	175,000	175,100
180	200	180,000	180,063	180,000	180,100
180	210	180,000	180,063	180,000	180,100
180	220	180,000	180,072	180,000	180,100
190	230	190,000	190,072	190,000	190,115
190	235	190,000	190,072	190,000	190,115
200	220	200,000	200,072	200,000	200,115
200	230	200,000	200,072	200,000	200,115
200	245	200,000	200,072	200,000	200,115
215	270	215,000	215,072	215,000	215,115
220	270	220,000	220,072	220,000	220,115

Europe's Most Modern Chrome-Plated Bar Facility



DIAMETER TOLERANCES OF COLD DRAWN PRECISION SEAMLESS TUBES (EN 10305-1)

Outside Diameter (mm)	Outside Diameter Tolerance	Wall Thickness						
		4	4,5	5	5,5	6	7	8
Specified Inner Diameter and Tolerances								
40	3 0,15	32 3 0,15	31 3 0,15	30 3 0,15	29 3 0,15	28 3 0,15	26 3 0,15	24 3 0,15
42	3 0,20	34 3 0,20	33 3 0,20	32 3 0,20	31 3 0,20	30 3 0,20	28 3 0,20	26 3 0,20
45		37 3 0,20	36 3 0,20	35 3 0,20	34 3 0,20	33 3 0,20	31 3 0,20	29 3 0,20
48	3 0,25	40 3 0,20	39 3 0,20	38 3 0,20	37 3 0,20	36 3 0,20	34 3 0,20	32 3 0,20
50		42 3 0,20	41 3 0,20	40 3 0,20	39 3 0,20	38 3 0,20	36 3 0,20	34 3 0,20
55	3 0,30	47 3 0,25	46 3 0,25	45 3 0,25	44 3 0,25	43 3 0,25	41 3 0,25	39 3 0,25
60		52 3 0,25	51 3 0,25	50 3 0,25	49 3 0,25	48 3 0,25	46 3 0,25	44 3 0,25
65	3 0,35	57 3 0,30	56 3 0,30	55 3 0,30	54 3 0,30	53 3 0,30	51 3 0,30	49 3 0,30
70		62 3 0,30	61 3 0,30	60 3 0,30	59 3 0,30	58 3 0,30	56 3 0,30	54 3 0,30
75	3 0,40	67 3 0,35	66 3 0,35	65 3 0,35	64 3 0,35	63 3 0,35	61 3 0,35	59 3 0,35
80		72 3 0,35	71 3 0,35	70 3 0,35	69 3 0,35	68 3 0,35	66 3 0,35	64 3 0,35
85	3 0,45	77 3 0,40	76,3 0,40	75 3 0,40	74 3 0,40	73 3 0,40	71 3 0,40	69 3 0,40
90		82 3 0,40	81 3 0,40	80 3 0,40	79 3 0,40	78 3 0,40	76 3 0,40	74 3 0,40
95	3 0,50	87 3 0,45	86 3 0,45	85 3 0,45	84 3 0,45	83 3 0,45	81 3 0,45	79 3 0,45
100		92 3 0,45	91 3 0,45	90 3 0,45	89 3 0,45	88 3 0,45	86 3 0,45	84 3 0,45
110	3 0,70	102 3 0,50	101 3 0,50	100 3 0,50	99 3 0,50	98 3 0,50	96 3 0,50	94 3 0,50
120		112 3 0,50	111 3 0,50	110 3 0,50	109 3 0,50	108 3 0,50	106 3 0,50	104 3 0,50
130	3 0,80	122 3 0,70	121 3 0,70	120 3 0,70	119 3 0,70	118 3 0,70	116 3 0,70	114 3 0,70
140		132 3 0,70	131 3 0,70	130 3 0,70	129 3 0,70	128 3 0,70	126 3 0,70	124 3 0,70
150	3 0,90	142 3 0,80	141 3 0,80	140 3 0,80	139 3 0,80	138 3 0,80	136 3 0,80	134 3 0,80
160		152 3 0,80	151 3 0,80	150 3 0,80	149 3 0,80	148 3 0,80	146 3 0,80	144 3 0,80
170	3 1,00	162 3 0,90	161 3 0,90	160 3 0,90	159 3 0,90	158 3 0,90	156 3 0,90	154 3 0,90
180		172 3 0,90	171 3 0,90	170 3 0,90	169 3 0,90	168 3 0,90	166 3 0,90	164 3 0,90
190	3 1,10	182 3 1,0	181 3 1,0	180 3 1,0	179 3 1,0	178 3 1,0	176 3 1,0	174 3 1,0
200		192 3 1,0	191 3 1,0	190 3 1,0	89 3 1,0	188 3 1,0	186 3 1,0	184 3 1,0
220	3 1,20	208 3 1,1	210 3 1,1	209 3 1,1	208 3 1,1	206 3 1,1	204 3 1,1	
240		231 3 1,2	230 3 1,2	229 3 1,2	228 3 1,2	226 3 1,2	224 3 1,2	
260	3 1,30		250 3 1,3	249 3 1,3	248 3 1,3	246 3 1,3	244 3 1,3	
280		269 3 1,4		268 3 1,4	266 3 1,4	264 3 1,4		
300	3 1,50			288 3 1,5	286 3 1,5	284 3 1,5		

Wall Thickness								
9	10	12	14	16	18	20	22	25
Specified Inner Diameter and Tolerances								
22 3 0,15	20 3 0,15							
24 3 0,20	22 3 0,20							
27 3 0,20	25 3 0,20							
30 3 0,20	28 3 0,20							
32 3 0,20	30 3 0,20							
37 3 0,25	35 3 0,25	31 3 0,25						
42 3 0,25	40 3 0,25	36 3 0,25						
47 3 0,30	45 3 0,30	41 3 0,30	37 3 0,30					
52 3 0,30	50 3 0,30	46 3 0,30	42 3 0,30					
57 3 0,35	55 3 0,35	51 3 0,35	47 3 0,35	43 3 0,35				
62 3 0,35	60 3 0,35	56 3 0,35	52 3 0,35	48 3 0,35				
67 3 0,40	65 3 0,40	61 3 0,40	57 3 0,40	53 3 0,40				
72 3 0,40	70 3 0,40	66 3 0,40	62 3 0,40	58 3 0,40				
77 3 0,45	75 3 0,45	71 3 0,45	67 3 0,45	63 3 0,45	59 3 0,45			
82 3 0,45	80 3 0,45	76 3 0,45	72 3 0,45	68 3 0,45	64 3 0,45			
92 3 0,50	90 3 0,50	86 3 0,50	82 3 0,50	78 3 0,50	74 3 0,50			
102 3 0,50	100 3 0,50	96 3 0,50	92 3 0,50	88 3 0,50	84 3 0,50			
112 3 0,70	110 3 0,70	106 3 0,70	102 3 0,70	98 3 0,70	94 3 0,70			
122 3 0,70	120 3 0,70	116 3 0,70	112 3 0,70	108 3 0,70	104 3 0,70			
132 3 0,80	130 3 0,80	126 3 0,80	122 3 0,80	118 3 0,80	114 3 0,80	110 3 0,80		
142 3 0,80	140 3 0,80	136 3 0,80	132 3 0,80	128 3 0,80	124 3 0,80	120 3 0,80		
152 3 0,90	150 3 0,90	146 3 0,90	142 3 0,90	138 3 0,90	134 3 0,90	130 3 0,90		
162 3 0,90	160 3 0,90	156 3 0,90	152 3 0,90	148 3 0,90	144 3 0,90	140 3 0,90		
172 3 1,0	170 3 1,0	166 3 1,0	162 3 1,0	158 3 1,0	154 3 1,0	150 3 1,0	146 3 1,0	
182 3 1,0	180 3 1,0	176 3 1,0	172 3 1,0	168 3 1,0	164 3 1,0	160 3 1,0	156 3 1,0	
202 3 1,1	200 3 1,1	196 3 1,1	192 3 1,1	188 3 1,1	184 3 1,1	180 3 1,1	176 3 1,1	170 3 1,1
222 3 1,2	220 3 1,2	216 3 1,2	212 3 1,2	208 3 1,2	204 3 1,2	200 3 1,2	196 3 1,2	190 3 1,2
242 3 1,3	240 3 1,3	236 3 1,3	232 3 1,3	228 3 1,3	224 3 1,3	220 3 1,3	216 3 1,3	210 3 1,3
262 3 1,4	260 3 1,4	256 3 1,4	252 3 1,4	248 3 1,4	244 3 1,4	240 3 1,4	236 3 1,4	230 3 1,4
282 3 1,5	280 3 1,5	276 3 1,5	272 3 1,5	268 3 1,5	264 3 1,5	260 3 1,5	256 3 1,5	250 3 1,5



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