

 **Çolakoğlu Metalurji**

PRODUCT CATALOGUE

Çolakoğlu



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2011-2017 EXPORT LEADER OF HOT ROLLED FLAT PRODUCTS

Sustainability
in
Export



Symbols and Abbreviations Used for Chemical Elements

Sembol	Element
C	Carbon
Mn	Manganese
P	Phosphorus
S	Sulphur
Si	Silicon
Al	Aluminum
Cu	Copper
N	Nitrogen
O	Oxygen
H	Hydrogen
Ca	Calcium
Ti	Titanium
V	Vanadium
Cr	Chromium
Ni	Nickel
Mo	Molybdenum
Nb	Niobium
B	Boron
Sn	Tin
Fe	Iron
Zn	Zinc
Pb	Lead
As	Arsenic
W	Wolfram (Tungsten)
Zr	Zirconium

Symbols and Abbreviations Used for Mechanical Tests

Sembool	Explanation
R_e	Yield strength (N/mm ²)
R_m	Tensile strength (N/mm ²)
R_{p0,2}	Yield strength at high temperature (N/mm ²)
A	Elongation (%)
A₅	Elongation ($L_0=5,65 \times \sqrt{S_0}$)
A₅₀	Elongation ($L_0=50$ mm)
A₈₀	Elongation ($L_0=80$ mm)
A₁₀₀	Elongation ($L_0=100$ mm)
A₂₀₀	Elongation ($L_0=200$ mm)
S₀	Cross-sectional area of the specimen (mm ²)
L₀	Original gauge length of the specimen (mm)
d	Nominal thickness (mm)
t	Ton
Impact	Impact test
KVc	Impact energy, joule (J)
Temp.	Test temperature (°C)
Bend	Bend test
mr_b	Mandrel radius for bending (mm)
md_b	Mandrel diameter for bending (mm)
tran.	Transverse test piece
long.	Longitudinal test piece
HRB	Hardness of Rockwell-B
min.	Minimum
max.	Maximum
=	Equal to
<	Smaller than
≤	Smaller than or equal to
>	Bigger than
≥	Bigger than or equal to
ppm	Parts per million
DWTT	Drop weight tear test
Std.	Standard

CERTIFICATES

CERTIFICATES	
NAME OF CERTIFICATE	INSPECTION TYPE
ISO 14001:2015	Environmental Management System
CE Marking Certificate	Flat Products
Factory Approval for Pressure Purposes	Flat Products
Sustainability Hot Rolled Flat Steel Certificate	Flat Products
Certificate of Conformity of the Production Control	Flat Products
Environmental Product Declaration	Flat Products
TS ISO/IEC 27001: 2013	Information Security Management Systems
TSE Certificate of Conformity to Turkish Standarts	Long Products
G Certificate	Long Products
Germany Product Certificate	Long Products
Nederlands Product Certificate	Long Products
Colombia Product Certificate	Long Products
Costa Rica Product Certificate	Long Products
France Product Certificate	Long Products
Romania Product Certificate	Long Products
Bulgaria Product Certificate	Long Products
Chile Product Certificate	Long Products
Malaysia Product Certificate	Long Products
İsrael Product Certificate	Long Products
Austria Product Certificate	Long Products
Sustainability Constructional Steel Certificate	Long Products
BS EN ISO 9001:2015	Long Products
Environmental Product Declaration	Long Products
Product Conformity Certificates	Long Products
ISO 5001:2011	Management Systems of Energy
OHSAS 18001 : 2007	Occupational Health and Safety Management System
Environmental Permit and License Certificate	Production
ISO 9001:2015	Quality Management System Certificate

CERTIFIED BY	COUNTRY	STANDARD / SPECIFICATIONS
CARES	UK	ISO 14001:2015
KIWA	TURKEY	EN 10025-1
BUREAU VERITAS	TURKEY(HPI/VS)	EN 10028-2:2009
CARES	UK	CARES Sustainability Scheme Appendix 06
KIWA	NEDERLANDS	EN 10025. 2004 HRC
BRE ve GReenBookLive	UK	EN 15804:2012 +A1:2013
DENETIK	TURKEY	ISO: 27001: 2013
TSE	TURKEY	TS 708
TSE	TURKEY	TS 708
KIWA	GERMANY	DIN-488
KIWA	NEDERLANDS	NEN-6008
ICONTEC	COLOMBIA	NTC 2289:2015
INTECO	COSTA RICA	INTE 06-09-01, INTE 06-09-02
AFCAB	FRANCE	NFA 35-080-1
ICECON	ROMANIA	SR 438-1:2012, ST 009:2011
BULGAR KONTROLA	BULGARIA	BDS 9252:2007
INN	CHILE	NCH 204
SIRIM	MALAYSIA	MS 146:2014
SII	ISRAEL	Preliminary Tests Agreement
ACRS	AUSTRIA	AS/NZS4671
CARES	UK	CARES Sustainability Scheme Appendix 01
CARES	UK	BS EN ISO 9001:2015 BS 4449:2005
BRE ve GReenBookLive	UK	EN 15804:2012 +A1:2013
CARES	UK	ISO 9001
VERICERT	TURKEY	ISO 5001:2011
CARES	UK	OHSAS 18001:2007
Ministry of Environment and Urban Planning	TURKEY	National Regulations
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		RRSt 23	20123	
		St 24	20124	
		RRSt 23-with B	30623	
		St 24-with B	30624	
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		DD13	30113	
		DD11	35111	
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		Grade 60 Type 1	56560	
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STRUCTURAL STEELS SUITABLE FOR COLD FORMING AND BENDING	ASTM A 1011 A 1011M-2007	CS Type B	56340	35
		SS Grade 33	56360	
		SS 36 Type 1	56365	
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		S235JO (Cu+Cr+Ni≤0.35)	50237	
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		S355J2-low Si	54358	
GENERAL STRUCTURAL STEELS SUITABLE FOR COLD FORMING,BENDING AND SPINNING	EN 10025 Part 2 -2004	S235JRC	40234	50
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		S235JRC+N	44235	
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		S275JRC+N-Special	44276	
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		C45E-Special	98145	
		C60E	98060	
		C60E-Special	98160	
		C60E-1-Cr	98260	
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		S420MC	36420	
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		S235JR+N	42235	
		S275JR+N-low Si	41275	
		S275J2+N-low Si	42275	
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		SAE 1012	91012	
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SAE 1022-low Si	91122			
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SAE 1030	91030			
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		B / L245 / PSL1	95135	
		X42 / L290 / PSL1	95142	
		X46 / L320 / PSL1	95146	
		X52 / L360 / PSL1	95152	
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		X56M / L390M / PSL2	95056	
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BILLET QUALITIES AND USING AREAS			
Using Area	Standart	Standard Quality	Page No.
CARBON STEEL	SAE J 403	SAE 1005	102
CARBON STEEL	SAE J 403	SAE 1006	
CARBON STEEL	SAE J 403	SAE 1008	
CARBON STEEL	SAE J 403	SAE 1010	
CARBON STEEL	SAE J 403	SAE 1012	
CARBON STEEL	SAE J 403	SAE 1015	
CARBON STEEL	SAE J 403	SAE 1018	
CARBON STEEL	SAE J 403	SAE 1020	
CARBON STEEL	SAE J 403	SAE 1030	
CARBON STEEL	SAE J 403	SAE 1035	
CARBON STEEL	SAE J 403	SAE 1040	
CARBON STEEL	SAE J 403	SAE 1045	
CARBON STEEL	SAE J 403	SAE 1050	
CARBON STEEL	SAE J 403	SAE 1055	
CARBON STEEL	SAE J 403	SAE 1060	

BILLET QUALITIES AND USING AREAS			
Using Area	Standard	Standard Quality	Page No.
REINFORCING STEEL BAR	ABNT NBR 7480 : 2017	CA 50	104
REINFORCING STEEL BAR	ACHM 7-93	A 500C	
REINFORCING STEEL BAR	ASTM A 615	GR 40	
REINFORCING STEEL BAR	ASTM A 615	GR 60	
REINFORCING STEEL BAR	ASTM A 615	GR 75	
REINFORCING STEEL BAR	ASTM A 706	GR 60	
REINFORCING STEEL BAR	BDS 9252 : 2007	B 500B	
REINFORCING STEEL BAR	BS 4449:1997	GR 460 B	
REINFORCING STEEL BAR	BS 4449:2005	B 500 B	
REINFORCING STEEL BAR	BS 4449:2005	B 500 C	
REINFORCING STEEL BAR	CAN/CSA.G30.18-09	GR 400R	
REINFORCING STEEL BAR	CAN/CSA.G30.18-09	GR 400W	
REINFORCING STEEL BAR	CAN/CSA.G30.18-09	GR 500R	
REINFORCING STEEL BAR	CAN/CSA.G30.18-09	GR 500W	
REINFORCING STEEL BAR	DIN 17100	St 50	
REINFORCING STEEL BAR	DIN 17100	St 60	
REINFORCING STEEL BAR	DIN 17100	St 37-2	
REINFORCING STEEL BAR	DIN 488: 2009	B 500 B	
REINFORCING STEEL BAR	DM 14.01.2008	B 450 C	
REINFORCING STEEL BAR	E 449 : 2010	A 400 NR	
REINFORCING STEEL BAR	E 450 : 2010	A 500 NR	
REINFORCING STEEL BAR	GOST 380	3SP	
REINFORCING STEEL BAR	GOST 380	5SP	
REINFORCING STEEL BAR	IS 6935-2 : 2007	B 500 BWR	
REINFORCING STEEL BAR	IS 4466-3 : 2013	S 400	
REINFORCING STEEL BAR	IS 4466-3 : 2013	S 400 W	
REINFORCING STEEL BAR	IS 4466-3 : 2013	S 500 W-C	
REINFORCING STEEL BAR	JS 33: 2013	GR 300	
REINFORCING STEEL BAR	JS 33: 2013	GR 400	
REINFORCING STEEL BAR	MS 146 : 2006	B 500 B	
REINFORCING STEEL BAR	NCh 206 : 2006	A 630- 420H	
REINFORCING STEEL BAR	NCh 206 : 2006	A 440- 280H	
REINFORCING STEEL BAR	NEN 6008:2008	B 500 B	
REINFORCING STEEL BAR	NF A 35-016:1986	FEE 400	
REINFORCING STEEL BAR	NF A 35-016:1996	FEE 500	
REINFORCING STEEL BAR	NF A 35- 080-1:2013	B 500 B	
REINFORCING STEEL BAR	NTC 2289:2012	GR 60	
REINFORCING STEEL BAR	SR 438-1:2012	OB 37	
REINFORCING STEEL BAR	SR 438-1:2012	PC 52	
REINFORCING STEEL BAR	TS 708 : 2016	B 420 B	
REINFORCING STEEL BAR	TS 708 : 2016	B 420C	
REINFORCING STEEL BAR	TS 708 : 2016	B 500 B	
REINFORCING STEEL BAR	TS 708 : 2016	B 500 C	
REINFORCING STEEL BAR	TS 708 : 2016	S 420	
REINFORCING STEEL BAR	INTE 06-09-01	GR 40	
REINFORCING STEEL BAR	INTE 06-09-01	GR 60	
REINFORCING STEEL BAR	INTE 06-09-02	GR 60	

REINFORCING BAR QUALITIES

Standard	Standard Quality	Page No.
ABNT NBR 7480	CA 50	106
ACHM 7-93	A 500C	
ASTM A 615	GR 40	
ASTM A 615	GR 60	
ASTM A 615	GR 75	
ASTM A 706	GR 60	
BDS 9252:2007	B 500B	
BS 4449:1997	GR 460 B	
BS 4449:2005	B 500 B	
BS 4449:2005	B 500 C	
CAN/CSA G30.18-09	GR 400R	
CAN/CSA G30.18-09	GR 400W	
CAN/CSA G30.18-09	GR 500R	
CAN/CSA G30.18-09	GR 500W	
DIN 488:2009	B 500 B	
DM. 14/01/2008	B 450 C	
E 449 : 2010	A 400 NR	
E 450 : 2010	A 500 NR	
IS 6935-2 :2007	B 500 BWR	
IS 4466-3:2013	S 400	
IS 4466-3:2013	S 400 W	
IS 4466-3:2013	S 500 W-C	

REINFORCING BAR QUALITIES

Standard	Standard Quality	Page No.
JS 33 : 2013	GR 300	106
JS 33 : 2013	GR 400	
MS 146 : 2006	GR 500 B	
NCh 204:2006	A 630- 420H	
NCh 204:2006	A 440- 280H	
NEN 6008:2008	B 500 B	
NF A35-080-1:2013	B 500 B	
NFA 35-016:1986	FEE 400	
NFA 35-016:1996	FEE 500	
NFA 35-080:2013	B 500B	
NTC 2289:2012	GR 60	
SR 438-1:2012	OB 37	
SR 438-1:2012	PC 52	
TS 708 : 2016	B 420 B	
TS 708 : 2016	B 420C	
TS 708 : 2016	B 500 B	
TS 708 : 2016	B 500 C	
TS 708 : 2016	S 420	
INTE 06-09-01	GR 40	
INTE 06-09-01	GR 60	
INTE 06-09-02	GR 60	

HELICAL ROD QUALITIES

Standard	Standard Quality	Page No.
NCh 204 : 2006	A 630- 420H	111
NCh 204 : 2006	A 440- 280H	
DIN Material No 1.1165	St 450/700	





FLAT STEEL PRODUCTS

CHEMICAL &
MECHANICAL PROPERTIES

Slab	
Thickness:	200-250 mm
Width:	800-1650 mm
Length:	5.80-11.80 m

*Slab qualities are the same as
Hot Rolled Steel Qualities*

Hot Rolled Steel Coil (HRC)	
Thickness:	1.10-25.4
Width:	800-1650 mm
Coil Weight:	10-39 ton
Coil Inner Dia.:	762 mm

HOT ROLLED STEELS FOR COLD ROLLING AND GALVANIZING

Standard: DIN 1614-Part1-1986

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality		C	Mn	P	S	N ⁽¹⁾	Al
				max.	max.	max.	max.	max.	min.
20122	DIN 1614-1	St 22	Standard	0.10	0.45	0.035	0.035	0.007	—
25122	DIN 1614-1	St 22-low Cu	Standard	0.10	0.45	0.035	0.035	0.007	—
20123	DIN 1614-1	RRSt 23	Standard	0.10	0.45	0.030	0.030	—	0.020
20124	DIN 1614-1	St 24	Standard	0.08	0.40	0.025	0.025	—	0.020
30623	DIN 1614-1	RRSt 23-with B	Standard	0.10	0.45	0.035	0.035	—	0.020
30624	DIN 1614-1	St 24-with B	Standard	0.08	0.40	0.030	0.030	—	0.020

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.
- 2) Mechanical test is not applied.

HOT ROLLED LOW CARBON STEELS FOR COLD FORMING

Standard: EN 10111-2008

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality ⁽¹⁾		C	Mn	P	S	N	Al
				max.	max.	max.	max.	max.	min.
30111 ⁽³⁾	EN 10111	DD11-low Cu	Standard	0.12	0.60	0.045	0.045	0.007	—
30112 ⁽⁴⁾	EN 10111	DD12	Standard	0.10	0.45	0.035	0.035	—	0.020
30113 ⁽⁴⁾	EN 10111	DD13	Standard	0.08	0.40	0.030	0.030	—	0.020
35111	EN 10111	DD11	Standard	0.12	0.60	0.045	0.045	—	—
34111	EN 10111	DD11 High strength	Standard	0.12	0.60	0.045	0.045	0.007	—
30612	EN 10111	DD12 with B	Standard	0.10	0.45	0.035	0.035	—	0.020
30613	EN 10111	DD13 with B	Standard	0.08	0.40	0.030	0.030	—	0.020

Explanations

- 1) All grades are produced as fully killed steel (Al ≥ % 0.02)
- 2) Cu = % 0.20 - 0.40
- 3) Guarantee period in usage is one month in Std. (When Al ≥ % 0.02, Guarantee period is 6 months.)
- 4) Guarantee period in usage is 6 months.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re		Rm ⁽¹⁾	A(%)			Bending
			N/mm ²			A ₈₀		A _s	(tran.; 180°)
			1.5 ≤ d < 2	2 ≤ d ≤ 8		1.5 ≤ d < 2	2 ≤ d < 3	3 ≤ d < 8	mrb
					max.	min.	min.	min.	d: thickness
30111	EN 10111	DD11-low Cu	170 - 360	170 - 340	440	23	24	28	1 d
30112	EN 10111	DD12	170 - 340	170 - 320	420	25	26	30	0
30113	EN 10111	DD13	170 - 330	170 - 310	400	28	29	33	0
35111	EN 10111	DD11	170 - 360	170 - 340	440	23	24	28	1 d
34111	EN 10111	DD11 High strength	170 - 360	170 - 340	440	23	24	28	1 d
30612	EN 10111	DD12 with B	170 - 340	170 - 320	420	25	26	30	0
30613	EN 10111	DD13 with B	170 - 330	170 - 310	400	28	29	33	0

Explanations

- 1) Tensile tests are applied to "Transverse" test samples.

HOT ROLLED STEELS SUITABLE FOR COLD ROLLING & GALVANISING

Std. : SAE J403-2009

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Cu	Ni	Cr	Mo	B
						max.	max.	max.	min.	max.	max.	ppm
21006	SAE J 403	SAE 1006	Standard	0.08	0.25-0.40	0.030	0.050	0.20	0.20	0.15	0.06	-
21106	SAE J 403	SAE 1006-low Mn	Standard	0.03-0.06	0.15-0.25	0.020	0.015	0.08	0.06	0.05	0.015	-
21606	SAE J 403	SAE 1006 with B	Standart	0.08	0.25-0.40	0.030	0.050	0.20	0.20	0.15	0.06	30-50
21008	SAE J 403	SAE 1008	Standard	0.10	0.30-0.50	0.030	0.050	0.20	0.20	0.15	0.06	-
21010	SAE J 403	SAE 1010	Standard	0.08-0.13	0.30-0.60	0.030	0.050	0.20	0.20	0.15	0.06	-
21110	SAE J 403	SAE 1010-high Mn	Standard	0.08-0.13	0.80-1.00	0.030	0.050	0.20	0.20	0.15	0.06	-
21112	SAE J 403	SAE 1012-high Mn	Standard	0.10-0.15	0.30-0.60	0.030	0.050	0.20	0.20	0.15	0.06	-
21118	SAE J 403	SAE 1018-low Mn	Standart	0.15-0.20	0.60-0.90	0.030	0.035	0.20	0.20	0.15	0.06	-

UNALLOYED GENERAL STRUCTURAL STEEL

Standard: ASTM A 36-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Si
				max.	max.	max.	max.	max.
56036	ASTM A 36	A 36	Standard	0.25	0.80 - 1.20	0.040	0.050	0.40

Explanations

- 1) If the thickness is 20 mm and thinner, Mn % limit is not required.
- 2) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.35 %.
- 3) Optionally, 0.2 % Cu is permitted.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)		Impact	
			N/mm ²		A ₅₀	A ₂₀₀	Temp.	KVc
			(min.)	(min.)	min.	min.	C	J
56036	ASTM A 36	A 36	250	400 - 550	21	18	-20	40

Explanations

- 1) Tensile tests are applied to "Transverse" test samples.
- 2) Impact tests are not required if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

UNALLOYED GENERAL STRUCTURAL STEEL SUITABLE FOR GALVANIZING

Standard: ASTM A 36-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Cu
				max.	max.	max.	max.	min.
56436	ASTM A 36	A 36-low Si	Standard	0.25	0.80 - 1.20	0.040	0.050	0.40

Explanations

- 1) If the thickness is 20 mm and thinner, Mn % limit is not required.
- 2) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.35 %.
- 3) Optionally, 0.2 % Cu is permitted.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)		Impact	
			N/mm ²		A ₅₀	A ₂₀₀	Temp.	KVc
			(min.)	(min.)	min.	min.	C	J
56436	ASTM A 36	A 36-low Si	250	400 - 550	23	20	-20	40

Explanations

- 1) Tensile tests are applied to "Transverse" test samples.
- 2) Impact tests are not required if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

UNALLOYED PIPE AND PROFILE STEELS													
Standard: ASTM A53 Grade A													
Chemical Composition (%)													
Çolakoglu Quality ID	Standard	Quality	Std.	C	Mn	P	S	Si	Cu ⁽¹⁾	Ni ⁽¹⁾	Cr ⁽¹⁾	Mo ⁽¹⁾	V ⁽¹⁾
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
56053	ASTM A 53	Grade A	Std.	0.25	0.95	0.050	0.045	0.35	0.40	0.40	0.40	0.15	0.08

Explanations

1) Total weight of these elements are max. % 1.00 for ASTM A 53 Grade A.

Mechanical Properties					
Çolakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A ⁵⁰ (%)
			N/mm ²		
			min.	min.	min.
56053	ASTM A 53	Grade A	205	330	"2"

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) $A_{50} (\%) = 1940 S_0 0.2 / U0.9$ (S_0 : Cross sectional area, mm²; U: Tensile stress, N/mm²)

UNALLOYED PIPE AND PROFILE STEELS SUITABLE FOR GALVANIZING													
Standard: ASTM A53 Grade A													
Chemical Composition (%)													
Çolakoglu Quality ID	Standard	Quality	Std.	C	Mn	P	S	Si	Cu ⁽¹⁾	Ni ⁽¹⁾	Cr ⁽¹⁾	Mo ⁽¹⁾	V ⁽¹⁾
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
56453 ⁽²⁾	ASTM A 53	Grade A-low Si	Std.	0.25	0.95	0.050	0.045	—	0.40	0.40	0.40	0.15	0.08

Explanations

1) Total weight of these elements are max. % 1.00 for ASTM A 53 Grade A.

2) 56453 with %Si ≤ 0.04 is suitable for galvanizing and cold forming.

Mechanical Properties					
Çolakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A ⁵⁰ (%)
			N/mm ²		
			min.	min.	min.
56453	ASTM A 53	Grade A-low Si	205	330	"2"

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) $A_{50} (\%) = 1940 S_0 0.2 / U0.9$ (S_0 : Cross sectional area, mm²; U: Tensile stress, N/mm²)

PIPE AND PROFILE STEELS

Standard: ASTM A53 Grade B

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	P	S	Cu ⁽¹⁾	Ni ⁽¹⁾	Cr ⁽¹⁾	Mo ⁽¹⁾	V ⁽¹⁾
				max.	max.	max.	max.	max.	max.	max.	max.	max.
56052	ASTM A 53	Grade B-with Si	Std.	0.30	1.20	0.050	0.045	0.50	0.40	0.40	0.15	0.08

Explanations

1) Total weight of these elements are max. % 1.00 for ASTM A 53 Grade B.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A ₅₀ (%)
			N/mm ²		
			min.	min.	min.
56052	ASTM A 53	Grade B-with Si	240	415	"2"

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) A₅₀ (%) = 1940 S₀ 0.2 / U0.9 (S0: Cross sectional area, mm²; U: Tensile stress, N/mm²)

UNALLOYED PIPE AND PROFILE STEELS SUITABLE FOR GALVANIZING

Standard: ASTM A53 Grade B

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	P	S	Si	Cu ⁽¹⁾	Ni ⁽¹⁾	Cr ⁽¹⁾	Mo ⁽¹⁾	V ⁽¹⁾
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
56452	ASTM A 53	Grade B-low Si	Std.	0.30	1.20	0.050	0.045	—	0.40	0.40	0.40	0.15	0.08

Explanations

1) Total weight of these elements are max. % 1.00 for ASTM A 53 Grade B.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A ₅₀ (%)
			N/mm ²		
			min.	min.	min.
56452	ASTM A 53	Grade B-low Si	240	415	"2"

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) A₅₀ (%) = 1940 S₀ 0.2 / U0.9 (S0: Cross sectional area, mm²; U: Tensile stress, N/mm²)

UNALLOYED GENERAL STRUCTURAL STEEL

Standard: ASTM A 283-2003

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality		C	Mn ⁽²⁾	P	S	Si	Cu
				max.	max.	max.	max.	max.	max.
56380	ASTM A 283	Grade C	Standard	0.24	0.90	0.035	0.040	0.40	0.20

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A (%)	
			N/mm ²		A 50	A 200
			min.	min.	min.	min.
56380	ASTM A 283	Grade C	205	380 - 515	23	20

Explanations

1) Tensile tests are applied to "Transverse" test samples.

UNALLOYED PIPE AND PROFILE STEELS SUITABLE FOR GALVANIZING

Standard: ASTM A 500-2007

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality		C	Mn	P	S	Cu
				max.	max.	max.	max.	max.
56542	ASTM A 500	Grade B	Standard	0.26	1.35	0.035	0.035	0.20
56546	ASTM A 500	Grade C	Standard	0.23	1.35	0.035	0.035	0.20

Explanations

1) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum 1.50 %.

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A (%)
			N/mm ²		A 50
			min.	min.	min.
56542	ASTM A 500	Grade B	290	400	23 ²
56546	ASTM A 500	Grade C	315	425	21 ³

Explanations

- 1) Tensile tests are applied to "Longitudinal" test samples.
- 2) Given elongation values are valid for 4.7 mm and thicker samples. % elongation = 2.40 d+12 formula is applied for the products with lower thickness than 4.7 mm.
- 3) Given elongation values are applied for 3.05 mm and thicker samples.

**CARBON STEEL SUITABLE FOR USING WITH A PRESSURE
AT MIDDLE & HIGH TEMPERATURES**

Standard: ASTM A 516-2010

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Si
				max.	max.	max.	max.	max.
56660	ASTM A 516-2010	ASTM A 516 Grade 60	Standard	0.23	0.6-1.2	0.025	0.025	0.15-0.40

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A 50 (%)
			N/mm ²		
			min.	min.	min.
56660	ASTM A 516-2010	ASTM A 516 Grade 60	220	415	25

HIGH STRENGTH LOW ALLOY STRUCTURAL STEELS

Standard: ASTM A572 -2007

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C ⁽¹⁾	Mn ⁽¹⁾	P	S	Si	Cu ⁽²⁾	V	Nb
				max.	max.	max.	max.	max.	min.		
56350	ASTM A 572	Grade 50 Type 1	Standard	0.23	0.8-1.35	0.04	0.05	0.40	0.20	-	0.005-0.05
56550	ASTM A 572	Grade 50 Type 2	Standard	0.23	0.8-1.35	0.04	0.05	0.40	0.20	0.01-0.15	0.05
56355	ASTM A 572	Grade 55 Type 1	Standard	0.25	0.8-1.35	0.04	0.05	0.40	0.20	-	0.005-0.05
56555	ASTM A 572	Grade 55 Type 2	Standard	0.25	0.8-1.35	0.04	0.05	0.40	0.20	0.01-0.15	-
56560	ASTM A 572	Grade 60 Type 1	Standard	0.26	0.8-1.35	0.04	0.05	0.40	0.20	-	0.005-0.05
56565	ASTM A 572	Grade 65 Type 1	Standard	0.23	0.80-1.65	0.04	0.05	0.40	0.20	-	0.005-0.05

Explanations

- 1) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.60.
- 2) When copper is specified, a minimum of 0.20 % is required.
- 3) Mn will be min %0.80 if the coil thickness bigger than 10 mm and will be min %0.50 if the coil thickness is equal or less than 10 mm.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)		Impact (long.) ²	
			N/mm ²		A ₅₀	A ₂₀₀	Temp.	KVc
			(min.)	(min.)	min.	min.	°C	J
56350	ASTM A 572	Grade 50 Type 1	345	450	21	18	+20	27
56550	ASTM A 572	Grade 50 Type 2	345	450	21	18	+20	27
56355	ASTM A 572	Grade 55 Type 1	380	485	20	17	+20	27
56555	ASTM A 572	Grade 55 Type 2	380	485	20	17	+20	27
56560	ASTM A 572	Grade 60 Type 1	415	520	18	16	+20	27
56565	ASTM A 572	Grade 65 Type 1	450	550	17	15	+20	27

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are carried out if it is customer's request in order.

MICROALLOYED HIGH STRENGTH STEEL RESISTANT TO ATMOSPHERE CORROSION

Standard: ASTM A 606

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	S	Cu
				max.	max.	max.	max.
55340	ASTM A 606	Type 2	Standard	0.22	1.25	0.04	0.20

Explanations

1) %C max. could be 0.15 in case %Mn is 1.40 max.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm	A (%)
			N/mm ²		A 50
			min.	min.	min.
55340	ASTM A 606	Type 2	340	480	22

STRUCTURAL STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A 1011/A 1011M-07

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	Ti ⁽³⁾	Ca
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
56340	ASTM A 1011	CS Type B	Std.	0.15	0.60	0.030	0.035	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	0.0080
56360	ASTM A 1011	SS Grade 33	Std.	0.25	0.90	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	0.0080
56365	ASTM A 1011	SS 36 Type 1	Std.	0.25	0.90	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	0.0080
56400 ⁽¹⁾	ASTM A 1011	SS 36 Type 2	Std.	0.25	1.35	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	-
56275	ASTM A 1011	SS Grade 40	Std.	0.25	0.90	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	-
56454	ASTM A 1011	SS Grade 50-low Si	Std.	0.25	1.35	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	-
56450	ASTM A 1011	SS Grade 50	Std.	0.25	1.35	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	-
56484	ASTM A 1011	SS Grade 55-low Si	Std.	0.25	1.35	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	-
56480	ASTM A 1011	SS Grade 55	Std.	0.25	1.35	0.035	0.040	-	0.20	0.20	0.15	0.06	0.008	0.008	0.025	-

Explanations

- 1) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.50 %.
- 2) When copper is specified, a minimum of 0.20 % is required.
- 3) Ti/ N is max. 3.4.

STRUCTURAL STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A 1011/A 1011M-07

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)			Bending
			N/mm ²		A 50		A200	(tran.; 90°)
					2.5≤T≤6.0	1.6≤T≤2.5	T≤6.0	mrB
			min.	min.	min.	min.	min.	d: thickness
56340	ASTM A 1011	CS Type B	205-340	-	-	-	-	-
56360	ASTM A 1011	SS Grade 33	230	360	23	22	18	1d
56365	ASTM A 1011	SS 36 Type 1	250	365	22	21	17	1.5d
56400	ASTM A 1011	SS 36 Type 2	250	400 - 550	21	20	16	2d
56275	ASTM A 1011	SS Grade 40	275	380	21	20	16	2d
56454	ASTM A 1011	SS Grade 50-low Si	340	450	17	16	12	2.5d
56450	ASTM A 1011	SS Grade 50	340	450	17	16	12	2.5d
56484	ASTM A 1011	SS Grade 55-low Si	380	480	15	14	10	3d
56480	ASTM A 1011	SS Grade 55	380	480	15	14	10	3d

Explanations

- 1) Tensile tests are applied to "Longitudinal" test samples.
- 2) Bending tests are carried out if it is customer's request in order.

MICROALLOYED STRUCTURAL STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A 1011/A 1011M-07

Chemical Composition (%)

Çolakoğlu Quality ID	Std.	Quality	C	Mn	Si	P	S	Cr	Ni	Cu	Al	Mo	V	Ti	N ppm	Nb
56245 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 45 Class 2	Std. 0.15	1.35	-	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56150 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 1-low Si	Std. 0.23	1.35	-	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56151 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 1	Std. 0.23	1.35	0.14-0.25	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56250	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 2	Std. 0.15	1.50	-	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56155 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 55 Class 1-low Si	Std. 0.25	1.35	-	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56156 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 55 Class 1	Std. 0.25	1.35	0.14-0.25	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56255	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 55 Class 2	Std. 0.15	1.35	-	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56160	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 60 Class 1	Std. 0.26	1.50	-	0.04	0.04	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56260	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 60 Class 2	Std. 0.15	1.50	-	0.040	0.040	0.15	0.20	0.20	-	0.06	0.005	0.005	-	0.005
56270	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 70 Class 2	Std. 0.15	1.65	-	0.040	0.040	0.15	0.20	0.20	-	0.16	0.005	0.005	-	0.005
56280	ASTM A 1011 / ASTM A 1011M	HSLAS-F Grade 80	Std. 0.15	1.65	-	0.020	0.025	0.15	0.20	0.20	-	0.16	0.005	0.005	-	0.005
56152	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 1-with Cu	Std. 0.23	1.35	-	0.040	0.040	0.15	0.20	0.30	-	0.06	0.005	0.005	-	0.005
56162	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 60 Class 1-with Cu	Std. 0.26	1.50	-	0.040	0.040	0.15	0.20	0.30	-	0.06	0.005	0.005	-	0.005

Explanations

1) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.50 %.

2) ASTM A1011/A 1011M-2007 Std. is valid for strip thickness ≤6 mm coils.

MICROALLOYED STRUCTURAL STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A 1011/A 1011M-07

Mechanical Properties									
Colakoglu Quality ID	Standard	Quality	Re		Rm ⁽¹⁾		A(%)		Bending (trans.; 90°) mrb
			min.	N/mm ²	min.	min.	T < 2.5	2.5 < T	
56245 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 45 Class 2	310	380	23	25	25	1.5d	
56150 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 1-low Si	340	450	20	22	2d	2d	
56151 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 1	340	450	20	22	2d	2d	
56250	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 2	340	410	20	22	2d	1.5d	
56155 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 55 Class 1-low Si	380	480	18	20	2d	2d	
56156 ⁽¹⁾	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 55 Class 1	380	480	18	20	2d	2d	
56255	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 55 Class 2	380	450	18	20	2d	2d	
56160	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 60 Class 1	410	520	16	18	18	2.5d	
56260	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 60 Class 2	410	480	16	18	18	2d	
56270	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 70 Class 2	480	550	12	14	14	3d	
56280	ASTM A 1011 / ASTM A 1011M	HSLAS-F Grade 80	550	620	16	18	18	2d	
56152	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 50 Class 1-with Cu	340	450	20	22	2d	2d	
56162	ASTM A 1011 / ASTM A 1011M	HSLAS Grade 60 Class 1-with Cu	410	520	16	18	18	2.5d	

Explanations

- 1) Tensile tests are applied to "Longitudinal" test samples.
- 2) Bending tests are carried out if it is customer's request in order.

STRUCTURAL STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A1018/A 1018M-07

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)												
			C	Mn	P	S	Cu ⁽²⁾	Ni	Cr	Mo	V	Nb	Ti ⁽³⁾	N	
56830	ASTM A 1018	CS Type B	max. 0.02-0.15	max. 0.60	max. 0.030	max. 0.035	max. 0.20	max. 0.20	max. 0.15	max. 0.06	max. 0.008	max. 0.008	max. 0.025	max.	
56833	ASTM A 1018	SS Grade 33	Std. 0.25	1.50	0.035	0.040	0.20	0.12	0.10	0.02	0.008	0.008	0.025	-	
56836	ASTM A 1018	SS 36 Type 1	Std. 0.25	1.50	0.035	0.040	0.20	0.20	0.15	0.06	0.008	0.008	0.025	0.014	
56837 ⁽¹⁾	ASTM A 1018	SS 36 Type 2-low S1	Std. 0.25	1.35	0.035	0.040	0.20	0.20	0.15	0.06	0.008	0.008	0.025	0.014	
56838	ASTM A 1018	SS 36 Type 2	Std. 0.25	1.35	0.035	0.040	0.20	0.20	0.15	0.06	0.008	0.008	0.025	0.014	
56840	ASTM A 1018	SS Grade 40	Std. 0.25	1.50	0.035	0.04	0.20	0.12	0.10	0.02	0.008	0.008	0.025	0.014	

Explanations

- 1) Mn % is 0.80-1.20 for 20 mm and thicker strips. For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.35.
- 2) When copper is specified, a minimum of 0.20 % is required.
- 3) Ti/N is max.3.4.

STRUCTURAL STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A1018/A 1018M-07

Mechanical Properties

Colakoglu Quality ID	Std.	Quality	Re	Rm ⁽¹⁾	A(%)		Impact (long.) ²		Bending (tran., 90°) mb
			N/mm ²	min.	A50	A200	Temp.	KVc min.	
					T≤25	4.5≤T≤25			
					min.	min.			
				°C		J			
56830	ASTM A 1018	C5 Type B	-	-	-	-	-	-	-
56833	ASTM A 1018	S5 Grade 33	230	360	22	16	+20	40	1d
56836	ASTM A 1018	S5 36 Type 1	250	365	21	15	+20	40	1.5d
56837	ASTM A 1018	S5 36 Type 2-low S1	250	400-550	21	18	+20	40	2d
56838	ASTM A 1018	S5 36 Type 2	250	400-550	21	18	+20	40	2d
56840	ASTM A 1018	S5 Grade 40	275	380	19	14	+20	40	2d

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact and Bending tests are carried out if it is customer's request in order.

MICRO ALLOYED STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A1018/A 1018M-07

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)											
			C max.	Mn max.	P max.	S max.	Cu max.	Ni max.	Cr max.	Mo max.	V min.	Nb min.	Ti min.	Si max.
56845	ASTM A 1018 ASTM A 1018M	HSLAS Grade 45 Class 1	Std. 0.22	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56945	ASTM A 1018 ASTM A 1018M	HSLAS Grade 45 Class 2	Std. 0.15	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56850	ASTM A 1018 ASTM A 1018M	HSLAS Grade 50 Class 1	Std. 0.23	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
55850	ASTM A 1018 ASTM A 1018M	HSLAS Grade 50 Class 1-with Cu	Std. 0.23	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56851	ASTM A 1018 ASTM A 1018M	HSLAS Grade 50 Class 1-with Si	Std. 0.23	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	0.14-0.25
55851	ASTM A 1018 ASTM A 1018M	HSLAS Grade 50 Class 1-with Cu+Si	Std. 0.23	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	0.14-0.25
56855	ASTM A 1018 ASTM A 1018M	HSLAS Grade 55 Class 1	Std. 0.25	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56856	ASTM A 1018 ASTM A 1018M	HSLAS Grade 55 Class 1-with Si	Std. 0.25	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	0.14-0.25
56950	ASTM A 1018 ASTM A 1018M	HSLAS Grade 50 Class 2	Std. 0.15	1.50	0.040	0.040	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56955	ASTM A 1018 ASTM A 1018M	HSLAS Grade 55 Class 2	Std. 0.15	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56860	ASTM A 1018 ASTM A 1018M	HSLAS Grade 60 Class 1	Std. 0.26	1.5	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56960	ASTM A 1018 ASTM A 1018M	HSLAS Grade 60 Class 2	Std. 0.15	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56965	ASTM A 1018 ASTM A 1018M	HSLAS Grade 65 Class 2	Std. 0.15	1.50	0.04	0.04	0.20	0.20	0.15	0.06	0.005	0.005	0.005	
56970	ASTM A 1018 ASTM A 1018M	HSLAS Grade 70 Class 2	Std. 0.15	1.65	0.04	0.040	0.20	0.20	0.15	0.16	0.005	0.005	0.005	
56980	ASTM A 1018 ASTM A 1018M	HSLAS-F Grade 80	Std. 0.15	1.65	0.020	0.025	0.20	0.20	0.15	0.16	0.005	0.005	0.005	

MICRO ALLOYED STEELS SUITABLE FOR COLD FORMING & BENDING

Standard: ASTM A1018/A 1018M-07

Mechanical Properties

Colokagılı Quality ID	Standard	Quality	Re		Rm ⁽¹⁾		A(%)		Bending ⁽²⁾ (tran.; 90°) mb
			N/mm ²		min.		A 50	A 200	
			min.	min.	T≤25	4.5≤T≤25	min.	min.	
56845	ASTM A1018/ASTM A 1018M	HSLAS Grade 45 Class 1	310	410	22	17	17	1.5d	
56945	ASTM A1018/ASTM A 1018M	HSLAS Grade 45 Class 2	310	380	22	17	17	1.5d	
56850	ASTM A1018/ASTM A 1018M	HSLAS Grade 50 Class 1	340	450	20	16	16	2d	
55850	ASTM A1018/ASTM A 1018M	HSLAS Grade 50 Class 1-with Cu	340	450	20	16	16	2d	
56851	ASTM A1018/ASTM A 1018M	HSLAS Grade 50 Class 1-with Si	340	450	20	16	16	2d	
55851	ASTM A1018/ASTM A 1018M	HSLAS Grade 50 Class 1-with Cu+Si	340	450	20	16	16	2d	
56855	ASTM A1018/ASTM A 1018M	HSLAS Grade 55 Class 1	380	480	18	15	15	2d	
56856	ASTM A1018/ASTM A 1018M	HSLAS Grade 55 Class 1-with Si	380	480	18	15	15	2d	
56950	ASTM A1018/ASTM A 1018M	HSLAS Grade 50 Class 2	340	410	20	16	16	1.5d	
56955	ASTM A1018/ASTM A 1018M	HSLAS Grade 55 Class 2	380	450	18	15	15	2d	
56860	ASTM A1018/ASTM A 1018M	HSLAS Grade 60 Class 1	410	520	16	14	14	2.5d	
56960	ASTM A1018/ASTM A 1018M	HSLAS Grade 60 Class 2	410	480	16	14	14	2d	
56965	ASTM A1018/ASTM A 1018M	HSLAS Grade 65 Class 2	450	520	14	12	12	2.5d	
56970	ASTM A1018/ASTM A 1018M	HSLAS Grade 70 Class 2	480	550	12	10	10	3d	
56980	ASTM A1018/ASTM A 1018M	HSLAS-F Grade 80	550	620	12	10	10	2d	

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Bending tests are carried out if it is customer's request in order.

UNALLOYED GENERAL STRUCTURAL STEELS

Standard: EN 10025-Part 2-2004

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C (max.)		Mn	P	S	Cu	Al ⁽¹⁾	N ⁽¹⁾	Ceq ⁽²⁾
				d≤16	16<d≤40	max.	max.	max.	max.	min.	max.	max.
51235	EN 10025-2	S235JR	Standard	0.17	0.17	1.4	0.035	0.035	0.55	—	0.012	0.35
51236	EN 10025-2	S235JR+N	Standard	0.17	0.17	1.4	0.025	0.025	0.55	0.200	—	0.35
55235	EN 10025-2	S235JR+Cu	Standard	0.17	0.17	1.4	0.035	0.035	0.55	—	0.012	0.35
52235	EN 10025-2	S235J2+N	Standard	0.17	0.17	1.4	0.025	0.025	0.55	0.020	—	—
51275	EN 10025-2	S275JR	Standard	0.21	0.21	1.5	0.035	0.035	0.55	—	0.012	0.40
52275	EN 10025-2	S275J2+N	Standard	0.18	0.18	1.5	0.025	0.025	0.55	0.020	—	0.40

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.
- 2) Ceq is calculated by %CE (IIW) = C+Mn/6+(C+Mo+V)/5+(Ni+Cr)/15 formula.

Mechanical Properties

Colakoglu Quality ID	Std.	Quality	Re		Rm ⁽⁴⁾		A(%), min.					Impact (long.) ⁽²⁾	
			N/mm ²		N/mm ²		A ₅₀			A ₅	Temp.	KVc	
			min.	min.	d : thickness, mm		d : thickness, mm						
			≤16	16<d≤40	<3	3≤d<40	1<d≤1.5	1.5<d≤2	2<d≤2.5	2.5<d≤3	3≤d≤40	°C	J
51235	EN 10025-2	S235JR	235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27 ⁽³⁾
51236	EN 10025-2	S235JR+N	235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27
55235	EN 10025-2	S235JR+Cu	235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27
52235	EN 10025-2	S235J2+N	235	225	360 - 510	360 - 510	16	17	18	19	24	-20	27
51275	EN 10025-2	S275JR	275	265	430 - 580	410 - 560	14	15	16	17	21	+20	27 ⁽³⁾
52275	EN 10025-2	S275J2+N	275	265	430 - 580	410 - 560	14	15	16	17	21	-20	27

Explanations

- 1) Grades with N code can be normalized and/or hot formed by customers.
- 2) Impact tests are not required if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.
- 4) Tensile tests are applied to "Transversal" test samples.

UNALLOYED GENERAL STRUCTURAL STEELS

Standard: EN 10025-Part 2-2004

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		P	S	Cu	N
				max.	max.	max.	max.
51335	EN 10025-2	E335	Standard	0.045	0.045	0.55	120

Mechanical Properties

Colakoglu Quality ID	Std.	Quality	Re		Rm ⁽²⁾		A (%), min					Impact (long.) ³	
			N/mm ²		N/mm ²		A ₈₀			A 5		Temp.	KVc
			min.	min.	d : thickness, mm		d : thickness, mm						min
			d : thickness, mm		d : thickness, mm		d : thickness, mm		d : thickness, mm				
			≤16	16<d≤40	<3	3≤d<100	1<d≤1.5	1.5<d≤2	2<d≤2.5	2.5<d≤3	3≤d≤40	°C	J
51235	EN 10025-2	S235JR	235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27 ⁽³⁾

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

UNALLOYED GENERAL STRUCTURAL STEELS														
Standard: EN 10025-Part 2-2004														
Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)											
			C (max.)		Si	Mn	P	S	Cu	Al ⁽¹⁾	N ⁽¹⁾	Ce ⁽²⁾		
d≤16	16<d≤40	max.	max.	max.									max.	max.
50355	EN 10025-2	S355J0	Std.	0.20	0.20	0.55	1.6	0.030	0.030	0.030	0.55	—	0.012	0.45
51355	EN 10025-2	S355JR	Std.	0.24	0.24	0.55	1.6	0.035	0.035	0.035	0.55	—	0.012	0.45
53355	EN 10025-2	S355J2	Std.	0.20	0.20	0.55	1.6	0.025	0.025	0.025	0.55	—	—	0.45
52355	EN 10025-2	S355J2+N	Std.	0.20	0.20	0.55	1.6	0.025	0.025	0.025	0.55	0.020	—	0.45
55355	EN 10025-2	S355J2+H+with Cu	Std.	0.20	0.20	0.55	1.6	0.025	0.025	0.025	0.55	—	—	0.45

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.
- 2) Ceq is calculated by %CE (lith) = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cr)/15 formula.

UNALLOYED GENERAL STRUCTURAL STEELS

Standard: EN 10025-Part 2:2004

Mechanical Properties

Çelikoglu Quality ID	Standard	Quality	Re		Rm ²⁾		A(%) ³⁾ , min.				Impact (long. ⁴⁾)		
			N/mm ²		N/mm ²		A ₈₀		A ₅		Temp.	KJc min.	
			min.	min.	d : thickness, mm		d : thickness, mm		d : thickness, mm				
			≤16	16<d≤40	<3	3≤d<40	1<d≤1.5	1.5<d≤2	2<d≤2.5	2.5<d≤3	3≤d≤40	°C	J
50B55	EN 10025-2	S355J0	355	345	510-680	470-630	13	14	15	16	20	0	27 ⁴⁾
51B55	EN 10025-2	S355JR	355	345	510-680	470-630	13	14	15	16	20	+20	27
53B55	EN 10025-2	S355J2	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁴⁾
52B55	EN 10025-2	S355J2+N ¹⁾	355	345	510-680	470-630	13	14	15	16	20	-20	27
55B55	EN 10025-2	S355J2+N+Cu ¹⁾	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁴⁾

Explanations

- 1) Grades with +N code can be normalized and/or hot formed by customers.
- 2) Tensile tests are applied to "Transversal" test samples.
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request, in order.

UNALLOYED GENERAL STRUCTURAL STEELS SUITABLE FOR GALVANIZING AND BENDING

Standard: EN 10025 Part 2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)									
			C (max.)	Mn	P	S	Cu	Al ⁽¹⁾	N ⁽¹⁾	Ceq ⁽²⁾		
			d≤16	16<d≤40	max.	max.	max.	max.	max.	min.	max.	max.
54235	EN 10025-2	S235JR	Std.	0.17	0.17	1.40	0.035	0.035	0.55	—	0.012	0.35
50236	EN 10025-2	S235JR (Cu+Cr+Ni≤0.35)	Std.	0.17	0.17	1.4	0.035	0.035	0.55	—	0.012	0.35
50237	EN 10025-2	S235J0 (Cu+Cr+Ni≤0.35)	Std.	0.17	0.17	1.4	0.030	0.030	0.55	—	0.012	0.35
50238	EN 10025-2	S235J0 (Cu+Cr+Ni≤0.35)	Std.	0.17	0.17	1.4	0.035	0.035	0.55	—	0.012	0.35
50235	EN 10025-2	S235J0	Std.	0.17	0.17	1.4	0.030	0.030	0.55	—	0.012	0.35
53235	EN 10025-2	S235J2	Std.	0.17	0.17	1.4	0.025	0.025	0.55	—	0.012	0.35
54275	EN 10025-2	S275JR	Std.	0.21	0.21	1.5	0.035	0.035	0.55	—	0.012	0.40
50275	EN 10025-2	S275J0	Std.	0.18	0.18	1.5	0.030	0.030	0.55	—	0.012	0.40
53275	EN 10025-2	S275J2	Std.	0.18	0.18	1.5	0.025	0.025	0.55	—	0.012	0.40

Explanations

1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.

2) Ceq is calculated by %CCE (IWW) = C+Mn/6+(C+Mn+V)/5+(Ni+Cr)/15 formula.

UN ALLOYED GENERAL STRUCTURAL STEELS SUITABLE FOR GALVANIZING AND BENDIN

Standard: EN 10025 Part 2-2004

Mechanical Properties

Colokoglu Quality ID	Standard	Quality	Re		Rm ¹⁾ N/mm ²	A(%) min.			Impact (long.) ³⁾			
			min.	min. d : thickness, mm		A ₅₀	A ₃	Temp.				
								°C	J			
54235	EN 10025-2	S235JR	≤16	16 < d ≤ 40	< 3	1 < d ≤ 1,5	1,5 < d ≤ 2	2 < d ≤ 2,5	2,5 < d ≤ 3	3 ≤ d ≤ 40	0	27 ^B
			235	225	360-510	16	17	18	19	24	+20	27 ^B
50236	EN 10025-2	S235JR (Cu+Cr+Ni≤0.35)	235	225	360-510	16	17	18	19	24	+20	27 ^B
50237	EN 10025-2	S235J0 (Cu+Cr+Ni≤0.35)	235	225	360-510	16	17	18	19	24	0	27 ^B
50238	EN 10025-2	S235J0 (Cu+Cr+Ni≤0.35)	235	225	360-510	16	17	18	19	24	0	27 ^B
50235	EN 10025-2	S235J0	235	225	360-510	16	17	18	19	24	0	27 ^B
53235	EN 10025-2	S235J2	235	225	360-510	16	17	18	19	24	-20	27 ^B
54275	EN 10025-2	S275JR	275	265	430-580	14	15	16	17	21	+20	27 ^B
50275	EN 10025-2	S275J0	275	265	430-580	14	15	16	17	21	0	27
53275	EN 10025-2	S275J2	275	265	430-580	14	15	16	17	21	-20	27

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

**UNALLOYED GENERAL STRUCTURAL STEELS
(SUITABLE TO CLASS 1 TYPE GALVANIZING STANDARD)**

Standard: EN 10025 Part 2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)										
			C (max.)		Si	Mn	P	S	Cu	Al ⁽¹⁾	N ⁽¹⁾	Ceq ⁽²⁾	
			d ≤ 16	16 < d ≤ 40	max.	max.	max.	max.	max.	max.	min.	max.	max.
54354	EN 10025-2	S355JR+N ⁽¹⁾ -low Si	Std.	0.24	0.24	1.6	0.035	0.035	0.035	0.55	—	0.012	0.45
54355	EN 10025-2	S355JR-low Si	Std.	0.24	0.24	1.6	0.035	0.035	0.035	0.55	—	0.012	0.45
54356	EN 10025-2	S355J0-low Si	Std.	0.20	0.20	1.6	0.030	0.030	0.030	0.55	—	0.012	0.45
54357	EN 10025-2	S355J2+N-low Si	Std.	0.20	0.20	1.6	0.025	0.025	0.025	0.55	—	—	0.45
54358	EN 10025-2	S355J2-low Si	Std.	0.20	0.20	1.6	0.025	0.025	0.025	0.55	—	—	0.45

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020%.
- 2) Ceq is calculated by $\%Ceq (100) = C + Mn / (6 + (C + Mo + V) / 5) + (Ni + Cr) / 15$ formula.

UNALLOYED GENERAL STRUCTURAL STEELS (SUITABLE TO CLASS 1 TYPE GALVANIZING STANDARD)

Standard: EN 10025 Part 2:2004

Mechanical Properties

Çelik/çözümlü Kalite ID	Std.	Kalite	Re		Rm ⁽¹⁾		A(%) ⁽²⁾ min.				Impact (long.) ⁽³⁾		
			min.	min.	N/mm ²		A ₁₀	A ₅	Temp.	KJc min.			
			d : thickness, mm		d : thickness, mm		d : thickness, mm				°C		
			≤16	16<d≤40	<3	3≤d<40	1<d≤1,5	1,5<d≤2	2<d≤2,5	2,5<d≤3		3≤d≤40	
54354	EN 10025-2	S355JR+N ⁽⁴⁾ -low SI	355	345	510-680	470-630	13	14	15	16	20	+20	27 ⁽⁴⁾
54355	EN 10025-2	S355JR-low SI	355	345	510-680	470-630	13	14	15	16	20	+20	27 ⁽⁴⁾
54356	EN 10025-2	S355J0-low SI	355	345	510-680	470-630	13	14	15	16	20	0	27 ⁽⁴⁾
54357	EN 10025-2	S355J2+N ⁽⁴⁾ -low SI	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁽⁴⁾
54358	EN 10025-2	S355J2-low SI	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁽⁴⁾

Explanations

- 1) Grades with N code can be normalized and/or hot formed by customers.
- 2) Tensile tests are applied to "Transversal" test samples.
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request in order.

GENERAL STRUCTURAL STEELS SUITABLE FOR COLD FORMING, BENDING AND SPINNING

Standard: EN 10025-Part 2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)									
			C (max.)		Mn	P	S	Ca	Al ⁽¹⁾	Ce ⁽²⁾		
d ≤ 16	16 < d ≤ 40	max.	max.	max.							ppm	min.
40234	EN 10025-2	S235JRC	Std.	0.17	1.4	0.035	0.035	20	0.020	0.35		
40235	EN 10025-2	S235J2C	Std.	0.17	1.4	0.025	0.025	20	0.020	0.35		
44235	EN 10025-2	S235JRC+N	Std.	0.17	1.4	0.035	0.035	20	0.020	0.35		
43275	EN 10025-2	S275JRC	Std.	0.21	1.5	0.035	0.035	20	0.020	0.40		
40275	EN 10025-2	S275J2C	Std.	0.18	1.5	0.025	0.025	20	0.020	0.40		
44276	EN 10025-2	S275JRC+N-Special	Std.	0.21	1.5	0.035	0.035	0.55	0.020	0.40		
44275	EN 10025-2	S275J2C+N	Std.	0.18	1.5	0.025	0.025	20	0.020	0.40		

Explanations

1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.

2) Ceq is calculated by %CE (liv) = C+Mn/6+(C+Mo+N)/75+(Ni+Cr)/15 formula.

GENERAL STRUCTURAL STEELS SUITABLE FOR COLD FORMING, BENDING & SPINNING

Standard: EN 10025-Part 2:2004

Mechanical Properties

Çelik/çözümlü Quality ID	Standard	Quality	Re		Rm ⁽¹⁾ N/mm ²	A (%)			Impact (long, ⁽²⁾ KJc				
			min. d : thickness, mm	min. 16 < d ≤ 40		A ₅₀			Temp.	min.			
						d : thickness, mm	d : thickness, mm	A ₃					
40234	EN 10025-2	S235JR ⁽²⁾	≤16	16 < d ≤ 40	≤3	3 ≤ d < 40	1 < d ≤ 1.5	1.5 < d ≤ 2	2 < d ≤ 2.5	2.5 < d ≤ 3	3 ≤ d ≤ 40	0°C	J
40235	EN 10025-2	S235J2C	235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27 ⁽³⁾
44235	EN 10025-2	S235JR+N ⁽¹⁾⁽²⁾	235	225	360 - 510	360 - 510	16	17	18	19	24	-20	27 ⁽³⁾
43275	EN 10025-2	S275JR ⁽²⁾	275	265	430 - 580	410 - 560	14	15	16	17	21	+20	27 ⁽³⁾
40275	EN 10025-2	S275J2C	275	265	430 - 580	410 - 560	14	15	16	17	21	-20	27 ⁽³⁾
44276	EN 10025-2	S275JR+N-Special	275	265	430 - 580	410 - 560	14	15	16	17	21	+20	27 ⁽³⁾
44275	EN 10025-2	S275J2C+N ⁽¹⁾⁽²⁾	275	265	430 - 580	410 - 560	14	15	16	17	21	-20	27 ⁽³⁾

Explanations

- 1) Grades with N code can be normalized and/or hot formed by customers.
- 2) Grades with C code can be cold formed and/or cold flanged by customers.
- 3) Tensile tests are applied to "Transversal" test samples.
- 4) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 5) Impact tests are carried out if it is customer's request in order.

Mechanical Properties

Çelik/çözümlü Quality ID	Standard	Quality	Bending ⁽¹⁾ (tran., ≤90°, m/b)							
			thickness, d (mm)							
			6 < d ≤ 7	7 < d ≤ 8	8 < d ≤ 10	10 < d ≤ 12	12 < d ≤ 14	14 < d ≤ 16	16 < d ≤ 18	18 < d ≤ 20
40234	EN 10025-2	S235JR	10	12	16	20	25	28	36	40
40235	EN 10025-2	S235J2C	10	12	16	20	25	28	35	40
44235	EN 10025-2	S235JR+N	10	12	16	20	25	28	36	40
43275	EN 10025-2	S275JR	12	16	20	25	28	32	40	45
40275	EN 10025-2	S275J2C	12	16	20	25	28	32	40	45
44275	EN 10025-2	S275JR+N	12	16	20	25	28	32	40	45

GENERAL STRUCTURAL STEELS SUITABLE FOR COLD FORMING, BENDING AND SPINNING

Standard: EN 10025-Part 2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)											
			d≤16	16<d≤40	C(max.)	Si	Mn	P	S	Cu	Al ¹⁾	N ¹⁾	Ceq ²⁾	
42355	EN 10025-2	S355JRC-low SI	Std.	0.24	0.24	0.55	1.6	0.035	0.035	0.035	0.55	—	0.012	0.45
41355	EN 10025-2	S355J0C-low SI	Std.	0.24	0.24	0.55	1.6	0.035	0.035	0.035	0.55	—	0.012	0.45
43355	EN 10025-2	S355J2C-low SI	Std.	0.20	0.20	0.55	1.6	0.025	0.025	0.025	0.55	—	—	0.45
40355	EN 10025-2	S355J2C	Std.	0.20	0.20	0.55	1.6	0.025	0.025	0.025	0.55	0.020	—	0.45
44355	EN 10025-2	S355J2C+N	Std.	0.20	0.20	0.55	1.6	0.025	0.025	0.025	0.55	0.020	—	0.45
40856	EN 10025-2	S355JRC	Std.	0.24	0.24	0.55	1.6	0.035	0.035	0.035	0.55	—	0.012	0.45
44856	EN 10025-2	S355J2C+N-Special	Std.	0.20	0.20	0.55	1.7	0.025	0.025	0.025	0.55	0.020	—	0.45

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020%.
- 2) Ceq is calculated by %CE (IIW) = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15 formula.

GENERAL STRUCTURAL STEELS SUITABLE FOR COLD FORMING, BENDING & SPINNING

Standard: EN 10025-Part 2-2004

		Mechanical Properties											
Colokloglu Quality ID	Standard	Quality	Re		N/mm ²	Rm ⁽¹⁾	A (%)				Impact (long.) ⁽⁴⁾		
			min.	min.			A ₅₀	A ₅	Temp.	KJc min.			
											d : thickness, mm		
											d : thickness, mm	d : thickness, mm	
42355	EN 10025-2	S355JRC-low SI	≤16	16<d≤40	<3	3≤d<40	1<d≤15	1.5<d≤2	2<d≤2.5	2.5<d≤3	3≤d≤40	0	27 ⁽⁵⁾
41355	EN 10025-2	S355J10C-low SI	355	345	510-680	470-630	13	14	15	16	20	+20	27 ⁽⁵⁾
43355	EN 10025-2	S355J2C-low SI	355	345	510-680	470-630	13	14	15	16	20	0	27 ⁽⁵⁾
40355	EN 10025-2	S355J2C	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁽⁵⁾
44355	EN 10025-2	S355J2C+N	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁽⁵⁾
40356	EN 10025-2	S355J1RC	355	345	510-680	470-630	13	14	15	16	20	+20	27 ⁽⁵⁾
44356	EN 10025-2	S355J2C+N-Special	355	345	510-680	470-630	13	14	15	16	20	-20	27 ⁽⁵⁾

Explanations

- 1) Grades with H code can be normalized and/or hot formed by customers.
- 2) Grades with C code can be cold formed and/or cold flanged by customers.
- 3) Tensile tests are applied to "transversal" test samples.
- 4) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 5) Impact tests are carried out if it is customer's request in order.

		Mechanical Properties											
Colokloglu Quality ID	Standard	Quality	Bending ⁽¹⁾ (tran., ≤90°, mb)										
			thickness, d (mm)										
			6<d≤7	7<d≤8	8<d≤10	10<d≤12	12<d≤14	14<d≤16	16<d≤18	18<d≤20			
42355	EN 10025-2	S355JRC-low SI	—	—	—	—	—	—	—	—	—	—	—
43355	EN 10025-2	S355J2C-low SI	12	16	20	25	32	36	45	50	—	—	—
40355	EN 10025-2	S355J2C	12	16	20	25	32	36	45	50	—	—	—
44355	EN 10025-2	S355J2C+N	12	16	20	25	32	36	45	50	—	—	—
40356	EN 10025-2	S355J1RC	-	-	-	-	-	-	-	-	-	-	-
44356	EN 10025-2	S355J2C+N-Special	12	16	20	25	32	36	45	50	—	—	—

Explanations

- 1) The values for bending tests are applied to 90° and acute angles.

HIGH STRENGTH NORMALISED STRUCTURAL STEELS SUITABLE FOR HOT FORMING

Standard: EN 10025 Part 3 - 2004

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality	C	Mn	Si	P	S	Nb	V	Ti	Mo	Cr	Ni	Cu	Al	N ppm
52420	EN 10025-3	S420N-Special (SAH540)	max. 0.20	1.00-1.70	max. 0.60	max. 0.030	max. 0.025	max. 0.05	max. 0.20	max. 0.05	max. 0.10	max. 0.30	max. 0.80	max. 0.55	max. 0.02	max. 0.025
52460	EN 10025-3	S460N	Std. 0.20	1.00-1.70	0.60	0.030	0.025	0.05	0.20	0.05	0.10	0.30	0.80	0.55	0.02	0.025
57355	EN 10025-3	S355N	Std. 0.20	0.90-1.65	0.50	0.030	0.025	0.05	0.12	0.05	0.10	0.30	0.50	0.55	0.02	0.015

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Re		Rm ⁽¹⁾	A(%)	Impact (long.) ²		Bending (trans. ≤180°)			
			N/mm ²	min.			Temp.	KVc	min.	mrB		
											d : thickness, mm	°C
52420	EN 10025-3	S420N-Special (SAH540)	420	400	520-680	19	-20	40	4d			
52460	EN 10025-3	S460N	460	440	540-720	17	-20	40	4d			
57355	EN 10025-3	S355N	355	345	470-630	22	-20	40	4d			

ATMOSPHERE CORROSION RESISTANT STEELS

Standard: EN 10025 Part 5 - 2004

Chemical Composition (%)

Çelikoglu Quality ID	Standard	Quality	C	Mn	Si	P	S	Cr	Ni	Cu	Al	N
			max.	max.	max.	max.	max.	max.	max.	max.	min.	max.
58235	EN 10025-5	S235J0W	Std. 0.16	0.15-0.70	0.45	0.040	0.040	0.35-0.85	—	0.20-0.60	—	0.01
58236	EN 10025-5	S235J2W	Std. 0.16	0.15-0.70	0.45	0.040	0.035	0.35-0.85	—	0.20-0.60	—	0.01
58355	EN 10025-5	S355J0W	Std. 0.19	0.45-1.60	0.55	0.040	0.040	0.35-0.85	—	0.20-0.60	—	0.01
58356	EN 10025-5	S355J2W	Std. 0.19	0.45-1.60	0.55	0.035	0.035	0.35-0.85	—	0.20-0.60	—	0.01
58357	EN 10025-5	S355J0WP	Std. 0.15	1.1	0.80	0.05-0.16	0.040	0.25-1.35	—	0.20-0.60	—	0.01
58358	EN 10025-5	S355J2WP	Std. 0.15	1.1	0.80	0.05-0.16	0.035	0.25-1.35	—	0.20-0.60	—	0.01

Mechanical Properties

Çelikoglu Quality ID	Standard	Quality	Re		N/mm ²	Rm ¹⁾			A (%)		Impact (long.) ²⁾	
			min.	d : thickness, mm		min.	A ₈₀	d : thickness, mm	d : thickness, mm	Temp.	KJc	
												max.
58235	EN 10025-5	S235J0W	235	≤16	360-510	19	20	21	26	0	27 ³⁾	
58236	EN 10025-5	S235J2W	235	225	360-510	17	18	19	24	-20	27 ³⁾	
58355	EN 10025-5	S355J0W	355	345	510-680	16	17	18	22	0	27 ³⁾	
58356	EN 10025-5	S355J2W	355	345	510-680	14	15	16	20	-20	27 ³⁾	
58357	EN 10025-5	S355J0WP	355	345	510-680	16	17	18	22	0	27 ³⁾	
58358	EN 10025-5	S355J2WP	355	345	510-680	14	15	16	20	-20	27 ³⁾	

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are applied to "Longitudinal" test samples.
- 3) Impact tests are carried out if it is customer's request in order.

WHEEL STEELS SUITABLE FOR COLD FORMING, BENDING AND SPINNING

Standard: EN 10025-Part 2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)										
			C	Mn	Si	P	S	Cu	Cu+Cr+Ni	Al	N	Ca	
82235	EN 10025-2	S235JRC Special	Std. 0.14	0.7	0.15	0.02	0.01	"1"	0.30	0.02-0.045	0.001	—	
81235	EN 10025-2	S235J2C+N	Std. 0.14	0.7	0.1	0.02	0.015	"1"	0.30	0.02-0.07	0.009	—	
82280	EN 10025-2	S275JRC	Std. 0.10	0.8	0.05	0.02	0.015	"1"	0.30	0.015-0.07	0.009	—	
82290	EN 10025-2	S275JRC Special (S275J2C+N)	Std. 0.18	1.25	0.1	0.020	0.015	"1"	0.30	0.02-0.07	0.009	—	
82330 ¹⁾	EN 10025-2	S355JRC Special (S355J2C+N)	Std. 0.15-0.18	1.3-1.4	0.1	0.02	0.01	0.15	—	0.02-0.06	0.001	20-50	
82355	EN 10025-2	S355J2C+N Special	Std. 0.24	1.6	0.55	0.035	0.035	0.55	—	—	0.012	—	
81330	EN 10025-2	S355JRC Special	Std. 0.19	1.6	0.3	0.025	0.02	"2"	0.30	0.02-0.07	0.009	—	
80235	EN 10025-2	S235JR Special S5092 Rev 27	Std. 0.06-0.16	0.40-0.90	0.015-0.1	0.025	0.015	—	—	0.020-0.06	—	—	
80236	EN 10025-2	S235JR Special S5095 Rev 4	Std. 0.06-0.16	0.40-0.90	0.015-0.1	0.025	0.015	—	—	0.020-0.06	—	—	
80280	EN 10025-2	S275J0 Special	Std. 0.21	1.6	—	0.05	0.05	—	—	—	—	—	
80290	EN 10025-2	S275J2+N Special	Std. 0.21	1.6	—	0.05	0.05	—	—	—	—	—	
80355	EN 10025-2	S355J0 Special	Std. 0.23	1.7	0.6	0.05	0.05	—	—	—	—	—	

Explanations

- 1) Ceq is calculated by %CE (lIW) = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cr)/15 formula.
- 2) Cu+Cr+Ni is permitted up to a maximum 0.3 %.
- 3) Cr max. 0.05 %, Mo max. 0.015 %, V max. 0.005 %, Ni max. 0.1 %, Nb max. 0.005 %.

WHEEL STEELS SUITABLE FOR COLD FORMING, BENDING & SPINNING

Standard: EN 10025-Part 2:2004

Mechanical Properties

Çolakoglu Quality ID	Standard	Quality	Re		A(%)		Bending		Impact (long.) ^{2b)}		
			N/mm ²		A ₅		Ø		Temp. °C	KV _C min.	J
			min.	min.	min.	min.	d: kalınlık				
82235	EN 10025-2	S235JRC-Special	235	360-440	30	0.5d	0.5d	+20	27 ¹⁾		
81235	EN 10025-2	S235J2C+N	235-320	350-430	35	0.5d	0.5d	-20	27 ¹⁾		
82280	EN 10025-2	S275JRC	280-350	390-460	28	0.5d	0.5d	+20	27 ¹⁾		
82290	EN 10025-2	S275JRC-Special (S275J2C+N)	280-420	430-500	29	0.5d	0.5d	+20	27 ¹⁾		
82330	EN 10025-2	S355JRC-Special (S355J2C+N)	330-450	480-590	25	2.0d	2.0d	+20	27 ¹⁾		
82335	EN 10025-2	S355J2C+N-Special	330-540	480-600	24	2.0d	2.0d	-20	27 ¹⁾		
81330	EN 10025-2	S355JRC-Special	330-540	480-600	24	2.0d	2.0d	+20	27 ¹⁾		
80235	EN 10025-2	S235JR-Special S5092 Rev 27	230	370-450	30	0.5d	-	-	-		
80236	EN 10025-2	S235JR-Special S5095 Rev 4	230	370-450	30	0.5d	-	-	-		
80280	EN 10025-2	S275J0-Special	275	410-560	24	-	-	0	27		
80290	EN 10025-2	S275J2+N-Special	275	410-560	24	-	-	0	27		
80355	EN 10025-2	S355J0-Special	355	470-630	24	-	-	0	27		

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

Mechanical Properties

Çolakoglu Quality ID	Standard	Quality	Bending ¹⁾ (tran., ≤90°, mmb)																		
			thickness, d (mm)																		
			1<d≤1,5	1,5<d≤2,5	2,5<d≤3	3<d≤4	4<d≤5	5<d≤6	6<d≤7	7<d≤8	8<d≤10	10<d≤12	12<d≤14	14<d≤16	16<d≤18	18<d≤20	20<d≤25	25<d≤30			
82235	EN 10025-2	S235JRC-Special	1.6	2.5	3	5	6	8	10	12	16	20	25	28	32	36	40	45	50	55	60
82280	EN 10025-2	S275JRC	2	3	4	5	8	10	12	16	20	25	28	32	40	45	55	70			
82290	EN 10025-2	S275JRC-Special (S275J2C+N)	2	3	4	5	8	10	12	16	20	25	28	32	40	45	55	70			

WHEEL STEELS SUITABLE FOR COLD FORMING, BENDING AND SPINNING

Standard: EN 10111:2008-06

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Cu	Al
				max.	max.	max.	max.	max.	max.	min.
81222	EN 10111	DD11	Std.	0.10	0.45	-	0.035	0.035	—	—
80122	EN 10111	DD 11-Special-1	Std.	0.10	0.50	0.20	0.035	0.030	0.20	0.010
80222	EN 10111	DD 11-Special-2	Std.	0.14	0.65	-	0.050	0.050	—	—

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re		Rm ⁽¹⁾	A(%)
			N/mm ²			A ₅
			min.	min.	min.	min.
80122	EN 10111	DD 11-Special-1	215		300-440	35
80222	EN 10111	DD 11-Special-2	340		440	28

HIGH STRENGTH WHEEL STEELS SUITABLE FOR COLD FORMING AND SPINNING

Standard: EN 10149-Part2-1995

Chemical Composition (%)

Colakoglu Quality ID	Std.	Quality		C	Mn	Si	P	S	Al	Nb ⁽¹⁾	V ⁽¹⁾	Ti ⁽¹⁾
				max.	max.	max.	max.	max.	min.	max.	max.	max.
83355	EN 10149-2	S355MC	Std.	0.12	1.50	0.50	0.025	0.020	0.015	0.09	0.20	0.15
84355	EN 10149-2	S355MC-Special SS088 Rev 10	Std.	0.12	1.50	0.50	0.025	0.010	0.020	0.09	0.20	0.15
83420	EN 10149-2	S420MC (HL-2242-01)	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.09	0.20	0.15
83460	EN 10149-2	S460MC (HL-6000-02)	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.09	0.20	0.15

Explanations

1) Nb+V+Ti = % 0.22 max.

Mechanical Properties

Colakoglu Quality ID	Std.	Quality	Re ⁽¹⁾	Rm ⁽¹⁾	A(%)		Impact (long.) ⁽²⁾		Bending
			N/mm ²		A ₁₀	A ₅	Temp.	KVc	(tran.;180°)
					d<3	d≤T		min.	mdb
			min.	min.	min.	min.	°C	J	(d=thickness)
83355	EN 10149-2	S355MC	355	430-550	19	23	-20	40	0.5d
84355	EN 10149-2	S355MC-Special SS088 Rev 10	340-430	470-560	25	-	-40	27	0.5d
83420	EN 10149-2	S420MC (HL-2242-01)	420	480-620	16	19	-20	40	0.5d
83460	EN 10149-2	S460MC (HL-6000-02)	450-550	550-650	-	22	-	-	1d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) Impact tests are carried out if it is customer's request in order. Impact tests are not carried out if nominal thickness is lesser than 6 mm.

3) Bending test values are applied to "Transversal" test samples.

HIGH STRENGTH DUAL PHASE STEELS SUITABLE FOR COLD FORMING

Standard : EN10338-2009

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Al	Mo	Nb	N ppm	Cu	Cr
				max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.
83500	EN 10338	HCT500X (DP 500)	Std.	0.06-0.08	1.10-1.20	0.20-0.30	0.020	0.005	0.030-0.060	0.05	0.005	100	0.15-0.20	0.10-0.20

Explanations

1) The values are applied to strips with thickness T≤6 mm

HIGH STRENGTH DUAL PHASE WHEEL STEEL SUITABLE FOR COLD FORMING AND SPINNING

Standard: EN 10338-2010

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Al	Mo+Cr	V	Nb+Ti	B ppm	Cu	Cr
				max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.	max.
83600	EN 10338	HDT580X (DP 600)	Std.	0.17	2.20	0.80	0.080	0.015	2.0	1.00	0.20	0.15	50	-	-

Explanations

1) The values are applied to strips with thickness T≤6 mm

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re ⁽¹⁾	Rm ⁽¹⁾	A(%)	Strain hardening exponent
			N/mm ²		A ₅₀	n
			min.	min.	min.	min.
83600	EN 10338-2010	HDT580X (DP 600)	330-480	580	19	0.13

Explanations

1) Tensile tests are applied to "Transversal" test samples.

HOT ROLLED HIGH STRENGTH DUAL PHASE STEEL SUITABLE FOR COLD FORMING

Standard : EN 10338-2010

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Al
				max.	max.	max.	max.	max.	min.
83610	EN 10338	HCT600X (DP 600)	Std.	0.07-0.1	1.30-1.45	0.20-0.30	0.020	0.008	0.025-0.06
83780	EN 10338	HCT780X (DP 780)	Std.	0.09-0.11	1.70-1.90	0.20-0.30	0.020	0.005	0.03-0.06

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		Mo+Cr	V	Nb+Ti	B ppm	Cu	Cr
				max.	max.	max.	max.	max.	max.
83610	EN 10338	HCT600X (DP 600)	Std.	0.75	0.01	0.020	100	0.15-0.20	0.50-0.70
83780	EN 10338	HCT780X (DP 780)	Std.	-	-	-	5	0.10-0.20	0.20-0.30

Explanations

1) The values are applied to strips with thickness T≤6 mm

SPIRAL PIPE STEEL

Standard: EN 10025-Part 2-2004

Chemical Composition (%)

Çolakoğlu Quality ID	Std.	Quality	Chemical Composition (%)								
			C	Mn	Si	P	S	Cu	%N		
92355	EN 10025-2	S355JR-Special	Std.	max.	max.	max.	max.	max.	max.	max.	max.
				0.24	1.60	0.55	0.035	0.035	0.035	0.55	0.012

Mechanical Properties

Çolakoğlu Quality ID	Std.	Quality	Re		Rm		A (%)		Impact (long.)		
			N/mm ²		N/mm ²		A ₉₀		KJc		
			min.	min.	d : thickness, mm		d : thickness, mm		Temp.		
			d : thickness, mm	d : thickness, mm	d : thickness, mm		d : thickness, mm		min.		
92355	EN 10025-2	S355JR-Special	355	345	510-680	470-630	16	17	18	22	27
			≤16	16<d≤40	<3	3≤d<100	1.5<d≤2	2<d≤2.5	2.5<d≤3	3<d≤40	°C
											+20

BOILER STEELS

Standard: EN 10028 - Part 2 - 2008

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Si	Mn	P	S	Al	Nb	Cr ⁽¹⁾	Cu ⁽¹⁾	Mo ⁽¹⁾	Ni ⁽¹⁾
				max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.
86235 ⁽²⁾	EN 10028-2	P235GH	Std.	0.16	0.35	0.60 - 1.20	0.025	0.020	0.020	0.020	0.30	0.30	0.08	0.30
86265 ⁽²⁾	EN 10028-2	P265GH	Std.	0.20	0.40	0.80 - 1.20	0.025	0.020	0.020	0.020	0.30	0.30	0.08	0.30
86295 ⁽²⁾	EN 10028-2	P295GH	Std.	0.08 - 0.20	0.40	0.90 - 1.50	0.025	0.015	0.020	0.020	0.30	0.30	0.08	0.30
86355	EN 10028-2	P355GH	Std.	0.10 - 0.22	0.60	1.10 - 1.70	0.025	0.015	0.020	0.020	0.30	0.30	0.08	0.30

Explanations

- 1) Cr+Cu+Mo+Ni ≤ % 0.70
- 2) Mn content can be decreased as 0.20 % if the thickness is under 6 mm.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re (min.)		Rm ⁽¹⁾	A ₅ (%)	Impact ⁽²⁾ (tran.)		Rp 0.02 ⁽¹⁾ (min.) T: 300°C	
			N/mm ²		N/mm ²	min.	Temp.	KVc (min.)	N/mm ² (kg / mm ²)	
			d ≤ 16	16 < d ≤ 40			°C	J	d ≤ 16	16 < d ≤ 40
86235	EN 10028	P235GH	235	225	360 - 480	24	-20	27	153	147
86265	EN 10028	P265GH	265	255	410 - 530	22	-20	27	173	166
86295	EN 10028	P295GH	295	290	460 - 580	22	-20	27	192	189
86355	EN 10028	P355GH	355	345	510 - 650	20	-20	27	232	225

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.

BOILER STEELS

Standard: EN 10028 - Part 3 - 2008

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Si	Mn	P	S	Al	Cr	Ni	Cu	Mo	V	Ti	Nb
				max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.	max.	max.
87355	EN 10028 Part 3	P355NL1	Std.	0.18	0.50	1.10-1.70	0.025	0.010	0.02	0.30	0.50	0.30	0.08	0.1	0.03	0.05

Explanations

- 1) Mn content could be 0.60 % if the thickness is less than 6 mm.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re (min.)		Rm ⁽¹⁾	A ₅ (%)	Impact ⁽²⁾ (tran.)		Rp 0.02 ⁽¹⁾ (min.) T: 300°C
			N/mm ²		N/mm ²	min.	Temp.	KVc (min.)	N/mm ² (kg / mm ²)
			d ≤ 16				°C	J	d ≤ 16
87355	EN 10028-Part 3	P355NL1	355		490-630	22	-40	27	232

STEELS SUITABLE TO USE UNDER LOW PRESSURE

Standard: EN 10207-2005

Chemical Composition (%)

Çolakoglu Quality ID	Standard	Quality	Std.	C	Si	Mn	P	S	Al
				max.	max.	max.	max.	max.	min.
86275	EN 10207	P275SL	Std.	0.16	0.40	0.50-1.50	0.025	0.020	0.02

Explanations

1) If the chemical composition includes Nb, V, Ti, %Al min. value does not valid.

Mechanical Properties

Çolakoglu Quality ID	Std.	Quality	Re ⁽¹⁾			Rm ⁽¹⁾	A (%)		Impact (long.) ²	
			N/mm ²			N/mm ²	l	t	Temp.	KVc
			min.	min.	min.	min.				min.
			d ≤ 16	16 < d ≤ 40	40 < d ≤ 60					
86275	EN 10207	P275SL	275	265	255	390-510	17	18	-50	28

BOILER PIPE STEELS

Standard: EN 10217-2-2002

Chemical Composition (%)

Çolakoglu Quality ID	Standard	Quality	Std.	C	Si	Mn	P	S	Al	Cr ⁽¹⁾	Cu ⁽¹⁾	Mo ⁽¹⁾	Nb ⁽¹⁾	V	Ti
				max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.	max.
86435	EN 10217-2	P235GH-low Si	Std.	0.16	0.35	1.20	0.025	0.020	0.020	0.30	0.30	0.08	0.010	0.020	0.030

Explanations

1) Cr+Cu+Mo+Ni ≤ % 0.70.

Mechanical Properties

Çolakoglu Quality ID	Std.	Quality	Re ⁽¹⁾	Rm ⁽¹⁾	A (%)		Impact (long.) ²		Impact (tran.) ²	
			N/mm ²	N/mm ²	l	t	Temp.	KVc	Temp.	KVc
			min.	min.				min.		min.
			d ≤ 16	16 < d ≤ 40	40 < d ≤ 60					
86435	EN 10217-2	P235GH-low Si	235	360-500	25	23	0	40	0	27

Explanations

1) Tensile tests are applied to "Transversal" test samples.

2) Impact test values are valid upto ≤16 mm in thickness. Impact tests can be carried out in transversal and longitudinal directions of coils.

3) l: longitudinal, t: transversal.

BOILER PIPE STEELS															
Standard : EN 10217-3-2005															
Chemical Composition (%)															
Colakoglu Quality ID	Standard	Quality		C	Si	Mn	P	S	Al	Cr	Cu	Mo	Nb	V	Ti
			Std.	max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.	max.
86475	EN 10217-3	P275NL1-low Si	Std.	0.16	0.40	0.50-1.50	0.025	0.020	0.02	0.30	0.30	0.08	0.05	0.05	0.03

Mechanical Properties										
Colakoglu Quality ID	Standard	Quality	Re ⁽¹⁾	Rm ⁽¹⁾	A (%)		Impact (long.) ²		Impact (tran.) ²	
			N/mm ²	N/mm ²	l	t	Temp.	KVc	Temp.	KVc
			min.	min.	min.	min.	°C	J	°C	J
86475	EN 10217-3	P275NL1-low Si	275	390-530	24	22	-40	40	-40	27

LPG TUBE STEELS												
Standard : EN 10120-2008												
Chemical Composition (%)												
Colakoglu Quality ID	Standard	Quality		C	Si	Mn	P	S	Al	N ⁽¹⁾	Nb	Ti
			Std.	max.	max.	min.	max.	max.	min.	max.	max.	max.
85245	EN 10120	P245NB	Std.	0.16	0.25	0.30	0.025	0.015	0.020	0.009	0.050	0.03
85265	EN 10120	P265NB	Std.	0.19	0.25	0.40	0.025	0.015	0.020	0.009	0.050	0.03
85310	EN 10120	P310NB	Std.	0.20	0.50	0.70	0.025	0.015	0.020	0.009	0.050	0.03
85355	EN 10120	P355NB	Std.	0.20	0.50	0.70	0.025	0.015	0.020	0.009	0.050	0.03

Explanations

1) N content can be % 0.012 if (Al/N) ≥ 2.2 or steel includes Nb and Ti additions.

Mechanical Properties						
Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)	
			N/mm ²	N/mm ²	A ₁₀ (min.)	A ₅ (min.)
			(min.)		d < 3	3 ≤ d ≤ 5
85245	EN 10120	P245NB	245	360 - 450	26	34
85265	EN 10120	P265NB	265	410 - 500	24	32
85310	EN 10120	P310NB	310	460 - 550	21	28
85355	EN 10120	P355NB	355	510 - 620	19	24

Explanations

1) Tensile tests are applied to "Transversal" test samples.

GENERAL STRUCTURAL STEELS SUITABLE FOR HEAT TREATMENT

Standard: EN 10083 - Part 2 -2006

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Cr	Ni	Mo	Cr+Mo+Ni
				max.	max.	max.	max.	max.	max.	max.	max.	
98628	EN 10083-2	28Mn6	Std.	0.25-0.32	1.30-1.65	0.40	0.030	0.010	0.40	0.40	0.10	0.63
98035	EN 10083-2	C35E	Std.	0.32-0.39	0.5-0.8	0.40	0.030	0.030	0.40	0.40	0.10	0.63
98135	EN 10083-2	C35E-Cr	Std.	0.32-0.39	0.5-0.8	0.40	0.030	0.030	0.40	0.40	0.10	0.63
98145	EN 10083-2	C45E-Special	Std.	0.42-0.50	0.5-0.8	0.40	0.030	0.030	0.40	0.40	0.10	0.63
98060	EN 10083-2	C60E	Std.	0.57-0.65	0.6-0.9	0.40	0.030	0.030	0.40	0.40	0.10	0.63
98160	EN 10083-2	C60E-Special	Std.	0.57-0.65	0.6-0.9	0.40	0.030	0.030	0.40	0.40	0.10	0.63
98260	EN 10083-2	C60E-1-Cr	Std.	0.57-0.65	0.6-0.9	0.40	0.030	0.030	0.20-0.40	0.40	0.10	0.63

Explanations

1) There is no mechanical test guarantee for heat treatment steels.

GENERAL STRUCTURAL STEELS SUITABLE FOR HEAT TREATMENT

Standard: EN 10083- Part 3 -2006

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	B	Cr
				max.	max.	max.	max.	max.	ppm	max.
98530	EN 10083-3	30MnB5	Std.	0.27-0.33	1.15-1.45	0.40	0.035	0.040	8-50	-
98534	EN 10083-3	34MnB5	Std.	0.33-0.37	1.15-1.45	0.40	0.035	0.040	8-50	-
98527	EN 10083-3	27MnCrB5-2	Std.	0.24-0.30	1.10-1.40	0.40	0.035	0.040	8-50	0.30-0.60
98526	EN 10083-3	26MnB5	Std.	0.27-0.33	1.15-1.45	0.40	0.035	0.040	8-50	-
98522	EN 10083-3	22MnB5	Std.	0.18-0.23	1.15-1.45	0.40	0.035	0.040	8-50	-

Explanations

1) There is no mechanical test guarantee for heat treatment steels.

HIGH STRENGTH STEELS SUITABLE FOR COLD FORMING AND BENDING

Standard: EN 10149 - Part2 - 1995

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Al	V ⁽²⁾	Ti ⁽²⁾	Nb ⁽²⁾	Mo	B
				max.	max.	max.	max.	max.	min.	max.	max.	max.	max.	max.
36315	EN 10149-2	S315MC	Std.	0.12	1.30	0.50	0.025	0.020	0.015	0.20	0.15	0.09	-	-
36355	EN 10149-2	S355MC	Std.	0.12	1.50	0.50	0.025	0.020	0.015	0.20	0.15	0.09	-	-
36356	EN 10149-2	S355MC-Special	Std.	0.12	1.50	0.50	0.025	0.020	0.015	0.20	0.15	0.09	-	-
36420	EN 10149-2	S420MC	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36421	EN 10149-3	S420MC-with Si	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36460	EN 10149-2	S460MC	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36461	EN 10149-5	S460MC-with Si	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36500	EN 10149-2	S500MC	Std.	0.12	1.70	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36501	EN 10149-2	S500MC-with Si	Std.	0.12	1.70	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36550	EN 10149-2	S550MC	Std.	0.12	1.80	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36551	EN 10149-2	S550MC-with Si	Std.	0.12	1.80	0.50	0.025	0.015	0.015	0.20	0.15	0.09	-	-
36600	EN 10149-2	S600MC	Std.	0.12	1.90	0.50	0.025	0.015	0.015	0.20	0.15	0.09	0.5	50
36650	EN 10149-2	S650MC	Std.	0.12	2.00	0.60	0.025	0.015	0.015	0.20	0.22	0.09	0.5	50
36700	EN 10149-2	S700MC	Std.	0.12	2.10	0.60	0.025	0.015	0.015	0.20	0.22	0.09	0.5	50

Explanations

- 1) All grades are produced by thermo mechanical rolling method.
2) Nb+Ti+V≤ % 0,22

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)		Impact ⁽²⁾ Kvc (long.)	Bending (tran.;180°)
					d<3	d≥3		
			N/mm ²		A ₈₀	A ₅	Temp. -20°C	mdb
			min.	min.	min.	min.		
36315	EN 10149-2	S315MC	315	390 - 510	20	24	40 J	0
36355	EN 10149-2	S355MC	355	430 - 550	19	23	40 J	0.5 d
36356	EN 10149-2	S355MC-Special	355	430 - 550	19	23	40 J	0.5 d
36420	EN 10149-2	S420MC	420	480 - 620	16	19	40 J	0.5 d
36421	EN 10149-3	S420MC-with Si	420	480 - 620	16	19	40 J	0.5 d
36460	EN 10149-2	S460MC	460	520 - 670	14	17	40 J	1 d
36461	EN 10149-5	S460MC-with Si	460	520 - 670	14	17	40 J	1 d
36500	EN 10149-2	S500MC	500	550 - 700	12	14	40 J	1 d
36501	EN 10149-2	S500MC-with Si	500	550 - 700	12	14	40 J	1 d
36550	EN 10149-2	S550MC	550	600 - 760	12	14	40 J	1.5 d
36551	EN 10149-2	S550MC-with Si	550	600 - 760	12	14	40 J	1.5 d
36600	EN 10149-2	S600MC	600	650-820	11	13	40 J	1.5 d
36650	EN 10149-2	S650MC	650	700-880	10	12	40 J	2d
36700	EN 10149-2	S700MC	700	750-950	10	12	40 J	2d

Explanations

- 1) Tensile tests are applied to "Longitudinal" test samples.
2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.

MICRO ALLOYED STEELS SUITABLE FOR COLD FORMING AND GALVANIZING

Standard: EN 10025-Part2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)												
			C	Mn	Si	P	S	Cu	Cr	Ni	Al	V	Ti	Nb	N
44277	EN 10025-2	S275JR-Special	max. 0.03-0.05	0.3-0.5	max. 0.03	max. 0.015	max. 0.008	0.20	max. 0.10	max. 0.10	max. 0.02-0.06	max. 0.2	max. 0.005	max. 0.01-0.02	max. 0.01

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Re		Rm		A(%)		Hardness	
			N/mm ²		N/mm ²		min.		HB	
44277	EN 10025-2	S275JR-Special	275	365	410	485	30		115	145

MICRO ALLOYED STEELS SUITABLE FOR COLD FORMING AND GALVANIZING

Standard: EN 10149-Part2-1995

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Al	V ⁽²⁾	Ti ⁽²⁾	Nb ⁽²⁾
				max.	max.	max.	max.	max.	min.	max.	max.	max.
37280	EN 10149-2	S280MC-Special	Std.	0.12	1.30	0.50	0.025	0.020	0.015	0.2	0.15	0.09
37315	EN 10149-2	S315MC	Std.	0.12	1.30	0.50	0.025	0.020	0.015	0.20	0.15	0.09
37355	EN 10149-2	S355MC	Std.	0.12	1.50	0.50	0.025	0.020	0.015	0.20	0.15	0.09
37420	EN 10149-2	S420MC	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09
37421	EN 10149-2	S420MC-HX-420LAD	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09
37460	EN 10149-2	S460MC	Std.	0.12	1.60	0.50	0.025	0.015	0.015	0.20	0.15	0.09
37352	EN 10149-2	S355MC-Special	Std.	0.06 - 0.08	0.45 - 0.65	0.15	0.020	0.003	0.20 - 0.60	-	0.10 - 0.20	0.25 - 0.35
37422	EN 10149-2	S420MC-Special	Std.	0.06 - 0.09	0.60 - 0.70	0.08	0.015	0.005	0.20 - 0.70	-	0.10 - 0.20	0.40 - 0.50
37462	EN 10149-2	S460MC-Special	Std.	0.07 - 0.08	1.00 - 1.20	0.08	0.015	0.003	0.20 - 0.70	-	0.15 - 0.30	0.45 - 0.60

Explanations

- 1) All grades are produced by thermo mechanical rolling method.
- 2) Nb+Ti+V ≤ % 0,22

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A(%)		Impact ⁽²⁾ KVc (long.) Temp. = 20°C	Bending (tran., 180°) mdb
					d < 3	d ≥ 3		
			N/mm ²		A ₅₀	A ₂	min.	d: thickness
			min.	min.	min.	min.		
37315	EN 10149-2	S315MC	315	390 - 510	20	24	40 J	0
37355	EN 10149-2	S355MC	355	430 - 550	19	23	40 J	0.5 d
37420	EN 10149-2	S420MC	420	480 - 620	16	19	40 J	0.5 d
37421	EN 10149-2	S420MC-HX420LAD	420	480 - 620	16	19	40 J	0.5 d
37460	EN 10149-2	S460MC	420	480 - 620	16	19	40 J	1 d

Explanations

- 1) Tensile tests are applied to "Longitudinal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.

NORMALISE ROLLED STEELS SUITABLE FOR COLD FORMING

Standard: BS 10149-Part 3-2013

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	V	Ti	Al	Nb
				max.	max.	max.	max.	max.	max.	max.	max.	
38280	BS 10149-3	S280NC-Special	Std.	0.16	1.20	0.50	0.025	0.020	0.10	0.15	0.015	0.09

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Re		Rm	A(%)		Bending	
			N/mm ²			d<3	d≥3	tran.,180°	
			min.		max.	A ₅₀	A ₅	mdb	
			min.	min.	max.	min.	min.	d: thickness	
38280	BS 10149-3	S280NC-Special	280	370	490	24	30	0	

PRESSURE PIPE STEELS

Standard: EN 10217 Part 1-2005

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	Cr	Ni	Al	Cu	Mo
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
94235	EN 10217-1	P235TR1	Std.	0.16	1.20	0.35	0.025	0.020	0.30	0.30	-	0.30	0.08
94236	EN 10217-1	P235TR2	Std.	0.16	1.20	0.35	0.025	0.020	0.30	0.30	0.02	0.30	0.08
94035	EN 10217-1	P235TR1-low Si	Std.	0.16	1.20	0.35	0.025	0.020	0.30	0.30	-	0.30	0.08
94036	EN 10217-1	P235TR2-low Si	Std.	0.16	1.20	0.35	0.025	0.020	0.30	0.30	0.02	0.30	0.08

Explanations

1) Cu+Cr+Mo+Ni = 0.70 max

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Re ⁽¹⁾		Rm ⁽¹⁾	A(%)		Impact (long.) ⁽²⁾ min.							
			N/mm ²			I		t		Temp.	KVC	Temp.	KVC	Temp.	KVC
			d≤16	16<d≤40		l	t	°C	J						
			min.	min.	min.	min.	min.	°C	J	°C	J	°C	J		
94235	EN 10217-1	P235TR1	235	225	360-500	25	23	0	-	-10	-	0	-		
94236	EN 10217-1	P235TR2	235	225	360-500	25	23	0	40	-10	28	0	27		
94035	EN 10217-1	P235TR1-low Si	235	225	360-500	25	23	0	-	-10	-	0	-		
94036	EN 10217-1	P235TR2-low Si	235	225	360-500	25	23	0	40	-10	28	0	27		

Explanations

1) Tensile tests are applied to "Transversal" test samples.

2) Impact tests are applied to "Transversal" and "Longitudinal" test samples.

**LOW ALLOYED GENERAL STRUCTURAL STEELS SUITABLE FOR COLD DRAWING AND NORMALIZING
(SUITABLE FOR CLASS 1 GALVANIZING Std.)**

Standard: EN 10025 Part 2-2004

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	Cu	Ti	N ppm	Nb	Ceq
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
54510	EN 10025-2	S355JR+N-low Si (Fe510DTCL)	Std.	0.24	1.60	0.55	0.035	0.035	0.55	0.01-0.03	120	0.005-0.03	0.45

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.
- 2) Ceq is calculated by %CE (IIW) = C+Mn/6+(C+Mo+V)/5+(Ni+Cr)/15 formula.

Mechanical Properties

Colakoglu Quality ID	Std.	Quality	Re		Rm ⁽²⁾		A(%), min.					Impact (long.) ⁽³⁾	
			N/mm ²		N/mm ²		A ₃₀			A ₅		Temp.	KJc
			min.	min.	d : thickness, mm		d : thickness, mm						
			≤16	16<d≤40	<3	3≤d<40	1<d≤1.5	1.5<d≤2	2<d≤2.5	2.5<d≤3	3≤d≤40	°C	J
54510	EN 10025-2	S355JR+N ⁽¹⁾ low Si Fe510DTCL	355	345	510-680	470-630	13	14	15	16	20	+20	27 ⁽⁴⁾

Explanationsq

- 1) Grades with N code can be normalized and/or hot formed by customers.
- 2) Tensile tests are applied to "Transversal" test samples.
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request in order.

LOW ALLOYED GENERAL STRUCTURAL AND TUBE STEELS SUITABLE FOR NORMALISING

Standard: EN 10025 Part 2-2004

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	Cu	Ti	N ppm	Nb	Ceq
				max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
51520	EN 10025-2	S355JR+N (Fe520DTCL)	Std.	0.24	1.60	0.55	0.035	0.01	0.55	0.01-0.03	120	0.005-0.03	0.45
51530	EN 10025-2	S355JR+N (Fe510DTCL)	Std.	0.19-0.22	1.30-1.60	0.18-0.25	0.02	0.003	0.55	0.01-0.03	120	0.02-0.035	0.45

Explanations

- 1) Mechanical test is not applied.

UNALLOYED STRUCTURAL STEELS SUITABLE FOR HOT FORMING (SRM PIPE PRODUCTION)
COLD ROLLING, NORMALIZING AND GALVANIZING

Standard: EN 10025-Part 2-2004

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)											
			C (max.)		Mn	P	S	Cu	Al ¹⁾		N ¹⁾	Ce ²⁾		
			d ≤ 16	16 < d ≤ 40					max.	min.			max.	max.
41235	EN 10025-2	S235JR+N-low S1	Std.	0.17	1.4	0.035	0.035	0.55	—	0.012	0.35	—	0.012	0.35
42235	EN 10025-2	S235JR+N	Std.	0.17	1.4	0.025	0.025	0.55	0.020	—	0.35	—	0.012	0.40
41275	EN 10025-2	S275JR+N-low S1	Std.	0.21	1.5	0.035	0.035	0.55	—	0.012	0.40	—	0.012	0.40
42275	EN 10025-2	S275JR+N-low S1	Std.	0.18	1.5	0.025	0.025	0.55	—	0.012	0.40	—	0.012	0.40

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.
- 2) Ce_q is calculated by %CE (IIW) = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cr)/15 formula.

Çolakoğlu Quality ID	Standard	Quality	Mechanical Properties											
			Re		N/mm ²	Rm ²⁾		A (%)		Impact (long. ³⁾)				
			min.	min.		min.	min.	A ₅₀	A ₅	Temp.	KVc			
			d : thickness, mm		d : thickness, mm		d : thickness, mm		d : thickness, mm		°C			
			≤ 16	16 < d ≤ 40	< 3	3 ≤ d < 40	360 - 510	360 - 510	1.5 < d ≤ 2	2 < d ≤ 2.5	2.5 < d ≤ 3	3 ≤ d ≤ 40	J	
41235	EN 10025-2	S235JR+N-low S1	235	225	360 - 510	360 - 510	16	17	18	19	19	24	+20	27 ⁴⁾
42235	EN 10025-2	S235JR+N	235	225	360 - 510	360 - 510	16	17	18	19	19	24	-20	27
41275	EN 10025-2	S275JR+N-low S1	275	265	430-580	410-560	14	15	16	17	17	21	+20	27 ⁴⁾
42275	EN 10025-2	S275JR+N-low S1	275	265	430-580	410-560	14	15	16	17	17	21	-20	27

Explanations

- 1) Grades with N code can be normalized and/or hot formed by customers.
- 2) Tensile tests are applied to "Transversal" test samples.
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request in order.

UNALLOYED STRAP STEELS FOR COLD ROLLING AND GALVANIZING

Standard: EN 10025-Part 2-2004

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Chemical Composition (%)										
			C (max.)	Mn	Si	P	S	Cu	Al ⁽¹⁾	N ⁽¹⁾	Ceq ⁽²⁾		
51238	EN 10025-2	S235JR Strap Steel	d ≤ 16	16 < d ≤ 40	max.	max.	max.	max.	max.	max.	max.	max.	max.
			Std.	0.17	0.17	1.4	—	0.035	0.035	0.55	—	0.012	0.35
54238	EN 10025-2	S235JR Strap Steel with low SI	Std.	0.21	0.21	1.5	—	0.035	0.035	0.55	—	0.012	0.35

Explanations

- 1) The maximum value for nitrogen does not apply if the chemical composition shows a minimum aluminium content of 0.020 %.
- 2) Ceq is calculated by %C E (IIW) = C+Mn/6+(Cr+Mo+V)/5+(Ni+Cr)/15 formula.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re		Rm ⁽¹⁾		A(%) min.				Impact (long.) ⁽³⁾		
			min.	min.	N/mm ²	Rm ⁽¹⁾	A ₅₀	A ₅	Temp.	KJc			
											d : thickness, mm	d : thickness, mm	
51238	EN 10025-2	S235JR Strap Steel	≤ 16	16 < d ≤ 40	< 3	3 ≤ d < 40	1 < d ≤ 1.5	1.5 < d ≤ 2	2 < d ≤ 2.5	2.5 < d ≤ 3	3 ≤ d ≤ 40	°C	J
			235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27 ⁽³⁾
54238	EN 10025-2	S235JR Strap Steel with low SI	235	225	360 - 510	360 - 510	16	17	18	19	24	+20	27 ⁽³⁾

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

STRUCTURAL STEELS FOR SHIP BUILDING									
Standard: ABS-Part 2-2013									
Chemical Composition (%)									
Çolakoglu Quality ID	Standard	Quality		C	Si	Mn	P	S	
				max.	max.	max.	max.	max.	
57701	ABS-Part 2-2013	ABS Grade A	Std.	0.21	0.50	2.5xC	0.035	0.035	
57702	ABS-Part 2-2013	ABS Grade B	Std.	0.21	0.35	0.60	0.035	0.035	

Explanations

1) C+(Mn/6) value should be max. %0.40.

Mechanical Properties									
Çolakoglu Quality ID	Standard	Quality		Re(min.)	Rm ⁽¹⁾	A 5 (%)	Temp.	Impact ⁽²⁾ (tran.)	
				N/mm ²		min.	°C	KVc (min.)	
								J	
57701	ABS-Part 2-2013	ABS Grade A		235	400-520	22	20	-	
57702	ABS-Part 2-2013	ABS Grade B		235	400-520	22	0	27	

UNALLOYED GENERAL STRUCTURAL STEEL									
Standard: JIS G3101-2005									
Chemical Composition (%)									
Çolakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	
				max.	max.		max.	max.	
93400	JIS G 3101	SS400	Std.	-	-	-	0.050	0.050	

Mechanical Properties										
Çolakoglu Quality ID	Standard	Quality		Re ⁽¹⁾		Rm ⁽¹⁾	A (%)			Bending
				N/mm ²		N/mm ²	(d=thickness)			(long.;180°)
				≤16	16<d≤40		d≤5	5<d≤16	16<d≤50	(d=thickness)
				min.	min.	min.	min.	min.	min.	mrB
93400	JIS G 3101	SS400		245	235	400-510	21	17	21	1.5d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

CHROME ADDED GENERAL STRUCTURAL STEELS

Standard: JIS G3101-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S
				max.	max.	-	max.	max.
93430	JIS G 3101	SS400-with Cr	Std.	-	-	-	0.050	0.050

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re ⁽¹⁾		Rm ⁽¹⁾	A (%)			Bending
			N/mm ²		N/mm ²	(d=thickness)			(long.;180°)
			≤16	16<d≤40		d≤5	5<d≤16	16<d≤50	(d=thickness)
			min.	min.	min.	min.	min.	min.	mrB
93430	JIS G 3101	SS400-with Cr	245	235	400-510	21	17	21	1.5d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

BORON ADDED GENERAL STRUCTURAL STEELS

Standard: JIS G3101-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	B
				max.	max.	-	max.	max.	ppm
93420	JIS G 3101	SS400-with B	Std.	-	-	-	0.050	0.050	20-50

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re ⁽¹⁾		Rm ⁽¹⁾	A (%)			Bending
			N/mm ²		N/mm ²	(d=thickness)			(long.;180°)
			≤16	16<d≤40		d≤5	5<d≤16	16<d≤50	(d=thickness)
			min.	min.	min.	min.	min.	min.	mrB
93420	JIS G 3101	SS400-with B	245	235	400-510	21	17	21	1.5d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

**HOT ROLLED LOW CARBON COMMERCIAL QUALITY STEELS
SUITABLE FOR COLD FORMING**

Standard: JIS G3131-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S
				max.	max.		max.	max.
93111	JIS G 3131	SPHC	Std.	0.15	0.60	-	0.050	0.050

Mechanical Properties

Colakoglu Quality ID	Std.	Quality	Rm ⁽¹⁾	A (%)						Bending
			N/mm ²	(d=thickness)						(long.;180°) (mrb)
				1.2≤d<1,6	1.6≤d<2.0	2.0≤d<2.5	2.5≤d<3.2	3.2≤d<4.0	4.0≤d	(d=thickness 3.2≤d)
				min.	min.	min.	min.	min.	min.	min.
93111	JIS G 3131	SPHC	270	27	29	29	29	31	31	0.5d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

**LOW CARBON STEELS WITH BORON SUITABLE
FOR COLD FORMING**

Standard: JIS G3131-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	B
				max.	max.		max.	max.	ppm
93211	JIS G 3131	SPHC-with B	Std.	0.15	0.60	-	0.050	0.050	20-50

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Rm ⁽¹⁾	A (%)						Bending
			N/mm ²	(d=thickness)						(long.;180°) (mrb)
				1.2≤d<1,6	1.6≤d<2.0	2.0≤d<2.5	2.5≤d<3.2	3.2≤d<4.0	4.0≤d	(d=thickness 3.2≤d)
				min.	min.	min.	min.	min.	min.	min.
93211	JIS G 3131	SPHC-with B	270	27	29	29	29	31	31	0.5d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

**HOT ROLLED LOW CARBON PIPE AND PROFILE STEELS SUITABLE
FOR COLD FORMING AND GALVANIZING**

Standard: JIS G3132-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S
				max.	max.	max.	max.	max.
93270	JIS G 3132	SPHT-1	Std.	0.10	0.50	0.040	0.040	0.040
93340	JIS G 3132	SPHT-2	Std.	0.18	0.60	0.35	0.040	0.040

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Rm ¹⁾	A (%)				Bending	
			N/mm ²	(d=thickness)				(long.;180°) (mrb)	
				1.2≤d<1,6	1.6≤d<3.0	3.0≤d<6.0	6.0≤d≤13	(d=thickness 3.2≤d)	
				min.	min.	min.	min.	min.	3.0≤d
93270	JIS G 3132	SPHT-1	270	30	32	35	37	-	0.5d
93340	JIS G 3132	SPHT-2	340	25	27	30	32	1d	1.5d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

ATMOSPHERE CORROSION RESISTANT STEELS

Standard: JIS G3125-2005

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C	Si	Mn ¹⁾	P	S	Cu	Cr	Ni
				max.	max.	max.	max.	max.	max.	max.	max.
93125	JIS G3125	SPA - H	Std.	0.12	0.20 - 0.75	0.60	0.070-0.150	0.035	0.25 - 0.55	0.30 - 1.25	0.65

Explanations

1) Upper limit for Mn can be 1 % by agreement.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality		Re	Rm ¹⁾	A (%)		Bending	
			(d=thickness)	N/mm ²	min.	min.	A ₅₀	A ₂₀₀	(long.;180°)
									mrb
									(d=thickness)
93125	JIS G3125	SPA - H	d≤6	355	490	22	15	0.5 d	
			6<d≤16	355	490			1.5 d	

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

UNALLOYED GENERAL STRUCTURAL STEELS SUITABLE FOR GALVANIZING AND BENDING															
Standard: AS NZS 1594-2002															
Chemical Composition (%)															
Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	Cr	Ni	Cu	Al	Ti	N ppm	Ceq
				max.	max.	max.	max.	max.	max.	max.	max.	min.	max.	max.	
94250	AS NZS 1594	HA250-low Si ⁽¹⁾	Std.	0.20	1.20	0.35	0.040	0.030	0.25	0.25	0.25	0.10	0.040	120	0.39

Explanations

1) Nb+V = % 0.03 max.

Mechanical Properties													
Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A (%)						Bending ⁽²⁾		
			N/mm ²		d≤3			3<d			(tran.;180°, d=thickness, mdb)		
			min.	min.	A ₅₀	A ₈₀	A ₂₀₀	A ₅₀	A ₈₀	A ₂₀₀	d≤3	3<d≤5	5<d
94250	AS NZS 1594	HA250-low Si	250	350	22	20	16	26	24	17	d	d	2d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) Bending tests are applied to "Transverse" test samples.

UNALLOYED GENERAL STRUCTURAL STEELS SUITABLE FOR GALVANIZING AND BENDING															
Standard: AS NZS 1594-2002															
Chemical Composition (%)															
Colakoglu Quality ID	Standard	Quality	Std.	C	Mn	Si	P	S	Cr	Ni	Cu	Al	Ti	N ppm	Ceq
				max.	max.	max.	max.	max.	max.	max.	max.	min.	max.	max.	max.
94350	AS NZS 1594	HA350-low Si ⁽¹⁾	Std.	0.20	1.6	0.35	0.040	0.030	0.25	0.25	0.25	0.10	-	120	0.44

Explanations

1) For the quality HA350, V could be %0.10 max. or Nb+V+Ti could be %0.15 max.

Mechanical Properties													
Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A (%)						Bending ⁽²⁾		
			N/mm ²		d≤3			3<d			(tran.;180°, d=thickness, mdb)		
			min.	min.	A ₅₀	A ₈₀	A ₂₀₀	A ₅₀	A ₈₀	A ₂₀₀	d≤3	3<d≤5	5<d
94350	AS NZS 1594	HA350-low Si	350	430	18	16	14	22	20	15	2d	2d	3d

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

2) Bending tests are applied to "Transverse" test samples.

UNALLOYED GENERAL STRUCTURAL STEELS											
Standard: CSAG40											
Chemical Composition (%)											
Colakoglu Quality ID	Standard	Quality		C	Mn	Si	P	S	Cu	Al	N ppm
				max.			max.	max.		min.	max.
96350	CSAG40	350 WT	Std.	0.22	0.80-1.50	0.15-0.40	0.03	0.04	0.20-0.60	0.02	120
96450	CSAG40	44W/50W	Std.	0.22	0.50-1.50	0.40	0.040	0.050	-	-	-

Explanations

1)Nb + V = % 0.15 max.

Mechanical Properties										
Colakoglu Quality ID	Standard	Quality	Re	Rm			A (%)		Impact (long.)	
			N/mm ²			A ₅₀	A ₂₀₀	Temp.	KVc (min)	
			min.	min.	max.	min.	min.	°C	J	
96350	CSAG40	350 WT	350	450	650	22	19	-20	27	
96450	CSAG40	44W/50W	345	450	655	22	19	-	-	

HIGH STRENGTH AND MICROALLOYED STEELS SUITABLE FOR COLD FORMING AND BENDING													
Standard: SAE J2340-1999-10													
Chemical Composition (%)													
Colakoglu Quality ID	Standard	Quality		C	P	S	Cr	Ni	Cu	Mo	V	Ti	Nb
				max.	max.	max.	max.	max.	max.	max.	min.	max.	min.
38340	SAE J2340	340XF	Std.	0.13	0.060	0.015	0.150	0.200	0.200	0.060	0.005	0.005	0.005
38420	SAE J2340	420XF	Std.	0.13	0.060	0.015	0.150	0.200	0.200	0.060	0.005	0.005	0.005

Mechanical Properties						
Colakoglu Quality ID	Standard	Quality	Re	Rm	A (%)	
			N/mm ²			A ₅₀
			min.	min.		
38340	SAE J2340	340XF	340-440	410	25	
38420	SAE J2340	420XF	420-520	490	22	

Explanations

1) Tensile tests are applied to "Longitudinal" test samples.

HOT ROLLED CARBON STEELS											
Std. : SAE J403-2001											
Chemical Composition (%)											
Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Cu	Ni	Cr	Mo
				max.	max.	max.	max.	max.	max.	max.	max.
91006	SAE J 403	SAE 1006	Std.	0.08	0.25-0.40	0.030	0.050	0.20	0.25	0.20	0.06
91008	SAE J 403	SAE 1008	Std.	0.10	0.30-0.50	0.030	0.050	0.20	0.25	0.20	0.06
91108	SAE J 403	SAE 1008-Modified	Std.	0.10	0.30-0.50	0.030	0.050	0.20	0.25	0.20	0.06
91010	SAE J 403	SAE 1010	Std.	0.08 - 0.13	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91110	SAE J 403	SAE 1010-Modified	Std.	0.08 - 0.13	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91210	SAE J 403	SAE 1010 with Ca	Std.	0.08 - 0.13	0.30 - 0.60	0.030	0.035	0.20	0.25	0.20	0.06
91012	SAE J 403	SAE 1012	Std.	0.10 - 0.15	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91112	SAE J 403	SAE 1012-High Mn	Std.	0.10 - 0.15	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91015	SAE J 403	SAE 1015	Std.	0.13 - 0.18	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91017	SAE J 403	SAE 1017	Std.	0.15 - 0.20	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91018	SAE J 403	SAE 1018	Std.	0.15 - 0.20	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91118	SAE J 403	SAE 1018-Modified	Std.	0.15 - 0.20	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91020	SAE J 403	SAE 1020	Std.	0.18 - 0.23	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91121	SAE J 403	SAE 1020-low Si	Std.	0.18 - 0.23	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91022	SAE J 403	SAE 1022-Modified	Std.	0.18 - 0.23	0.70 - 1.00	0.030	0.050	0.20	0.25	0.20	0.06
91222	SAE J 403	SAE 1022-high Mn	Std.	0.17 - 0.22	0.70 - 1.60	0.030	0.050	0.20	0.25	0.20	0.06
91122	SAE J 403	SAE 1022-low Si	Std.	0.18 - 0.23	0.70 - 1.00	0.030	0.050	0.20	0.25	0.20	0.06
91025	SAE J 403	SAE 1025	Std.	0.22 - 0.28	0.30 - 0.60	0.030	0.050	0.20	0.25	0.20	0.06
91026	SAE J 403	SAE 1026	Std.	0.22 - 0.28	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91030	SAE J 403	SAE 1030	Std.	0.28 - 0.34	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06

HOT ROLLED MEDIUM AND HIGH CARBON STEELS											
Standard: SAE J403-2001											
Chemical Composition (%)											
Colakoglu Quality ID	Standard	Quality		C	Mn	P	S	Cu	Ni	Cr	Mo
				max.	max.	max.	max.	max.	max.	max.	max.
91040	SAE J 403	SAE 1040	Std.	0.37-0.44	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91045	SAE J 403	SAE 1045	Std.	0.43 - 0.50	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91145	SAE J 403	SAE 1045-Special	Std.	0.42 - 0.48	0.50 - 0.80	0.030	0.050	0.20	0.25	0.20	0.06
91050	SAE J 403	SAE 1050	Std.	0.48 - 0.55	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06
91055	SAE J 403	SAE 1055	Std.	0.5 - 0.6	0.6 - 0.9	0.030	0.050	0.20	0.25	0.20	0.06
91060	SAE J 403	SAE 1060	Std.	0.55 - 0.65	0.60 - 0.90	0.030	0.050	0.20	0.25	0.20	0.06

HOT ROLLED MEDIUM AND HIGH CARBON STEELS

Std. :SAE J 404-2000

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality	C	Mn	P	S	Si	Ni	Cr	Mo
			max.	max.	max.	max.	max.	max.	max.	max.
92130	SAE J 404-2000	SAE 4130	0.28-0.33	0.40-0.60	0.030	0.040	0.15-0.35	-	0.80-1.10	0.15-0.25

STEELS FOR PIPE LINES

Standard: API 5L 45th Edition-2012/ISO 3183-2012

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C ⁽³⁾	Mn ⁽³⁾	P	S	Cr	Ni	Cu	Mo	B
				max.	max.	max.	max.	max.	max.	max.	max.	max.
95130 ⁽⁵⁾	API 5L / ISO 3183	A / L210 / PSL1	Std.	0.22	0.90	0.030	0.030	0.50	0.50	0.50	0.15	10
95135 ^(1,2,5)	API 5L / ISO 3183	B / L245 / PSL1	Std.	0.26	1.20	0.030	0.030	0.50	0.50	0.50	0.15	10
95142 ^(1,5)	API 5L / ISO 3183	X42 / L290 / PSL1	Std.	0.26	1.30	0.030	0.030	0.50	0.50	0.50	0.15	10
95146 ^(1,5)	API 5L / ISO 3183	X46 / L320 / PSL1	Std.	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	10
95152 ^(1,5)	API 5L / ISO 3183	X52 / L360 / PSL1	Std.	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	10
95156 ^(1,5)	API 5L / ISO 3183	X56 / L390 / PSL1	Std.	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	10
95652 ^(1,6)	API 5L / ISO 3183	X52 / L360 / PSL1	Std.	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	10
95160 ^(1,6)	API 5L / ISO 3183	X60 / L415 / PSL1	Std.	0.26	1.40	0.030	0.030	0.50	0.50	0.50	0.15	10
95165 ^(1,6)	API 5L / ISO 3183	X65 / L450 / PSL1	Std.	0.26	1.45	0.030	0.030	0.50	0.50	0.50	0.15	10
95170 ^(1,6)	API 5L / ISO 3183	X70 / L485 / PSL1	Std.	0.26	1.65	0.030	0.030	0.50	0.50	0.50	0.15	10

Explanations

- 1) Nb+V+Ti≤0.15
- 2) Nb+V≤0.06
- 3) For each reduction of 0.01 % for carbon, an increase of 0.05 % for manganese is permitted, up to a maximum of 1.65 % for L245, L290, L320 and L360 grades, 1.75 % for X56, X60 and X65 grades, 2.00% for X70 grade.
- 4) For L360/X52 and lower grades, 0.5 %, Cr : % 0.5, Ni : % 0.5 and Mo : % 0.15 is permitted.
- 5) Suitable for ERW Pipe Manufacturing
- 6) Suitable for Spiral Welded Pipe Manufacturing

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	Af(%)
			N/mm ²		
			min.	min.	min.
95130	API 5L / ISO 3183	A / L210 / PSL1	210	335	"2"
95135	API 5L / ISO 3183	B / L245 / PSL1	245	415	"2"
95142	API 5L / ISO 3183	X42 / L290 / PSL1	290	415	"2"
95146	API 5L / ISO 3183	X46 / L320 / PSL1	320	435	"2"
95152	API 5L / ISO 3183	X52 / L360 / PSL1	360	460	"2"
95156	API 5L / ISO 3183	X56 / L390 / PSL1	390	490	"2"
95652	API 5L / ISO 3183	X52 / L360 / PSL1	360	460	"2"
95160	API 5L / ISO 3183	X60 / L415 / PSL1	415	520	"2"
95165	API 5L / ISO 3183	X65 / L450 / PSL1	450	535	"2"
95170	API 5L / ISO 3183	X70 / L485 / PSL1	485	570	"2"

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Af % = 1940 Axc0.2 / U0.9 (Axc: Cross sectional area, mm² ; U : Minimum tensile strength, N / mm²).

STEELS FOR PIPE LINES WITH STANDARD YIELD STRENGTH/TENSILE STRENGTH RATIO

Standard: API 5L 45th Edition-2012/ISO 3183-2012

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)														B		C equivalence	
			C ⁽¹⁾	Mn ⁽³⁾	Si	P	S	Cr	Ni	Cu	Mo	Ti	V	Nb	max.	ppm, max.	CE _{low}	CE _{total}		
			max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	
95035 ^{(1),(2),(6)}	API 5L/ISO 3183	BM / L245M / PSL2	Std.	1.20	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25		
95735 ^{(1),(2),(7)}	API 5L/ISO 3183	BM / L245M / PSL2	Std.	1.20	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25		
95036 ^{(1),(2),(6)}	API 5L/ISO 3183	BM / L245M / PSL2	Std.	1.30	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25		
95042 ^{(2),(6)}	API 5L/ISO 3183	X42M / L290M / PSL2	Std.	1.30	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25		
95046 ^{(2),(6)}	API 5L/ISO 3183	X46M / L320M / PSL2	Std.	1.40	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	"3"	"3"	"3"	10	0.43	0.25		
95752 ^{(2),(6)}	API 5L/ISO 3183	X52M / L360M / PSL2	Std.	1.40	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	"3"	"3"	"3"	10	0.43	0.25		
95052 ^{(2),(7)}	API 5L/ISO 3183	X52M / L360M / PSL2	Std.	1.60	0.45	0.025	0.015	0.50	0.50	0.50	0.50	0.50	"3"	"3"	"3"	10	0.43	0.25		
95056 ^{(2),(7)}	API 5L/ISO 3183	X56M / L390M / PSL2	Std.	1.60	0.45	0.025	0.015	0.50	0.50	0.50	0.50	0.50	"3"	"3"	"3"	10	0.43	0.25		
95060 ^{(2),(7)}	API 5L/ISO 3183	X60M / L415M / PSL2	Std.	1.70	0.45	0.025	0.015	0.50	0.50	0.50	0.50	0.50	"3"	"3"	"3"	10	0.43	0.25		
95065 ^{(2),(7)}	API 5L/ISO 3183	X65M / L450M / PSL2	Std.	1.40	0.45	0.025	0.015	0.30	0.30	0.30	0.50	0.15	"3"	"3"	"3"	10	0.43	0.25		
95070 ^{(2),(7)}	API 5L/ISO 3183	X70M / L485M / PSL2	Std.	1.60	0.45	0.025	0.015	0.50	0.50	0.50	0.50	0.50	"3"	"3"	"3"	10	0.43	0.25		

Explanations

- 1) Nb+V≤0.06
- 2) Cu 0.5% , Cr 0.3% , Ni 0.3% and Mn 0.15%
- 3) Nb+V+Ti≤0.15
- 4) Cu 0.5% , Cr 0.5% , Ni 0.5% and Mn 0.5%
- 5) For each reduction of 0.01% for carbon, an increase of 0.05% for manganese is permitted, up to a maximum of 1.50 for X42PSL2, X46PSL2 and X52PSL2
- 6) Suitable for X56PSL2, X60PSL2 and X65PSL2 grades and up to a maximum 2.00% for X70PSL2 grade.
- 7) Suitable for Spiral Welded Pipe Manufacturing

STEELS FOR PIPE LINES WITH STANDARD YIELD STRENGTH/TENSILE STRENGTH RATIO

Standard: API 5L 45th Edition, 2012/ISO 3183-2012

Mechanical Properties

Coil/pipe Quality ID	Standard	Quality	Rt _(0.05)		Rm ⁽¹⁾		Rt _(0.05) /Rm	A ₅₀ (%)	Impact ^{(3),(4)} (tran.)		DWTT (tran.) % Shear Area	
			N/mm ²		min.				Temp. °C	KV _C (min.)		J
			min.	max.	min.	max.						
95035	API 5L/ISO 3183	BM / L245M / PSL2	245	450	415	760	0.93	"2"	0	40	85	
95735	API 5L/ISO 3183	BM / L245M / PSL2	245	450	415	760	0.93	"2"	0	40	85	
95036	API 5L/ISO 3183	BM / L245M / PSL2	245	450	415	760	0.93	"2"	0	40	85	
95042	API 5L/ISO 3183	X42M / L290M / PSL2	290	495	415	760	0.93	"2"	0	40	85	
95046	API 5L/ISO 3183	X46M / L320M / PSL2	320	525	435	760	0.93	"2"	0	40	85	
95752	API 5L/ISO 3183	X52M / L360M / PSL2	360	530	460	760	0.93	"2"	0	40	85	
95052	API 5L/ISO 3183	X52M / L360M / PSL2	360	530	460	760	0.93	"2"	0	40	85	
95056	API 5L/ISO 3183	X56M / L390M / PSL2	390	545	490	760	0.93	"2"	0	40	85	
95060	API 5L/ISO 3183	X60M / L415M / PSL2	415	565	520	760	0.93	"2"	0	40	85	
95065	API 5L/ISO 3183	X65M / L450M / PSL2	450	600	535	760	0.93	"2"	0	54	85	
95070	API 5L/ISO 3183	X70M / L485M / PSL2	485	635	570	760	0.93	"2"	0	68	85	

Explanations

- 1) Tensile tests are applied to "transversal" test samples.
- 2) A₅₀ % = 1944 S00.2 / 10 05 (S0) : Cross sectional area, mm²; U : tensile strength N / mm²
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request in order.
- 5) DWTT tests are applied to "transverse" test samples.

STEELS FOR PIPE LINES WITH LOW YIELD STRENGTH/TENSILE STRENGTH RATIO

Standard: API 5L 45th Edition-2012/ISO 3183-2012

Çolakoğlu Quality ID	Standard	Quality	Chemical Composition (%)											C equivalence				
			C ⁶⁾ max.	Mn ⁴⁾ max.	Si max.	P max.	S max.	Cr max.	Ni max.	Cu max.	Mo max.	Ti max.	V max.	Nb max.	B ppm, max.	CE _{FW}	CE _{FCM}	
95835 ^{2,3)}	API 5L/ISO 3183	BM / L245M / PSL2	Std.	0.22	1.20	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25
95842 ^{2,3)}	API 5L/ISO 3183	X42M / L290M / PSL2	Std.	0.22	1.30	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25
95846 ^{2,3,5)}	API 5L/ISO 3183	X46M / L320M / PSL2	Std.	0.22	1.30	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25
95857 ^{2,3,5)}	API 5L/ISO 3183	X52M / L360M / PSL2	Std.	0.22	1.40	0.45	0.025	0.015	0.30	0.30	0.50	0.15	"3"	"3"	10	0.43	0.25	
95952 ^{2,3,6)}	API 5L/ISO 3183	X52M / L360M / PSL2	Std.	0.22	1.40	0.45	0.025	0.015	0.30	0.30	0.50	0.15	"3"	"3"	10	0.43	0.25	

Explanations

- 1) Nb+V≤0.06
- 2) Cu 0.5 % , Cr 0.3 % , Ni 0.3 % and Mo 0.15%
- 3) Nb+V+Ti≤0.15
- 4) For each reduction of 0.01 % for carbon, an increase of 0.05 % for manganese is permitted, up to a maximum of 1.50 for X42PSL2, X46PSL2 and X52PSL2.
- 5) Suitable for ERW Pipe Manufacturing
- 6) Suitable for Spiral Welded Pipe Manufacturing

Çolakoğlu Quality ID	Standard	Quality	Mechanical Properties									
			Rt _{0.05}		Rm ¹⁾		A ₅₀ (%)		Darbe ¹⁰⁾ (tran.)		DWTT (tran.)	
			min.	max.	min.	max.	min.	max.	Src.	°C	J	%Shear Area
95835	API 5L/ISO 3183	BM / L245M / PSL2	245	450	415	760	0.93	"2"	0	40	40	85
95842	API 5L/ISO 3183	X42M / L290M / PSL2	290	495	415	760	0.93	"2"	0	40	40	85
95846	API 5L/ISO 3183	X46M / L320M / PSL2	320	525	435	760	0.93	"2"	0	40	40	85
95852	API 5L/ISO 3183	X52M / L360M / PSL2	360	530	460	760	0.93	"2"	0	40	40	85
95952	API 5L/ISO 3183	X52M / L360M / PSL2	360	530	460	760	0.93	"2"	0	40	40	85

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) A₅₀ % = 1944.5σ_{0.2}² / U² (σ : Cross sectional area,mm² ; U : tensile strength N / mm²)
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request in order.
- 5) DWTT tests are applied to "Transverse" test samples.

STEELS FOR PIPE LINES SUITABLE FOR SRM PIPE MANUFACTURING OR NORMALISING

Standard: API 5L 45th Edition-2012/ISO 3183-2012

Chemical Composition (%)

Çolakoglu Quality ID	Standard	Quality	C ⁽⁶⁾ max.	Mn ⁽⁴⁾ max.	Si max.	P max.	S max.	Cr max.	Ni max.	Cu max.	Mo max.	Ti max.	V max.	Nb max.	B ppm, max.	C equivalence	
																CE _{int}	CE _{total}
95535 ^{1,2)}	API 5L/ISO 3183	BN / L245N / PSL2	Std.	1.20	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25
95536 ^{1,2)}	API 5L/ISO 3183	BN / L245N / PSL2	Std.	1.20	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25
95542 ²⁾	API 5L/ISO 3183	X42N / L290N / PSL2	Std.	1.30	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25
95546 ^{2,3)}	API 5L/ISO 3183	X46N / L320N / PSL2	Std.	1.30	0.45	0.025	0.015	0.30	0.30	0.50	0.15	0.04	0.05	0.05	10	0.43	0.25

Açıklamalar

- 1) Nb+V≤0.06
- 2) Cu 0.5% , Cr 0.3% , Ni 0.3% and Mo 0.15%
- 3) Nb+V+Ti≤0.15
- 4) For each reduction of 0.01% for carbon, an increase of 0.05% for manganese is permitted, up to a maximum of 1.50 for X42PSL2 and X46PSL2.

Mechanical Properties

Çolakoglu Quality ID	Standard	Quality	R _t (6.3)		R _m ⁽¹⁾		A ₅₀ (%) min.	R _t _{0.50} /R _m	Darbe ⁽¹⁰⁾ (tran.)		DWTT (tran.)	
			min.	max.	N/mm ²	min.			max.	Sic. °C	KV ₂ (min) J	%Shear Area min.
95535	API 5L/ISO 3183	BN / L245N / PSL2	245	450	415	760	0.93	"2"	0	40	85	85
95536	API 5L/ISO 3183	BN / L245N / PSL2	245	450	415	760	0.93	"2"	0	40	85	85
95542	API 5L/ISO 3183	X42N / L290N / PSL2	290	495	415	760	0.93	"2"	0	40	85	85
95546	API 5L/ISO 3183	X46N / L320N / PSL2	320	525	435	760	0.93	"2"	0	40	85	85

Açıklamalar

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) A₅₀ % = 1944.56² / (U³ S₀); Cross sectional area, mm²; U: tensile strength N / mm²
- 3) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 4) Impact tests are carried out if it is customer's request in order.
- 5) DWTT tests are applied to "Transverse" test samples.

STEELS FOR PIPE LINES

Standard: EN ISO3183-2012 Annex M

Chemical Composition (%)

Çolakoğlu Quality ID	Standard	Quality	C	Mn	Si	P	S	Cr	Ni	Cu	Al	Mo	Ti	V	Nb	N	B
95560	EN ISO3183-2012 Annex M	L415NE PSL2 (API 5L X60N)	Std.	1.40	0.45	0.025	0.015	0.30	0.30	0.25	0.015-0.060	0.10	0.04	0.10	0.05	1.20	10
95552	EN ISO3183-2012 Annex M	L360N PSL2 (API 5L X52N)	Std.	1.40	0.45	0.025	0.015	0.30	0.30	0.50	0.015-0.060	0.15	0.04	0.10	0.05	1.20	10

Explanations

1) Nb+V+Ti ≤ 0.15

Mechanical Properties

Çolakoğlu Quality ID	Standard	Quality	Rt _(0.5)		Rm		A ₅ (%)	Impact (tran.)		Bending		
			N/mm ²		N/mm ²			Temp. °C	KV ₂ (min)	J	mdb	
			min.	max.	min.	max.					d: thickness	5d
95560	EN ISO3183-2012 Annex M	L415NE PSL2 (API 5L X60N)	415	565	520	760	18	0	min. tek: 31 min. ort. 42	5d		
95552	EN ISO3183-2012 Annex M	L360N PSL2 (API 5L X52N)	360	530	460	760	A ₅₀ (%): 27	0	40	-		

STEELS FOR CASING AND / OR TUBING

Standard: API 5CT-2011

Chemical Composition (%)

Coloqloglu Quality ID	Standard	Quality	C	Mn	Si	P	S	Cr	Ni	Sn	Cu	Al	Mo	V	Ti	N	B	Ca	Nb
95254	API 5CT	J55 Upgradeable (Tubing)	Std. 0.25-0.30	1.20-1.40	0.15-0.25	0.015	0.005	0.10	0.07	0.012	0.15	0.015-0.050	0.030	0.008	0.010	90	5	15-50	-
95255	API 5CT	J55 Upgradeable (Casing)	Std. 0.23-0.27	1.20-1.40	0.15-0.30	0.020	0.005	0.15-0.35	0.07	0.012	0.15	0.045 max.	0.030	0.008	0.010	100	5	15-50	-
95256	API 5CT	J55 Upgradeable	Std. 0.23-0.27	1.20-1.40	-	0.020	0.010	-	-	-	-	-	-	0.010	-	-	5	-	-
95257	API 5CT	J55 Upgradeable	Std. 0.24-0.27	1.25-1.35	0.15-0.25	0.020	0.005	0.20-0.30	-	-	-	-	0.08-1.2	0.010	-	-	5	15-50	-
95355	API 5CT	J55 regular	Std. 0.17-0.23	0.90-1.45	0.30	0.020	0.015	0.10	0.10	0.015	0.15	0.015-0.050	0.080	0.06	0.020	100	5	15-50	0.05
95356	API 5CT	J55 regular	Std. 0.22-0.26	1.10-1.30	0.15-0.30	0.020	0.008	0.10	0.07	0.012	0.15	0.015-0.050	0.040	0.008	0.010	90	5	15-50	-
95455	API 5CT	5CT J55 Upgradeable	Std. 0.025-0.029	1.25-1.40	0.20-0.25	0.015	0.005	-	0.07	0.012	0.15	0.045 max.	0.030	0.008	0.018-0.035	100	10-25	15-50	-

Mechanical Properties

Coloqloglu Quality ID	Standard	Quality	Re	Rm ¹⁾		A ₅₀ (%)	Impact (long.) ²⁾		
				N/mm ²			Temp.	KJc (min.)	
				min.	max.				
95254	API 5CT	J55 Upgradeable (Tubing)	379	552	517	—	(3)	-20	27
95255	API 5CT	J55 Upgradeable (Casing)	379	552	517	—	(3)	-20	27
95256	API 5CT	J55 Upgradeable	379	552	517	—	(3)	-20	27
95257	API 5CT	J55 Upgradeable	379	552	517	—	(3)	-20	27
95355	API 5CT	J55 regular	379	552	517	—	(3)	-20	27
95356	API 5CT	J55 regular	379	552	517	—	(3)	-20	27
95455	API 5CT	5CT J55 Upgradeable	379	552	517	—	(3)	-20	27

Explanations

- 1) Tensile and Impact tests are applied to "Longitudinal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) A₅₀(%) = 1944.50^{0.2} / U^{0.8} (S₀: sectional area, mm²; U: tensile strength, N/mm²)

UNALLOYED GENERAL STRUCTURAL STEELS (FLOOR PLATE)

Standard: ASTM A 36-2005 Floor Plate Standard: ASTM A786

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C ⁽²⁾	Mn ^(1,2)	Si	P	S
				max.		max.	max.	max.
56435 ⁽³⁾	ASTM A 36: 2005	ASTM A 36 ASTM A786	Std.	0.26	0.80-1.20	0.40	0.040	0.050

Explanations

- 1) Upper limit for Mn does not apply if the thickness of strips are 20 mm and thinner.
- 2) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.35
- 3) Optionally, Cu 0.20 % is permitted.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A (%)		Impact ⁽²⁾⁽³⁾	
			N/mm ²		A 50	A 200	Temp.	KVc (min)
			min.	min.	min.	min.	°C	J
56435	ASTM A 36: 2005	ASTM A 36 ASTM A786	250	400 - 550	23	20	-20	40

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.

**UNALLOYED GENERAL STRUCTURAL STEELS SUITABLE
FOR GALVANIZING (FLOOR PLATE)**

Standard: ASTM A 36-2005 Floor Plate Standard: ASTM A786

Chemical Composition (%)

Colakoglu Quality ID	Standard	Quality		C ⁽²⁾	Mn ^(1,2)	Si	P	S
				max.		max.	max.	max.
56437 ⁽³⁾	ASTM A 36: 2005	ASTM A 36 ASTM A786	Std.	0.26	0.80-1.20	0.40	0.040	0.050

Explanations

- 1) Upper limit for Mn does not apply if the thickness of strips are 20 mm and thinner.
- 2) For each reduction of 0.01 % for carbon, an increase of 0.06 % for manganese is permitted, up to a maximum of 1.35.
- 3) Optionally, Cu 0.20 % is permitted.

Mechanical Properties

Colakoglu Quality ID	Standard	Quality	Re	Rm ⁽¹⁾	A (%)		Impact ⁽²⁾⁽³⁾	
			N/mm ²	A 50	A 200	Temp.	KVc (min)	
			min.	min.	min.	min.	°C	J
56437	ASTM A 36: 2005	ASTM A 36 ASTM A786	250	400 - 550	23	20	-20	40

Explanations

- 1) Tensile tests are applied to "Transversal" test samples.
- 2) Impact tests are not carried out if nominal thickness is lesser than 6 mm.
- 3) Impact tests are carried out if it is customer's request in order.





HOT ROLLED FLAT STEEL PRODUCTS

PRODUCTION LIMITS
& TOLERANCES

Group No.	STEEL GRADES
1	<p>DIN 1614-Part 1 (St 22, St 22-(low Cu), RRSt 23, St 24, RRSt 23-with B, St 24-with B) EN 10111-2008 (DD11-(low Cu), DD12, DD13, DD11, DD11-(high strenght), DD12-with B, DD13-with B, DD11, DD 11-Special-1, DD 11-Special-2) SAE J403-2009 (SAE 1006, SAE 1006-low Mn, SAE 1006-with B) ASTM A 1011/A 1011M-2007 (CS Type B) JIS G 3131-2005 (SPHC, SPHC-with B, SPHT-1)</p>
2	<p>SAE J403-2009 (SAE 1008, SAE 1010, SAE 1010-high Mn, SAE 1012-high Mn, SAE 1008-Modified, SAE 1010-Modified, SAE 1012) ASTM A53-2006 (Grade A, Grade A-low Si, Grade B, Grade B-low Si) ASTM A 283-2003 (Grade C) ASTM A 1011/A 1011M-2007 (SS Grade 33, SS 36 Type 1) ASTM A 1018/A 1018M-07 (CS Type B, SS Grade 33, SS 36 Type 1) EN 10025 Part 2-2004 (S235JR, S235JR+N, S235JR+Cu, S235J2+N, S235JR, S235JR (Cu+Cr+Ni≤0.35), S235J0 (Cu+Cr+Ni≤0.35), S235J0 (Cu+Cr+Ni≤0.35), S235J0, S235J2, S235JRC, S235J2C, S235JRC+N, S235JRC Special, S235J2C+N, S275JRC, S235JR-Special SS092 Rev 27, S235JR-Special SS095 Rev 4, S235JR+N-low Si, S235JR+N, S235JR Strap Steel, S235JR Strap Steel with low Si) API 5L 45th Edition-2012/ISO 3183-2012 (A PSL1 / L210 PSL1, B PSL1 / L245 PSL1, BN PSL2 / L245N PSL2) AS NZS 1594-2002 (HA250-low Si) EN 10025 Part 5-2004 (S235J0W, S235J2W) EN 10028-Part 2-2008 (P235GH) EN 10120-2008 (P245NB) EN 10217 Part 1-2005 (P235TR1, P235TR2, P235TR1-Düşük Si, P235TR2-low Si) EN 10217-2-2005 (P235GH-low Si) JIS G 3132-2005 (SPHT-2)</p>
3	<p>ABS-Part 2-2013 (ABS Grade A, ABS Grade B) API 5L 45th Edition-2012/ISO 3183-2012 (X42 PSL1 L290 PSL1, X46 PSL1 L320 PSL1, X42N PSL2 / L290N PSL2, X46N PSL2 / L320N PSL2) ASTM A 1011/A 1011M-2007 (SS 36 Type 2, HSLAS Grade 45 Class 2, HSLAS Grade 50 Class 2) ASTM A 1018/A 1018M-07 (SS 36 Type 2-low Si, SS 36 Type 2, SS Grade 40, HSLAS Grade 45 Class 1, HSLAS Grade 45 Class 2) ASTM A 36-2005 (A36, A 36-low Si) ASTM A 36-2005 ASTM A786 (ASTM A786 (ASTM A36)) ASTM A 36-2005 ASTM A787 (ASTM A786 (ASTM A36)) ASTM A 500-2007 (Grade B) BS 10149-Part 3-2013 (S280NC-Special) EN 10025 Part 2-2004 (S275JR, S275J2+N, S275JR, S275J0, S275J2, S275JRC, S275J2C, S275JRC+N-Special, S275J2C+N, S275JRC Special (S275J2C+N), S275J0-Special, S275J2+N-Special, S275JR+N-low Si, S275J2+N-low Si) EN 10028-Part 2-2008 (P265GH, P295GH) EN 10120-2008 (P265NB, P310NB) EN 10149-Part 2-1995 (S355MC, S355MC-Special SS088 Rev 10, S315MC, S355MC, S355MC-Special, S280MC-Special, S315MC, S355MC) EN 10207-2005 (P275SL) EN 10217-3-2005 (P275NL1-low Si) JIS G 3101-2005 (SS400, SS400-with Cr, SS400-with B) JIS G 3125-2005 (SPA-H) SAE J2340-1999-10 (340XF, 420XF) SAE J403-2009 (SAE 1015, SAE 1017, SAE 1018, SAE 1018-low Mn, SAE 1018-Modified, SAE 1020, SAE 1020-low Si, SAE 1022-Modified, SAE 1022-high Mn, SAE 1022-low Si)</p>

Group No.	STEEL GRADES
4	<p>AS NZS 1594-2002 (HA350-low Si) ASTM A 1011/A 1011M-2007 (SS Grade 50-low Si, SS Grade 50, SS Grade 55-low Si, SS Grade 55, HSLAS Grade 50 Class 1-low Si, HSLAS Grade 50 Class 1, HSLAS Grade 55 Class 1 -low Si, HSLAS Grade 55 Class 1, HSLAS Grade 55 Class 2, HSLAS Grade 50 Class 1-with Cu) ASTM A 1018/A 1018M-07 (HSLAS Grade 50 Class 1, HSLAS Grade 50 Class 1 -with Cu, HSLAS Grade 50 Class 1- with Si, HSLAS Grade 50 Class 1 -with Cu+Si, HSLAS Grade 55 Class 1, HSLAS Grade 55 Class 1-with Si, HSLAS Grade 50 Class 2, HSLAS Grade 55 Class 2) ASTM A 500-2007 (Grade C) ASTM A 606 (Type 2) ASTM A572 -2007 (Grade 50 Type 1, Grade 50 Type 2, Grade 55 Type 1, Grade 55 Type 2) CSA G40 (350 WT, 44W/50W) EN 10025-Part 2-2004 (E335, S355J0, S355JR, S355J2, S355J2+N, S355J2+N+Cu, S355JR+N-low Si, S355JR-low Si, S355J0-low Si, S355J2+N-low Si, S355J2-low Si, S355JRC-low Si, S355J0C-low Si, S355J2C-low Si, S355J2C+N, S355JRC, S355J2C+N-Special, S355JR-Special, S355JRC Special (S355J2C+N), S355J2C+N Special, S355JRC Special, S355J0-Special, S355JR+N-low Si (Fe510DTCL), S355JR+N (Fe520DTCL), S355JR+N (Fe510DTCL1)) EN 10025 Part 5-2004 (S355J0W, S355J2W, S355J0WP, S355J2WP) EN 10028-Part 2-2008 (P355GH) EN 10028-Part 3-2008 (P355NL1) EN 10083- Part 2 -2006 (28Mn6) EN 10083- Part 3 -2006 (30MnB5, 34MnB5, 27MnCrB5-2, 26MnB5, 22MnB5) EN 10120-2008 (P355NB) EN 10338-2009 (HCT500X (DP 500)) EN 10338-2010 (HDT580X (DP 600), HCT600X (DP 600)) SAE J403-2009 (SAE 1025, SAE 1026, SAE 1030) SAE J404-2000 (SAE 4130)</p>
5	<p>API 5CT-2011 (J55 Upgradeable (Tubing), J55 Upgradeable (Casing), J55 Upgradeable, J55 regular, SCT J55 Upgradeable) EN 10025 Part 3 -2004 (S355N) EN 10083- Part 2 -2006 (C35E, C35E-Cr, C45E-Special) SAE J403-2009 (SAE 1040, SAE 1045, SAE 1045-Special)</p>
6	<p>EN 10083- Part 2 -2006 (C60E, C60E-Special, C60E-1-Cr) SAE J403-2009 (SAE 1050, SAE 1055, SAE 1060)</p>
7	<p>API 5L 45th Edition-2012/ISO 3183-2012 (X52 / L360 / PSL1, X56 / L390 / PSL1, X60 / L415 / PSL1, X52M / L360M / PSL2, X56M / L390M / PSL2, X60M / L415M / PSL2) ASTM A 1011/A 1011M-07 (HSLAS Grade 60 Class 1, HSLAS Grade 60 Class 2, HSLAS Grade 60 Class 1-with Cu) ASTM A 1018/A 1018M-07 (HSLAS Grade 60 Class 1, HSLAS Grade 60 Class 2) ASTM A 516-2010 (Grade 60) ASTM A572 -2007 (Grade 60 Type 1) EN 10149-Part 2-1995 (S420MC (HL-2242-01), S420MC, S420MC-with Si, S420MC, S420MC-HX420LAD)</p>
8	<p>API 5L 45th Edition-2012/ISO 3183-2012 (X65 / L450 / PSL1, X65 / L450 / PSL2, X70 / L485 / PSL1, X70 / L485 / PSL2) ASTM A 1018/A 1018M-07 (HSLAS Grade 65 Class 2) ASTM A572 -2007 (Grade 65 Type 1) EN 10025 Part 3 -2004 (S420N-Special (SAH540)) EN 10149-Part 2-1995 (S460MC (HL-6000-02), S460MC, S460MC-with Si, S460MC)</p>
9	<p>ASTM A 1011/A 1011M-07 (HSLAS Grade 70 Class 2, HSLAS-F Grade 80) ASTM A 1018/A 1018M-07 (HSLAS Grade 70 Class 2) EN 10025 Part 3 -2004 (S460N) EN 10149-Part 2-1995 (S500MC, S500MC-with Si, S550MC, S550MC-with Si, S600MC, S650MC, S700MC) EN 10338-2010 (HCT780X (DP 780))</p>

STANDARD HOT ROLLED COIL PRODUCTION LIMITS

Thickness (mm)	Maximum Width (mm)								
	Group-1	Group-2	Group-3	Group-4	Group-5	Group-6	Group-7	Group-8	Group-9
1.00-1.14	1000 **	1000 **							
1.15-1.19	1000	1000							
1.20-1.29	1250	1250							
1.30-1.39	1250*	1250*							
1.40-1.49	1400*	1400*	1150						
1.50-1.59	1500*	1500*	1250	1250					
1.60-1.69	1550	1550	1300	1300					
1.70-1.79	1550	1550	1350*	1350*	1000				
1.80-1.99	1650	1550	1400*	1400	1200	1000	1000		
2.00-2.09	1650	1600	1500*	1500*	1250	1000	1200*	1000*	1000*
2.10-2.19	1650	1600	1500*	1500*	1250	1000	1250	1250*	1000
2.20-2.29	1650	1600	1550	1550	1250	1100	1450	1450	1200
2.30-2.39	1650	1650	1650	1650	1450	1150	1450	1450	1200
2.40-2.49	1650	1650	1650	1650	1450	1250	1450	1450	1250
2.50-2.59	1650	1650	1650	1650	1450	1250	1450	1450	1250*
2.60-2.89	1650	1650	1650	1650	1450	1250	1450	1450	1250
2.90-2.99	1650	1650	1650	1650	1650	1450	1450	1450	1250*
3.00-3.09	1650	1650	1650	1650	1650	1450	1650	1650	1650
3.10-3.39	1650	1650	1650	1650	1650	1450	1650	1650	1650
3.40-3.89	1650	1650	1650	1650	1650	1450	1650	1650	1650
3.90-3.99	1650	1650	1650	1650	1650	1650	1650	1650	1650
4.00-4.39	1650	1650	1650	1650	1650	1650	1650	1650	1650
4.40-4.99	1650	1650	1650	1650	1650	1650	1650	1650	1650
5.00-5.79	1650	1650	1650	1650	1650	1650	1650	1650	1650
5.80-18.99	1650	1650	1650	1650	1650	1650	1650	1650	1650
19.00-26.00	1650	1650	1650	1650	1650	1650	1650	1500	1500

(*) There may be a limit difference for some steel grades in the groups with this * sign.

(**) Just for domestic market, export orders shall be discussed at the time of orders.

Notes:

For the coils with 1,5 mm and lower strip thicknesses, there may be the coil telescoping, folded and some damage at the inner and outer wraps.

**HOT ROLLED COIL PRODUCTION LIMITS FOR THE CUSTOMERS THAT
SURFACE SENSIBILITY IS IMPORTANT**

Thickness (mm)	Maximum Width (mm)								
	Group-1	Group-2	Group-3	Group-4	Group-5	Group-6	Group-7	Group-8	Group-9
1.35-1.39	1250								
1.40-1.49	1250								
1.50-1.59	1350	1350	1200						
1.60-1.69	1450	1450	1300	1200*					
1.70-1.79	1500	1500	1350*	1250*					
1.80-1.99	1500	1550	1400*	1300*					
2.00-2.09	1500	1600	1500*	1400*	1250	1000	1200	1000*	
2.10-2.19	1500	1600	1500*	1500*	1250	1000	1250	1250	
2.20-2.29	1500	1600	1550	1550	1250	1100	1450	1450	
2.30-2.39	1500	1650	1650	1650	1450	1150	1450	1450	
2.40-2.49	1500	1650	1650	1650	1450	1250	1450	1450	
2.50-2.59	1550	1650	1650	1650	1450	1250	1450	1450	
2.60-2.89	1550	1650	1650	1650	1450	1250	1450	1450	
2.90-2.99	1550	1650	1650	1650	1650	1450	1450	1450	
3.00-3.09	1650	1650	1650	1650	1650	1450	1650	1650	1650
3.10-3.39	1650	1650	1650	1650	1650	1450	1650	1650	1650
3.40-3.89	1650	1650	1650	1650	1650	1450	1650	1650	1650
3.90-3.99	1650	1650	1650	1650	1650	1650	1650	1650	1650
4.00-4.39	1650	1650	1650	1650	1650	1650	1650	1650	1650
4.40-4.99	1650	1650	1650	1650	1650	1650	1650	1650	1650
5.00-5.79	1650	1650	1650	1650	1650	1650	1650	1650	1650
5.80-18.99	1650	1650	1650	1650	1650	1650	1650	1650	1650
19.00-26.00*	1650	1650	1650	1650	1650	1650	1650	1500	1500*

(*) There may be a limit difference for some steel grades in the groups with this * sign.

Notes:

For the coils with 1,5 mm and lower strip thicknesses, there may be the coil telescropy, folded and some damage at the inner and outer wraps.

AVAILABLE SLAB LIMITS ACC. TO STRIP THICKNESS

Strip Thickness (mm)	Strip Width (mm)			
	1000-1050	1200-1270	1500	1550
	Slab Length (mm)			
1,1	8000			
1,2	8000			
1,3-1,49	11800	11800		
1,5	11800	11800		
1,8	11800	11800		
2	11800	11800		9000*
3			10000*	
4			10000*	

Notes:

- *Specified limitations, due to the legal obligations for overland transport.
Longer slabs can be used for orders which will be shipped by vessels.
- For 1,3 mm and lower strip thickness, 5800 mm slabs shall be preferred.

CALCULATED COIL WEIGTHS DEPENDING ON THE SLAB LENGTHS

		Slab Length (mm)					
		5800	7300	8000	9000	10000	11800
Coil Width (mm)	900		11.1	12.2			18
	950		12.4	13.5			20
	1000	9.8	12.4	13.5			20
	1050	10.3	13.6	14.2			21
	1100	10.7	13.6	14.9			22
	1150	11.2	14.2	15.6			23
	1200	11.7	14.8	16.2			24
	1250	12.2	15.4	16.9			25
	1300	12.8		17.6		22	
	1350	13.3		18.3		22.8	
	1400	13.7		19		23.7	
	1450	14.2		19.6		24.5	
	1500	14.7		20.3		25.4	
	1550	15.2		21	23.6		
	1600	15.7		21.7	24.4		
	1650	16.2		22.3			

HOT ROLLED STEEL COIL TOLERANCES

General Application

The specified values for tolerances shall not apply to the uncropped ends of the coil for a total length "l" which is calculated using the formula:

$$l(m) = \frac{90}{\text{nominal thickness (mm)}}$$

provided that the result does not exceed 20 meters. (DIN EN 10 051-1997)

TOLERANCES ON THICKNESS (DIN EN 10 051-1997)

The tolerances on thickness for continuously hot-rolled low carbon steel sheet/plate for cold forming.

Nominal Thickness (mm)	Tolerances for a nominal width (mm)		
	W≤1200	1200<W≤ 1500	1500<W≤ 1650
≤ 2.00	± 0.13	± 0.14	± 0.16
> 2.00 ≤ 2.50	± 0.14	± 0.16	± 0.17
> 2.50 ≤ 3.00	± 0.15	± 0.17	± 0.18
> 3.00 ≤ 4.00	± 0.17	± 0.18	± 0.20
> 4.00 ≤ 5.00	± 0.18	± 0.20	± 0.21
> 5.00 ≤ 6.00	± 0.20	± 0.21	± 0.22
> 6.00 ≤ 8.00	± 0.22	± 0.23	± 0.23

The tolerances on thickness for steels with normal deformation resistance at elevated temperatures are given the table below. These tolerances are indicated as category A.

Nominal Thickness (mm)	Tolerances for a nominal width (mm)		
	W≤1200	1200<W≤ 1500	1500<W≤ 1650
≤ 2.00	± 0.17	± 0.19	± 0.21
> 2.00 ≤ 2.50	± 0.18	± 0.21	± 0.23
> 2.50 ≤ 3.00	± 0.20	± 0.22	± 0.24
> 3.00 ≤ 4.00	± 0.22	± 0.24	± 0.26
> 4.00 ≤ 5.00	± 0.24	± 0.26	± 0.28
> 5.00 ≤ 6.00	± 0.26	± 0.28	± 0.29
> 6.00 ≤ 8.00	± 0.29	± 0.30	± 0.31
> 8.00 ≤ 10.00	± 0.32	± 0.33	± 0.34
> 10.00 ≤ 12.50	± 0.35	± 0.36	± 0.37
> 12.50 ≤ 15.00	± 0.37	± 0.38	± 0.40
> 15.00 ≤ 25.00	± 0.40	± 0.42	± 0.45

The tolerances on thickness for steels exhibiting a high deformation resistance at elevated temperatures shall be increased by the amounts specified in table below.

Category	Deformation Resistance	Increment of Thickness Tolerance
A	235 Mpa < Yield Strenght < 355 MPa	-
B	355 Mpa ≤ Yield Strenght < 420 MPa	% 15
C	420 MPa ≤ Yield Strenght < 480 MPa	% 30
D	480 Mpa ≤ Yield Strenght	% 40

Note:

The thickness shall be measured at any point situated at least 40 mm from the edges for products with mill edges. Special thickness tolerances shall be agreed at the time of enquiry and order

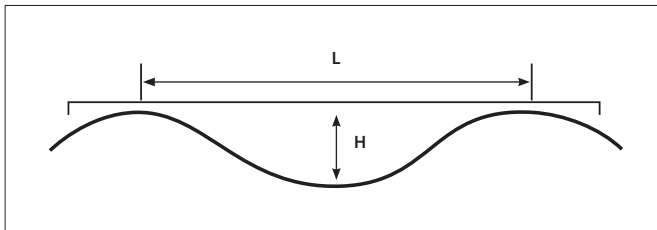
TOLERANCES ON WIDTH

The width shall be measured at right angles to the longitudinal axis of the product.

Nominal Width (mm)	Tolerances (mm)	
	Mill Edges	
	Lower	Upper
W ≤ 1200	0	+20
1200 < W ≤ 1500	0	+20
W > 1500	0	+25

TOLERANCES ON FLATNESS

Deviation from flatness shall be determined by measuring the deviation in distance between the product and a flat horizontal surface on which it is placed.



Nominal Thickness (mm)	Nominal Width (mm)	Tolerances on Flatness (mm)	Special Tolerances on Flatness (mm)
t≤2	W≤1200	18	9
	1200<W≤1500	20	10
	1500<W	25	13
2<t≤25	W≤1200	15	8
	1200<W≤1500	18	9
	1500<W	23	12

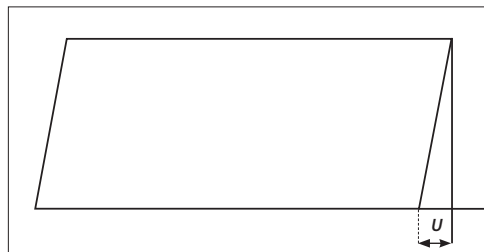
Tolerances on flatness for steels exhibiting a high deformation resistance at elevated temperatures.

For The Grades of Group B, C, D			
Category	Tolerances on Flatness (mm)		
Nominal Thickness t≤ 25 mm	Nominal Width (mm)		
	W≤1200	1200<W≤1500	W>1500
B	18	23	28
C	23	30	38
D	Shall be agreed at the time of enquiry and order.		

OUT OF SQUARENESS TOLERANCES

The out-of-squareness “u” is the orthogonal projection of a transverse edge over a longitudinal edge.

The out-of-squareness “u” measured shall not exceed 1 % of the actual width of the sheet/plate.

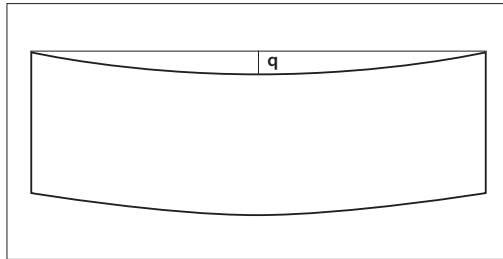


EDGE CAMBER

The Edge Camber is the maximum deviation of a longitudinal edge from a straight edge measuring base applied to it.

The camber is measured on the concave edge.

For sheet /plate the measuring base shall be the length of the product for a nominal length <5000mm.



Type of Product	Dimensions		Gauge Lengths (mm)	Tolerances in "q"(mm)	
	Width (mm)	Length (mm)		Mill Edge	Trimmed Edge
Sheet - Plate	> = 600	> = 5000	5000	20	15
	> = 600	< 5000	Actual Length (L)	+ 0.005 x L	+ 0.005 x L
Coil	> = 600	-	5000	20	15

FORM OF COILS

Coils shall be tightly wound, as round as possible and edge parallel, any gradual displacement of the strip edges in one direction not exceeding 35mm for widths less than 600mm and 60mm for widths not less than 600mm for strip with mill edges.

Unless otherwise is specified at the time of order, deviations from inside diameter tolerances are as follows;

±7% for strip with mill edges.

(DIN 1016-1987)

COIL DIMENSIONS AND WEIGHTS

Tolerances on coil inside diameter and maximum values for outside diameter and coil weight are given in following table.

Description	Values and Tolerance
Inside Diameter	762 +0/-50
Outside Diameter	Max. 2100 mm
Coil Weight	Max. 39 tonnes

FLOOR PLATES (TEARDROP PATTERN) PRODUCTION LIMITS AND TOLERANCES

Floor plates produce according to ASTM A786/A786M(2009) with the Pattern No: 4.
Production limits are as in follows;

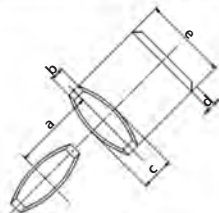
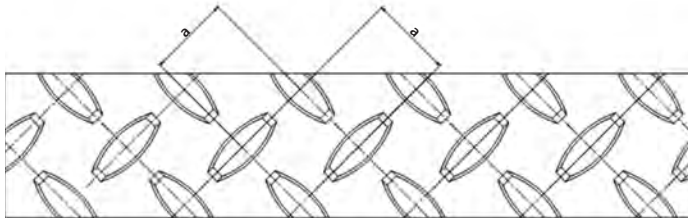
Thick-ness (mm)	Maximum Width (mm)								
	Group1	Group2	Group3	Group4	Group5	Group6	Group7	Group8	Group9
2.0-2.99		1250							
3.0-3.99		1550							
4.0-4.99		1550							
5.0-5.99		1550							
6.0-12.0		1550							

Notes:

Minimum order width is 800 mm.

Other grades shall be discussed at the time of orders.

Minimum mill campaign shall be 2000 m tonnes.



	Dimension
a	~ 30 mm
b	4 +/- 0.5 mm
c	8.5 +/- 1 mm
d	1-2 mm*
e	30 +/- 2 mm

* Except the core thickness between 4 - 2.5 mm for which the height of patern (d) may vary 0.7 mm to 2 mm and core thickness of less than 2.5 mm for which the height of patern (d) may vary 0.5 mm to 2 mm.





LONG STEEL PRODUCTS

CHEMICAL &
MECHANICAL PROPERTIES

Billet	
Size:	130 x 130 mm. 150 x 150 mm. 200 x 200 mm.
Length:	6 - 16 m.

Reinforcing Steel Bar	
Diameter:	8 - 40 mm
Length:	6 - 18 m

Threaded Bar (Helical Rod)	
Diameter:	16 - 28 mm
Length:	6 - 18 m

BILLET FOR CARBON STEEL QUALITIES

Chemical Composition (%)

Qualities	Standard	C	Mn	Si	P	S	Cr
		max.	max.	max.	max.	max.	max.
SAE 1005	SAE J 403	0.06max.	0.35max.	0.03-0.10	0.030	0.050	0.20
SAE 1006	SAE J 403	0.08max.	0.40max.	0.03-0.10	0.030	0.050	0.20
SAE 1008	SAE J 403	0.06-0.10	0.30-0.50	0.05-0.15	0.030	0.050	0.20
SAE 1010	SAE J 403	0.08-0.13	0.30-0.60	0.05-0.15	0.030	0.050	0.20
SAE 1012	SAE J 403	0.10-0.15	0.30-0.60	0.05-0.15	0.030	0.050	0.20
SAE 1015	SAE J 403	0.13-0.18	0.30-0.60	0.05-0.15	0.030	0.050	0.20
SAE 1018	SAE J 403	0.15-0.20	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1020	SAE J 403	0.18-0.23	0.30-0.60	0.15-0.35	0.030	0.050	0.20
SAE 1030	SAE J 403	0.28-0.34	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1035	SAE J 403	0.32-0.38	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1040	SAE J 403	0.37-0.44	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1045	SAE J 403	0.43-0.50	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1050	SAE J 403	0.48-0.55	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1055	SAE J 403	0.50-0.60	0.60-0.90	0.15-0.35	0.030	0.050	0.20
SAE 1060	SAE J 403	0.55-0.65	0.60-0.90	0.15-0.35	0.030	0.050	0.20

Ni	Cu	Mo	V	N	Ceq
max.	max.	max.	max.	max.	max.
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			
0.25	0.35	0.060			

BILLET FOR REINFORCING STEEL BARS

Chemical Composition (%)

Qualities	Standard	C	Mn	Si	P	S	Cr
		max.	max.	max.	max.	max.	max.
CA 50	ABNT NBR 7480 : 2017	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
A 500C	ACHM 7-93	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
GR 40	ASTM A 615	0.20 -0.34	0.60-1.10	0.10-0.40	0.060	0.050	0.30
GR 60	ASTM A 615	0.30-0.44	0.90-1.40	0.10-0.40	0.060	0.050	0.30
GR 75	ASTM A 615	0.30 -0.44	0.90-1.40	0.10-0.40	0.060	0.050	0.30
GR 60	ASTM A 706	0.20 -0.30	0.70-1.30	0.10-0.40	0.035	0.045	0.30
B 500B	BDS 9252 : 2007	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
GR 460 B	BS 4449:1997	0.14-0.25	0.60-1.20	0.10-0.40	0.050	0.050	0.30
B 500 B	BS 4449:2005	0.14-0.22	0.60-1.30	0.10-0.40	0.050	0.050	0.30
B 500 C	BS 4449:2005	0.14-0.22	0.60-1.30	0.10-0.40	0.050	0.050	0.30
GR 400R	CAN/CSA.G30.18-09	0.18-0.38	0.90-1.30	0.10-0.40	0.050	0.050	0.30
GR 400W	CAN/CSA.G30.18-09	0.18-0.30	0.60-1.30	0.10-0.40	0.035	0.045	0.30
GR 500R	CAN/CSA.G30.18-09	0.18-0.38	0.60-1.30	0.10-0.40	0.050	0.050	0.30
GR 500W	CAN/CSA.G30.18-09	0.26-0.30	0.70-1.30	0.10-0.40	0.035	0.045	0.30
St 50	DIN 17100	0.24-0.33	0.60-0.90	0.10-0.40	0.050	0.050	0.30
St 60	DIN 17100	0.34-0.43	0.60-0.90	0.10-0.40	0.050	0.050	0.30
St 37-2	DIN 17100	0,05-0.19	0.30-0.6	0.05-0.30	0.050	0.050	0.30
B 500 B	DIN 488: 2009	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
B 450 C	DM 14.01.2008	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
A 400 NR	E 449 : 2010	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
A 500 NR	E 450 : 2010	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
3SP	GOST 380	0.14-0.22	0.40-0.65	0.15-0.30	0.040	0.050	0.30
5SP	GOST 380	0.28-0.37	0.50-0.80	0.15-0.30	0.040	0.050	0.30
B 500 BWR	IS 6935-2 : 2007	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
S 400	IS 4466-3 : 2013	0.14-0.38	0.60-1.30	0.10-0.40	0.050	0.050	0.30
S 400 W	IS 4466-3 : 2013	0.18-0.24	0.70-1.40	0.10-0.40	0.050	0.050	0.30
S 500 W-C	IS 4466-3 : 2013	0.24	1.80	0.55	0.050	0.050	-
GR 300	JS 33: 2013	0.14-0.22	0.60-1.00	0.10-0.40	0.050	0.050	0.30
GR 400	JS 33: 2013	0.14-0.22	0.60-1.00	0.10-0.40	0.050	0.050	0.30
B 500 B	MS 146 : 2006	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
A 630- 420H	NCh 206 : 2006	0.30 -0.43	0.70-1.40	0.10-0.40	0.050	0.050	0.30
A 440- 280H	NCh 206 : 2006	0.20 -0.30	0.60-0.90	0.10-0.40	0.050	0.050	0.30
B 500 B	NEN 6008:2008	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
FEE 400	NF A 35-016:1986	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
FEE 500	NF A 35-016:1996	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
B 500 B	NF A 35- 080-1:2013	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
GR 60	NTC 2289:2012	0.26 -0.30	0.60-1.20	0.10-0.40	0.035	0.045	0.30
OB 37	SR 438-1:2012	018-0.23	0.40 -0.75	0.10-0.40	0.045	0.045	0.30
PC 52	SR 438-1:2012	0,18-0.22	0.60-1.20	0.10-0.55	0.045	0.045	0.30
B 420 B	TS 708 : 2016	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
B 420C	TS 708 : 2016	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
B 500 B	TS 708 : 2016	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
B 500 C	TS 708 : 2016	0.14-0.22	0.60-1.20	0.10-0.40	0.050	0.050	0.30
S 420	TS 708 : 2016	0.14-0.45	0.60-1.20	0.10-0.40	0.050	0.050	0.30
GR 40	INTE 06-09-01	0.20 -0.30	0.60-1.10	0.10-0.40	0.060	0.050	0.30
GR 60	INTE 06-09-01	0.30 -0.44	0.90-1.40	0.10-0.40	0.060	0.050	0.30
GR 60	INTE 06-09-02	0.20 -0.30	0.70-1.30	0.10-0.40	0.035	0.045	0.30

Ni	Cu	Mo	V	N	Ceq
max.	max.	max.	max.	max.	max.
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.060		
0.30	0.50	0.050	0.010		0.55
0.30	0.80	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.51
0.30	0.80	0.050	0.03	0.012	0.50
0.30	0.80	0.050	0.030	0.012	0.50
0.30	0.50	0.050	0.030		
0.30	0.50	0.050	0.010		0.55
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		0.55
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.30	0.050	0.010	0.010	
0.30	0.30	0.050	0.010	0.010	
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010		0.60
0.30	0.50	0.050	0.010		0.55
-	-	-	-	-	0.55
0.30	0.50	0.050	0.010		0.40
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010		0.55
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		0.50
0.30	0.80	0.050	0.010	0.012	0.50
0.30	0.80	0.050	0.010	0.012	0.50
0.30	0.80	0.050	0.010	0.012	0.50
0.30	0.80	0.050	0.010	0.012	0.50
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.010		
0.30	0.50	0.050	0.040		0.55

REINFORCING STEEL BAR QUALITIES - 1

Chemical Composition (%)

Qualities	Standard	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	V	N	Ceq
		max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
A 400 NR	E 449 : 2010	0,22			0,050	0,050			0,80			0,012	0,50
A 440-280H	NCh 204:2006	-	-	-	-	-	-	-	-	-	-	-	-
A 500 NR	E 450 : 2010	0,22			0,050	0,050			0,80			0,012	0,50
A 500C	ACHM 7-93	0,22	1,60	0,90	0,050	0,050						0,012	0,50
A 630-420H	NCh 204:2006	-	-	-	-	-	-	-	-	-	-	-	-
B 420 B	TS 708 : 2016	0,22			0,050	0,050			0,80			0,012	0,50
B 420C	TS 708 : 2016	0,22			0,050	0,050			0,80			0,012	0,50
B 450 C	DM. 14/01/2008	0,22			0,050	0,050			0,80			0,012	0,50
B 500 B	BS 4449:2005	0,22			0,050	0,050			0,80			0,012	0,50
B 500 B	DIN 488:2009	0,22			0,050	0,050			0,60			0,012	0,50
B 500 B	NEN 6008:2008	0,22			0,050	0,050			0,80			0,012	0,50
B 500 B	NF A35-080-1:2013	0,22			0,050	0,050			0,80			0,012	0,50
B 500 B	TS 708 : 2016	0,22			0,050	0,050			0,80			0,012	0,50
B 500 BWR	IS 6935-2:2007	0,22	1,60	0,60	0,050	0,050						0,012	0,50
B 500 C	BS 4449:2005	0,22			0,050	0,050			0,80			0,012	0,50
B 500 C	TS 708 : 2016	0,22			0,050	0,050			0,80			0,012	0,50
B 500B	BDS 9252:2007	0,22			0,050	0,050			0,80			0,012	0,50
B 500B	NFA 35-080:2013	0,22			0,050	0,050						0,012	0,50
CA 50	ABNT NBR 7480	-	-	-	-	-	-	-	-	-	-	-	-
FEE 400	NFA 35-016:1986	0,22			0,050	0,050						0,012	0,50

REINFORCING STEEL BAR QUALITIES - 1							
Mechanical Properties (%)							
Qualities	Standard	Yield Strength (Re) N/mm ² (min.)	Tensile Strength (Rm) N/mm ² (min.)	Elongation % (min.)	(Agt) % (min.)	Rm/Re (min.)	Re, act / Re, nom (max.)
A 400 NR	E 449 : 2010	400			5	1,08	
A 440- 280H	NCh 204 : 2006	280	440	16		1,25	
A 500 NR	E 450 : 2010	500			5	1,08	
A 500C	ACHM 7-93	500	600	14			
A 630- 420H	NCh 204 : 2006	420 - (Max = 580)	630	8		1,25	
B 420 B	TS 708 : 2016	420		12	5	1,08	
B 420C	TS 708 : 2016	420		12	7,5	1,15 (Max=1,35)	1,30
B 450 C	DM. 14/01/2008	450	540		7,50	1,15 (Max=1,35)	1,25
B 500 B	BS 4449:2005	500 (Max=650)			5,00	1,08	
B 500 B	DIN 488 : 2009	500			5	1,08	1,30
B 500 BWR	IS 6935-2:2007	500		14	5	1,08	
B 500 C	BS 4449:2005	500 (Max=650)			7,5	1,15 (Max=1,35)	
B 500B	BDS 9252:2007	500	550		5		1,25
B 500B	MS 146:2006	500		12		1,05	
B 500B	NEN 6008 : 2008	500			5	1,08	
B 500B	NF A35-080-1:2013	500					
B 500B	NFA 35-080:2015	500			5	1,08	
B 500B	TS 708 : 2016	500		12	5	1,08	
B 500C	TS 708 : 2016	500		12	7,5	1,15 (Max=1,35)	1,30
CA 50	ABNT NBR 7480	500		8	5	1,08	
FEE 400	NFA 35-016:1986	400	440	14	5	1,05	

REINFORCING STEEL BAR QUALITIES - 2													
Chemical Composition (%)													
Qualities	Standard	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	V	N	Ceq
		max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
FEE 500	NFA 35-016:1996	0,22			0,050	0,050						0,012	0,50
GR 300	JS 33 : 2013				0,050								0,40
GR 40	ASTM A 615				0,060								
GR 40	INTE 06-09-01				0,060								
GR 400	JS 33 : 2013				0,050								
GR 400R	CAN/CSA G30.18-09				0,050								
GR 400W	CAN/CSA G30.18-09	0,30	1,60	0,50	0,035	0,045							0,55
GR 460 B	BS 4449:1997	0,25			0,050	0,050						0,012	0,51
GR 500 B	MS 146 : 2006	0,30			0,050	0,050						0,012	0,51
GR 500R	CAN/CSA G30.18-09				0,050								
GR 500W	CAN/CSA G30.18-09	0,30	1,60	0,50	0,035	0,045							0,55
GR 60	ASTM A 615				0,060								
GR 60	ASTM A 706	0,30	1,50	0,50	0,035	0,045							0,55
GR 60	NTC 2289:2012	0,30	1,50	0,50	0,035	0,045							0,55
GR 60	INTE 06-09-01				0,060								
GR 60	INTE 06-09-02	0,30	1,50	0,50	0,035	0,045							0,55
GR 75	ASTM A 615				0,060								
OB 37	SR 438-1:2012	0,23	0,75	0,07	0,045	0,045	0,30	0,30					
PC 52	SR 438-1:2012	0,22	1,60	0,55	0,045	0,045	0,30	0,30	0,50				0,50
S 400	IS 4466-3:2013	0,38			0,050	0,050							0,60
S 400 W	IS 4466-3:2013	0,24			0,050	0,050							0,55
S 500 W-C	IS 4466-3:2013	0,24	1,80	0,55	0,050	0,050	-	-	-	-	-	-	0,55
S 420	TS 708 : 2016	0,45			0,050	0,050							

REINFORCING STEEL BAR QUALITIES - 2

Mechanical Properties (%)							
Qualities	Standard	Yield Strength (Re) N/mm ² (min.)	Tensile Strength (Rm) N/mm ² (min.)	Elongation % (min.)	(Agt) % (min.)	Rm/Re (min.)	Re, act / Re, nom (max.)
FEE 500	NFA 35-016:1996	500			5	1,08	
GR 40	INTE 06-09-01	275- (Max=398)	412	11 - 12			
GR 60	INTE 06-09-01	412 - (Max=535)	618	7 - 9			
GR 60	INTE 06-09-02	420 - (Max=540)	550	10 - 14		1,25	
GR 60	NTC 2289-2012	420 - (Max=540)	550	10 - 14		1,25	
GR 300	JS 33 : 2013	300 - (Max=425)		10 - 12		1,25	
GR 40	ASTM A 615	280	420	10 - 12			
GR 400	JS 33 : 2013	400 - (Max=525)		7 - 9		1,25	
GR 400R	CAN/CSA G30.18-09	400	540	7 - 10		1,15	
GR 400W	CAN/CSA G30.18-09	400 - (Max=525)	540	12 - 13		1,15	
GR 460 B	BS 4449:1997	460		14	5	1,08	
GR 500R	CAN/CSA G30.18-09	500	675	6 - 9		1,15	
GR 500W	CAN/CSA G30.18-09	500 - (Max= 625)	625	10 - 12		1,15	
GR 60	ASTM A 615	420	620	7 - 9			
GR 60	ASTM A 706	420 (Max= 540)	550	10 - 14		1,25	
GR 75	ASTM A 615	520	690	6 - 7			
OB 37	SR 438-1:2012	6mm≤d≤12mm=255 14mm≤d≤40mm=235	360	25			
PC 52	SR 438-1:2012	8mm≤d≤14mm=355 16mm≤d≤28mm=345 32mm≤d≤40mm=335	510	20			
S 400	IS 4466-3 : 2013	400 - (Max=520)		12	8	1,25	
S 400 W	IS 4466-3 : 2013	400 - (Max=520)		12	8	1,25	
S 500 W-C	IS 4466-3 : 2013	500 - (Max=650)		11	7,5	1,15 -(Max=1,35)	
S 420	TS 708 : 2016	420 - (Max=546)	500	10		1,15	1,30



HELICAL RODS QUALITIES

Chemical Composition (%)

Qualities	Standard	C	Mn	Si	P	S	Cr	Ni	Cu	Mo	V	N	Ceq
		max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.	max.
A 630- 420H	NCh 204 : 2006	0.45 max	1,60	0.30 max.	0.050	0.050	0.30	0.30	0.50	0.050	0.030		
A 440- 280H	NCh 204 : 2006	0.33 max	1,00	0.30 max.	0.050	0.050	0.30	0.30	0.50	0.050			
St 450/700	DIN Material No 1.1165	0.27- 0.34	1,50	0.15-0.40	0.035	0.035	0.30	0.30	0.50	0.050	0.050		

* Different chemical requirements and qualities shall be discussed.

Mechanical Properties (%)

Qualities	Standard	Yield Strength (Re) N/mm ² (min.)	Tensile Strength (Rm) N/mm ² (min.)	Elongation % (min.)	(Agt) % (min.)	Rm/Re (min.)	Re, act /Re, nom (max.)
A 630- 420H	NCh 204 : 2006	420 - (Max = 580)	630	8		1,25	
A 440- 280H	NCh 204 : 2006	280	440	16		1,25	
St 450/700	DIN Material No 1.1165	450	700	15			

* Different requirements shall be discussed.

COLAKOĞLU
METALURJİ A.Ş.



IA01361K027

COLAKOĞLU
METALURJİ A.Ş.



IA01361K026

DÖKÜM NO :IA01361

BOY(MM) :12000.0

Colakoglu Metalurji A.Ş.
Dilovasi Organize Sanayi Bölgesi, Gökkuş Cad. 1.
Kısım No:6 41455 Dilovasi, Kocaeli



IA01361K025

DÖKÜM NO :IA013

BOY(MM) :12000.0

Colakoglu Metalurji A.Ş.
Dilovasi Organize Sanayi
Kısım No:6 41455 Dilovasi, Kocaeli

LONG STEEL PRODUCTS

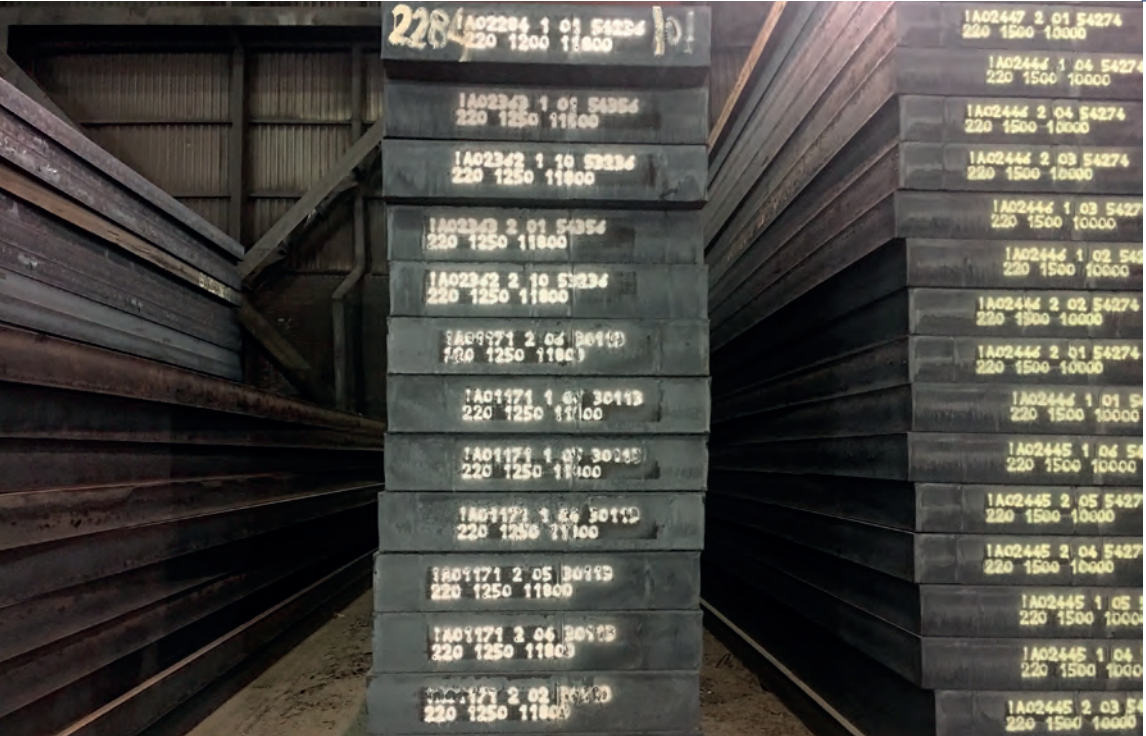
TOLERANCES





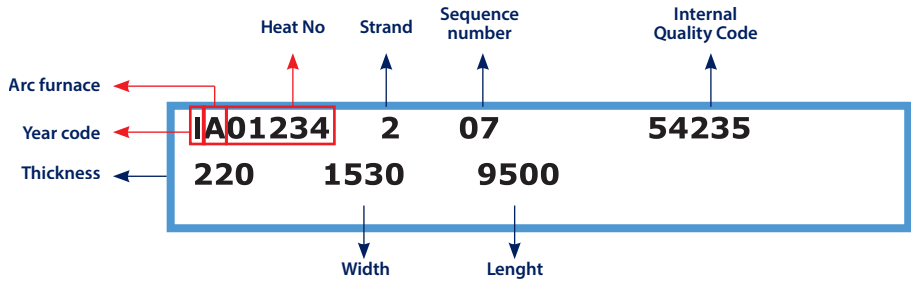
BILLET TOLERANCES		
	Tolerances	
Thickness	130 mm : ± 3 mm 150 mm : ± 5 mm	
Width	130 mm : ± 3 mm 150 mm : ± 5 mm	
Length	± 100 mm	
Straightness	(≤ 10 mm/m)	
Rhomboidity	$\leq 6\%$ mm	
Twist	$\leq 1^\circ$ / m	
Corner Radius	130 mm : ≤ 8 mm 150 mm : ≤ 10 mm	

**PACKAGING &
LABELLING**



FLAT STEEL PRODUCTS
SLAB

Labelling





FLAT STEEL PRODUCTS
HOT ROLLED FLAT STEEL COIL
HOT ROLLED CHEQUERED




Packaging

- 3 circumferential straps + 3 radial straps



Labelling

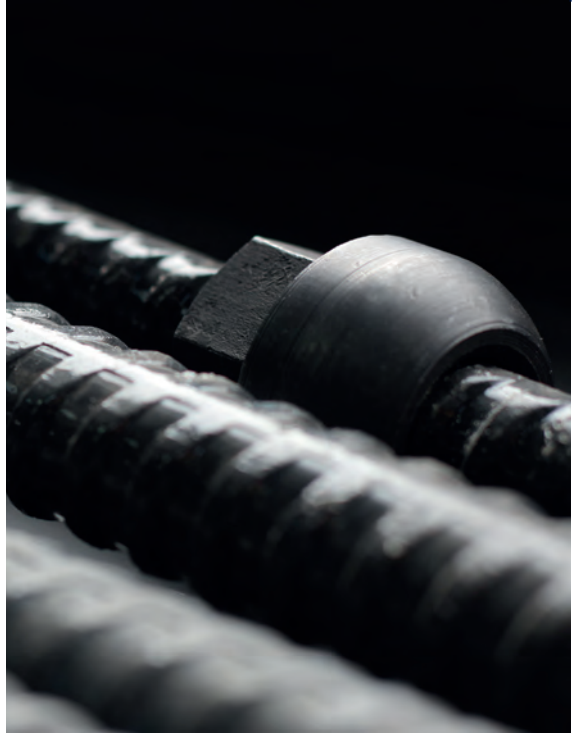
- Overseas Shipment
 3 circumferential straps + 4 radial straps

Colakoglu logo		ÇOLAKOĞLU METALURJİ A.Ş.*		CE Certificate logo
Coil number	COIL NO: I016401000		0 620 CPR - 58521	CE Certificate number
Product description	PRODUCT: HRC			
Quality	QUALITY: S235JR			
Standard	STANDARD: DIN EN 10025-2			
Slab number	HEAT NO: IA00659/101			Number of slabs produced
Coil thickness	THICKNESS(MM) : 4.00			Number of slabs produced
Coil width	WIDTH(MM) : 1000.0			
Coil weight	WEIGHT(KG) : 20.500			
				
	Made in Turkey	DOP: CM 001		Performance dechlorination number



LONG STEEL PRODUCTS

BILLET**Labelling**



LONG STEEL PRODUCTS
**REINFORCING STEEL BAR /
 THREADED BAR (HELICAL ROD)**

Labelling

Red Label Fields:

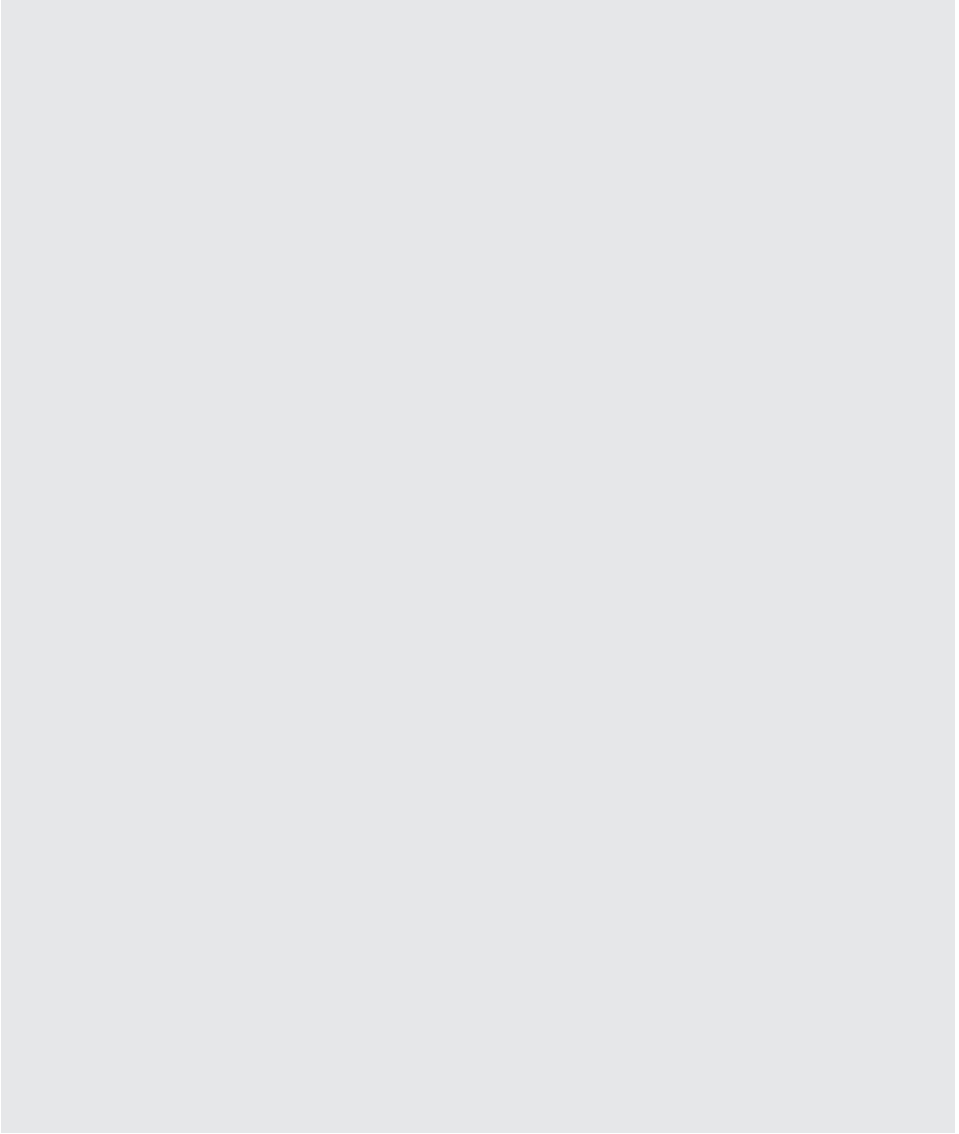
- Order number: CM NO : 2238
- Customer name: CUSTOMER:MED TRADE
- Customer number: HEAT NO:HA06539
- Standard: SPECIFICATION:ASTM A 615
- Quality: GRADE:GR 60
- Size: SIZE : 5/8 inch
- Length: LENGTH: 60 ft
- Destination: DESTINATION: USA
- Bundle weight: BUNDLE WEIGHT:4380,600 lbs
- Number of pieces in the bundle: NO OF PIECES:70
- MADE IN TURKEY
- Casting number: HA06539C140 #5
- MILL'S NAME: Çolakoğlu Metalurji A.Ş. Dilovası - Kocaeli / Turkey
- Bundle barcode number: (indicated by a blue arrow pointing to the barcode)

Grey Label Fields:

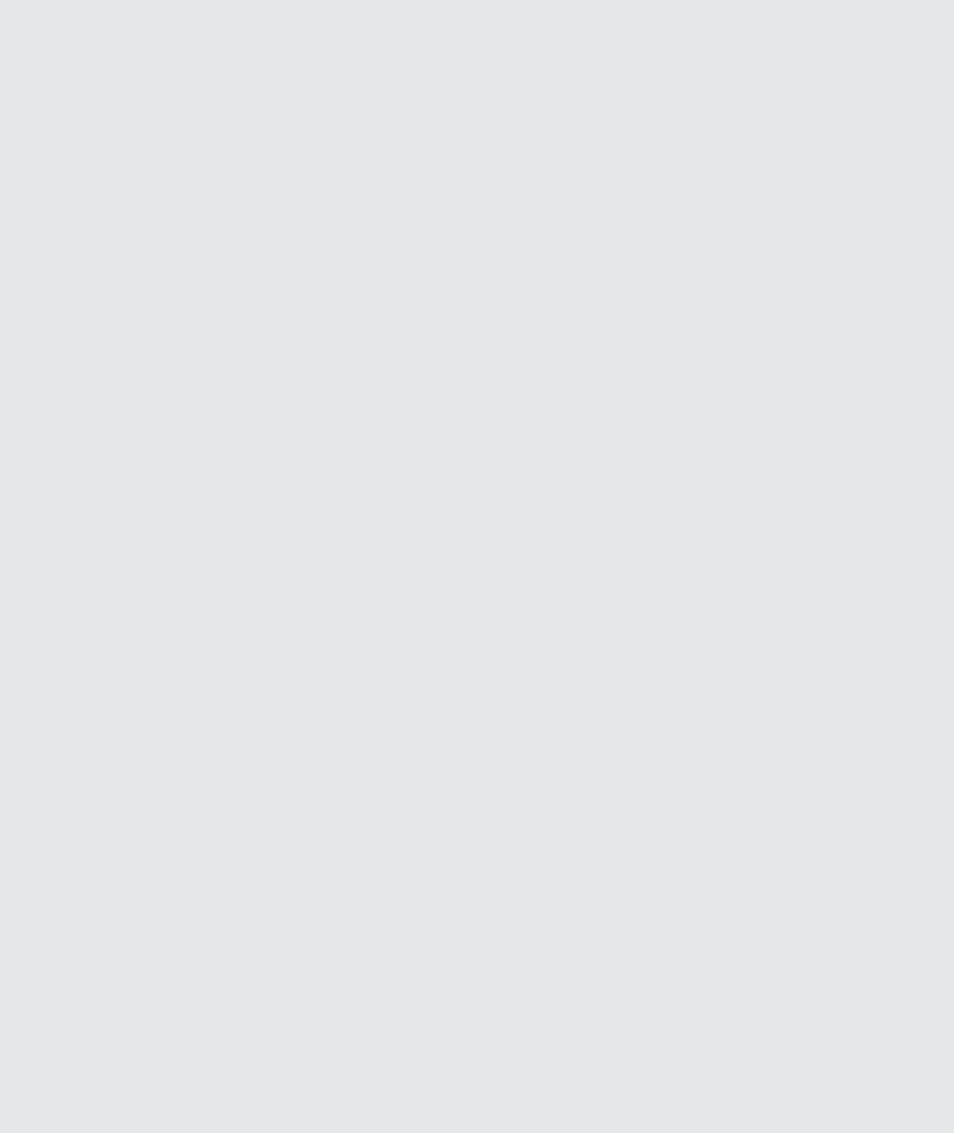
- COIL NO: I016491000
- PRODUCT: HRC
- QUALITY: S 355J2+N
- STANDARD: DIN EN 10025-2
- HEAT NO: IT00229904
- THICKNESS(MM) : 4.60
- WIDTH(MM) : 1550.0
- WEIGHT(KG) : 24.740
- CE mark
- 0 620
- CPR - 58521
- Barcode
- Made in Turkey
- DOP: CM 001

- According to our customers request, Reinforcing Steel Bar / Threaded Bar labels are arranged .

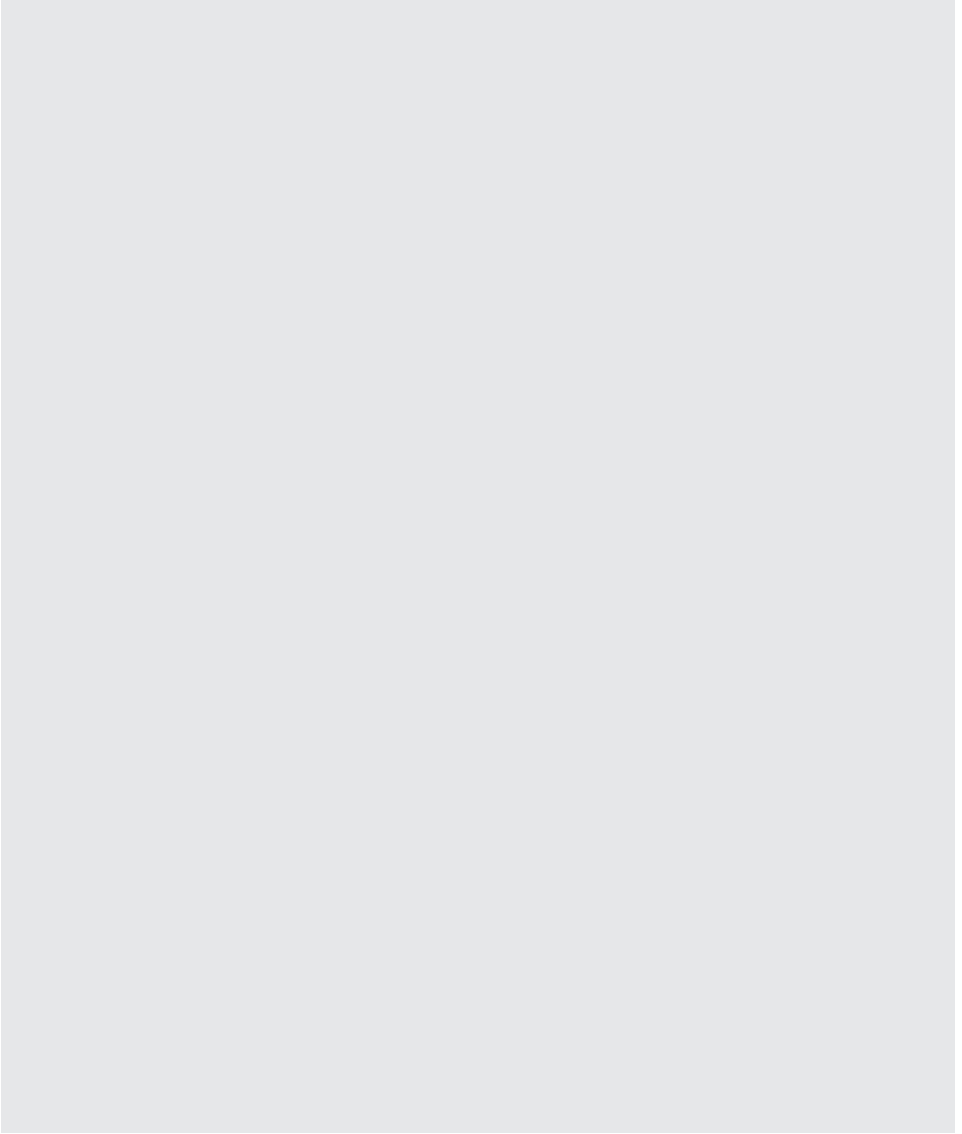
NOTES



NOTES



NOTES



Çolakođlu Metalurji A.Ş.

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