

Petrol, Gaz ve Hat Boruları

Oil & Gas Line Pipes



FOREKSBORU

-2017-

Eşdeğer karbon içeriği (CE) farklı alaşım elementlerinin çeliğin sertliği ve kaynak yapılabirliğini nasıl etkilediğini anlamak için kullanılır.

Equivalent carbon content (CE) is used to understand how the different alloying elements affect hardness of the steel being welded.

$$CE = \%C + \left(\frac{\%Mn + \%Si}{6} \right) + \left(\frac{\%Cr + \%Mo + \%V}{5} \right) + \left(\frac{\%Cu + \%Ni}{15} \right)$$



Uzunluk\Length

fit (ft)	0,3048 metre (m)
feet (ft)	metre (m)
inch (in)	25,4 milimetre (mm)
inch (in)	milimetre (mm)
yarda (yd)	0,9144 metre (m)
yard (yd)	metre (m)
kara mili (USA)	1.609 metre (m)
mile (USA)	metre (m)
metre (m)	3,28 fit (ft)
metre (m)	feet (ft)
metre (m)	39,37 inch (in)
metre (m)	inch (in)
metre (m)	10.936 yarda (yd)
metre (m)	yard (yd)

Alan\Area

feet kare (ft ²)	0,0929 metre (m ²)
square feet (ft ²)	square meter (m ²)
inch kare (in ²)	0,0006451 metre kare (m ²)
square inch (in ²)	square meter (m ²)
yarda kare (yd ²)	0,8361 metre kare (m ²)
square yard (yd ²)	square meter (m ²)
metre kare (m ²)	10,76 feet kare (ft ²)
square meter (m ²)	square feet (ft ²)
metre kare (m ²)	1550 inch kare (in ²)
square meter (m ²)	square inch (in ²)
metre kare (m ²)	1.196 yarda kare (yd ²)
square meter (m ²)	square yard (yd ²)
Ar	100 metre kare (m ²)
Ar	square meter (m ²)

Hacim\Volume

feet küp (ft ³)	0,02832 metre küp (m ³)
cubic feet (ft ³)	cubic meter (m ³)
inch küp (in ³)	16.387 santimetre küp (m ³)
cubic inch (in ³)	cubic centimeter (m ³)
galon (İngiliz)	4.546 litre (dm ³)
gallon (GB)	liter (dm ³)
galon (USA)	3.785 litre (dm ³)
gallon (USA)	liter (dm ³)
metreküp (m ³)	35,31feet küp (ft ³)
cubic meter (m ³)	cubic feet (ft ³)
litre (dm ³)	61.024 inch küp (in ³)
liter (dm ³)	cubic inch (in ³)
litre (dm ³)	0,22 galon (İngiliz)
liter (dm ³)	gallon (GB)
litre (dm ³)	0,2642 galon (USA)
liter (dm ³)	gallon (USA)
Varil Petrol (42 US Galon)	159 litre
Barrel Petrol (42 US Gallon)	liter

Debi\Flow

ft ³ /saniye	0,02832 m ³ /saniye
ft ³ /second	m ³ /second
ft ³ /saniye	1700 litre/dakika
ft ³ /second	liter/min
in ³ /dak	2,73x10 ⁻⁷ m ³ /saniye
in ³ /min	m ³ /second
in ³ /dak	2,73x10 ⁻⁴ litre/saniye
in ³ /min	liter/second
m ³ /saat	0,588 ft ³ /dak (cfm)
m ³ /h	ft ³ /min (cfm)
m ³ /saat	4.404 galon/dak (gpm),USA
m ³ /h	gallon/min (gpm),USA

Ağırlık\Weight

Pound veya Libre (lb.)	0,4536 kg
Pound or Libre (lb.)	kg
Ib/ft ³	16,02 kg/m ³
Ib/in ³	27.680 kg/m ³
kg/m ³	0,0624 Ib/ft ³
kg/dm ³	62,4 Ib/ft ³
kg/ dm ³	0,036 Ib/in ³
Ib/galon (USA)	119,83 kg/m ³
Ib/yarda küp	0,5933 kg/m ³
ton, long (22.401 bs)	1.016 kg
tonne, long (22.401 bs)	kg
ton, short (20.000 lbs)	907,2 kg
tonne, short (20.000 lbs)	kg
ton, metrik	1.000 kg
tonne, metric	kg

Sıcaklık\Temperature

9 / 5 x °C + 32	°F (Fahrenheit)
5 / 9 x (°F - 32)	°C (Celcius)

Kuvvet\Force

Kilogramfors (kgf)	9,81 Newton (N)
Kilogramforce (kgf)	Newton (N)
Newton (N)	0,102 Kilogramfors (kgf)
Newton (N)	Kilogramforce (kgf)

Basınç\Pressure

Pascal (Pa)	1 (Newton/metre kare (N/m ²))
Pascal (Pa)	(Newton/squaremeter (N/m ²))
Pascal (Pa)	0,001 kiloPascal (kPa)
kg/cm ²	98.066 kPa
kg/cm ²	9,81 Pa
kg/m ²	9,81 Pa
milibar	100 Pa
kPa	0,0102 kg/cm ²

Enerji\Energy

kiloWattsaat (kWs)	3.600 kJoule (kJ)
kiloWattsaat (kWh)	kJoule (kJ)
BTU	1.055 Joule (J)
Joule	0,24 kalori (cal)
Joule	calorie (cal)
Wattsaat (kWs)	3.600 Joule
Wattsaat (Wh)	Joule
Watt.saniye (W.s)	1 Joule
BTU	0,252 kilocalorie (kcal)
kalori (cal)	4,19 Joule
calorie (cal)	Joule
kalori (cal)	0,427 kgm
calorie (cal)	kgm
kilogrammetre (kgm)	9,81 Joule
kilogrammetre (kgm)	Joule
Joule/saniye (J/s)	1 Watt (W)
Joule/second (J/s)	Watt (W)
BTU/saat	0,293 Watt (W)
BTU/h	Watt (W)
cal/saniye	41.868 Watt (W)
cal/second	Watt (W)
kcal	1.163 Watt (W)
kcal	Watt (W)

Eşdeğer Karbon	Kaynak Yapılabilirlik
Carbon Equivalent	Weldability
< 35	Mükemmel
	Excellent
0,36-0,40	Çok İyi
	Very good
0,41-0,45	İyi
	Good
0,46-0,50	Orta
	Fair
50 <	Zayıf
	Poor

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ASTM A106 \ A333

KİMYASAL KOMPOZİSYON \ CHEMICAL COMPOSITION

Standart	Kalite	C	Mn	Si	P	S	Cu	Ni	Cr	Mo	V	Al	N
Standard	Grade	Max		Min	Max	Max	Max	Max	Max	Max	Max		
ASTM A53	Gr.A	0,25	max. 0,95		0,05	0,045	0,40	0,40	0,40	0,15	0,08		
ASTM A53	Gr.B	0,30	max. 1,20		0,05	0,045	0,40	0,40	0,40	0,15	0,08		
ASTM A106	Gr.A	0,25	0,27-0,93	0,1	0,035	0,035	0,40	0,40	0,40	0,15	0,08		
ASTM A106	Gr.B	0,30	0,29-1,06	0,1	0,035	0,035	0,40	0,40	0,40	0,15	0,08		
ASTM A106	Gr.C	0,35	0,29-1,06	0,1	0,035	0,035	0,40	0,40	0,40	0,15	0,08		
ASTM A333	Gr.1	0,30	0,40-1,06		0,025	0,025							
ASTM A333	Gr.6	0,30	0,29-1,06	0,10	0,025	0,025							

ASTM A106 \ A333

KİMYASAL KOMPOZİSYON \ MECHANICAL PROPERTIES

Standart	Kalite	İşil İşlem Heat Treatment	Akma Dayanımı(Re min. (MPa))			Kopma Dayanımı	A5min.(%) Uzama	KV(J)	İşlem Sıcaklığı Temperature of Apl.
Standard	Grade	Treatment	Yield Strength			Tensile Strength	Elongation		
ASTM A53	Gr.A	U,N	205	205	205	min, 330			20
ASTM A53	Gr.B	U,N	240	240	240	min, 415			20
ASTM A106	Gr.A	U,N	205	205	205	min, 330	35		475
ASTM A106	Gr.B	U,N	240	240	240	min, 415	30		475
ASTM A106	Gr.C	U,N	275	275	275	min, 485	30		20
ASTM A333	Gr.1	U,N	205	205	205	min, 380	35	L=18(-45°C)	-50
ASTM A333	Gr.6	U,N	240	240	240	min, 415	30	L=18(-45°C)	-50

t up to 16 mm t 16-40 mm t 40-65 mm

T = Et kalınlığı

U=İşil işlemsiz

N=Normalize edilmiş

Malzemeler aynı zamanda ASME SA standartına uygun olarak tedarik edilebilir



API 5L LINE PIPES

KİMYASAL KOMPOZİSYON CHEMICAL COMPOSITION

Standart Standard	Kalite Grade	C max	Mn max	Si max	P max	S max	Cu	Ni	Cr	Mo	V	Al	N	Nb, Ti, B, As & W
API Spec. 5L	A (L210) PSL 1	0,22	0,90		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				
API Spec. 5L	B (L245) PSL1	0,28	1,20		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V max. 0,06 Nb+V+Ti max.0,15
API Spec. 5L	BR (L245R) PSL 2	0,24	1,20	0,40	0,025	0,015	max. 0,50	max. 0,30	max. 0,30	max. 0,15				Ti max.0,04 Nb+V max. 0,06
API Spec. 5L	X42 (L290) PSL 1	0,28	1,30		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V+Ti max. 0,15
API Spec. 5L	X42N (L290N) PSL 2	0,24	1,20	0,40	0,025	0,015	max. 0,50	max. 0,30	max. 0,30	max. 0,15	max. 0,06			Nb max. 0,05 Ti max. 0,04
API Spec. 5L	X46(L320) PSL 1	0,28	1,40		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V+Ti max. 0,15
API Spec. 5L	X46N (L320N) PSL 2	0,24	1,40	0,40	0,025	0,015	max. 0,50	max. 0,30	max. 0,30	max. 0,15	max. 0,07			Nb max. 0,05 Ti max. 0,04 Nb+V+Ti max. 0,15
API Spec. 5L	X52 (L360) PSL 1	0,28	1,40		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V+Ti max. 0,15
API Spec. 5L	X52N (L360N) PSL 2	0,24	1,40	0,45	0,025	0,015	max. 0,50	max. 0,30	max. 0,30	max. 0,15	max. 0,10			Nb max. 0,05 Ti max. 0,04 Nb+V+Ti max. 0,15
API Spec. 5L	X56 (L390) PSL 1	0,28	1,40		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V+Ti max. 0,15
API Spec. 5L	X56N (L390N) PSL 2	0,24	1,40	0,45	0,025	0,015	max. 0,50	max. 0,30	max. 0,30	max. 0,15	max. 0,10			Nb max. 0,05 Ti max. 0,04 Nb+V+Ti max. 0,15
API Spec. 5L	X60 (L415) PSL 1	0,28	1,40		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V+Ti max. 0,15
API Spec. 5L	X60N (L415N) PSL 2	0,24	1,40	0,45	0,025	0,015	max. 0,50	max. 0,50	max. 0,50	max. 0,50	max. 0,10			Nb max. 0,05 Ti max. 0,04 Nb+V+Ti max. 0,15
API Spec. 5L	X65 (L450) PSL 1	0,28	1,40		0,030	0,030	max. 0,50	max. 0,50	max. 0,50	max. 0,15				Nb+V+Ti max. 0,15
API Spec. 5L	X65Q (L450Q) PSL 2	0,18	1,70	0,45	0,025	0,015	max. 0,50	max. 0,50	max. 0,50	max. 0,50	max. 0,10			Nb max. 0,05 Ti max. 0,04 Nb+V+Ti max. 0,15

MEKANİK ÖZELLİKLER MECHANICAL PROPERTIES

Standart Standard	Kalite Grade	Isıl İşlem Heat Treatment	Akma Dayanımı / Yield Strength Re min. (MPa)			Kopma Dayanımı Rm / Tensile Strength (MPa)	KV (J)
			t up to 16 mm	t 16-40 mm	t 40-65 mm		
API Spec. 5L	A(L210)-PSL1	U,N	210	210	210	min. 335	
API Spec. 5L	B(L245)-PSL1	U,N	245	245	245	min. 415	
API Spec. 5L	BN(L245N)-PSL 2	U,N	245 - 450	245 - 450		415 - 760	T=27(0°C); L=41(0°C)
API Spec. 5L	X42(L290)-PSL1	U,N	290	290	290	min. 415	
API Spec. 5L	X42N(L290N)-PSL2	U,N	290 - 495	290 - 496		415 - 760	T=27(0°C); L=41(0°C)
API Spec. 5L	X46(L320)-PSL1	U,N	320	320	320	min. 435	
API Spec. 5L	X46N(L320N)-PSL2	U,N	320 - 525	320 - 525		435 - 760	T=27(0°C); L=41(0°C)
API Spec. 5L	X52(L360)-PSL1	U,N	360	360	360	min. 460	
API Spec. 5L	X52N(L360N)-PSL2	U,N	360 - 530	360 - 530		460 - 760	T=27(0°C); L=41(0°C)
API Spec. 5L	X56(L390)-PSL1	U,N	390	390	390	min. 490	
API Spec. 5L	X56N(L390N)-PSL2	U,N	390 - 545	390 - 545		490 - 760	T=27(0°C); L=41(0°C)
API Spec. 5L	X60(L415)-PSL1	U,N	415	415	415	min. 520	
API Spec. 5L	X60N(L415N)-PSL2	U,N	415 - 565	415 - 565		520 - 760	T=27(0°C); L=41(0°C)
API Spec. 5L	X65(L450)-PSL1	U,N	450	450	450	min. 535	
API Spec. 5L	X65Q(L450Q)-PSL2	U,N	450 - 600	450 - 600		535 - 760	T=27(0°C); L=41(0°C)

t – et kalınlığı wall thickness

U – ısıl işlemsiz without heat treatment

N – normalize edilmiş normalizing



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**Sanayi Dış Ticaret
Limited Şirketi**

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