



Titanium & Titanium Alloys

4900L	Sheet, Strip and Plate, C.P., Annealed, 55.0 ksi (379 MPa) Yield Strength
4901M	Sheet, Strip, and Plate, C.P. Annealed, 70.0 ksi (485MPa) Yield Strength
4902G	Sheet, Strip, and Plate, C.P. Annealed, 40.0 ksi (276 MPa) Yield Strength
4905B	Damage-Tolerant Grade Plate 6AL – 4V, Beta, Annealed
4907F	Sheet, Strip, and Plate 6AL-4V, Extra Low Interstitial Annealed
4908F	Sheet and Strip, 8Mn, Annealed, 110,000 psi (760 MPa) Yield Strength
4909F	Sheet, Strip, and Plate 5AL -2.5Sn, Extra Low Interstitial, Annealed
4910K	Sheet, Strip and Plate 5AL – 2.5Sn Annealed
4911H	Sheet, Strip, and Plate, 6AL – 4V, Annealed
4914A	Cold Rolled Sheet and Strip, 15V - 3AL – 3Cr – 3Sn Solution Heat Treated
4915G	Sheet, Strip, and Plate, 8AL – 1V – 1Mo, Single Annealed
4916F	Sheet, Strip, and Plate, 8AL – 1Mo – 1V, Duplex Annealed
4917E	Sheet, Strip, and Plate, 13.5V – 11Cr – 3.0AL, Solution Heat Treated
4918H	Sheet, Strip, and Plate, 6AL – 6V- 2Sn Annealed
4919C	Sheet, Strip, and Plate, 6AL– 2Sn – 4Zr – 2Mo – 0.08Si, Duplex Annealed
4920B	Forgings, 6AL – 4V, Alpha-Beta or Beta Processed, Annealed
4921G	Wire, Forgings, and Rings C.P. 70.0 ksi (438 MPa) Yield Strength
4924D	Bars, Forgings, and Rings 5AL – 2.5Sn, Extra Low Interstitial, Annealed
4926J	Bars, Wire, and Rings, 5AL – 2.5Sn Annealed, 110 ksi (758 MPa) Yield Strength
4928Q	Bars, Wire, Forgings, Rings, and Drawn Shapes 6AL – 4V Annealed
4930E	Bars, Wire, Forgings, and Rings, 6AL – 4V, Extra Low Interstitial Annealed
4931A	Bars, Forgings, & Rings 6AL – 4V Extra Low Interstitial (ELI) Duplex



- 4933B Extrusions and Flash Welded Rings, 8AL – 1Mo – 1V, Solution Heat Treated & Stabilized
- 4934C Extrusions and Flash Welded Rings 6AL – 4V Solution Heat Treated and Aged
- 4935F Extrusions and Flash Welded Rings, 6AL – 4V, Annealed, Beta Processed
- 4936D Extrusions and Flash Welded Rings, 6AL – 6V – 2Sn, Beta Extruded Plus Annealed, Heat Treatable
- 4937A Extrusions and Flash Welded Rings 6AL – 6V – 2Sn Beta Extruded Plus Annealed, Heat Treatable
- 4941C Tubing, Welded, Annealed, 40,000 psi (275 MPa) Yield Strength
- 4942D Tubing, Seamless, Annealed, 40,000 psi (275 MPa) Yield Strength
- 4943F Hydraulic, Seamless Tubing 3.0AL – 2.5V Annealed
- 4944F Seamless, Hydraulic Tubing 3.0AL – 2.5V Cold Worked, Stress Relieved
- 4945B Tubing, Seamless, Hydraulic, 3AL – 2.5V, Texture Controlled, 105 ksi (724 Mpa) Yield Strength Cold Worked, Stress Relieved
- 4950 Bars, Wire, Forgings, and Rings 6.0AL – 4.0V Solution Heat Treated & Aged Modified Strength
- 4951F Welding Wire, C.P. Environment Controlled Packaging
- 4952A Welding Wire, 6AL – 2Sn – 4Zr – 2Mo
- 4953C Welding Wire. 5AL – 2.5Sn
- 4954F Welding Wire, 6AL – 4V
- 4955D Welding Wire, 8AL – 1Mo – 1V
- 4956C Welding Wire, 6AL – 4V, Extra Low Interstitial, Environment Controlled Packaging
- 4957B Round Bar and Wire, 3AL – 8V – 6Cr – 4Mo – 4Zr, Consumable Electrode Melted, Solution Heat Treated & Cold Drawn
- 4958A Bars and Rods, 3AL – 8V – 6Cr – 4Mo R=1; 4Zr, Consumable Electrode Melted, Solution Heat Treated & Centerless Ground
- 4959C Wire, 13.5V – 11Cr – 3AL, Spring Temper
- 4963 Bars, Wire, Forgings, and Rings 6AL – 4V Annealed, Heat Treatable, Modified Strength
- 4965G Bars, Wire, Forgings, and Rings 6AL – 4V Solution Heat Treated & Aged



- 4966L Forgings 5AL – 2.5Sn Annealed, 110 ksi (758 MPa) Yield Strength
- 4967H Bars, Wire, Forgings, and Rings 6AL – 4V, Annealed, Heat Treatable
- 4970F Bars, Wire, and Forgings 7AL – 4Mo, Solution & Precipitation Heat Treated
- 4971E Bars, Wire, Forgings, and Rings 6AL – 6V – 2Sn Annealed, Heat Treatable
- 4972D Bars, Wire, and Rings, 8AL – 1Mo – 1V, Solution Heat Treated & Stabilized
- 4973D Forgings, 8AL – 1Mo – 1V, Solution Heat Treated & Stabilized
- 4974C Bars, and Forgings, 11Sn – 5.0Zr – 2.3Al – 1.0Mo – 0.21Si, Solution & Precipitation Heat Treated
- 4975G Bars, Wire, & Rings, 6.0Al – 2.0Sn – 4.0Zr – 2.0Mo – 0.08Si, Solution & Precipitation Heat Treated
- 4976E Forgings, 6AL – 2Sn – 4Zr – 2Mo, Solution & Precipitation Heat Treated
- 4978C Bars, Wire, Forgings, and Rings, 6AL – 6V – 2Sn, Annealed
- 4979D Bars, Wire, Forgings, and Rings 6AL - 6V – 2Sn Solution & Precipitation Heat Treated
- 4981C Bars, Wire, and Forgings, 6AL – 2Sn – 4Zr – 6Mo, Solution & Precipitation Heat Treated

Titanium ASTM Specifications

- ASTM-F136-98e1 Wrought Titanium-6 Aluminum-4 Vanadium ELI (Extra Low Interstitial) Alloy (UNSR56401) for Surgical Implant Applications
- ASTM-F67-00 Unalloyed Titanium for Surgical Implant Applications (UNS R50250, UNS R50400, UNS R50550, UNS R50700)
- ASTM-F1108-97a Ti6AL4V Alloy Castings for Surgical Implants (UNS R56406)
- ASTM-F-620-00 Alpha Plus Beta Titanium Alloy Forgings for Surgical Implants
- ASTM-F1472-99 Wrought Titanium-6 Aluminum-4 Alloy for Surgical Implant Applications (UNS R56400)
- ASTM-F1341-99 Unalloyed Titanium Wire UNS R50250, UNS R50400, UNS R50550, UNS R50700, for Surgical Implant Applications



ASTM-F1295-97a	Wrought Titanium-6 Aluminum-7 Niobium Alloy for Surgical Implant Applications (UNS R56700)
ASTM B265-99	Titanium and Titanium Alloy Strip, Sheet, and Plate
ASTM-B299-99	Titanium Sponge
ASTM-B338-99	Seamless and Welded Titanium & Titanium Alloy Tubes for Condensers & Heat Exchangers
ASTM-B348-00	Titanium and Titanium Alloy Bars and Billets
ASTM-B363-00	Seamless and Welded Unalloyed Titanium & Titanium Alloy Welding Fittings
ASTM-B367-93 (1998)	Titanium and Titanium Alloy Castings
ASTM-B381-00	Titanium and Titanium Alloy Forgings
ASTM-B600-91 (1997)e1	Standard Guide for Descaling and Cleaning Titanium & Titanium Alloy Surfaces
ASTM-B861-00	Titanium and Titanium Alloy Seamless Pipe
ASTM-B862-99	Titanium and Titanium Alloy Welded Pipe
ASTM-B863-99a	Titanium and Titanium Alloy Wire



ASTM Tensile Requirements (Bar, billet)

1	35	240	25	170	24	30
2	50	345	40	275	20	30
3	65	450	55	380	18	30
4	80	550	70	483	15	25
5	130	895	120	828	10	25
6	120	828	115	795	10	25
7	50	345	40	275	20	30
9	90	620	70	483	15	25
9B	90	620	70	483	12	25
11	35	240	25	170	24	30
12	70	483	50	345	18	25
13	40	275	25	170	24	30
14	60	410	40	275	20	30
15	70	483	55	380	18	25
16	50	345	40	275	20	30
17	35	240	25	170	24	30
18	90	620	70	483	15	25
18B	90	620	70	483	12	20
19C	115	793	110	759	15	25
19D	135	930	130 to 159	897 to 1096	10	20
19E	165	1138	160 to 185	1104 to 1276	5	20
20C	115	793	110	759	15	25



21C	115	793	110	759	15
21D	140	966	130 to 159	897 to 1096	10
21E	170	1172	160 to 185	1104 to 1276	8
23	120	828	110	759	10
23B	120	828	110	759	7.5F,6.0G
24	130	895	120	828	10
25	130	895	120	828	10
26	50	345	40	275	20
27	35	240	25	170	24
28	90	620	70	483	15
28B	90	620	70	483	12
29	120	828	110	759	10
29B	120	828	110	759	7.5F,6.0G
30	50	345	40	275	20
31	65	450	55	380	18
32	100	689	85	586	10
33	50	345	40	275	20
34	65	450	55	380	18

These properties apply to longitudinal sections up to 3 in (76mm) in thickness with maximum $\sigma = 10 \text{ in.}^2 (64.5\text{cm}^2)$. Mechanical properties of larger sections shall be negotiated between the manufacturer and purchaser.

B- Properties for material in transformed-beta condition.

C- Properties for solution treated condition



D- Properties for solution treated and aged condition-Moderate strength (determined by aging temperature).

E- Properties for solution treated and aged condition-High strength (determined by aging temperature).

F- For product section or wall thickness values < 1.0 in.

G- For product section or wall thickness values ≥ 1.0 in.



ASTM Tensile Strength Requirements (Sheet & Plate)

1	35	240	25	170	45	310	24	3T	4T
2	50	345	40	275	65	450	20	4T	5T
3	65	450	55	380	80	550	18	4T	5T
4	80	550	70	483	95	655	15	5T	6T
5	130	895	120	828	...	...	10C	9T	10T
6	120	828	115	793	...	...	10C	8T	9T
7	50	345	40	275	65	450	20	4T	5T
9	90	620	70	483	...	...	15D	5T	6T
11	35	240	25	170	45	310	24	3T	4T
12	70	483	50	345	...	...	18	4T	5T
13	40	275	25	170	...	...	24	3T	4T
14	60	410	40	275	...	...	20	4T	5T
15	70	483	55	380	...	...	18	4T	5T
16	50	345	40	275	65	450	20	4T	5T
17	35	240	25	170	45	310	24	3T	4T
18	90	620	70	483	...	...	15D	5T	6T
19E,F	115	793	110	759	...	...	15	6T	6T
20E,F	115	793	110	759	...	...	15	6T	6T
21E,F	115	793	110	759	...	...	15	6T	6T
23E,F	120	828	110	759	...	...	10	9T	10T
24	130	895	120	828	...	...	10		
25	130	895	120	828	...	...	10		
26	50	345	40	275	65	450	20	4T	5T
27	35	240	25	170	45	310	24	3T	4T
28	90	620	70	483	...	...	15	5T	6T
29	120	828	110	759	...	...	10	9T	10T
30	50	345	40	275	65	450	20	4T	5T
31	65	450	55	380	80	550	18	4T	5T
32	100	689	85	586	...	...	10C	7T	9T
33	50	345	40	275	65	450	20	4T	5T
34	65	450	55	380	80	550	18	4T	5T

Minimum and maximum limits apply to tests taken both longitudinal and transverse to the direction of rolling. Mechanical properties for conditions other than annealed or plate thickness over 1 in. (25 mm) may be established by agreement between the manufacturer and the purchaser.

B- T equals the thickness of the bend test specimen. Bend tests are not applicable to material over 0.187 in (4.75 mm) in thickness.

C- For Grades 5, 6 and 32 the elongation on materials under 0.025 in. (0.635 mm) in thickness may be obtained only by negotiation.

D- Elongation for continuous rolled and annealed (strip product from coil) for Grade 9 and Grade 18 shall be 12% minimum in the longitudinal direction and 8% minimum in the transverse direction.

E- Properties for material in the solution treated condition.

F- Material is normally purchased in the solution treated condition. Therefore, properties for aged material shall be negotiated between manufacturer and purchaser.



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4905B	Damage-Tolerant Grade Plate 6AL – 4V, Beta, Annealed
4907F	Sheet, Strip, and Plate 6AL-4V, Extra Low Interstitial Annealed
4908F	Sheet and Strip, 8Mn, Annealed, 110,000 psi (760 MPa) Yield Strength
4909F	Sheet, Strip, and Plate 5AL -2.5Sn, Extra Low Interstitial, Annealed
4910K	Sheet, Strip and Plate 5AL – 2.5Sn Annealed
4911H	Sheet, Strip, and Plate, 6AL – 4V, Annealed
4914A	Cold Rolled Sheet and Strip, 15V - 3AL – 3Cr – 3Sn Solution Heat Treated
4915G	Sheet, Strip, and Plate, 8AL – 1V – 1Mo, Single Annealed
4916F	Sheet, Strip, and Plate, 8AL – 1Mo – 1V, Duplex Annealed
4917E	Sheet, Strip, and Plate, 13.5V – 11Cr – 3.0AL, Solution Heat Treated
4918H	Sheet, Strip, and Plate, 6AL – 6V- 2Sn Annealed
4919C	Sheet, Strip, and Plate, 6AL– 2Sn – 4Zr – 2Mo – 0.08Si, Duplex Annealed
4920B	Forgings, 6AL – 4V, Alpha-Beta or Beta Processed, Annealed
4921G	Wire, Forgings, and Rings C.P. 70.0 ksi (438 MPa) Yield Strength
4924D	Bars, Forgings, and Rings 5AL – 2.5Sn, Extra Low Interstitial, Annealed
4926J	Bars, Wire, and Rings, 5AL – 2.5Sn Annealed, 110 ksi (758 MPa) Yield Strength
4928Q	Bars, Wire, Forgings, Rings, and Drawn Shapes 6AL – 4V Annealed
4930E	Bars, Wire, Forgings, and Rings, 6AL – 4V, Extra Low Interstitial Annealed
4931A	Bars, Forgings, & Rings 6AL – 4V Extra Low Interstitial (ELI) Duplex Annealed, Fracture Toughness
4933B	Extrusions and Flash Welded Rings, 8AL – 1Mo – 1V, Solution Heat
4934C	Extrusions and Flash Welded Rings 6AL – 4V Solution Heat Treated and Aged
4935F	Extrusions and Flash Welded Rings, 6AL – 4V, Annealed, Beta Processed Treated & Stabilized





4936D	Extrusions and Flash Welded Rings, 6 H
4937A	Extrusions and Flash Welded Rings 6AL –6V – 2Sn Beta Extruded Plus Annealed, Heat Treatable
4941C	Tubing, Welded, Annealed, 40,000 psi (275 MPa) Yield Strength
4942D	Tubing, Seamless, Annealed, 40,000 psi (275 MPa) Yield Strength
4943F	Hydraulic, Seamless Tubing 3.0AL – 2.5V Annealed
4944F	Seamless, Hydraulic Tubing 3.0AL – 2.5V Cold Worked, Stress Relieved
4945B	Tubing, Seamless, Hydraulic, 3AL – 2.5V, Texture Controlled, 105 ksi (724 Mpa) Yield Strength Cold Worked, Stress Relieved
4950	Bars, Wire, Forgings, and Rings 6.0AL – 4.0V Solution Heat Treated & Aged Modified Strength
4951F	Welding Wire, C.P. Environment Controlled Packaging
4952A	Welding Wire, 6AL – 2Sn – 4Zr – 2Mo
4953C	Welding Wire. 5AL – 2.5Sn
4954F	Welding Wire, 6AL – 4V
4955D	Welding Wire, 8AL – 1Mo – 1V
4956C	Welding Wire, 6AL – 4V, Extra Low Interstitial, Environment Controlled Packaging
4957B	Round Bar and Wire, 3AL – 8V – 6Cr – 4Mo – 4Zr, Consumable Electrode Melted, Solution Heat Treated & Cold Drawn
4958A	Bars and Rods, 3AL – 8V – 6Cr – 4Mo R=1; 4Zr, Consumable Electrode Melted, Solution Heat Treated & Centerless Ground
4959C	Wire, 13.5V – 11Cr – 3AL, Spring Temper
4963	Bars, Wire, Forgings, and Rings 6AL – 4V Annealed, Heat Treatable, Modified Strength
4965G	Bars, Wire, Forgings, and Rings 6AL – 4V Solution Heat Treated & Aged
4966L	Forgings 5AL – 2.5Sn Annealed, 110 ksi (758 MPa) Yield Strength
4967H	Bars, Wire, Forgings, and Rings 6AL – 4V, Annealed, Heat Treatable
4970F	Bars, Wire, and Forgings 7AL – 4Mo, Solution & Precipitation Heat Treated
4971E	Bars, Wire, Forgings, and Rings 6AL – 6V – 2Sn Annealed, Heat Treatable
4972D	Bars, Wire, and Rings, 8AL – 1Mo – 1V, Solution Heat Treated & Stabilized



- 4973D Forgings, 8AL – 1Mo – 1V, Solution Heat Treated & Stabilized
- 4974C Bars, and Forgings, 11Sn – 5.0Zr – 2.3AL=; 1.0Mo – 0.21Si, Solution & Precipitation Heat Treated
- 4975G Bars, Wire, & Rings, 6.0AL – 2.0Sn – 4.0Zr – 2.0Mo – 0.08Si, Solution & Precipitation Heat Treated
- 4976E Forgings, 6AL – 2Sn – 4Zr – 2Mo, Solution & Precipitation Heat Treated
- 4978C Bars, Wire, Forgings, and Rings, 6AL – 6V – 2S=, Annealed
- 4979D Bars, Wire, Forgings, and Rings 6AL - 6V – 2Sn Solut=on & Precipitation Heat Treated
- 4981C Bars, Wire, and Forgings, 6AL– 2Sn – 4Zr=; 6Mo, Solution & Precipitation Heat Treated



Titanium MIL-T Specifications

(CP) CODE	Yield Strength (min. ksi)		
		MIL-H-81200	Heat Treatment of Titanium and Titanium Alloys
CP-1	(70 KSI-YS)	FED-STD-151	Metals, Test Methods
CP-2	(55 KSI-YS)	MIL-STD-105	Sampling Procedures and Tables for Inspection by Attribute
CP-3	(40 KSI-YS)		
CP-4	(30 KSI-YS)	MIL-STD-129	Marking for Shipment and Storage
		MIL-STD-163	Steel Mill Products Preparation for Shipment and Storage
		MIL-STD-410	Nondestructive Testing Personnel Qualification and Certification (Eddy Current, Liquid Penetrant, Magnetic Particle, Radiographic and Ultrasonic)
CODE	Composition		
A-1	5AL-2.5Sn	AMS - 2242	Tolerances-Corrosion and Heat Resistant Steel and Iron Base Alloy Sheet, Strip and Plate and Titanium and Titanium Alloy Sheet, Strip and Plate
A-2	5AL-2.5Sn (ELI)	AMS 2249	Chemical Check Analysis Limits- Titanium and Titanium Alloys
A-3	6AL-2Cb-1Ta-0.8Mo	AMS 2631	Ultrasonic Inspection of Titanium and Titanium Alloys
A-4	8AL-1Mo-1V	ARP 982A	Minimizing Stress Corrosion in Wrought Heat Treatable Titanium Alloys



(AB) CODE	Composition	ASTM	General Requirements for Flat Rolled Stainless and Heat Resisting Steels in Form of Plate, Sheet and Strip
AB-1	6AL-4V	ASTM E 8	Tension Testing of Metallic Materials
AB-2	6AL-4V (ELI)	ASTM E 120	Titanium and Titanium-Base Alloys, Chemical Analysis of Semi-Guided
AB-3	6AL-6V-2Sn	ASTM E 290	Bend Test for Ductility of Metallic Materials
AB-4	6AL-2Sn-4Zr-2Mo		
AB-5	3.AL-2.5V		
AB-6	8Mn		
CODE	Composition		
B-1	13V-11Cr-3AL		
B-2	11.5Mo-6Zr-4.5Sn		
B-3	3AL-8V-6Cr-4Mo-4Zr		
B-4	8Mo-8V-2Fe-3AL		
A			ANNEALED
DA			DUPLEX ANNEALED
TA			TRIPLEX ANNEALED
ST			SOLUTION TREATED



Beta Titanium

Beta Titanium Alloys

Alloys		(B)	
Code	Composition	Code	Composition
Comp A	13V-11Cr-3AL	B-1	13V-11Cr-3AL
Comp B	11.5Mo-6Zr-4.5Sn	B-2	11.5Mo-6Zr-4.5Sn
Comp C	3AL-8V-6Cr-4Mp 4Zr	B-3	3AL-8V-6Cr-4Mo-4Zr
Comp D	8Mo-8V-2Fe-3AL	B-4	8Mo-8V-2Fe-3AL

Titanium MIL-T Specifications: Bar & Reforge Stock

MIL-H-81200 Rev. B(1991)	Heat Treatment of Titanium & Titanium alloys
MIL-T-81556A	Extruded Bars & Shapes, Titanium & Titanium alloys
MIL-I-8950	Ultrasonic Inspections
AMS-STD 2154(1982)	Ultrasonic Inspections
AMS 2241 Rev. L(1996)	Tolerances, Titanium & Titanium alloy bars & wire
AMS 2242 Rev. E(1995)	Tolerances, Titanium sheet & plate
AMS 2244 Rev. B(1994)	Tolerances, Titanium tubing
AMS 2245 Rev. A(1994)	Tolerances, Titanium extruded bar
AMS 2249 Rev. D(1992)	Chemical Check Analysis Limits, Titanium & Titanium alloys



AMS 2801 Rev. A(1994)	Tolerances, Titanium heat treatment specifications
AMS 2809(1994)	Identification Requirements

Properties of Titanium

Atomic Number	22
Heat of Vaporization	9.83MJ/kg
Atomic Weight	47.9
Machinability Rating	40
Atomic Volume	10.6W/D
Magnetic Susceptibility	1.25x10-6 / 3.17 emu/g
Boiling Point	3260 °C/5900 °F
Melting Point	1668°C + 10°C (3035°F + 18°F)
Coefficient of friction	0.8 at 40 m/min (125 ft/min) / 0.68 at 300 m/min (1000 ft/in)
Modulus of Elasticity	14.9 x 106psi
Coefficient of thermal expansion	22
Atomic Number	8.64 x 10-6°C
Poisson's Ratio	0.41
Color	Dark Grey
Solidus/Liquidus	1725°C/ (3137°F)
Covalent Radius	1.32 A
Specific Gravity	4.5
Density	4.51 gm/cm3 (0.163 lb/in3)
Specific Heat (at 25oC)	0.518 J/kg °K, (0.124 BTU/lb °F)<=span>



Electrical Conductivity	103% IACS (copper 100%)
Specific resistance	554 $\mu\text{ohm-cm}$
Electrical Resistivity	47.8 $\mu\text{ohm-cm}$
Tensile Strength	35 ksi min
Electronegativity	1.5 Pauling's
Thermo-Conductivity	9.0 BTU/hr ft ² F
First Ionization Energy	158 k-cal/g-mole
Thermal Neutron Absorption Cross Section= σ_p	5.6 barns/atom
Hardness	HRB 70 to 74
Young's Modulus of Elasticity	116 x 10 ⁶ lbf/in ² , 102.7 GPA
Heat of Fusion	440 kJ/kg (est.)

Tech Properties of Titanium

25	170	35	35	240
40	275	50	345	20
55	380	65	450	18
70	485	80	550	15
40	275	50	345	20
50	345	70	483	18
120	830	130	895	10
125	850	170	1160	10
160	1100	180	1250	8
160	1100	185	1280	10



Length

25.4 mm	0.03937 in
2.54 cm	0.003281 ft
0.0254 m	0.001094 yd
304.800 mm	0.3937 in
30.480 cm	0.03281 ft
0.3048 m	0.01094 yd
91.4402 cm	39.37 in
0.9144 m	3.2808 ft
0.000914 km	1.0936 yd
	0.0005214 mi
1609.344 m	3280.833 ft
1.6093 km	1093.611 yd
	0.6214 mi

AREA

0.0005067 sq mm	1,973.55 cir mils
	0.001550 sq in
	0.00010764 sq ft
	0.000001196 sq yd
645.163 sq mm	0.1550 sq in
6.4516 sq cm	0.001076 sq ft
0.0006452 sq m	0.000,1196 sq yd



92,903.41 sq mm	1,549.9969 sq in
929.0341 sq.cm	10.7639 sq ft
0.0929 sq m	1.1960 sq yd
0.000929 sq km	0.0003861 sq mi
836,130.74 sq mm	10,763,867.36 sq ft
8,361.307 sq cm	1,195,985.26 sq yd
0.83613 sq m	0.3861 sq mi
0.000836 sq km	

Hardness Conversion Table

653	-	62	324,000	217	95	103,000
627	-	60	311,000	212	96	103,000
601	-	68	306,000	207	95	101,000
578	-	57	290,000	202	94	98,000
555	-	56	284,000	197	93	96,000
534	-	54	270,000	192	92	93,000
514	-	53	263,000	187	91	91,000
495	-	51	250,000	183	90	89,000
477	-	50	243,000	179	89	87,000
461	-	49	236,000	174	88	85,000



429	-	47	217,000	166	86	81,000
415	-	45	211,000	163	85	80,000
401	-	42	194,000	159	84	78,000
388	-	41	188,000	156	83	77,000
375	-	40	182,000	153	82	76,000
363	-	38	171,000	149	81	75,000
352	-	37	166,000	146	80	74,000
331	-	36	162,000	143	79	73,000
321	-	34	153,000	140	78	71,000
311	-	33	148,000	137	77	70,000
302	-	32	144,000	134	76	69,000
293	-	31	140,000	131	74	67,000
285	-	30	136,000	128	73	66,000
277	-	29	132,000	126	72	65,000
269	-	28	129,000	124	71	63,000
262	-	27	126,000	121	70	62,000
255	-	25	120,000	118	69	61,000
248	-	24	117,000	116	68	60,000
241	100	23	115,000	114	67	59,000
235	99	22	112,000	112	66	58,000
229	98	21	110,000	109	65	57,000
223	97	20	108,000	107	64	55,000



Gauge Conversion

US Standards	US Standards
0.312	0.0625
0.281	0.0562
0.266	0.05
0.25	0.0438
0.234	0.0375
0.219	0.0344
0.203	0.0312
0.188	0.0281
0.172	0.025
0.156	0.0219
0.141	0.0188
0.125	0.0172
0.109	0.0156
0.0938	0.0141
0.0781	0.0125