

# Conversion Charts



Inserts

## hardness

Brinell	Rockwell		Brinell	Rockwell	
	HB	HRB		HRC	HB
654	—	60	253	101.5	25
634	—	59	247	101.0	24
615	—	58	243	100.0	23
595	—	57	237	99.0	22
577	—	56	231	98.5	21
560	—	55	228	98.0	20
543	—	54	222	97.0	18.6
525	—	53	216	96.0	17.2
512	—	52	210	95.0	15.7
496	—	51	205	94.0	14.3
481	—	50	200	93.0	13
469	—	49	195	92.0	11.7
455	—	48	190	91.0	10.4
443	—	47	185	90.0	9.2
432	—	46	180	89.0	8
421	—	45	176	88.0	6.9
409	—	44	172	87.0	5.8
400	—	43	169	86.0	4.7
390	—	42	165	85.0	3.6
381	—	41	162	84.0	2.5
371	—	40	159	83.0	1.4
362	—	39	156	82.0	0.3
353	—	38	153	81.0	—
344	—	37	150	80.0	—
336	109.0	36	147	79.0	—
327	108.5	35	144	78.0	—
319	108.0	34	141	77.0	—
311	107.5	33	139	76.0	—
301	107.0	32	137	75.0	—
294	106.0	31	135	74.0	—
286	105.5	30	132	73.0	—
279	104.5	29	130	72.0	—
271	104.0	28	127	71.0	—
264	103.0	27	125	70.0	—
258	102.5	26	123	69.0	—

## inch to metric

diameter Ø		diameter Ø		doc		speed	
inches	mm	inches	mm	inches	mm	sfm	m/min.
.314	8,0	3.000	76,2	.010	0,254	300	91
.375	9,5	3.149	80,0	.015	0,381	400	122
.393	10,0	3.500	88,9	.030	0,762	500	152
.472	12,0	3.937	100,0	.050	1,270	600	183
.500	12,7	4.000	101,6	.100	2,540	800	244
.625	15,9	4.921	125,0	.125	3,175	1000	305
.630	16,0	5.000	127,0	.150	3,810	1200	366
.750	19,1	6.000	152,4	.250	6,350	2000	610
.787	20,0	6.299	160,0	.375	9,525	4000	1219
.875	22,2	7.000	177,8	.500	12,700	10000	3048
.984	25,0	7.874	200,0				
1.000	25,4	8.000	203,2				
1.259	32,0	9.842	250,0				
1.500	38,1	10.000	254,0				
1.968	50,0	12.000	304,8				
2.000	50,8	12.401	315,0				
2.480	63,0	14.000	355,6				
2.500	63,5	15.748	400,0				

  

feed C.P.T.		surface finish (Ra)	
inch/T	mm/T	µ inch	µm
.003	0,076	500	12,5
.004	0,12	250	6,3
.005	0,127	125	3,2
.006	0,152	63	1,6
.007	0,178	32	0,8
.008	0,203	16	0,4
.009	0,229		
.010	0,254		
.011	0,279		
.012	0,305		

NOTE: Values in shaded areas are beyond normal range and are given for information only.

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**English Measures** — unless otherwise designated, are those used in the United States, and the units of weight and mass are avoirdupois units.

**Gallon** — designates the U.S. gallon. To convert into the Imperial gallon, multiply the U.S. gallon by 0.83267. Likewise, the word ton designates a short ton, 2,000 pounds.

**Exponents** — the figures  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$ , etc. denote 0.1, 0.01, 0.001, etc. respectively. The figures  $10^1$ ,  $10^2$ ,  $10^3$ , etc. denote 10, 100, 1000, etc. respectively.

**Properties of water** — it freezes at 32°F., and is at its maximum density at 39.2°F. In the multipliers using the properties of water, calculations are based on water at 39.2°F. in a vacuum, weighing 62.427 pounds per cubic foot, or 8.345 pounds per U.S. gallon.

multiply	by	to obtain
B.T.U./Min.	12.96	foot-lbs./sec.
B.T.U./Min.	0.02356	horsepower
B.T.U./Min.	0.01757	kilowatts
B.T.U./Min.	17.57	watts
centigrams	0.01	grams
centiliters	0.01	liters
centimeters	0.3937	inches
centimeters	0.01	meters
centimeters	10	millimeters
centimeters/second	1.969	feet/minute
centimeters/second	0.03281	feet/second
centimeters/second	0.036	kilometers/hour
centimeters/second	0.6	meters/minute
centimeters/second	0.02237	miles/hour
centimeters/second	$3.728 \times 10^{-4}$	miles/minute
cms./sec./sec.	0.03281	feet/sec./sec.
cubic centimeters	$3.531 \times 10^{-5}$	cubic feet
cubic centimeters	$6.102 \times 10^{-2}$	cubic inches
cubic centimeters	$10^{-6}$	cubic meters
cubic centimeters	$1.308 \times 10^{-6}$	cubic yards
cubic centimeters	$2.642 \times 10^{-4}$	gallons
cubic centimeters	$10^{-3}$	liters
cubic centimeters	$2.113 \times 10^{-3}$	pints (liquid)
cubic centimeters	$1.057 \times 10^{-3}$	quarts (liquid)
cubic inches	16.39	cubic centimeters
cubic inches	$5.787 \times 10^{-4}$	cubic feet
cubic inches	$1.639 \times 10^{-5}$	cubic meters
cubic inches	$2.143 \times 10^{-5}$	cubic yards
cubic inches	$4.329 \times 10^{-3}$	gallons
cubic inches	$1.639 \times 10^{-2}$	liters
cubic inches	0.03463	pints (liquid)
cubic inches	0.01732	quarts (liquid)
cubic meters	$10^6$	cubic centimeters
cubic meters	35.31	cubic feet
cubic meters	61.023	cubic inches
cubic meters	1.308	cubic yards
cubic meters	264.2	gallons
cubic meters	$10^3$	liters
cubic meters	2113	pints (liquid)
cubic meters	1057	quarts (liquid)
cubic yards	$7.646 \times 10^5$	cubic centimeters
cubic yards	27	cubic feet
cubic yards	46,656	cubic inches
cubic yards	0.7646	cubic meters
cubic yards	202.0	gallons
cubic yards	764.6	liters
cubic yards	1616	pints (liquid)
cubic yards	807.9	quarts (liquid)
decigrams	0.1	grams
deciliters	0.1	liters
decimeters	0.1	meters

multiply	by	to obtain
degrees (angle)	60	minutes
degrees (angle)	0.01745	radians
degrees (angle)	3600	seconds
degrees/second	0.01745	radians/second
degrees/second	0.1667	revolutions/minute
degrees/second	0.002778	revolutions/second
dekagrams	10	grams
dekaliters	10	liters
dekameters	10	meters
drams	27.34375	grains
drams	0.0625	ounces
drams	1.771845	grams
feet	30.48	centimeters
feet	12	inches
feet	0.3048	meters
feet	1/3	yards
feet/minute	0.5080	centimeters/second
feet/minute	0.01667	feet/second
feet/minute	0.01829	kilometers/hour
feet/minute	0.3048	meters/minute
feet/minute	0.01136	miles/hour
feet/second	30.48	centimeters/second
feet/second	1.097	kilometers/hour
feet/second	0.5921	knots
feet/second	18.29	miles/minute
feet/second	0.6818	miles/hour
feet/second	0.01136	miles/minute
foot/sec./sec.	30.48	cms./sec./sec.
foot/sec./sec.	0.3048	meters/sec./sec.
foot-pounds	$1.286 \times 10^{-3}$	British Thermal Units
foot-pounds	$5.050 \times 10^{-7}$	horsepower-hrs.
foot-pounds	$3.241 \times 10^{-4}$	kilogram-calories
foot-pounds	0.1383	kilogram-meters
foot-pounds	$3.766 \times 10^{-7}$	kilowatt-hours
foot-pounds/minute	$1.286 \times 10^{-3}$	B.T.U./minute
foot-pounds/minute	0.01667	foot-pounds/second
foot-pounds/minute	$3.030 \times 10^{-5}$	horsepower
foot-pounds/minute	$3.241 \times 10^{-4}$	kg.-calories/minute
foot-pounds/minute	$2.260 \times 10^{-5}$	kilowatts
foot-pounds/second	$7.717 \times 10^{-2}$	B.T.U./minute
foot-pounds/second	$1.818 \times 10^{-3}$	horsepower
foot-pounds/second	$1.945 \times 10^{-2}$	kg.-calories/minute
foot-pounds/second	$1.356 \times 10^{-3}$	kilowatts
gallons/minute	0.06308	liters/second
gallons/minute	8.0208	cubic feet/hour
gallons/minute	8.0208	overflow rate
grams	area (square foot)	feet/hour
grams	980.7	dynes
grams	15.43	grains
grams	$10^{-3}$	kilograms
grams	103	milligrams
grams	0.03527	ounces
grams	0.03215	ounces (troy)
grams	$2.205 \times 10^{-3}$	pounds
grams/cm.	$5.600 \times 10^{-3}$	pounds/inch
grams/cubic cm.	62.43	pounds/cubic foot
grams/cubic cm.	0.03613	pounds/cubic inch
hectograms	100	grams
hectoliters	100	liters
hectometers	100	meters
hectowatts	100	watts
horsepower	42.44	B.T.U./minute
horsepower	33,000	foot-lbs./minute
horsepower	550	foot-lbs./second

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End Mills

Die and Mold

Slotting

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	multiply	by	to obtain		multiply	by	to obtain
	horsepower	1.014	horsepower (metric)		miles/hour	1.467	feet/second
	horsepower	10.70	kg.-calories/minute		miles/hour	1.609	kilometers/hour
	horsepower	0.7457	kilowatts		miles/hour	0.8684	knots
	horsepower	745.7	watts		miles/hour	26.82	meters/minute
	inches	2.540	centimeters		miles/minute	2682	centimeters/second
	kilograms	980,665	dynes		miles/minute	88	feet/second
	kilograms	2.205	lbs.		miles/minute	1.609	kilometers/minute
	kilograms	1.102 x 10 <sup>-3</sup>	tons (short)		miles/minute	60	miles/hour
	kilograms	10 <sup>3</sup>	grams		milligrams	10 <sup>-3</sup>	grams
	kiloliters	10 <sup>3</sup>	liters		milliliters	10 <sup>-3</sup>	liters
	kilometers	10 <sup>5</sup>	centimeters		millimeters	0.1	centimeters
	kilometers	3281	feet		millimeters	0.03937	inches
	kilometers	10 <sup>3</sup>	meters		minutes (angle)	2.909 x 10 <sup>-4</sup>	radians
	kilometers	0.6214	miles		ounces	16	drams
	kilometers	1094	yards		ounces	437.5	grains
	kilometers/hour	27.78	centimeters/second		ounces	0.0625	pounds
	kilometers/hour	54.68	feet/minute		ounces	28.349527	grams
	kilometers/hour	0.9113	feet/second		ounces	0.9115	ounces (troy)
	kilometers/hour	0.5396	knots		ounces	2.790 x 10 <sup>-5</sup>	tons (long)
	kilometers/hour	16.67	meters/minute		ounces	2.835 x 10 <sup>-5</sup>	tons (metric)
	kilometers/hour	0.6214	miles/hour		pounds	16	ounces
	kilowatts	56.92	B.T.U./min.		pounds	256	drams
	kilowatts	4.425 x 10 <sup>4</sup>	foot-lbs./min.		pounds	7000	grains
	kilowatts	737.6	foot-lbs./sec.		pounds	0.0005	tons (short)
	kilowatts	1.341	horsepower		pounds	453.5924	grams
	kilowatts	14.34	kg.-calories/min.		pounds	1.21528	pounds (troy)
	kilowatts	10 <sup>3</sup>	watts		pounds	14.5833	ounces (troy)
	kilowatt-hours	3415	B.T.U.		pounds/foot	1.488	kgs./meter
	kilowatt-hours	2.655 x 10 <sup>6</sup>	foot-lbs.		pounds/inch	178.6	grams/cm.
	kilowatt-hours	1.341	horsepower-hrs.		quadrants (angle)	90	degrees
	kilowatt-hours	860.5	kilogram-calories		quadrants (angle)	5400	minutes
	kilowatt-hours	3.671 x 10 <sup>5</sup>	kilogram-meters		quadrants (angle)	1.571	radians
	liters	10 <sup>3</sup>	cubic centimeters		radians	57.30	degrees
	liters	0.03531	cubic feet		radians	3438	minutes
	liters	61.02	cubic inches		radians	0.637	quadrants
	liters	10 <sup>-3</sup>	cubic meters		radians/second	57.30	degrees/second
	liters	1.308 x 10 <sup>-3</sup>	cubic yards		radians/second	0.1592	revolutions/second
	liters	0.2642	gallons		radians/second	9.549	revolutions/minute
	liters	2.113	pints (liquid)		radians/second/second	573.0	revolutions/minute/minute
	liters	1.057	quarts (liquid)		radians/second/second	0.1592	revolutions/second/second
	liters/min.	5.886 x 10 <sup>-4</sup>	cubic feet/second		revolutions	360	degrees
	liters/min.	4.403 x 10 <sup>-3</sup>	gallons/second		revolutions	4	quadrants
	meters	100	centimeters		revolutions	6.283	radians
	meters	3.281	feet		revolutions/min.	6	degrees/second
	meters	39.37	inches		revolutions/min.	0.1047	radians/second
	meters	10 <sup>-3</sup>	kilometers		revolutions/min.	0.01667	revolutions/second
	meters	10 <sup>3</sup>	millimeters		revolutions/min./min.	1.745 x 10 <sup>-3</sup>	radians/second/second
	meters	1.094	yards		revolutions/min./min.	2.778 x 10 <sup>-4</sup>	revolutions/second/second
	meters/minute	1.667	centimeters/second		revolutions/second	360	degrees/second
	meters/minute	3.281	feet/minute		revolutions/second	6.283	radians/second
	meters/minute	0.05468	feet/second		revolutions/second	60	revolutions/minute
	meters/minute	0.06	kilometers/hour		revolutions/second/second	6.283	radians/second/second
	meters/minute	0.03728	miles/hour		revolutions/second/second	3600	revolutions/minute/minute
	meters/second	196.8	feet/minute		seconds (angle)	4.848 x 10 <sup>-6</sup>	radians
	meters/second	3.281	feet/second		square centimeters	1.076 x 10 <sup>-3</sup>	square feet
	meters/second	3.6	kilometers/hour		square centimeters	0.1550	square inches
	meters/second	0.06	kilometers/minute		square centimeters	10 <sup>-4</sup>	square meters
	meters/second	2.237	miles/hour		square centimeters	100	square millimeters
	meters/second	0.03728	miles/minute		square feet	2.296 x 10 <sup>-5</sup>	acres
	miles	5280	feet		square feet	929.0	square centimeters
	miles	1.609	kilometers		square feet	144	square inches
	miles	1760	yards		square feet	0.09290	square meters
	miles/hour	44.7	centimeters/second		square feet	3.587 x 10 <sup>-8</sup>	square miles
	miles/hour	88	feet/minute		square feet	1/9	square yards

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multiply	by	to obtain
square inches	6.452	square centimeters
square inches	$6.944 \times 10^{-3}$	square feet
square inches	645.2	square millimeters
square kilometers	247.1	acres
square kilometers	$10.76 \times 10^6$	square feet
square kilometers	$10^6$	square meters
square kilometers	0.3861	square miles
square kilometers	$1.196 \times 10^6$	square yards
square meters	$2.471 \times 10^{-4}$	acres
square meters	10.76	square feet
square meters	$3.861 \times 10^{-7}$	square miles
square meters	1.196	square yards
square miles	640	acres
square miles	$27.88 \times 10^6$	square feet
square miles	2.590	square kilometers
square miles	$3.098 \times 10^6$	square yards
square millimeters	0.01	square centimeters
square millimeters	$1.550 \times 10^{-3}$	square inches
square yards	$2.066 \times 10^{-4}$	acres
square yards	9	square feet
square yards	0.8361	square meters
square yards	$3.228 \times 10^{-7}$	square miles
Temperature (°C.) + 273	1	Abs. temperature (°C.)
Temperature (°C.) + 17.78	1.8	temperature (°F.)
Temperature (°F.) + 460	1	Abs. temperature (°F.)
Temperature (°F.) -32	5/9	temperature (°C.)
tons (short)	2000	pounds
tons (short)	32,000	ounces
tons (short)	907.18486	kilograms
tons (short)	2430.56	pounds (troy)
tons (short)	0.89287	tons (long)
tons (short)	29166.66	ounces (troy)
tons (short)	0.90718	tons (metric)
watts	0.05692	B.T.U./minute
watts	44.26	foot-pounds/minute
watts	0.7376	foot-pounds/second
watts	$1.341 \times 10^{-3}$	horsepower
watts	0.01434	kilogram-calories/minute
watts	$10^{-3}$	kilowatts
watts-hours	3.415	B.T.U.
watts-hours	2655	foot-pounds
watts-hours	$1.341 \times 10^{-3}$	horsepower-hours
watts-hours	0.8605	kilogram-calories
watts-hours	367.1	kilogram-meters
watts-hours	$10^{-3}$	kilowatt-hours
yards	91.44	centimeters
yards	3	feet
yards	36	inches
yards	0.9144	meters

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