

Reference Guide



CONVERSIONS

Conversion Factors

MULTIPLY	BY	OBTAIN
Atmospheres (Std.)		
760 MM of Mercury at 32°F	14.696	lbs./sq. in.
Atmospheres	76.0	cms mercury
atm	29.92	ins mercury
atm	33.90	ft. water
atm	1.0333	kgs/sq. cm.
atm	14.70	lbs./sq. in.
atm	1.058	tons/sq. ft.
Barrels-Oil	42	gals-oil
BT Units	0.2520	kgs-calories
BTUs	777.5	ft.-lbs.
BTUs	0.000393	hp-hrs
BTUs	107.5	kg-meters
BTUs	0.293	w-hrs
BTU/Min.	12.96	ft.-lbs./sec.
BTU/min	0.2356	hp
BTU/min	0.01757	kw
BTU/min	17.57	watts
Calorie	0.003968	BTU
Centimeters	0.3937	inches
cm	0.0328	feet
cm	0.01	meters
cm	10	mm
Cms Mercury	0.01316	atm
cms mercury	0.4461	ft. water
cms mercury	136.0	kgs/sq. meter
cms mercury	27.85	lbs./sq. ft.
cms mercury	0.1934	lbs./sq. in.
Cms/Second	1.969	ft./min.
cms/second	0.03281	ft. sec.
cms/second	0.036	km/hr.
cms/second	0.6	meters/min.
cms/second	0.02237	miles/hr.
cms/second	0.0003728	miles/min.
Cms/Sec/Sec	0.03281	ft./sec./sec.
Cubic Cms	0.00003531	cu. ft.
cu cms	0.06102	cu. in.
cu cms	0.000001	cu meters
cu cms	0.000001308	cu. yds.
cu cms	0.0002642	gals
cu cms	0.001	liters
cu cms	0.002113	pints (liq.)
cu cms	0.001057	quarts (liq.)
Cubic Feet	28320	cubic cms
cu. ft.	1728	cu. inches
cu. ft.	0.02832	cu. meters
cu. ft.	0.03704	cu. yds.
cu. ft.	7.48052	gals
cu. ft.	28.32	liters
cu. ft.	59.84	pints (liq.)
cu. ft.	29.92	quarts (liq.)
Cubic Ft./Min.	472.0	cu. cms/sec.
cu. ft./min.	0.1247	gals/sec.
cu. ft./min.	0.4720	liters/sec
cu. ft./min.	62.43	lbs. w/min.

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Cubic Ft./Sec.	0.646317	million gals/day
cu. ft./sec.	448.831	gals./min.
Cubic Ft. Water	62.4	lbs. @ 60°F
Cubic Inches	16.39	cc
cu. ins.	0.0005787	cu. ft.
cu ins.	0.00001639	cu. meters
cu. ins.	0.00002143	cu. yds.
cu. ins.	0.004329	gals
cu. ins.	0.01639	liters
cu. ins.	0.03463	pints (liq.)
cu. ins.	0.01732	quarts (liq.)
Cubic Meters	100.000	cc
cu. meters	35.31	cu. ft.
cu. meters	61.023	cu. ins.
cu. meters	1.308	cu. yds.
cu. meters	264.2	gals
cu. meters	1000	liters
cu. meters	2113	pints (liq.)
cu. meters	1057	quarts (liq.)
Cubic Yards	764,600	cu. cms
cu. yds	27	cu. ft.
cu. yds	46.656	cu. ins.
cu. yds	0.7646	cu. meters
cu. yds	202.0	gals
cu. yds	764.6	liters
cu. yds	1616	pints (liq.)
cu. yds.	807.9	quarts (liq.)
Decimeters	0.1	meters
Degrees (Angle)	60	minutes
degs (angle)	0.01745	radians
degs (angle)	3600	secs
Degrees/Sec.	0.01745	radians/sec.
degs/sec.	0.1667	revs/min.
degs/sec.	0.002778	revs/sec.
Fathoms	6	ft.
Feet	30.48	cms
ft.	12	ins
ft.	0.3048	meters
ft.	1/3	yds
Feet of Water	0.02950	atms
ft. of w	0.8876	ins mercury
ft. of w	0.03048	kgs/sq. cm
ft. of w	62.43	lbs./sq. ft.
ft. of w	0.4335	lbs./sq. in.
Feet/Min.	0.5080	cms/sec
ft./min.	0.01667	ft./sec.
ft./min.	0.01829	kms/hrs
ft./min.	0.3040	meters/min.
ft./min.	0.01136	miles/hr.
Ft./Sec./Sec.	30.48	cms/sec./sec.
ft./sec./sec.	0.3048	ms/sec./sec.
Foot-Pounds	0.001286	BTUs
ft.-lbs.	0.000000505	hp-hrs
ft.-lbs.	0.0003241	kg-calories
ft.-lbs.	0.1383	kg-meters
ft.-lbs.	0.0000003766	kw-hrs

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Ft.-Lbs./Min.	0.001286	BTUs/min.
ft.-lbs./min.	0.01667	ft.-lbs./sec.
ft.-lbs./min.	0.0000303	hp
ft.-lbs./min.	0.0003241	kg-calories/min.
ft.-lbs./min.	0.0000226	kws
Ft.-Lbs./Sec.	0.007717	BTUs/min
ft.-lbs./sec.	0.001818	hp
ft.-lbs./sec.	0.01945	kg-calories/min.
ft.-lbs./sec.	0.001356	kws
Gallons	3785	ccs
gals	0.1337	cu. ft.
gals	231	cu. ins
gals	128	fl. ozs.
gals	0.003784	cu. meters
gals	3.785	liters
gals	8	pints (liq.)
gals	4	quarts (liq.)
Gallons, Imp	1.20095	US gals
Gallons, US	0.83267	Imp gals
Gallons Water	8.3453	lbs. water
Gallons/Min.	0.002228	cu. ft./sec.
gals/min.	0.06308	liter/sec.
gals/min.	8.0208	cu. ft./hr.
Gals Water/Min.	6.0086	tons water/24 hrs
Grams	15.432	grains
grams	.001	kgs
grams	1000	milligrams
grams	0.03527	ozs
grams	0.03215	ozs (troy)
grams	0.002205	lbs.
Grams/Cm	0.0056	lbs./in.
Grams/Cu. Cm	62.43	lbs./cu. ft.
grams/cu. cm	0.03613	lbs./cu. in.
Grams/Liter	58.417	grains/gal
grams/liter	8.345	lbs./1000 gals
grams/liter	0.062427	lbs./cu. ft.
grams/liter	1000	parts/million
Horsepower	42.44	BTUs/min.
hp	33.000	ft.-lbs./min.
hp	550	ft.-lbs./sec.
hp	1.014	hp (metric)
hp	10.70	kg-calories/min.
hp	0.7457	kws
hp	745.7	watts
Horsepower (boiler)	33,479	BTU/hr.
hp (boiler)	9.803	kws
HP-Hours	2547	BTUs
hp-hrs	1,980,000	ft.-lbs.
hp-hrs	641.7	kg-calories
hp-hrs	273,700	kg-meters
hp-hrs	0.7457	kw-hrs
Inches	2540	cms
ins	25.4	mm
ins	0.0254	M
ins	0.0833	ft.
Inches of Mercury	0.03342	atms

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ins mercury	1.133	ft. water
ins mercury	13.57	in. water
ins mercury	0.03453	kgs/sq. cm
ins mercury	70.73	lbs./sq. ft.
ins mercury	0.4912	lbs./sq. in.
Inches of Water	0.002458	atms
ins of w	0.07355	ins mercury
ins of w	0.002540	kgs/sq. cm
ins of w	0.5781	ozs/sq. in.
ins of w	5.202	lbs./sq. ft.
ins of w	0.03613	lbs./sq. in.
Kilograms	980.665	dynes
kgs	2.205	lbs.
kgs	0.001102	tons (short)
kgs	1000	grams
Kgs/Sq. Cm	0.9678	atms
kgs/sq. cm	32.81	ft. water
kgs/sq. cm	28.96	ins mercury
kgs/sq. cm	20.48	lbs./sq. ft.
kgs/sq. cm	14.22	lbs./sq. in.
Kiloliters	1000	liters
Kilometers	100,000	cms
kms	3281	ft.
kms	1000	meters
kms	0.6214	miles
Kms/Hr.	27.78	cms/sec.
kms/hr.	54.68	ft./min.
kms/hr.	0.9113	ft./sec.
kms/hr.	16.67	meters/min.
kms/hr.	0.6214	miles/hr.
Kms/Hr. Sec.	27.78	cms/sec./sec.
kms/hr. sec.	0.9113	ft./sec./sec.
kms/hr. sec.	0.2778	meters/sec./sec.
Kilowatts	56.92	BTUs/min
kws	44,250	ft.-lbs./min.
kws	737.6	ft.-lbs./sec.
kws	1.341	hp
kws	14.34	kg-calories/min.
kws	1000	watts
Kilowatt-Hrs.	3415	BTUs
kw-hrs.	2,665,500	ft.-lbs.
kw-hrs.	1.341	hp-hours
kw-hrs.	860.5	kg-calories
kw-hrs.	367,100	kg-meters
Liters	100	ccs
liters	0.03531	cu. ft.
liters	61.02	cu. ins
liters	0.01	cu. meters
liters	0.2642	gals
liters	2.113	pints (liq.)
liters	1.057	quarts (liq.)
Liters/Min.	0.004403	gals/sec.
Meters	100	cms
meters	3.281	ft.
meters	39.37	ins
meters	0.001	kms

Refer to manufacturer's instructions and local codes.

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meters	1000	mms
meters	1.094	yards
Meters/Min.	1.667	cms/sec.
meters/min.	3.281	ft./min.
meters/min.	0.05468	ft./sec.
meters/min.	0.06	kms/hr.
meters/min.	0.03728	miles/hr.
Meters/Sec.	196.8	ft./min.
meters/sec.	3.281	ft./sec.
meters/sec.	3.6	kms/hr.
meters/sec.	0.06	kms/min.
meters/sec.	2.237	miles/hr.
meters/sec.	0.03728	miles/min.
Microns	0.000001	meters
microns	25.400	in.
Miles/Hr.	44.70	cms/sec.
miles/hr.	88	ft./min.
miles/hr.	1.467	ft./sec.
miles/hr.	1.609	kms/hr.
miles/hr.	0.8684	knots
miles/hr.	26.82	meters/min.
Millimeters	0.1	cms
mms	0.03937	ins
Mins (Angle)	0.0002909	radians
Ounces	16	drams
ozs	437.5	grains
ozs	0.0625	lbs.
ozs	28.349527	grams
ozs	0.9115	ozs (troy)
ozs	0.0000279	tons (long)
ozs	0.00002835	tons (metric)
Ounces (Fluid)	1.805	cu. in.
ozs (fluid)	0.02957	liters
Pints	0.4732	liters
Pounds	16	ozs
lbs	256	drams
lbs	7000	grains
lbs	0.0005	tons (short)
lbs	453.5924	grams
lbs	1.21528	lbs. (troy)
lbs	14.5833	ozs (troy)
Lbs. of Water	0.01602	cu. ft.
lbs. of water	27.68	cu. in.
lbs. of water	0.1198	gals
Lbs. of Water/Min.	0.0002679	cu. ft./sec.
Pounds/Cu. Ft.	0.0005787	lbs./cu. in.
Pounds/Cu. In.	1728	lbs./cu. ft.
Pounds/Sq. Ft.	0.01602	ft. of water
Pounds/Sq. Ft.	0.006945	lbs./sq. in.
Pounds/Sq. In.	0.06804	atms
lbs./sq. in.	2.307	ft. water
lbs./sq. in.	2.036	in. mercury
lbs./sq. in.	27.68	in. water
lbs./sq. in.	0.07031	kgs/sq. cm
Radians	57.29578	degrees
Temp. (°C) +273	1	abs. temp. (°C)

MULTIPLY	BY	OBTAIN
Temp. (°C) +17.78	1.8	temp. (°F)
Temp. (°F) +460	1	abs. temp. (°F)
Temp. (°F) -32	5/9	temp. (°C)
Therm	100,000	BTUs
Tons (Long)	1016	kgs
tons (long)	2240	lbs
tons (long)	1.12000	tons (short)
Tons, Refrigeration	12,000	BTU/hr.
Tons (Short)	2000	lbs.
tons (short)	907.18486	kgs
tons (short)	2430.56	lbs. (troy)
tons (short)	0.89287	tons (long)
tons (short)	29,166.66	ozs (troy)
tons (short)	0.90718	tons (metric)
Watts	0.05692	BTUs/min.
watts	44.26	ft.-lbs./min.
watts	0.7376	ft.-lbs./sec.
watts	0.001341	hp
watts	0.01434	kg-calories/min.
watts	0.001	kws
Watt-Hours	3.415	BTU/hr.
watt-hrs.	2655	ft.-lbs.
watt-hrs.	0.001341	hp-hrs
watt-hrs.	0.8605	kg-calories
watt-hrs.	367.1	kg-meters
watt-hrs.	0.001	kw-hrs

Five Basic Laws of Nature

Law 1: Heat exists in the air at all temperatures – below freezing as well as above – all the way down to absolute zero (-460° F).

Law 2: Heat flows from a higher temperature to a lower temperature regardless of how small the temperature difference might be.

Law 3: All gases become warmer when compressed.

Law 4: Most matter can be in a solid (ice), liquid (water) or gaseous (steam) state.

Law 5: The temperature at which a material changes from a liquid to a gas (evaporates or boils) or from a gas to a liquid (condenses or liquefies) depends on the pressure at which it is contained.