

Conversion of Units

Prof. Dr. Werner Bidlingmaier & Dr.-Ing. Christian Springer

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Area

	km ²	m ²	cm ²	mm ²	sq. mile	acre	yd ²	ft ²	in ²
km ²	1	10 ⁻⁶	10 ¹⁰	10 ¹²	0.38612	247.11	1.196 x 10 ⁶	1.076 x 10 ⁷	1.550 x 10 ⁹
m ²	10 ⁻⁶	1	10 ⁴	10 ⁶	3.86 x 10 ⁻⁷	2.471 x 10 ⁻⁴	1.1960	10.764	1550
cm ²	10 ⁻¹⁰	10 ⁻⁴	1	100	3.86 x 10 ⁻¹¹	2.471 x 10 ⁻⁸	1.196 x 10 ⁻⁴	1.076 x 10 ⁻³	0.1550
mm ²	10 ⁻¹²	10 ⁻⁶	10 ⁻²	1	3.86 x 10 ⁻¹³	2.47 x 10 ⁻¹⁰	1.196 x 10 ⁻⁶	1.076 x 10 ⁻⁵	1.550 x 10 ⁻³
sq. mile	2.590	2.59 x 10 ⁶	2.59 x 10 ¹⁰	2.59 x 10 ¹²	1	639.96	3.097 x 10 ⁶	2.788 x 10 ⁷	4.01 x 10 ⁸
acre	4.047 x 10 ⁻³	4047	4.047 x 10 ⁷	4.047 x 10 ⁹	1.563 x 10 ⁻³	1	4840	43560	6.273 x 10 ⁶
yd ²	8.36 x 10 ⁻⁷	0.8361	8361	8.36 x 10 ⁵	3.228 x 10 ⁻⁷	2.066 x 10 ⁻⁴	1	9	1296
ft ²	9.29 x 10 ⁻⁸	9.29 x 10 ⁻²	929	92900	3.587 x 10 ⁻⁸	2.296 x 10 ⁻⁵	0.1111	1	144
in ²	6.45 x 10 ⁻⁴	6.45 x 10 ⁻⁴	6.4516	645.16	2.491 x 10 ⁻¹⁰	1.594 x 10 ⁻⁷	7.716 x 10 ⁻⁴	6.944 x 10 ⁻³	1

Density

	Tonne/m ³ Mg/m ³ g/cm ³	Kg/m ³	lb/in ³	UK ton/yd ³	US ton/yd ³	lb/ft ³
Tonne/m ³ Mg/m ³ g/cm ³	1	1000	0.03613	0.75247	0.8428	62.43
Kg/m ³	10 ⁻³	1	3.613 x 10 ⁻⁵	7.525 x 10 ⁻⁴	8.428 x 10 ⁻⁴	6.243 x 10 ⁻²
lb/in ³	27.680	27680	1	20.828	23.328	1.728 x 10 ³
UK ton/yd ³	1.3289	1.328 x 10 ³	4.801 x 10 ⁻²	1	1.12	82.955
US ton/yd ³	1.1865	1.186 x 10 ³	4.287 x 10 ⁻²	0.8929	1	74.074
lb/ft ³	1.602 x 10 ⁻²	16.019	5.787 x 10 ⁻⁴	1.205 x 10 ⁻²	1.35 x 10 ⁻²	1

Force and weight

	MN	kN	N	kgf	konf	lbf
MN	1	1000	10 ⁶	1.0196 x 10 ⁵	100.4	2.248 x 10 ⁵
kN	10 ⁻³	1	10 ³	101.96	0.1004	224.82
N	10 ⁻⁶	10 ⁻³	1	0.10196	1.004 x 10 ⁻⁴	0.2248
kgf	9.807 x 10 ⁻⁶	9.807 x 10 ⁻³	9.807	1	9.842 x 10 ⁻⁴	2.2048
konf	9.964 x 10 ⁻³	9.964	9964	1016	1	2240
lbf	4.448 x 10 ⁻⁶	4.448 x 10 ⁻³	4.448	0.45455	4.464 x 10 ⁻⁴	1

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	km	m	mm	mile	yard	ft	in	10 ⁻³ in
km	1	1000	10 ⁶	0.6214	1094	3281	3.937 x 10 ⁴	3.937 x 10 ⁷
m	10 ⁻³	1	1000	6.214 x 10 ⁻⁴	1.0936	3.281	39.370	3.937 x 10 ⁴
mm	10 ⁻⁶	10 ⁻³	1	6.214 x 10 ⁻⁷	1.094 x 10 ⁻³	3.281 x 10 ⁻³	3.937 x 10 ⁻²	39.37
mile	1.6094	1.6094	1.609 x 10 ⁶	1	1760	5280	63360	6.336 x 10 ⁷
yard	9144 x 10 ⁻⁴	0.9144	914.41	5.682 x 10 ⁻⁴	1	3	36	36000
ft	3.048 x 10 ⁻⁴	0.3048	304.8	1.894 x 10 ⁻⁴	0.3333	1	12	12000
in	2.54 x 10 ⁻⁵	0.0245	25.4	1.578 x 10 ⁻⁵	2.778 x 10 ⁻²	8.333 x 10 ⁻²	1	1000
10 ⁻³ in	2.45 x 10 ⁻⁸	2.54 x 10 ⁻⁵	0.0254	1.578 x 10 ⁻⁸	2.778 x 10 ⁻⁵	8.33 x 10 ⁻⁵	10 ⁻³	1

Mass

	Tonne (Mg)	kg	g	UK ton	US ton	cwt	lb	oz
Tonne (Mg)	1	1000	10 ⁶	0.9842	1.1011	19.66	2.205 x 10 ³	3.527 x 10 ⁴
kg	10 ⁻³	1	1000	9.842 x 10 ⁻⁴	9.842 x 10 ⁻⁴	1.966 x 10 ⁻²	2.2046	35.274
g	10 ⁻⁶	10 ⁻³	1	9.842 x 10 ⁻⁷	1.101 x 10 ⁻⁶	1.966 x 10 ⁻⁵	2.204 x 10 ⁻³	3.527 x 10 ⁻²
UK ton	1.016	1016	1.016 x 10 ⁶	1	1.12	20	2240	35840
US ton	0.9081	908.1	9.081 x 10 ⁵	0.8928	1	17.856	2000	32000
cwt	5.085 x 10 ⁻²	50.85	5.085 x 10 ⁴	0.05	0.0560	1	112	1792
lb	4536 x 10 ⁻⁴	0.4536	453.6	4.46 x 10 ⁻⁴	5 x 10 ⁻⁴	8.92 x 10 ⁻³	1	16
oz	2.835 x 10 ⁻⁵	2.835 x 10 ⁻²	28.349	2.79 x 10 ⁻⁵	3.125 x 10 ⁻⁵	5.580 x 10 ⁻⁴	6.25 x 10 ⁻²	1

Permeability

	m/s	cm/s	m/year	Darcy	ft/yr	ft/day
m/s	1	100	3.156 x 10 ⁷	1.04 x 10 ⁵	1.035 x 10 ⁸	2.835 x 10 ⁵
cm/s	0.01	1	3.156 x 10 ⁵	1.04 x 10 ³	1.035 x 10 ⁶	2.834 x 10 ³
m/year	3.169 x 10 ⁻⁸	3.169 x 10 ⁻⁶	1	3.28 x 10 ³	3.281	8.982 x 10 ⁻³
Darcy	9.66 x 10 ⁻⁶	9.66 x 10 ⁻⁴	304	1	1000	2.74
ft/year	9.658 x 10 ⁻⁹	9.659 x 10 ⁻⁷	0.3048	10 ⁻³	1	2.738 x 10 ⁻³
ft/day	3.527 x 10 ⁻⁶	3.527 x 10 ⁻⁴	111.33	0.365	365.25	1

Umrechnen von Einheiten

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Pressure, stress and modulus of elasticity

	MN/m ² MPa	kN/m ² kPa	kp kgf/cm ²	bar	atm	m H ₂ O	ft H ₂ O	mm Hg	ton/ft ²	psi lbf/in ²	lbf/ft ²
MN/m ² MPa	1	1000	10.197	10	9.869	102.2	355.2	7500.6	9.320	145.04	20886
kN/m ² kPa	0.001	1	1.019 x 10 ⁻²	0.0100	9.87 x 10 ⁻³	0.1022	0.3352	7.5006	0.0093	0.14504	20.886
kp kgf/cm ²	9.807 x 10 ⁻²	98.07	1	0.9807	0.9678	10.017	32.866	735.56	0.9139	14.223	2048.1
Bar	0.100	100	1.0197	1	0.9869	10.215	33.515	750.06	0.9320	14.504	2088.6
Atm	0.1013	101.33	1.0332	1.0132	1	10.351	33.959	760.02	0.9444	14.696	2116.2
m H ₂ O	9.788 x 10 ⁻³	9.7885	9.983 x 10 ⁻²	9.798 x 10 ⁻²	9.661 x 10 ⁻²	1	3.2808	73.424	9.124 x 10 ⁻²	1.4198	204.45
ft H ₂ O	2.983 x 10 ⁻³	2.9835	3.043 x 10 ⁻²	2.984 x 10 ⁻²	2.945 x 10 ⁻²	0.3048	1	22.377	2.781 x 10 ⁻²	0.43275	62.316
mm Hg	1.333 x 10 ⁻⁴	0.1333	1.3595 x 10 ⁻³	1.333 x 10 ⁻³	1.315 x 10 ⁻³	1.362 x 10 ⁻²	4.469 x 10 ⁻²	1	1.243 x 10 ⁻³	1.934 x 10 ⁻²	2.7846
ton/ft ²	0.1073	107.3	1.0942	1.0730	1.0589	10.960	35.960	804.78	1	15.562	2240
psi lbf/in ²	6.895 x 10 ⁻³	6.895	7.031 x 10 ⁻²	6.895 x 10 ⁻²	6.805 x 10 ⁻²	0.7043	2.3108	51.714	6.426 x 10 ⁻²	1	144
lbf/ft ²	4.788 x 10 ⁻⁵	4.788 x 10 ⁻²	4.883 x 10 ⁻⁴	4.788 x 10 ⁻⁴	4.725 x 10 ⁻⁴	4.891 x 10 ⁻³	1.605 x 10 ⁻²	0.3591	4.464 x 10 ⁻⁴	6.944 x 10 ⁻³	1

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ft H ₂ O	2.983 x 10 ⁻³	2.9835	3.043 x 10 ⁻²	2.984 x 10 ⁻²	2.945 x 10 ⁻²	0.3048	1	22.377	2.781 x 10 ⁻²	0.43275	62.316
mm Hg	1.333 x 10 ⁻⁴	0.1333	1.3595 x 10 ⁻³	1.333 x 10 ⁻³	1.315 x 10 ⁻³	1.362 x 10 ⁻²	4.469 x 10 ⁻²	1	1.243 x 10 ⁻³	1.934 x 10 ⁻²	2.7846
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Volume

	m ³	dm ³ (litre)	cm ³ (ml)	yd ³	ft ³	in ³	UK gallon	US gallon
m ³	1	10 ⁻³	10 ⁶	1.3079	35.311	6102	219.97	264.17
dm ³ (litre)	10 ⁻³	1	10 ³	1.308 x 10 ⁻³	3.531 x 10 ⁻²	61.02	0.2200	0.2642
cm ³ (ml)	10 ⁻⁶	10 ⁻³	1	1.308 x 10 ⁻⁶	6.102 x 10 ⁻²	6.102 x 10 ⁻²	2.199 x 10 ⁻⁴	2.642 x 10 ⁻⁴
yd ³	0.7646	764.6	7.646 x 10 ⁵	1	3.704 x 10 ⁻²	46650	168.19	201.99
ft ³	2.832	2832	2.832 x 10 ⁵	2.832 x 10 ⁻⁴	1	1728	6.229	7.481
in ³	1.639 x 10 ⁻⁵	1.639 x 10 ⁻²	16.387	2.144 x 10 ⁻⁵	5.787 x 10 ⁻⁴	1	3.605 x 10 ⁻³	4.329 x 10 ⁻³
UK gallon	4.564 x 10 ⁻³	4.546	4.546 x 10 ³	5.946 x 10 ⁻³	0.1605	277.42	1	1.2008
US gallon	3.785 x 10 ⁻³	3.785	3.785 x 10 ³	4.951 x 10 ⁻³	0.1337	231	0.8327	1