CANAM
Solutions + Service
Manufacturers of USD United Steel Deck products.

Conversion Factors for Deck Products

In the following chart: m = meters; mm = millimeters; kilograms = kg; grams = g; pascals = Pa; newtons = N; newton meters = Nm; kilopascals = kPa; megapascals = MPa

For deck calculations three significant figures are sufficient.
Do not use this table if more precision is required.

TO CONVERT	TO	MULTIPLY BY	NOTES
m	feet	3.28	
m	inches	39.4	
mm	inches	0.0394	
m^2	sq. feet	10.8	
m^2	squares	0.108	1 square = 100 $ft.^2$
mm^2	sq. inches	0.00155	
mm^2/m	sq. in. per ft.	0.000473	reinforcing steel area; concrete area available for shear
mm^4	$inches^4$	2.40×10^{-6}	moment of inertia
mm^4/m	$inches^4$ per ft.	0.732×10^{-6}	deck moment of inertia per unit of width
mm^4/mm	$inches^4$ per ft.	0.732×10^{-3}	
mm^3	$inches^3$	61.0×10^{-6}	section modulus
mm^3/m	$inches^3$ per ft.	18.6×10^{-6}	deck section modulus per unit of width
mm^3/mm	$inches^3$ per ft.	18.6×10^{-3}	
mm	mils	39.4	1 mil = 0.001 inches, paint thickness
m^3	$feet^3$	35.29	concrete volume
m^3	$yards^3$	1.307	concrete volume
m^3/m^2	$feet^3$ per $ft.^2$	3.28	concrete volume per unit area – slab volume
kg	pounds	2.20	mass units - **not to be used for stess or deflection calculations**
kg/m^2	pounds per $ft.^2$	0.205	mass units
g/m^2	ounces per $ft.^2$	3.28×10^{-3}	galvanizing
kg/m^3	pounds per $ft.^3$	0.0624	concrete density
kg/m^2	Pa	9.81	use pascal (N/m^2) for stress and deflection calculations
N	pounds (force)	0.225	concentrated loads, stress and deflection calculations
Nm	pound ft.	0.738	bending moment
Nm	pound in.	8.85	bending moment
N/m	pounds per ft.	0.0685	line loads; diaphragm strength or stiffness
kPa	pounds per $ft.^2$	20.9	1 pascal = 1 N/m^2; live load; pressure
MPa*	pounds per $inch^2$	145	stress; Modulus of Elasticity (E)

*For steel deck, the modulus of elasticity (E) is 210,000 MPa.

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STEEL THICKNESS CONVERSION

TYPE (GAGE)	DESIGN THICKNESS INCHES	DESIGN THICKNESS (mm)
28	0.0149	0.38
26	0.0179	0.45
24	0.0239	0.61
22	0.0295	0.75
20	0.0358	0.91
18	0.0474	1.20
16	0.0598	1.52
14	0.0747	1.90
12	0.1046	2.66
10	0.1345	3.42

STEEL PROPERTIES

ASTM NUMBER	CUSTOMARY UNITS (ksi)			SI UNITS (MPa)		
	F_y	F_u	F*	F_y	F_u	F*
A1008 Grade 33	33	48	20	230	330	140
A1008 Grade 40	40	52	24	275	360	165
A1008 Grade 50	50	65	30	340	410	205
A1008 Grade 80	80	82	36	550	565	250
A653 Grade 33	33	45	20	230	310	140
A653 Grade 40	40	55	24	275	380	165
A653 Grade 50	50	65	30	345	450	205
A653 Grade 80	80	82	36	550	570	250

*Design stress in bending.

GALVANIZING DESIGNATIONS

Customary Units*	SI Units**	Approximate Total Thickness***	
		(in.)	(mm.)
G30(0.3 oz. min.)	Z090(90 g min.)	0.0005	0.013
G60(0.6 oz. min.)	Z180(180 g min.)	0.0010	0.026
G90(0.9 oz. min.)	Z275(275 g min.)	0.0015	0.039

* Total of both sides, ounces/ft.^{2}
** Total of both sides, grams/m^2
***Both sides

EXAMPLE PROBLEM

EXAMPLE: A 1 1/2 x 6(40 x 150 mm) 20 gage composite floor deck is to carry a 150 mm (total depth) slab of normal weight concrete (2320 kg/m^3). The deck will be three spans with the clear distance between support beams of 1.5 meters. Find the deck deflection caused by the concrete mass. The I of the deck is 290 mm^4/mm. The concrete required to fill the ribs of the deck is 0.0143 m^3/m^2.

The equation for deflection is: deflection = $y = 0.0069\ wl^4/(EI)$.

Concrete mass = $[0.0143 + 1^2(150-40)/1000]2320$	=	288.4 kg/m^2
Deck mass	=	7.8 kg/m^2
Total	=	296.2 kg/m^2; 296.2 x 9.81 = w = 2910 Pascals

Where 1 pascal = 1 newton per meter^2(N/m^2).
E = 210,000 megapascals; note mega means 10^6.

Check units:
y = mm = pascals (mm^4)/[pascals x 10^6(mm^4/mm)]
= 0.0069 x 2910(1500)^4/210,000 x 10^6(290)
= 1.67 mm = 1.7 mm

The important points of the example problem are:
(1) Mass units must be changed to force units. In the problem, kilograms per square meter were changed to newtons per square meter (pascals).
(2) Units in the International System are always in powers of ten - simply substitute the appropriate power of ten for the prefix on the unit such as was done for "mega" (10^6). A quick dimension check will show if the units are correct.

PREFIX	SYMBOL	PREFIX	SYMBOL
exa = 10^{18}	E	milli = 10^{-3}	m
peta = 10^{15}	P	micro = 10^{-6}	μ
tera = 10^{12}	T	nano = 10^{-9}	n
giga = 10^9	G	pico = 10^{-12}	p
mega = 10^6	M	femto = 10^{-15}	f
kilo = 10^3	k	atto = 10^{-18}	a