APPENDIX

F

Conversion Factors

F.1 Conversion Factors

Some conversion factors useful in structural design, especially when the designer is using the American standard codes (which are still in FPS units), are provided in this appendix.

Quantity	*To convert*	*To*	*Multiply by*
Length	inch (in.)	mm	25.4
	foot (ft)	m	0.3048
	metre (m)	ft	3.2808
	mile	km	1.609
Area	$in.^2$	mm^2	645.16
	ft^2	m^2	0.0929
	m^2	ft^2	10.764
Volume	$in.^3$	mm^3	16,387
	ft^3	m^3	0.02832
	m^3	ft^3	35.315
	gallon	litre	3.7853
	litre	gallon	0.2642
Mass per unit volume	lb/ft^3	kg/m^3	16.0185
	kg/m^3	lb/ft^3	0.062428
Force	kilo pound (kip)	kN	4.448
	lb	N	4.448
	ton (2000 lb)	kN	8.896
	N	lb	0.2248
	kN	Kip	0.2248
Pressure, stress	psi	MPa	0.006895
	ksi	MPa	6.895
	kN/m^2	kip/ft^2	0.02089
	psf	N/m^2	47.88
	N/m^2	psf	0.02088
	MPa	ksi	0.145
	MPa	psi	145.0

(contd)

(contd)

Moments	in.-lb	N m	0.1130
	kip-in.	kN m	0.1130
	kip-ft	kN m	1.3558
	kN m	ft-kip	0.7376
Uniform loading	kip/ft	kN/m	14.59
	kip/in.	kN/m	175.2
	kN/m	kip/ft	0.06852
Speed	mile/h	m/s	4.470
Acceleration	ft/s^2	m/s^2	0.3048
Density	$lb/in.^3$	kg/m^3	27,680
	lb/ft^3	kg/m^3	16.02
Temperature	degree Fahrenheit (^oF)	Degree celsius (^oC)	$(t^o–32)/1.8$
Inertia	$in.^4$	mm^4	416,231
Energy	ft-lb	Joule (N m/9.81)	1.356

1 Pa = $1N/m^2$, 1 MPa = 10^6 Pa = 1 N/mm^2 , g = 32.17 ft/s^2 = $9.807m/s^2$, 1 erg = 10^{-7} J, 1 Hz (Hertz) = 1 cycle/s, ^oK (Kelvin) = ^oC + 273

F.2 Basic SI units Relating to Structural Steel Design

Quantity	***Unit***	***Symbol***
Length	metre	m
Mass	kilogram	kg
Time	second	s

F.3 Derived SI Units Relating to Structural Design

The SI unit of force is Newton (N). 1 Newton is the force which causes a mass of 1 kg to have an acceleration of $1m/s^2$. The acceleration due to gravity is 9.807 m/s^2 approximately, and hence the weight of a mass of 1 kg is 9.807 N.

Quantity	***Unit***	***Symbol***	***Formula***
Force	Newton	N	kgm/s^2
Pressure, Stress	Pascal	Pa	N/m^2
Energy or work	Joule	J	N m