

APPENDIX B STEEL CONSTANTS AND CONVERSION FACTORS

[Table B-1](#) lists the constants recommended for steel. These values are used throughout the Manual and in the CARS '98 program.

Table B-1 Recommended constants for steel

Constants	SI Units	U.S. Customary Units
Average Mass Density	7.85E-06 kg/mm ³	0.284 lbm/in ³
Modulus of Elasticity	203,000 MPa	29,500 ksi
Shear Modulus	78,000 MPa	11,300 ksi
Poisson's Ratio	0.3	0.3

[Table B-2](#) lists conversion factors recommended when using the Manual or the CARS '98 program.

Table B-2 Recommended conversion factors

	SI Units	Conversion Units		U.S. Customary Units
		SI to U.S. Customary, Multiply by	U.S. Customary to SI, Multiply by	
Length	mm (millimeter)	39.37E-03	25.4	inch (in.)
Area	mm ²	1.550E-03	645.2	in. ²
Volume	mm ³	61.02E-06	16.39E+03	in. ³
Area Moment of Inertia	mm ⁴	2.403E-06	416.2E+03	in. ⁴
Strain	mm/mm	1	1	in./in.
Mass Density	kg/mm ³	36.1E+03	27.7E.06	lbm/in. ³
Mass Per Unit Area	kg/mm ²	1.422E+03	703E-06	lbm/in. ²
Mass per Unit Length	kg/mm	56.0	17.9E-03	lbm/in.
Mass	kg (kilogram)	2.205	454E-03	lbm
Force	Newtons (N or kn)	225E-03	4.45	pound-force (lbf) or kilo-lbf (kip)
		225E-03	4.45	
Moment	N-mm	8.85E-06	113E+03	kip-in.
Stress	MPa	145E-03	6.89	ksi

Notes:

- k = kilo or 10³
- M = mega or 10⁶
- 1 Newton (N) = 0.225 lbf
- 1 Pascal (Pa) = 1 Newton/meter²
- 1 Mpa = 1 Newton/mm²

