HEAVY DUTY STEEL DESIGN CRITERIA

Design Criteria

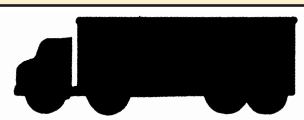
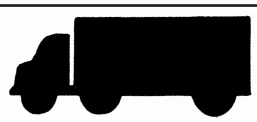
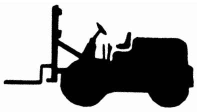
The following pages show capacities on the basis of vehicular load distribution and concentrated loading per foot of grating width for a given span. Calculations for concentrated load are similar in format to those for Light Duty Steel grating shown on page 40, except F = 20,000 psi. Calculations for vehicular loadings are based on AASHTO Standard Specifications for Highway Bridges and utilize the following formulas:

M = Bending Moment
S = Section Modulus - in^3/ft of grating width
I = Moment of Inertia - in^4/bar
E = Modulus of Elasticity (29,000,000 psi)
F = Allowable Bending Stress (20,000 psi)
L = Simple Clear Span - inches
D = Deflection - inches

a = Partial Load Contact Parallel to Span - inches
s = Center-to-Center Spacing Between Bearing Bars - in.
b = Partial Load Contact Dimension at 90˚ to Span - in.
b = a + (2s)
P = Total Wheel or Partial Load Including Impact - lbs.
P_1 = P per bearing bar
P_1 = P x (s/b)

Step 1. Determine M:	$M = \frac{FS}{12}$
Step 2. Substituting for M, solve for L:	(i) a > L: $M = \frac{PL^2}{8ab}$ (ii) a < L: $M = \frac{P(.25L - .125a)}{b}$
Step 3. Check D*:	$D = \frac{P_1[(2L^3) - (a^2L) + (a^3/4)]}{96EI}$

•Deflection should be limited to 1/400 span.

Maximum Traffic Conditions	Wheel Load (lbs.) (1/2 of Axle Load + 30% Impact)	Loading	Load Distribution**	
			a	b
Truck Traffic 32,000 Lb. Axle Load Dual Wheels 	20,800	H-20	20"	20" + (2s)
Truck Traffic 24,000 Lb. Axle Load Dual Wheels 	15,600	H-15	15"	15" + (2s)
10,000 Lb. Capacity Lift Truck 14,400 Lb. Vehicle 24,400 Lb. Total Load 85% Drive Axle Load (Rubber Tires) 	13,480	5 Ton	11"	11" + (2s)
6,000 Lb. Capacity Lift Truck 9,800 Lb. Vehicle 15,800 Lb. Total Load 85% Drive Axle Load (Rubber Tires) 	8,730	3 Ton	7"	7" + (2s)
2,000 Lb. Capacity Lift Truck 4,200 Lb. Vehicle 6,200 Lb. Total Load 85% Drive Axle Load (Rubber Tires) 	3,425	1 Ton	4"	4" + (2s)

NOTES:
(1) For continuous spans, use continuity factor = .80.
** (2) This distribution results in larger grating sizes for lighter trucks on shorter spans. Spans shown for H15/H20 reflect the more critical condition.
(3) The fork lift wheel loads and load distribution patterns depicted above, generally, and only partially, represent the broad range of rubber-tired lift trucks available. For those applications falling outside of these examples, please contact the factory.
(4) Wheeled vehicles with urethane tires should NEVER be used in conjunction with open grid bar grating.
(5) HS20 is the same as H20 and HS15 is the same as H15. The "S" stands for semi-trailer.