524 CMR 33.00: LOADING CLASSIFICATIONS

Section

33.01: Car Frame Uprights (Stiles)

The total stress in each car frame upright, due to tension and bending and the slenderness ratio of each upright and its moment of inertia, shall be determined in accordance with the following formulas:

(1) Stress Due to Bending and Tension.

$$\text{Total Stress} = \frac{KL}{4HZ_u} + \frac{G}{2A}$$

Where $\frac{KL}{4HZ_u}$ is the bending stress in each upright in the plane of the

frame due to the live load W on the platform for the class of loading A, B or C for which the elevator is to be used (See Part 2, 524 CMR 33.03). K is determined by the following formulas:

(a) For Class A freight loading or passenger loading: $K = \frac{WE}{8}$

(b) For Class B freight loading: $K = W\left(\frac{E}{2} - 48\right)$ or $K = \frac{WE}{8}$

(c) For Class C freight loading: $K = \frac{WE}{4}$

(2) Slenderness Ratio. The slenderness ratio L/R for uprights subject to compressions other than those resulting from safety and buffer action shall not exceed 120.

(3) Moment of Inertia. The moment of inertia of each upright shall be not less than determined by the following formula:

$$I = \frac{K(L)^3}{18E\,H}$$

33.02: Freight Elevator Platform Frames

The calculation of the stresses in the platform frame at the entrance of freight elevators, due to loading and unloading at the landings, shall be based on the following:

(1) For Class A loading: ¼ of the rated load shall be considered as being concentrated on the mid-point of the frame member.

ILLUSTRATION
Turning Moment Based on Class of Loading

(2) For Class B loading: 75% of the rated load shall be considered as being concentrated on the frame member supported at two points five feet apart, symmetrically located with respect to the mid-point of the member.

(3) For Class C loading: 80% of the rated load shall be considered as being concentrated on the frame member supported at two points two feet six inches apart, symmetrically located with respect

to the mid-point of the member.

33.03: Formula Symbols

The symbols used in the formulas in 524 CMR 33.00 shall have the following meanings:

W = Rated load in pounds.
C = Net weight in pounds of complete elevator car.
G = Load in pounds supported by crosshead with rated load in car at rest at top terminal landing.
K = Turning moment in inch-pounds as determined by class of loading.
D = Distance in inches between guide rails.
E = Inside clear width of car in inches.
H = Vertical center distance between upper and lower guide shoes (or rollers) in inches.
L = Free length of uprights in inches (distance from lowest fastening in crosshead to top fastening in plank).
A = Net area of section in (inches)2.
R = Least radius of gyration of section in inches.
I = Moment of inertia of member, gross section in (inches)4.
Z = Combined section module of plank members, gross section, (inches)8.
Z_u = Section modulus of one upright, gross section, $(inches)^3$.

REGULATORY AUTHORITY

524 CMR 33.00: M.G.L. c. 143, § 69.