

# ORDINANCE NO. 445

AN ORDINANCE to repeal and re-enact Sub-section N., of Section 49, of the Building Code of the City of Alexandria, Virginia adopted May 23, 1939, relating to the minimum thickness of steel.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF ALEXANDRIA, VIRGINIA AS FOLLOWS:

Section 1. That Sub-section N., of Section 49, of the Building Code of the City of Alexandria, Virginia adopted May 23, 1939 by the Council of said City be, and the same hereby is repealed and re-enacted so as to read as follows:

## N. Minimum Thickness.

No steel less than five-sixteenths inch shall be used for exposed construction, nor less than one-fourth inch for interior construction, except for linings or fillers, webs of rolled structural beams and channels, and for 1-story sheet metal buildings, skylights, or light miscellaneous steel work.

And except that in areas classified "E" Industrial Zone by Chapter 28 of the City Code, buildings not exceeding one story or 15 feet in height may be constructed of cold formed pressed steel units not less than No. 16 United States Standard Gage, contingent upon adherence to the following limitations.

The steel used shall have the properties corresponding to the American Society of Testing Materials Specification A245-T for Grade "C" Material.

All members used as beams or girders which are spaced more than four feet on centers shall be not less than No. 8 United States Standard Gage and shall be of the type formed with stiffened flanges.

All members used as posts or columns and which are spaced more than four feet on centers shall be not less than No. 6 United States Standard Gage and shall be of the type with the stiffened flange; and it is further provided that such posts or columns shall be protected from the effect of impact for a distance of five feet above the floor level with not less than two inches of class "D" concrete poured in place at the site. Flange Stiffeners.

## Stiffeners of Flange

### (a) Minimum Dimensions of Stiffeners

The minimum dimensions of longitudinal stiffening lips, necessary in order to stiffen compression flanges with full effectiveness at the edges, shall be obtained from the table below:

Minimum Properties of Stiffener Lips

w/t	I	d	w/t	I	d
Less than					
10	0	0	20	35.2t4	7.5t
10	0	0	25	46.2t4	8.2t
12	8.2t4	4.6t	30	54.8t4	8.7t
14	16.2t4	5.8t	40	73.7t4	9.6t
16	23.7t4	6.6t	50	92.7t4	10.4t
18	30.2t4	7.1t	60	110.8t4	11.0t

where  $w$ =flange projection beyond web, in inches.

$t$ =thickness of flange, in inches.

$I$ =Minimum moment of inertia of stiffener (of any shape\*) about centroidal axis parallel to flange.

$d$ =minimum total depth (out to out) of lip, in inches, where stiffener consists of a simple lip of thickness  $t$ , bent at right angles to the flange.

**(b) Maximum Depth of Stiffening Lip\***

To prevent buckling of the stiffening lip, the maximum clear projection from flange to edge of lip shall not exceed 12 times its thickness if the lip is part of a compression member carrying the full, allowable design stress  $f_b$  (Section 2.2\*.) If the maximum compression stress  $f$  in the lip is less than  $f_b$ , the maximum clear projection,  $d$ , of the lip may be increased before the critical point of buckling is reached, and shall be determined from the following formula, for all grades of steel.

$$*d = \frac{1.667fb - (f \div 5430)}{0.0555 (fb - 8150)} t$$

For flanges with lips of depths exceeding  $d=12t$ , the maximum allowable compression stress that will avoid buckling of the lip, is determined from the formula:

$$*f = (1.667fb - 5430) - 0.0555 (fb - 8150) d/t$$

Note: The two equations above are identical, except that the first is solved for  $d$  for a given  $f$ , (for use in design) while the second is solved for  $f$  for a given  $d$  (for checking the critical stress of a given member\*.)

**Tests**

The Building Inspector shall have the right to collect samples of material from the site and have them tested in a laboratory of his selection, at the expense of the owner.

**Footnote:** \*The provisions of this section apply only to stiffening lips that are located entirely on the compression side of the neutral axis of the member. Where the extremity of the projecting lip extends beyond the neutral axis, into the tension zone, stresses become effective that tend to prevent buckling of the lip.

Section 2. That this ordinance shall take effect on the day after its publication in the Alexandria Gazette.

November 6, 1945

William T. Wilkins  
Mayor