

2x4s supported at ends 20' long 140# at center

Flat Position  $E = \frac{31 \cdot 10^6}{Y}$

Piece	Deflection	E
A	15.75	$1.97 \cdot 10^6$
B	14.00	$2.21 \cdot 10^6$
C	15.25	$2.03 \cdot 10^6$
D	17.00	$1.82 \cdot 10^6$

Edge Position  $E = \frac{6.21 \cdot 10^6}{Y}$

A	3.75	$1.66 \cdot 10^6$
B	3.00	$2.07 \cdot 10^6$
C	3.75	$1.66 \cdot 10^6$
D	4.00	$1.56 \cdot 10^6$

Compression test gives failure at  
 1000#/sq" across grain  
 4000#/sq" with "  
 $S = \frac{M}{Z} = \frac{140 \cdot 20 \cdot 12 \cdot 6}{4 \cdot 1.625 \cdot 3.625^3} = 650 \text{#/sq" edge on}$   
 $S = \frac{M}{Z} = \frac{140 \cdot 20 \cdot 12 \cdot 6}{4 \cdot 3.625 \cdot 1.625^3} = 3250 \text{#/sq" flat-wise}$

$E = \frac{PL^3}{48IY}$

Y = deflection

P = 140#, L = 20ft.

$I_{Flat} = \frac{3.625 \cdot 1.625^3}{12} = 1.295$

$I_{Edge} = \frac{1.625 \cdot 3.625^3}{12} = 6.44$

Test of Wood