Safe Load for Laterally Unsupported Angles

Editor's Note: *This article is reprinted in its entirety, without revisions, with the gracious permission of the Australian Institute of Steel Construction. It is in response to the many inquiries AISC has received on the subject of laterally unsupported angles. The AISC Specification and Manual offers limited direct design criteria for such members. Relevant Australian research reports and publications, primarily this article, have often been referenced in the past to provide requested design guidance.*

The reader should note that the load tables were prepared in conformance with the Australian Specification which does not necessarily correspond to the AISC Specification (i.e., see shear requirement). In addition, some of the angle sizes shown may not be readily available in the U.S. However, the tables provide a quick rational estimate of angle bending capacity. References on the theoretical and experimental behavior and recommended design of laterally unsupported angles are listed at the end of the article and may be obtained from AISC headquarters.

In addition, a convenient rule of thumb based on the Australian research that may be applied in angle design for flexure is to simply use an allowable bending stress, $F_b = 0.6F_y$, *with appropriate serviceability deflection limits. Available evidence indicates that laterally unsupported practical angle sections in bending experience excessive deflections prior to any lateral buckling and, therefore, will be governed by deflection limitations rather than buckling.*

An Explanation of the Tables

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INTRODUCTION

The tables are based theoretically on the constant moment case and use a maximum permissible stress of $0.66F_y$,[1] where F_y is the material yield stress. However, for short spans the loads are reduced where necessary to ensure that the maximum permissible shear stresses given in Ref. 1 are not exceeded. The safe loads are applicable for applied loads within half a leg length on either side of the shear centre (Fig. 1). The method by which this load is obtained is described under "Calculation of Safe Loads." The safe load shown in the tables is the uniformly distributed load which causes a maximum bending moment equal to the critical constant moment. This conversion has been made to correspond with the AISC (Australian) Safe Load Tables.[2] Safe loads are given for

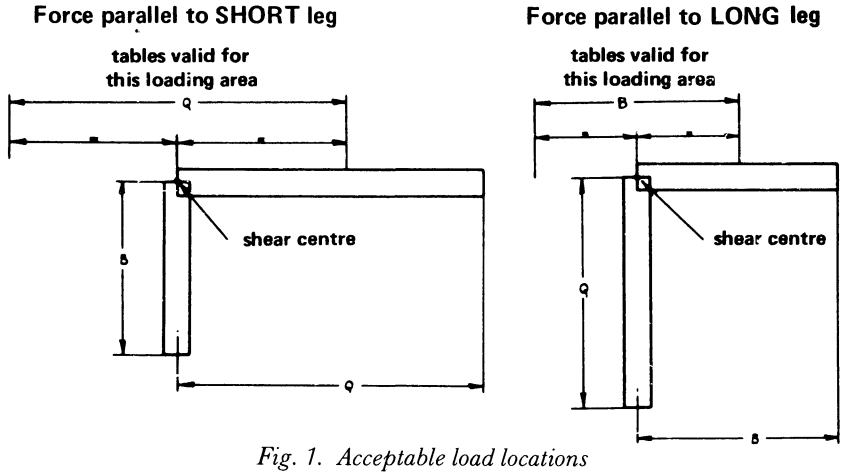

Fig. 1. Acceptable load locations

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steels with nominal yield stresses of 36 and 52 ksi.

In addition to loads, the tables give the associated loading plane deflection of the beam. The deflection is indicated in smaller type directly beneath the corresponding load value.

For cases where the moment on a beam is not constant across the span, the tables give conservative estimates of the load carrying capacity as the constant moment case produces the most critical lateral buckling situation.[3] The same constant moment basis is used for the lateral buckling rules of AS CA1.[1,4]

NOMENCLATURE

B	length of the shorter angle leg as defined in Fig. 1 (actual leg length $-\frac{t}{2}$)
C	centroid location
F_v	maximum shear stress
F_y	yield stress
G	modulus of rigidity
K_T	St. Venant torsional constant
L	length of span
M	moment
M_a	total moment, i.e. applied moment plus moment component due to the dead weight of the beam, calculated about the appropriate leg
M_v	component of the total moment (M_a) about the VV axis
P	applied load
P'	uniformly distributed load
Q	length of longer angle leg as defined in Fig. 1 (actual leg length $-\frac{t}{2}$)
S	shear centre location
T	applied torque
UU	major principal axis
U'U'	major principal axis of the twisted cross-section
VV	minor principal axis
V'V'	minor principal axis of the twisted cross-section
X, Y	axes through the centroid parallel to an angle leg of the twisted cross-section
Z_a	section modulus about the same axis as M_a
Z_x	section modulus about the XX axis
e	load eccentricity
m	weight of beam in lb/inch length
t	thickness of angle leg
u	deflection of the shear centre in the U direction
v	deflection of the shear centre in the V direction
x	deflection of the shear centre in the X direction
y	deflection of the shear centre in the Y direction
σ_a	nominal stress found from $\sigma_a = \frac{M_a}{Z_a}$
σ_{max}	actual maximum section stress
δ	deflection
λ_1 λ_2	coefficients used in equation 8
ϕ_T	the algebraic sum of component twists
θ	angle between XX and UU axis

CALCULATION OF SAFE LOADS

The design relationships for angle beams obtained in Ref. 5 have been used to determine the value of the equivalent uniformly distributed load which produces a maximum section stress of $0.66F_y$. Iterative methods have been used to locate the value of this load from an initial approximation of

$$M_a = \sigma_a Z_a \tag{1}$$

where σ_a is the nominal applied stress, Z_a the section modulus and M_a the total applied moment about some common axis, aa.

For small angles of twist, the nominal applied stress, σ_a, and the actual maximum section stress, σ_{max}, are related by:[5]

$$\sigma_a = 0.80\ \sigma_{max} \tag{2}$$

Hence for

$$\sigma_{max} = 0.66\ F_y \tag{3}$$

$$\sigma_a = 0.528\ F_y \tag{4}$$

Thus, the initial approximations, using the relationships for Z_a from Ref. 5, are:

Unequal Angles—Force direction parallel to short leg

$$M_a = 0.528F_y \frac{B^2t(B + 4Q)}{6\ (B + 2Q)} \tag{5}$$

Force direction parallel to long leg

$$M_a = 0.528F_y \frac{Q^2t\ (Q + 4B)}{6\ (2B + Q)} \tag{6}$$

Equal Angles

$$M_a = 0.528F_y \frac{B^2t}{3.6} \tag{7}$$

For small angles of twist these expressions give the actual value of the safe load directly. However, large angles of twist modify the value of the maximum stress in the section with consequent changes in its load carrying capacity.

Studies in Ref. 6 have shown that the effects of loads located within half a leg length of the shear centre (Fig. 1) are negligible for the load ranges considered. For loads outside these limits the designer should use the procedures on Refs. 5 and 7.

The maximum stress in the section can be found from:

$$\sigma_{max} = \frac{18\ M_a}{(B + Q)^2t}(\lambda_1 + \lambda_2\ \phi_T) \tag{8}$$

where values of λ_1 and λ_2 for each unequal angle section, regardless of t, are given in Table 1.

For all equal angles, $\lambda_1 = 1.0$ $\lambda_2 = \frac{1}{3}$

The value of ϕ_T is the algebraic sum of the twist due to nonprincipal axis loading,[5] the initial twist and all applied torques. The first two are usually negligible for the situations covered by the tables.[5] The initial twist value assumed from studies in Ref. 5 is

$$\phi_{initial} = 0.436 \times 10^{-4}\ L \text{ radian} \tag{9}$$

Table 1

Section Dimensions	Force parallel to short leg, ϕ_T positive		Force parallel to long leg, ϕ_T positive	
in. x in.	λ_1	λ_2	λ_1	λ_2
6 x 4	1.49	−0.275	0.731	0.422
6 x 3½	1.73	−0.261	0.672	0.462
5 x 3½	1.42	−0.280	0.753	0.405
5 x 3	1.67	−0.263	0.682	0.450
4 x 3	1.32	−0.290	0.792	0.392
3½ x 3	1.15	−0.308	0.878	0.363
3½ x 2½	1.38	−0.283	0.766	0.404
3 x 2½	1.19	−0.303	0.858	0.368
3 x 2	1.50	−0.273	0.726	0.422
2½ x 2	1.23	−0.298	0.831	0.379

For all equal angles $\lambda_1 = 1.0$ $\lambda_2 = -\frac{1}{3}$

The twist due to the applied torque T is given by TL/GK_T where G is the shear modulus and K_T the torsion constant. In assessing the value of T the tables include the effect of eccentricity of the beam self-weight and of applied load P relative to the shear centre.

A force parallel to one of the angle legs may be oriented to produce either tension or compression at the leg tip. The influence on the load carrying capacity of the orientation of loading varies with the loading condition. For angles subjected to loads in the short leg direction, Ref. 5 shows that the effect of reversing the load orientation is negligible. For loads in the long leg direction the tabulated values are chosen for the worst case and the maximum variation between load orientations is 6%.

AS CA1[1] states that the maximum shear stress F_y in a member shall not exceed $0.45\,F_y$ and hence the shear stress limits[8,9] are:

Force parallel to short leg

$$F_v = \frac{3P}{4Bt} + \frac{PQt}{4K_T} \leq 0.45\,F_y \qquad (10)$$

Force parallel to long leg

$$F_v = \frac{3P}{4Qt} + \frac{PBt}{4K_T} \leq 0.45\,F_y \qquad (11)$$

Where it is the shear stress limitation that governs, the tabulated loads are based on this and are indicated as those to the left of the heavy broken line in the tables.

The theoretical predictions given above and used in formulating the tables have been confirmed by an extensive test series on laterally unsupported angles.[10]

DEFLECTION EQUATIONS

The exact approach to this problem would involve the solution of a set of coupled partial differential equations for a variety of boundary conditions. The problem does not warrant the time involved in utilizing such a solution. A simplified analysis based on an extension of first order theory is used to find the maximum loading plane deflection.

The total angle of twist (ϕ_T) is computed and the section rotated through this angle while the applied moment M_a retains its original direction (Fig. 2). The applied moment is then resolved into components about the closest rotated axes and the principal axes deflections due to each component determined using the appropriate equations from Fig. 2 and Ref. 5. Thus, loading plane deflections are calculated from:

Force parallel to short leg

$$x_{max} = \sqrt{u^2_{max} + v^2_{max}} \times \cos\left(\theta + \phi_T + \operatorname{artan}\frac{v_{max}}{u_{max}}\right) \qquad (12)$$

Force parallel to long leg

$$y_{max} = \sqrt{u^2_{max} + v^2_{max}} \sin\left(\theta + \phi_T + \operatorname{artan}\frac{v_{max}}{u_{max}}\right) \qquad (13)$$

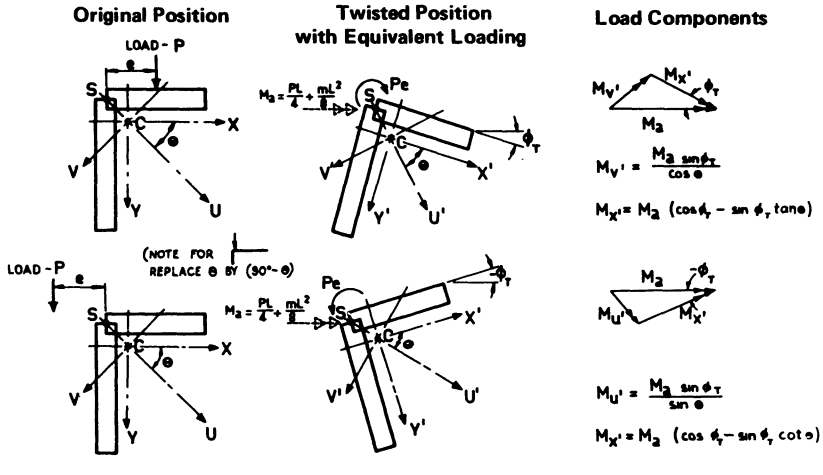


Fig. 2. Method of determination of load components for deflection equations

where u_{max} and v_{max} are respectively the summation of component deflections along the U and V axes. The tables use equations involving ϕ_T, however, reasonably accurate answers to cases where deflections are restricted can be obtained by calculating u_{max} and v_{max} from simple beam theory. If this simplification is used, then the applied moment, M_a, can be resolved directly into components about $U'U'$ and $V'V'$ (Fig. 2).

AS CA1, Appendix A, Sec. A2.2, recommends a deflection limit of:

$$\triangle = \frac{L}{180} \tag{14}$$

for structural applications where angle sections could be used. This limit is shown in the safe load tables as a heavy line, dividing the tables into regions above and below this limit. Deflection values to the left of this line are less than those recommended by AS CA1. Where possible, beam selection should be confined to this area of the tables.

The deflections for other loads may be estimated by proportions from the tables. However, as these include deadweight effects, a small adjustment must be made. For a load P'' which is less than the tabulated safe load P', the relevant deflection $\triangle''$ can be calculated from the tabulated deflection $\triangle'$ as

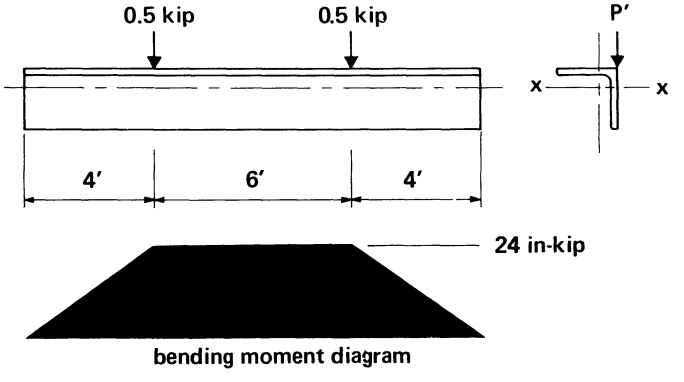
$$\triangle'' = \frac{P'' + mL}{P' + mL} \times \triangle \tag{15}$$

where mL is the beam weight.

Note that AS CA1 actually only requires live load deflections to be considered. However, the tables include dead load deflections as many angles otherwise included would suffer large visible deformations under their own weight and cause concern during fixing.

Example

The following simple example illustrates the use of the tables.



bending moment diagram

Data:

Steel	F_y = 36 ksi
Permissible Bending Stress	$0.66F_y$
Allowable maximum deflection	$\frac{L}{180} = 0.93''$
Loading Case:	For loads parallel to the long leg.

Maximum Bending Moment due to Applied Load:

$$M = 24 \text{ in.-kips}$$

Equivalent Uniformly Distributed Load:

$$P = \frac{8M}{L}$$

$$= 1.15 \text{ kips.}$$

The appropriate safe load tables are found on page 39 et seq for this loading and yield stress.

For a 14-ft span the smallest section capable of sustaining its maximum load whilst remaining within the permitted deflection limit is the 6 × 3½ × 5⁄16 angle.

However, use of Equation 15 will permit the use of many lighter sections. The lightest section that can be used is the 5 × 3 × 5⁄16. The table values for this 8.1 lb/ft section are $P' = 1.47$ kip and $\delta = 1.13$ inch.

Equation 15 gives

$$'' = \frac{1.15 + 0.0081 \times 14}{1.47 + 0.0081 \times 14} \times 1.13 = 0.90''$$

which satisfies the limit of 0.93''.

REFERENCES

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4. *Lay, M. G.* AS CA1 Design Guide *BHP Melbourne Research Laboratory Report MRL 17/4C, Sept. 1970.*
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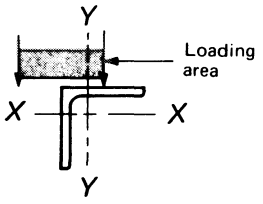
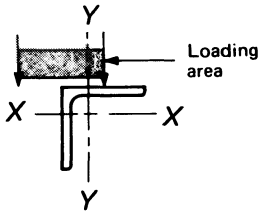


EQUAL ANGLES

HIGH STRENGTH STEEL (52 ksi)

BASED ON AS CA1 1968



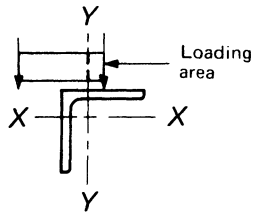
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
8 x 8	1	51.0	49.3 0.01	49.3 0.05	47.0 0.17	35.0 0.30	27.9 0.46	23.0 0.67	19.5 0.91	13.2 1.86	10.1 2.9
	7/8	45.0	38.8 0.01	38.8 0.04	38.8 0.16	31.1 0.29	24.7 0.46	20.4 0.66	17.4 0.91	11.7 1.86	8.95 2.9
	3/4	38.9	29.3 0.01	29.3 0.04	29.3 0.13	27.1 0.29	21.5 0.46	17.8 0.66	15.1 0.90	10.2 1.86	7.79 2.9
	5/8	32.7	21.0 0.00	21.0 0.03	21.0 0.11	21.0 0.27	18.2 0.46	15.0 0.67	12.7 0.91	8.55 1.87	6.51 2.9
	1/2	26.6	13.8 0.00	13.8 0.03	13.8 0.09	13.8 0.22	13.8 0.44	12.0 0.66	10.2 0.91	6.82 1.87	5.14 3.1
6 x 6	1	37.5	45.8 0.02	38.5 0.10	25.5 0.23	19.0 0.41	15.1 0.63	12.4 0.91	10.5 1.25	6.98 2.6	5.10 4.0
	7/8	33.1	36.3 0.02	34.5 0.10	22.9 0.23	17.0 0.40	13.5 0.63	11.1 0.91	9.42 1.24	6.07 2.5	4.56 4.0
	3/4	28.7	27.7 0.01	27.7 0.09	19.6 0.22	14.6 0.39	11.6 0.61	9.52 0.88	7.99 1.20	5.30 2.5	3.98 3.9
	5/8	24.2	20.0 0.01	20.0 0.08	16.6 0.22	12.4 0.39	9.81 0.61	8.08 0.88	6.84 1.20	4.49 2.5	3.38 3.9
	9/16	21.9	16.2 0.01	16.2 0.08	15.0 0.22	11.1 0.39	8.85 0.61	7.38 0.88	6.00 1.20	4.08 2.5	3.10 3.9
	1/2	19.5	13.3 0.01	13.3 0.07	13.3 0.22	10.0 0.39	7.97 0.61	6.57 0.88	5.49 1.20	3.64 2.5	2.74 3.9
	7/16	17.2	10.2 0.01	10.2 0.06	10.2 0.19	8.78 0.39	6.96 0.61	5.66 0.88	4.79 1.19	3.18 2.5	2.39 4.0
	3/8	14.8	7.77 0.01	7.77 0.05	7.77 0.17	7.50 0.39	5.95 0.61	4.90 0.88	4.15 1.20	2.75 2.5	2.08 4.0
5 x 5	3/4	23.6	26.5 0.02	20.4 0.12	13.5 0.27	10.1 0.48	7.96 0.76	6.55 1.09	5.53 1.49	3.53 3.0	2.61 4.8
	5/8	19.9	19.2 0.02	17.0 0.12	11.3 0.27	8.38 0.47	6.63 0.74	5.45 1.07	4.60 1.46	3.02 3.0	2.23 4.7
	1/2	16.1	12.9 0.01	12.9 0.11	9.20 0.26	6.84 0.47	5.41 0.73	4.45 1.06	3.76 1.45	2.47 3.0	1.79 4.7
	3/8	12.3	7.59 0.01	7.59 0.09	7.01 0.26	5.21 0.46	4.13 0.73	3.39 1.06	2.86 1.45	1.83 3.0	1.36 4.9
	5/16	10.4	5.41 0.01	5.41 0.07	5.41 0.24	4.37 0.47	3.46 0.74	2.85 1.07	2.40 1.48	1.53 3.1	1.09 5.1

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
4 x 4	5/8	15.7	18.2 0.03	10.8 0.15	7.14 0.34	5.30 0.61	4.19 0.95	3.43 1.37	2.82 1.86	1.81 3.8	1.29 6.0
	1/2	12.7	12.3 0.03	8.69 0.15	5.75 0.33	4.27 0.59	3.37 0.93	2.76 1.34	2.32 1.84	1.49 3.8	1.06 6.0
	3/8	9.7	7.33 0.02	6.69 0.14	4.43 0.33	3.29 0.59	2.59 0.92	2.13 1.34	1.79 1.82	1.15 3.9	0.80 6.0
	5/16	8.1	5.10 0.02	5.10 0.13	3.67 0.33	2.73 0.58	2.15 0.92	1.76 1.34	1.48 1.85	0.94 3.9	0.65 6.3
	1/4	6.6	3.45 0.02	3.45 0.11	3.00 0.33	2.23 0.59	1.76 0.94	1.44 1.37	1.19 1.87	0.73 4.0	0.51 6.7
3½ x 3½	5/8	13.5	16.2 0.04	8.06 0.17	5.33 0.39	3.95 0.70	3.11 1.10	2.54 1.58	2.13 2.2	1.30 4.4	0.92 7.0
	1/2	11.0	11.9 0.04	6.70 0.17	4.43 0.39	3.28 0.69	2.55 1.07	2.08 1.55	1.75 2.1	1.08 4.4	0.76 7.0
	3/8	8.4	7.16 0.03	5.13 0.17	3.39 0.38	2.51 0.68	1.98 1.06	1.62 1.54	1.34 2.1	0.84 4.3	0.59 7.1
	5/16	7.1	5.00 0.02	4.28 0.17	2.83 0.38	2.10 0.68	1.65 1.07	1.32 1.52	1.11 2.1	0.69 4.4	0.48 7.2
	1/4	5.7	3.40 0.02	3.40 0.16	2.33 0.38	1.68 0.67	1.32 1.05	1.08 1.54	0.89 2.1	0.55 4.6	0.38 7.8
3 x 3	5/8	11.4	11.5 0.05	5.72 0.21	3.77 0.47	2.79 0.83	2.19 1.30	1.79 1.87	1.49 2.6	0.91 5.3	0.61 8.2
	1/2	9.3	9.64 0.05	4.79 0.20	3.16 0.46	2.34 0.81	1.84 1.28	1.47 1.83	1.22 2.5	0.75 5.2	0.51 8.2
	3/8	7.1	6.93 0.05	3.67 0.20	2.42 0.44	1.79 0.79	1.41 1.25	1.15 1.81	0.95 2.5	0.58 5.2	0.40 8.2
	5/16	6.0	4.92 0.04	3.07 0.19	2.03 0.44	1.50 0.79	1.18 1.24	0.96 1.80	0.80 2.5	0.48 5.1	0.32 8.3
	1/4	4.8	3.32 0.03	2.53 0.19	1.67 0.44	1.23 0.79	0.97 1.24	0.79 1.82	0.65 2.5	0.39 5.4	0.26 8.7
	3/16	3.7	1.95 0.03	1.92 0.19	1.27 0.44	0.94 0.80	0.73 1.27	0.58 1.84	0.47 2.6	0.27 5.8	0.17 9.0

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

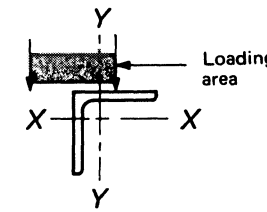
Safe Load Tables for Laterally Unsupported Angles
Normal-Strength Steel—36 ksi yield stress



EQUAL ANGLES

HIGH STRENGTH STEEL (52 ksi)

BASED ON AS CA1 1968



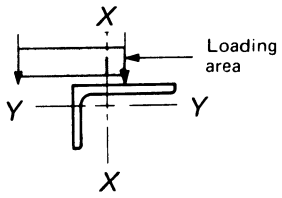
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
2½ x 2½	½	7.6	6.45 0.06	3.20 0.25	2.11 0.56	1.56 0.99	1.22 1.56	0.99 2.3	0.79 3.1	0.47 6.3	
	⅜	5.9	5.11 0.06	2.54 0.24	1.67 0.55	1.20 0.96	0.94 1.52	0.76 2.2	0.63 3.0	0.37 6.1	
	5/16	5.0	4.20 0.06	2.09 0.24	1.37 0.53	1.01 0.96	0.79 1.51	0.64 2.2	0.53 3.0	0.31 6.2	
	¼	4.0	3.22 0.05	1.73 0.23	1.14 0.53	0.83 0.95	0.66 1.50	0.53 2.2	0.43 3.0	0.24 6.4	
	3/16	3.1	1.91 0.04	1.32 0.23	0.86 0.53	0.64 0.94	0.49 1.49	0.40 2.2	0.32 3.0	0.19 6.5	
2¼ x 2¼	⅜	5.2	4.06 0.07	2.02 0.27	1.33 0.61	0.98 1.09	0.75 1.70	0.61 2.5	0.49 3.4	0.29 7.0	
	5/16	4.4	3.45 0.07	1.71 0.27	1.11 0.60	0.82 1.07	0.64 1.69	0.52 2.5	0.42 3.3	0.24 6.9	
	¼	3.6	2.81 0.07	1.38 0.26	0.91 0.59	0.67 1.07	0.52 1.66	0.42 2.4	0.34 3.3	0.20 6.9	
	3/16	2.7	1.88 0.06	1.06 0.26	0.70 0.59	0.51 1.06	0.40 1.67	0.32 2.4	0.26 3.3	0.14 7.1	
2 x 2	⅜	4.6	3.14 0.08	1.56 0.31	1.02 0.69	0.75 1.24	0.57 1.93	0.46 2.8	0.37 3.8	0.21 7.9	
	5/16	3.9	2.67 0.08	1.33 0.30	0.87 0.69	0.63 1.22	0.49 1.92	0.39 2.8	0.32 3.8	0.18 8.0	
	¼	3.2	2.19 0.07	1.09 0.30	0.71 0.67	0.52 1.21	0.41 1.90	0.32 2.8	0.26 3.8	0.15 8.1	
	3/16	2.4	1.69 0.07	0.84 0.29	0.54 0.67	0.40 1.19	0.31 1.90	0.25 2.8	0.20 3.8	0.11 8.1	
	⅛	1.7	0.86 0.05	0.56 0.29	0.37 0.67	0.26 1.22	0.20 2.0	0.16 2.9	0.13 4.0		

Deflection values to the right of the heavy line are greater than 1/180 of the span.

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) /MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
1¾ x 1¾	⅜	4.0	2.33 0.09	1.15 0.36	0.76 0.80	0.55 1.43	0.43 2.3	0.33 3.3	0.27 4.4	0.14 9.1	
	5/16	3.4	2.00 0.09	0.99 0.35	0.65 0.79	0.46 1.41	0.36 2.2	0.29 3.2	0.23 4.3	0.12 9.0	
	¼	2.7	1.68 0.09	0.83 0.35	0.53 0.77	0.39 1.39	0.30 2.2	0.24 3.1	0.19 4.3	0.10 9.2	
	3/16	2.1	1.29 0.08	0.64 0.34	0.41 0.77	0.30 1.37	0.23 2.2	0.18 3.2	0.15 4.4		
	⅛	1.5	0.85 0.08	0.43 0.33	0.28 0.77	0.20 1.37	0.15 2.3	0.12 3.3			
1½ x 1½	5/16	2.85	1.41 0.10	0.70 0.41	0.46 0.94	0.33 1.67	0.25 2.6	0.20 3.8	0.16 5.1		
	¼	2.35	1.20 0.10	0.59 0.41	0.38 0.92	0.28 1.64	0.21 2.6	0.17 3.7	0.13 5.1		
	3/16	1.8	0.92 0.10	0.46 0.40	0.30 0.91	0.22 1.62	0.17 2.6	0.13 3.8	0.10 5.2		
	⅛	1.2	0.63 0.10	0.31 0.39	0.20 0.91	0.14 1.63	0.11 2.6				
1¼ x 1¼	5/16	2.3	0.95 0.13	0.47 0.51	0.30 1.15	0.22 2.1	0.16 3.2	0.13 4.7	0.10 6.3		
	¼	1.9	0.80 0.12	0.40 0.50	0.26 1.12	0.18 2.0	0.14 3.2	0.11 4.5			
	3/16	1.45	0.62 0.12	0.30 0.48	0.20 1.10	0.14 2.0	0.11 3.1				
	⅛	1.0	0.44 0.12	0.22 0.48	0.14 1.10	0.10 2.0					
1 x 1	¼	1.5	0.49 0.16	0.24 0.64	0.15 1.44	0.11 2.6					
	3/16	1.15	0.39 0.15	0.19 0.62	0.12 1.40						
	⅛	0.8	0.27 0.15	0.13 0.60							

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

Safe Load Tables for Laterally Unsupported Angles
High-Strength Steel—52 ksi yield stress

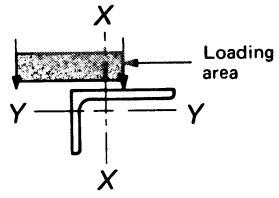


UNEQUAL ANGLES

Force parallel to SHORT leg

HIGH STRENGTH STEEL (52 ksi)

BASED ON AS CA1 1968



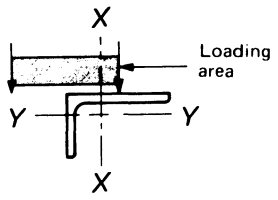
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
6 x 4	3/4	23.6	21.4 0.03	13.2 0.14	8.69 0.32	6.44 0.58	5.06 0.91	4.13 1.31	3.45 1.78	2.18 3.7	1.53 5.3
	5/8	19.9	15.6 0.03	11.3 0.14	7.45 0.32	5.52 0.58	4.35 0.90	3.55 1.31	2.97 1.78	1.87 3.7	1.32 5.8
	1/2	16.1	10.4 0.02	9.28 0.15	6.13 0.33	4.54 0.58	3.57 0.92	2.92 1.32	2.44 1.81	1.55 3.8	1.09 6.0
	7/16	14.2	8.17 0.02	8.17 0.15	5.45 0.33	4.04 0.59	3.18 0.93	2.60 1.35	2.17 1.85	1.38 3.9	0.98 6.2
	3/8	12.3	6.19 0.02	6.19 0.13	4.76 0.34	3.53 0.61	2.78 0.96	2.27 1.39	1.90 1.92	1.21 4.1	0.85 6.6
6 x 3 1/2	5/8	18.8	14.8 0.03	8.64 0.16	5.69 0.37	4.20 0.66	3.29 1.03	2.68 1.48	2.22 2.0	1.36 4.2	0.92 6.6
	1/2	15.3	9.73 0.03	7.15 0.16	4.72 0.37	3.49 0.66	2.73 1.04	2.22 1.51	1.85 2.1	1.14 4.3	0.77 6.8
	7/16	13.5	7.70 0.02	6.39 0.17	4.21 0.38	3.11 0.67	2.44 1.06	1.99 1.53	1.65 2.1	1.02 4.4	0.69 7.1
	3/8	11.6	5.73 0.02	5.52 0.17	3.64 0.39	2.69 0.69	2.11 1.09	1.72 1.58	1.43 2.2	0.88 4.6	0.60 7.4
	5/16	9.7	4.07 0.02	4.07 0.16	3.07 0.41	2.27 0.73	1.78 1.15	1.45 1.67	1.20 2.3	0.74 4.9	0.51 8.1
5 x 3 1/2	5/8	16.7	15.2 0.04	8.35 0.17	5.51 0.37	4.08 0.66	3.20 1.04	2.61 1.50	2.17 2.0	1.35 4.2	0.93 6.7
	1/2	13.6	10.4 0.03	6.95 0.17	4.59 0.37	3.39 0.66	2.67 1.04	2.17 1.51	1.81 2.1	1.13 4.3	0.78 6.9
	3/8	10.3	6.10 0.02	5.38 0.17	3.55 0.38	2.63 0.68	2.06 1.07	1.68 1.56	1.40 2.1	0.88 4.5	0.61 7.4
	5/16	8.7	4.38 0.02	4.38 0.16	3.02 0.39	2.24 0.71	1.76 1.11	1.43 1.62	1.20 2.2	0.75 4.8	0.52 7.9

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
5 x 3	1/2	12.7	9.44 0.05	5.10 0.19	3.36 0.43	2.47 0.77	1.93 1.21	1.56 1.74	1.29 2.4	0.77 5.0	0.50 7.9
	7/16	11.2	7.46 0.04	4.55 0.19	2.99 0.43	2.21 0.77	1.72 1.21	1.39 1.76	1.15 2.4	0.69 5.0	0.45 8.1
	3/8	9.7	5.66 0.04	3.98 0.20	2.62 0.44	1.93 0.79	1.51 1.24	1.22 1.79	1.01 2.5	0.61 5.2	0.40 8.4
	5/16	8.1	4.01 0.03	3.36 0.20	2.21 0.45	1.63 0.81	1.28 1.28	1.03 1.86	0.85 2.6	0.51 5.5	0.34 9.0
	1/4	6.6	2.72 0.02	2.72 0.21	1.82 0.48	1.34 0.86	1.05 1.36	0.85 2.0	0.71 2.8	0.43 6.1	0.28 10.2
4 x 3	5/8	13.6	12.3 0.05	6.10 0.20	4.02 0.44	2.97 0.79	2.32 1.24	1.88 1.78	1.56 2.4	0.95 5.0	0.63 8.0
	1/2	11.0	9.89 0.05	4.91 0.19	3.24 0.44	2.39 0.78	1.87 1.22	1.52 1.77	1.26 2.4	0.77 5.1	0.52 8.1
	3/8	8.4	6.07 0.04	3.84 0.20	2.53 0.44	1.87 0.79	1.47 1.24	1.19 1.80	0.99 2.5	0.61 5.2	0.41 8.5
	5/16	7.1	4.41 0.03	3.29 0.20	2.17 0.45	1.60 0.80	1.26 1.26	1.02 1.84	0.85 2.5	0.52 5.4	0.34 8.6
	1/4	5.8	2.95 0.03	2.70 0.20	1.78 0.46	1.32 0.83	1.03 1.32	0.84 1.93	0.70 2.7	0.41 5.6	0.27 9.3
3 1/2 x 3	1/2	10.2	9.78 0.05	4.86 0.20	3.21 0.45	2.37 0.79	1.86 1.25	1.51 1.80	1.26 2.5	0.78 5.1	0.53 8.2
	3/8	7.8	6.45 0.04	3.80 0.20	2.51 0.44	1.85 0.79	1.45 1.25	1.18 1.81	0.99 2.5	0.59 5.1	0.40 8.2
	5/16	6.5	4.56 0.04	3.21 0.20	2.12 0.45	1.57 0.80	1.23 1.26	1.00 1.84	0.81 2.5	0.50 5.2	0.33 8.5
	1/4	5.3	3.06 0.03	2.64 0.20	1.69 0.44	1.25 0.80	0.98 1.26	0.79 1.83	0.66 2.5	0.40 5.4	0.26 8.9

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

Safe Load Tables for Laterally Unsupported Angles
Normal-Strength Steel—36 ksi yield stress



UNEQUAL ANGLES

Force parallel to SHORT leg

HIGH STRENGTH STEEL (52 ksi)

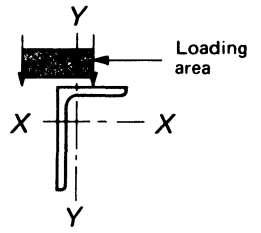
BASED ON AS CA1 1968

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
3½ x 2½	½	9.4	6.73 0.06	3.33 0.23	2.19 0.53	1.61 0.94	1.25 1.47	1.00 2.1	0.83 2.9	0.49 6.1	0.30 9.7
	⅜	7.1	5.25 0.06	2.60 0.23	1.71 0.52	1.26 0.94	0.98 1.47	0.79 2.1	0.65 2.9	0.38 6.2	0.24 10.1
	5/16	6.0	4.14 0.06	2.23 0.23	1.47 0.53	1.08 0.95	0.84 1.49	0.68 2.2	0.56 3.0	0.33 6.4	0.21 10.6
	¼	4.8	2.73 0.05	1.82 0.24	1.20 0.55	0.88 0.98	0.69 1.56	0.56 2.3	0.46 3.2	0.26 6.7	0.16 11.2
	3/16	3.7	1.66 0.03	1.43 0.25	0.94 0.58	0.69 1.05	0.54 1.68	0.44 2.5	0.35 3.4	0.20 7.5	0.12 12.9
3 x 2½	½	8.5	6.58 0.06	3.26 0.24	2.15 0.54	1.58 0.96	1.23 1.51	1.00 2.2	0.82 3.0	0.49 6.2	0.32 9.9
	⅜	6.5	5.17 0.06	2.57 0.24	1.69 0.53	1.25 0.95	0.97 1.50	0.79 2.2	0.65 3.0	0.39 6.3	0.24 9.9
	5/16	5.5	4.43 0.06	2.20 0.24	1.45 0.53	1.07 0.95	0.84 1.51	0.68 2.2	0.56 3.0	0.32 6.3	0.21 10.2
	¼	4.4	2.90 0.05	1.79 0.24	1.18 0.54	0.87 0.97	0.68 1.54	0.53 2.2	0.44 3.0	0.26 6.5	0.16 10.8
	3/16	3.4	1.76 0.04	1.36 0.24	0.90 0.54	0.66 0.99	0.51 1.56	0.41 2.3	0.34 3.2	0.20 7.1	0.12 11.7
3 x 2	½	7.7	4.13 0.07	2.04 0.29	1.33 0.66	0.97 1.19	0.75 1.86	0.60 2.7	0.48 3.7	0.26 7.7	0.14 12.2
	⅜	5.9	3.30 0.07	1.63 0.29	1.07 0.66	0.78 1.17	0.60 1.83	0.48 2.7	0.39 3.7	0.21 7.7	0.12 12.4
	5/16	5.0	2.84 0.07	1.40 0.29	0.92 0.65	0.67 1.17	0.52 1.85	0.42 2.7	0.34 3.7	0.18 7.9	0.10 13.0
	¼	4.0	2.32 0.07	1.15 0.29	0.75 0.66	0.55 1.19	0.42 1.89	0.34 2.8	0.27 3.8	0.15 8.4	
	3/16	3.1	1.55 0.07	0.90 0.31	0.59 0.70	0.43 1.26	0.33 2.02	0.27 3.0	0.22 4.2	0.12 9.3	
2½ x 2	⅜	5.2	3.16 0.07	1.57 0.30	1.03 0.67	0.75 1.19	0.58 1.87	0.47 2.7	0.38 3.7	0.21 7.9	0.12 12.9
	5/16	4.4	2.72 0.07	1.35 0.29	0.88 0.67	0.65 1.19	0.50 1.88	0.40 2.7	0.33 3.8	0.19 8.1	0.10 12.9
	¼	3.6	2.26 0.07	1.12 0.29	0.73 0.67	0.54 1.20	0.42 1.90	0.34 2.8	0.27 3.9	0.15 8.3	
	3/16	2.7	1.57 0.07	0.85 0.30	0.56 0.69	0.40 1.23	0.31 1.96	0.25 2.9	0.20 4.0	0.11 9.1	

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

HIGH STRENGTH STEEL(52 ksi)

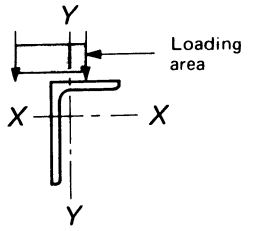
BASED ON AS CA1 1968



NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
6 x 4	¾	23.6	33.3 0.02	27.3 0.10	18.1 0.23	13.5 0.42	10.7 0.66	8.84 0.95	7.49 1.29	5.00 2.7	3.71 4.3
	⅝	19.9	24.0 0.02	23.1 0.10	15.3 0.23	11.4 0.41	9.07 0.65	7.49 0.94	6.34 1.29	4.19 2.7	3.12 4.4
	½	16.1	16.0 0.01	16.0 0.09	12.4 0.23	9.26 0.41	7.35 0.65	6.06 0.95	5.14 1.32	3.35 2.7	2.40 4.4
	7/16	14.2	12.5 0.01	12.5 0.08	10.9 0.23	8.14 0.42	6.46 0.66	5.34 0.97	4.38 1.32	2.82 2.8	2.09 4.7
	⅜	12.3	9.43 0.01	9.43 0.07	9.42 0.23	7.02 0.42	5.41 0.65	4.44 0.97	3.32 1.31	2.37 2.9	1.71 4.8
6 x 3½	⅝	18.8	26.4 0.02	22.6 0.10	15.0 0.23	11.1 0.42	8.89 0.66	7.34 0.97	6.19 1.34	3.97 2.8	2.99 4.6
	½	15.3	17.2 0.01	17.2 0.09	12.1 0.23	8.96 0.42	7.11 0.66	5.87 0.97	4.98 1.35	3.14 2.8	2.28 4.6
	7/16	13.5	13.6 0.01	13.6 0.08	10.6 0.23	7.90 0.42	6.27 0.67	5.17 0.99	4.24 1.34	2.71 2.9	1.93 5.1
	⅜	11.6	10.1 0.01	10.1 0.07	9.03 0.24	6.73 0.43	5.34 0.69	4.26 0.99	3.55 1.38	2.21 3.1	1.54 5.2
	5/16	9.7	7.10 0.01	7.10 0.07	7.10 0.23	5.40 0.43	4.23 0.69	3.42 1.03	2.82 1.47	1.69 3.3	1.14 5.2
5 x 3½	⅝	16.7	22.4 0.02	15.8 0.12	10.5 0.28	7.80 0.50	6.16 0.79	5.06 1.12	4.27 1.54	2.79 3.2	2.07 5.2
	½	13.6	15.1 0.02	13.0 0.12	8.57 0.28	6.36 0.50	5.03 0.77	4.17 1.11	3.48 1.53	2.28 3.3	1.63 5.2
	⅜	10.3	8.86 0.01	8.86 0.11	6.46 0.28	4.79 0.49	3.78 0.77	3.09 1.13	2.60 1.57	1.64 3.3	1.16 5.5
	5/16	8.7	6.35 0.01	6.35 0.09	5.39 0.28	3.97 0.49	3.13 0.79	2.57 1.16	2.17 1.63	1.32 3.6	0.91 5.8

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

Safe Load Tables for Laterally Unsupported Angles
Normal-Strength Steel—36 ksi yield stress

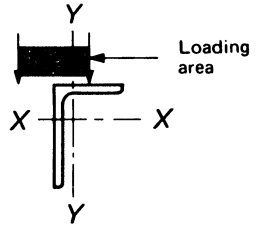


UNEQUAL ANGLES

Force parallel to LONG leg

HIGH STRENGTH STEEL (52 ksi)

BASED ON AS CA1 1968



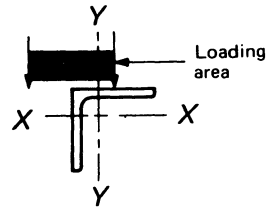
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
5 x 3	$\frac{1}{2}$	12.7	16.3 0.02	12.6 0.12	8.31 0.28	6.16 0.51	4.87 0.79	3.98 1.15	3.34 1.59	2.17 3.5	1.53 5.6
	$\frac{7}{16}$	11.2	12.8 0.02	11.1 0.12	7.33 0.28	5.44 0.51	4.29 0.79	3.50 1.16	2.93 1.61	1.86 3.5	1.31 5.8
	$\frac{3}{8}$	9.7	9.68 0.02	9.54 0.12	6.30 0.28	4.66 0.51	3.66 0.80	2.98 1.19	2.48 1.68	1.54 3.7	1.07 6.1
	$\frac{5}{16}$	8.1	6.83 0.01	6.83 0.11	5.20 0.28	3.82 0.51	2.99 0.82	2.41 1.20	2.04 1.74	1.20 3.9	0.80 6.2
	$\frac{1}{4}$	6.6	4.62 0.01	4.62 0.10	4.14 0.29	3.01 0.52	2.34 0.86	1.87 1.32	1.52 1.88	0.86 4.0	0.55 6.4
4 x 3	$\frac{5}{8}$	13.6	16.1 0.04	10.6 0.16	7.04 0.36	5.09 0.63	4.01 0.99	3.29 1.43	2.76 1.95	1.76 4.0	1.27 6.4
	$\frac{1}{2}$	11.0	13.8 0.03	8.20 0.15	5.41 0.35	4.02 0.62	3.16 0.98	2.59 1.39	2.17 1.93	1.38 4.0	0.99 6.6
	$\frac{3}{8}$	8.4	8.23 0.03	6.29 0.15	4.14 0.34	3.08 0.62	2.42 0.96	1.97 1.40	1.65 1.93	1.04 4.2	0.73 6.7
	$\frac{5}{16}$	7.1	5.96 0.02	5.29 0.15	3.50 0.34	2.59 0.61	2.03 0.97	1.65 1.41	1.37 1.94	0.85 4.2	0.58 7.0
	$\frac{1}{4}$	5.8	3.98 0.02	3.98 0.14	2.81 0.34	2.07 0.62	1.62 0.93	1.31 1.44	1.08 2.0	0.64 4.5	0.42 7.0
3½ x 3	$\frac{1}{2}$	10.2	12.7 0.04	6.50 0.18	4.30 0.40	3.11 0.70	2.45 1.09	1.99 1.59	1.67 2.2	1.05 4.4	0.74 7.1
	$\frac{3}{8}$	7.8	7.59 0.03	4.88 0.17	3.23 0.39	2.40 0.69	1.88 1.09	1.54 1.56	1.28 2.2	0.80 4.5	0.56 7.4
	$\frac{5}{16}$	6.5	5.37 0.03	4.09 0.17	2.70 0.38	2.00 0.69	1.57 1.07	1.27 1.56	1.06 2.2	0.66 4.6	0.45 7.4
	$\frac{1}{4}$	5.3	3.60 0.02	3.32 0.17	2.20 0.38	1.61 0.69	1.26 1.08	1.02 1.59	0.85 2.2	0.51 4.8	0.34 7.6

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
3½ x 2½	$\frac{1}{2}$	9.4	12.7 0.04	6.17 0.18	4.06 0.40	3.01 0.72	2.38 1.14	1.93 1.64	1.61 2.3	1.02 4.7	0.71 7.6
	$\frac{3}{8}$	7.1	8.17 0.03	4.73 0.18	3.10 0.40	2.30 0.71	1.80 1.11	1.46 1.64	1.22 2.2	0.75 4.8	0.51 7.9
	$\frac{5}{16}$	6.0	5.90 0.03	3.97 0.18	2.62 0.39	1.93 0.71	1.51 1.12	1.22 1.63	1.01 2.3	0.61 5.0	0.41 8.0
	$\frac{1}{4}$	4.8	3.89 0.02	3.19 0.17	2.08 0.40	1.53 0.71	1.19 1.14	0.96 1.69	0.79 2.4	0.46 5.3	0.29 8.2
	$\frac{3}{16}$	3.7	2.35 0.02	2.35 0.17	1.56 0.40	1.14 0.74	0.89 1.22	0.70 1.86	0.57 2.6	0.30 5.2	0.17 8.2
3 x 2½	$\frac{1}{2}$	8.5	9.33 0.05	4.64 0.21	3.06 0.47	2.27 0.84	1.74 1.31	1.42 1.90	1.17 2.6	0.73 5.3	0.50 8.4
	$\frac{3}{8}$	6.5	7.09 0.05	3.53 0.20	2.33 0.46	1.71 0.82	1.34 1.29	1.09 1.86	0.91 2.6	0.56 5.4	0.37 8.6
	$\frac{5}{16}$	5.5	5.38 0.04	3.00 0.20	1.98 0.45	1.45 0.82	1.14 1.27	0.92 1.86	0.76 2.5	0.47 5.4	0.31 8.9
	$\frac{1}{4}$	4.4	3.51 0.04	2.41 0.20	1.57 0.45	1.17 0.82	0.90 1.28	0.73 1.86	0.60 2.6	0.36 5.6	0.23 9.1
	$\frac{3}{16}$	3.4	2.13 0.03	1.83 0.20	1.21 0.46	0.88 0.82	0.68 1.33	0.55 1.93	0.45 2.7	0.25 5.8	0.15 9.1
3 x 2	$\frac{1}{2}$	7.7	8.98 0.05	4.47 0.22	2.87 0.48	2.12 0.86	1.67 1.35	1.35 1.94	1.13 2.7	0.70 5.7	0.47 9.2
	$\frac{3}{8}$	5.9	6.84 0.05	3.40 0.21	2.22 0.47	1.65 0.84	1.28 1.35	1.04 1.95	0.86 2.7	0.52 5.8	0.34 9.8
	$\frac{5}{16}$	5.0	5.83 0.05	2.90 0.21	1.89 0.47	1.40 0.84	1.08 1.33	0.87 1.95	0.72 2.7	0.43 6.1	0.27 10.1
	$\frac{1}{4}$	4.0	3.90 0.04	2.28 0.21	1.51 0.47	1.10 0.85	0.85 1.36	0.68 2.0	0.55 2.9	0.31 6.3	0.18 10.0
	$\frac{3}{16}$	3.1	2.37 0.03	1.75 0.21	1.13 0.48	0.82 0.88	0.63 1.46	0.50 2.2	0.40 3.2	0.20 6.5	0.11 10.2
2½ x 2	$\frac{3}{8}$	5.2	4.83 0.06	2.40 0.25	1.54 0.56	1.14 1.00	0.89 1.57	0.71 2.3	0.59 3.1	0.35 6.6	0.23 10.8
	$\frac{5}{16}$	4.4	4.01 0.06	1.99 0.24	1.31 0.56	0.97 0.99	0.75 1.57	0.61 2.3	0.50 3.2	0.29 6.6	0.18 10.9
	$\frac{1}{4}$	3.6	3.28 0.06	1.63 0.24	1.08 0.55	0.79 0.99	0.61 1.56	0.50 2.3	0.40 3.2	0.23 7.1	0.14 11.0
	$\frac{3}{16}$	2.7	1.98 0.05	1.22 0.24	0.80 0.56	0.59 1.00	0.45 1.64	0.36 2.5	0.29 3.3	0.15 7.0	

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

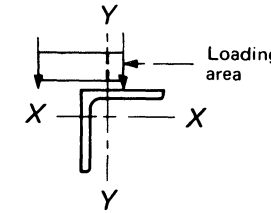
Safe Load Tables for Laterally Unsupported Angles
Normal-Strength Steel—36 ksi yield stress



EQUAL ANGLES

NORMAL STRENGTH STEEL (36 ksi)

BASED ON AS CA1 1968



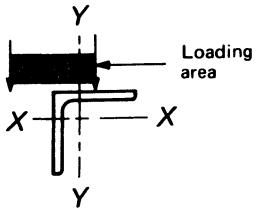
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
8 x 8	1	51.0	34.1 0.00	34.1 0.03	32.9 0.12	24.5 0.20	19.4 0.32	16.0 0.46	13.5 0.63	8.93 1.30	6.69 2.0
	7/8	45.0	26.9 0.00	26.9 0.03	26.9 0.11	21.8 0.20	17.3 0.32	14.2 0.46	12.0 0.63	7.95 1.29	5.95 2.0
	3/4	38.9	20.3 0.00	20.3 0.03	20.3 0.10	19.0 0.20	15.0 0.32	12.4 0.46	10.5 0.63	6.94 1.29	5.05 1.99
	5/8	32.7	14.5 0.00	14.5 0.02	14.5 0.08	14.5 0.19	12.4 0.31	10.2 0.45	8.61 0.61	5.69 1.26	4.26 1.98
	1/2	26.6	9.57 0.00	9.57 0.02	9.57 0.06	9.57 0.15	9.57 0.30	8.22 0.45	6.95 0.61	4.60 1.27	3.44 2.0
6 x 6	1	37.5	31.7 0.01	26.6 0.07	17.6 0.16	13.1 0.28	10.3 0.44	8.47 0.63	7.12 0.86	4.60 1.76	3.35 2.8
	7/8	33.1	25.2 0.01	23.8 0.07	15.8 0.16	11.7 0.28	9.25 0.43	7.59 0.62	6.38 0.85	4.13 1.74	3.00 2.7
	3/4	28.7	19.2 0.01	19.2 0.06	13.8 0.15	10.3 0.28	8.11 0.43	6.65 0.62	5.60 0.85	3.62 1.73	2.64 2.7
	5/8	24.2	13.8 0.01	13.8 0.05	11.8 0.15	8.75 0.27	6.91 0.43	5.67 0.62	4.77 0.84	3.09 1.73	2.14 2.7
	9/16	21.9	11.4 0.01	11.4 0.05	10.8 0.15	7.83 0.27	6.35 0.42	5.00 0.60	4.23 0.83	2.88 1.72	1.98 2.7
	1/2	19.5	9.20 0.01	9.20 0.05	9.20 0.15	6.92 0.27	5.46 0.42	4.48 0.60	3.77 0.82	2.44 1.70	1.74 2.7
	7/16	17.2	7.08 0.01	7.08 0.04	7.08 0.13	6.05 0.27	4.78 0.42	3.92 0.60	3.29 0.82	2.13 1.70	1.51 2.7
	3/8	14.8	5.38 0.01	5.38 0.04	5.38 0.11	5.25 0.26	4.15 0.42	3.40 0.60	2.86 0.82	1.85 1.71	1.31 2.6
5 x 5	3/4	23.6	18.4 0.01	14.1 0.08	9.32 0.19	6.91 0.33	5.44 0.52	4.45 0.75	3.72 1.02	2.37 2.1	1.68 3.3
	5/8	19.9	13.3 0.01	12.1 0.08	7.98 0.19	5.91 0.33	4.66 0.52	3.81 0.75	3.19 1.02	2.03 2.1	1.45 3.3
	1/2	16.1	8.92 0.01	8.92 0.07	6.56 0.18	4.86 0.33	3.83 0.51	3.13 0.74	2.63 1.01	1.63 2.1	1.16 3.2
	3/8	12.3	5.26 0.01	5.26 0.06	4.89 0.18	3.62 0.32	2.86 0.50	2.33 0.72	1.96 1.00	1.24 2.1	0.87 3.3
	5/16	10.4	3.75 0.01	3.75 0.05	3.75 0.16	3.05 0.32	2.40 0.50	1.96 0.73	1.64 1.00	1.04 2.1	0.71 3.2

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
4 x 4	5/8	15.7	12.6 0.03	7.45 0.10	4.91 0.24	3.63 0.42	2.85 0.65	2.31 0.94	1.93 1.29	1.19 2.6	0.81 4.2
	1/2	12.7	8.53 0.02	6.17 0.10	4.07 0.23	3.01 0.41	2.36 0.65	1.92 0.93	1.60 1.27	0.99 2.6	0.64 4.1
	3/8	9.7	5.08 0.02	4.78 0.10	3.16 0.23	2.33 0.41	1.83 0.64	1.46 0.91	1.21 1.25	0.75 2.6	0.49 4.1
	5/16	8.1	3.53 0.01	3.53 0.09	2.56 0.22	1.89 0.40	1.48 0.63	1.21 0.91	1.00 1.25	0.62 2.6	0.41 4.2
	1/4	6.6	2.39 0.01	2.39 0.07	2.11 0.22	1.56 0.40	1.22 0.63	0.99 0.92	0.83 1.26	0.49 2.6	0.33 4.1
3½ x 3½	5/8	13.5	11.2 0.03	5.56 0.12	3.66 0.27	2.70 0.48	2.11 0.76	1.71 1.09	1.42 1.48	0.85 3.1	0.56 4.8
	1/2	11.0	8.26 0.03	4.63 0.12	3.04 0.27	2.25 0.48	1.76 0.74	1.42 1.07	1.18 1.47	0.71 3.0	0.47 4.8
	3/8	8.4	4.95 0.02	3.61 0.12	2.38 0.26	1.75 0.47	1.37 0.74	1.11 1.07	0.92 1.46	0.54 3.0	0.35 4.7
	5/16	7.1	3.46 0.02	3.02 0.12	1.99 0.26	1.41 0.46	1.10 0.72	0.89 1.05	0.74 1.44	0.45 2.9	0.29 4.8
	1/4	5.7	2.35 0.01	2.39 0.12	1.57 0.26	1.15 0.46	0.90 0.72	0.73 1.05	0.61 1.44	0.37 3.0	0.24 4.8
3 x 3	5/8	11.4	7.96 0.04	3.95 0.14	2.59 0.32	1.91 0.57	1.48 0.89	1.19 1.29	0.98 1.76	0.57 3.6	0.35 5.7
	1/2	9.3	6.67 0.04	3.31 0.14	2.17 0.32	1.60 0.56	1.24 0.88	1.00 1.27	0.82 1.73	0.48 3.6	0.30 5.6
	3/8	7.1	4.80 0.03	2.59 0.14	1.71 0.31	1.25 0.55	0.98 0.87	0.79 1.25	0.65 1.71	0.36 3.5	0.23 5.5
	5/16	6.0	3.41 0.02	2.18 0.14	1.44 0.31	1.06 0.55	0.82 0.86	0.66 1.24	0.54 1.70	0.30 3.5	0.19 5.5
	1/4	4.8	2.30 0.02	1.74 0.13	1.14 0.30	0.84 0.54	0.65 0.85	0.52 1.23	0.43 1.69	0.25 3.5	0.15 5.6
	3/16	3.7	1.35 0.02	1.32 0.13	0.87 0.30	0.64 0.54	0.49 0.85	0.40 1.21	0.32 1.66	0.18 3.7	0.11 5.9

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

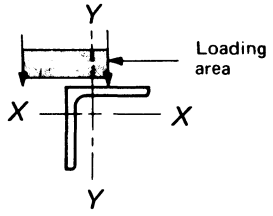
Safe Load Tables for Laterally Unsupported Angles
High-Strength Steel—52 ksi yield stress



EQUAL ANGLES

NORMAL STRENGTH STEEL (36 ksi)

BASED ON AS CA1 1968



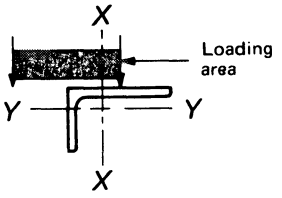
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
2½ x 2½	½	7.6	4.46 0.04	2.20 0.17	1.44 0.38	1.06 0.68	0.82 1.07	0.65 1.54	0.53 2.1	0.29 4.3	0.17 6.9
	⅜	5.9	3.54 0.04	1.75 0.17	1.15 0.38	0.84 0.67	0.65 1.05	0.52 1.52	0.42 2.1	0.23 4.3	0.13 6.8
	5/16	5.0	2.99 0.04	1.48 0.17	0.97 0.37	0.71 0.66	0.55 1.04	0.44 1.51	0.36 2.1	0.19 4.2	0.11 6.7
	¼	4.0	2.42 0.04	1.19 0.17	0.78 0.36	0.56 0.65	0.44 1.03	0.35 1.49	0.28 2.0	0.14 4.3	
	3/16	3.1	1.32 0.04	0.91 0.16	0.60 0.36	0.43 0.65	0.34 1.03	0.27 1.46	0.22 2.0	0.12 4.4	
2½ x 2¼	⅜	5.2	2.81 0.05	1.39 0.19	0.91 0.42	0.66 0.75	0.51 1.17	0.41 1.70	0.33 2.3	0.18 4.8	
	5/16	4.4	2.38 0.05	1.18 0.18	0.77 0.42	0.56 0.74	0.43 1.16	0.35 1.69	0.28 2.3	0.14 4.8	
	¼	3.6	1.99 0.05	0.98 0.18	0.64 0.41	0.47 0.74	0.36 1.16	0.28 1.66	0.22 2.3	0.12 4.7	
	3/16	2.7	1.28 0.03	0.74 0.18	0.48 0.40	0.35 0.72	0.27 1.15	0.21 1.64	0.17 2.3		
2 x 2	⅜	4.6	2.17 0.05	1.07 0.21	0.70 0.48	0.51 0.85	0.39 1.33	0.31 1.93	0.25 2.6	0.13 5.5	
	5/16	3.9	2.85 0.05	0.91 0.21	0.60 0.47	0.42 0.84	0.33 1.32	0.26 1.91	0.21 2.6	0.10 5.4	
	¼	3.2	1.55 0.05	0.76 0.21	0.50 0.47	0.36 0.83	0.28 1.31	0.22 1.90	0.17 2.6		
	3/16	2.4	1.20 0.05	0.59 0.21	0.37 0.46	0.27 0.82	0.21 1.30	0.16 1.86	0.13 2.6		
	⅛	1.7	0.59 0.04	0.40 0.20	0.25 0.46	0.18 0.81	0.14 1.29	0.11 1.90			

Deflection values to the right of the heavy line are greater than 1/180 of the span.

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
1¾ x 1¾	⅜	4.0	1.61 0.06	0.79 0.25	0.52 0.55	0.37 0.99	0.28 1.55	0.22 2.2	0.18 3.1		
	5/16	3.4	1.38 0.06	0.68 0.24	0.44 0.54	0.32 0.97	0.24 1.52	0.19 2.2	0.15 3.0		
	¼	2.7	1.16 0.06	0.57 0.24	0.37 0.54	0.27 0.96	0.21 1.51	0.16 2.2	0.12 3.0		
	3/16	2.1	0.91 0.06	0.44 0.24	0.29 0.53	0.21 0.94	0.16 1.49	0.12 2.2			
	⅛	1.5	0.59 0.06	0.30 0.23	0.19 0.52	0.14 0.94	0.11 1.50				
1½ x 1½	5/16	2.85	0.98 0.07	0.48 0.29	0.31 0.64	0.22 1.15	0.17 1.80	0.13 2.6	0.10 3.6		
	¼	2.35	0.83 0.07	0.41 0.28	0.26 0.63	0.19 1.13	0.14 1.80	0.11 2.6			
	3/16	1.8	0.65 0.07	0.32 0.28	0.21 0.63	0.15 1.12	0.11 1.75				
	⅛	1.2	0.44 0.07	0.22 0.27	0.14 0.62	0.10 1.10					
1¼ x 1¼	5/16	2.3	0.66 0.09	0.32 0.35	0.21 0.79	0.15 1.41	0.11 2.2				
	¼	1.9	0.56 0.09	0.27 0.34	0.18 0.77	0.12 1.38					
	3/16	1.45	0.43 0.08	0.21 0.33	0.14 0.76						
	⅛	1.0	0.31 0.08	0.15 0.33							
1 x 1	¼	1.5	0.34 0.11	0.16 0.44	0.10 0.99						
	3/16	1.15	0.27 0.11	0.13 0.43							
	⅛	0.8	0.19 0.10								

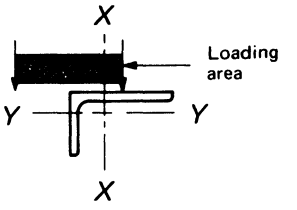
The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

Safe Load Tables for Laterally Unsupported Angles
High-Strength Steel—52 ksi yield stress



UNEQUAL ANGLES

Force parallel to SHORT leg



NORMAL STRENGTH STEEL (36 ksi)

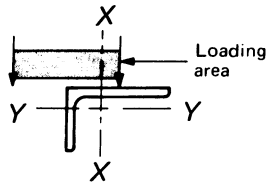
BASED ON AS CA1 1968

NOMINAL SIZE	THICK-NESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
6 x 4	3/4	23.6	14.8 0.02	9.05 0.10	5.95 0.22	4.38 0.39	3.42 0.61	2.77 0.88	2.28 1.20	1.36 2.4	0.87 3.8
	5/8	19.9	10.8 0.01	7.74 0.10	5.10 0.21	3.75 0.38	2.93 0.59	2.37 0.86	1.96 1.17	1.17 2.4	0.76 3.8
	1/2	16.1	7.21 0.01	6.41 0.10	4.22 0.21	3.11 0.38	2.43 0.59	1.96 0.86	1.62 1.17	0.97 2.4	0.63 3.8
	7/16	14.2	5.66 0.01	5.66 0.10	3.75 0.21	2.76 0.38	2.16 0.60	1.75 0.86	1.44 1.17	0.87 2.4	0.57 3.8
	3/8	12.3	4.28 0.01	4.28 0.10	3.27 0.21	2.41 0.38	1.89 0.60	1.53 0.86	1.26 1.17	0.76 2.4	0.50 3.9
6 x 3½	5/8	18.8	10.2 0.03	5.94 0.11	3.90 0.24	2.86 0.43	2.21 0.67	1.77 0.97	1.45 1.32	0.82 2.7	0.49 4.3
	1/2	15.3	6.74 0.02	4.93 0.11	3.23 0.25	2.37 0.44	1.84 0.69	1.48 0.99	1.21 1.35	0.69 2.8	0.42 4.3
	7/16	13.5	5.33 0.02	4.41 0.10	2.89 0.24	2.12 0.43	1.65 0.68	1.32 0.98	1.08 1.33	0.62 2.7	0.38 4.3
	3/8	11.6	3.97 0.02	3.82 0.10	2.51 0.24	1.84 0.42	1.43 0.66	1.15 0.95	0.94 1.30	0.54 2.7	0.33 4.3
	5/16	9.7	2.81 0.01	2.81 0.10	2.12 0.24	1.56 0.43	1.21 0.67	0.97 0.96	0.80 1.31	0.46 2.7	0.28 4.5
5 x 3½	5/8	16.7	10.5 0.03	5.76 0.11	3.78 0.25	2.78 0.45	2.16 0.70	1.74 1.01	1.43 1.38	0.83 2.8	0.52 4.4
	1/2	13.6	7.17 0.02	4.79 0.11	3.15 0.25	2.32 0.45	1.80 0.70	1.45 1.01	1.20 1.38	0.69 2.8	0.43 4.4
	3/8	10.3	4.22 0.02	3.71 0.11	2.44 0.25	1.79 0.44	1.40 0.67	1.13 1.00	0.92 1.34	0.54 2.8	0.34 4.5
	5/16	8.7	3.03 0.01	3.03 0.11	2.05 0.24	1.51 0.43	1.18 0.67	0.95 0.97	0.78 1.34	0.46 2.8	0.29 4.6
5 x 3	1/2	12.7	6.53 0.03	3.50 0.12	2.29 0.28	1.67 0.50	1.29 0.78	1.03 1.13	0.84 1.55	0.46 3.2	0.25 5.1
	7/16	11.2	5.16 0.02	3.13 0.12	2.05 0.28	1.50 0.50	1.16 0.78	0.92 1.12	0.75 1.53	0.41 3.2	0.23 5.1
	3/8	9.7	3.92 0.02	2.75 0.12	1.80 0.28	1.32 0.50	1.02 0.77	0.81 1.12	0.66 1.53	0.36 3.2	0.20 5.1
	5/16	8.1	2.78 0.02	2.32 0.12	1.52 0.28	1.11 0.50	0.86 0.78	0.69 1.12	0.56 1.53	0.31 3.2	0.17 5.2
	1/4	6.6	1.89 0.01	1.89 0.12	1.26 0.27	0.92 0.49	0.71 0.77	0.57 1.12	0.46 1.54	0.26 3.3	0.14 5.4
4 x 3	5/8	13.6	8.50 0.03	4.21 0.13	2.76 0.31	2.02 0.55	1.57 0.86	1.25 1.23	1.02 1.68	0.57 3.4	0.33 5.4
	1/2	11.0	6.82 0.03	3.38 0.13	2.20 0.29	1.62 0.52	1.26 0.82	1.01 1.18	0.82 1.61	0.46 3.3	0.27 5.3
	3/8	8.4	4.20 0.02	2.62 0.13	1.73 0.29	1.27 0.51	0.98 0.81	0.79 1.16	0.64 1.59	0.37 3.3	0.22 5.3
	5/16	7.1	3.05 0.02	2.26 0.13	1.48 0.29	1.09 0.51	0.84 0.80	0.68 1.16	0.55 1.59	0.32 3.3	0.19 5.4
	1/4	5.8	3.76 0.03	1.86 0.13	1.22 0.29	0.90 0.52	0.70 0.81	0.56 1.18	0.46 1.60	0.26 3.4	0.15 5.6
3½ x 3	1/2	10.2	6.85 0.03	3.40 0.14	2.23 0.31	1.64 0.55	1.27 0.86	1.02 1.28	0.84 1.68	0.48 3.4	0.29 5.4
	3/8	7.8	5.33 0.03	2.64 0.13	1.74 0.30	1.27 0.54	0.99 0.84	0.80 1.21	0.66 1.64	0.38 3.4	0.23 5.4
	5/16	6.5	4.52 0.03	2.24 0.13	1.47 0.30	1.08 0.54	0.84 0.84	0.68 1.21	0.57 1.66	0.31 3.3	0.19 5.3
	1/4	5.3	3.70 0.03	1.83 0.13	1.20 0.30	0.89 0.53	0.67 0.84	0.55 1.21	0.44 1.61	0.26 3.3	0.15 5.2

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

Safe Load Tables for Laterally Unsupported Angles
High-Strength Steel—52 ksi yield stress

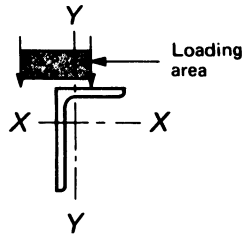


UNEQUAL ANGLES

Force parallel to LONG leg

NORMAL STRENGTH STEEL (36 ksi)

BASED ON AS CA1 1968



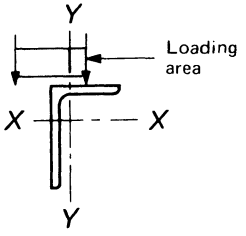
NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
3½ x 2½	½	9.4	4.81 0.04	2.38 0.16	1.55 0.37	1.13 0.66	0.87 1.02	0.66 1.42	0.53 1.93	0.28 4.0	0.14 6.2
	⅜	7.1	3.71 0.04	1.84 0.16	1.20 0.36	0.88 0.63	0.67 0.99	0.54 1.42	0.43 1.94	0.23 4.0	0.12 6.3
	5/16	6.0	2.87 0.04	1.56 0.16	1.02 0.35	0.75 0.62	0.57 0.97	0.46 1.41	0.37 1.92	0.20 3.9	0.10 6.2
	¼	4.8	1.89 0.03	1.29 0.16	0.84 0.35	0.59 0.60	0.46 0.95	0.36 1.37	0.29 1.87	0.16 3.9	
	3/16	3.7	1.15 0.02	0.97 0.15	0.63 0.34	0.46 0.60	0.36 0.94	0.28 1.36	0.23 1.87	0.12 3.9	
3 x 2½	½	8.5	4.60 0.04	2.28 0.17	1.49 0.37	1.09 0.66	0.84 1.04	0.67 1.50	0.54 2.0	0.29 4.2	0.16 6.6
	⅜	6.5	3.61 0.04	1.79 0.16	1.17 0.36	0.85 0.65	0.66 1.01	0.53 1.46	0.43 2.0	0.23 4.1	0.13 6.5
	5/16	5.5	3.07 0.04	1.54 0.16	1.01 0.36	0.74 0.64	0.57 1.00	0.46 1.46	0.37 2.0	0.20 4.0	0.11 6.3
	¼	4.4	2.01 0.03	1.25 0.16	0.82 0.36	0.60 0.63	0.46 1.00	0.37 1.47	0.30 2.0	0.15 4.1	
	3/16	3.4	1.22 0.03	0.95 0.15	0.62 0.35	0.45 0.62	0.35 0.97	0.28 1.41	0.24 2.0	0.12 4.2	
3 x 2	½	7.7	2.88 0.05	1.42 0.20	0.92 0.46	0.66 0.81	0.50 1.27	0.39 1.83	0.30 2.5	0.14 5.1	
	⅜	5.9	2.35 0.05	1.16 0.20	0.75 0.45	0.52 0.77	0.39 1.21	0.31 1.74	0.24 2.4	0.11 5.0	
	5/16	5.0	1.99 0.05	0.98 0.20	0.64 0.44	0.46 0.78	0.35 1.21	0.27 1.75	0.22 2.4	0.10 4.9	
	¼	4.0	1.63 0.05	0.81 0.20	0.52 0.43	0.38 0.77	0.29 1.20	0.23 1.70	0.18 2.4		
	3/16	3.1	1.08 0.04	0.75 0.20	0.41 0.43	0.30 0.76	0.23 1.20	0.18 1.73	0.14 2.4		
2½ x 2	⅜	5.2	2.24 0.05	1.10 0.20	0.72 0.46	0.52 0.83	0.40 1.29	0.31 1.87	0.25 2.5	0.11 5.1	
	5/16	4.4	1.86 0.05	0.92 0.20	0.60 0.44	0.43 0.79	0.33 1.23	0.26 1.80	0.20 2.4	0.10 5.2	
	¼	3.6	1.57 0.05	0.77 0.20	0.50 0.44	0.37 0.80	0.28 1.23	0.22 1.79	0.18 2.4		
	3/16	2.7	1.08 0.05	0.58 0.19	0.38 0.43	0.28 0.80	0.21 1.22	0.17 1.78	0.13 2.4		

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
6 x 4	¾	23.6	23.0 0.01	19.2 0.07	12.7 0.16	9.23 0.28	7.30 0.44	6.00 0.64	5.05 0.88	3.30 1.81	2.43 2.8
	⅝	19.9	16.6 0.01	16.1 0.07	10.7 0.16	7.94 0.28	6.28 0.44	5.16 0.64	4.35 0.88	2.84 1.83	2.03 2.9
	½	16.1	11.0 0.01	11.0 0.06	8.68 0.16	6.46 0.28	5.11 0.44	4.20 0.64	3.54 0.88	2.23 1.81	1.64 2.9
	7/16	14.2	8.65 0.02	8.65 0.05	7.57 0.16	5.63 0.28	4.45 0.44	3.66 0.64	3.08 0.88	2.01 1.87	1.42 3.0
	⅜	12.3	6.53 0.01	6.53 0.04	6.46 0.16	4.80 0.28	3.80 0.44	3.12 0.64	2.63 0.88	1.72 1.82	1.20 3.0
6 x 3½	⅝	18.8	18.2 0.01	15.9 0.07	10.5 0.16	7.83 0.29	6.20 0.46	5.09 0.66	4.30 0.91	2.71 1.87	2.00 2.9
	½	15.3	11.9 0.01	11.9 0.07	8.40 0.16	6.25 0.29	4.95 0.45	4.07 0.66	3.43 0.91	2.24 1.90	1.58 3.1
	7/16	13.5	9.38 0.01	9.38 0.06	7.42 0.16	5.52 0.28	4.32 0.45	3.55 0.65	2.99 0.91	1.96 1.93	1.36 3.0
	⅜	11.6	6.96 0.01	6.96 0.05	6.31 0.16	4.70 0.29	3.71 0.45	3.05 0.67	2.57 0.92	1.63 1.92	1.16 3.2
	5/16	9.7	4.92 0.01	4.92 0.04	4.92 0.15	3.92 0.29	3.10 0.47	2.45 0.67	2.04 0.92	1.31 2.1	0.88 3.5
5 x 3½	⅝	16.7	15.5 0.01	11.2 0.09	7.38 0.19	5.48 0.34	4.32 0.54	3.54 0.78	2.97 1.07	1.91 2.2	1.32 3.5
	½	13.6	10.5 0.01	9.16 0.09	6.06 0.19	4.50 0.34	3.55 0.54	2.91 0.78	2.44 1.06	1.57 2.2	1.07 3.5
	⅜	10.3	6.13 0.01	6.13 0.07	4.51 0.19	3.34 0.34	2.64 0.53	2.16 0.77	1.81 1.05	1.17 2.3	0.79 3.5
	5/16	8.7	4.39 0.01	4.39 0.06	3.80 0.19	2.77 0.34	2.19 0.54	1.79 0.77	1.50 1.06	0.90 2.2	0.66 3.7

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

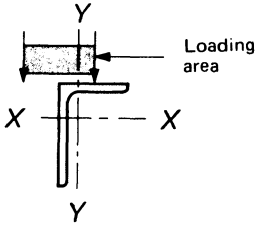
The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1

Safe Load Tables for Laterally Unsupported Angles
High-Strength Steel—52 ksi yield stress



UNEQUAL ANGLES

Force parallel to LONG leg



NORMAL STRENGTH STEEL (36 ksi)

BASED ON AS CA1 1968

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
5 x 3	$\frac{1}{2}$	12.7	11.3 0.01	8.78 0.09	5.81 0.19	4.32 0.34	3.41 0.54	2.79 0.79	2.35 1.08	1.51 2.3	1.05 3.7
	$\frac{7}{16}$	11.2	8.87 0.01	7.79 0.09	5.16 0.19	3.83 0.35	3.02 0.54	2.48 0.79	2.08 1.09	1.29 2.3	0.92 3.7
	$\frac{3}{8}$	9.7	6.70 0.01	5.75 0.09	4.47 0.19	3.32 0.35	2.62 0.55	2.15 0.81	1.77 1.09	1.12 2.4	0.77 3.8
	$\frac{5}{16}$	8.1	4.73 0.01	4.73 0.07	3.64 0.19	2.80 0.35	2.13 0.55	1.75 0.81	1.47 1.13	0.90 2.4	0.55 4.0
	$\frac{1}{4}$	6.6	3.20 0.01	3.20 0.06	2.93 0.19	2.15 0.35	1.68 0.55	1.37 0.82	1.15 1.16	0.67 2.5	0.44 4.2
4 x 3	$\frac{5}{8}$	13.6	14.7 0.03	7.31 0.11	4.83 0.24	3.57 0.44	2.81 0.68	2.29 0.99	1.91 1.35	1.19 2.8	0.83 4.4
	$\frac{1}{2}$	11.0	9.57 0.02	5.86 0.11	3.87 0.24	2.86 0.43	2.22 0.67	1.81 0.97	1.51 1.33	0.94 2.8	0.64 4.4
	$\frac{3}{8}$	8.4	5.70 0.02	4.44 0.11	2.93 0.23	2.17 0.42	1.71 0.67	1.39 0.97	1.16 1.33	0.70 2.8	0.47 4.3
	$\frac{5}{16}$	7.1	4.13 0.02	3.74 0.10	2.47 0.24	1.83 0.42	1.44 0.67	1.17 0.97	0.97 1.32	0.60 2.8	0.40 4.5
	$\frac{1}{4}$	5.8	2.75 0.01	2.75 0.09	2.00 0.24	1.49 0.43	1.14 0.66	0.93 0.97	0.77 1.35	0.48 3.0	0.29 4.6
$3\frac{1}{2}$ x 3	$\frac{1}{2}$	10.2	9.12 0.03	4.53 0.12	2.99 0.28	2.20 0.49	1.67 0.76	1.35 1.10	1.12 1.50	0.67 3.1	0.44 4.7
	$\frac{3}{8}$	7.8	5.26 0.03	3.38 0.12	2.23 0.26	1.64 0.47	1.29 0.74	1.04 1.06	0.87 1.45	0.53 3.0	0.33 4.9
	$\frac{5}{16}$	6.5	3.71 0.02	2.88 0.12	1.90 0.27	1.40 0.47	1.07 0.75	0.87 1.08	0.72 1.46	0.44 3.1	0.29 5.0
	$\frac{1}{4}$	5.3	2.49 0.02	2.39 0.12	1.57 0.27	1.17 0.48	0.88 0.74	0.72 1.08	0.59 1.49	0.33 3.2	0.20 5.0

Deflection values to the right of the heavy line are greater than 1/180 of the span.
Load values to the left of the broken line are based on shear capacity, and are less than the permissible flexural load.

NOMINAL SIZE	THICKNESS t NOMINAL	WEIGHT PER FOOT	SAFE DISTRIBUTED LOADS (KIPS) / MAX DEFLECTION (in) SPANS IN FEET								
in	in	lb	2	4	6	8	10	12	14	20	25
$3\frac{1}{2}$ x $2\frac{1}{2}$	$\frac{1}{2}$	9.4	8.66 0.03	4.30 0.12	2.84 0.28	2.10 0.49	1.64 0.77	1.34 1.12	1.11 1.53	0.68 3.2	0.42 5.0
	$\frac{3}{8}$	7.1	5.66 0.03	3.33 0.12	2.19 0.27	1.62 0.49	1.27 0.77	1.01 1.11	0.84 1.52	0.51 3.2	0.33 5.1
	$\frac{5}{16}$	6.0	4.09 0.02	2.85 0.12	1.88 0.28	1.35 0.48	1.05 0.77	0.85 1.12	0.71 1.53	0.42 3.3	0.28 5.3
	$\frac{1}{4}$	4.8	2.69 0.02	2.28 0.12	1.44 0.27	1.06 0.48	0.78 0.77	0.65 1.15	0.56 1.56	0.33 3.4	0.20 5.5
	$\frac{3}{16}$	3.7	1.63 0.01	1.63 0.12	1.11 0.27	0.81 0.48	0.63 0.77	0.50 1.17	0.41 1.61	0.23 3.5	0.13 5.6
3 x $2\frac{1}{2}$	$\frac{1}{2}$	8.5	6.40 0.04	3.18 0.15	2.09 0.32	1.54 0.57	1.20 0.90	0.97 1.31	0.80 1.77	0.47 3.7	0.30 5.8
	$\frac{3}{8}$	6.5	5.03 0.04	2.50 0.14	1.64 0.32	1.21 0.57	0.94 0.90	0.76 1.29	0.61 1.75	0.36 3.6	0.23 5.8
	$\frac{5}{16}$	5.5	3.72 0.03	2.12 0.14	1.40 0.32	1.03 0.56	0.80 0.89	0.62 1.27	0.52 1.75	0.30 3.6	0.19 5.9
	$\frac{1}{4}$	4.4	2.43 0.03	1.66 0.14	1.10 0.31	0.81 0.56	0.63 0.88	0.51 1.28	0.42 1.80	0.24 3.7	0.15 6.0
	$\frac{3}{16}$	3.4	1.47 0.02	1.31 0.14	0.86 0.31	0.62 0.56	0.50 0.88	0.39 1.30	0.32 1.80	0.18 3.7	0.10 6.3
3 x 2	$\frac{1}{2}$	7.7	6.18 0.04	3.06 0.15	2.02 0.33	1.49 0.59	1.16 0.93	0.94 1.35	0.78 1.84	0.44 3.8	0.28 6.1
	$\frac{3}{8}$	5.9	4.80 0.04	2.38 0.14	1.57 0.33	1.16 0.58	0.90 0.92	0.73 1.34	0.60 1.83	0.34 3.9	0.22 6.3
	$\frac{5}{16}$	5.0	4.14 0.04	2.06 0.15	1.28 0.33	0.88 0.60	0.65 1.00	0.55 1.35	0.49 1.84	0.29 4.0	0.18 6.5
	$\frac{1}{4}$	4.0	2.70 0.03	1.63 0.14	1.04 0.32	0.79 0.59	0.60 0.92	0.48 1.36	0.39 1.87	0.22 4.1	0.13 6.6
	$\frac{3}{16}$	3.1	1.64 0.04	1.21 0.14	0.80 0.32	0.59 0.59	0.46 0.95	0.36 1.38	0.30 1.96	0.16 4.3	
$2\frac{1}{2}$ x 2	$\frac{3}{8}$	5.2	3.31 0.04	1.64 0.17	1.08 0.38	0.79 0.69	0.61 1.08	0.49 1.57	0.40 2.2	0.20 4.3	0.11 7.2
	$\frac{5}{16}$	4.4	2.82 0.04	1.40 0.17	0.88 0.38	0.67 0.68	0.52 1.08	0.42 1.56	0.33 2.2	0.17 4.4	0.10 7.1
	$\frac{1}{4}$	3.6	2.34 0.04	1.16 0.17	0.76 0.38	0.53 0.68	0.43 1.10	0.35 1.60	0.26 2.2	0.15 4.4	
	$\frac{3}{16}$	2.7	1.37 0.03	0.84 0.17	0.55 0.38	0.40 0.67	0.31 1.07	0.25 1.55	0.20 2.2	0.10 4.7	

The tables are calculated for loads applied anywhere within half a leg length on either side of the shear centre—see fig. 1.

Safe Load Tables for Laterally Unsupported Angles

High-Strength Steel—52 ksi yield stress