Dynaform® Fiberglass Structural Shapes

Design Guide

Corrosion Resistant

Fire Retardant

Low Maintenance

Light Weight

Long Service Life

Fibergrate
Composite Structures

High Performance Composite Solutions

QUALITY ISO 9001-2000 CERTIFIED

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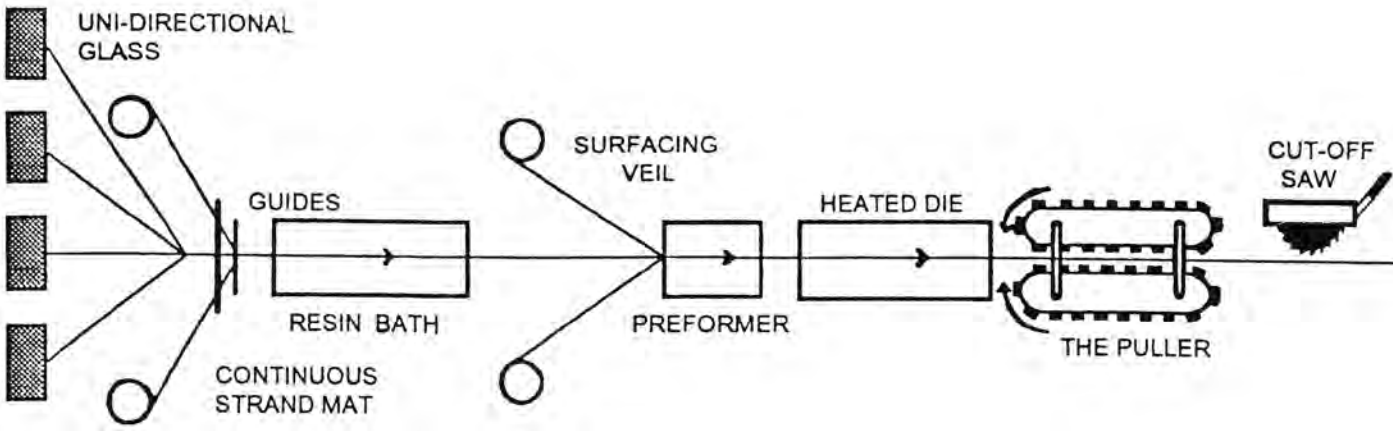
Pultrusion Process



Pultrusion is a continuous process of raw materials, typically resin and reinforcing materials, forming profiles of constant cross section in continuous length.

Pultrusion gets its name from the method by which the profiles are made. Raw materials are literally pulled by what we call "the puller." "The puller" is the machine made up of pulling pads, which grip the product, and a drive system which keeps the product moving. "The puller" is located just before the final cut-off saw.

The process starts with the reinforcements. Typically, unidirectional glass roving is the fiber that runs along the length of the profile. Second, the fiberglass mat is added in, which is multidirectional reinforcement. Third is the resin, typically polyester or vinylester. The glass is "wet-out" with the liquid resin and pulled into a heated die. Just before all the material enters the die, surface veil may be added which enhances the final product's surface.

Now that all the reinforcements have been "wet-out" and pulled into a heated die, the curing takes place. All the resins used in the pultrusion process have a catalyst or hardener added when the resin is mixed. This catalyst activated at about 200°F. Consequently, as the "wet-out" reinforcement pass through the heated die, the product changes from liquid to a solid profile with all the reinforcement laminated within.

The product exiting the die is pulled by "the puller", which upon exiting can be cut to the desired length.

Standard Resin Systems for Structural Shapes

STANDARD POLYESTER (ISO *or* PN) RESIN SYSTEM

The STANDARD POLYESTER RESIN SYSTEM refers to a NON FLAME RETARDANT isophthalic polyester resin system. This resin system is manufactured in olive green and incorporates ultraviolet inhibitors. Polyester resins exhibit good corrosion resistance, good electrical properties, low thermal conductivity and excellent mechanical properties.

FLAME RETARDANT POLYESTER (ISOFR *or* PF) RESIN SYSTEM

This resin system exhibits the same characteristics as the Standard Polyester resin system PLUS a flame spread rating of 25 or less when tested in accordance with ASTM E-84. The FLAME RETARDANT resin system is manufactured in gray and yellow.

FLAME RETARDANT VINYL ESTER (VEFR *or* VF) RESIN SYSTEM

This resin system is manufactured from vinyl ester resin which exhibits higher strength, improved strength and stiffness retention at elevated temperatures, and improved corrosion resistance. This system also meets a maximum flame spread rating of 25 and is produced in beige and yellow.

ELEVATED TEMPERATURE EFFECTS

The approximate retention of mechanical properties at elevated temperatures are:

	TEMPERATURE	ISO*(PN)*/ISOFR*(PF)*	VEFR*(VF)*
Ultimate Stress	100˚ F	85%	90%
	125˚ F	70%	80%
	150˚ F	50%	80%
	175˚ F	Not Recommended	75%
	200˚ F	Not Recommended	50%
Modulus of Elasticity	100˚ F	100%	100%
	125˚ F	90%	95%
	150˚ F	85%	90%
	175˚ F	Not Recommended	88%
	200˚ F	Not Recommended	85%

Chemical Resistance Guide - Structural Shapes

The data in this chemical resistance guide is based on field service performance, laboratory testing and extrapolated values from our resin manufacturers' recommendation. Data shown is intended as a guide only. It is recommended that for a specific application, testing be done in the actual chemical environment.

The following conditions will effect the suitability of a specific resin laminate:

- Periodic changes in temperature
- Temperature spikes
- Changes in chemical concentrations
- Combinations of chemicals
- Exposure to vapors only
- Exposure to frequent splashes and spills
- Exposure to intermittent splashes and spills
- Frequency of maintenance wash down
- Load bearing or non-load bearing requirements

Chemical Environment	Maximum Recommended Service Temperatures, °F		Chemical Environment	Maximum Recommended Service Temperatures, °F	
	VEFR	ISO/ISOFR		VEFR	ISO/ISOFR
Acetic Acid, to 10%	170	80	Butyl Acetate	NR	NR
Acetic Acid, to 50%	180	NR	Butyl Alcohol	80	NR
Acetic Acid, Glacial	NR	NR	Calcium Carbonate	170	120
Acetone	NR	NR	Calcium Hydroxide	140	120
Aluminum Chloride	170	120	Calcium Hypochlorite	120	NR
Aluminum Hydroxide	140	120	Calcium Nitrate	170	120
Aluminum Nitrate	140	120	Calcium Sulfate	170	120
Aluminum Sulfate	170	120	Carbon Disulfide	NR	NR
Ammonium Chloride	170	120	Carbon Monoxide Gas	170	160
Ammonium Hydroxide, 5%	140	NR	Carbon Dioxide Gas	170	160
Ammonium Nitrate, to 50%	170	120	Carbon Tetrachloride		
Ammonium Nitrate, Saturated	170	NR	Liquid or Vapor	110	NR
Ammonium Persulfate, to 25%	140	90	Chlorine, Dry Gas	170	NR
Ammonium Phosphate	170	120	Chlorine, Wet Gas	170	NR
Ammonium Sulfate	170	120	Chlorine Water	140	NR
Amyl Alcohol	80	NR	Chloroform	NR	NR
Barium Carbonate	170	120	Chromic Acid, to 5%	110	NR
Barium Chloride	170	120	Chromous Sulfate	140	120
Barium Sulfate	170	120	Citric Acid	170	120
Benzene	NR	NR	Copper Chloride	170	170
Benzene Sulfonic Acid 50%	110	NR	Copper Cyanide	170	170
Benzoic Acid	170	120	Copper Nitrate	170	170
Benzyl Alcohol	NR	NR	Crude Oil, Sour	170	170
Borax	170	120	Cyclohexane, Liquid and Vapor	170	NR
Brine (Sodium Chloride Sol.)	170	120	Diesel Fuel	140	90
Bromine, Liquid or Vapor	NR	NR	Ethyl Acetate	NR	NR
Ethyl Alcohol	NR	NR	Phosphoric Acid, Vapor	170	120
Ethylene Glycol	170	120	Potassium Aluminum Sulfate	170	120
Fatty Acids	170	80	Potassium Bicarbonate	110	100
Ferric Chloride	170	100	Potassium Carbonate, to 10%	110	NR
Ferric Sulfate	170	110	Potassium Chloride	170	120
Formaldehyde	110	NR	Potassium Hydroxide	140	NR
Fuel Oil	140	80	Potassium Nitrate	170	120
Gasoline, Aviation and Ethyl	140	80	Potassium Sulfate	170	120

Chemical Resistance Guide - Structural Shapes

Chemical Environment	Maximum Recommended Service Temperatures, °F		Chemical Environment	Maximum Recommended Service Temperatures, °F	
	VEFR	ISO/ISOFR		VEFR	ISO/ISOFR
Glucose	170	100	Propylene Glycol	170	120
Glycerine	170	100	Sodium Acetate	170	120
Hexane	120	90	Sodium Benzoate	140	120
Hydraulic Fluid (Glycol Based)	140	NR	Sodium Bicarbonate	140	120
Hydraulic Fluid Skydraul	140	NR	Sodium Bisulfate	170	120
Hydrobromic Acid	110	NR	Sodium Bisulfite	170	120
Hydrochloric Acid, up to 15%	140	80	Sodium Borate	170	120
Hydrochloric Acid, Concentrated	110	NR	Sodium Bromide	170	120
Hydrogen Bromide, Dry Gas	140	80	Sodium Carbonate, to 10%	140	70
Hydrogen Bromine, Wet Gas	140	NR	Sodium Chloride	170	120
Hydrogen Chloride, Dry Gas	170	80	Sodium Cyanide	170	120
Hydrogen Chloride, Wet Gas	170	80	Sodium Dichromate	170	120
Hydrogen Flouride, Sol or Vapor	140	NR	Sodium Diphosphate	170	120
Hydrogen Peroxide, to 10%	110	NR	Sodium Hydroxide, 10%	140	NR
Hydrogen Sulfide, Dry Gas	140	80	Sodium Hypochlorite, to 5-1/4%	110	70
Hydrogen Sulfide, Wet Gas	140	80	Sodium Monophosphate	170	120
Isopropyl Alcohol	80	NR	Sodium Nitrate	170	120
JP-4	140	80	Sodium Nitrite	170	120
Kerosene	140	110	Sodium Sulfate	170	120
Lactic Acid	170	120	Sodium Tetraborate	140	120
Lead Acetate	170	120	Sodium Thiosulfate	140	120
Linseed Oil	170	100	Soy Oil	170	100
Lithium Chloride	170	120	Stearic Acid	170	120
Magnesium Carbonate	170	120	Styrene	NR	NR
Magnesium Chloride	170	120	Sulfamic Acid	170	120
Magnesium Hydroxide	170	100	Sulfated Detergents	NR	120
Magnesium Nitrate	170	120	Sulfite Liquor	160	100
Magnesium Sulfate	170	120	Sulfur Dioxide, gas-dry	170	120
Mercuric Chloride	170	120	Sulfur Dioxide, gas-wet	170	70
Mercury Metal	170	120	Sulfur Trioxide, gas-wet or dry	170	NR
Methyl Ethyl Ketone	NR	NR	Sulfuric Acid, to 25%	170	80
Mineral Oil	170	120	Tartaric Acid	170	120
Monochlorobenzene	NR	NR	Tetrachloroethylene	NR	NR
Naphtha	140	120	Toluene	NR	NR
Nickel Chloride	170	120	Trichloroethylene vapor	NR	NR
Nitric Acid, to 5%	110	100	Trisodium Phosphate	170	NR
Nitric Acid, Concentrated	NR	NR	Urea, 35%	110	NR
Nitric Acid, Vapor	140	100	Vinegar	170	150
Oleic Acid	170	120	Water, Distilled	180	150
Oxalic Acid	170	120	Water, Tap	180	120
Paper Mill Liquor	100	100	Zinc Chloride	170	120
Phenol Solution or Vapor	NR	NR	Zinc Nitrate	170	120
Phosphoric Acid	170	100	Zinc Sulfate	170	120
Phosphoric Acid, Salts thereof	170	120			

Chemical Resistance Guide - Vinyl Ester Threaded Rods

SOLUTION	MAXIMUM RECOMMENDED TEMPERATURE F°/C°
H_2SO_4 - 25 %	210/99
HCI - 20%	210/99
HNO_3 - Gas	100/38
Acetic Acid - 25%	210/99
Phosphoric Acid - 100%	210/99
NaOH - 50%	180/82
Sodium Carbonate - 35%	180/82
NaCl - Saturated	180/82
Ethanol - 10%	120/49
Sodium Hypochlorate - 10%	120/49
All AIK $(SO_4)_2$	210/99
Perochloroethylene - 100%	80/27
n-Heptane - 100%	210/99
Kerosene - 100%	180/82
Toluene - 100%	80/27
H_2O_2 - 30%	150/65
Distilled Water	180/82

NOTE: Threads of threaded rods are cut into specially manufactured pultruded rods. Therefore, after installation of threaded rods and fiberglass nuts in a corrosive environment, the threads are to be sealed with a vinyl ester resin.

Coupon Properties - Structural Shapes

The values listed below are test results from coupon tests performed in accordance with the noted ASTM Test.

MECHANICAL PROPERTIES	ASTM	UNITS	VALUE
Tensile Stress, LW	D-638	psi	30,000
Tensile Stress, CW	D-638	psi	7,000
Tensile Modulus, LW	D-638	10^6 psi	2.5
Tensile Modulus, CW	D-638	10^6 psi	0.8
Compressive Stress, LW	D-695	psi	30,000
Compressive Stress, CW	D-695	psi	15,000
Compressive Modulus, LW	D-695	10^6 psi	2.5
Compressive Modulus, CW	D-695	10^6 psi	1.0
Flexural Stress, LW	D-790	psi	30,000
Flexural Stress, CW	D-790	psi	10,000
Flexural Modulus, LW	D-790	10^6 psi	1.8
Flexural Modulus, CW	D-790	10^6 psi	0.8
Modulus of Elasticity, E	Full Section	10^6 psi	2.8
Shear Modulus	---	10^6 psi	0.450
Short Beam Shear	D-2344	psi	4,500
Punch Shear	D-732	psi	10,000
Bearing Stress, LW	D-953	psi	30,000
Notched Izod Impact, LW	D-256	ft-lbs/in	25
Notched Izod Impact, CW	D-256	ft-lbs/in	4

PHYSICAL PROPERTIES	ASTM	UNITS	VALUE
Barcol Hardness	D-2583	---	45
24 Hour Water Absorption	D-570	% max	0.45
Density	D-792	lbs/in^3	.062-.070
Coefficient of Thermal Expansion, LW	D-696	10^{-6} in/in/°C	8

ELECTRICAL PROPERTIES	ASTM	UNITS	VALUE
Arc Resistance, LW	D-495	seconds	120
Dielectric Strength, LW	D-149	kv/in	35
Dielectric Strength, PF	D-149	volts/mil	200
Dielectric Constant, PF	D-150	@60hz	5

ISOFR and VEFR Fire Retardant Structural Profiles:

FLAMMABILITY PROPERTIES	ASTM	UNITS	VALUE
Tunnel Test	E-84	Flame Spread	25 max
Flammability	D-635	---	Nonburning

LW = Lengthwise CW = Crosswise PF = Perpendicular to Laminate Face

Coupon Properties - Pultruded Flat Sheets

Below are the test results for typical coupon properties of ISO, ISOFR and VEFR Flat Sheet. Properties are derived per the ASTM test method shown. Synthetic surfacing veil and ultraviolet inhibitors are standard.

MECHANICAL PROPERTIES	ASTM	UNITS	THICKNESS					
			ISO & ISOFR			VEFR		
			1/8"	3/16"-1/4"	3/8"-1"	1/8"	3/16"-1/4"	3/8"-1"
Tensile Stress, LW	D-638	psi	24,000	24,000	24,000	24,000	24,000	24,000
Tensile Stress, CW	D-638	psi	7,500	10,000	10,000	7,500	10,000	10,000
Tensile Modulus, LW	D-638	10^6 psi	2.0	2.0	2.0	2.0	2.0	2.0
Tensile Modulus, CW	D-638	10^6 psi	1.0	1.1	1.4	1.0	1.1	1.4
Compressive Stress, LW	D-695	psi	24,000	24,000	24,000	24,000	24,000	24,000
Compressive Stress, CW	D-695	psi	15,500	16,500	16,500	16,500	17,500	17,500
Compressive Modulus, LW	D-695	10^6 psi	1.8	1.8	1.8	1.8	1.8	1.8
Compressive Modulus, CW	D-695	10^6 psi	1.0	1.0	1.0	1.0	1.0	1.0
Flexural Stress, LW	D-790	psi	35,000	35,000	30,000	35,000	35,000	30,000
Flexural Stress, CW	D-790	psi	15,000	15,000	18,000	15,000	15,000	18,000
Flexural Modulus, LW	D-790	10^6 psi	1.6	2.0	2.0	1.6	2.0	2.0
Flexural Modulus, CW	D-790	10^6 psi	0.9	1.1	1.4	0.9	1.1	1.4
Perpendicular Shear Stress, LW	D-3846	psi	6,000	6,000	6,000	6,000	6,000	6,000
Perpendicular Shear Stress, CW	D-3846	psi	6,000	6,000	6,000	6,000	6,000	6,000
Bearing Stress, LW	D-953	psi	32,000	32,000	32,000	32,000	32,000	32,000
Notched Izod Impact, LW	D-256	ft-lbs/in	18.5	20	20	18.5	20	20
Notched Izod Impact, CW	D-256	ft-lbs/in	5	5	5	5	5	5

PHYSICAL PROPERTIES	ASTM	UNITS	1/8"	3/16"-1/4"	3/8"-1"	1/8"	3/16"-1/4"	3/8"-1"
Barcol Hardness	D-2583	----	40	40	40	40	40	40
24 Hour Water Absorption	D-570	% max	0.6	0.6	0.6	0.6	0.6	0.6
Density	D-792	lbs./in.^{3}	.062-.070	.062-.070	.062-.070	.062-.070	.062-.070	.062-.070
Coefficient Thermal Expansion, LW	D-696	10^{-6} in/in/°F	8	8	8	8	8	8

ELECTRICAL PROPERTIES	ASTM	UNITS	1/8"	3/16"-1/4"	3/8"-1"	1/8"	3/16"-1/4"	3/8"-1"
Arc Resistance, LW	D-495	seconds	120	120	120	120	120	120
Dielectric Strength, LW	D-149	kv./in.	35	35	35	35	35	35
Dielectric Strength, PF	D-149	volts/mil.	200			200		

FLAMMABILITY PROPERTIES FOR ISOFR & VEFR FLAT SHEET		
Tunnel Test	E-84	Flame Spread 25 max.
Flammability	D-635	Nonburning
UL	94	VO
NBS Smoke Chamber	E-662	Smoke Density 600-700

LW = Lengthwise CW = Crosswise PF = Perpendicular to Laminate Face

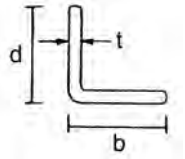
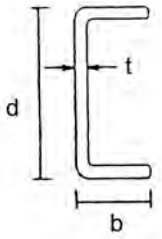
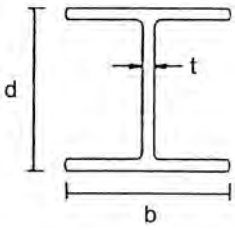
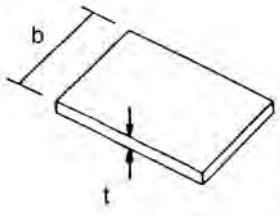
Coupon Properties - Threaded Rods and Nuts

Threaded rod and nuts are manufactured using premium vinyl ester resin containing UV inhibitors. The properties listed below are the result of the ASTM test method indicated.

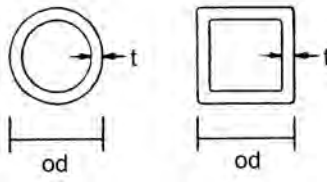
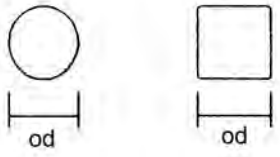
PROPERTIES	ASTM	UNITS	VALUE Diameter- Threads per Inch (UNC)				
			3/8-16	1/2-13	5/8-11	3/4-10	1-8
Ultimate Transverse Shear (Double Shear)	B-565	lb	4,200	6,800	10,000	13,400	24,000
Longitudinal Compressive Strength	D-695	psi	50,000	50,000	50,000	50,000	50,000
Flexural Strength	D-790	psi	70,000	70,000	70,000	70,000	70,000
Flexural Modulus	D-790	10^6 psi	2.5	2.5	2.5	2.5	2.5 psi
Flammability	D-635		Self-extinguishing for all				
Fire Retardant	E-84		Class 1	Class 1	Class 1	Class 1	Class 1
Water Absorption 24 hr. Immersion	D-570	% max	0.8	0.8	0.8	0.8	0.8
Longitudinal Coefficient of Thermal Expansion	D-696	10^{-6} in/in/°F	6	6	6	6	6
Ultimate Thread Shear using fiberglass nut	----	lb	1,200	2,400	3,600	4,000	8,200
Ultimate Torque Strength fiberglass nut lubricated with SAE 10W30 motor oil	----	ft-lb	12	18	35	75	110
Rod Weight	----	lb/ft	.07	.08	.20	.30	.53
Nut Weight	----	lb	.01	.02	.04	.06	.14
Nut Dimensions	----	in (sq) x in (thick)	.68 x.45	.86 x.56	1.06 x.69	1.24 x.82	1.63 x1.1
Color			Gray	Gray	Gray	Gray	Gray

NOTE: Threads of threaded rods are cut into specifically manufactured pultruded rods. Therefore, after installation of threaded rods and fiberglass nuts in a corrosive environment, the threads are to be sealed with a vinyl ester resin.

Cross Sectional Tolerances

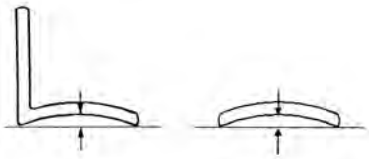
SHAPE	DIMENSION	TOLERANCE	MAXIMUM OR MINIMUM TOLERANCES
ANGLES 	t = thickness	± 10%	± 0.010" minimum
	b = flange width	± 5%	± 0.094" maximum
	d = depth	± 5%	± 0.094" maximum
CHANNELS 	t = thickness	± 10%	± 0.010" minimum
	b = flange width	± 5%	± 0.094" maximum
	d = depth	± 5%	± 0.094" maximum
WIDE FLANGE, I SHAPES 	t = thickness	± 10%	± 0.010" minimum
	b = flange width	± 5%	± 0.094" maximum
	d = depth	± 5%	± 0.094" maximum
FLAT SHEET 	t = thickness	± 10%	± 0.040" maximum
	b = width	± 3%	± 0.094" maximum 0.187" minimum

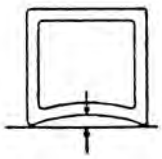
Cross Sectional Tolerances

SHAPE	DIMENSION	OUTSIDE DIMENSION CONDITION	TOLERANCES
ROUND & SQUARE TUBE 	t = thickness	Under 1"	± 20%
		1" and up	± 15 %
	od = outside dimension	Under 2"	± 0.020"
		2" and up	± 0.040"
ROUND ROD & SQUARE BAR 	od = outside dimension	Up to 3"	± 0.010"

FLATNESS

Flatness is measured in the center with the weight of the profile minimizing the deviation by contact with a flat surface.

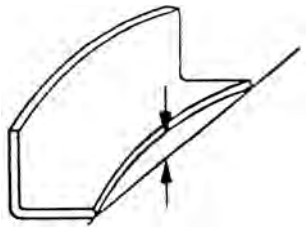
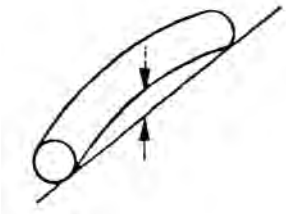
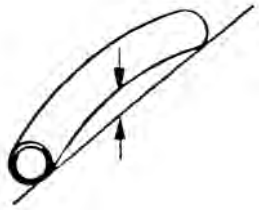
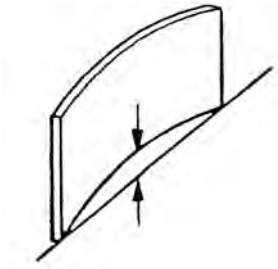
STRUCTURAL SHAPES RODS, BARS, & SHEET 	**Allowable deviation from flat**	
	Width	**All Thicknesses**
	Up to 1"	0.008"
	Over 1"	0.008"/inch

HOLLOW SHAPES 	**Allowable deviation from flat**		
	Width	**Thickness 0.125" to 0.188"**	**Thickness 0.189" and over**
	Up to 1"	0.012"	0.008"
	Over 1"	0.012"/inch	0.008"/inch

Cross Sectional Tolerances

STRAIGHTNESS

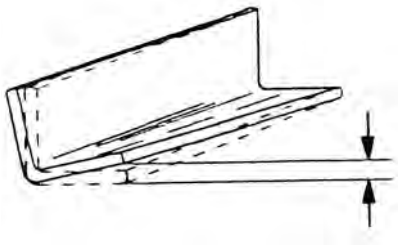
Straightness is measured in the center with the weight of the pultrusion minimizing the deviation by contact with a flat surface.

<table>
<tr><td rowspan="2">ANGLE, BEAM AND CHANNEL
  </td><td colspan="2">Allowable deviation from straight</td></tr>
<tr><td>All widths</td><td>0.050"/foot</td></tr>
<tr><td rowspan="4">RODS AND BARS
  </td><td colspan="2">Allowable deviation from straight</td></tr>
<tr><td>Diameter/Depth</td><td>Per Foot</td></tr>
<tr><td>Up to 1"</td><td>0.020"</td></tr>
<tr><td>Over 1"</td><td>0.040"</td></tr>
<tr><td rowspan="4">ROUND, SQUARE, AND RECTANGULAR TUBE
  </td><td colspan="2">Allowable deviation from straight</td></tr>
<tr><td>Diameter/Depth</td><td>Per Foot</td></tr>
<tr><td>Up to 2"</td><td>0.020"</td></tr>
<tr><td>Over 2"</td><td>0.030"</td></tr>
<tr><td rowspan="2">SHEET AND PLATE
  </td><td colspan="2">Allowable deviation from straight</td></tr>
<tr><td>All thicknesses and widths</td><td>0.025"/foot</td></tr>
</table>

Cross Sectional Tolerances

TWIST

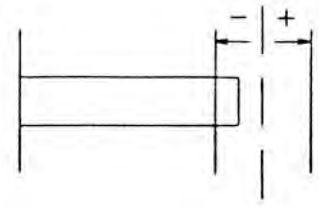
Twist is measured with the weight of the pultrusion minimizing the twist.

ALL PROFILES	Allowable twist		
	**Width/Depth**	**Per Foot**	**Per Piece Max**
	Up to 1.499"	tan 1° x width	tan 7° x width
	1.500" to 2.999"	tan 1/2° x width	tan 5° x width
	3.000" and over	tan 1/3° x width	tan 3° x width

ANGULARITY

ALL PROFILES	Allowable deviation from specific angle	
	thickness up to 3/4"	tan 1-1/2° x width of flange in inches

CUT LENGTHS

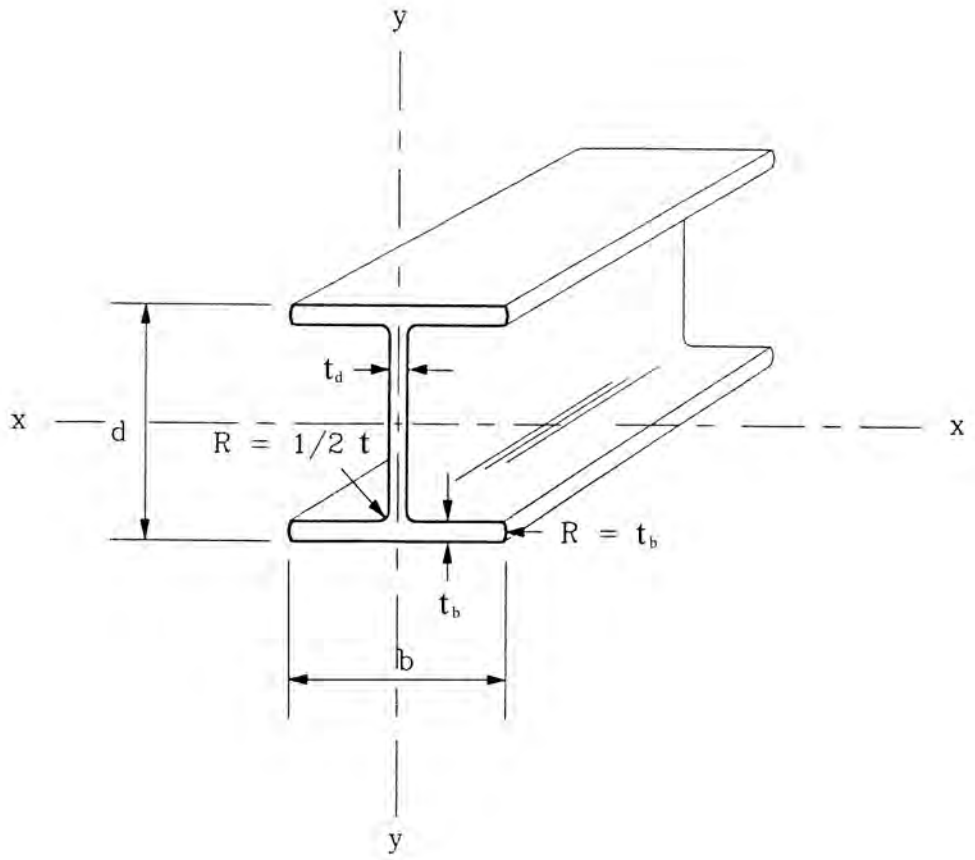
ALL PROFILES	Allowable deviation from specific length	
	Up to 20'	-0", + 1/2"
	Over 20' to 50'	-0", + 1"

SQUARENESS OF ENDCUT

ALL PROFILES	Allowable deviation from square	
	All thicknesses	tan 1° x width in inches

WIDE FLANGE SHAPES

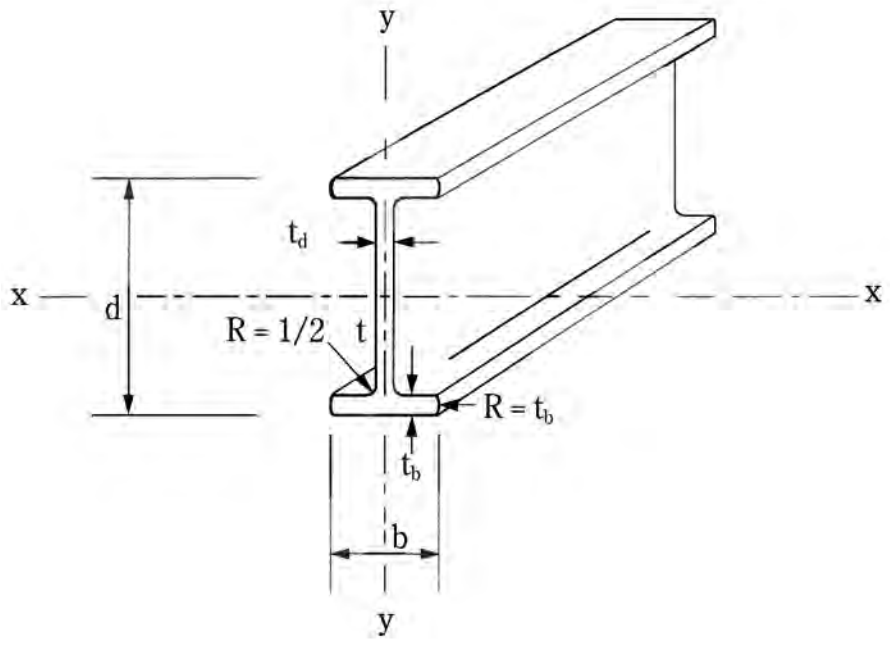
SECTION DIMENSIONS					SECTION PROPERTIES					
					X - X			Y - Y		
d	b	t	A	Wt.	I	S	r	I	S	r
in.	in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.
3	3	1/4	2.13	1.64	3.17	2.11	1.22	1.13	0.75	0.73
4	4	1/4	2.89	2.15	7.94	3.97	1.66	2.67	1.34	0.96
6	6	1/4	4.39	3.40	28.28	9.43	2.54	9.01	3.00	1.43
6	6	3/8	6.48	4.90	40.17	13.39	2.49	13.52	4.51	1.44
8	8	3/8	8.73	6.49	99.19	24.80	3.37	32.03	8.01	1.92
8	8	1/2	11.51	8.70	126.96	31.74	3.32	42.74	10.69	1.93
10	10	1/2	14.51	10.90	256.20	51.24	4.21	83.42	16.68	2.40
12	12	1/2	17.51	13.20	452.45	75.45	5.08	144.11	24.02	2.87



Section Properties

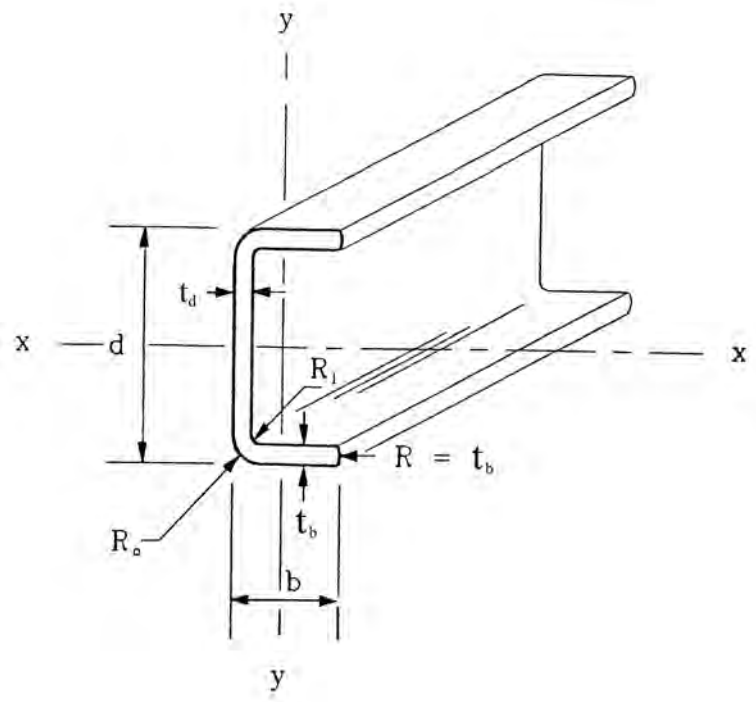
I SHAPES

SECTION DIMENSIONS					SECTION PROPERTIES					
					X - X			Y - Y		
d	b	t	A	Wt.	I	S	r	I	S	r
in.	in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.
3	1-1/2	1/4	1.38	1.10	1.75	1.17	1.13	0.14	0.19	0.32
4	2	1/4	1.88	1.50	4.41	2.21	1.53	0.34	0.34	0.43
6	3	1/4	2.88	2.20	16.99	5.66	2.43	1.13	0.75	0.63
6	3	3/8	4.23	3.20	22.35	7.45	2.30	1.71	1.14	0.64
8	4	3/8	5.73	4.30	55.55	13.89	3.11	4.03	2.02	0.84
8	4	1/2	7.51	5.70	70.62	17.66	3.07	5.40	2.70	0.85
10	5	3/8	7.22	5.78	111.63	22.33	3.93	7.85	3.14	1.04
10	5	1/2	9.51	7.20	143.29	28.66	3.88	10.51	4.21	1.05
12	6	1/2	11.51	8.70	253.96	42.33	4.70	18.11	6.04	1.26
18	4-1/2	3/8 - 1/2	10.92	8.70	498.15	55.35	6.75	7.66	3.40	0.84
24	7-1/2	3/8 - 3/4	19.90	15.20	1877.00	156.42	9.76	52.83	14.09	1.64



CHANNELS

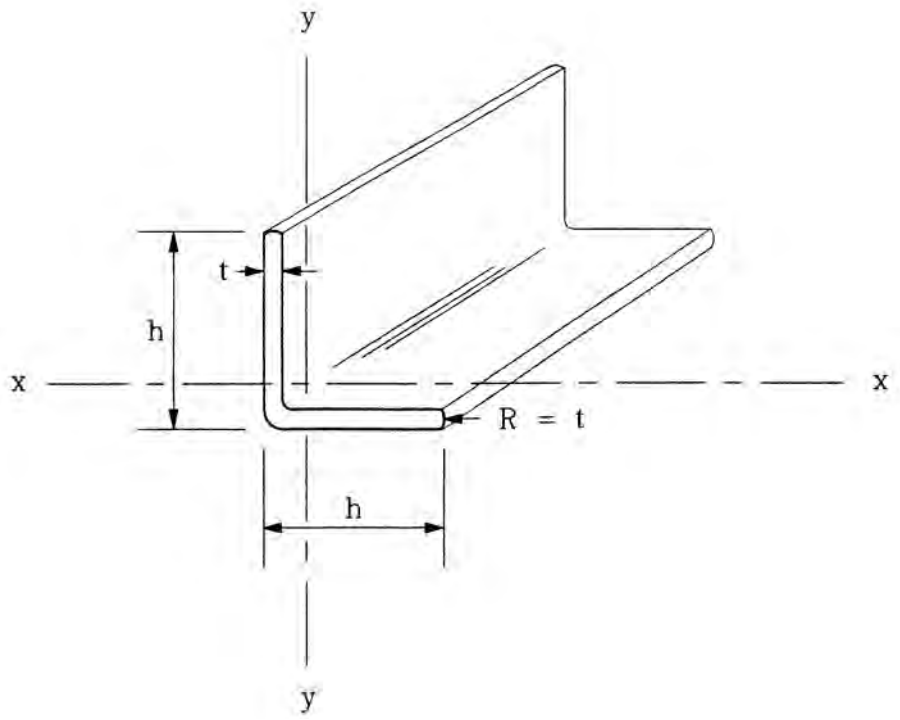
SECTION DIMENSIONS								SECTION PROPERTIES					
								X - X			Y - Y		
d	b	t_d	t_b	A	Wt.	R_i	R_o	I	S	r	I	S	r
in.	in.	in.	in.	$in.^2$	lb./ft.	in.	in.	$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.
3	13/16	1/8	1/8	0.55	0.43	3/16	1/32	0.64	0.43	1.08	0.03	0.04	0.22
3	1	1/4	1/4	1.08	0.79	1/8	3/8	1.27	0.85	1.09	0.06	0.09	0.24
3	1-1/2	1/4	1/4	1.33	1.01	1/8	3/8	1.75	1.16	1.15	0.26	0.25	0.44
3-1/2	1-3/16	1/8	3/16	0.88	0.67	1/8	3/16	1.54	0.88	1.32	0.11	0.13	0.36
4	1-1/8	1/4	1/4	1.38	1.05	1/8	3/8	2.87	1.44	1.44	0.13	0.16	0.31
4	1-3/8	3/16	3/16	1.16	0.88	1/8	5/16	2.62	1.31	1.50	0.19	0.18	0.40
6	1-5/8	1/4	1/4	2.13	1.67	1/8	3/8	10.18	3.39	2.19	0.43	0.35	0.45
6	1-11/16	3/8	3/8	3.23	2.60	1/8	1/8	14.55	4.85	2.12	0.52	0.45	0.45
8	2-3/16	3/8	3/8	4.23	3.20	3/16	9/16	35.77	8.94	2.88	1.52	0.91	0.60
10	2-3/4	1/2	1/2	7.02	5.30	1/4	3/4	92.49	18.50	3.63	3.97	1.92	0.75



Section Properties

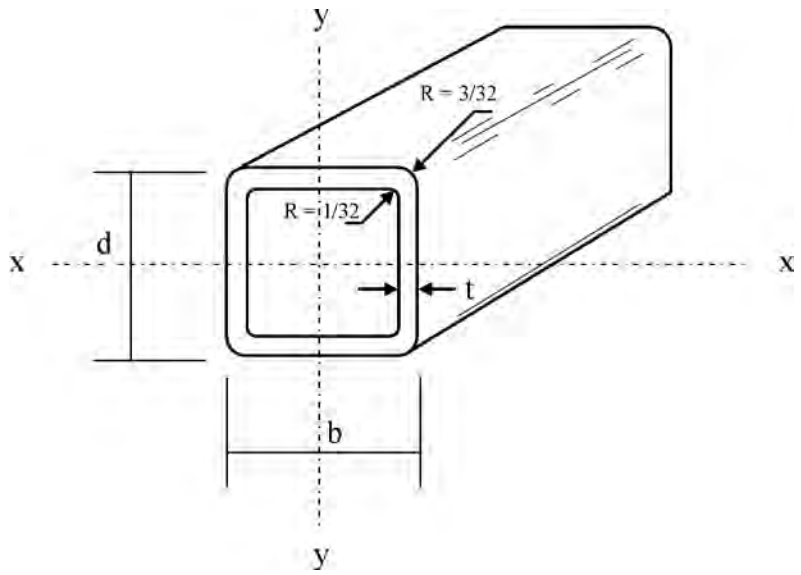
EQUAL LEG ANGLES

SECTION DIMENSIONS				SECTION PROPERTIES			
DEPTH	WALL			X - X / Y - Y			
h	t	A	Wt.	I	S	r	x/y
in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.	in.
1	1/8	0.23	0.18	0.02	0.05	0.31	0.29
1-1/4	1/8	0.29	0.22	0.04	0.05	0.38	0.36
1-1/2	3/16	0.52	0.40	0.11	0.10	0.46	0.44
1-1/2	1/4	0.67	0.54	0.14	0.13	0.45	0.47
2	1/4	0.92	0.70	0.33	0.23	0.59	0.59
3	1/4	1.42	1.08	1.24	0.58	0.93	0.84
3	3/8	2.09	1.61	1.76	0.83	0.91	0.89
3	1/2	2.70	2.11	2.22	1.07	0.91	0.93
4	1/4	1.92	1.45	3.04	1.04	1.26	1.09
4	3/8	2.84	2.18	4.35	1.52	1.24	1.14
4	1/2	3.70	2.89	5.56	1.97	1.23	1.18
6	1/2	5.70	4.45	19.91	4.60	1.87	1.68



SQUARE TUBES

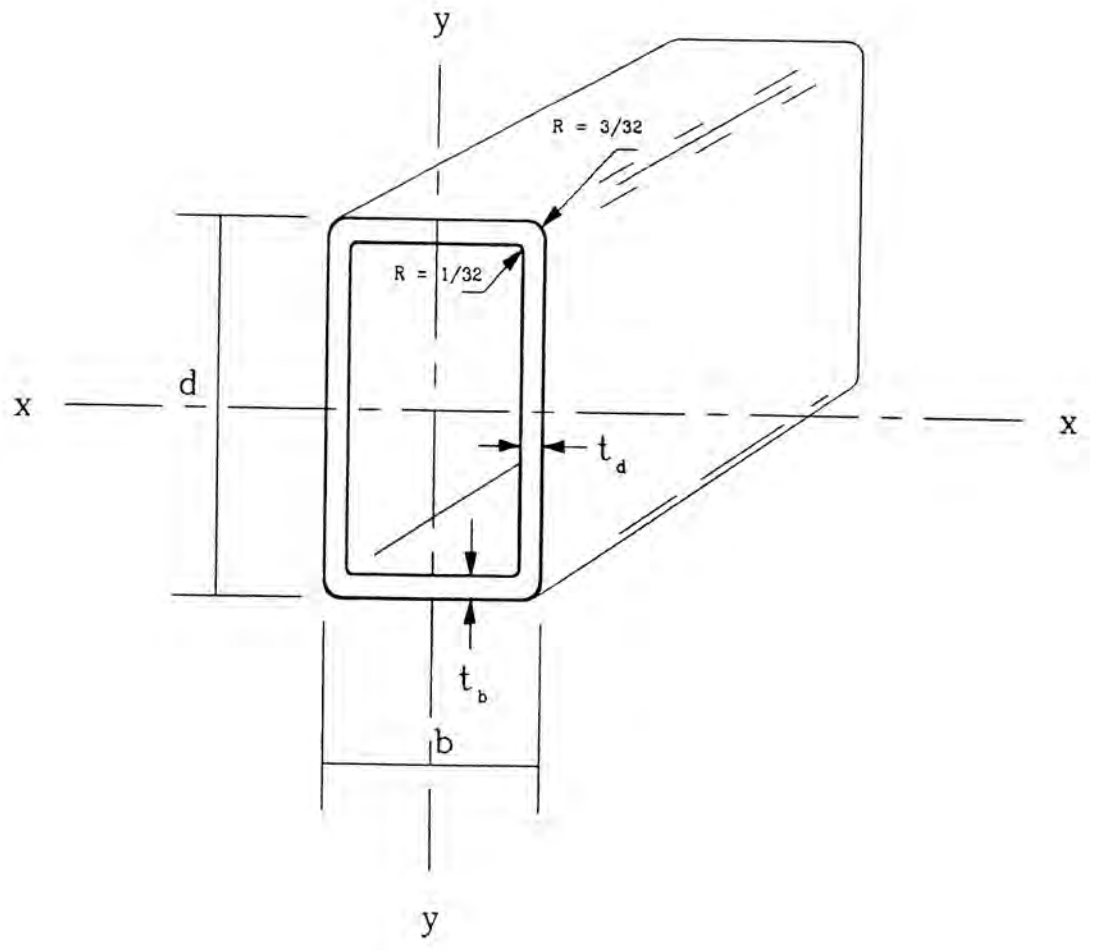
SECTION DIMENSIONS				SECTION PROPERTIES		
b	t	A	Wt.	I	S	r
in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.
1	1/8	0.43	0.32	0.06	0.11	0.36
1	1/4	0.74	0.55	0.08	0.16	0.33
1-1/4	1/8	0.56	0.41	0.12	0.19	0.46
1-1/4	1/4	0.99	0.75	0.18	0.28	0.42
1-1/2	1/8	0.68	0.50	0.22	0.29	0.56
1-1/2	1/4	1.24	0.98	0.34	0.45	0.52
1-3/4	1/8	0.81	0.61	0.36	0.41	0.67
1-3/4	1/4	1.49	1.13	0.58	0.66	0.62
2	1/8	0.93	0.70	0.55	0.55	0.77
2	1/4	1.74	1.32	0.91	0.91	0.73
2	3/8	2.44	1.85	1.13	1.13	0.68
2-1/8	3/16	1.45	1.10	0.91	0.85	0.79
2-1/4	1/8	1.06	0.81	0.80	0.71	0.87
2-1/4	1/4	1.99	1.51	1.35	1.20	0.83
3	1/8	1.43	1.08	1.98	1.32	1.18
3	1/4	2.74	2.07	3.50	2.33	1.13
4	1/4	3.74	2.83	8.82	4.41	1.53



Section Properties

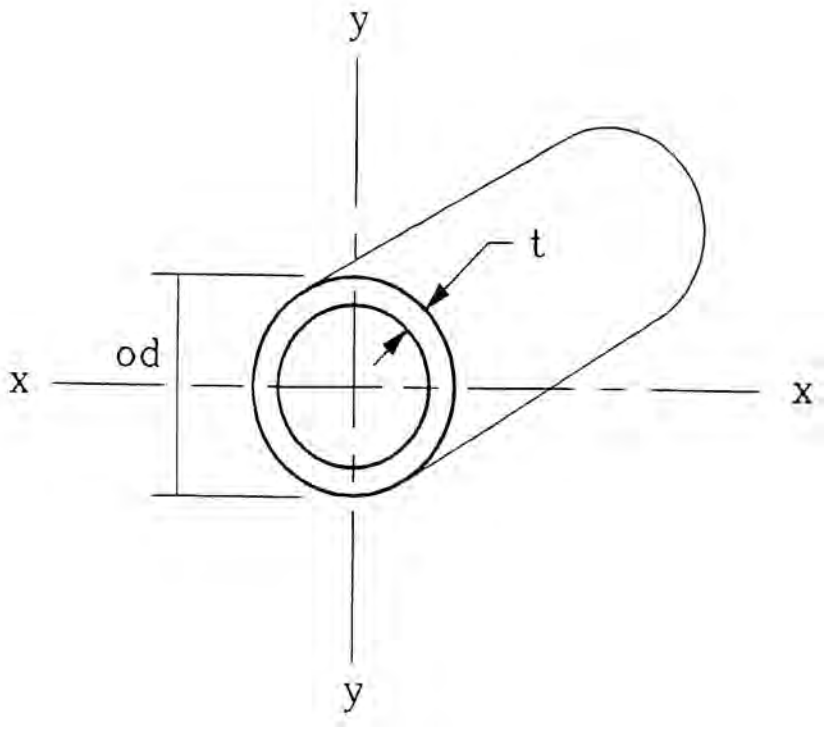
RECTANGULAR TUBES

SECTION DIMENSIONS						SECTION PROPERTIES					
						X - X			Y - Y		
d	b	t_d	t_b	A	Wt.	I	S	r	I	S	r
in.	in.	in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.
1-1/2	3/4	1/8	1/8	0.50	0.39	0.13	0.17	0.51	0.04	0.11	0.32
1-1/2	1	1/8	1/8	0.56	0.44	0.16	0.21	0.53	0.08	0.16	0.40
2	1/2	1/8	1/8	0.56	0.44	0.22	0.89	0.63	0.02	0.07	0.18
2	1	1/8	1/8	0.69	0.54	0.33	0.33	0.69	0.11	0.21	0.39
4	1	1/8	1/8	1.19	0.90	2.04	1.02	1.31	0.20	0.40	0.42
4-3/8	1-3/8	1/8	3/16	1.52	1.18	3.60	1.64	1.54	0.47	0.69	0.79
4-1/2	1-3/4	1/8	3/16	1.69	1.29	4.52	2.07	1.64	0.85	0.97	0.71
5	2	1/8	1/8	1.69	1.32	5.20	2.08	1.76	1.21	1.21	0.85



ROUND TUBES

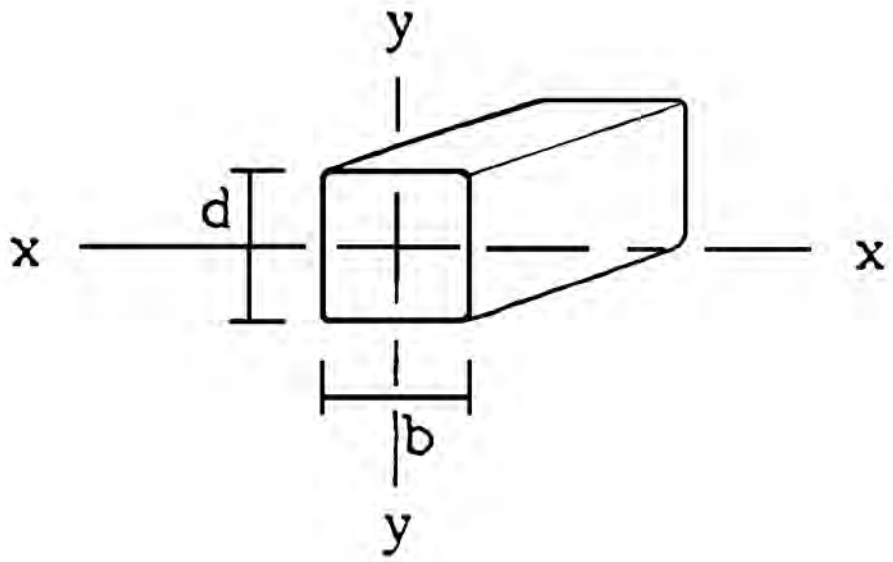
SECTION DIMENSIONS				SECTION PROPERTIES		
od	t	A	Wt.	I	S	r
in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.
1	3/32	0.27	0.22	0.03	0.06	0.32
1	1/8	0.34	0.25	0.03	0.07	0.31
1-1/8	1/8	0.39	0.33	0.05	0.09	0.36
1-1/4	3/32	0.34	0.27	0.06	0.09	0.41
1-1/4	1/8	0.44	0.32	0.07	0.11	0.40
1-1/4	1/4	0.79	0.61	0.10	0.17	0.36
1-1/2	1/8	0.54	0.45	0.13	0.17	0.49
1-1/2	1/4	0.98	0.79	0.20	0.27	0.45
1-3/4	1/8	0.64	0.51	0.21	0.24	0.58
1-3/4	1/4	1.18	0.94	0.34	0.39	0.54
1-7/8	3/16	0.99	0.88	0.36	0.38	0.60
2	1/4	1.37	1.08	0.54	0.54	0.62
3	1/4	2.16	1.70	2.06	1.37	0.98
3	1/2	3.93	2.98	3.19	2.13	0.90



Section Properties

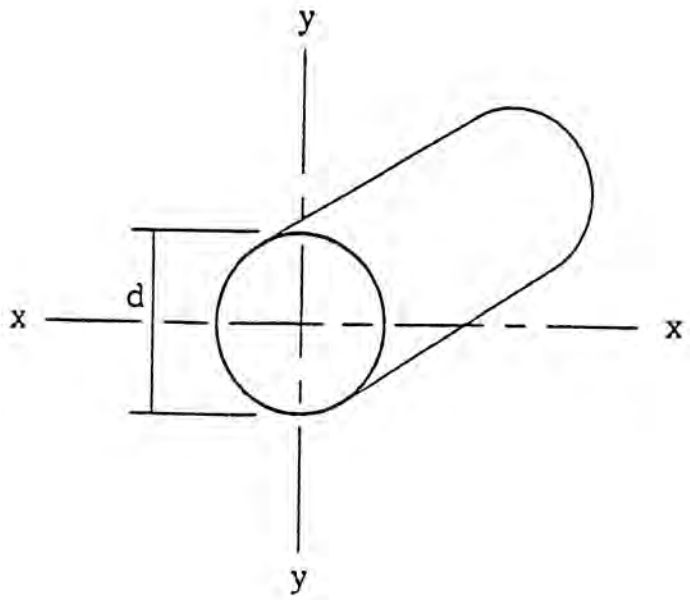
SQUARE BARS

SECTION DIMENSIONS				SECTION PROPERTIES					
				X - X			Y - Y		
d	b	A	Wt.	I	S	r	I	S	r
in.	in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.	$in.^4$	$in.^3$	in.
1	1	1.00	0.88	0.08	0.17	0.29	0.08	0.17	0.29
1-1/4	1-1/4	1.56	1.37	0.20	0.33	0.36	0.20	0.33	0.36
1-1/2	1-1/2	2.25	1.98	0.42	0.56	0.43	0.42	0.56	0.43



SOLID ROUNDS

SECTION DIMENSIONS			SECTION PROPERTIES		
d	A	Wt.	I	S	r
in.	$in.^2$	lb./ft.	$in.^4$	$in.^3$	in.
0.2500	0.049	0.044	0.0002	0.0016	0.0625
0.3000	0.071	0.062	0.0004	0.0027	0.0750
0.3125	0.077	0.067	0.0005	0.0030	0.0781
0.3500	0.096	0.083	0.0007	0.0042	0.0875
0.3750	0.110	0.095	0.0010	0.0052	0.0938
0.4375	0.150	0.133	0.0018	0.0082	0.1094
0.4720	0.175	0.150	0.0024	0.0103	0.1180
0.4800	0.181	0.160	0.0026	0.0109	0.1200
0.5000	0.196	0.172	0.0031	0.0123	0.1250
0.6250	0.307	0.270	0.0075	0.0240	0.1563
0.7500	0.442	0.397	0.0156	0.0414	0.1875
0.8125	0.518	0.460	0.0214	0.0527	0.2031
0.8750	0.601	0.534	0.0288	0.0658	0.2188
1.0000	0.785	0.697	0.0491	0.0982	0.2500
1.2500	1.227	1.094	0.1198	0.1917	0.3125
1.5000	1.766	1.571	0.2485	0.3313	0.3750



Beams - Allowable Uniform Load Tables

TABLE NOTATION

A_w - Area of web (in^2)

Δ - Deflection (in)

E - Modulus of Elasticity (psi)

F_b - Maximum Allowable Flexural Stress for Laterally Supported Beam (psi)

F_v - Maximum Allowable Shear Stress for Laterally Supported Beam (psi)

G - Shear Modulus (psi)

I - Moment of Inertia (in^4)

L - Span Length (in)

S - Section Modulus (in^3)

V - Vertical Shear (lbs)

w - Uniform Load (lbs/in)

M - Maximum Moment (in-lb)

Beams - Allowable Uniform Load Tables

TABLE NOTATION

The allowable uniform load tables were generated using the results from tests and the following formulas, properties and assumptions. The deflection formula reflects that the deflection is the result of both flexural and shear stresses.

$$\Delta = \frac{5wL^4}{384EI} + \frac{wL^2}{4A_wG}$$

$$F_v = \frac{V}{A_w}$$

$$F_b = \frac{M}{S}$$

$$E = 2.8 \times 10^6 \text{ psi}$$

$$G = 450{,}000 \text{ psi}$$

$$F_b = 10{,}000 \text{ psi}$$

$$F_v = 1{,}500 \text{ psi}$$

Adequate lateral support is provided (full lateral support for channels).

LATERAL SUPPORT REQUIREMENTS - FRP STRUCTURAL SHAPES			
MEMBER	LATERAL SUPPORT SPACING	MEMBER	LATERAL SUPPORT SPACING
C6" x 1/4"	48"	W4" x 1/4"	60"
C8" x 3/8"	60"	W6" x 1/4"	84"
C10" x 1/2"	60"	W6" x 3/8"	96"
I4" x 1/4"	24"	W8" x 3/8"	108"
I6" x 1/4"	36"	W10" x 3/8"	156"
I8" x 3/8"	48"	W12" x 1/2"	168"
I10" x 3/8"	60"		
I12" x 1/2"	84"		

Load is applied perpendicular to major axis.

Beam simply supported at both ends.

The part weight has been deducted in the following tables.

Beams - Allowable Uniform Load Tables (lbs/ft)

3 x 3 x 1/4 WIDE FLANGE BEAM

Laterally Supported

A_w = 0.625 in^2 I_x= 3.17 in^4 S_x = 2.11 in^3 Wt. = 1.64 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	623	F_v	---	---	---	496	330
4	467	F_v	---	388	323	242	161
5	373	F_v	322	214	178	133	88
6	311	F_v	194	129	107	80	53
7	266	F_v	125	83	69	51	33
8	218	F_b	85	56	46	34	22
9	172	F_b	60	39	32	24	15
10	139	F_b	43	28	23	17	11

The part weight has been deducted in the above table.

4 x 4 x 1/4 WIDE FLANGE BEAM

Laterally Supported

A_w = 0.875 in^2 I_x= 7.94 in^4 S_x = 3.97 in^3 Wt. = 2.15 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	872	F_v	---	---	---	---	661
4	653	F_v	---	---	---	522	347
5	522	F_v	---	483	402	301	200
6	435	F_v	---	300	249	186	123
7	372	F_v	297	197	163	122	80
8	325	F_v	204	135	112	83	55
9	289	F_v	146	96	80	59	38
10	260	F_v	107	71	58	43	28
11	216	F_b	81	53	44	32	20
12	181	F_b	62	40	33	24	15
13	154	F_b	49	31	26	19	11

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

6 x 6 x 1/4 WIDE FLANGE BEAM

Laterally Supported

A_w = 1.375 in^2 I_x= 28.28 in^4 S_x = 9.43 in^3 Wt. = 3.40 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	821	F_v	---	---	---	---	554
6	684	F_v	---	---	---	549	364
7	585	F_v	---	---	503	377	250
8	512	F_v	---	430	358	267	177
9	454	F_v	---	315	262	195	129
10	409	F_v	357	237	196	146	96
11	371	F_v	274	181	150	112	73
12	340	F_v	215	142	117	87	57
13	313	F_v	171	112	93	69	44
14	291	F_v	138	90	75	55	35
15	271	F_v	112	74	61	44	28

The part weight has been deducted in the above table.

6 x 6 x 3/8 WIDE FLANGE BEAM

Laterally Supported

A_w = 1.969 in^2 I_x= 40.17 in^4 S_x = 13.39 in^3 Wt. = 4.90 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	1176	F_v	---	---	---	---	790
6	980	F_v	---	---	---	782	520
7	839	F_v	---	---	717	537	356
8	733	F_v	---	613	510	381	252
9	651	F_v	---	449	373	279	184
10	586	F_v	508	337	280	209	138
11	532	F_v	390	259	215	160	105
12	487	F_v	306	202	168	124	81
13	449	F_v	243	160	133	98	64
14	417	F_v	196	129	107	79	51
15	389	F_v	160	105	87	64	41

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

8 x 8 x 3/8 WIDE FLANGE BEAM

Laterally Supported

A_w = 2.719 in^2 I_x= 99.19 in^4 S_x = 24.80 in^3 Wt. = 6.49 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1353	F_v	---	---	---	---	1028
7	1158	F_v	---	---	---	1105	735
8	1013	F_v	---	---	---	811	539
9	899	F_v	---	---	815	609	404
10	809	F_v	---	751	625	467	309
11	735	F_v	---	586	488	364	240
12	673	F_v	---	465	387	288	190
13	620	F_v	565	374	311	231	152
14	576	F_v	461	305	253	188	123
15	537	F_v	380	251	208	154	100
16	503	F_v	316	209	173	128	83
17	473	F_v	266	175	145	107	69
18	446	F_v	225	148	122	90	58
19	422	F_v	192	126	104	76	48
20	401	F_v	165	108	89	65	41
21	368	F_b	143	93	76	55	35
22	335	F_b	124	80	66	48	29
23	306	F_b	108	70	57	41	25
24	280	F_b	95	61	50	35	21
25	258	F_b	83	53	43	31	18

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

8 x 8 x 1/2 WIDE FLANGE BEAM

Laterally Supported

A_w = 3.5 in^2 I_x= 126.96 in^4 S_x = 31.74 in^3 Wt. = 8.70 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1741	F_v	---	---	---	---	1319
7	1491	F_v	---	---	---	1418	942
8	1304	F_v	---	---	---	1040	691
9	1158	F_v	---	---	1044	781	518
10	1041	F_v	---	963	801	598	396
11	946	F_v	---	751	625	466	308
12	866	F_v	---	596	495	369	243
13	799	F_v	724	479	398	296	194
14	741	F_v	590	390	324	241	157
15	691	F_v	486	321	266	197	129
16	647	F_v	405	267	221	164	106
17	609	F_v	341	224	185	137	88
18	574	F_v	288	189	156	115	74
19	544	F_v	246	161	133	97	62
20	516	F_v	211	138	113	83	52
21	471	F_b	183	119	97	71	44
22	428	F_b	159	103	84	61	38
23	391	F_b	138	89	73	52	32
24	358	F_b	121	78	63	45	27
25	330	F_b	107	68	55	39	23

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

10 x 10 x 3/8 WIDE FLANGE BEAM

Laterally Supported

A_w = 3.469 in^2 I_x= 198.53 in^4 S_x = 39.71 in^3 Wt. = 8.74 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1725	F_v	---	---	---	---	1635
7	1478	F_v	---	---	---	---	1210
8	1292	F_v	---	---	---	---	914
9	1147	F_v	---	---	---	1059	703
10	1032	F_v	---	---	---	829	549
11	937	F_v	---	---	880	658	435
12	858	F_v	---	851	708	529	349
13	791	F_v	---	693	576	430	284
14	734	F_v	---	571	474	353	233
15	685	F_v	---	475	394	293	192
16	641	F_v	602	398	330	245	161
17	603	F_v	509	337	279	207	135
18	569	F_v	434	287	237	176	114
19	539	F_v	373	246	203	150	97
20	511	F_v	322	212	175	129	83
21	487	F_v	280	184	152	111	71
22	464	F_v	245	160	132	97	61
23	443	F_v	215	140	115	84	53
24	425	F_v	189	123	101	74	46
25	407	F_v	167	109	89	64	40

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

10 x 10 x 1/2 WIDE FLANGE BEAM

Laterally Supported

A_w = 4.50 in^2 I_x= 256.20 in^4 S_x = 51.24 in^3 Wt. = 10.90 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
7	1918	F_v	---	---	---	---	1567
8	1677	F_v	---	---	---	---	1183
9	1489	F_v	---	---	---	1370	910
10	1339	F_v	---	---	---	1072	711
11	1216	F_v	---	---	1138	850	563
12	1114	F_v	---	1100	915	684	452
13	1027	F_v	---	896	745	556	367
14	953	F_v	---	738	613	457	301
15	889	F_v	---	614	510	379	249
16	833	F_v	778	515	427	318	208
17	783	F_v	658	435	361	268	175
18	739	F_v	562	371	307	228	148
19	700	F_v	482	318	263	195	126
20	664	F_v	417	274	227	167	108
21	632	F_v	362	238	196	144	93
22	603	F_v	316	207	171	125	80
23	576	F_v	278	181	149	109	69
24	552	F_v	245	160	131	96	60
25	529	F_v	217	141	115	84	52
26	494	F_b	192	125	102	74	46
27	458	F_b	172	111	90	65	40
28	425	F_b	153	99	80	57	35
29	395	F_b	138	88	72	51	30

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

12 x 12 x 1/2 WIDE FLANGE BEAM

Laterally Supported

A_w = 5.50 in^2 I_x= 452.45 in^4 S_x = 75.45 in^3 Wt. = 13.20 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
7	2343	F_v	---	---	---	---	2273
8	2049	F_v	---	---	---	---	1760
9	1819	F_v	---	---	---	---	1383
10	1636	F_v	---	---	---	---	1102
11	1486	F_v	---	---	---	1338	888
12	1361	F_v	---	---	---	1091	723
13	1255	F_v	---	---	1203	899	595
14	1165	F_v	---	---	1001	747	493
15	1086	F_v	---	1010	839	626	413
16	1017	F_v	---	854	710	529	348
17	957	F_v	---	728	604	450	295
18	903	F_v	---	624	518	385	252
19	854	F_v	814	538	446	331	216
20	811	F_v	707	467	387	287	186
21	772	F_v	618	407	337	249	161
22	736	F_v	542	357	295	218	140
23	703	F_v	478	314	259	191	123
24	674	F_v	423	277	229	168	107
25	646	F_v	376	246	203	148	94
26	621	F_v	335	219	180	131	83
27	597	F_v	300	195	160	171	73
28	575	F_v	269	175	143	104	65
29	555	F_v	242	157	128	93	57
30	536	F_v	219	141	115	83	51

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

3 x 1-1/2 x 1/4 I BEAM

Laterally Supported

A_w = 0.625 in^2 I_x= 1.75 in^4 S_x = 1.17 in^3 Wt. = 1.10 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	623	F_v	---	511	425	319	212
4	467	F_v	355	236	196	147	97
5	310	F_b	189	126	104	78	51
6	215	F_b	112	74	61	45	30
7	157	F_b	71	46	38	28	18
8	120	F_b	47	31	25	19	12
9	94	F_b	33	21	17	13	8
10	76	F_b	24	15	12	9	5

The part weight has been deducted in the above table.

4 x 2 x 1/4 I BEAM

Laterally Supported

A_w = 0.875 in^2 I_x= 4.41 in^4 S_x = 2.21 in^3 Wt. = 1.50 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	873	F_v	---	---	---	692	461
4	654	F_v	---	542	451	338	225
5	523	F_v	449	299	249	186	123
6	407	F_b	271	180	150	112	74
7	299	F_b	175	116	96	72	47
8	228	F_b	119	78	65	48	32
9	180	F_b	84	55	46	34	22
10	145	F_b	61	40	33	24	16
11	120	F_b	46	30	25	18	11
12	100	F_b	35	23	19	13	8

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

6 x 3 x 1/4 I BEAM

Laterally Supported

A_w = 1.375 in^2 I_x= 16.99 in^4 S_x = 5.66 in^3 Wt. = 2.20 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	822	F_v	---	---	797	597	397
6	685	F_v	---	607	505	378	251
7	586	F_v	---	405	337	252	167
8	513	F_v	424	282	234	175	116
9	455	F_v	306	203	169	126	83
10	374	F_b	227	150	125	93	61
11	309	F_b	173	114	95	70	46
12	259	F_b	134	88	73	54	35
13	220	F_b	106	70	57	42	27
14	189	F_b	85	56	46	34	21
15	165	F_b	69	45	37	27	17

The part weight has been deducted in the above table.

6 x 3 x 3/8 I BEAM

Laterally Supported

A_w = 1.969 in^2 I_x= 22.35 in^4 S_x = 7.45 in^3 Wt. = 3.20 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	981	F_v	---	813	676	506	336
7	840	F_v	812	540	449	336	223
8	734	F_v	564	375	312	233	154
9	609	F_b	406	269	224	167	110
10	493	F_b	301	199	165	123	81
11	406	F_b	229	151	125	93	61
12	341	F_b	177	117	97	72	46
13	290	F_b	140	92	76	56	36
14	249	F_b	112	73	60	44	28
15	217	F_b	91	59	49	36	22
16	190	F_b	75	48	40	29	18
17	168	F_b	62	40	33	23	14
18	149	F_b	52	33	27	19	11

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

8 x 4 x 3/8 I BEAM

Laterally Supported

A_w = 2.719 in^2 I_x= 55.55 in^4 S_x = 13.89 in^3 Wt. = 4.30 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1355	F_v	---	---	---	1083	720
7	1160	F_v	---	---	993	744	494
8	1015	F_v	---	849	707	529	351
9	901	F_v	---	622	518	387	256
10	811	F_v	704	468	389	291	192
11	737	F_v	542	359	299	223	147
12	638	F_b	425	281	234	174	114
13	543	F_b	338	224	186	138	90
14	467	F_b	273	181	150	111	72
15	407	F_b	224	147	122	90	58
16	357	F_b	185	122	101	74	48
17	315	F_b	154	101	84	61	39
18	281	F_b	130	85	70	51	33
19	251	F_b	111	72	59	43	27
20	226	F_b	94	61	50	36	23

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

8 x 4 x 1/2 I BEAM

Laterally Supported

A_w = 3.50 in^2 I_x= 70.62 in^4 S_x = 17.66 in^3 Wt. = 5.70 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1744	F_v	---	---	---	1383	920
7	1494	F_v	---	---	1267	949	631
8	1307	F_v	---	1082	901	674	448
9	1161	F_v	---	793	660	494	327
10	1044	F_v	897	596	496	370	245
11	949	F_v	690	458	381	284	187
12	812	F_b	541	358	298	222	146
13	691	F_b	431	285	237	176	115
14	595	F_b	348	230	191	142	92
15	517	F_b	285	188	156	115	75
16	454	F_b	236	155	128	95	61
17	401	F_b	197	129	107	79	50
18	357	F_b	166	109	90	66	42
19	320	F_b	141	92	76	55	35
20	288	F_b	121	78	64	47	29

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

10 x 5 x 1/2 I BEAM

Laterally Supported

A_w = 4.50 in^2 I_x= 143.29 in^4 S_x = 28.66 in^3 Wt. = 7.20 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	2242	F_v	---	---	---	---	1579
7	1921	F_v	---	---	---	1681	1118
8	1680	F_v	---	---	1635	1225	814
9	1492	F_v	---	1468	1222	914	607
10	1342	F_v	---	1120	932	697	462
11	1219	F_v	---	872	725	542	359
12	1117	F_v	1038	690	573	428	283
13	1030	F_v	834	554	460	343	226
14	956	F_v	679	450	374	278	183
15	841	F_b	559	370	307	228	150
16	738	F_b	466	308	255	189	124
17	653	F_b	391	258	214	158	103
18	582	F_b	331	218	180	133	86
19	521	F_b	283	186	153	113	73
20	470	F_b	243	159	131	97	62
21	425	F_b	210	137	113	83	53
22	387	F_b	183	119	98	71	45
23	353	F_b	160	104	85	62	39
24	324	F_b	140	91	74	54	33
25	298	F_b	123	80	65	47	28

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

10 x 5 x 3/8 I BEAM

Laterally Supported

A_w = 3.469 in^2 I_x= 111.63 in^4 S_x = 22.33 in^3 Wt. = 5.78 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1728	F_v	---	---	---	---	1225
7	1481	F_v	---	---	---	1305	868
8	1295	F_v	---	---	1270	951	632
9	1150	F_v	---	1141	949	711	472
10	1035	F_v	---	871	725	542	359
11	940	F_v	---	678	564	422	279
12	861	F_v	808	537	446	333	220
13	794	F_v	649	431	358	267	176
14	737	F_v	529	350	291	217	143
15	656	F_b	436	288	239	178	117
16	575	F_b	363	240	199	148	96
17	509	F_b	305	201	167	123	80
18	453	F_b	258	170	141	104	67
19	406	F_b	220	145	120	88	57
20	366	F_b	189	124	103	75	48
21	332	F_b	164	107	88	65	41
22	302	F_b	142	93	76	56	35
23	275	F_b	124	81	66	48	30
24	252	F_b	109	71	58	42	26
25	232	F_b	96	62	51	37	22

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

12 x 6 x 1/2 I BEAM

Laterally Supported

A_w = 5.50 in^2 I_x= 253.96 in^4 S_x = 42.33 in^3 Wt. = 8.70 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	2741	F_v	---	---	---	---	2354
7	2348	F_v	---	---	---	---	1715
8	2054	F_v	---	---	---	1922	1278
9	1824	F_v	---	---	---	1463	972
10	1641	F_v	---	---	1514	1134	753
11	1491	F_v	---	1434	1193	893	592
12	1366	F_v	---	1147	954	713	473
13	1260	F_v	---	929	773	577	382
14	1170	F_v	1147	762	633	473	312
15	1091	F_v	951	631	524	391	258
16	1022	F_v	796	528	438	327	215
17	962	F_v	673	445	370	275	180
18	862	F_b	573	379	314	122	153
19	773	F_b	491	324	269	199	130
20	696	F_b	424	279	231	171	111
21	631	F_b	368	242	200	148	96
22	574	F_b	321	211	174	129	83
23	524	F_b	282	185	152	112	72
24	481	F_b	248	162	134	98	62
25	442	F_b	220	143	118	86	55
26	408	F_b	195	127	104	76	48
27	378	F_b	174	113	93	67	42
28	351	F_b	156	101	83	60	37
29	327	F_b	140	90	74	53	32
30	305	F_b	126	81	66	74	28

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

18 x 3/8 x 4-1/2 x 1/2 I BEAM

Laterally Supported

A_w = 6.375 in^2 I_x= 498.15 in^4 S_x = 55.35 in^3 Wt. = 8.70 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
8	2382	F_v	---	---	---	---	1996
9	2116	F_v	---	---	---	---	1565
10	1904	F_v	---	---	---	1872	1245
11	1730	F_v	---	---	---	1507	1002
12	1585	F_v	---	---	---	1228	816
13	1462	F_v	---	---	1351	1011	671
14	1357	F_v	---	1349	1123	840	557
15	1266	F_v	---	1132	942	704	466
16	1186	F_v	---	957	796	595	394
17	1116	F_v	---	815	678	506	335
18	1054	F_v	---	700	581	434	286
19	998	F_v	910	604	502	374	246
20	913	F_b	791	524	436	324	213
21	828	F_b	691	458	380	283	186
22	753	F_b	607	402	333	248	162
23	688	F_b	536	354	294	218	142
24	632	F_b	475	313	260	193	125
25	581	F_b	422	279	231	171	111
26	537	F_b	377	248	206	152	98
27	497	F_b	338	222	184	136	87
28	462	F_b	304	200	165	121	78
29	430	F_b	274	180	148	109	70
30	401	F_b	248	162	134	98	62

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

24 x 3/8 x 7-1/2 x 3/4 I BEAM

Laterally Supported

A_w = 8.44 in^2 I_x= 1877.00 in^4 S_x = 156.42 in^3 Wt. = 15.20 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
35	707	F_v	552	363	300	221	142
36	687	F_v	510	335	276	203	130
37	668	F_v	472	309	255	187	119
38	650	F_v	437	286	236	173	110
39	633	F_v	405	265	218	160	101
40	617	F_v	377	246	202	148	93
41	602	F_v	350	228	188	137	86
42	575	F_b	327	212	174	127	79
43	548	F_b	305	198	162	118	73
44	523	F_b	284	184	151	109	67
45	499	F_b	266	172	141	101	62
46	477	F_b	249	161	131	94	58
47	456	F_b	233	150	122	88	53
48	437	F_b	219	140	114	82	49
49	418	F_b	205	131	107	76	45
50	401	F_b	193	123	100	71	42
51	385	F_b	181	116	94	66	39
52	370	F_b	171	108	88	62	36
53	355	F_b	161	102	82	58	33
54	342	F_b	151	96	77	54	31
55	329	F_b	143	90	72	50	28
56	316	F_b	135	84	68	47	26
57	305	F_b	127	79	64	44	24

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

3 x 13/16 x 1/8 CHANNEL

Laterally Supported

A_w = 0.344 in^2 I_x= 0.64 in^4 S_x = 0.43 in^3 Wt. = 0.43 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	317	F_b	301	200	167	125	83
4	178	F_b	135	90	75	56	37
5	114	F_b	71	47	39	29	19
6	79	F_b	41	27	23	17	11
7	57	F_b	26	17	14	10	7
8	44	F_b	17	11	9	7	4
9	34	F_b	12	8	6	4	3
10	28	F_b	8	5	4	3	2

The part weight has been deducted in the above table.

3 x 1 x 1/4 CHANNEL

Laterally Supported

A_w = 0.625 in^2 I_x= 1.27 in^4 S_x = 0.85 in^3 Wt. = 0.85 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	624	F_v	591	393	328	246	163
4	353	F_b	267	178	148	111	73
5	226	F_b	141	94	78	58	38
6	156	F_b	83	55	46	34	22
7	115	F_b	52	35	29	21	14
8	88	F_b	35	23	19	14	9
9	69	F_b	24	16	13	10	6
10	56	F_b	18	11	9	7	4

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

3 x 1-1/2 x 1/4 CHANNEL

Laterally Supported

A_w = 0.625 in^2 I_x= 1.75 in^4 S_x = 1.16 in^3 Wt. = 1.01 lbs./ft.

SPAN	MAXIMUM LOAD		DEFLECTION				
FEET			L/100	L/150	L/180	L/240	L/360
3	623	F_v	---	511	425	319	212
4	467	F_v	355	236	196	147	97
5	307	F_b	189	126	104	78	51
6	213	F_b	112	74	61	45	30
7	156	F_b	71	46	38	28	18
8	119	F_b	47	31	25	19	12
9	93	F_b	33	21	17	13	8
10	75	F_b	24	15	12	9	5

The part weight has been deducted in the above table.

3-1/2 x 1-3/16 x 1/8 x 3/16 CHANNEL

Laterally Supported

A_w = 0.406 in^2 I_x= 1.54 in^4 S_x = 0.88 in^3 Wt. = 0.67 lbs./ft.

SPAN	MAXIMUM LOAD		DEFLECTION				
FEET			L/100	L/150	L/180	L/240	L/360
3	623	F_v	---	511	425	319	212
4	467	F_v	355	236	196	147	97
5	307	F_b	189	126	104	78	51
6	213	F_b	112	74	61	45	30
7	156	F_b	71	46	38	28	18
8	119	F_b	47	31	25	19	12
9	93	F_b	33	21	17	13	8
10	75	F_b	24	15	12	9	5

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

3-1/2 x 1-1/2 x 3/16 CHANNEL

MAJOR AXIS

Laterally Supported

A_w = 0.54 in^2 I_x= 1.92 in^4 S_x = 1.10 in^3 Wt. = 0.86 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	539	F_v	---	532	443	332	221
4	404	F_v	377	251	209	157	104
5	291	F_b	204	136	113	84	56
6	202	F_b	122	81	67	50	33
7	148	F_b	78	52	43	32	21
8	113	F_b	53	35	29	21	14
9	89	F_b	37	24	20	15	10
10	72	F_b	27	18	14	11	7
11	59	F_b	20	13	11	8	5
12	50	F_b	15	10	8	6	4

The part weight has been deducted in the above table.

MINOR AXIS

Laterally Supported

A_w = 0.44 in^2 I_x= 0.22 in^4 S_x = 0.21 in^3 Wt. = 0.86 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	154	F_b	115	77	64	47	31
4	86	F_b	49	32	27	20	13
5	55	F_b	25	16	13	10	6
6	38	F_b	14	9	7	5	3

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/

4 x 1-3/8 x 3/16 CHANNEL

Laterally Supported

A_w = 0.680 in^2 I_x= 2.62 in^4 S_x = 1.31 in^3 Wt. = 0.88 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	679	F_v	---	---	593	445	296
4	509	F_v	509	339	282	211	141
5	348	F_b	277	184	153	115	76
6	242	F_b	165	110	91	68	45
7	177	F_b	106	70	58	44	29
8	135	F_b	72	48	39	29	19
9	107	F_b	51	33	28	21	13
10	86	F_b	37	24	20	15	10

The part weight has been deducted in the above table.

4 x 1-1/8 x 1/4 CHANNEL

Laterally Supported

A_w = 0.875 in^2 I_x= 2.87 in^4 S_x = 1.44 in^3 Wt. = 1.05 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	873	F_v	---	811	675	506	337
4	598	F_b	570	380	316	236	157
5	382	F_b	307	204	170	127	84
6	265	F_b	182	121	100	75	49
7	194	F_b	116	77	64	47	31
8	148	F_b	78	52	43	31	20
9	117	F_b	55	36	30	22	14
10	94	F_b	40	26	21	15	10

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

5-1/2 x 1-1/2 x 1/4 CHANNEL

MAJOR AXIS

Laterally Supported

A_w = 1.3125 in^2 I_x= 7.38 in^4 S_x = 2.68 in^3 Wt. = 1.49 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	1311	F_v	---	---	---	1118	745
4	982	F_v	---	887	739	554	368
5	714	F_b	---	493	411	308	204
6	495	F_b	450	299	249	186	123
7	363	F_b	291	194	161	120	79
8	278	F_b	199	132	109	82	54
9	219	F_b	141	93	77	58	38
10	177	F_b	103	68	56	42	27
11	146	F_b	78	51	42	31	20
12	122	F_b	60	39	32	24	15
13	104	F_b	47	31	25	18	12
14	89	F_b	37	24	20	14	9
15	78	F_b	30	19	16	11	7

The part weight has been deducted in the above table.

MINOR AXIS

Laterally Supported

A_w = 0.56 in^2 I_x= 0.32 in^4 S_x = 0.29 in^3 Wt. = 1.49 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
3	211	F_b	166	110	91	68	45
4	118	F_b	71	46	38	28	18
5	75	F_b	36	23	19	14	8
6	51	F_b	20	13	10	7	4

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

6 x 1-5/8 x 1/4 CHANNEL

Laterally Supported

A_w = 1.375 in^2 I_x= 10.18 in^4 S_x = 3.39 in^3 Wt. = 1.67 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	823	F_v	---	649	540	405	269
6	626	F_b	599	399	332	249	165
7	459	F_b	392	261	217	162	107
8	351	F_b	269	179	149	111	73
9	277	F_b	192	127	106	79	52
10	224	F_b	141	93	78	58	38
11	185	F_b	107	70	58	43	28
12	155	F_b	82	54	45	33	21
13	132	F_b	65	43	35	26	17
14	113	F_b	52	34	28	20	13
15	98	F_b	42	27	22	16	10

The part weight has been deducted in the above table.

6 x 1-11/16 x 3/8 CHANNEL

Laterally Supported

A_w = 1.969 in^2 I_x= 14.55 in^4 S_x = 4.85 in^3 Wt. = 2.39 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	1178	F_v	---	928	773	579	385
6	895	F_b	857	570	475	355	236
7	657	F_b	560	372	310	232	153
8	502	F_b	384	255	212	158	105
9	396	F_b	274	182	151	112	74
10	320	F_b	202	133	111	82	54
11	264	F_b	152	101	83	62	40
12	222	F_b	118	77	64	47	31
13	188	F_b	92	61	50	37	24
14	162	F_b	74	48	40	29	18
15	141	F_b	60	39	32	23	14

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

8 x 2-3/16 x 3/8 CHANNEL

Laterally Supported

A_w = 2.719 in^2 I_x= 35.77 in^4 S_x = 8.94 in^3 Wt. = 3.20 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	1627	F_v	---	---	---	1235	822
6	1356	F_v	---	1261	1050	787	523
7	1161	F_v	---	845	704	527	350
8	927	F_b	887	590	491	367	244
9	732	F_b	642	426	355	265	175
10	592	F_b	478	317	264	197	130
11	489	F_b	364	241	201	149	98
12	410	F_b	283	188	156	116	76
13	349	F_b	224	148	123	91	59
14	300	F_b	180	119	98	73	47
15	261	F_b	147	97	80	59	38
16	229	F_b	121	79	65	48	31
17	202	F_b	101	66	54	40	25
18	180	F_b	85	55	45	33	21
19	161	F_b	72	46	38	27	17
20	145	F_b	61	39	32	23	14

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

10 x 2-3/4 x 1/2 CHANNEL

Laterally Supported

A_w = 4.50 in^2 I_x= 92.49 in^4 S_x = 18.50 in^3 Wt. = 5.30 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	2244	F_v	---	---	---	1802	1199
7	1923	F_v	---	---	1654	1239	824
8	1682	F_v	---	1414	1177	882	586
9	1494	F_v	---	1037	864	646	429
10	1227	F_b	1174	781	650	486	322
11	1013	F_b	904	600	499	373	247
12	850	F_b	709	470	391	292	193
13	724	F_b	565	375	311	232	153
14	623	F_b	457	303	251	187	123
15	542	F_b	374	248	205	153	100
16	476	F_b	310	205	170	126	82
17	421	F_b	259	171	141	105	68
18	375	F_b	219	144	119	88	56
19	336	F_b	186	122	101	74	47
20	302	F_b	160	104	86	63	40
21	274	F_b	138	90	74	54	34
22	249	F_b	119	78	64	46	29
23	227	F_b	104	67	55	40	25
24	208	F_b	91	59	48	34	21
25	191	F_b	80	51	42	30	18

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

11-1/2 x 2-3/4 x 1/2 CHANNEL

Laterally Supported

A_w = 5.25 in^2 I_x= 124.6 in^4 S_x = 21.67 in^3 Wt. = 6.07 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	2618	F_v	---	---	---	2313	1540
7	2243	F_v	---	---	2143	1605	1068
8	1962	F_v	---	1846	1537	1151	765
9	1743	F_v	---	1362	1134	849	563
10	1438	F_b	---	1029	857	641	425
11	1187	F_b	---	795	661	494	327
12	996	F_b	940	625	519	368	256
13	848	F_b	752	499	414	309	204
14	730	F_b	609	404	335	250	164
15	635	F_b	500	331	275	204	134
16	557	F_b	415	274	227	169	110
17	493	F_b	348	229	190	141	91
18	439	F_b	294	194	160	118	77
19	393	F_b	250	164	136	100	64
20	354	F_b	215	141	116	85	55
21	321	F_b	185	121	100	73	46
22	291	F_b	161	105	86	63	40
23	266	F_b	140	91	75	54	34
24	244	F_b	123	80	65	47	29
25	224	F_b	108	70	57	41	25

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

3 x 1/4 SQUARE TUBE

Laterally Supported

A_w = 1.25 in^2 I_x= 3.50 in^4 S_x = 2.33 in^3 Wt. = 2.07 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
4	935	F_v	710	472	393	294	195
5	618	F_b	380	252	210	156	103
6	428	F_b	224	149	123	92	60
7	314	F_b	142	94	78	58	37
8	240	F_b	96	63	52	38	24
9	189	F_b	67	43	36	26	16
10	152	F_b	48	31	25	18	11
11	125	F_b	36	23	18	13	8
12	105	F_b	27	17	14	9	5

The part weight has been deducted in the above table.

3-1/2 x 1/4 SQUARE TUBE

Laterally Supported

A_w = 1.5 in^2 I_x= 5.73 in^4 S_x = 3.27 in^3 Wt. = 2.49 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
4	1122	F_v	1113	741	617	462	307
5	869	F_b	605	402	335	250	166
6	602	F_b	361	240	199	149	98
7	442	F_b	231	153	127	95	62
8	338	F_b	156	103	85	63	41
9	266	F_b	110	72	60	44	28
10	215	F_b	80	52	43	32	20
11	177	F_b	60	39	32	23	14
12	148	F_b	45	29	24	17	10
13	126	F_b	35	22	18	13	8
14	108	F_b	28	17	14	10	6

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

4 x 1/4 SQUARE TUBE

Laterally Supported

A_w = 1.75 in^2 I_x= 8.82 in^4 S_x = 4.41 in^3 Wt. = 2.83 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
4	1310	F_v	---	1085	903	677	450
5	1047	F_v	900	599	499	373	248
6	814	F_b	543	361	301	225	149
7	597	F_b	351	233	194	144	95
8	456	F_b	238	158	131	98	64
9	360	F_b	169	112	92	69	45
10	291	F_b	123	81	67	50	32
11	240	F_b	93	61	50	37	24
12	201	F_b	71	46	38	28	18
13	171	F_b	56	36	30	21	13
14	147	F_b	44	28	23	17	10
15	128	F_b	35	23	18	13	8

The part weight has been deducted in the above table.

4 x 3/8 SQUARE TUBE

Laterally Supported

A_w = 2.44 in^2 I_x= 12.03 in^4 S_x = 6.01 in^3 Wt. = 4.24 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	1459	F_v	1230	818	681	510	338
6	1108	F_b	742	493	410	306	202
7	813	F_b	478	317	264	196	129
8	621	F_b	325	215	178	132	87
9	490	F_b	230	151	125	93	60
10	396	F_b	168	110	91	67	43
11	326	F_b	126	82	68	49	31
12	273	F_b	96	62	51	37	23
13	232	F_b	75	48	39	28	17
14	199	F_b	59	38	31	22	13
15	173	F_b	47	30	24	17	10
16	151	F_b	38	24	19	13	7
17	134	F_b	31	19	15	10	5
18	119	F_b	25	15	12	8	3
19	106	F_b	21	12	9	6	2
20	95	F_b	17	10	7	4	1

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

4 x 1/8 X 2 X 1/4 RECTANGULAR TUBE

Laterally Supported

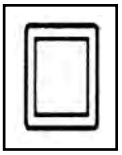
A_w = 0.44 in^2 I_x= 4.38 in^4 S_x = 2.19 in^3 Wt. = 1.46 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
5	262	F_v	---	260	217	162	107
6	218	F_b	---	162	135	101	66
7	187	F_b	161	107	89	66	43
8	163	F_b	111	73	61	45	29
9	145	F_b	79	52	43	32	21
10	130	F_b	58	38	32	23	15
11	118	F_b	44	29	24	17	11
12	99	F_b	34	22	18	13	8

The part weight has been deducted in the above table.

Beams - Allowable Uniform Load Tables (lbs/ft)

6 x 4 x 1/4 RECTANGULAR TUBE



MAJOR AXIS

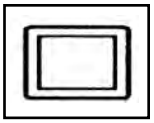
Laterally Supported

A_w = 2.42 in^2 I_x= 22.89 in^4 S_x = 7.63 in^3 Wt. = 3.80 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	1004	F_v	---	862	718	537	357
7	1033	F_b	855	569	473	354	235
8	791	F_b	591	392	326	244	161
9	624	F_b	423	281	233	174	115
10	505	F_b	313	207	172	128	84
11	416	F_b	237	157	130	96	63
12	349	F_b	184	121	100	74	48
13	297	F_b	145	95	79	58	37
14	255	F_b	116	76	63	46	29
15	222	F_b	94	61	50	37	23
16	195	F_b	77	50	41	30	18

The part weight has been deducted in the above table.

MINOR AXIS



Laterally Supported

A_w = 1.54 in^2 I_x= 12.09 in^4 S_x = 6.05 in^3 Wt. = 3.80 lbs./ft.

SPAN FEET	MAXIMUM LOAD		DEFLECTION				
			L/100	L/150	L/180	L/240	L/360
6	638	F_v	---	468	389	291	193
7	546	F_b	461	306	254	190	125
8	477	F_b	316	209	174	129	85
9	424	F_b	225	149	123	92	60
10	381	F_b	166	109	90	67	43
11	329	F_b	125	82	68	50	32
12	276	F_b	96	63	52	38	24
13	235	F_b	75	49	40	29	18
14	202	F_b	60	38	31	23	14
15	175	F_b	48	31	25	18	10
16	154	F_b	39	25	20	14	8

BEARING ON FRP

Bolt Allowable for Given FRP Plate Thickness (1)

MATERIAL THICKNESS	BOLT DIAMETER				
	3/8"	1/2"	5/8"	3/4"	1"
1/8"	469	625	781	938	1250
1/4"	938	1250	1563	1875	2500
3/8"	1406	1875	2344	2813	3750
1/2"	1875	2500	3125	3750	5000
3/4"	2813	3750	4688	5625	7500
1"	3750	5000	6250	7500	10000

(1) BEARING on FRP plate or web controls (Factor of Safety = 3.0; Fp=10,000 psi)
The designer must confirm that no other component of connection controls.

BOLT SHEAR

Bolt Allowable for Given Bolt Diameter (2)

BOLT TYPE & APPLICATION	BOLT DIAMETER				
	3/8"	1/2"	5/8"	3/4"	1"
316SS- single shear (3)	1408	2503	3912	5633	10014
316SS- double shear	2816	5007	7823	11265	20027
FRP threaded rod (4) single shear	300	600	900	1000	2050
FRP threaded rod - double shear	600	1200	1800	2000	4100

(2) The designer must confirm that no other component of connection controls.
*(3) SHEAR of bolt controls. Fv=0.17*FU = 0.17*75,000 psi = 12,750 psi*
(4) SHEAR of FRP threaded rod controls (Factor of Safety = 4.0).
Ultimate values from Dynaform® Design Guide

RATIO OF EDGE DISTANCE TO FASTENER DIAMETER

	RANGE	RECOMMENDED
Edge Distance - cl* bolt to END	2.0-4.0	3.0
Edge Distance - cl* bolt to SIDE	1.5-3.5	2.5
Bolt Pitch - cl* to cl*	4.0-5.0	5.0

** - "cl" is centerline*

Stringer Design Tables

Stringer Design Table - OSHA Design Criteria
3'-0" Wide Stair Only

Notes:
1. Slope range is 30° to 50°
2. OSHA does not limit the maximum rise
3. Design is for a 1000 lb point load, L/D ≥ 180
4. C8 = C 8" x 2-3/16" x 3/8"; C10 = C10" x 2-3/4" x 1/2"

Vertical Rise in Feet	Horizontal Run in Feet																				
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	1	C8																				
	2		C8	C8																		
	3			C8	C8	C8																
	4				C8	C8	C8															
	5					C8	C8	C8	C8						Stringers below double line require lateral bracing.							
	6						C8	C8	C8	C8	C8											
	7						C8	C8	C8	C8	C8	C8	C8									
	8							C8	C8	C8	C8	C8	C8	C8								
	9								C8	C8	C8	C8	C8	C8	C8	C8						
	10		Rise/Run combinations without stringer size fall outside of 30° - 50° slope limits set by OSHA.							C8	C8	C8	C8	C8	C8	C8	C8	C8				
	11										C8	C8	C8	C8	C8	C8	C8	C8	C8	C8		
	12											C8	C8	C8	C8	C8	C8	C8	C8	C8	C8	
	13											C8	C8	C8	C8	C8	C8	C8	C8	C10	C10	C10
	14												C8	C8	C8	C8	C10	C10	C10	C10	C10	C10
	15							Stringers below heavy black line are longer than 20'-0". These require a splice or pull to length.						C10	C10	C10	C10	C10	C10	C10	C10	C10
	16														C10	C10	C10	C10	C10	C10	C10	C10
	17															C10	C10	C10	C10	C10	C10	C10
	18																C10	C10	C10	C10	C10	C10

Stringer Design Tables

Stringer Design Table - UBC Design Criteria
3'-0" Wide Stair Only

Notes:
1. Slope range is 19.5° to 41.6°
2. Landings are required every 12' of rise
3. Design is for a 100 psf point load, L/D ≥ 180
4. C8 = C 8" x 2-3/16" x 3/8"; C10 = C10" x 2-3/4" x 1/2"

Vertical Rise in Feet	Horizontal Run in Feet																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1		C8																	
2			C8	C8	C8														
3				C8	C8	C8	C8	C8								Stringers below double line require lateral bracing.			
4					C8	C8	C8	C8	C8	C8	C8								
5	Rise/Run combinations without stringer size fall outside of slope limits set by UBC.					C8	C8	C8	C8	C8	C8	C10	C10						
6							C8	C8	C8	C8	C8	C10	C10	C10	C10	C10			
7								C8	C8	C8	C8	C10	C10	C10	C10	C10	C8*	C8*	C8*
8									C8	C8	C10	C10	C10	C10	C10	C8*	C8*	C8*	C8*
9											C10	C10	C10	C10	C10	C8*	C8*	C8*	C8*
10								Stringers below heavy black line are longer than 20'-0".				C10	C10	C8*	C8*	C8*	C8*	C8*	C8*
11													C10	C8*	C8*	C8*	C8*	C8*	C8*
12														C10	C8*	C8*	C8*	C8*	C8*

**Indicates that C8 stringers can be used if columns are installed at midspan of stringer. C10 will not work.*

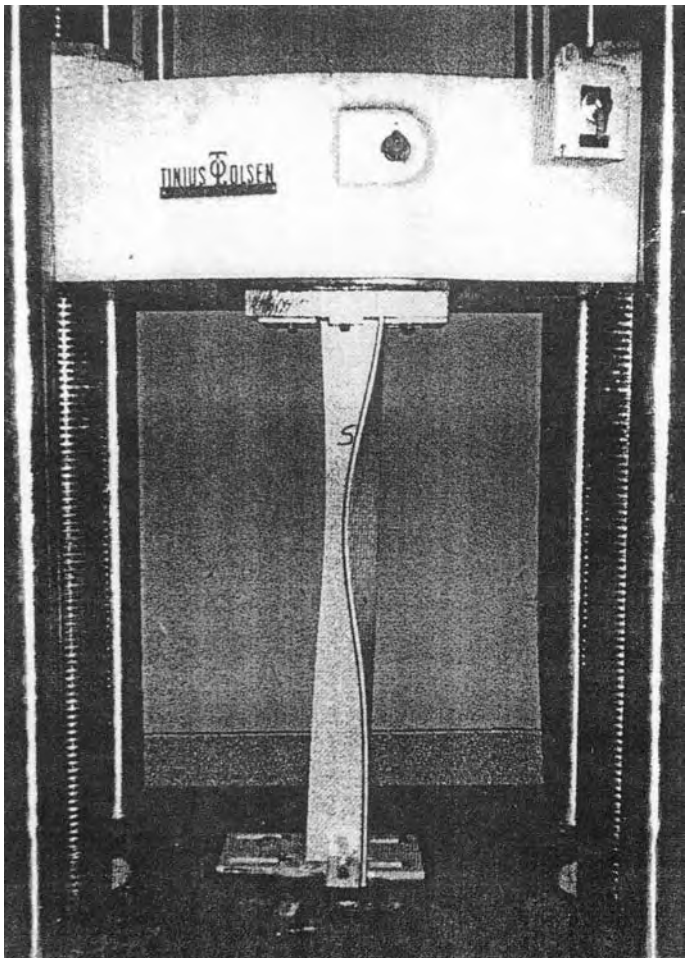
Stringer Design Table - UBC Design Criteria
4'-0" Wide Stair Only

Notes:
1. Slope range is 19.5° to 41.6°
2. Landings are required every 12' of rise
3. Design is for a 100 psf point load, L/D ≥ 180
4. C8 = C 8" x 2-3/16" x 3/8"; C10 = C10" x 2-3/4" x 1/2"

Vertical Rise in Feet	Horizontal Run in Feet																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1		C8																	
2			C8	C8	C8														
3				C8	C8	C8	C8	C8								Stringers below double line require lateral bracing.			
4					C8	C8	C8	C8	C8	C8	C10								
5	Rise/Run combinations without stringer size fall outside of slope limits set by UBC.					C8	C8	C8	C8	C8	C10	C10	C10						
6							C8	C8	C8	C8	C10	C10	C10	C10	C8*	C8*			
7								C8	C8	C8	C8	C10	C10	C10	C8*	C8*	C8*	C8*	C8*
8									C8	C8	C10	C10	C10	C10	C8*	C8*	C8*	C8*	C8*
9											C10	C10	C10	C8*	C8*	C8*	C8*	C8*	C8*
10								Stringers below heavy black line are longer than 20'-0".				C10	C10	C8*	C8*	C8*	C8*	C8*	C8*
11													C10	C8*	C8*	C8*	C8*	C8*	C8*
12														C8*	C8*	C8*	C8*	C8*	C8*

**Indicates that C8 stringers can be used if columns are installed at midspan of stringer. C10 will not work.*

Columns - Allowable Axial Load Tables



8' long - 6" x 6" x 1/2" Angle

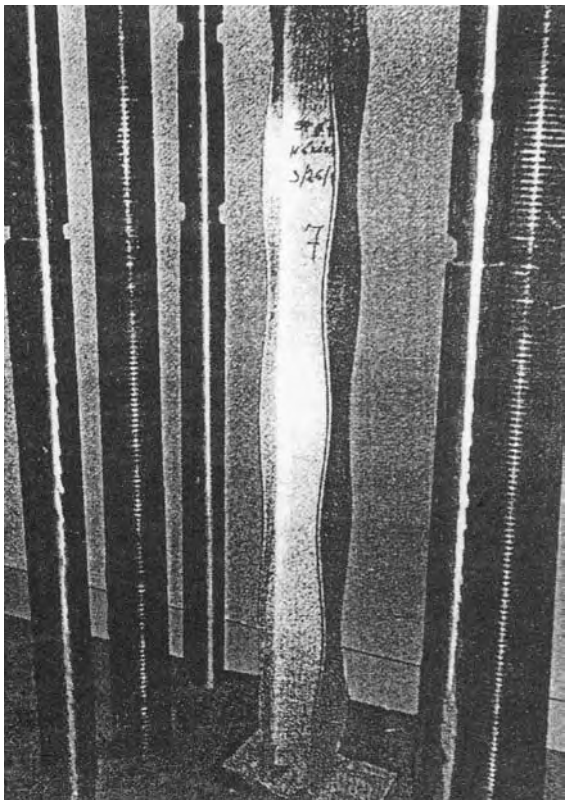
Full section column testing was conducted on equal leg angles, I and Wide Flange Shapes and Square Tubes. Ultimate values were generated through testing of elements with square cut ends placed between the table and the upper, moving platen of a universal testing machine. This test procedure closely simulates how FRP columns will generally be used in practice.

Comparison of test data versus theoretical Euler buckling capacity suggests that the "K" value as tested is approximately 0.70, representing a fixed-pinned condition. The values in the tables represent an FS = 3.0 for the tested condition. Should you feel, however, that your column end conditions closely approximate a pinned-pinned condition ("rounded" column ends are somewhat difficult to achieve in practice) we recommend you multiply the allowable values shown in the tables by the following values:

SHAPE	To Obtain FS = 2.0 multiply by:	To Obtain FS = 3.0 multiply by:
I, W or Angle	0.75	0.50
Square Tube	0.50	0.33

Columns - Allowable Axial Load Tables

Allowable Concentric Axial Stresses and Loads



8' long - 6" x 3/8" WIDE FLANGE SHAPE

NOTATION

A	area (in^2)
b	width of flange/leg/wall (in)
t	thickness of flange (in)
r	minimum radius gyration (in)
l	length (in)
K	effective column length factor
F_a	allowable column concentric axial stress (psi)
P_a	allowable column centric axial load (lbs)

ANGLE

Maximum Allowable Stress:

b/t ≤ 8	4,862 psi
b/t = 10.7	4,194 psi
b/t = 12	3,620 psi
b/t = 16	2,758 psi

SQUARE TUBE (1/4" wall)

Maximum Allowable Stress:

b/t ≤ 10	10,000 psi
b/t = 12	8,880 psi
b/t = 16	6,595 psi

WIDE FLANGE & I SHAPES

Maximum Allowable Stress:

	b/t ≤ 12	10,000 psi
	b/t = 13.3	8,747 psi
t = 1/4"	b/t = 16	7,208 psi
t > 1/4"	b/t = 16	6,233 psi
	b/t = 20	4,920 psi
	b/t = 21.3	4,483 psi
t = 1/4"	b/t = 24	4,167 psi
t > 1/4"	b/t = 24	3,608 psi
	b/t = 26.7	2,732 psi

Columns - Allowable Axial Load Tables

2 x 2 x 1/4 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 0.92 in.^{2} r = 0.38 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,862	4,473
1.0	2,807	2,582
1.5	2,077	1,911
2.0	1,684	1,549
2.5	1,416	1,303
3.0	1,211	1,114
3.5	1,079	993
4.0	988	909
4.5	891	820
5.0	833	766
5.5	752	692
6.0	667	614

The effective "K" value is 0.70. *See page 58 for additional information.*

3 x 3 x 1/4 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 1.42 in.^{2} r = 0.90 in. b/t = 12

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	3,620	5,140
1.0	3,620	5,140
1.5	2,933	4,165
2.0	2,277	3,233
2.5	1,968	2,795
3.0	1,736	2,465
3.5	1,538	2,184
4.0	1,391	1,975
4.5	1,249	1,774
5.0	1,146	1,627
5.5	1,070	1,519
6.0	1,010	1,434
6.5	952	1,352
7.0	889	1,262
7.5	849	1,206
8.0	815	1,157
8.5	757	1,075
9.0	708	1,005
9.5	665	944

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

3 x 3 x 3/8 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 2.09 in.^{2} r = 0.59 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,862	10,162
1.0	4,862	10,162
1.5	2,933	6,130
2.0	2,277	4,759
2.5	1,968	4,113
3.0	1,736	3,628
3.5	1,538	3,214
4.0	1,391	2,907
4.5	1,249	2,610
5.0	1,146	2,395
5.5	1,070	2,236
6.0	1,010	2,111
6.5	952	1,990
7.0	889	1,858
7.5	849	1,774
8.0	815	1,703
8.5	757	1,582
9.0	708	1,480
9.5	665	1,390

The effective "K" value is 0.70. *See page 58 for additional information.*

3 x 3 x 1/2 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 2.70 in.^{2} r = 0.59 in. b/t = 6

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,862	13,127
1.0	4,862	13,127
1.5	2,933	7,919
2.0	2,277	6,148
2.5	1,968	5,314
3.0	1,736	4,687
3.5	1,538	4,153
4.0	1,391	3,756
4.5	1,249	3,372
5.0	1,146	3,094
5.5	1,070	2,889
6.0	1,010	2,727
6.5	952	2,570
7.0	889	2,400
7.5	849	2,292
8.0	815	2,201
8.5	757	2,044
9.0	708	1,912
9.5	665	1,796

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

4 x 4 x 1/4 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 1.92 in.^{2} r = 0.80 in. b/t = 16

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	2,758	5,295
1.0	2,758	5,295
1.5	2,758	5,295
2.0	2,758	5,295
2.5	2,393	4,595
3.0	2,133	4,095
3.5	1,914	3,675
4.0	1,760	3,379
4.5	1,603	3,078
5.0	1,482	2,845
5.5	1,379	2,648
6.0	1,283	2,463
6.5	1,187	2,279
7.0	1,123	2,156
7.5	1,064	2,043
8.0	1,020	1,958
8.5	980	1,882
9.0	933	1,791
9.5	889	1,707
10.0	860	1,651
10.5	834	1,601
11.0	802	1,540
11.5	759	1,457
12.0	727	1,396
12.5	693	1,331
13.0	660	1,267

The effective "K" value is 0.70. *See page 58 for additional information.*

4 x 4 x 3/8 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 2.84 in.^{2} r = 0.79 in. b/t = 10.7

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,194	11,911
1.0	4,194	11,911
1.5	4,194	11,911
2.0	2,947	8,369
2.5	2,367	6,722
3.0	2,113	6,001
3.5	1,896	5,385
4.0	1,741	4,944
4.5	1,586	4,504
5.0	1,461	4,149
5.5	1,364	3,874
6.0	1,260	3,578
6.5	1,177	3,343
7.0	1,113	3,161
7.5	1,048	2,976
8.0	1,012	2,874
8.5	969	2,752
9.0	922	2,618
9.5	878	2,494
10.0	853	2,423
10.5	828	2,352
11.0	791	2,246
11.5	745	2,116
12.0	712	2,022
12.5	680	1,931
13.0	652	1,852

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

4 x 4 x 1/2 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 3.70 in.^{2} r = 0.78 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,862	17,989
1.0	4,862	17,989
1.5	4,862	17,989
2.0	2,904	10,745
2.5	2,350	8,695
3.0	2,098	7,763
3.5	1,884	6,971
4.0	1,724	6,379
4.5	1,570	5,809
5.0	1,446	5,350
5.5	1,350	4,995
6.0	1,234	4,565
6.5	1,167	4,318
7.0	1,095	4,051
7.5	1,036	3,833
8.0	1,005	3,719
8.5	959	3,548
9.0	912	3,374
9.5	872	3,226
10.0	847	3,134
10.5	821	3,038
11.0	777	2,875
11.5	735	2,720
12.0	704	2,605

The effective "K" value is 0.70. *See page 58 for additional information.*

6 x 6 x 3/8 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 4.33 in.^{2} r = 1.14 in. b/t = 16

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	2,758	11,942
1.0	2,758	11,942
1.5	2,758	11,942
2.0	2,758	11,942
2.5	2,758	11,942
3.0	2,758	11,942
3.5	2,427	10,509
4.0	2,229	9,652
4.5	2,060	8,920
5.0	1,911	8,275
5.5	1,802	7,803
6.0	1,684	7,292
6.5	1,585	6,863
7.0	1,503	6,508
7.5	1,416	6,131
8.0	1,354	5,863
8.5	1,289	5,581
9.0	1,211	5,244
9.5	1,167	5,053

True Length (ft)	F_a (psi)	P_a (lbs)
10.0	1,121	4,854
10.5	1,079	4,672
11.0	1,041	4,508
11.5	1,015	4,395
12.0	988	4,278
12.5	955	4,135
13.0	922	3,992
13.5	892	3,862
14.0	872	3,776
14.5	851	3,685
15.0	833	3,607
15.5	813	3,520
16.0	782	3,386
16.5	752	3,256
17.0	729	3,157
17.5	706	3,057
18.0	680	2,944
18.5	660	2,858

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

6 x 6 x 1/2 ANGLE

Allowable Concentric Axial Stresses and Loads

A = 5.70 in.^{2} r = 1.19 in. b/t = 12

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	3,620	20,634
1.0	3,620	20,634
1.5	3,620	20,634
2.0	3,620	20,634
2.5	3,620	20,634
3.0	2,960	16,872
3.5	2,512	14,318
4.0	2,290	13,053
4.5	2,120	12,084
5.0	1,984	11,309
5.5	1,844	10,511
6.0	1,748	9,964
6.5	1,642	9,359
7.0	1,548	8,824
7.5	1,469	8,373
8.0	1,397	7,963
8.5	1,337	7,621
9.0	1,267	7,222
9.5	1,202	6,851
10.0	1,157	6,595

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	1,117	6,367
11.0	1,076	6,133
11.5	1,033	5,888
12.0	1,015	5,786
12.5	989	5,637
13.0	958	5,461
13.5	927	5,284
14.0	896	5,107
14.5	873	4,976
15.0	855	4,874
15.5	839	4,782
16.0	822	4,685
16.5	794	4,526
17.0	765	4,361
17.5	737	4,201
18.0	717	4,087
18.5	699	3,984
19.0	672	3,830
19.5	655	3,734

The effective "K" value is 0.70. *See page 58 for additional information.*

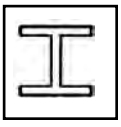
3 x 1 1/2 x 1/4 I SHAPE

Allowable Concentric Axial Stresses and Loads

A = 1.38 in.^{2} r = .32 in. b/t = 6

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	13,800
1.0	8,121	11,207
1.5	5,155	7,114
2.0	3,583	4,945
2.5	2,462	3,398
3.0	1,683	2,323
3.5	1,278	1,764
4.0	1,027	1,417
4.5	843	1,163
5.0	652	900

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

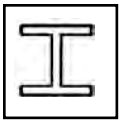
4 x 2 x 1/4 I SHAPE

Allowable Concentric Axial Stresses and Loads

A = 1.88 in.^{2} r = 0.43 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	18,800
1.0	10,000	18,800
1.5	7,107	13,361
2.0	5,206	9,787
2.5	4,061	7,635
3.0	3,017	5,672
3.5	2,248	4,226
4.0	1,717	3,228
4.5	1,373	2,581
5.0	1,147	2,156
5.5	992	1,865
6.0	854	1,606
6.5	713	1,340
7.0	567	1,066

The effective "K" value is 0.70. *See page 58 for additional information.*



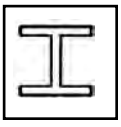
6 x 3 x 1/4 I SHAPE

Allowable Concentric Axial Stresses and Loads

A = 2.88 in.^{2} r = 0.63 in. b/t = 12

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	28,800
1.0	10,000	28,800
1.5	10,000	28,800
2.0	7,944	22,879
2.5	6,127	17,646
3.0	5,083	14,639
3.5	4,255	12,254
4.0	3,486	10,040
4.5	2,886	8,312
5.0	2,380	6,854
5.5	1,974	5,685
6.0	1,623	4,674
6.5	1,403	4,041
7.0	1,245	3,586
7.5	1,105	3,182
8.0	1,003	2,889
8.5	908	2,615
9.0	817	2,353
9.5	717	2,065
10.0	615	1,771
10.5	520	1,498

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

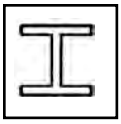
6 x 3 x 3/8 I SHAPE

Allowable Concentric Axial Stresses and Loads

A = 4.23 in.^{2} r = 0.64 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	42,300
1.0	10,000	42,300
1.5	10,000	42,300
2.0	7,700	32,571
2.5	5,415	22,905
3.0	4,237	17,923
3.5	3,450	14,594
4.0	2,833	11,984
4.5	2,297	9,716
5.0	1,843	7,796
5.5	1,563	6,611
6.0	1,347	5,698
6.5	1,169	4,945
7.0	1,050	4,442
7.5	923	3,904
8.0	800	3,384
8.5	721	3,050
9.0	647	2,737
9.5	586	2,479
10.0	525	2,221
10.5	479	2,026

The effective "K" value is 0.70. *See page 58 for additional information.*



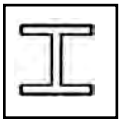
8 x 4 x 3/8 I SHAPE

Allowable Concentric Axial Stresses and Loads

A = 5.73 in.^{2} r = 0.84 in. b/t = 10.7

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	57,300
1.0	10,000	57,300
1.5	10,000	57,300
2.0	10,000	57,300
2.5	8,370	47,960
3.0	6,182	35,423
3.5	4,917	28,174
4.0	4,157	23,820
4.5	3,558	20,387
5.0	3,063	17,551
5.5	2,598	14,887
6.0	2,232	12,789
6.5	1,888	10,818
7.0	1,667	9,552
7.5	1,461	8,372
8.0	1,311	7,512
8.5	1,176	6,738
9.0	1,085	6,217
9.5	997	5,713
10.0	888	5,088
10.5	800	4,584
11.0	741	4,246
11.5	680	3,896
12.0	630	3,610
12.5	582	3,335
13.0	535	3,066
13.5	498	2,854
14.0	467	2,676

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

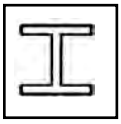
8 x 4 x 1/2 I SHAPE

Allowable Concentric Axial Stresses and Loads

A = 7.51 in.^{2} r = 0.85 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	75,100
1.0	10,000	75,100
1.5	10,000	75,100
2.0	10,000	75,100
2.5	8,597	64,563
3.0	6,303	47,336
3.5	5,016	37,670
4.0	4,217	31,670
4.5	3,620	27,186
5.0	3,103	23,304
5.5	2,660	19,977
6.0	2,282	17,138
6.5	1,943	14,592
7.0	1,697	12,744
7.5	1,485	11,152
8.0	1,340	10,063
8.5	1,200	9,012
9.0	1,102	8,276
9.5	1,015	7,623
10.0	914	6,864
10.5	822	6,173
11.0	755	5,670
11.5	697	5,234
12.0	644	4,836
12.5	596	4,476
13.0	549	4,123
13.5	510	3,830
14.0	476	3,575

The effective "K" value is 0.70. *See page 58 for additional information.*



10 x 5 x 3/8 I SHAPE

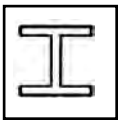
Allowable Concentric Axial Stresses and Loads

A = 7.22 in.^{2} r = 1.04 in. b/t = 13.3

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	8,747	63,153
1.0	8,747	63,153
1.5	8,747	63,153
2.0	8,747	63,153
2.5	8,747	63,153
3.0	8,747	63,153
3.5	6,814	49,197
4.0	5,520	39,854
4.5	4,711	34,013
5.0	4,097	29,580
5.5	3,620	26,136
6.0	3,186	23,003
6.5	2,833	20,454
7.0	2,470	17,833
7.5	2,188	15,797
8.0	1,918	13,848
8.5	1,714	12,375

True Length (ft)	F_a (psi)	P_a (lbs)
9.0	1,540	11,119
9.5	1,404	10,137
10.0	1,288	9,299
10.5	1,179	8,512
11.0	1,103	7,964
11.5	1,033	7,458
12.0	954	6,888
12.5	869	6,274
13.0	800	5,776
13.5	751	5,422
14.0	704	5,083
14.5	658	4,751
15.0	619	4,469
15.5	581	4,195
16.0	543	3,920
16.5	511	3,689
17.0	482	3,480

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

10 x 5 x 1/2 I SHAPE

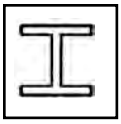
Allowable Concentric Axial Stresses and Loads

A = 9.51 in.^{2} r = 1.05 in. b/t = 10

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	95,100
1.0	10,000	95,100
1.5	10,000	95,100
2.0	10,000	95,100
2.5	10,000	95,100
3.0	9,163	87,140
3.5	6,917	65,781
4.0	5,605	53,304
4.5	4,765	45,315
5.0	4,157	39,533
5.5	3,666	34,864
6.0	3,227	30,689
6.5	2,880	27,389
7.0	2,517	23,937
7.5	2,232	21,226
8.0	1,963	18,668
8.5	1,739	16,538
9.0	1,564	14,874

True Length (ft)	F_a (psi)	P_a (lbs)
9.5	1,429	13,590
10.0	1,311	12,468
10.5	1,200	11,412
11.0	1,120	10,651
11.5	1,049	9,976
12.0	975	9,272
12.5	889	8,484
13.0	818	7,779
13.5	764	7,266
14.0	717	6,819
14.5	669	6,362
15.0	630	5,991
15.5	592	5,630
16.0	554	5,269
16.5	520	4,945
17.0	491	4,669
17.5	467	4,441

The effective "K" value is 0.70. *See page 58 for additional information.*



12 x 6 x 1/2 I SHAPE

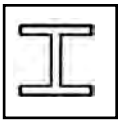
Allowable Concentric Axial Stresses and Loads

A = 11.51 in.^{2} r = 1.26 in. b/t = 12

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	115,100
1.0	10,000	115,100
1.5	10,000	115,100
2.0	10,000	115,100
2.5	10,000	115,100
3.0	10,000	115,100
3.5	9,800	112,798
4.0	7,512	86,348
4.5	6,182	71,155
5.0	5,310	61,118
5.5	4,653	53,556
6.0	4,157	47,847
6.5	3,741	43,059
7.0	3,364	38,720
7.5	3,063	35,255
8.0	2,753	31,687
8.5	2,458	28,292
9.0	2,232	25,690
9.5	2,008	23,112
10.0	1,793	20,637

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	1,667	19,187
11.0	1,513	17,415
11.5	1,411	16,241
12.0	1,311	15,090
12.5	1,217	14,008
13.0	1,144	13,167
13.5	1,084	12,477
14.0	1,025	11,798
14.5	960	11,050
15.0	888	10,221
15.5	828	9,530
16.0	780	8,978
16.5	741	8,529
17.0	701	8,069
17.5	662	7,620
18.0	630	7,251
18.5	598	6,883
19.0	567	6,526
19.5	535	6,158
20.0	510	5,870

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

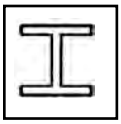
3 x 3 x 1/4 WIDE FLANGE SHAPE

Allowable Concentric Axial Stresses and Loads

A = 2.13 in.^{2} r = 0.73 in. b/t = 12

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	21,300
1.0	10,000	21,300
1.5	10,000	21,300
2.0	10,000	21,300
2.5	7,271	15,487
3.0	5,915	12,599
3.5	5,046	10,748
4.0	4,318	9,197
4.5	3,667	7,811
5.0	3,105	6,614
5.5	2,647	5,638
6.0	2,208	4,703
6.5	1,907	4,062
7.0	1,597	3,402
7.5	1,412	3,008
8.0	1,274	3,714
8.5	1,145	2,439
9.0	1,048	2,232
9.5	965	2,055
10.0	883	1,881
10.5	803	1,710
11.0	719	1,531
11.5	633	1,348
12.0	547	1,165

The effective "K" value is 0.70. See page 58 for additional information.



4 x 4 x 1/4 WIDE FLANGE SHAPE

Allowable Concentric Axial Stresses and Loads

A = 2.89 in.^{2} r = 0.96 in. b/t = 16

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	7,208	20,831
1.0	7,208	20,831
1.5	7,208	20,831
2.0	7,208	20,831
2.5	7,208	20,831
3.0	7,208	20,831
3.5	6,697	19,354
4.0	5,838	16,872
4.5	5,155	14,898
5.0	4,621	13,355
5.5	4,050	11,705
6.0	3,583	10,355
6.5	3,163	9,141
7.0	2,792	8,069
7.5	2,452	7,115
8.0	2,150	6,214
8.5	1,923	5,557
9.0	1,683	4,864
9.5	1,503	4,344
10.0	1,383	3,997
10.5	1,278	3,693
11.0	1,174	3,393
11.5	1,095	3,165
12.0	1,027	2,968
12.5	964	2,786
13.0	902	2,607
13.5	843	2,436
14.0	777	2,246
14.5	714	2,063
15.0	652	1,884
15.5	582	1,682
16.0	520	1,503

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

6 x 6 x 1/4 WIDE FLANGE SHAPE

Allowable Concentric Axial Stresses and Loads

A = 4.39 in.^{2} r = 1.43 in. b/t = 24

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,167	18,293
1.0	4,167	18,293
1.5	4,167	18,293
2.0	4,167	18,293
2.5	4,167	18,293
3.0	4,167	18,293
3.5	4,167	18,293
4.0	4,167	18,293
4.5	4,167	18,293
5.0	4,167	18,293
5.5	4,167	18,293
6.0	4,167	18,293
6.5	4,167	18,293
7.0	3,997	17,547
7.5	3,666	16,094
8.0	3,334	14,636
8.5	3,068	13,469
9.0	2,800	12,292
9.5	2,534	11,124
10.0	2,322	10,194
10.5	2,097	9,206
11.0	1,917	8,416
11.5	1,754	7,700
12.0	1,644	7,217
12.5	1,510	6,629
13.0	1,419	6,229
13.5	1,332	5,847
14.0	1,244	5,461
14.5	1,171	5,141
15.0	1,118	4,908
15.5	1,066	4,680
16.0	1,013	4,447
16.5	954	4,188
17.0	891	3,911
17.5	834	3,661
18.0	792	3,477
18.5	756	3,319
19.0	722	3,170
19.5	687	3,016
20.0	655	2,875

The effective "K" value is 0.70. *See page 58 for additional information.*

6 x 6 x 3/8 WIDE FLANGE SHAPE

Allowable Concentric Axial Stresses and Loads

A = 6.48 in.^{2} r = 1.44 in. b/t = 16

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	6,233	40,390
1.0	6,233	40,390
1.5	6,233	40,390
2.0	6,233	40,390
2.5	6,233	40,390
3.0	6,233	40,390
3.5	6,233	40,390
4.0	6,233	40,390
4.5	6,233	40,390
5.0	6,233	40,390
5.5	5,586	36,197
6.0	4,917	31,862
6.5	4,447	28,817
7.0	4,037	26,160
7.5	3,695	23,944
8.0	3,365	21,805
8.5	3,093	20,043
9.0	2,833	18,358
9.5	2,563	16,608
10.0	2,345	15,196

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	2,123	13,757
11.0	1,948	12,623
11.5	1,774	11,496
12.0	1,667	10,802
12.5	1,528	9,901
13.0	1,436	9,305
13.5	1,347	8,729
14.0	1,260	8,165
14.5	1,206	7,815
15.0	1,129	7,316
15.5	1,076	6,972
16.0	1,025	6,642
16.5	969	6,279
17.0	906	5,871
17.5	845	5,476
18.0	800	5,184
18.5	765	4,957
19.0	731	4,737
19.5	696	4,510
20.0	662	4,290

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

8 x 8 x 3/8 WIDE FLANGE SHAPE

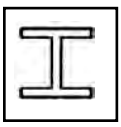
Allowable Concentric Axial Stresses and Loads

A = 8.73 in.^{2} r = 1.92 in. b/t = 21.3

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,483	39,137
1.0	4,483	39,137
1.5	4,483	39,137
2.0	4,483	39,137
2.5	4,483	39,137
3.0	4,483	39,137
3.5	4,483	39,137
4.0	4,483	39,137
4.5	4,483	39,137
5.0	4,483	39,137
5.5	4,483	39,137
6.0	4,483	39,137
6.5	4,483	39,137
7.0	4,483	39,137
7.5	4,483	39,137
8.0	4,483	39,137
8.5	4,483	39,137
9.0	4,237	36,989
9.5	3,927	34,283
10.0	3,695	32,257

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	3,450	30,119
11.0	3,213	28,049
11.5	3,038	26,522
12.0	2,833	24,732
12.5	2,627	22,934
13.0	2,442	21,319
13.5	2,297	20,053
14.0	2,129	18,586
14.5	2,003	17,486
15.0	1,843	16,089
15.5	1,744	15,225
16.0	1,667	14,553
16.5	1,563	13,645
17.0	1,477	12,894
17.5	1,413	12,335
18.0	1,348	11,768
18.5	1,283	11,201
19.0	1,220	10,651
19.5	1,169	10,205
20.0	1,129	9,856

The effective "K" value is 0.70. *See page 58 for additional information.*



8 x 8 x 1/2 WIDE FLANGE SHAPE

Allowable Concentric Axial Stresses and Loads

A = 11.51 in.^{2} r = 1.93 in. b/t = 16

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	6,233	71,742
1.0	6,233	71,742
1.5	6,233	71,742
2.0	6,233	71,742
2.5	6,233	71,742
3.0	6,233	71,742
3.5	6,233	71,742
4.0	6,233	71,742
4.5	6,233	71,742
5.0	6,233	71,742
5.5	6,233	71,742
6.0	6,233	71,742
6.5	6,233	71,742
7.0	6,037	69,486
7.5	5,460	62,845
8.0	4,966	57,159
8.5	4,606	53,015
9.0	4,267	49,133
9.5	3,957	45,545
10.0	3,718	42,794

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	3,475	39,997
11.0	3,240	37,292
11.5	3,058	35,198
12.0	2,860	32,919
12.5	2,653	30,536
13.0	2,470	28,430
13.5	2,321	26,715
14.0	2,158	24,839
14.5	2,023	23,285
15.0	1,868	21,501
15.5	1,757	20,223
16.0	1,679	19,325
16.5	1,580	18,186
17.0	1,491	17,161
17.5	1,425	16,402
18.0	1,360	15,654
18.5	1,296	14,917
19.0	1,231	14,169
19.5	1,179	13,570
20.0	1,137	13,087

The effective "K" value is 0.70. *See page 58 for additional information.*

Columns - Allowable Axial Load Tables

10 x 10 x 3/8 WIDE FLANGE SHAPE

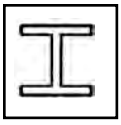
Allowable Concentric Axial Stresses and Loads

A = 11.06 in.^{2} r = 2.38 in. b/t = 26.7

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	2,732	30,216
1.0	2,732	30,216
1.5	2,732	30,216
2.0	2,732	30,216
2.5	2,732	30,216
3.0	2,732	30,216
3.5	2,732	30,216
4.0	2,732	30,216
4.5	2,732	30,216
5.0	2,732	30,216
5.5	2,732	30,216
6.0	2,732	30,216
6.5	2,732	30,216
7.0	2,732	30,216
7.5	2,732	30,216
8.0	2,732	30,216
8.5	2,732	30,216
9.0	2,732	30,216
9.5	2,732	30,216
10.0	2,732	30,216

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	2,732	30,216
11.0	2,732	30,216
11.5	2,732	30,216
12.0	2,732	30,216
12.5	2,732	30,216
13.0	2,732	30,216
13.5	2,732	30,216
14.0	2,732	30,216
14.5	2,732	30,216
15.0	2,732	30,216
15.5	2,621	28,988
16.0	2,476	27,385
16.5	2,349	25,980
17.0	2,232	24,686
17.5	2,093	23,149
18.0	1,993	22,043
18.5	1,868	20,660
19.0	1,773	19,609
19.5	1,709	18,902
20.0	1,640	18,138

The effective "K" value is 0.70. *See page 58 for additional information.*



10 x 10 x 1/2 WIDE FLANGE SHAPE

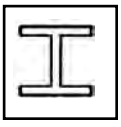
Allowable Concentric Axial Stresses and Loads

A = 14.51 in.^{2} r = 2.4 in. b/t = 20

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	4,920	71,389
1.0	4,920	71,389
1.5	4,920	71,389
2.0	4,920	71,389
2.5	4,920	71,389
3.0	4,920	71,389
3.5	4,920	71,389
4.0	4,920	71,389
4.5	4,920	71,389
5.0	4,920	71,389
5.5	4,920	71,389
6.0	4,920	71,389
6.5	4,920	71,389
7.0	4,920	71,389
7.5	4,920	71,389
8.0	4,920	71,389
8.5	4,920	71,389
9.0	4,920	71,389
9.5	4,920	71,389
10.0	4,917	71,346

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	4,641	67,341
11.0	4,367	63,365
11.5	4,117	59,738
12.0	3,867	56,110
12.5	3,695	53,614
13.0	3,500	50,785
13.5	3,304	47,941
14.0	3,133	45,460
14.5	2,999	43,515
15.0	2,833	41,107
15.5	2,966	43,037
16.0	2,517	36,522
16.5	2,379	34,519
17.0	2,267	32,894
17.5	2,129	30,892
18.0	2,033	29,499
18.5	1,908	27,685
19.0	1,800	26,118
19.5	1,729	25,088
20.0	1,667	24,188

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

12 x 12 x 1/2 WIDE FLANGE SHAPE

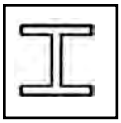
Allowable Concentric Axial Stresses and Loads

A = 17.51 in.^{2} r = 2.87 in. b/t = 24

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	3,608	63,176
1.0	3,608	63,176
1.5	3,608	63,176
2.0	3,608	63,176
2.5	3,608	63,176
3.0	3,608	63,176
3.5	3,608	63,176
4.0	3,608	63,176
4.5	3,608	63,176
5.0	3,608	63,176
5.5	3,608	63,176
6.0	3,608	63,176
6.5	3,608	63,176
7.0	3,608	63,176
7.5	3,608	63,176
8.0	3,608	63,176
8.5	3,608	63,176
9.0	3,608	63,176
9.5	3,608	63,176
10.0	3,608	63,176

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	3,608	63,176
11.0	3,608	63,176
11.5	3,608	63,176
12.0	3,608	63,176
12.5	3,608	63,176
13.0	3,608	63,176
13.5	3,608	63,176
14.0	3,608	63,176
14.5	3,608	63,176
15.0	3,608	63,176
15.5	3,516	61,565
16.0	3,349	58,641
16.5	3,200	56,032
17.0	3,078	53,896
17.5	2,954	51,725
18.0	2,813	49,256
18.5	2,673	46,804
19.0	2,552	44,686
19.5	2,429	42,532
20.0	2,333	40,851

The effective "K" value is 0.70. *See page 58 for additional information.*



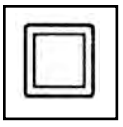
2 x 2 x 1/4 SQUARE TUBE

Allowable Concentric Axial Stresses and Loads

A = 1.74 in.^{2} r = 0.73 in. b/t = 8

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	17,400
1.0	10,000	17,400
1.5	10,000	17,400
2.0	9,850	17,139
2.5	8,650	15,051
3.0	7,450	12,963
3.5	6,491	11,294
4.0	5,684	9,890
4.5	5,000	8,700
5.0	4,253	7,400
5.5	3,726	6,483
6.0	3,188	5,547
6.5	2,786	4,848
7.0	2,454	4,270
7.5	2,111	3,673
8.0	1,895	3,297
8.5	1,722	2,996
9.0	1,585	2,758
9.5	1,448	2,520
10.0	1,370	2,384
10.5	1,276	2,220
11.0	1,189	2,069
11.5	1,079	1,877
12.0	957	1,665

The effective "K" value is 0.70. See page 58 for additional information.



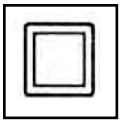
Columns - Allowable Axial Load Tables

2-1/2 x 2-1/2 x 1/4 SQUARE TUBE

Allowable Concentric Axial Stresses and Loads

A = 2.24 in.^{2} r = 0.92 in. b/t = 10

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	10,000	22,400
1.0	10,000	22,400
1.5	10,000	22,400
2.0	10,000	22,400
2.5	9,900	22,176
3.0	8,816	19,748
3.5	7,842	17,566
4.0	7,078	15,855
4.5	6,351	14,226
5.0	5,733	12,842
5.5	5,192	11,630
6.0	4,675	10,472
6.5	4,146	9,287
7.0	3,673	8,228
7.5	3,246	7,271
8.0	2,904	6,505
8.5	2,629	5,889
9.0	2,358	5,282
9.5	2,087	4,675
10.0	1,923	4,308
10.5	1,825	4,088
11.0	1,641	3,676
11.5	1,533	3,434
12.0	1,445	3,237
12.5	1,387	3,107
13.0	1,320	2,957
13.5	1,239	2,775
14.0	1,163	2,605
14.5	1,077	2,412
15.0	977	2,188



The effective "K" value is 0.70. See page 58 for additional information.

3 x 3 x 1/4 SQUARE TUBE

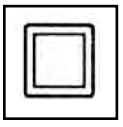
Allowable Concentric Axial Stresses and Loads

A = 2.74 in.^{2} r = 1.13 in. b/t = 12

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	8,880	24,331
1.0	8,880	24,331
1.5	8,880	24,331
2.0	8,880	24,331
2.5	8,880	24,331
3.0	8,880	24,331
3.5	8,880	24,331
4.0	8,237	22,668
4.5	7,573	20,750
5.0	6,976	19,114
5.5	6,386	17,498
6.0	5,857	16,048
6.5	5,416	14,840
7.0	4,977	13,637
7.5	4,566	12,511
8.0	4,133	11,324
8.5	3,732	10,226
9.0	3,397	9,308

True Length (ft)	F_a (psi)	P_a (lbs)
9.5	3,046	8,346
10.0	2,821	7,730
10.5	2,604	7,135
11.0	2,383	6,529
11.5	2,163	5,927
12.0	2,013	5,516
12.5	1,865	5,110
13.0	1,748	4,790
13.5	1,643	4,502
14.0	1,565	4,288
14.5	1,467	4,020
15.0	1,428	3,913
15.5	1,367	3,746
16.0	1,308	3,584
16.5	1,248	3,420
17.0	1,193	3,269
17.5	1,121	3,072
18.0	1,052	2,882

The effective "K" value is 0.70. *See page 58 for additional information.*



Columns - Allowable Axial Load Tables

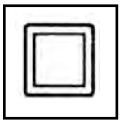
3-1/2 x 1/4 SQUARE TUBE

Allowable Concentric Axial Stresses and Loads

A = 3.24 in.^{2} r = 1.53 in.

True Length (ft)	F_a (psi)	P_a (lbs)
1.0	7,575	24,543
1.5	7,575	24,543
2.0	7,575	24,543
2.5	7,575	24,543
3.0	7,575	24,543
3.5	7,575	24,543
4.0	7,575	24,543
4.5	7,575	24,543
5.0	7,575	24,543
5.5	7,333	23,759
6.0	6,595	21,368
6.5	6,304	20,425
7.0	5,866	19,006
7.5	5,483	17,765
8.0	5,109	16,553
8.5	4,753	15,400
9.0	4,313	13,974
9.5	4,034	13,070
10.0	3,697	11,978
10.5	3,400	11,016
11.0	3,083	9,989
11.5	2,896	9,383
12.0	2,689	8,712
12.5	2,516	8,152
13.0	2,325	7,533

The effective "K" value is 0.70. See page 58 for additional information.



4 x 4 x 1/4 SQUARE TUBE

Allowable Concentric Axial Stresses and Loads

A = 3.74 in.^{2} r = 1.53 in. b/t = 16

True Length (ft)	F_a (psi)	P_a (lbs)
0.5	6,595	24,665
1.0	6,595	24,665
1.5	6,595	24,665
2.0	6,595	24,665
2.5	6,595	24,665
3.0	6,595	24,665
3.5	6,595	24,665
4.0	6,595	24,665
4.5	6,595	24,665
5.0	6,595	24,665
5.5	6,595	24,665
6.0	6,595	24,665
6.5	6,595	24,665
7.0	6,595	24,665
7.5	6,349	23,745
8.0	5,941	22,219
8.5	5,608	20,974
9.0	5,283	19,758
9.5	4,962	18,558
10.0	4,666	17,451

True Length (ft)	F_a (psi)	P_a (lbs)
10.5	4,306	16,104
11.0	4,025	15,054
11.5	3,738	13,980
12.0	3,493	13,064
12.5	3,233	12,091
13.0	3,000	11,220
13.5	2,836	10,607
14.0	2,672	9,993
14.5	2,511	9,391
15.0	2,350	8,789
15.5	2,225	8,322
16.0	2,052	7,674
16.5	1,948	7,286
17.0	1,850	6,919
17.5	1,767	6,609
18.0	1,687	6,309
18.5	1,631	6,100
19.0	1,558	5,827
19.5	1,484	5,550
20.0	1,441	5,389

The effective "K" value is 0.70. *See page 58 for additional information.*

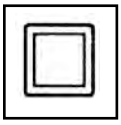
Columns - Allowable Axial Load Tables

4 x 4 x 3/8 SQUARE TUBE

Allowable Concentric Axial Stresses and Loads

A = 5.23 in.^{2} r = 1.48 in.

True Length (ft)	F_a (psi)	P_a (lbs)
1.0	6,595	34,492
1.5	6,595	34,492
2.0	6,595	34,492
2.5	6,595	34,492
3.0	6,595	34.492
3.5	6,595	34,492
4.0	6,595	34,492
4.5	6,595	34,492
5.0	6,595	34,492
5.5	6,595	34,492
6.0	6,595	34,492
6.5	6,318	33,043
7.0	5,895	30,831
7.5	5,490	28,713
8.0	5,175	27,065
8.5	4,874	25,491
9.0	4,576	23,932
9.5	4,298	22,479
10.0	3,960	20,711
10.5	3,712	19,414
11.0	3,420	17,887
11.5	3,209	16,783
12.0	2,961	15,486
12.5	2,719	14,220
13.0	2,566	13,420
13.5	2,411	12,610
14.0	2,268	11,862
14.5	2,113	11,051
15.0	1,964	10,272



The effective "K" value is 0.70. See page 58 for additional information.

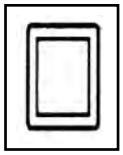
6 x 4 x 1/4 RECTANGULAR TUBE

Allowable Concentric Axial Stresses and Loads

A = 4.68 in.^{2} r = 1.61 in.

True Length (ft)	F_a (psi)	P_a (lbs)
1.0	5,935	27,776
1.5	5,935	27,776
2.0	5,935	27,776
2.5	5,935	27,776
3.0	5,935	27,776
3.5	5,935	27,776
4.0	5,935	27,776
4.5	5,935	27,776
5.0	5,935	27,776
5.5	5,935	27,776
6.0	5,935	27,776
6.5	5,935	27,776
7.0	5,935	27,776
7.5	5,935	27,776
8.0	5,620	26,302
8.5	5,295	24,781
9.0	5,017	23,480
9.5	4,710	22,043
10.0	4,466	20,901
10.5	4,208	19,693
11.0	3,899	18,247
11.5	3,678	17,213
12.0	3,415	15,982
12.5	3,220	15,070
13.0	2,976	13,928
13.5	2,753	12,884
14.0	2,614	12,234
14.5	2,442	11,429
15.0	2,313	10,825
15.5	2,194	10,268
16.0	2,054	9,613

The effective "K" value is 0.70. See page 58 for additional information.



Columns - Allowable Axial Load Tables

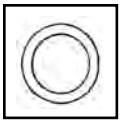
3 x 1/2 ROUND TUBE

Allowable Concentric Axial Stresses and Loads

A = 3.93 in.^{2} r = 0.9 in.

True Length (ft)	F_a (psi)	P_a (lbs)
1.0	7,992	31,409
1.5	7,992	31,409
2.0	7,992	31,409
2.5	7,992	31,409
3.0	7,800	30,654
3.5	6,944	27,290
4.0	6,255	24,582
4.5	5,580	21,929
5.0	5,047	19,835
5.5	4,553	17,893
6.0	4,079	16,030
6.5	3,605	14,168
7.0	3,191	12,541
7.5	2,774	10,902
8.0	2,513	9,876
8.5	2,276	8,945
9.0	2,025	7,958

The effective "K" value is 0.70. *See page 58 for additional information.*



Chemical

- Elevated Walkways in Tank Farms
- Access Platforms for Process Vessels and Tanks
- Platforms Over Piping and Equipment
- Chemical Loading/Unloading Platforms
- Walkways, Skids and Platforms for Chemical Storage Areas
- Access Systems for Hazardous Waste Areas

Food & Beverage

- Elevated Crossovers at Machinery
- Support Platforms for Materials Storage
- Wastewater Treatment Areas
- Loading Docks

Water & Wastewater

- Filter Media Support Grids & Structures (Biofilter, Trickling Filters, Etc.)
- Tank & Equipment Access Platforms
- Elevated Platforms & Walkways
- Air Intake Access & Safety
- Ships Ladders

Oil & Gas

- Boat Landings, Splash Zone Areas
- Stairways, Decking, Bridges, Catwalks
- Chemical Injection Skids (Access Platforms)
- Walkways over Mud Pits/Mud Tanks
- Access Platforms for Metering Stations, Valve Operations and Other Areas
- Communications/Radar Platforms
- Support, Protection for Subsea Components
- Drilling Derrick
- Ship's Ladders

Recreation

- Boat Docks, Walkways
- Stairways, Decking, Bridges, Catwalks
- Access Platforms, Ramps
- Aquatic Facility Drainage Areas/Walkways
- Mechanical Rooms
- Storage Areas
- Playground Structures
- Golf Course Bridges and Cart Path Areas
- Nature Trail Bridges, Ramps and Outlooks

Pulp & Paper

- Scrubbers - Media Support, Structures
- Tank Farm Walkways
- Waste Treatment Walkways
- Chemical Unloading Structures
- Wood Yard Conveyor Systems
- Liquor Storage Areas
- Crossovers

Microelectronics

- Plating Line Platforms
- Wastewater Neutralization Platforms and Walkways
- Corrosive Storage
- Raised Access Flooring in Etching Lines
- Bulk Chemical Distribution Platforms and Walkways
- Acid Waste Neutralization (AWN) Platforms and Walkways
- Cooling Tower Basins
- Central Utility Building (CUB) Platforms and Walkways

Transportation

- Loading/Unloading Platforms
- Rail Washdown & Offloading Areas
- Maintenance/Inspection Platforms for Bridges
- Platforms for Mass Transit
- At Grade Crossings
- Platforms at Diesel Refueling Facilities
- Elevated Platforms for Light Rail Car Maintenance
- Pit Covers in Light Rail Maintenance Facilities
- Covers for Electrified Cable Ways

Metals & Mining

- Elevated Walkways in Electrowinning Areas
- Stairways to Chemical Storage Tanks
- Walkway Supports & Stairways in Refineries
- Support for Walkways Around Flotation Cells & Flotation Cell Support
- Walkways and Access Stairways to Thickeners
- Piping Supports, Walkways and Stairways in Sulfuric Acid Plants & Smelters
- Walkways, Stairways and Equipment Supports in High-sulfur Coal Prep Plants

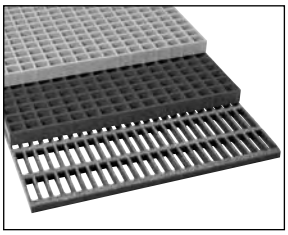
Power

- Platforms/Walkways Around Sumps and Trenches
- Platforms/Accesways Around Tanks & Injection Skids
- Gratings Subject to Coal Dust, Fly Ash, Bottom Ash, Gypsom, Limestone
- FGD Scrubber Environments
- Intake Structures
- Cooling Tower Structures and Walkways

Pharmaceutical

- Tank & Equipment Access Platforms
- Stairways & Landings
- Filter Media Support Grids & Structures (Biofilter, Trickling Filters, Etc.)
- Elevated Platforms & Walkways

Fibergrate Products & Services

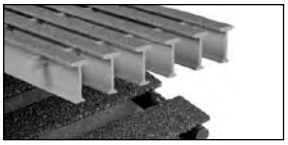


Fibergrate® Molded Grating

Fibergrate molded gratings are designed to provide the ultimate in reliable performance, even in the most demanding conditions. Fibergrate offers the widest selection in the market with more than ten resins including Chemgrate CP-84 and more than twenty grating configurations available in many panel sizes and surfaces.

RIGIDEX® Moltruded® Grating

RIGIDEX Moltruded gratings are the first fiberglass gratings to combine the corrosion resistance of molded grating with the longer span capacity of pultruded grating, all at the low cost of metal gratings.



Safe-T-Span® Pultruded Industrial and Pedestrian Gratings

Combining corrosion resistance, long-life and low-maintenance designs, Safe-T-Span provides unidirectional strength for industrial and pedestrian pultruded grating applications.

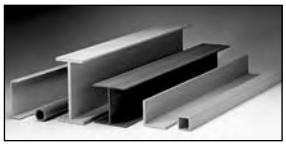
Dynarail® Handrail

Easily assembled from durable prefabricated components or engineered to your specifications, Dynarail handrail meets or exceeds OSHA and strict building code requirements for safety and design.

Dynarail® Safety Ladder System

Easily assembled on site, Dynarail safety ladder systems meet or exceed OSHA requirements. Though less costly than prefabricated ladder systems, these safety ladders provide a custom fit to the supporting structure.

Dynaform® Structural Shapes



Fibergrate offers a wide range of pultruded structural components for industrial use, including bars, rods, tubes, beams, channels, leg angles and plates.

Stair Solutions

Fibergrate offers a wide range of slip-resistant products to meet your stair safety needs. These durable products which include treads, tread covers and covered stair treads are a long-term, cost-efficient solution for your facility.

Grating Pedestals

Uniquely designed adjustable single and quad head pedestals for square mesh molded grating are manufactured to provide safe and economical support for elevated flooring.

Engineering and Fabrication Services

Combining engineering expertise with an understanding of fiberglass applications, Fibergrate provides turnkey design and fabrication of fiberglass structures, including platforms, catwalks, stairways and test racks.

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