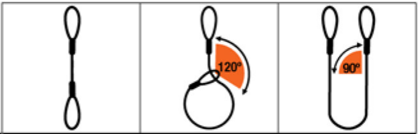
WIRE ROPE SLINGS 6x19 and 6x36 Class

EIPS – MS – Fiber Core
(extra improved plow steel, mechanical splice, fiber core)



Wire Rope Size (in.)	Working Load Limit (tons)		
	Vertical (1 Leg)	Single Choker	Basket 90º
1/4	0.56	0.42	1.10
5/16	0.87	0.66	1.70
3/8	1.20	0.94	2.50
7/16	1.70	1.30	3.40
1/2	2.20	1.60	4.40
9/16	2.70	2.10	5.50
5/8	3.40	2.60	6.80
3/4	4.80	3.70	9.70
7/8	6.60	5.00	13.00
1	8.30	6.40	17.00
1-1/8	10.00	8.10	21.00
1-1/4	13.00	9.90	26.00

Based on OSHA standards - Always use the sling tag for the working load limits or consult sling manufacturer.

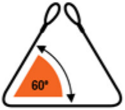
Note: Rated loads based on a minimum D/d of 25:1

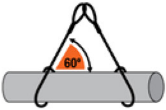
Values listed in US tons.

WIRE ROPE SLINGS 6x19 and 6x36 Class

EIPS – MS – Fiber Core

(extra improved plow steel, mechanical splice, fiber core)





Wire Rope Size (in.)	Working Load Limit (tons)			
	Basket 60°	Basket 30°	Two Chokers 60°	Two Chokers 30°
1/4	0.97	0.56	0.73	0.42
5/16	1.50	0.87	1.10	0.66
3/8	2.20	1.20	1.60	0.94
7/16	2.90	1.70	2.20	1.30
1/2	3.80	2.20	2.90	1.60
9/16	4.80	2.70	3.60	2.10
5/8	5.90	3.40	4.50	2.60
3/4	8.40	4.80	6.30	3.70
7/8	11.00	6.60	8.60	5.00
1	14.00	8.30	11.00	6.40
1-1/8	18.00	10.00	14.00	8.10
1-1/4	22.00	13.00	17.00	9.90

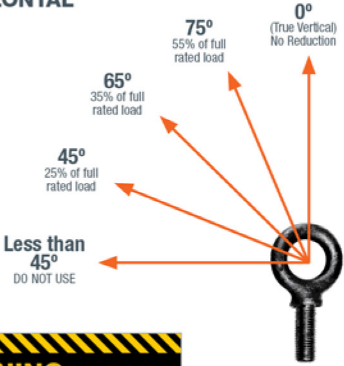
Based on OSHA standards - Always use the sling tag for the working load limits or consult sling manufacturer.

Note: Rated loads based on a minimum D/d of 25:1

Values listed in US tons.

EYE BOLTS

SHOULDER EYE BOLTS WORKING LOAD LIMIT ANGLE TO HORIZONTAL



WARNING
DO NOT USE AT ANGLES LESS THAN 45º

Size (in.)	Working Load Limit (lbs.)			
	0º True Vertical	75º 55% of FULL WLL	65º 35% of FULL WLL	45º 25% of FULL WLL
1/4 x 20	500	275	175	125
5/16 x 18	900	495	315	225
3/8 x 16	1,300	715	455	325
7/16 x 14	1,800	990	630	450
1/2 x 13	2,400	1,320	840	600
5/8 x 11	4,000	2,200	1,400	1,000
3/4 x 10	5,000	2,750	1,750	1,250
7/8 x 9	7,000	3,850	2,450	1,750
1 x 8	9,000	4,950	3,150	2,250
1-1/8 x 7	12,000	6,600	4,200	3,000
1-1/4 x 7	15,000	8,250	5,250	3,750
1-1/2 x 6	21,000	11,550	7,350	5,250

Always consult manufacturer's loads charts before using eye bolts.

HOIST RING & EYE BOLT USE

MINIMUM ENGAGEMENT DEPTH

Hoist rings and eye bolts should be threaded into the surface a minimum of 1-1/2 times the thread diameter.

Example:
The minimum engagement depth for an eye bolt with a 1/2" diameter would be 3/4"

ALWAYS PULL LOAD IN THE PLANE OF THE EYE

Never go below 45° side pull

SIDE LOADING

Vertical pull should be used whenever possible. **Only shoulder eye bolts may be side loaded.**

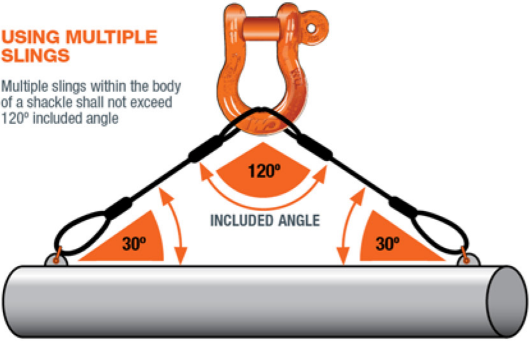
* per ASME B30.26-2.9.4.2 "when used in a tapped blind hole, the effective thread length shall be at least 1-1/2 times the diameter of the bold for engagement in steel... For other thread engagements or in other materials, contact the eye bolt manufacturer or a qualified person"

Always verify manufacturer's information prior to use.

SHACKLE AND SLING USE

USING MULTIPLE SLINGS

Multiple slings within the body of a shackle shall not exceed 120º included angle



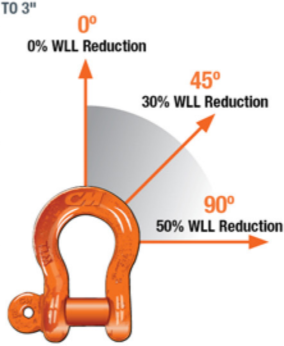
SIDE LOADING

When side loading a shackle with a single sling, the rated WLL will be reduced in accordance with the manufacturer's recommendation or a qualified person. ASME B30.26 recommends reducing the capacity of a side loaded shackle from 30% to 50% as shown below.

WLL REDUCTIONS

FOR ALL SHACKLE STYLES SIZES 3/16" TO 3"

Angles in Degrees	Working Load Limit Reduction
0° to 10°	0%
11° to 20°	15%
21° to 30°	25%
31° to 45°	30%
46° to 55°	40%
56° to 70°	45%
71° to 90°	50%



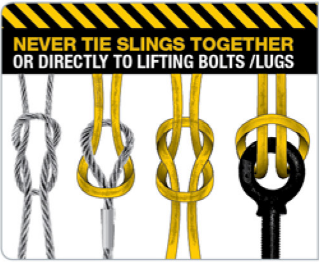
NEVER SIDE LOAD ROUND PIN SHACKLES

Always verify manufacturer's information prior to use.

SHACKLE AND SLING USE

CONNECTING SLINGS TOGETHER

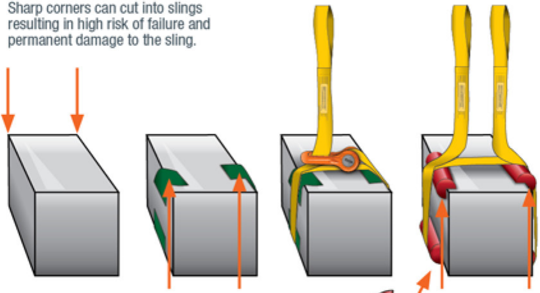
A shackle may be used to connect slings together.



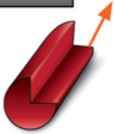
PROTECT YOUR SLING FROM CORNERS & SHARP EDGES

These safe practices apply to all types of slings

Sharp corners can cut into slings resulting in high risk of failure and permanent damage to the sling.



To protect the sling, sharp edges and corners that come in contact the sling should be padded with material of sufficient strength.



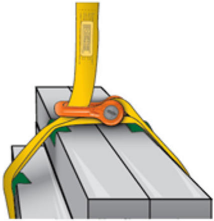
Change the profile of a corner in contact with a sling to a radius with padding.

SHACKLE USE

Attach multiple sling legs to the bow, not to the pin. This can damage and weaken the sling.

When point loading shackle to shackle, connect: **Bow to Bow** or **Bow to Pin**

Loading should stay centered and/or in line.



The bow of shackle should be put into the bit of a choke.

The shackle must be equal to or larger than the wire rope diameter.

To avoid pinching and binding of synthetic slings, shackle must be large enough.

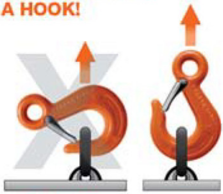
HOOK USE

HOOK LATCHES

CORRECT INCORRECT

Hook latches (when required) must be in good working condition. If not, the hook should be removed from service.

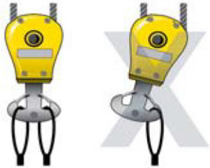
NEVER TIP LOAD A HOOK!



INCORRECT CORRECT

DUPLEX HOOKS

Must be loaded equally on both sides

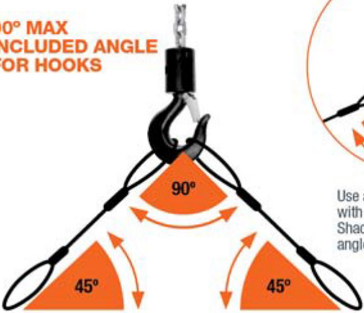


CORRECT INCORRECT

SELECTING THE RIGHT SIZE HOOK/SLING

Be sure the component is of adequate size and shape so that it can be properly seated in the saddle of hook or lifting device.

90º MAX INCLUDED ANGLE FOR HOOKS



Use a shackle when working with low horizontal angles. Shackles can be used with angles up to 120°.

Always verify manufacturer's information prior to use.

WIRE ROPE CLIPS

Rope Diameter (in.)	No. of Clips	Turnback (in.)	Torque (ft.-lbs.) (unlubed bolts)
1/8	2	3-1/4	4-1/2
3/16	2	3-3/4	7-1/2
1/4	2	4-3/4	15
5/16	2	5-1/4	30
3/8	2	6-1/2	45
7/16	2	7	65
1/2	3	11-1/2	65
9/16	3	12	95
5/8	3	12	95
3/4	4	18	130
7/8	4	20	225
1	5	26	225

PROPER USE OF WIRE ROPE CLIPS

NOTE: Mechanical spliced or flemished eyes slings are the preferred method of wire rope sling construction. OSHA does not allow the use of clips to form the eyes of wire rope slings.

WARNING
NEVER INSTALL THE U-BOLT ON THE LIVE SIDE!

IMPROPER USE OF WIRE ROPE CLIPS

Always verify manufacturer's information prior to use.

TENSION CALCULATOR

BY USING ANGLES

Here is how to calculate the tension on a sling when used at angles other than 90° vertical.

Step 1:
Identify the Load Angle Factor (L.A.F.) based on the horizontal angle.

Step 2:
Use the formula below
(Weight ÷ No. of legs) x L.A.F.

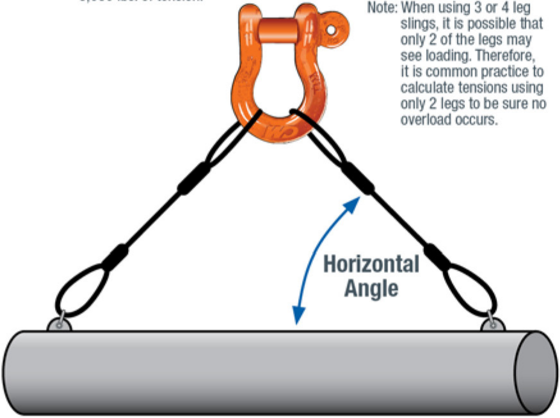
Example: If the load weight is 8,000 lbs. and three (3) slings are used at a 60° angle each:

(8,000 ÷ 3) x 1.155 = 3,080 lbs.

Therefore, each leg will have 3,080 lbs. of tension.

Horizontal Angle	L.A.F.
30°	2.00
35°	1.742
40°	1.555
45°	1.414
50°	1.305
55°	1.221
60°	1.155
65°	1.104
70°	1.064
75°	1.035
80°	1.015
85°	1.004
90°	1.00

Note: When using 3 or 4 leg slings, it is possible that only 2 of the legs may see loading. Therefore, it is common practice to calculate tensions using only 2 legs to be sure no overload occurs.



Always verify calculations with a qualified person.

TENSION CALCULATOR

BY USING MEASUREMENTS

When working in the field, determining the exact horizontal angles can be difficult.

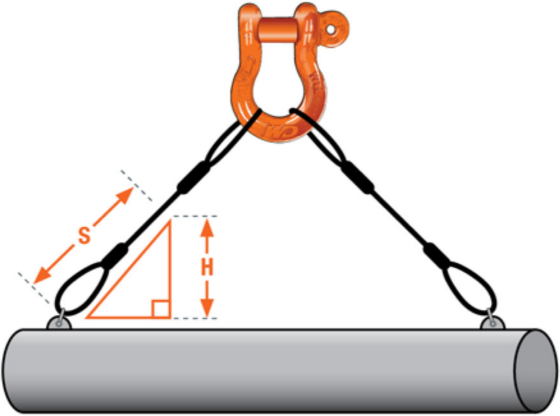
We can calculate the tension based on what information we do know, and apply this formula:

(Weight ÷ Number of legs) x (S ÷ H)

Example: The load weight is 12,000 lbs. and two (2) slings are used. You measure up the sling 48" (the "S" dimension) and then measure straight down and get a 30" measurement (the "H" dimension)

(12,000 ÷ 2) x (48 ÷ 30) = 9,600 lbs. of tension per leg
6,000 x 1.6 = 9,600 lbs. of tension per leg (1.6 is the calculated L.A.F.)

Therefore, each leg will have 9,600 lbs. of tension.



Note: When using 3 or 4 leg slings, it is possible that only 2 of the legs may see loading. Therefore, it is common practice to calculate tensions using only 2 legs to be sure no overload occurs.

Always verify calculations with a qualified person.

LOAD ANGLE TENSION CHART

Share of Load (lbs.)	Load on Each Leg (lbs.) Sling Angle (Load Angle Factor)				
	30° (2)	45° (1.414)	60° (1.155)	75° (1.035)	90° (1)
100	200	141	116	104	100
200	400	283	231	207	200
300	600	424	347	311	300
400	800	566	462	414	400
500	1,000	707	578	518	500
600	1,200	848	693	621	600
700	1,400	990	809	725	700
800	1,600	1,131	924	828	800
900	1,800	1,273	1,040	932	900
1,000	2,000	1,414	1,155	1,035	1,000
1,100	2,200	1,555	1,271	1,139	1,100
1,200	2,400	1,697	1,386	1,242	1,200
1,300	2,600	1,838	1,502	1,346	1,300
1,400	2,800	1,980	1,617	1,449	1,400
1,500	3,000	2,121	1,733	1,553	1,500
1,600	3,200	2,262	1,848	1,656	1,600
1,700	3,400	2,404	1,964	1,760	1,700
1,800	3,600	2,545	2,079	1,863	1,800
1,900	3,800	2,687	2,195	1,967	1,900
2,000	4,000	2,828	2,310	2,070	2,000
2,100	4,200	2,969	2,426	2,174	2,100
2,200	4,400	3,111	2,541	2,277	2,200
2,300	4,600	3,252	2,657	2,381	2,300
2,400	4,800	3,394	2,772	2,484	2,400
2,500	5,000	3,535	2,888	2,588	2,500

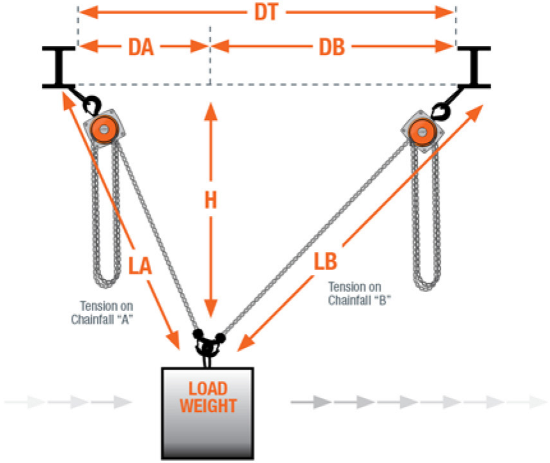
Always verify tension calculations with a qualified person.

DRIFTING LOADS

To calculate the amount of tension on chainfalls used in angular rigging applications, the following formula should be used:

TENSION ON CHAINFALL "A" =
(Load Weight x DB x LA) ÷ (H x DT)

TENSION ON CHAINFALL "B" =
(Load Weight x DA x LB) ÷ (H x DT)



The CM Hurricane 360° hand chain hoist is ideal for load drifting

NOTE: THIS FORMULA IS BASED ON BOTH CHAINFALLS POSITIONED AT THE SAME ELEVATION

Always verify calculations with a qualified person.

EXAMPLE OF A LOAD DRIFT WITH VALUES USED:

DA = 36"	DB = 60"	DT = 96"
LA = 96"	LB = 120"	H = 60"

Load Weight = 1,500 lbs.

EXAMPLE CALCULATIONS

Tension for CM Hurricane 360° Chainfall "A" =
(Load x DB x LA) ÷ (H x DT)
(1,500 lbs. x 60" x 96") ÷ (60" x 96")
(8,640,000) ÷ (5,760)

1,500 lbs. of tension on CM Hurricane 360° Chainfall "A"

Tension for Hurricane 360° Chainfall "B" =
(Load x DA x LB) ÷ (H x DT)
(1,500 lbs. x 36" x 120") ÷ (60" x 96")
(6,480,000) ÷ (5,760)

1,125 lbs. of tension on CM Hurricane 360° Chainfall "B"

WARNING!
AN ENGINEER SHALL ANALYZE YOUR SUPPORT STRUCTURE BEFORE DRIFTING LOADS

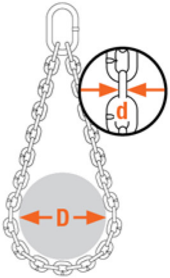
Always verify calculations with a qualified person.

D/d RATIOS

These charts show reductions in working load limits when using basket type slings.

ALLOY CHAIN D/d RATIOS

This chart shows reductions in working load limits of a basket type alloy chain sling based on D/d ratio. Consult with the manufacturer for any D/d ratio below 2:1.



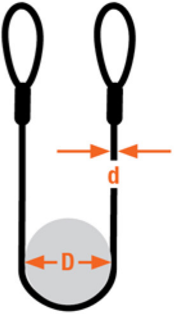
D/d Ratio	% Rated Capacity
6 and above	100
5/1	90
4/1	80
3/1	70
2/1	60

Note:
"D" = Diameter of the object contacting the sling
"d" = Diameter of the link body

Source: National Association of Chain Manufacturers

WIRE ROPE D/d RATIOS

Wire rope capacities are reduced when wire rope sling body is bending around a sharp corner.



D/d Ratio	% Rated Capacity
25/1	100%
20/1	92%
10/1	86%
4/1	75%
2/1	65%
1/1	50%

Note:
"D" = Diameter of the object contacting the sling
"d" = Diameter of the wire rope

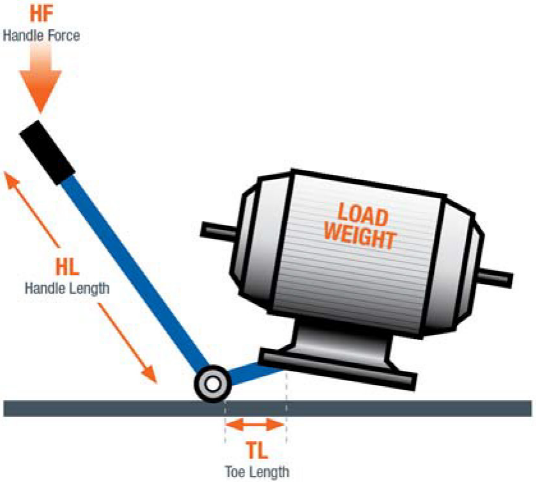
LEVERAGE

To calculate the amount of handle force required to raise a load, one of the following formulas should be used:

HF x HL = (Load Weight ÷ 2) x TL

HF = [(Load Weight ÷ 2) x TL)] ÷ HL

Example: **How much handle force is required to raise load 3 in.?**
List of known values:
HF = ?
HL = 48 in.
LOAD WEIGHT = 1,200 lbs.
TL = 5 in.
HF = [(Load Weight ÷ 2) x TL)] ÷ HL
HF = [(1,200 ÷ 2) x 5)] ÷ 48
HF = (600 x 5) ÷ 48
HF = (3,000) ÷ 48
HF = 62.5 lbs.



Always verify calculations with a qualified person.

PULLING FORCE

To calculate the pulling force required to move a load on a level or inclined plane, use the corresponding formula below:

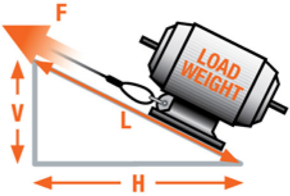
TO MOVE A LOAD ON A LEVEL PLANE

$$F = CF \times W$$

TO MOVE A LOAD ON AN UPHILL INCLINE

$$F = [(CF \times W) \times (H \div L)] + [(V \div L) \times W]$$

Note: For inclines greater than 45° from horizontal this formula will not produce accurate results



TO MOVE A LOAD ON DOWNHILL

$$F = [(CF \times W) \times (H \div L)] - [(V \div L) \times W]$$

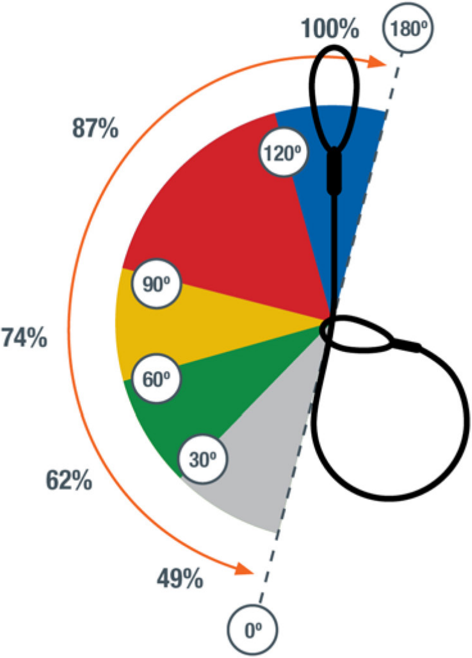
F = Force required to move load
CF = Coefficient of friction
W = Load weight
V = Vertical distance in feet (height)
H = Horizontal distance in feet (run)

* Values apply to hard, clean surfaces sliding against one another. Actual CF values may differ depending on actual application surface conditions.

Always verify calculations with a qualified person.

Coefficient of Friction for Popular Surfaces*	
Wood on wood	0.50
Wood on metal	0.30
Wood on concrete	0.45
Concrete on concrete	0.65
Metal on concrete	0.60
Steel on steel	0.20
Cast iron on steel	0.25
Load on wheels	0.05
Load on ice	0.01

CHOKE REDUCTIONS



Choker Hitch Rated Capacity Adjustment	
Angle of Choke	**% of Rated Capacity**
Over 120°	100%
90° to 120°	87%
60° to 89°	74%
30° to 59°	62%
0° to 29°	49%

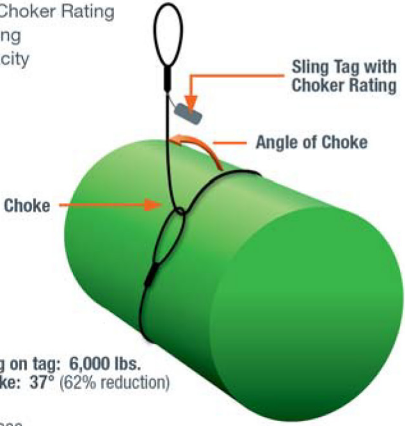
CHOKE REDUCTIONS

TO CALCULATE ADJUSTED CHOKER RATINGS

Use the formula below:

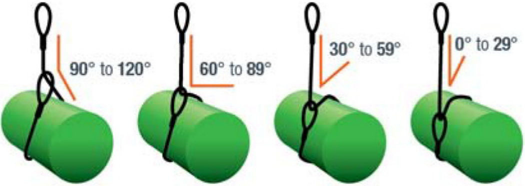
RC = C x R

RC: Reduced Choker Rating
C: Choker Rating
R: Rated Capacity



Example:
Choker rating on tag: 6,000 lbs.
Angle of Choke: 37° (62% reduction)

RC = C x R
RC = .62 x 6,000
RC = 3,720
Reduced Rating: 3,720 lbs.

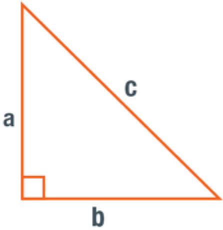


87% OF RATED CAPACITY	**74%** OF RATED CAPACITY	**62%** OF RATED CAPACITY	**49%** OF RATED CAPACITY

Always verify calculations with a qualified person.

EQUATIONS

HOW TO DETERMINE THE DIMENSIONS OF A RIGHT ANGLE TRIANGLE:



$$a = \sqrt{c^2 - b^2} \qquad c^2 - b^2 = a^2$$

$$b = \sqrt{c^2 - a^2} \qquad a^2 - c^2 = b^2$$

$$c = \sqrt{a^2 + b^2} \qquad a^2 + b^2 = c^2$$

UNIT OF MEASURE CONVERSIONS

Units of Measure		
1 US pound (lb.)	=	16 oz.
1 US pound (lb.)	=	.45 kg
1 kilogram (kg)	=	2.2 lb.
1 kilogram (kg)	=	35 oz.
1 kilogram (kg)	=	1,000 grams
1 US ton (short)	=	2,000 lbs.
1 US ton (short)	=	.91 metric tons
1 US ton (short)	=	907 kg.
1 metric ton	=	2204.62 lb.
1 metric ton	=	1.102 US tons
1 metric ton	=	1,000 kg.
1 liter	=	.264 gallons (US)
1 liter	=	1.06 quarts
1 US (liq) gallon	=	4 quarts
1 US (liq) gallon	=	3.8 liters
1 US gallon water	=	8.3 lb.
1 cubic ft. of liquid	=	7.5 US gallons

Always verify calculations with a qualified person.

MATERIAL WEIGHTS

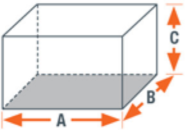
Material	Weight (lbs.)	
	Per Cu. Ft.	Per Cu. In.
Aluminum	165	0.0955
Brass	535	0.3096
Brick Masonry (common)	125	0.0723
Bronze	500	0.2894
Cast Iron	480	0.2778
Cement (portland, loose)	94	0.0544
Concrete (stone aggregate)	144	0.0833
Copper	560	0.3241
Earth (dry)	75	0.0434
Earth (wet)	100	0.0579
Ice	56	0.0324
Lead	710	0.4109
Snow (fresh fallen)	8	0.0046
Snow (wet)	35	0.0203
Steel	490	0.2836
Tin	460	0.2662
Water	62	0.0359
Gypsum Wall Board	54	0.0313
Wood (pine)	30	0.0174

CALCULATING WEIGHT AND VOLUME

WEIGHT = Volume x Material Weight per x Cu. Inch or Foot

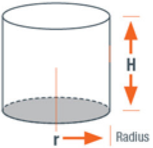
CUBE:

VOLUME = A x B x C



CYLINDER:

VOLUME = $\pi r^2 \times H$



Always verify calculations with a qualified person.