**HOW TO FIGURE HORSEPOWER AND TORQUE**

| To Obtain | Having | Formula |
|---|---|---|
| Velocity (V) Feet Per Minute | Pitch Diameter (D) of Gear or sprocket – Inches & Rev. Per Min. (RPM) | V = 2618 x D x RPM |
| Rev. per Min. (RPM) | Velocity (V) Ft. Per Min. & Pitch Diameter (D) of Gear or Sprocket – Inches | $RMP = \frac{V}{.268 \times D}$ |
| Pitch Diameter (D) of Gear or Sprocket – Inches | Velocity (V) Ft. Per Min & Rev. Per Min. (RPM) | $D = \frac{V}{.2618 \times RPM}$ |
| Torque (T) In. Lbs. | Force (W) Lbs. & Radius (R) Inches | T = W x R |
| Horsepower (HP) | Force (W) Lbs. & Velocity (V) Ft. Per Min. | $HP = \frac{W \times V}{33000}$ |
| Horsepower (HP) | Torque (T) In Lbs. & Rev. per Min. (RPM) | $HP = \frac{T \times TPM}{63025}$ |
| Torque (T) In. Lbs. | Horsepower (HP) & Rev. Per Min. (RPM) | $T = \frac{63025 \times HP}{RPM}$ |
| Force (W) Lbs. | Horsepower (HP) & Velocity (V) Ft. Per Min. | $W = \frac{33000 \times HP}{V}$ |
| Rev. Per Min. (RPM) | Horsepower (HP) & Torque (TP) In. Lbs. | $RPM = \frac{63025 \times H^{P}}{T}$ |

**POWER** is the rate of doing work.

**WORK** is the exerting of a FORCE through a DISTANCE. ONE FOOT POUND is a unit of WORK. It is the WORK done in exerting a FORCE OF ONE POUND through a DISTANCE of ONE FOOT.

**THE AMOUNT OF WORK** done (Foot Pounds) is the FORCE (Pounds) exerted multiplied by the DISTANCE(Feet) through which the FORCE acts.

**THE AMOUNT OF POWER** used (Foot Pounds per Minute( is the WORK (Foot Pounds) done divided by the TIME (Minutes) required.

$$\text{POWER (Foot Pounds per Minute)} = \frac{\text{WORK (Ft. Lbs.)}}{\text{TIME (Minutes)}}$$

**POWER** is usually expressed in terms of HORSEPOWER.

**HORSEPOWER** is POWER (Foot Pounds per Minute) divided by 33,000.

$$\text{HORSEPOWER (HP)} = \frac{\text{POWER (Ft. Lbs. per Minute)}}{33{,}000}$$

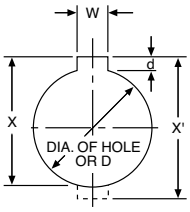
$$= \frac{\text{WORK (Ft. Pounds)}}{33{,}000 \times \text{TIME (Min.)}}$$

$$= \frac{\text{FORCE (Lbs.)} \times \text{DISTANCE (Feet)}}{33{,}000 \times \text{TIME (Min.)}}$$

$$\text{HORSEPOWER (HP)} = \frac{\text{FORCE (Lbs.)} \times \text{DISTANCE (Feet)}}{33{,}000 \times \text{TIME (Min.)}}$$

**STANDARD KEYWAYS & SETSCREW**

| Diam. of Hole | Standard Keyway W | Standard Keyway D | Recommended Setscrew |
|---|---|---|---|
| 5/16 to 7/16" | 3/32" | 3/64" | 10–32 |
| 1/2 to 9/16 | 1/8 | 1/16 | 1/4–20 |
| 5/8 to 7/8 | 3/16 | 3/32 | 5/16–18 |
| 15/16 to 1-1/4 | 1/4 | 1/8 | 3/8–16 |
| 1-5/16 to 1-3/8 | 5/16 | 5/32 | 7/16–14 |
| 1-7/16 to 1-3/4 | 3/8 | 3/16 | 1/2–13 |
| 1-13/16 to2-1/4 | 1/2 | 1/4 | 9/16–12 |
| 2-5/16 to 20-3/4 | 5/8 | 5/16 | 5/8–11 |
| 2-13/16 to 3-1/4 | 3/4 | 3/8 | 3/4–10 |
| 3-5/16 to 3-3/4 | 7/8 | 7/16 | 7/8–9 |
| 3-13/16 to 4-1/2 | 1 | 1/2 | 1–8 |
| 4-9/16 to 5-1/2 | 1-1/4 | 7/16 | 1-1/8–7 |
| 5-9/16 to 6-1/2 | 1-1/2 | 1/2 | 1-1/4–6 |




**FORMULA:**

$$X = \sqrt{(D/2)^2 - (W/2)^2} + D + D/2$$

$$X^1 = 2X - D$$

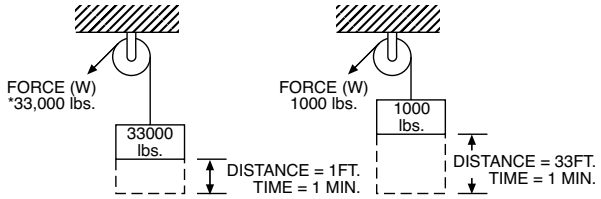
**EXAMPLE:**

Hole 1"; Keyway 1/4" wide by 1/8" deep.

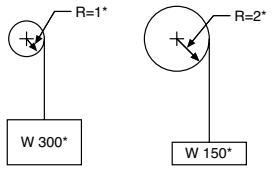
$$X = \sqrt{(1/2)^2 - (1/8)^2} + 1/8 + 1/2 = 1.109"$$

$$X^1 = 2.218 - 1.000 = \mathbf{1.218"}$$

**ILLUSTRATION OF HORSEPOWER**




**TORQUE** (T) is the product of a FORCE (W) in pounds, times a RADIUS (R) in inches from the center of shaft (Lever Arm) and is expressed in Inch Pounds.




T=WR=300 x 1=300 In. Lbs. T=WR=150 x 2=300 In. Lbs.

If the shaft is revolved, the FORCE (W) is moved through a distance, and WORK is done.

$$\text{WORK (Ft. Pounds )} = W \times \frac{2\pi R}{12} \times \text{No. of Rev. of Shaft.}$$

When this WORK is done in a specified TIME, POWER is used.

$$\text{POWER (Ft. Pounds per Min.)} = W \times \frac{2\pi R}{12} \times RPM$$

Since (1) HORSEPOWER = 33,000 Foot Pounds per minute

$$\text{HORSEPOWER (HP)} = W \times \frac{2\pi R}{12} \times \frac{RPM}{33{,}000} = \frac{W \times R \times RPM}{63{,}025}$$

but TORQUE (Inch Pounds) = FORCE (W) x RADIUS (R)

$$\text{Therefore HORSEPOWER (HP)} = \frac{\text{TORQUE (T)} \times (RPM}{63{,}025}$$

I

## General

### Mounting

#### SPUR & HELICAL

For proper functioning gears, gears must be accurately aligned and supported by a shaft and bearing system which maintains alignment under load. Deflection should not exceed .001 inch at the tooth mesh for general applications. The tolerance on Center Distance normally should be positive to avoid possibility of gear teeth binding. Tolerance value is dependent on acceptable system backlash. As a guide for average application, this tolerance might vary from .002 for Boston Gear's fine pitch gears to .005 for the coarsest pitch.

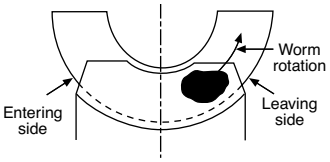
#### WORMS AND WORM GEAR

It is important that the mounting assures the central plane of the Worm gear passes essentially through the axis of the Worm. This can be accomplished by adjusting the Worm Gear axially. Boston Worm Gears are cut to close toleranc-ing of the Center Line of the Gear tooth to the flush side of the Gear. When properly mounted Worm Gears will become more efficient after initial break-in period.

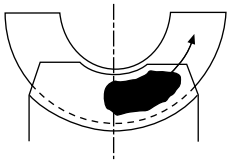
#### HOW WORM GEARS "ADJUST" THEMSELVES

The gear in a worm gear reducer is made of a soft bronze material. Therefore, it can cold-work and wear-in to accommodate slight errors in misalignment.

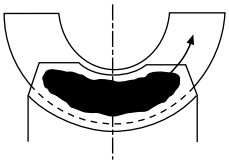
### Evolution of Contact in a Worm Gear




*Initially, contact is concentrated on the leaving side of the worm.*



*After several hours or running under load, gear has cold-worked to spread area of contact.*



*After many hours of operation, contact has spread to cover the entire working area of the tooth.*

### Alterations

Boston Gear Service Centers are equipped to alter catalog sprockets (rebore, keyway, setscrew, etc.). For customers, choosing to make their own alterations, the guidelines listed below should be beneficial. Alterations to hardened gears should not be made without consultation with factory.

In setting up for reboring the most important consideration is to preserve the accuracy of concentricity and lateral runout provided in the original product. There are several methods for accomplishing this. One procedure is: mount the part on an arbor, machine hub diameter to provide a true running surface, remove from arbor and chuck on the hub diameter, check face and bore runout prior to reboring. As a basic rule of thumb, the maximum bore should not exceed 60% of the Hub Diameter and depending on Key size should be checked for minimum wall thickness. A minimum of one setscrew diameter over a keyway is considered adequate.

Boston Gear offers a service for hardening stock sprockets. This added treatment can provide increased horsepower capacity with resultant longer life and/or reduction in size and weight.

Customers wishing to do the hardening operation should refer to "Materials" below for information.

### Lubrication

The use of a straight mineral oil is recommended for most worm gear applications. This type of oil is applicable to gears of all materials, including non-metallic materials.

Mild E.P. (Extreme Pressure) lubricants may be used with Iron and Steel Gears. E.P. lubricants normally should be selected of the same viscosity as straight mineral oil, E.P. lubricants are not recommended for use with brass or bronze gears.

SAE80 or 90 gear oil should be satisfactory for splash lubricated gears. Where extremely high or low speed conditions are encountered, consult a lubricant manufac-turer. Oil temperature of 150°F should not be exceeded for continuous duty applications. Temperatures up to 200°F can be safely tolerated for short periods of time.

Many specialty lubricants have been recently developed to meet the application demands of today's markets, includ-ing synthetics and both high and low temperature oils and greases. In those instances where Bath or Drip Feed is not practical, a moly-Disulphide grease may be used successfully, for low speed applications.

## Materials

Boston Gear stock steel gears are made from a .20 carbon steel with no subsequent treatment. For those applications requiring increased wearability. Case-hardening produces a wear resistant, durable surface and a higher strength core. Carburizing and hardening is the most common process used. Several proprietary nitriding processes are available for producing an essentially distortion-free part with a relatively shallow but wear-resistant case. Boston stock worms are made of either a .20 or .45 carbon steel. Selection of material is based on size and whether furnished as hardened or untreated.

Stock cast iron gears are manufactured from ASTM-CLASS 30 cast iron to Boston Gear specifications. This provides a fine-grained material with good wear-resistant properties.

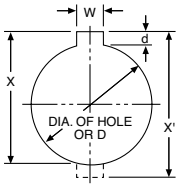
Bronze worm and helical gears are produced from several alloys selected for bearing and strength properties. Phosphor bronze is used for helicals and some worm gears (12P and coarser). Finer pitch worm gears are made from several different grades of bronze, dependent on size.

Non-metallic spur Gears listed in this Catalog are made from cotton reinforced phenolic normally referred to as Grade "C."

Plastic Gears listed are molded from either Delrin®, Acetal or Minlon®.

**STANDARD KEYWAYS AND SETSCREWS**

| Diameter of Hole | Standard | | Recommended Setscrew |
|---|---|---|---|
| | W | d | |
| 5/16 to 7/16" | 3/32" | 3/64" | 10-32 |
| 1/2 to 9/16 | 1/8 | 1/16 | 1/4-20 |
| 5/8 to 7/8 | 3/16 | 3/32 | 5/16-18 |
| 15/16 to 1-1/4 | 1/4 | 1/8 | 3/8-16 |
| 1-5/16 to 1-3/8 | 5/16 | 5/32 | 7/16-14 |
| 1-7/16 to 1-3/4 | 3/8 | 3/16 | 1/2-13 |
| 1-13/16 to 2-1/4 | 1/2 | 1/4 | 9/16-12 |
| 2-5/16 to 2-3/4 | 5/8 | 5/16 | 5/8-11 |
| 2-13/16 to 3-1/4 | 3/4 | 3/8 | 3/4-10 |
| 3-5/16 to 3-3/4 | 7/8 | 7/16 | 7/8-9 |
| 3-13/16 to 4-1/2 | 1 | 1/2 | 1-8 |
| 4-9/16 to 5-1/2 | 1-1/4 | 7/16 | 1-1/8-7 |
| 5-9/16 to 6-1/2 | 1-1/2 | 1/2 | 1-1/4-6 |




## Formula:

$X = \sqrt{(D/2)^2 - (W/2)^2} + d + D/2$

$X^1 = 2X - D$

## Example:

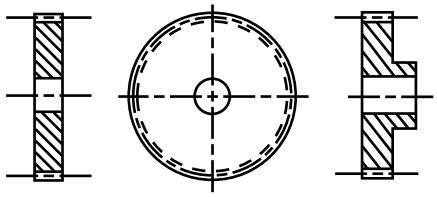
Hole 1"; Keyway 1/4" wide by 1/8" deep.

$X = \sqrt{(1/2)^2 - (1/8)^2} + 1/8 + 1/2 =$ **1.109"**

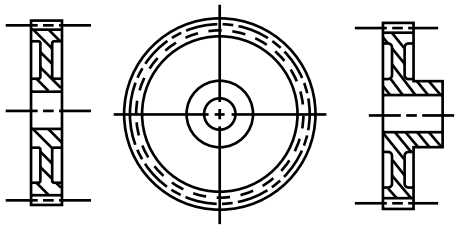
$X^1 = 2.218 - 1.000 =$ **1.218"**

## Styles

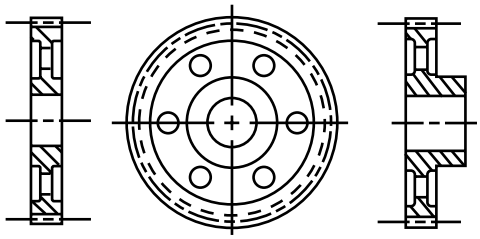
Boston Spur, Helical, and Worm Gears are carried in Plain, Web, or Spoke styles, as illustrated.



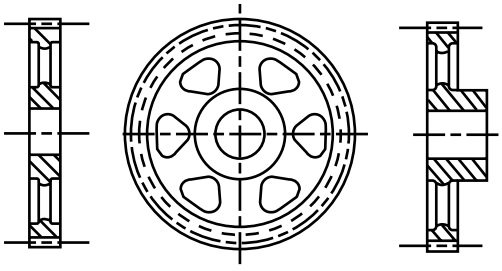
PLAIN – A



WEB – B



WEB WITH LIGHTNING HOLES – C



SPOKE – D

I

## Sprockets

### Alterations

Boston Gear Service Centers are equipped to alter catalog sprockets (rebore, keyway, setscrew, etc.). For customers, choosing to make their own alterations, the guidelines listed below should be beneficial. Alterations to hardened gears should not be made without consultation with factory.

In setting up for reboring the most important consideration is to preserve the accuracy of concentricity and lateral runout provided in the original product. There are several methods for accomplishing this. One procedure is: mount the part on an arbor, machine hub diameter to provide a true running surface, remove from arbor and chuck on the hub diameter, check face and bore runout prior to reboring. As a basic rule of thumb, the maximum bore should not exceed 60% of the Hub Diameter and depending on Key size should be checked for minimum wall thickness. A minimum of one setscrew diameter over a keyway is considered adequate.

Boston Gear offers a service for hardening stock sprockets. This added treatment can provide increased horsepower capacity with resultant longer life and/or reduction in size and weight.

Customers wishing to do the hardening operation should refer to “Materials” below for information.

### Materials

#### Plastic

Plastic sprockets listed are molded from Nylatron GS.

#### Steel

Type B one-piece sprockets are furnished in a free-machining, low carbon steel.

Plate sprockets (Type A) and two-piece construction (Type B) are made of low carbon steel (basically AISI 1020).

1/4” pitch (Type B) up to 20 teeth is furnished from sintered metal powder conforming to ASTM-B-426-70 Grade 1, Type III with hardness of RB60 MIN.

#### Stainless Steel

1/4, 3/8 and 1/2” Pitches stock bore, single strand are furnished from 303 free-machining Stainless Steel.

#### Cast Iron

Block Chain Sprockets are furnished in Cast Iron for 9 through 12 teeth, which conforms to ASTM-A48-Class 30 Cast Iron, providing a fine-grained material with good wear resistant properties.

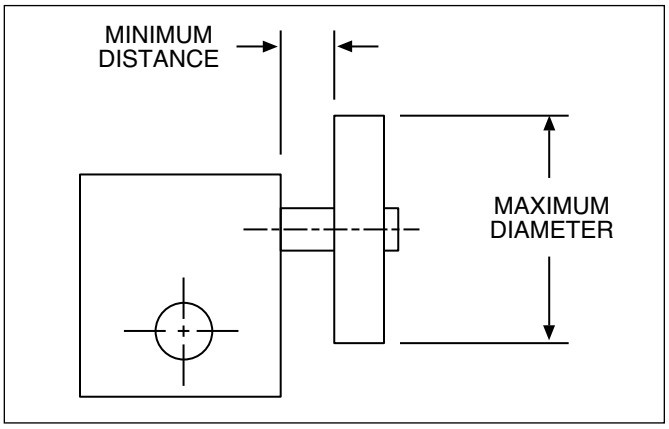
**STANDARD KEYWAYS AND SETSCREWS**

| Diameter of Hole | Standard Keyway | | Recommended Setscrew |
|---|---|---|---|
| | W | D | |
| 5/16 to 7/16” | 3/32” | 3/64” | 10–32 |
| 1/2 to 9/16 | 1/8 | 1/16 | 1/4–20 |
| 5/8 to 7/8 | 3/16 | 3/32 | 5/16–18 |
| 15/16 to 1-1/4 | 1/4 | 1/8 | 3/8–16 |
| 1-5/16 to 1-3/8 | 5/16 | 5/32 | 7/16–14 |
| 1-7/16 to 1-3/4 | 3/8 | 3/16 | 1/2–13 |
| 1-13/16 to 2-1/4 | 1/2 | 1/4 | 9/16–12 |
| 2-5/16 to 2-3/4 | 5/8 | 5/16 | 5/8–11 |
| 2-13/16 to 3-1/4 | 3/4 | 3/8 | 3/4–10 |
| 3-5/16 to 3-3/4 | 7/8 | 7/16 | 7/8–9 |
| 3-13/16 to 4-1/2 | 1 | 1/2 | 1–8 |
| 4-9/16 to 5-1/2 | 1-1/4 | 7/16 | 1-1/8–7 |
| 5-9/16 to 6-1/2 | 1-1/2 | 1/2 | 1-1/4–6 |

### Overhung Load

Overhung load is introduced on a shaft by the sprocket, gear, or belt from which the shaft is driven. A shaft driven by a properly installed flexible coupling would not have an overhung load.

The magnitude of the overhung load is determined by the load at the driving or driven member and the distance this member is from the nearest shaft support bearing. Overhung load will reduce the safe power transmission capacity of any shaft, therefore, every effort must be made to reduce this load. There are two ways to reduce this load (1) reduce the support distance or (2) increase the diameter of the driving and driven member. In most cases, increasing the size of a drive is not possible and therefore, all effort should be made to reduce the support distance.




**FORMULA:**

$X = \sqrt{(D/2)^2 - (W/2)^2} + D + D/2$

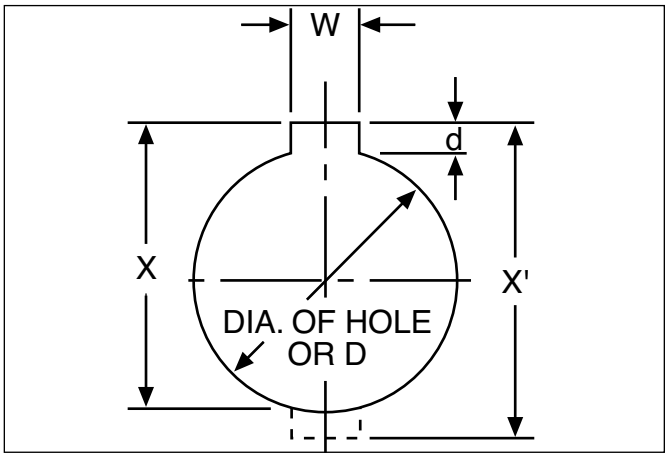
$X' = 2X - D$

**EXAMPLE:**

Hole 1”; Keyway 1/4” wide by 1/8” deep.

$X = \sqrt{(1/2)^2 - (1/8)^2} + 1/8 + 1/2 = 1.109"$

$X' = 2.218 - 1.000 = \mathbf{1.218"}$



## Sprocket Diameters for ANSI Standard Series

| Number of Teeth | 1/4" Pitch–No. 25 .130" Roller Diameter | | | 3/8" Pitch–No. 35 .200" Roller Diameter | | | 1/2" Pitch–No. 40 .312" Roller Diameter | | | 1/2" Pitch–No. 41 .306" Roller Diameter | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pitch Diameter | Outside Diameter | Bottom Diameter | Pitch Diameter | Outside Diameter | Bottom Diameter | Pitch Diameter | Outside Diameter | Bottom Diameter | Pitch Diameter | Outside Diameter | Bottom Diameter |
| 9 | 0.731 | 0.83 | 0.601 | 1.096 | 1.26 | 0.896 | 1.462 | 1.67 | 1.149 | 1.462 | 1.67 | 1.156 |
| 10 | 0.809 | 0.91 | 0.679 | 1.214 | 1.38 | 1.014 | 1.618 | 1.84 | 1.305 | 1.618 | 1.84 | 1.312 |
| 11 | 0.887 | 1.00 | 0.757 | 1.331 | 1.50 | 1.131 | 1.775 | 2.00 | 1.462 | 1.775 | 2.00 | 1.469 |
| 12 | 0.966 | 1.08 | 0.836 | 1.449 | 1.63 | 1.249 | 1.932 | 2.17 | 1.619 | 1.932 | 2.17 | 1.626 |
| 13 | 1.045 | 1.16 | 0.915 | 1.567 | 1.75 | 1.367 | 2.089 | 2.33 | 1.776 | 2.089 | 2.33 | 1.783 |
| 14 | 1.124 | 1.24 | 0.994 | 1.685 | 1.87 | 1.485 | 2.247 | 2.49 | 1.934 | 2.247 | 2.49 | 1.941 |
| 15 | 1.203 | 1.32 | 1.073 | 1.804 | 1.99 | 1.604 | 2.405 | 2.65 | 2.092 | 2.405 | 2.65 | 2.099 |
| 16 | 1.282 | 1.40 | 1.152 | 1.922 | 2.11 | 1.722 | 2.563 | 2.81 | 2.250 | 2.563 | 2.81 | 2.257 |
| 17 | 1.361 | 1.48 | 1.231 | 2.041 | 2.23 | 1.841 | 2.721 | 2.98 | 2.408 | 2.721 | 2.98 | 2.415 |
| 18 | 1.440 | 1.56 | 1.310 | 2.160 | 2.35 | 1.960 | 2.879 | 3.14 | 2.566 | 2.879 | 3.14 | 2.573 |
| 19 | 1.519 | 1.64 | 1.389 | 2.278 | 2.47 | 2.078 | 3.038 | 3.30 | 2.725 | 3.038 | 3.30 | 2.732 |
| 20 | 1.598 | 1.72 | 1.468 | 2.397 | 2.59 | 2.197 | 3.196 | 3.46 | 2.883 | 3.196 | 3.46 | 2.890 |
| 21 | 1.678 | 1.80 | 1.548 | 2.516 | 2.71 | 2.316 | 3.355 | 3.62 | 3.042 | 3.355 | 3.62 | 3.049 |
| 22 | 1.757 | 1.88 | 1.627 | 2.635 | 2.83 | 2.435 | 3.513 | 3.78 | 3.200 | 3.513 | 3.78 | 3.207 |
| 23 | 1.836 | 1.96 | 1.706 | 2.754 | 2.95 | 2.554 | 3.672 | 3.94 | 3.359 | 3.672 | 3.94 | 3.366 |
| 24 | 1.915 | 2.04 | 1.785 | 2.873 | 3.07 | 2.673 | 3.831 | 4.10 | 3.518 | 3.831 | 4.10 | 3.525 |
| 25 | 1.995 | 2.12 | 1.865 | 2.992 | 3.19 | 2.792 | 3.989 | 4.26 | 3.676 | 3.989 | 4.26 | 3.683 |
| 26 | 2.074 | 2.20 | 1.944 | 3.111 | 3.31 | 2.911 | 4.148 | 4.42 | 3.835 | 4.148 | 4.42 | 3.842 |
| 27 | 2.154 | 2.28 | 2.024 | 3.230 | 3.43 | 3.030 | 4.307 | 4.58 | 3.994 | 4.307 | 4.58 | 4.001 |
| 28 | 2.233 | 2.36 | 2.103 | 3.349 | 3.55 | 3.149 | 4.466 | 4.74 | 4.153 | 4.466 | 4.74 | 4.159 |
| 30 | 2.392 | 2.52 | 2.262 | 3.588 | 3.79 | 3.388 | 4.783 | 5.06 | 4.470 | 4.783 | 5.06 | 4.477 |
| 31 | 2.471 | 2.60 | 2.341 | 3.707 | 3.91 | 3.507 | 4.942 | 5.22 | 4.629 | 4.942 | 5.22 | 4.636 |
| 32 | 2.551 | 2.68 | 2.421 | 3.826 | 4.03 | 3.626 | 5.101 | 5.38 | 4.789 | 5.101 | 5.38 | 4.794 |
| 33 | 2.630 | 2.76 | 2.500 | 3.945 | 4.15 | 3.745 | 5.260 | 5.54 | 4.947 | 5.260 | 5.54 | 4.954 |
| 34 | 2.710 | 2.84 | 2.580 | 4.064 | 4.27 | 3.864 | 5.419 | 5.70 | 5.106 | 5.419 | 5.70 | 5.113 |
| 35 | 2.789 | 2.92 | 2.659 | 4.183 | 4.39 | 3.983 | 5.578 | 5.86 | 5.265 | 5.578 | 5.86 | 5.272 |
| 36 | 2.869 | 3.00 | 2.739 | 4.303 | 4.51 | 4.103 | 5.737 | 6.02 | 5.424 | 5.737 | 6.02 | 5.431 |
| 38 | 3.028 | 3.16 | 2.898 | 4.541 | 4.75 | 4.341 | 6.055 | 6.33 | 5.742 | 6.055 | 6.33 | 5.749 |
| 39 | 3.107 | 3.24 | 2.977 | 4.660 | 4.87 | 4.460 | 6.214 | 6.49 | 5.901 | 6.214 | 6.49 | 5.908 |
| 40 | 3.187 | 3.32 | 3.693 | 5.734 | 5.95 | 5.534 | 7.645 | 7.93 | 7.332 | 7.645 | 7.93 | 7.339 |
| 41 | 3.266 | 3.40 | 3.136 | 4.899 | 5.11 | 4.699 | 6.532 | 6.81 | 6.219 | 6.532 | 6.81 | 6.226 |
| 42 | 3.346 | 3.48 | 3.216 | 5.018 | 5.23 | 4.818 | 6.691 | 6.97 | 6.378 | 6.691 | 6.97 | 6.385 |
| 44 | 3.505 | 3.64 | 3.375 | 5.257 | 5.47 | 5.057 | 7.009 | 7.29 | 6.696 | 7.009 | 7.29 | 6.703 |
| 45 | 3.584 | 3.72 | 3.454 | 5.736 | 5.59 | 5.176 | 7.168 | 7.45 | 6.855 | 7.168 | 7.45 | 6.862 |
| 48 | 3.823 | 3.96 | 3.693 | 5.734 | 5.95 | 5.534 | 7.645 | 7.93 | 7.332 | 7.645 | 7.93 | 7.339 |
| 52 | 4.141 | 4.28 | 4.011 | 6.211 | 6.43 | 6.011 | 8.281 | 8.57 | 7.968 | 8.281 | 8.57 | 7.975 |
| 54 | 4.300 | 4.44 | 4.170 | 6.449 | 6.66 | 6.249 | 8.599 | 8.89 | 8.286 | 8.599 | 8.89 | 8.294 |
| 56 | 4.459 | 4.60 | 4.329 | 6.688 | 6.90 | 6.488 | 8.917 | 9.20 | 8.605 | 8.917 | 9.20 | 8.611 |
| 60 | 4.777 | 4.92 | 4.647 | 7.165 | 7.38 | 6.965 | 9.554 | 9.84 | 9.241 | 9.554 | 9.84 | 9.246 |
| 64 | 5.095 | 5.23 | 4.965 | 7.643 | 7.86 | 7.443 | 10.190 | 10.48 | 9.877 | 10.190 | 10.48 | 9.883 |
| 65 | 5.175 | 5.31 | 5.045 | 7.762 | 7.98 | 7.562 | 10.349 | 10.64 | 10.036 | 10.349 | 10.64 | 10.044 |
| 66 | 5.254 | 5.39 | 5.124 | 7.881 | 8.10 | 7.681 | 10.508 | 10.80 | 10.195 | 10.508 | 10.80 | 10.202 |
| 70 | 5.572 | 5.71 | 5.442 | 8.358 | 8.58 | 8.158 | 11.145 | 11.43 | 10.832 | 11.145 | 11.43 | 10.840 |
| 72 | 5.732 | 5.87 | 5.602 | 8.597 | 8.81 | 8.397 | 11.463 | 11.75 | 11.150 | 11.463 | 11.75 | 11.156 |
| 80 | 6.368 | 6.51 | 6.238 | 9.552 | 9.77 | 9.352 | 12.736 | 13.03 | 12.423 | 12.736 | 13.03 | 12.430 |
| 84 | 6.686 | 6.83 | 6.556 | 10.029 | 10.25 | 9.829 | 13.372 | 13.66 | 13.059 | 13.372 | 13.66 | 13.067 |
| 96 | 7.641 | 7.78 | 7.511 | 11.461 | 11.68 | 11.261 | 15.281 | 15.57 | 14.969 | 15.281 | 15.57 | 14.976 |

## Sprocket Diameters for ANSI Standard Series Hubs

| No. of Teeth | 5/8" Pitch–No. 50 .400" Roller Diameter | | | 3/4" Pitch–No. 60 .468" Roller Diameter | | | 1" Pitch–No. 80 .625" Roller Diameter | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pitch Diameter | Outside Diameter | Bottom Diameter | Pitch Diameter | Outside Diameter | Bottom Diameter | Pitch Diameter | Outside Diameter | Bottom Diameter |
| 9 | 1.87 | 2.09 | 1.427 | 2.193 | 2.51 | 1.724 | 2.924 | 3.35 | 2.299 |
| 10 | 2.023 | 2.30 | 1.623 | 2.427 | 2.76 | 1.958 | 3.236 | 3.68 | 2.611 |
| 11 | 2.218 | 2.50 | 1.818 | 2.662 | 3.00 | 2.193 | 2.549 | 4.01 | 2.924 |
| 12 | 2.415 | 2.71 | 2.015 | 2.898 | 3.25 | 2.429 | 3.864 | 4.33 | 3.239 |
| 13 | 2.612 | 2.91 | 2.212 | 3.134 | 3.49 | 2.665 | 4.179 | 4.66 | 3.554 |
| 14 | 2.809 | 3.11 | 2.409 | 3.371 | 3.74 | 2.902 | 4.494 | 4.98 | 3.869 |
| 15 | 3.006 | 3.32 | 2.606 | 3.607 | 3.98 | 3.138 | 4.180 | 5.31 | 4.185 |
| 16 | 3.204 | 3.52 | 2.804 | 3.844 | 4.22 | 3.375 | 5.126 | 5.63 | 4.501 |
| 17 | 3.401 | 3.72 | 3.001 | 4.082 | 4.46 | 3.613 | 5.442 | 5.95 | 4.817 |
| 18 | 3.599 | 3.92 | 3.199 | 4.319 | 4.70 | 3.850 | 5.759 | 6.27 | 5.134 |
| 19 | 3.797 | 4.12 | 3.397 | 4.557 | 4.95 | 4.088 | 6.076 | 6.59 | 5.451 |
| 20 | 3.995 | 4.32 | 3.595 | 4.794 | 5.19 | 4.325 | 6.393 | 6.91 | 5.768 |
| 21 | 4.193 | 4.52 | 3.793 | 5.032 | 5.43 | 4.563 | 6.710 | 7.24 | 6.085 |
| 22 | 4.392 | 4.72 | 3.992 | 5.270 | 5.67 | 4.801 | 7.027 | 7.56 | 6.402 |
| 23 | 4.590 | 4.92 | 4.190 | 5.508 | 5.91 | 5.039 | 7.344 | 7.88 | 6.719 |
| 24 | 4.788 | 5.12 | 4.388 | 5.746 | 6.15 | 5.277 | 7.661 | 8.20 | 7.036 |
| 25 | 4.987 | 5.32 | 4.587 | 5.984 | 6.39 | 5.515 | 7.979 | 8.52 | 7.354 |
| 26 | 5.185 | 5.52 | 4.785 | 6.222 | 6.63 | 5.753 | 8.296 | 8.84 | 7.671 |
| 28 | 5.582 | 5.92 | 5.182 | 6.699 | 7.11 | 6.230 | 8.931 | 9.48 | 8.306 |
| 30 | 5.979 | 6.32 | 5.579 | 7.175 | 7.59 | 6.706 | 9.567 | 10.11 | 8.942 |
| 32 | 6.376 | 6.72 | 5.976 | 7.652 | 8.07 | 7.183 | 10.202 | 10.75 | 9.577 |
| 34 | 6.774 | 7.12 | 6.374 | 8.128 | 8.54 | 7.659 | 10.838 | 11.39 | 10.213 |
| 35 | 6.972 | 7.32 | 6.572 | 8.367 | 8.78 | 7.898 | 11.156 | 11.71 | 10.531 |
| 36 | 7.171 | 7.52 | 6.771 | 8.605 | 9.02 | 8.136 | 11.474 | 12.03 | 10.849 |
| 37 | 7.370 | 7.72 | 6.970 | 8.844 | 9.26 | 8.375 | 11.792 | 12.35 | 11.167 |
| 38 | 7.569 | 7.92 | 7.169 | 9.082 | 9.50 | 8.613 | 12.110 | 12.67 | 11.485 |
| 40 | 7.966 | 8.32 | 7.566 | 9.559 | 9.98 | 9.090 | 12.746 | 13.31 | 12.121 |
| 42 | 8.363 | 8.72 | 7.963 | 10.036 | 10.46 | 9.567 | 13.382 | 13.94 | 12.757 |
| 44 | 8.761 | 9.11 | 8.361 | 10.513 | 10.94 | 10.044 | 14.018 | 14.58 | 13.393 |
| 45 | 8.960 | 9.31 | 8.560 | 10.752 | 11.18 | 10.283 | 14.336 | 14.90 | 13.711 |
| 48 | 9.556 | 9.91 | 9.156 | 11.467 | 11.89 | 10.998 | 15.290 | 15.86 | 14.665 |
| 49 | 9.755 | 10.11 | 9.355 | 11.706 | 12.13 | 11.237 | 15.608 | 16.18 | 14.983 |
| 50 | 9.954 | 10.31 | 9.554 | 11.945 | 12.37 | 11.476 | 15.926 | 16.50 | 15.301 |
| 52 | 10.351 | 10.71 | 9.951 | 12.422 | 12.85 | 11.953 | 16.562 | 17.13 | 15.937 |
| 54 | 10.749 | 11.11 | 10349 | 12.899 | 13.33 | 12.430 | 17.198 | 17.77 | 16.573 |
| 56 | 11.147 | 11.50 | 10.747 | 13.376 | 13.81 | 12.907 | 17.835 | 18.41 | 17.210 |
| 60 | 11.942 | 12.30 | 11.542 | 13.330 | 14.76 | 13.861 | 19.107 | 19.68 | 18.482 |
| 64 | 12.738 | 13.10 | 12.338 | 15.285 | 15.72 | 14.816 | 20.380 | 20.96 | 19.755 |
| 70 | 13.931 | 14.29 | 13.531 | 16.717 | 17.15 | 16.248 | 22.289 | 22.87 | 21.664 |
| 72 | 14.329 | 14.69 | 13.929 | 17.194 | 17.63 | 16.725 | 22.926 | 23.50 | 22.301 |
| 76 | 15.124 | 15.49 | 14.724 | 18.149 | 18.58 | 17.680 | 24.199 | 24.78 | 23.574 |
| 80 | 15.920 | 16.28 | 15.520 | 19.103 | 19.54 | 18.634 | 25.471 | 26.05 | 24.846 |
| 84 | 16.715 | 17.08 | 16.315 | 20.058 | 20.49 | 19.589 | 26.744 | 27.33 | 26.119 |
| 90 | 17.909 | 18.27 | 17.509 | 21.490 | 21.93 | 21.021 | 28.654 | 29.24 | 28.029 |
| 96 | 19.102 | 19.47 | 18.702 | 22.922 | 23.36 | 22.453 | 30.563 | 31.15 | 29.938 |

## Horsepower & Torque Capacity of Shafting

| Diameter | Shaft Horsepower Based on Pure Torsion at 10,000 PSI Maximum Shear Stress | | | | | | | Torque Capacity (Lb. Ins.) Based on 10,000 PSI Shear Stress |
|---|---|---|---|---|---|---|---|---|
| | 30 | 50 | 100 | 175 | 690 | 1150 | 1750 | |
| 3/8 | 0.049 | 0.082 | 0.164 | 0.287 | 1.13 | 1.88 | 2.87 | 103 |
| 7/16 | 0.078 | 0.130 | 0.261 | 0.456 | 1.79 | 2.99 | 4.56 | 164 |
| 1/2 | 0.117 | 0.194 | 0.389 | 0.681 | 2.68 | 4.47 | 6.80 | 245 |
| 9/16 | 0.166 | 0.277 | 0.554 | 0.969 | 3.82 | 6.36 | 9.69 | 349 |
| 5/8 | 0.228 | 0.380 | 0.760 | 1.32 | 5.24 | 8.73 | 13.2 | 479 |
| 11/16 | 0.303 | 0.506 | 1.01 | 1.76 | 6.97 | 11.6 | 17.6 | 637 |
| 3/4 | 0.394 | 0.656 | 1.31 | 2.29 | 9.05 | 15.0 | 22.9 | 827 |
| 13/16 | 0.501 | 0.834 | 1.66 | 2.92 | 11.5 | 19.1 | 29.2 | 1052 |
| 7/8 | 0.625 | 1.04 | 2.08 | 3.64 | 14.3 | 23.9 | 36.4 | 1314 |
| 15/16 | 0.769 | 1.28 | 2.56 | 4.48 | 17.6 | 29.4 | 44.3 | 1616 |
| 1 | 0.933 | 1.55 | 3.11 | 5.44 | 21.4 | 35.7 | 54.4 | 1961 |
| 1-1/16 | 1.12 | 1.86 | 3.73 | 6.53 | 25.7 | 42.9 | 65.3 | 2352 |
| 1-1/8 | 1.32 | 2.21 | 4.43 | 7.75 | 30.5 | 50.9 | 77.5 | 2792 |
| 1-3/16 | 1.56 | 2.60 | 5.21 | 9.11 | 35.9 | 59.9 | 91.1 | 3283 |
| 1-1/4 | 1.82 | 3.03 | 6.07 | 10.6 | 41.9 | 69.8 | 106 | 3830 |
| 1-5/16 | 2.11 | 3.51 | 7.03 | 12.3 | 48.5 | 80 | 123 | 4433 |
| 1-3/8 | 2.42 | 4.04 | 8.08 | 11.1 | 55.8 | 93 | 141 | 5097 |
| 1-7/16 | 2.77 | 4.62 | 9.24 | 16.1 | 63.7 | 106 | 161 | 5824 |
| 1-1/2 | 3.15 | 5.25 | 10.5 | 18.3 | 72.4 | 120 | 183 | 6618 |
| 1-9/16 | 3.56 | 5.93 | 11.8 | 20.7 | 81.8 | 136 | 207 | 7480 |
| 1-5/8 | 4.00 | 6.67 | 13.3 | 23.3 | 92.1 | 153 | 233 | 8414 |
| 1-11/16 | 4.48 | 7.47 | 14.9 | 26.1 | 103.1 | 171 | 261 | 9422 |
| 1-3/4 | 5.00 | 8.33 | 16.6 | 29.1 | 115.0 | 191 | 291 | 10509 |
| 1-13/16 | 5.55 | 9.26 | 18.5 | 32.4 | 127.8 | 213 | 324 | 11675 |
| 1-7/8 | 6.15 | 10.2 | 20.5 | 35.8 | 141.5 | 235 | 358 | 12925 |
| 1-15/16 | 6.78 | 11.3 | 22.6 | 39.6 | 156.1 | 260 | 396 | 14261 |
| 2 | 7.46 | 12.4 | 24.8 | 43.5 | 171.7 | 286 | 435 | 15686 |
| 2-1/16 | 8.18 | 13.6 | 27.2 | 47.7 | 188.3 | 313 | 477 | 17203 |
| 2-1/8 | 8.95 | 14.9 | 29.8 | 52.2 | 206.0 | 343 | 522 | 18815 |
| 2-3/16 | 9.77 | 16.2 | 32.5 | 56.9 | 224.7 | 374 | 569 | 20525 |
| 2-1/4 | 10.6 | 17.7 | 35.4 | 62.0 | 244.5 | 407 | 620 | 22335 |
| 2-5/16 | 11.5 | 19.2 | 38.4 | 67.3 | 265.4 | 442 | 673 | 24248 |
| 2-3/8 | 12.5 | 20.8 | 41.6 | 72.9 | 287.6 | 479 | 729 | 26268 |
| 2-7/16 | 13.5 | 22.5 | 45.0 | 78.8 | 310.9 | 518 | 788 | 29396 |
| 2-1/2 | 14.5 | 24.3 | 48.6 | 85.0 | 335.1 | 559 | 850 | 30637 |
| 2-9/16 | 15.7 | 26.1 | 52.3 | 91.6 | 361.2 | 602 | 916 | 32993 |
| 2-5/8 | 16.8 | 28.1 | 56.2 | 98.4 | 388.3 | 647 | 984 | 35466 |

The above table is computed based on a torsional stress of 10,000 PSI. For applications involving bending moments (gears, sprockets, etc.) the horsepower capacity must be reduced accordingly.

The stress level of 10,000 PSI is representative of medium carbon steel shafting. For other materials, a correction must be made accordingly.

## Temperature Conversion Table

### Degrees Celcius "C"; Degrees Fahrenheit "F"

| Degree C. | Degree F. | Degree C. | Degree F. | Degree C. | Degree F. | Degree C. | Degree F. | Degree C. | Degree F. |
|---|---|---|---|---|---|---|---|---|---|
| –40 | –40.0 | 8 | 46.4 | 56 | 132.8 | 104 | 219.2 | 152 | 305.6 |
| –39 | –38.2 | 9 | 48.2 | 57 | 134.6 | 105 | 221.0 | 153 | 307.4 |
| –38 | –36.4 | 10 | 50.0 | 58 | 136.4 | 106 | 222.8 | 154 | 309.2 |
| –37 | –34.6 | 11 | 51.8 | 59 | 138.2 | 107 | 224.6 | 155 | 311.0 |
| –36 | –32.8 | 12 | 53.6 | 60 | 140.0 | 108 | 226.4 | 156 | 312.8 |
| –35 | –31.0 | 13 | 55.4 | 61 | 141.8 | 109 | 228.2 | 157 | 314.6 |
| –34 | –29.2 | 14 | 57.2 | 62 | 143.6 | 110 | 230.0 | 158 | 316.4 |
| –33 | –27.4 | 15 | 59.0 | 63 | 145.4 | 111 | 231.8 | 159 | 318.2 |
| –32 | –25.6 | 16 | 60.8 | 64 | 147.2 | 112 | 233.6 | 160 | 320.0 |
| –31 | –23.8 | 17 | 62.6 | 65 | 149.0 | 113 | 235.4 | 161 | 321.8 |
| –30 | –22.0 | 18 | 64.4 | 66 | 150.8 | 114 | 237.2 | 162 | 323.6 |
| –29 | –20.2 | 19 | 66.2 | 67 | 152.6 | 115 | 239.0 | 163 | 325.4 |
| –28 | –18.4 | 20 | 68.0 | 68 | 154.4 | 116 | 240.8 | 164 | 327.2 |
| –27 | –16.6 | 21 | 69.8 | 69 | 156.2 | 117 | 242.6 | 165 | 329.0 |
| –26 | –14.8 | 22 | 71.6 | 70 | 158.0 | 118 | 244.4 | 166 | 330.8 |
| –25 | –13.0 | 23 | 73.4 | 71 | 159.8 | 119 | 246.2 | 167 | 332.6 |
| –24 | –11.2 | 24 | 75.2 | 72 | 161.6 | 120 | 248.0 | 168 | 334.4 |
| –23 | – 9.4 | 25 | 77.0 | 73 | 163.4 | 121 | 249.8 | 169 | 336.2 |
| –22 | – 7.6 | 26 | 78.8 | 74 | 165.2 | 122 | 251.6 | 170 | 338.0 |
| –21 | – 5.8 | 27 | 80.6 | 75 | 167.0 | 123 | 253.4 | 171 | 339.8 |
| –20 | – 4.0 | 28 | 82.4 | 76 | 168.8 | 124 | 255.2 | 172 | 341.6 |
| –19 | – 2.2 | 29 | 84.2 | 77 | 170.6 | 125 | 257.0 | 173 | 343.4 |
| –18 | – 0.4 | 30 | 86.0 | 78 | 172.4 | 126 | 258.8 | 174 | 345.2 |
| –17 | + 1.4 | 31 | 87.8 | 79 | 174.2 | 127 | 260.6 | 175 | 347.0 |
| –16 | 3.2 | 32 | 89.6 | 80 | 176.0 | 128 | 262.4 | 176 | 348.8 |
| –15 | 5.0 | 33 | 91.4 | 81 | 177.8 | 129 | 264.2 | 177 | 350.6 |
| –14 | 6.8 | 34 | 93.2 | 82 | 179.6 | 130 | 266.0 | 178 | 352.4 |
| –13 | 8.6 | 35 | 95.0 | 83 | 181.4 | 131 | 267.8 | 179 | 354.2 |
| –12 | 10.4 | 36 | 96.8 | 84 | 183.2 | 132 | 269.6 | 180 | 356.0 |
| –11 | 12.2 | 37 | 98.6 | 85 | 185.0 | 133 | 271.4 | 181 | 357.8 |
| –10 | 14.0 | 38 | 100.4 | 86 | 186.8 | 134 | 273.2 | 182 | 359.6 |
| – 9 | 15.8 | 39 | 102.2 | 87 | 188.6 | 135 | 275.0 | 183 | 361.4 |
| – 8 | 17.6 | 40 | 104.0 | 88 | 190.4 | 136 | 276.8 | 184 | 363.2 |
| – 7 | 19.4 | 41 | 105.8 | 89 | 192.2 | 137 | 278.6 | 185 | 365.0 |
| – 6 | 21.2 | 42 | 107.6 | 90 | 194.0 | 138 | 280.4 | 186 | 366.8 |
| – 5 | 23.0 | 43 | 109.4 | 91 | 195.8 | 139 | 282.2 | 187 | 368.6 |
| – 4 | 24.8 | 44 | 111.2 | 92 | 197.6 | 140 | 284.0 | 188 | 370.4 |
| – 3 | 26.6 | 45 | 113.0 | 93 | 199.4 | 141 | 285.8 | 189 | 372.2 |
| – 2 | 28.4 | 46 | 114.8 | 94 | 201.2 | 142 | 287.6 | 190 | 374.0 |
| – 1 | 30.2 | 47 | 116.6 | 95 | 203.0 | 143 | 289.4 | 191 | 375.8 |
| 0 | 32.0 | 48 | 118.4 | 96 | 204.8 | 144 | 291.2 | 192 | 377.6 |
| + 1 | 33.8 | 49 | 120.2 | 97 | 206.6 | 145 | 293.0 | 193 | 379.4 |
| 2 | 35.6 | 50 | 122.0 | 98 | 208.4 | 146 | 294.8 | 194 | 381.2 |
| 3 | 37.4 | 51 | 123.8 | 99 | 210.2 | 147 | 296.6 | 195 | 383.0 |
| 4 | 39.2 | 52 | 125.6 | 100 | 212.0 | 148 | 298.4 | 196 | 384.8 |
| 5 | 41.0 | 53 | 127.4 | 101 | 213.8 | 149 | 300.2 | 197 | 386.6 |
| 6 | 42.8 | 54 | 129.2 | 102 | 215.6 | 150 | 302.0 | 198 | 388.4 |
| 7 | 44.5 | 55 | 131.0 | 103 | 217.4 | 151 | 303.8 | 199 | 390.2 |

## Equivalent Table

### FRACTION — DECIMAL — MILLIMETER

| Fraction Inches | Inch Decimal Equivalent | Millimeter Equivalent | Fraction Inches | Inch Decimal Equivalent | Millimeter Equivalent |
|---|---|---|---|---|---|
| 1/64 | .0156 | .397 | 33/64 | .5156 | 13.097 |
| 1/32 | .0312 | .794 | 17/32 | .5312 | 13.494 |
| 3/64 | .0469 | 1.191 | 35/64 | .5469 | 13.891 |
| 1/16 | .0625 | 1.588 | 9/16 | .5625 | 14.288 |
| 5/64 | .0781 | 1.984 | 37/64 | .5781 | 14.684 |
| 3/32 | .0937 | 2.381 | 19/32 | .5937 | 15.081 |
| 7/64 | .1094 | 2.778 | 39/64 | .6094 | 15.478 |
| 1/8 | .1250 | 3.175 | 5/8 | .6250 | 15.875 |
| 9/64 | .1406 | 3.572 | 41/64 | .6406 | 16.272 |
| 5/32 | .1562 | 3.969 | 21/32 | .6562 | 16.669 |
| 11/64 | .1719 | 4.366 | 43/64 | .6719 | 17.066 |
| 3/16 | .1875 | 4.763 | 11/16 | .6875 | 17.463 |
| 13/64 | .2031 | 5.159 | 45/64 | .7031 | 17.859 |
| 7/32 | .2187 | 5.556 | 23/32 | .7187 | 18.256 |
| 15/64 | .2344 | 5.953 | 47/64 | .7344 | 18.653 |
| 1/4 | .2500 | 6.350 | 3/4 | .7500 | 19.050 |
| 17/64 | .2656 | 6.747 | 49/64 | .7656 | 19.447 |
| 9/32 | .2812 | 7.144 | 25/32 | .7812 | 19.844 |
| 19/64 | .2969 | 7.541 | 51/64 | .7969 | 20.241 |
| 5/16 | .3125 | 7.938 | 13/16 | .8125 | 20.638 |
| 21/64 | .3281 | 8.334 | 53/64 | .8281 | 21.034 |
| 11/32 | .3437 | 8.731 | 27/32 | .8437 | 21.431 |
| 23/64 | .3594 | 9.128 | 55/64 | .8594 | 21.828 |
| 3/8 | .3750 | 9.525 | 7/8 | .8750 | 22.225 |
| 25/64 | .3906 | 9.922 | 57/64 | .8906 | 22.622 |
| 13/32 | .4062 | 10.319 | 29/32 | .9062 | 23.019 |
| 27/64 | .4219 | 10.716 | 59/64 | .9219 | 23.416 |
| 7/16 | .4375 | 11.113 | 15/16 | .9375 | 23.813 |
| 29/64 | .4531 | 11.509 | 61/64 | .9531 | 24.209 |
| 15/32 | .4687 | 11.906 | 31/32 | .9687 | 24.606 |
| 31/64 | .4844 | 12.303 | 63/64 | .9844 | 25.003 |
| 1/2 | .5000 | 12.700 | 1 | 1.0000 | 25.400 |

### MILLIMETER — INCHES

| Millimeters | Inches |
|---|---|
| 1 | .0394 |
| 2 | .0787 |
| 3 | .1181 |
| 4 | .1575 |
| 5 | .1968 |
| 6 | .2362 |
| 7 | .2756 |
| 8 | .3150 |
| 9 | .3543 |
| 10 | .3937 |
| 11 | .4331 |
| 12 | .4724 |
| 13 | .5118 |
| 14 | .5512 |
| 15 | .5905 |
| 16 | .6299 |
| 17 | .6693 |
| 18 | .7087 |
| 19 | .7480 |
| 20 | .7874 |
| 21 | .8268 |
| 22 | .8661 |
| 23 | .9055 |
| 24 | .9449 |
| 25 | .9842 |
| 26 | 1.0236 |
| 27 | 1.0630 |
| 28 | 1.1024 |
| 29 | 1.1417 |
| 30 | 1.1811 |

# Engineering Information

## Metric Conversion Chart

### Area

| Multiply | By | To Obtain |
|---|---|---|
| Millimeters$^2$ | .00155 | inches$^2$ |
| Centimeters$^2$ | .155 | inches$^2$ |
| Meters$^2$ | 10.76 | feet$^2$ |
| Inches$^2$ | 645.16 | millimeters$^2$ |
| Inches$^2$ | 6.452 | centimeters$^2$ |
| Feet$^2$ | 929.03 | centimeters$^2$ |
| Feet$^2$ | .0929 | meters$^2$ |

### Density

| Multiply | By | To Obtain |
|---|---|---|
| lg/cm$^3$ | .03613 | lb/in$^3$ |
| lg/cm$^3$ | 62.43 | lb/in$^3$ |
| lb/in$^3$ | 27.68 | gr/cm$^3$ |
| lb/ft$^3$ | .016 | g/cm$^3$ |
| lb/ft$^3$ | 16.02 | Kg/m$^3$ |

### Power

| Multiply | By | To Obtain |
|---|---|---|
| Joule/sec | .001341 | Horsepower |
| Kilocalorie/hour | 3.967 | BTW/hour |
| Horsepower | .33000 | ft-lb/min |
| Horsepower | 746 | watts |
| BTU/hour | .2521 | kilocalorie/hour |

### Length

| Multiply | By | To Obtain |
|---|---|---|
| Millimeter | .03937 | inch |
| Centimeter | .3937 | inch |
| Meter | 39.37 | inch |
| Inch | 2.54 | centimeter |
| Feet | 30.48 | centimeter |
| Feet | .3048 | meter |

### Volume

| Multiply | By | To Obtain |
|---|---|---|
| Centimeter$^3$ | .0610 | inches$^3$ |
| Centimeter$^3$ | .034 | fluid ounce |
| Liter | 61.02 | inches$^3$ |
| Liter | .0353 | feet$^3$ |
| Liter | .264 | U.S. gallon |
| Inch$^3$ | 16.39 | centimeter$^3$ |
| Feet$^3$ | 28.32 | liter |
| Gallon | 3.785 | liter |

### Weight

| Multiply | By | To Obtain |
|---|---|---|
| Gram | .03527 | ounce |
| Kilogram | 35.27 | ounce |
| Kilogram | 2.205 | pounds |
| Ounce | 28.35 | gram |
| Pound | 453.6 | grams |

### Torque

| Multiply | By | To Obtain |
|---|---|---|
| Newton-meter | 8.84 | in-lb |
| in-lb | .113 | Newton-meter |

### Velocity

| Multiply | By | To Obtain |
|---|---|---|
| Centimeter/second | .3937 | inches/second |
| Centimeter/second | 1.969 | feet/minute |
| Meter/second | 3.281 | feet/second |
| Meter/second | 196.9 | feet/minute |
| Meter/second | 2.237 | miles per hour |
| Inch/second | 25.4 | millimeters/second |
| Inch/second | 2.54 | centimeters/second |
| Foot/second | .3048 | meters/second |
| Foot/minute | .00508 | meters/second |

## BOSTON GEAR REGISTERED TRADEMARKS

**BOSTON GEAR®**

**BOSTON®**

**BOStonE®**

**BOST-BRONZ®**

**BEAR-N-BRONZ®**

## Application Classification for Various Loads

| Type of Machine To Be Driven | Chart I For All Drives – Service Factor Loading: Not More Than 15 Mins. in 2 Hrs. | Not More Than 10 Hrs. per Day | More Than 10 Hrs. Per Day |
|---|---|---|---|
| **AGITATORS** | | | |
| Pure Liquid | 0.80 | 1.00 | 1.25 |
| Semi-Liquids, Variable Density | 1.00 | 1.25 | 1.50 |
| **BLOWERS** | | | |
| Centrifugal and Vane | 0.80 | 1.00 | 1.25 |
| Lobe | 1.00 | 1.25 | 1.50 |
| **BREWING AND DISTILLING** | | | |
| Bottling Machinery | 0.80 | 1.00 | 1.25 |
| Brew Kettles–Continuous Duty | — | — | 1.25 |
| Cookers – Continuous Duty | — | — | 1.25 |
| Mash Tubs – Continuous Duty | — | — | 1.25 |
| Scale Hopper – Frequent Starts | — | 1.25 | 1.50 |
| **CAN FILLING MACHINES** | — | 1.00 | — |
| **CANE KNIVES** | — | 1.50 | — |
| **CAR DUMPERS** | — | 1.75 | — |
| **CAR PULLERS** | — | 1.25 | — |
| **CLARIFIERS** | — | 1.00 | 1.25 |
| **CLASSIFIERS** | — | 1.25 | 1.50 |
| **CLAY WORKING MACHINERY** | | | |
| Brick Press & Briquette Machine | — | 1.75 | 2.00 |
| Extruders and Mixers | 1.00 | 1.25 | 1.50 |
| **COMPRESSORS** | | | |
| Centrifugal | — | 1.00 | 1.25 |
| Lobe – Reciprocating, Multi-Cycle | — | 1.25 | 1.50 |
| Reciprocating – Single Cycle | — | 1.75 | 2.00 |
| **CONVEYORS— UNIFORMLY LOADED & FED** | | | |
| Apron | — | 1.00 | 1.25 |
| Assembly-Belt – Bucket or Pan | — | 1.00 | 1.25 |
| Chain – Flight | — | 1.00 | 1.25 |
| Oven – Live Roll – Screw | — | 1.25 | 1.50 |
| **CONVEYORS—HEAVY DUTY NOT UNIFORMLY FED** | | | |
| Apron | — | 1.25 | 1.50 |
| Assembly-Belt – Bucket or Pan | — | 1.25 | 1.50 |
| Chain – Flight | — | 1.25 | 1.50 |
| Live Roll | — | — | — |
| Oven – Screw | — | 1.25 | 1.50 |
| Reciprocating – Shaker | — | 1.75 | 2.00 |
| **CRANES AND HOISTS** | | | |
| Main Hoists | | | |
| Bridge and Trolley Drive | * | 1.00 | 1.25 |
| **CRUSHER** | | | |
| Ore, Stone | — | 1.75 | 2.00 |
| Sugar | — | 1.50 | 1.50 |

| Type of Machine To Be Driven | Chart I For All Drives – Service Factor Loading: Not More Than 15 Mins. in 2 Hrs. | Not More Than 10 Hrs. per Day | More Than 10 Hrs. Per Day |
|---|---|---|---|
| **ELEVATORS** | | | |
| Bucket – Uniform Load | — | 1.00 | 1.25 |
| Bucket – Heavy Load | — | 1.25 | 1.50 |
| Centrifugal Discharge | — | 1.25 | 1.50 |
| Freight | — | 1.25 | 1.50 |
| Gravity Discharge | — | 1.00 | 1.25 |
| **FANS** | | | |
| Centrifugal – Light (Small Diam.) | — | 1.00 | 1.25 |
| Large Industrial | — | 1.25 | 1.50 |
| **FEEDERS** | | | |
| Apron – Belt – Screw | — | 1.25 | 1.50 |
| Disc | — | 1.00 | 1.25 |
| Reciprocating | — | 1.75 | 2.00 |
| **FOOD INDUSTRY** | | | |
| Beet Slicer | — | 1.25 | 1.50 |
| Cereal Cooker | — | 1.00 | 1.25 |
| Dough Mixer – Meat Grinder | — | 1.25 | 1.50 |
| **GENERATORS (NOT WELDING)** | — | 1.00 | 1.25 |
| **HAMMER MILLS** | — | 1.75 | 2.00 |
| **HOISTS** | | | |
| Heavy Duty | — | 1.75 | 2.00 |
| Medium Duty and Skip Type | — | 1.25 | 1.50 |
| **LAUNDRY TUMBLERS** | — | 1.25 | 1.50 |
| **LINE SHAFTS** | | | |
| Uniform Load | — | 1.00 | 1.25 |
| Heavy Load | — | 1.25 | 1.50 |
| **MACHINE TOOLS** | | | |
| Auxiliary Drive | — | 1.00 | 1.25 |
| Main Drive – Uniform Load | — | 1.25 | 1.50 |
| Main Drive – Heavy Duty | — | 1.75 | 2.00 |
| **METAL MILLS** | | | |
| Draw Bench Carriers & Main Drive | — | 1.25 | 1.50 |
| **SLITTERS** | — | 1.25 | 1.50 |
| **TABLE CONVEYORS — NON REVERSING** | | | |
| Group Drives | — | 1.25 | 1.50 |
| Individual Drives | — | 1.75 | 2.00 |
| Wiring Drawing, Flattening or Winding | — | 1.25 | 1.50 |
| **MILLS ROTARY TYPE BALL AND ROD** | | | |
| Spur Ring Gear and Direct Connected | — | — | 2.00 |
| Cement Kilns, Pebble | — | — | 1.50 |
| Dryers and Coolers | — | — | 1.50 |
| Plain and Wedge Bar | — | — | 1.50 |
| Tumbling Barrels | — | — | 2.00 |

## Application Classification for Various Loads (Continued)

| Type of Machine To Be Driven | Chart I For All Drives – Service Factor Loading: Not More Than 15 Mins. in 2 Hrs. | Not More Than 10 Hrs. per Day | More Than 10 Hrs. Per Day |
|---|---|---|---|
| **MIXERS** | | | |
| Concrete – Continuous | — | 1.25 | 1.50 |
| Concrete – Intermittent | — | 1.25 | 1.50 |
| Constant Density | — | 1.00 | 1.25 |
| Semi-Liquid | — | 1.25 | 1.50 |
| **OIL INDUSTRY** | | | |
| Oil Well Pumping | — | — | * |
| Chillers, Paraffin Filter Press | — | 1.25 | 1.50 |
| Rotary Kilns | — | 1.25 | 1.50 |
| **PAPER MILLS** | | | |
| Agitator (Mixer) | — | 1.25 | 1.50 |
| Agitator – Pure Liquids | — | 1.00 | 1.25 |
| Barking Drums – Mechanical | | | |
| Barkers | — | 1.75 | 2.00 |
| Bleacher | — | 1.00 | 1.25 |
| Beater | — | 1.25 | 1.50 |
| Calender Heavy Duty | — | — | 2.00 |
| Calender Anti-Friction Brgs. | — | 1.00 | 1.25 |
| Cylinders | — | 1.25 | 1.50 |
| Chipper | — | — | 2.00 |
| Chip Feeder | — | 1.25 | 1.50 |
| Coating Rolls – Couch Rolls | — | 1.00 | 1.25 |
| Conveyors – Chips – Bark – Chemical | — | 1.00 | 1.25 |
| Conveyors – Log and Slab | — | — | 2.00 |
| Cutter | — | — | 2.00 |
| Cylinder Molds, Dryers (Anti-Friction Brg.) | — | — | 1.25 |
| Felt Stretcher | — | 1.25 | 1.50 |
| Screens – Chip and Rotary | — | 1.25 | 1.50 |
| Thickener (AC) | — | 1.25 | 1.50 |
| Washer (AC) | — | 1.25 | 1.50 |
| Winder – Surface Type | — | — | 1.25 |
| **PLASTICS INDUSTRY** | | | |
| Intensive Internal Mixers | | | |
| Batch Type | — | — | 1.75 |
| Continuous Type | — | — | 2.00 |
| Batch Drop Mill – 2 Rolls | — | — | 1.25 |
| Compounding Mills | — | — | 1.25 |
| Calenders | — | — | 1.50 |
| Extruder – Variable Speed | — | — | 1.50 |
| Extruder – Fixed Speed | — | — | 1.75 |
| **PULLERS** | | | |
| Barge Haul | — | — | 2.00 |

| Type of Machine To Be Driven | Chart I For All Drives – Service Factor Loading: Not More Than 15 Mins. in 2 Hrs. | Not More Than 10 Hrs. per Day | More Than 10 Hrs. Per Day |
|---|---|---|---|
| **PUMPS** | | | |
| Centrifugal | — | — | 1.25 |
| Proportioning | — | — | 1.50 |
| Reciprocating | | | |
| Single Acting, 3 or more Cycles | — | 1.25 | 1.50 |
| Double Acting, 2 or more Cycles | — | 1.25 | 1.50 |
| Rotary – Gear or Lube | — | 1.00 | 1.25 |
| **RUBBER INDUSTRY** | | | |
| Batch Mixers | — | — | 1.75 |
| Continuous Mixers | — | — | 1.50 |
| Calenders | — | — | 1.50 |
| Extruders – Continuous | — | — | 1.50 |
| Extruders – Intermittent | — | — | 1.75 |
| Tire Building Machines | — | — | — |
| Tire & Tube Press Openers | — | — | — |
| **SEWAGE DISPOSAL EQUIPMENT** | | | |
| Bar Screens | — | 1.00 | 1.25 |
| Chemical Feeders | — | 1.00 | 1.25 |
| Collectors | — | 1.00 | 1.25 |
| Dewatering Screws | — | 1.25 | 1.50 |
| Scum Breakers | — | 1.25 | 1.50 |
| Slow or Rapid Mixers | — | 1.25 | 1.50 |
| Thickeners | — | 1.25 | 1.50 |
| Vacuum Filters | — | 1.25 | 1.50 |
| **SCREENS** | | | |
| Air Washing | — | 1.00 | 1.25 |
| Rotary – Stone or Gravel | — | 1.25 | 1.50 |
| Traveling Water Intake | — | 1.00 | 1.25 |
| **SKIP HOISTS** | — | — | — |
| **SLAB PUSHERS** | — | 1.25 | 1.50 |
| **STOKERS** | — | — | 1.25 |
| **TEXTILE INDUSTRY** | | | |
| Batchers or Calenders | — | 1.25 | 1.50 |
| Cards | — | 1.25 | 1.50 |
| Card Machines | — | 1.75 | 2.00 |
| Dry Cans and Dryers | — | 1.25 | 1.50 |
| Dyeing Machines | — | 1.25 | 1.50 |
| Looms | — | 1.25 | 1.50 |
| Mangles, Nappers and Pads | — | 1.25 | 1.50 |
| Soapers, Tenner Frames | — | 1.25 | 1.50 |
| Spinners, Washers, Winders | — | 1.25 | 1.50 |
| **TUMBLING BARRELS** | 1.50 | 1.75 | 2.00 |
| **WINDLASS** | — | 1.25 | 1.50 |