AS Inch/Metric Series

Selection Guide and Specifications

1. Selection of POWER-LOCK®

a) When only torque is applied:
Compare the max. transmitting torque (T max.) of the devices to be driven with the transmissible torque (Mt) of the POWER-LOCK listed on pages D-21, D-24, and D-25.
Mt ≥ T max . . . OK
Mt < T max . . . Select a larger POWER-LOCK or use two or more POWER-LOCK units.
The transmissible torque (Mt) of multiple POWER-LOCK units is obtained by multiplying Mt by the number of units used. Peak torque expected should be regarded as T max.

$$\text{Torque T max.} = \frac{5252 \bullet HP \bullet s.f.}{n} \text{ (ft./lbs.)} \qquad \text{- - - (1)}$$

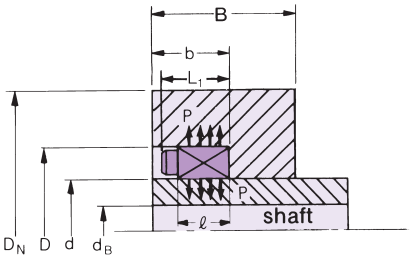
n: RPM s.f.: Safety Factor

b) When torque and thrust are applied:
Compare Mt with composite torque M_R.

$$M_R = \sqrt{T^2 \text{ max.} + (P \text{ max.} \bullet \frac{d}{2})^2} \leq Mt. \qquad \text{- - - (2)}$$

T max: Maximum torque (ft./lbs.)
P max: Maximum thrust load (lbs.)
d: Shaft O.D. (ft.)

2. Hub diameter calculation



a) Standard hub diameter (flange coupling, V sheave, etc.):
Min. hub outside diameters (D_N) are shown on pages D-22, D-23, D-26 and D-27 based on the yield point of hub material and the length of the hub. Hub diameter must be equal to or larger than (D_N). Special hub diameter can be calculated by the following:

b) Hubs of special material:
Calculate hub diameter using the following formula (not applicable to non-ferrous metals).

Y.P. (hub) ≥ 1.4P′
Y.P. (shaft) ≥ 1.4P

$$\text{Min. hub. dia. } D_N \geq D \sqrt{\frac{Y.P. + K_3 \bullet P'}{Y.P. - K_3 \bullet P'}} \qquad \text{- - - (3)}$$

K_3 : 0.6 ....Using single unit
$b \geq L_1$, $B \geq 2\ell$
K_3 : 0.8 ....Using multiple units
$b \geq n \bullet L_1$
$B \geq n \bullet L_1 + L_1$
K_3 : 1.0 ....Using single unit
$\ell \leq B < 2 \bullet \ell$
Using multiple units
$\ell + L_1 \leq B < L_1 (n + 1)$
(n: number of POWER-LOCK)

P′: Contact pressure on hub (psi)
Y.P.: Yield point of hub material (psi)
D: Hub bore inside dia. (in.)
D_N: Min. hub dia. (in.)

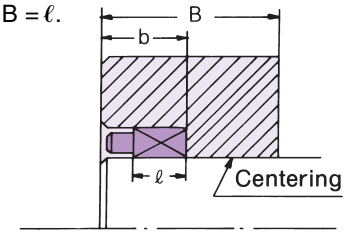
c) Hollow Shaft Application:
Inside diameter of the hollow shaft: d_B
Compute inside diameter of hollow shaft.

$$d_B \leq d \sqrt{\frac{Y.P. - 2 \bullet P \bullet K_3}{Y.P.}} \qquad \text{- - - (4)}$$

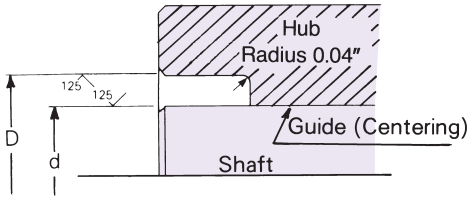
d: Outside diameter of shaft (in.)
P: Contact pressure on shaft side
(Refer to pages D-21, D-24 and D-25) (psi)
K3: 0.6 ... Using single POWER-LOCK
K3: 0.8 ... Using multiple POWER-LOCK

3. Hub width

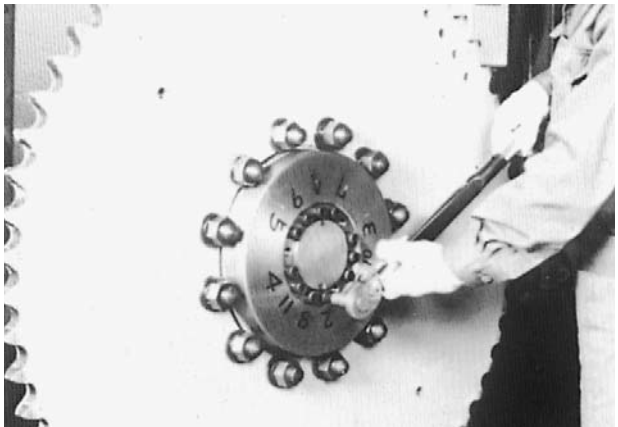
The AS Series POWER-LOCK is not self-aligning.
Thus centering (B – b) must be performed.
Suggested "guide length" (B – b) is to be equal to or greater than one half of the shaft diameter.
B – b ≥ d/2 (d: shaft diameter)
Hub width (B) can be calculated as follows:
B ≥ b + d/2 **- - - (5)**
Note: POWER-LOCK cannot be centered under the condition of B = ℓ.



4. Machining tolerance and surface roughness

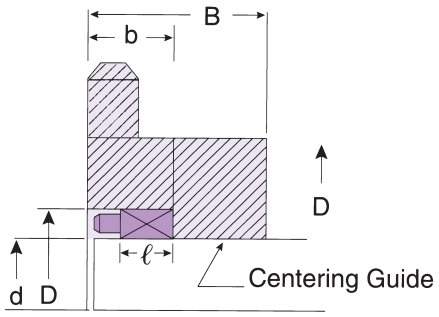


Machining tolerance for counter bore diameter of hub "D" and shaft diameter "d" are listed on pages D-21, D-24 and D-25. Required surface roughness of 125 RMS. Determine the tolerance of the guide according to the centering accuracy required.



Example Selection 1

A sprocket to be tightened by a POWER-LOCK® on a shaft.



<Conditions>

Shaft Dia. d: 1½″
Max. required torque Tmax. = 400 ft./lbs.
Sprocket Hub Material 1144 Y.P. = 56,000 psi
Sprocket Hub Length (B) = 1.875″
Sprocket Hub Dia. (D_S) = 3.5″
Counter Bore Length (b) = L_1 (Total PL Length)

Step 1

Select PL1½ since shaft dia. is 1½″
See Transmissible Torque (Mt) on page D-21
Mt (658) ≥ Tmax. (400) OK
POWER-LOCK Outside Dia. D = 2.559″
POWER-LOCK Total Length L_1 = 1.024″
POWER-LOCK Length ℓ = 0.709″

Step 2

Confirm Min. Hub Dia. D_N
$2\ell = 2 \bullet 0.709 = 1.418$ B (1.875) ≥ 2ℓ (1.418) OK
Refer Min. Hub Dia. D_N to page D-22
D_N = 3.030
D_S (3.5) ≥ D_N (3.030) OK

Step 3

Confirm Sprocket Hub Length B
Min. Hub Length Bmin. =

$$b + \frac{d}{2} = L_1 + \frac{d}{2} = 1.024 + \frac{1.5}{2} = 1.774$$

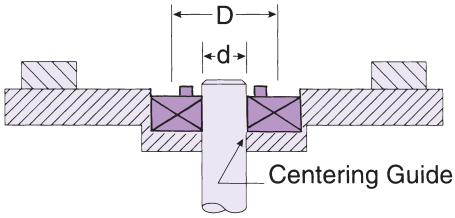
B (1.875) > Bmin(1.774) OK
Centering Guide will be 1.875 – b
= 1.875 – 1.024 = 0.851
0.851 > $\frac{d}{2}$ (0.75) OK

Step 4

Machining Tolerance. See page D-21
Shaft size (d) = 1.5″ + 0/–.0015″
Hub Bore Size (D) = 2.559″ + .0015″/–0

Example Selection 2

Turn table to be fixed on a vertical straight shaft by a POWER-LOCK.



<Conditions>

Shaft Dia. d = 2″ = 1/6 (ft.)
Max. Required Torque Tmax. = 500 ft./lbs.
Total Table Weight Pmax. = 500 ft./lbs.
Material for table and hub is 1040

Step 1

Select PL2 since shaft Dia. is 2″
See Transmissible Torque Mt and Thrust Pax on page D-21
Mt = 1627 ft./lbs. Pax = 19,360 lbs.

Step 2

Compare Mt with composite torque MR. Calculate composite torque MR.

$$MR = \sqrt{T^2 \text{ max.} + (Pmax. \bullet \frac{d}{2})^2} = 501.7 \text{ ft./lbs.}$$

MR (501.7) ≤ Mt (1,627) OK

Step 3

Hub Dimensions. See page D-22
Suggested Min. Hub Dia. (D_N) = 4.110″
Suggested Guide Length = $\frac{d}{2}$ = 1″

Step 4

Machining Tolerance. See page D-21
Shaft Size (d) = 2″ + 0/–0.0018″
Hub Bore Size (D) = 3.346 + 0.0018″/–0