Stock Drive Selection

To select the best V-Belt Drive for an application, utilizing stock sheaves, simply follow the step by step instructions below:

BEFORE SELECTING A DRIVE, YOU NEED TO KNOW THESE FACTS:

1. The horsepower requirement of the drive.
2. The RPM of the driver.
3. The RPM of the driven machine.
4. The approximate center distance for the drive.
5. Shaft size of both units.
6. Average hours of operation per day.

TABLE 1 — SERVICE FACTORS

THE CORRECT SERVICE FACTOR IS DETERMINED BY:

1. The extent and frequency of peak loads.

2. The number of operating hours per year, broken down into average hours per day of continuous service.

3. The proper service category, (intermittent, normal or continuous). Select the one that most closely approximates your application conditions.

INTERMITTENT SERVICE — SERVICE FACTOR 1.0 TO 1.5
- **a.** Light Duty — Not more than 6 hours per day.
- **b.** Never exceeding rated load.

NORMAL SERVICE — SERVICE FACTOR 1.1 TO 1.6
- **a.** Daily service 6 to 16 hours per day.
- **b.** Where occasional starting or peak load does not exceed 200% of the full load.

CONTINUOUS SERVICE — SERVICE FACTOR 1.2 TO 1.8
- **a.** Continuous service 16 to 24 hours per day.
- **b.** Where starting or peak load is in excess of 200% of the full load or where starting or peak loads and overloads occur frequently.

TYPICAL SERVICE FACTORS

Driven machine types noted below are representative samples only. Select a category most closely approximating your application from those listed below.

IF IDLERS ARE USED, ADD THE FOLLOWING TO THE SERVICE FACTOR:

Idler on slack side (inside)	None
Idler on slack side (outside)	0.1
Idler on tight side (inside)	0.1
Idler on tight side (outside)	0.2

DRIVEN MACHINE TYPES	DRIVER TYPES: ELECTRIC MOTORS: AC Normal Torque Squirrel Cage and Synchronous; AC Split Phase; DC Shunt Wound; Internal Combustion Engines			ELECTRIC MOTORS: AC Hi-Torque; AC Hi-Slip; AC Repulsion-Induction; AC Single Phase Series Wound; AC Slip Ring; DC Compound Wound		
	INTERMITTENT SERVICE	NORMAL SERVICE	CONTINUOUS SERVICE	INTERMITTENT SERVICE	NORMAL SERVICE	CONTINUOUS SERVICE
Agitators for Liquids Blowers and Exhausters Centrifugal Pumps and Compressors Fans up to 10 HP Light Duty Conveyors	1.0	1.1	1.2	1.1	1.2	1.3
Belt Conveyors For Sand, Grain, etc. Dough Mixers Fans Over 10 HP Generators Line Shafts Laundry Machinery Machine Tools Punches-Presses-Shears Printing Machinery Positive Displacement Rotary Pumps Revolving and Vibrating Screens	1.1	1.2	1.3	1.2	1.3	1.4
Brick Machinery Bucket Elevators Exciters Piston Compressors Conveyors (Drag-Pan-Screw) Hammer Mills Paper Mill Beaters Piston Pumps Positive Displacement Blowers Pulverizers Saw Mill and Woodworking Machinery Textile Machinery	1.2	1.3	1.4	1.4	1.5	1.6
Crushers (Gyratory-Jaw-Roll) Mills (Ball-Rod-Tube) Hoists Rubber Calenders-Extruders-Mills	1.3	1.4	1.5	1.5	1.6	1.8
Chokable Equipment	2.0	2.0	2.0	2.0	2.0	2.0

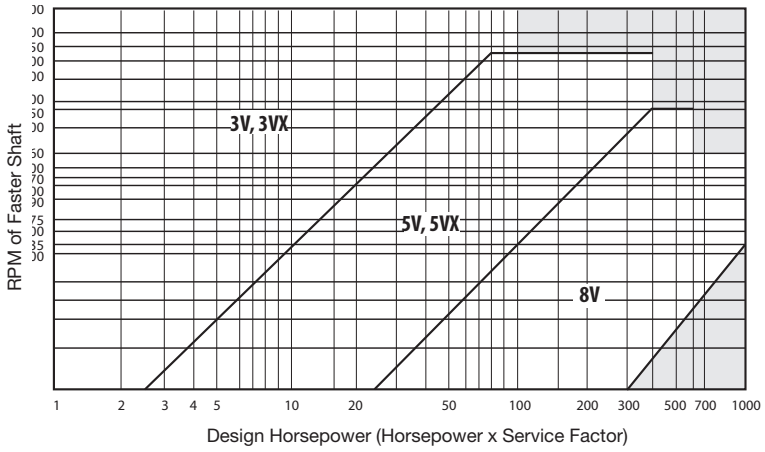
FOR A GOOD COMMERCIAL DRIVE SELECTION, USE CONTINUOUS SERVICE FACTOR

Stock Drive Selection

TYPICAL EXAMPLE

1. The driver is a 5 HP, normal torque electric motor.
2. The driver speed is 1750 RPM.
3. A speed reducer for a Martin screw conveyor is to be driven at 800 RPM.
4. The desired center distance is 20″.
5. The driver shaft diameter is 1⅛ and the driven shaft diameter is also 1⅛.
6. The conveyor will operate 18-20 hours per day.

TABLE 2 — HiCap Wedge Cross Section Selection Chart



Shaded area refer to factory.

TABLE 3 — Conventional Cross Section Selection

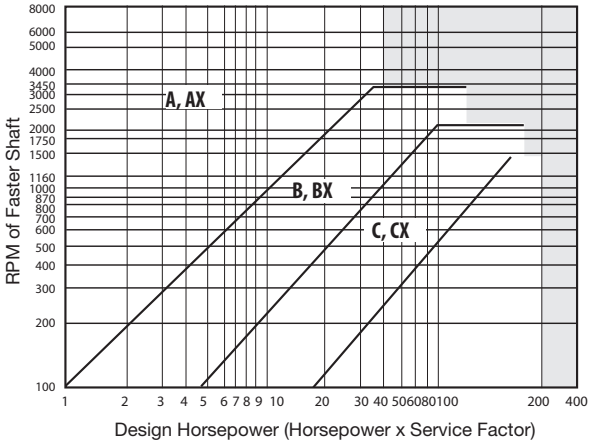


TABLE 4 — Minimum Recommended Sheave Diameters for Electric Motors

MOTOR HORSE-POWER	MOTOR RPM					
	575	695	870	1160	1750	3450
.50	2.50	2.50	2.50	—	—	—
.75	3.00	2.50	2.50	2.50	—	—
1.00	3.00	3.00	2.50	2.50	2.25	—
1.50	3.00	3.00	3.00	2.50	2.50	2.25
2.00	3.75	3.00	3.00	2.50	2.50	2.50
3.00	4.50	3.75	3.00	3.00	2.50	2.50
5.00	4.50	4.50	3.75	3.00	3.00	2.50
7.50	4.25	4.50	4.50	3.75	3.00	3.00
10.00	6.00	5.25	4.50	4.50	3.75	3.00
15.00	6.75	6.00	5.25	4.50	4.50	3.75
20.00	8.25	6.75	6.00	5.25	4.50	4.50
25.00	9.00	8.25	6.75	6.00	4.50	4.50*
* 30.00	10.00	9.00	6.75	6.75	5.25	—
40.00	10.00	10.00	8.25	6.75	6.00	—
50.00	11.00	10.00	9.00	8.25	6.75	—
60.00	12.00	11.00	10.00	9.00	7.50	—
75.00	14.00	13.00	10.00	10.00	9.00	—
100.00	18.00	15.00	13.00	13.00	10.00	—
125.00	20.00	18.00	15.00	13.00	11.00	—
150.00	22.00	20.00	18.00	13.00	—	—
200.00	22.00	22.00	22.00	—	—	—
250.00	22.00	22.00	—	—	—	—
300.00	27.00	27.00	—	—	—	—

*NOTE: Data above the line are from National Electrical Manufacturers Association Standard MG1-3.16 and MG1-3.16A. Data below the line are a composite of Electrical Motor Manufacturers data. They are generally conservative, and specific motors and bearings may permit the use of a smaller motor sheave. Consult the motor manufacturer.

CAUTION

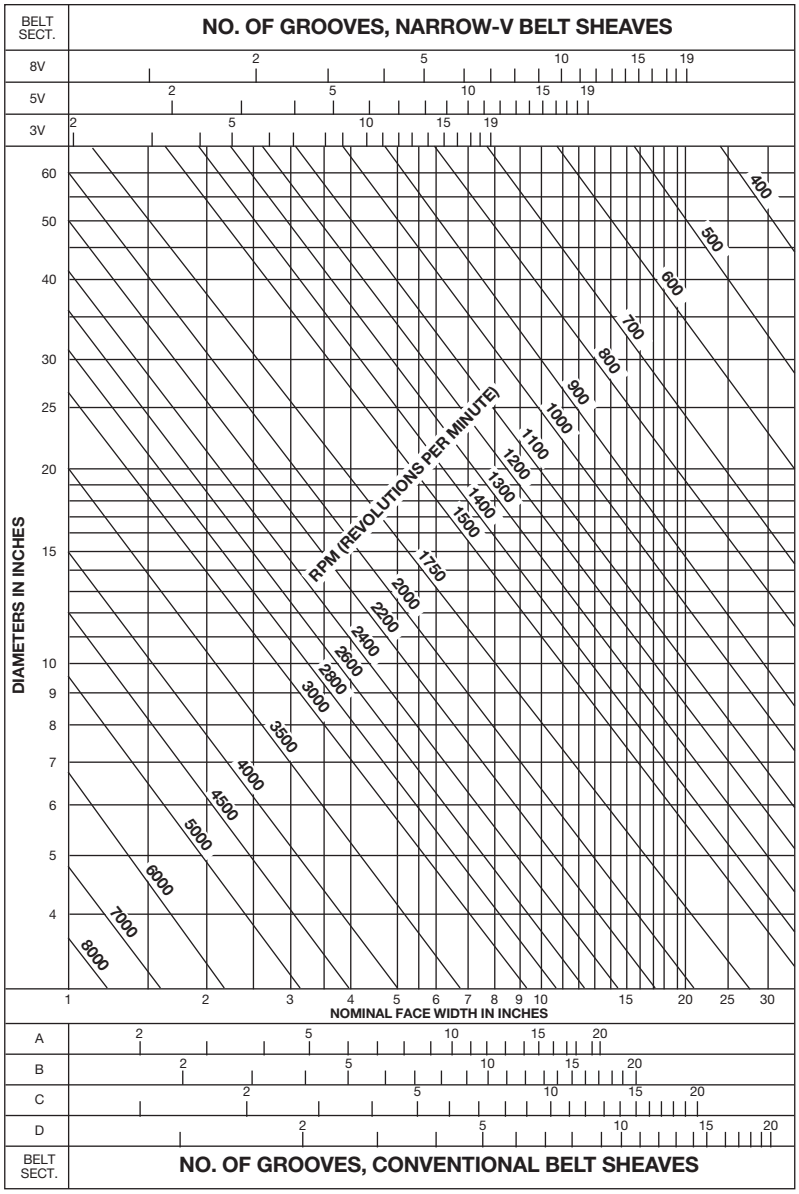
DO NOT USE STOCK SHEAVES ON SUCH EQUIPMENT AS DEBARKERS, WOOD CHIPPERS, CRUSHERS OR OTHER EQUIPMENT SUBJECT TO SEVERE SHOCK LOADS. CONSULT Martin FOR RECOMMENDATIONS.

Dynamic Balance

TO DETERMINE THE NEED FOR DYNAMIC BALANCE

This chart shows the maximum speed limit (in RPM) for a standard statically balanced sheave by a given diameter and face width. To exceed this speed limit it is recommended the sheave be dynamically balanced. This information can also be used for pulleys.

STATIC BALANCING – Both stock and Made-to-Order sheaves and pulleys are given a careful static balance for normal speeds. they will operate safely at belt speeds up to 6,500 feet per minute, but at speeds over 5,000 feet per minute and at any speed where vibration is a problem, dynamic balancing is recommended.



EXAMPLE: A 10″ diameter 2″ wide sheave or pulley is recommended to be dynamically balanced (balanced in two planes) at 3450 RPM and above. Below 3450 RPM a static balance (balanced in one plane) is sufficient.

WARNING: When belt speeds exceed 6500 feet per minute special materials must be used; consult Martin for special design requirements.

Stock Drive Selection

STOCK DRIVE SELECTION PROCEDURE

STEP 1. DETERMINE DESIGN HORSEPOWER.
Refer to "Table 1 — Service Factors" Page D-43. Determine proper service (intermittent, normal, or continuous). Find the type of driven machine most similar to your application in the left column. Then to the right, find the driver type to be used and locate the service factor under your proper service selection.

DESIGN HORSEPOWER = HORSEPOWER REQUIREMENT X SERVICE FACTOR

Example: From Table 1 Service Factor 1.4
HP Requirement × Service Factor = Design HP
5 × 1.4 = 7 Design HP

STEP 2. DETERMINE PREFERRED BELT CROSS SECTION. The choice of belt selection type (either Hi-Cap Wedge or Conventional) is determined by conditions unique to your specific application. For advantages and disadvantages of belt section type or a recommendation for your specific application, contact your belt manufacturer.

If you have a preferred type, refer to the appropriate chart below. On the horizontal axis of Table 2 or Table 3 below, locate the **Design Horsepower** and read up to the **RPM of the Faster Shaft**. The point at which the lines intersect indicates the **Recommended Belt Cross Section**.

Example: From Table 2 3VX is chosen. (The decision to use Hi-Cap Wedge was arbitrary, conventional could have also been chosen.)

STEP 3. CHECK MINIMUM SMALL (DRIVER) SHEAVE DIAMETER.
Refer to Table 4. Locate intersection of given motor horsepower and speed (rpm) for recommended minimum diameter.

Example: From Table 4 minimum recommended diameter is 3.00″.

STEP 4. SELECT THE DRIVE
A) Turn to the **Stock Drive Selection Tables** for the applicable belt section.
B) Find the **RPM of your DriveR**. (Speeds shown are for full load motor ratings.)
C) Read down the **DriveN speed column** until you reach the speed nearest your desired speed. Under the same column heading you will find the **Horsepower per belt.**
D) Read across to the left for the required **DriveR and DriveN sheaves**, making sure your DriveR diameter is larger than the minimum shown in Table 4.
E) Read across to the right for shaft centers nearest to your **Approximate Center Distance**. The belt size is shown at the top of the center distance column.

Example: From Stock Drive Selection tables for 3V belts:
Given: **The DriveR rpm is 1750.**
DriveN speed is 800 rpm.
Therefore: **3.04 is the HP per belt.**
At the far left on the same row, the sheave combination of **3.00″ DriveR** and **6.50″ DriveN** will provide the desired speeds. (The min. diameter from Table 4 is 3.00″.) The nearest shaft centers to the desired 20″ provided by a standard belt is **20.5″ provided by a 3VX x 560**.

STEP 5. DETERMINE THE NUMBER OF BELTS REQUIRED
To determine the number of belts (thus, the number of grooves) multiply the **horsepower per belt** found in step 4C by the **Arc & Length correction factor** found in the center distance column below the center distance selected. This gives the **corrected or actual horsepower per belt.** Now divide the **Design Horsepower** found in step 1 by the corrected horsepower to determine the number of belts required. (Always round up to the next whole number)

Example: # of Belts Required $= \frac{\textbf{Design HP}}{\text{Corrected HP}}$

Design HP found in step 1 is **7**, corrected HP is found by: Horsepower per belt (step 4c) × Arc & length correction factor

thus, **corrected HP = 3.04 × .96 = 2.92.**

# of belts required = $\frac{7}{2.92} = 2.4$

Use 3 belts.

STEP 6. Order Martin
(1) 3 3V 300 SH (driver sheave)
(1) SH 1⅝ (Bushing)
(1) 3 3V 650 SDS (driven sheave)
(1) SDS 1⅝ (Bushing)

(The decision to use QD bushings was arbitrary.)

ALTERNATE EXAMPLE

A 25 horsepower, 1160 RPM squirrel cage normal torque electric motor is to drive a fan 315 RPM. The shaft centers should be about 40″. The motor has a 2⅛″ shaft and the fan shaft is 2¼″. Service is 15 hours per day, constant load.

1. Horsepower Requirement of the Drive . . . . . .25 HP
2. RPM of DriveR Shaft . . . . . .1160 RPM
3. RPM of DriveN Machine . . . . . .315 RPM
4. Approximate Center Distance . . . . . .40″

STEP 1 **DETERMINE DESIGN HORSEPOWER**
From Table 1 Service Factor 1.2
HP Requirement × Service Factor = Design HP
25 × 1.2 = 30 Design HP

STEP 2 **DETERMINE BELT CROSS SECTION**
From Table 3 — B

STEP 3 **CHECK MINIMUM SMALL SHEAVE DIAMETER**
From Table 4 — 6.75″ min.

STEP 4 **SELECT THE DRIVE**
Locate the Drive Selection Tables
For B Belts
RPM of Drive — 1160 RPM
Driven Speed — HP per Belt
316 RPM — 8.19 HP per Belt
Required Driver and Driven Sheave
(Re-check minimum)
6.8 Driver
25.0 Driven (6.75″ min.)

NOTE: EQUIPMENT THAT IS SUBJECT TO HEAVY SHOCK LOAD SUCH AS ROCK CRUSHERS OR WOOD CHIPPERS, USUALLY REQUIRES SPECIAL CONSTRUCTION.

CONSULT FACTORY FOR RECOMMENDATIONS.

WARNING: BEFORE USING KEVLAR BELTS, CONSULT FACTORY.

Read across to right for shaft centers nearest required center distance. B-128 = 38.9″ centers

Find corrected horsepower by multiplying HP per belt by Arc and Length correction factor. 8.19 × 1.06 = 8.68

Determine number of belts needed by dividing Design HP by corrected HP 30/8.68 = 3.45. Use 4 belts

Order Martin
(1) 4 B 68 TB (Driver Sheave)
(1) 2517 2⅛ (Bushing)
(1) 4 B 250 TB (Driven Sheave)
(1) 3030 2¼ (Bushing)

(The decision to use Taper Bushed Sheaves was arbitrary.)