

# TECHNICAL CALCULATING HORSEPOWER

## FORMULAS

### BELT CONVEYORS & BELT DRIVEN LIVE ROLLERS

- + Product (Total Live Load)\*
- + Belt Weight\*\*
- + Roller Weight (N/A on Slider Bed Belt Conv.)\*\*
- + Drive Weight (250#)
- = Subtotal
- x Friction Factor (See Chart This Page)
- x 1.25 (25% Contingency Factor)
- = Effective Belt Pull
- x Speed of Conveyor
- ÷ 33,000 Horsepower Factor
- ÷ .95 Chain Reductions
- ÷ .85 GRE / Reducer Losses
- = Horsepower

### BELT CONVEYORS (INCLINE OR DECLINE)

- + Product (Total Live Load)
- + Belt Weight\*\*
- + Roller Weight (N/A on Slider Bed Belt Conv.)\*\*
- + Drive Weight (250#)
- = Subtotal
- x Friction Factor (See Chart This Page)
- = Subtotal
- + (Actual Live Load on Incline Portion of Conv.
  - x Sine of Incline--See Chart This Page)
- = Subtotal
- x 1.25 (25% Contingency Factor)
- = Effective Belt Pull
- x Speed of Conveyor
- ÷ 33,000 Horsepower Factor
- ÷ .95 Chain Reductions
- ÷ .85 GRE / Reducer Losses
- = Horsepower

### CHAIN DRIVEN LIVE ROLLERS

- + Product (Total Live Load)\*
- + Roller Weight\*\*
- + Sprocket and Chain Weight (add 3 lbs./roller)\*\*
- + Drive Weight (250#)
- = Subtotal
- x Friction Factor (See Chart This Page)
- x 1.25 (25% Contingency Factor)
- = Effective Chain Pull
- x Speed of Conveyor
- ÷ 33,000 Horsepower Factor
- ÷ .95 Chain Reductions
- ÷ .85 GRE / Reducer Losses
- = Horsepower

### SLAT AND CHAIN DRAG CONVEYORS

- + Product (Total Live Load)\*
- + Slat and Chain Weight@
- + Drive Weight (100#)
- = Subtotal
- x Friction Factor (See Chart This Page)
- x 1.25 (25% Contingency Factor)
- = Effective Chain Pull
- x Speed of Conveyor
- ÷ 33,000 Horsepower Factor
- ÷ .95 Chain Reductions
- ÷ .85 GRE / Reducer Losses
- = Horsepower

FRICTION FACTOR	
MODEL	FRICTION FACTOR
Slider Bed Belt Conveyor	.30
Roller Bed Belt Conveyor	.05
Belt Driven Live Roller	.10
Chain Driven Live Roller	.06
Slat Conveyor	.20
Chain Drag Conveyor	.20

SINES	
DEGREE	SINE
5°	.08715
10°	.17365
11°	.19081
12°	.20791
13°	.22495
14°	.24192
15°	.25882
16°	.27364
17°	.29237
18°	.30902
19°	.32557
20°	.34202
21°	.35837
22°	.37461
23°	.39073
24°	.40674
25°	.42262
26°	.43837
27°	.45399
28°	.46947
29°	.48481
30°	.50000
35°	.57358
40°	.64279

\*On zero pressure accumulators, only 1/2 of total live load should be used since only 1/2 of load should be in motion at any given time with conveyor design (does NOT apply to Smart Zone® models).

\*\*See weight charts opposite page.

@See slat and chain weight chart opposite page (slat and chain weight applies only to slat conveyor).

When calculating horsepower, use charts at right to determine proper shaft and pulley diameter. This will ensure that the pulley and shaft selected will be of the proper size (diameter) to adequately handle the loading and effective belt pull on the unit.

In Table I, use the 180° arc of contact for end drives and 210° for center drives. Multiply the figure shown by the belt width to find the effective belt pull of a pulley.

Once the proper pulley diameter is known, the diameter of the shaft must

be determined. Table II specifies effective belt pull ratings for various diameter shafts at selected pulley face width.

TABLE I - ARC OF CONTACT		
Pulley Dia.	180° End Drive	210° Center Drive
8"	85# PIW BELT	60# PIW BELT
12"	125# PIW BELT	90# PIW BELT
18"	230# PIW BELT	170# BELT
24"	345# PIW BELT	250# PIW BELT

TABLE II - SHAFT DIAMETER					
Pulley Face Width	Shaft Dia. 1-3/16"	Shaft Dia. 1-7/16"	Shaft Dia. 1-15/16"	Shaft Dia. 2-7/16"	Shaft Dia. 2-15/16"
12"	1000	1500	3700	6300	10600
14"	920	1500	3700	6300	10600
18"	670	1200	3700	6300	10600
20"	590	1100	3500	6300	10600
22"	530	950	3100	6300	10600
26"	440	790	2600	5600	10600
32"	350	620	2100	4400	9100
38"	290	510	1700	3700	7500
44"	240	440	1400	3100	6400
51"	210	370	1200	2700	5500
57"	180	330	1100	2400	4900

