



## SCREW CONVEYOR CAPACITY

Capacity is defined as the weight or volume per hour of a bulk material that can be safely and feasibly conveyed using a screw conveyor. Screw conveyor diameter is determined by multiple factors including capacity.

The following steps are required for proper screw conveyor selection –

1. Calculate required capacity in cubic feet per hour (ft<sup>3</sup>/hr).
2. Select the recommended trough loading percentage from the Bulk Material Table for the specific bulk material to be conveyed.
3. Select the screw conveyor diameter that corresponds with the recommended trough loading and is less than the capacity at maximum RPM from the Capacity Table.
4. Calculate actual conveyor speed by dividing the required capacity by the capacity at 1-RPM from the Capacity Table.

**NOTE:** Maximum speeds shown in the Capacity Table are not intended for every application and were developed for non-abrasive, free-flowing bulk materials. KWS recommends lower screw conveyor speeds for most industrial applications. A larger screw conveyor diameter will be required for lower screw conveyor speeds.

Maximum lump size must also be considered when designing a screw conveyor. Please refer to the Bulk Material Lump Size section for further information.

The Capacity Table is only intended for designing control fed screw conveyors. Conversely, screw feeders are flood loaded at the inlet and require special design considerations. Please refer to the Screw Feeder section for further information.

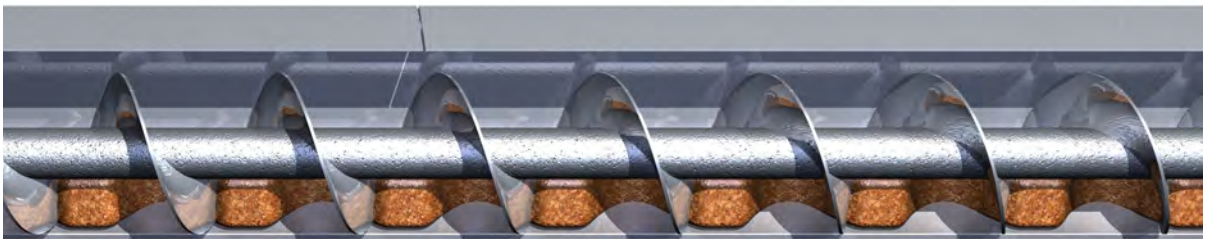
### Calculation Of Conveyor Speed

The maximum recommended capacity for each screw diameter is listed in the Capacity Table for reference and should not be exceeded. Using the formula below, the exact conveyor speed (S) can be calculated:

$$S = \frac{CFH}{CFH \text{ AT } 1 \text{ RPM}}$$

Nomenclature: S = Conveyor Speed

CFH = Capacity in Cubic Feet per Hour (ft<sup>3</sup>/hr)



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### Capacity Factors for Special Pitches

Screw conveyors transfer bulk materials volumetrically and capacity is calculated in cubic feet per hour. Screw conveyor capacity is affected when the flight pitch is reduced from standard full pitch. Reducing the flight pitch reduces the capacity. For example, a 1/2 pitch screw carries 1/2 the capacity of a full pitch screw at the same level of trough loading and speed. Capacity Factors for Special Pitches are shown below.

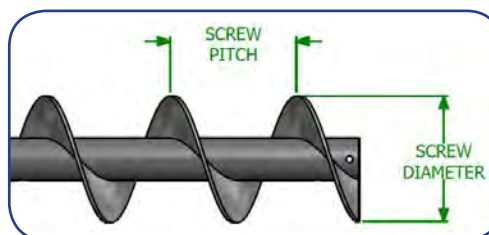
Selection Capacity (SC) is the capacity adjusted for special pitch or modified flights used in the process of selecting the screw conveyor diameter for the application.

Calculation of special screw conveyor capacities is as follows:

$$SC = CFH \times CF$$

Nomenclature: SC = Selection Capacity  
 CFH = Required Capacity in Cubic Feet per Hour (ft<sup>3</sup>/hr)  
 CF = Capacity Factor

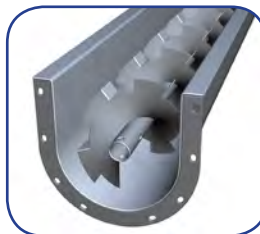
Capacity Factors for Special Pitches		
Pitch	Description	Capacity Factor
Standard	Pitch = Diameter	1.00
Short	Pitch = 2/3 Diameter	1.50
Half	Pitch = 1/2 Diameter	2.00
Long	Pitch = 1-1/2 Diameters	0.67



### Capacity Factors for Modified Flight

Screw conveyor capacity is also affected by using modified flight types such as cut flight, cut-and-folded flight, ribbon and paddles. The use of modified flights reduces conveying capacity. Capacity Factors for Modified Flights are shown below for various flight types and trough loading

Capacity Factors for Cut or Cut and Fold Flights			
Flight Type	Conveyor Loading		
	15%	30%	45%
Cut flight	1.92	1.57	1.43
Cut & folded flight	X	3.75	2.54



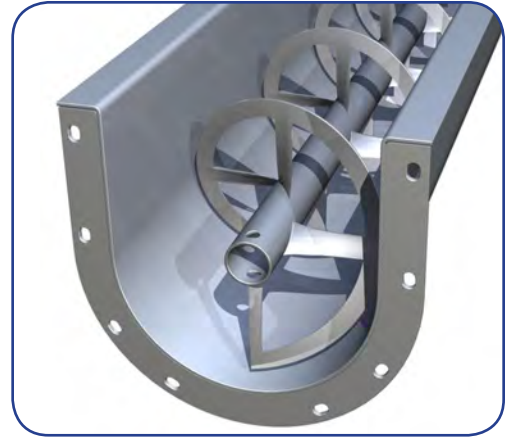
Capacity Factors for Paddles				
Paddles Per Pitch	1	2	3	4
Factor	1.08	1.16	1.24	1.32





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Capacity Factors for Ribbon Flights			
Ribbon Screw Dia.	Conveyor Loading		
	15%	30%	45%
4	X	X	X
6	1.32	1.52	1.79
9	1.34	1.54	1.81
12	1.11	1.27	1.50
14	1.27	1.45	1.71
16	1.55	1.69	1.90
18	1.33	1.53	1.80
20	1.60	1.75	1.96
24	2.02	2.14	2.28
30	2.16	2.29	2.44
36	3.27	3.37	3.70



### Example

A screw conveyor is required to transport 10 tons per hour of unslaked lime with a bulk density of 60 lbs/ft<sup>3</sup>. The unslaked lime also needs to be mixed in transit using cut and folded flights. The conveying distance is 15-feet, so short (2/3) pitch screws will be used to ensure proper mixing. The recommended trough loading percentage from the Bulk Material Table is 30A.

Actual calculated capacity is:

$$CHF = \frac{20,000 \text{ lbs/hr}}{60 \text{ lbs/ft}^3} = 333 \text{ ft}^3/\text{hr}$$

For proper selection of screw conveyor diameter and speed, the actual capacity must be adjusted for the cut and folded flights and short pitch using the Capacity Factors for Special Pitches and Modified Flights. As stated above, the adjusted capacity is defined as Selection Capacity (SC).

The Capacity Factor for short (2/3) pitch is 1.50.

Capacity Factors for Special Pitches		
Pitch	Description	Capacity Factor
Standard	Pitch = Diameter	1.00
Short	Pitch = 2/3 Diameter	1.50
Half	Pitch = 1/2 Diameter	2.00
Long	Pitch = 1-1/2 Diameters	0.67



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The Capacity Factor for cut and folded flights with 30-percent trough loading is 3.75.

Capacity Factors for Cut or Cut and Fold Flights			
Flight Type	Conveyor Loading		
	15%	30%	45%
Cut flight	1.92	1.57	1.43
Cut & folded flight	X	3.75	2.54

Therefore:

$$SC = 1.50 \times 3.75 \times 333 \text{ ft}^3/\text{hr}$$

$$SC = 1,873 \text{ ft}^3/\text{hr}$$


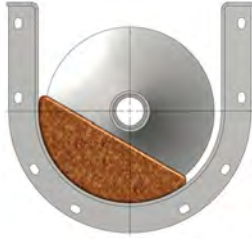

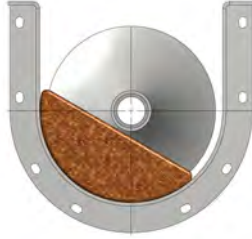
The Selection Capacity will be used to select the proper screw conveyor diameter and speed from the Capacity Table. With a recommended trough loading of 30A, the Selection Capacity must be less than the maximum capacity given in the Capacity Table. A 16-inch diameter screw conveyor will convey 2,496 cubic feet per hour at the maximum recommended speed of 80-rpm.

The actual screw conveyor speed is calculated by dividing the Selection Capacity by the capacity at 1-rpm.

$$1,873/31.2 = 60\text{-rpm}$$

60-rpm is the correct speed for a 16-inch diameter screw conveyor with cut and folded flights and short pitch for conveying and mixing 333 cubic feet per hour.

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Capacity Table				
Trough Loading	Screw Dia. (in.)	Max. RPM *	Capacity in ft <sup>3</sup> /hr	
			At Max. RPM	At 1 RPM
 15%	4	69	14.5	0.2
	6	60	45	0.8
	9	55	150	2.7
	12	50	323	6.5
	14	50	520	10.4
	16	45	702	15.6
	18	45	1,012	22.5
	20	40	1,248	31.2
	24	40	2,184	54.6
	30	35	3,728	106.5
 30% A	4	139	57	0.4
	6	120	179	1.5
	9	100	545	5.5
	12	90	1,161	12.9
	14	85	1,768	20.8
	16	80	2,496	31.2
	18	75	3,375	45.0
	20	70	4,375	62.5
	24	65	7,085	109.0
	30	60	12,798	213.3
 30% B	4	69	28	0.4
	6	60	90	1.5
	9	55	305	5.5
	12	50	645	12.9
	14	50	1,040	20.8
	16	45	1,404	31.2
	18	45	2,025	45.0
	20	40	2,500	62.5
	24	40	4,360	109.0
	30	35	7,465	213.3
 45%	4	190	116	0.61
	6	165	368	2.2
	9	155	1,271	8.2
	12	145	2,813	19.4
	14	140	4,368	31.2
	16	130	6,071	46.7
	18	120	8,112	67.6
	20	110	10,307	93.7
	24	100	16,400	164.0
	30	90	28,800	320.0
	36	75	41,490	553.2

**NOTE:** Maximum speeds shown in the Capacity Table are not intended for every application and were developed for non-abrasive, free-flowing bulk materials. KWS recommends lower screw conveyor speeds for most industrial applications. A larger screw conveyor diameter will be required for lower screw conveyor speeds.