Design
Engineering
Manufacturing

SCREW CONVEYOR AND BUCKET ELEVATOR ENGINEERING GUIDE

MEMBER
CEMA
CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION

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KWS Manufacturing Company, Ltd. was founded in 1972 to manufacture and sell screw conveyors and other bulk material handling equipment. KWS quickly became recognized as a key supplier of standard and specialty equipment for a variety of industries. The plant and facilities are currently a combined 125,000 square feet. KWS provides complete engineered systems, screw conveyors and feeders, shaftless conveyors, vertical screw conveyors, bucket elevators, live bottom bins, elevator buckets, Dragon-Flite conveyors, hoppers, belt conveyors, hollow-flite screw processors and screw pumps.

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INTRODUCTION

The engineering section of this catalog was complied to aid you in the design of a conveyor system, yielding optimum performance and efficiency, for your individual conveying function.

Primary considerations for the selection of a screw conveyor are:

1. Type and condition of the material to be handled, including maximum particle size, and, if available, the specific bulk density of the material to be conveyed.

2. Quantity of transported material, expressed in pounds or tons per hour.

3. The distance for which the material is to be conveyed.

In the next pages is the necessary information for the selection of a screw conveyor system, presented in a series of five steps. These steps are arranged in logical order, and are divided into separate sections for simplicity.

The five steps are:

1. Establishing the characteristics of the material to be conveyed.

2. Locating conveyor capacity (conveyor size and speed) on capacity tables.

3. Selection of conveyor components.

4. Calculation of required horsepower.

5. Checking of component torque capacities (including selection of shaft types and sizes).

All necessary calculations are expressed in graphic and equation form, and use of all charts, graphs, etc. will be explained fully at the end of each section.

Engineering data regarding the design of screw feeders and their selection, is presented in a separate section, immediately following the screw conveyor data.

Any unusual applications, or special designs, should be referred to KWS Mfg's. Engineering Department.

MATERIAL CHARACTERISTICS

The Material Tables on the following pages contain information regarding materials which may be effectively conveyed, using KWS Manufacturing Company's screw conveyor systems. For information on unlisted materials, refer to the Engineering Department of KWS Manufacturing Company, Inc.

"Conveyability" data for unlisted materials can, when necessary, be complied by making a comparison of listed materials which have similar physical characteristics, such as weight and particle size. The following is a brief description of the information presented in the Materials Table.

MAXIMUM PARTICLE SIZE

Conveyor size, speed, and horsepower requirements, are directly affected by bulk density and internal friction, which are relative to the particle size of conveyed material.

AVERAGE WEIGHT PER CUBIC FOOT

This section of the Materials Table is supplied to enable you to convert the required capacity in pounds or tons per hour to volume in cubic feet per hour.

NOTE Since most typical applications of screw conveyors receive slightly aerated, gravity fed products, the weights listed in this table are averages and when possible, actual bulk densities should be used.

CONVEYOR LOADING

The recommended percentages of conveyor loading is a prime factor in determining the size of conveyor, and is based on the maximum depth at which materials will flow through the conveyor without causing undue wear. Considerations should be made, for example, for materials with a high abrasiveness because wear indexes would normally be higher due to a larger contact area with component parts.

HORSEPOWER FACTOR

The horsepower factor, representing the relative mobility of the material, is necessary for horsepower calculation.

RECOMMENDED COMPONENT SERIES

This information is presented to assist in the selection of the proper materials of construction, component weights and other specifications best suited for the material to be conveyed. The alphabetical code refers to general component series, and the numerical code gives bearing and shaft type recommendations. See component series tables

ABRASIVENESS, CORROSIVENESS AND "FLOWABILITY"

In addition to the above information, the Materials Table also presents graphically the relative abrasiveness, corrosiveness and "flowability" of the materials listed. These characteristics, as well as other special aspects of materials, are given further treatment in the Component Selection Section. The values of the graphic presentation used in the Materials Table are listed below.

Description	I	II	III
Abrasiveness	Not Abrasive	Mildly Abrasive	Highly Abrasive
Corrosiveness	Not Corrosive	Mildly Corrosive	Highly Corrosive
Flowability	Free Flowing	Relatively Free Flowing	Sluggish
	Angle of Repose		
	To 30°	30° - 45°	Beyond 45°

NOTE Some materials, while they are not corrosive under "normal" conditions, may become corrosive under certain other conditions, such as when heated or in the presence of moisture.

SPECIAL CHARACTERISTICS NOTES

Notable unusual material characteristics are listed by numerical codes in the last column of the table where applicable. An explanation of these numerical codes is given below.

1 – Contains explosive dust.

2 – Fluidizes easily

3 – Absorbs moisture.

4 – Usage or value affected by contamination.

5 – Emits toxic fumes or dust.

6 – Usage or value affected by material degradation.

7 – Exceptionally light or fluffy.

8 – Tends to pack under pressure.

9 – Fibrous material which tends to mat.

● – Consult KWS Mgf. Engineering Department.

MATERIALS TABLE

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Acetylenogen (Calcium Carbide)	+1/2	70-80	30B	1.6	B4	II	I	II	1
Adipic Acid	–100M	45	30A	0.8	D3	I	II	II	3
Alfalfa Meal	–1/8	17	30A	0.9	B4	II	I	III	7
Alfalfa Seed	–1/8	48	30B	0.5	B4	II	I	I	1
Almonds	–1/2	28-30	30B	0.9	B4	II	I	II	6
Alum	–1/8	45-58	30A	0.6	A2	I	I	II	●
Alum, lumpy	+1/2	50-60	30A	1.4	B1	I	I	II	●
Alumina	–100M	60-120	15	1.8	C4	III	I	I	2
Aluminate Gell, dried	–100M	45	30B	1.7	B4	II	I	II	
Aluminum Chips	–1/2	7-15	30A	0.8	A2	I	I	III	9
Aluminum Hydrate (Aluminum Hydroxide)	–1/2	13-18	30A	1.4	A2	I	I	III	
Aluminum Oxide (Alumina)	–100M	60-120	15	1.8	C4	III	I	I	2
Aluminum Ore (Bauxite)	–3	75-85	15	1.8	D4	III	I	II	
Aluminum Silicate	–1/8	49	45	0.8	A2	I	I	II	
Aluminum Sulfate (Alum)	●	●	●	●	●	●	●	●	
Amianthus (Asbestos)	Fibers	20-40	30B	1.0	B4	II	I	III	5, 7, 8
Ammonium Chloride, Crystalline	–1/8	52	30A	0.8	A2	I	I	II	
Ammonium Nitrate	–1/8	45-62	●	●	●	●	●	●	● 1, 3
Ammonium Sulfate	●	40-58	●	●	●	●	●	III	●
Andalusite (Aluminum Silicate)	–1/8	49	45	0.8	A2	I	I	II	
Antimony	–100M	●	30B	●	B4	II	I	II	●
Apple Pomace, dry	–1/2	15	30B	0.5	B4	II	I	III	7
Arsenate of Lead (Lead Arsenate)	–1/8	72	30A	1.0	A2	I	I	III	2, 5
Arsenic	–100M	30	●	●	●	●	●	●	● 5
Arsenic Oxide (Arsenolite)	●	100-120	●	●	●	●	●	●	● 5
Asbestos, Ore	–1/2	81	15	1.2	C4	III	I	II	5
Asbestos, Shred	Fibers	20-40	30B	1.0	B4	II	I	III	5, 7, 8
Ashes, Coal, dry	–1/2	35-45	30B	2.0	B4	II	I	III	
Ashes, Coal, dry	–3	35-45	30B	2.0	B4	II	I	III	
Ashes, Coal, wet	–1/2	45-50	30B	3.0	D4	II	II	III	8
Ashes, Coal, wet	–3	40-50	15	4.0	D4	II	II	III	8
Asphalt, Crushed	–1/2	45	30A	2.0	A2	I	I	II	
Bagasse, dry	Fibers	7-10	30A	1.0	B1	I	I	III	5,7,8,9
Bakelite	–100M	30-40	30A	1.4	A2	I	I	III	
Baking Powder	–100M	41	30A	0.6	A2	I	I	II	
Baking Soda (Sodium Bicarbonate)	–100M	70-80	30A	1.0	A2	I	I	II	
Barite	+1/2	120-180	15	2.0	D4	III	I	II	
Barite	–100M	120-180	30B	2.6	B4	II	I	III	2
Barium Carbonate	–100M	72	30B	1.6	B4	II	I	III	5
Barium Sulfate (See Barite)	●	●	●	●	●	●	●	●	
Bark, wood	+1/2	10-20	30B	1.2	B4	II	I	III	9
Barley	–1/8	37-48	45	0.4	A2	I	I	I	1
Baryte (Barite)	●	●	●	●	●	●	●	●	
Basalt	–1/8	80-90	15	1.8	C4	III	I	I	
Bauxite, crushed	–3	75-85	15	1.8	D4	III	I	II	
Beans, Castor	–1/2	36	45	0.5	A2	I	I	I	
Beans, Castor, meal	–1/8	35-40	30A	1.2	A2	I	I	II	
Beans, Navy	–1/2	48	45	0.5	A2	I	I	I	
Beans, Soy	–1/2	45-50	45	0.5	A2	I	I	I	
Beet Pulp, dry	●	11-16	●	●	●	●	●	●	●
Beet Pulp, wet	●	25-45	●	●	●	●	●	●	●
Bentonite	+1/2	34-40	30B	1.2	B4	II	I	III	8
Bentonite	–100M	50-60	30B	0.7	B4	II	I	II	2
Benzene Hexachloride	–100M	56	30A	0.6	A2	I	I	III	5
Bicarbonate of Soda (Baking Powder)	–100M	41	30A	0.6	A2	I	I	II	
Blood, dried	+1/2	35-45	30B	1.7	B4	II	I	III	

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Blood, ground	–100M	30	30A	0.6	A2	I	I	II	
Bluestone (Copper Sulfate)	+1/2	60-70	30A	0.6	B1	I	I	II	●
Bone Ash (Tricalcium Phosphate)	–100M	40-50	30A	1.6	A2	I	I	III	
Bones, crushed	–1/2	35-40	30B	2.0	B4	II	I	III	
Bones, ground	–1/8	50	30B	1.7	B4	II	I	II	
Boneblack	–100M	20-25	30B	1.7	B4	II	I	II	
Bonechar	–1/8	40	30B	1.8	B4	II	I	II	
Bonemeal	–1/8	50-60	30B	1.7	B4	II	I	II	
Borate of Lime	–1/8	●	30A	●	A2	I	I	II	●
Borax	–1/2	60	30B	1.0	B4	II	I	II	
Borax	–1/8	50-60	30B	0.7	B4	II	I	II	
Boric Acid	–1/8	55	30A	0.8	A2	I	I	II	
Boron	–100M	75	15	1.0	C4	III	I	II	
Bran	–1/8	10-20	30A	0.4	A2	I	I	II	1, 7
Braunite (Manganese Oxide)	–100M	120	30B	2.0	B4	II	I	II	
Brewers Grain, spent, dry	–1/2	14-30	30A	0.4	A2	I	I	III	
Brewers Grain, spent, wet	–1/2	55-60	30A	0.6	D3	I	II	III	
Bronze chips	–1/8	30-50	15	0.8	C4	III	I	III	
Buckwheat	–1/4	37-42	45	0.4	A2	I	I	I	1
Calcine, flour	–100M	75-85	30A	0.7	A2	I	I	II	
Calcium Carbide	+1/2	70-80	30B	1.6	B4	II	I	II	1
Calcium Carbonate (Limestone)	●	●	●	●	●	●	●	●	
Calcium Fluoride (Fluorspar)	–1/4	82	30B	2.0	B4	II	I	III	
Calcium Hydrate (Lime, hydrated)	●	●	●	●	●	●	●	●	
Calcium Hydroxide (Lime, hydrated)	●	●	●	●	●	●	●	●	
Calcium Lactate	+1/2	26-29	30A	0.6	B1	I	I	III	6, 8
Calcium Magnesium Carbonate	+1/2	90-100	30B	2.0	B4	II	I	II	
Calcium Oxide (Lime, unslaked)	●	●	●	●	●	●	●	●	
Calcium Phosphate	–100M	40-50	30A	1.6	A2	I	I	III	
Calcium Sulfate (Gypsum)	●	●	●	●	●	●	●	●	
Carbon, activated	–1/8	8-20	30B	1.2	B4	II	I	I	6
Carbon Black, fine	–100M	4-6	30A	0.4	A2	I	I	III	● , 8
Carbon Black, pelleted	–1/8	20-40	●	●	●	●	●	●	● , 3, 8
Carborundum*	–1/2	100	15	3.0	C4	III	I	II	
Casein	–1/8	36	30B	1.6	B4	II	I	II	
Cast Iron, chips	–1/2	130-200	30B	4.0	B4	II	I	III	
Caustic Soda	–1/8	88	30B	1.8	D4	II	III	II	3, 5
Caustic Soda, flakes	–1/4	47	30A	1.5	D4	I	III	III	3,5,6,8
Celite (Diatomaceous Earth)	–100M	11-17	15	1.6	C4	III	I	II	● , 2, 8
Cement, clinker	+1/2	75-80	15	1.8	D4	III	I	II	
Cement, portland	–100M	75-85	30B	1.4	B4	II	I	II	2
Cerrusite (Lead Carbonate)	–100M	240-260	30B	1.0	B4	II	I	II	2, 5
Chalk, crushed	+1/2	85-90	30B	1.9	B4	II	I	III	8
Chalk, ground	-100M	70-75	30B	1.4	B4	II	I	III	2, 8
Charcoal	+1/2	18-25	30B	1.4	B4	II	I	III	6
Chips, pulpwood	+1/2	12-25	30A	1.0	B1	I	I	III	7, 9
Chrome Ore	–1/2	125-140	15	2.5	C4	III	I	II	
Cinders, blast furnace	+1/2	57	15	1.9	D4	III	I	III	
Cinders, Coal	+1/2	40	15	1.6	D4	III	I	II	
Clay, Ceramic, dry	–100M	65-80	30A	1.5	A2	I	I	II	
Clinker, cement	+1/2	75-80	15	1.8	D4	III	I	II	
Clover, seed	–1/8	48	45	0.4	A2	I	I	I	1
Coal, Anthracite	–1/2	52-60	30B	0.9	B4	II	II	II	1
Coal, pulverized	–100M	32-35	30A	0.6	D3	I	II	III	1, 2
Coal, sized	–1/2	50	30B	0.6	B4	II	II	II	1
Cocoa, beans	–1/2	30-45	30A	0.4	A2	I	I	II	6
Cocoa, nibs	–1/2	35	30A	0.5	A2	I	I	II	
Cocoa, powdered	–100M	30-35	30A	0.9	A2	I	I	III	2, 8

* Trademark of Carborundum Co.

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Cocoanut	shred	20-22	30A	1.0	B1	I	I	III	
Coffee, chaff	–1/8	20	30A	0.5	A2	I	I	II	2, 7
Coffee, green bean	–1/2	32-45	30A	0.5	A2	I	I	II	6
Coffee, ground	–1/8	25	30A	0.6	A2	I	I	II	4
Coffee, roasted bean	–1/2	22-26	45	0.4	A2	I	I	I	
Coffee, soluble	–100M	19	15	0.8	A2	I	I	I	2,3,4,6
Coke, loose	+1/2	23-32	15	1.2	D4	III	I	III	6, 9
Coke, calcined	+1/2	35-45	15	1.3	D4	III	I	II	9
Coke, breeze	–1/4	25-35	15	1.2	C4	III	I	III	
Compost	●	28	●	●	●	I	III	III	● 8, 9
Copper Ore	+1/2	120-150	15	4.0	D4	III	I	II	
Copper Sulfate	+1/2	60-70	30A	0.6	B1	I	I	II	●
Copperas (Ferrous Sulfate)	–1/2	50-75	30B	1.0	B4	II	I	II	
Copra	+1/2	22-33	30A	1.0	B1	I	I	II	
Copra, cake	+1/2	25-30	30A	0.7	B1	I	I	II	
Copra, cake, ground	–1/8	40-45	30A	0.7	A2	I	I	II	
Copra, meal	–1/8	40-45	30A	0.7	A2	I	I	II	
Cork, ground	–1/8	5-15	30A	0.5	A2	I	I	III	
Cork, granulated	–1/2	5-15	30A	0.4	A2	I	I	III	
Corn, cracked	–1/2	40-50	30A	0.7	A2	I	I	II	
Corn, seed	–1/4	45	45	0.4	A2	I	I	I	1, 6
Corn, shelled	–1/4	45	45	0.4	A2	I	I	I	1
Corn, germ	–1/8	21	30A	0.4	A2	I	I	II	
Corn, grits	–1/8	40-45	30A	0.5	A2	I	I	II	
Corn, sugar	–1/8	31	30A	1.0	A2	I	I	II	
Corn, meal	–1/8	32-40	30A	0.5	A2	I	I	II	
Cottonseed, dry, delinted	-1/4	22-40	30A	0.9	A2	I	I	II	
Cottonseed, dry, undelinted	–1/4	18-25	30A	0.8	A2	I	I	III	
Cottonseed, cake	+1/2	40-45	30A	1.0	B1	I	I	II	
Cottonseed, flakes	–1/4	20-25	30A	0.8	A2	I	I	III	
Cottonseed, hulls	–1/8	12	30A	0.9	A2	I	I	III	7
Cottonseed, meal	–1/8	35-40	30A	0.4	A2	I	I	II	
Cottonseed, meats	–1/8	40	30A	0.6	A2	I	I	II	
Cracklings	–3	40-50	30A	1.3	B1	I	I	III	
Cryolite	–1/2	90-110	30B	1.8	B4	II	I	II	5
Cryolite	–100M	50-75	30B	2.0	B4	II	I	II	2, 5
Cullet	+1/2	80-120	15	2.0	D4	III	I	II	
Cupric Sulfate (Copper Sulfate)	+1/2	60-70	30A	0.6	B1	I	I	II	●
Diatomaceous Earth (Diatomite)	–100M	11-17	15	1.6	C4	III	I	II	●, 2, 8
Dicalcium Phosphate	–100M	40-50	30A	1.6	A2	I	I	III	
Disodium Phosphate	–1/8	25-31	30B	0.5	B4	II	I	II	6
Dolomite (Calcium Magnesium Carbonate)	+1/2	80-100	30B	2.0	B4	II	I	II	
Earth, loam, dry, loose	–1/8	76	30B	1.2	B4	II	I	III	
Ebonite	–1/2	65-70	30A	0.8	A2	I	I	II	
Epsom Salts	–1/8	40-50	30A	0.7	A2	I	I	II	
Ethanedioic Acid (Oxalic Acid)	–1/8	60	30A	1.0	A2	I	I	III	3
Feldspar	–1/8	100-160	30B	1.5	B4	II	I	II	
Feldspar	–100M	65-75	30B	2.0	B4	II	I	III	
Ferrous Sulphate	–1/2	50-75	30B	1.0	B4	II	I	II	
Ferrous Sulfide (Iron Sulfide)	●	●	●	●	●	●	●	●	
Fish Meal	–1/8	30-40	30A	0.9	A2	I	I	III	
Fish Scrap	●	40-50	30A	●	B1	I	I	III	●
Flaxseed	–1/8	43-45	45	0.4	A2	I	I	I	1
Flaxseed Cake	+1/2	48-50	30A	0.6	B1	I	I	II	
Flaxseed Meal	–1/8	25	30A	0.4	A2	I	I	II	
Floridin (Fuller's Earth)	●	●	●	●	●	●	●	●	
Flour, Wheat	–100M	30-46	30A	0.6	A2	I	I	III	1, 4
Flue Dust, boiler, dry	–100M	40-125	15	3.5	C4	III	I	II	2

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Fluorspar (Fluorite)	−1/4	82-110	30B	2.0	B4	II	I	III	
Fly Ash, dry	−100M	35-45	30B	3.5	C4	III	I	I	2
Foundry Sand, dry	−1/8	90-100	15	2.0	C4	III	I	II	
Fuller's Earth, oil filter, burned	−1/8	40	15	1.5	C4	III	I	II	
Fuller's Earth, oil filter, raw	−1/8	35-40	30B	1.0	B4	II	I	II	
Fuller's Earth, oil filter, spent	35% oil	60-65	15	0.9	D4	III	I	III	
Galena (Lead Sulfide)	−100M	240-260	30B	1.0	B4	II	I	II	2, 5
Gelatin, granulated	−1/2	32	30A	0.8	A2	I	I	II	6
Gilsonite	−1/2	37	30B	1.5	D4	II	II	II	1, 5
Glass, batch	+1/2	80-100	15	1.8	D4	III	I	II	
Glue, ground	−1/8	40	30B	1.7	B4	II	I	II	
Glue, pearl	−1/2	40	45	0.5	A2	I	I	I	
Gluten, meal	−1/8	40	30A	0.6	A2	I	I	II	
Grains, distillery, spent, dry	lumps	30	30A	0.4	B1	I	I	II	7
Graphite Flake	−1/2	40	30A	0.4	A2	I	I	II	
Graphite Flour	−100M	28	45	0.4	A2	I	I	I	2
Graphite Ore	+1/2	65-75	30A	0.4	B1	I	I	I	
Granite, broken	+1/2	95-100	15	2.5	D4	III	I	II	
Grape Pomace	−1/2	15-20	30B	1.4	B4	II	I	III	7
Grass Seed	−1/8	10-32	30A	0.4	A2	I	I	II	1, 7
Green Vitriol (Ferrous Sulfate)	−1/2	50-75	30B	1.0	B4	II	I	II	
Gypsum, calcined	−1/2	55-60	30B	1.2	B4	II	I	II	
Gypsum, calcined	−100M	60-80	30B	0.8	B4	II	I	III	
Gypsum, raw	−1	90-100	30B	1.6	B4	II	I	II	
Hexanedioic Acid (Adipic Acid)	−100M	45	30A	0.8	D3	I	II	II	3
Hominy	−1/2	37-50	30A	0.4	A2	I	I	II	
Hops, spent, dry	Lumps	35	30A	0.8	B1	I	I	III	
Hops, spent, wet	Lumps	50-55	30A	1.0	D3	I	II	III	
Hydroxybenzoic Acid (Salicylic Acid)	−1/8	29	30A	0.6	A2	I	I	II	3
Ice, crushed	+1/2	35-45	30A	0.4	●	●	●	●	
Illmenite Ore	−1/8	140	15	2.0	C4	III	I	II	
Iron Ore	−1/8	120-180	15	2.0	C4	III	I	II	
Iron Pyrites (Iron Sulfide)	●	●	●	●	●	●	●	●	
Iron Sulfate (Ferrous Sulfate)	−1/2	50-75	30B	1.0	B4	II	I	II	
Iron Sulfide	−1/2	120-135	●	●	A2	I	I	I	
Iron Sulfide	−100M	105-120	●	●	A2	I	I	I	
Iron Vitriol (Ferrous Sulfate)	−1/2	50-75	30B	1.0	B4	II	I	II	
Kaolin Clay	−3	163	30A	1.8	B1	I	I	II	
Kaolin Talc	−100M	42-56	30B	2.0	B4	II	I	III	
Kryolith (Cryolite)	●	●	●	●	●	●	●	●	
Lactose	−100M	32	30A	0.6	A2	I	I	II	4, 8
Lamp Black (Carbon Black)	●	●	●	●	●	●	●	●	
Lead Arsenate	−1/8	72	30A	1.4	A2	I	I	III	2, 5
Lead Arsenite	−1/8	72	30A	1.4	A2	I	I	III	2, 5
Lead Carbonate	−100M	240-260	30B	1.0	B4	II	I	II	2, 5
Lead Ore	−1/2	180-230	15	1.4	C4	III	I	III	5
Lead Oxide	−100M	30-150	30B	1.0	B4	II	I	II	2, 5
Lead Oxide	−200M	30-180	30B	1.2	B4	II	I	II	2, 5
Lead Sulfide	−100M	240-260	30B	1.0	B4	II	I	II	2, 5
Lignite, air dried	+1/2	45-55	30A	0.8	B1	I	I	II	
Limanite	−1/2	120	15	1.7	C4	III	I	III	
Lime, hydrated	−1/8	40	30A	0.8	A2	I	I	II	2, 8
Lime, hydrated	−200M	32-40	30A	0.6	A2	I	I	II	2, 8
Lime, unslaked	−1/8	60	30A	0.6	A2	I	I	III	8
Lime, pebble, unslaked	+1/2	53-56	30A	2.0	B1	I	I	III	
Limestone, agricultural	−1/8	68	30B	1.4	B4	II	I	II	
Limestone, crushed	+1/2	85-90	30B	1.6	B4	II	I	II	
Limestone, dust	−100M	55-95	30B	1.0	B4	II	I	III	2

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Lindane (Benzene Hexachloride)	–100M	56	30A	0.6	A2	I	I	III	5
Linseed (Flaxseed)	●	●	●	●	●	●	●	●	
Litharge (lead Oxide)	–100M	30-150	30B	1.0	B4	II	I	II	2, 5
Lithopone	–100M	120-140	30A	1.0	A2	I	I	II	2, 5
Magnesium Chloride (Magnesite)	–1/2	33	30A	0.8	A2	I	I	III	
Magnesium Sulfate (Epsom Salts)	–1/8	40-50	30A	0.7	A2	I	I	II	
Maize	–1/4	45	45	0.4	A2	I	I	I	1
Malt, dry, ground	–1/8	22	30A	0.4	A2	I	I	II	1, 7
Malt, dry, whole	–1/2	27-30	30A	0.4	A2	I	I	II	1
Malt, wet or green	–1/2	60-65	30A	0.4	A2	I	I	III	
Malt, meal	–1/8	36-40	30A	0.4	A2	I	I	II	
Manganese Dioxide	●	80	●	●	●	●	●	●	●
Manganese Ore	–1/2	125-140	15	2.0	C4	III	I	III	
Manganese Oxide	–100M	120	30B	2.0	B4	II	I	II	
Manganese Sulfate	–1/2	70	15	2.0	C4	III	I	II	
Marble, crushed	–1/2	80-95	15	2.0	C4	III	I	II	
Marl	+1/2	80	30B	1.6	B1	I	I	II	
Meat, ground	–1/4	50-55	●	●	B4	II	I	I	●
Meat	Scraps	40	30B	●	D4	II	I	III	● 9
Mica, ground	–1/8	13-15	30B	0.7	B4	II	I	II	
Mica, pulverized	–100M	13-30	30B	0.9	B4	II	I	II	2
Mica, flakes	–1/8	17-22	30B	1.0	B4	II	I	I	7, 9
Milk, dried, flake	–1/8	5-6	30A	0.4	A2	I	I	II	4
Milk, malted	–100M	27-35	30A	0.4	A2	I	I	III	2, 4, 8
Milk, whole, dried	–100M	20	30A	0.4	A2	I	I	III	2,3,4,8
Milk Sugar (Lactose)	–100M	32	30A	0.6	A2	I	I	II	4, 8
Milo	–1/4	56	30A	0.4	A2	I	I	II	
Monosodium Phosphate	–1/8	50	30B	0.6	B4	II	I	II	
Muriate of Potash	–1/8	77	15	1.8	D4	III	III	II	
Mustard Seed	–1/8	45	45	0.4	A2	I	I	I	1
Nicotinic Acid (Niacin)	–1/8	35	30B	0.8	B4	II	I	II	
Niter (Potassium Nitrate)	●	●	●	●	●	●	●	●	●
Oakite (Trisodium Phosphate)	–1/8	60	30B	1 7	B4	II	I	II	
Oats	–1/2	25-35	45	0.4	A2	I	I	I	1
Oats, rolled	–1/2	19-24	30A	0.5	A2	I	I	II	1, 7
Oxalic Acid, crystals	–1/8	60	30A	1.0	A2	I	I	III	3
Oyster Shells, ground	–1/2	53	30B	0.9	B4	II	I	II	
Oyster Shells, whole	+1/2	80	30B	2.0	B4	II	I	II	
Paper Pulp, stock	5%	62	30A	0.9	●	●	●	●	9
Paper Pulp, stock	6-15%	60-62	30A	1.2	●	●	●	●	9
Paraffine Cake, broken	–1/2	30-45	30A	0.5	A2	I	I	II	
Peanuts, shelled	–1/4	35-45	30A	0.4	A2	I	I	II	6
Peanuts, unshelled	+1/2	15-24	30A	0.6	B1	I	I	II	6
Peas, dried	–1/2	45-50	45	0.5	A2	I	I	I	1, 6
Phosphate Acid	–100M	60	30A	1.4	A2	I	I	II	
Phosphate, crushed	+1/2	75-85	30B	1.8	B4	II	I	II	
Phosphate, granular	–1/8	90-100	15	1.7	C4	III	I	II	
Phosphate of Soda (Disodium Phosphate)	–1/8	25-31	30B	0.5	B4	II	I	II	6
Phosphoprotein (Casein)	–1/8	36	30B	1.6	B4	II	I	II	
Phosphoric Acid (Phosphate Acid)	–100M	60	30A	1.4	A2	I	I	II	
Plaster of Paris (Gypsum)	–200M	60-80	30B	0.9	B4	II	I	III	2
Plumbago (Graphite)	●	●	●	●	●	●	●	●	
Polyethylene, pellets	–1/8	35	30A	0.4	A2	I	I	II	4, 6
Polystyrene, pellets	–1/8	40	30A	0.4	A2	I	I	II	4, 6
Potash (Muriate of Potash)	–1/8	77	15	1.8	D4	III	III	II	
Potassium Carbonate	–1/8	50-80	30B	1.0	B4	II	II	II	
Potassium Chloride, pellets	–1/4	120-130	30B	1.6	B4	II	II	II	
Potassium Nitrate	–1/2	76	30B	1.0	B4	II	II	I	1

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Potassium Nitrate	−1/8	80	30A	1.2	D3	I	II	II	1
Potassium Sulfate	−1/8	42-48	30B	1.0	B4	II	I	III	8
Pumice	−1/8	40-45	15	1.6	C4	III	I	III	
Pyrite, pellets	−1/2	120-130	30B	2.0	B4	II	I	II	
Quartz	−1/8	85	15	1.8	C4	III	I	II	
Quicklime (Lime, unslaked)	●	●	●	●	●	●	●	●	
Red Lead (Lead Oxide)	−100M	150-300	30B	1.0	B4	II	I	II	2, 5
Rice,hulled or polished	−1/8	45-48	45	0.4	A2	I	I	I	
Rice, rough	−1/8	32-36	30A	0.4	A2	I	I	II	1
Rice Bran	−1/8	16-20	30A	0.4	A2	I	I	II	1, 7
Rice Grits	−1/8	42-45	30A	0.4	A2	I	I	II	
Rubber, ground	−1/8	23-50	30A	0.8	A2	I	I	III	
Rye	−1/8	44-48	45	0.4	A2	I	I	I	1
Safflower	−1/8	45	45	0.4	A2	I	I	I	1
Safflower, cake	+1/2	50	30A	0.6	B1	I	I	II	
Safflower,meal	−1/8	50	30A	0.6	A2	I	I	II	
Saffron (Safflower)	●	●	●	●	●	●	●	●	
Sal Ammoniac (Ammonium Chloride)	−1/8	52	30A	0.8	A2	I	I	II	
Salicylic Acid	−1/8	29	30A	0.6	A2	I	I	II	3
Salt, Dry Coarse	−1/4	45-50	30B	1.0	B4	II	II	II	3
Salt, Dry Fine	−1/8	70-80	30B	1.7	B4	II	II	II	3
Salt Cake (Sodium Sulfate)	−1/4	85	30B	2.1	B4	II	II	II	3
Saltpeter (Potassium Nitrate)	−1/2	76	30B	1.2	C4	II	III	I	1
Sand, damp, bank	−1/8	110-130	15	2.8	C4	III	I	III	
Sand, dry, bank	−1/8	90-110	15	1.7	C4	III	I	II	
Sand, dry silica	−1/8	90-100	15	2.0	C4	III	I	I	
Sand, foundry, prepared	−1/8	90	15	3.0	C4	III	I	III	
Sand, foundry, shakeout	+1/2	90	15	2.6	D4	III	I	II	
Sawdust, dry	−1/8	10-13	30A	0.7	A2	I	I	III	
Shale, crushed	−1/2	85-90	30B	2.0	B4	II	I	II	
Shavings, wood, dry	+1/2	8-15	30A	0.5	B1	I	I	III	7, 9
Shellac	−1/8	31	30A	0.8	A2	I	I	II	4
Silica Gel (Silicic Acid)	−1/8	45	15	1.7	B4	III	I	II	3, 6
Silicon Dioxide (Quartz)	−1/8	85	15	1.8	C4	III	I	II	
Slag, furnace	1/2	160-180	15	1.2	C4	III	I	II	
Slag, furnace	+1/2	60-65	15	2.4	D4	III	I	II	
Slaked Lime (Lime, hydrated)	●	●	●	●	●	●	●	●	
Slate, crushed	−1/2	80-90	30B	2.0	B4	II	I	II	
Slate, ground	−1/8	82	30B	1.6	B4	II	I	II	
Sludge, sewage, dried	−1/8	45-55	30B	0.5	D4	II	III	III	
Snow, fresh	−1/8	5-12	30A	0.4	A2	I	I	III	
Snow, packed	+1/2	15-35	30A	0.8	B1	I	I	III	
Soap, beads or granules	−1/4	15-35	30A	0.6	A2	I	I	II	3
Soap, chips	−1/2	15-25	30A	0.4	A2	I	I	II	3
Soap, flakes	−1/8	5-20	30A	0.6	A2	I	I	II	3
Soap, powder	−1/8	20-25	30A	0.8	A2	I	I	II	
Soapstone (Talc)	−100M	40-50	30B	0.9	B4	II	I	III	2, 8
Soda Ash, heavy	−1/8	55-65	30B	1.0	B4	II	I	II	
Soda Ash, light	−100M	20-35	30B	0.8	B4	II	I	II	2, 7
Sodium Aluminate	−1/8	72	30B	1.0	B4	II	I	II	
Sodium Aluminum Fluoride (Kryolith)	●	●	●	●	●	●	●	●	
Sodium Bicarbonate	−100M	70-80	30A	1.0	A2	I	I	II	
Sodium Borate (Borax)	●	●	●	●	●	●	●	●	
Sodium Carbonate (Soda Ash)	●	●	●	●	●	●	●	●	
Sodium Chloride (Salt)	●	●	●	●	●	●	●	●	
Sodium Hydrate (Caustic Soda)	●	●	●	●	●	●	●	●	
Sodium Hydroxide (Caustic Soda)	●	●	●	●	●	●	●	●	
Sodium Nitrate	−1/8	70-80	30A	1.2	A2	I	I	II	1

Material	Maximum Particle Size (IN.)	Average Weight Per Cu.Ft.	% Loading	H.P. Factor	Component Series	Abrasiveness	Corrosiveness	Flowability	NOTE
Sodium Phosphate	-1/8	50	30B	0.6	B4	II	I	II	
Sodium Sulfate, dry	+1/2	85	30B	0.8	B4	II	I	II	
Sodium Sulfate, dry	-1/8	65-85	30B	1.0	B4	II	I	II	
Sorghum seed	-1/8	32-52	45	0.5	A2	I	I	I	
Soybeans, cracked	-1/4	30-40	30B	0.5	B4	II	I	II	1
Soybeans, whole	-1/4	45-50	15	0.4	C4	III	I	I	1
Soybean, cake	+1/2	40-43	30A	1.0	B1	I	I	II	
Soybean Flakes, raw	-1/4	20-26	30A	0.8	A2	I	I	II	7
Soybean Flakes, spent	-1/4	18-20	30A	0.6	A2	I	I	II	7
Soybean Flour	-100M	27-30	30A	0.8	A2	I	I	II	1
Soybean Meal, cold	-1/8	40	30A	0.5	A2	I	I	II	
Soybean Meal,hot	-1/8	40	30A	0.5	D3	I	II	II	
Starch	-100M	25-50	●	●	●	●	●	●	●
Steatite (Talc)	●	●	●	●	●	●	●	●	
Steel, chips, crushed	+1/2	100-150	15	1.6	D4	III	I	II	
Stibium (Antimony)	●	●	●	●	●	●	●	●	
Sugar, granulated	-1/8	50-55	30A	0.7	A2	I	I	II	4, 6
Sugar, powdered	-200M	50-60	●	●	●	●	●	●	●
Sugar, raw, cane	-1/8	55-65	30A	1.0	A2	I	I	III	8
Sugar, wet, beet	-1/8	55-65	30A	1.4	A2	I	I	III	8
Sugar Beet, pulp, dry	-1/2	12-15	●	0.9	●	II	●	II	●
Sugar Beet, pulp, wet	-1/2	25-45	●	1.2	●	I	●	II	8
Sulphur, crushed	-1/2	50-60	30A	0.8	A2	I	I	II	1
Sulphur, ground	-1/8	50-60	30A	0.6	A2	I	I	II	1, 2
Sulphur, lumps	-3	80-85	30A	0.8	B1	I	I	II	1
Taconite, pellets	+1/2	116-130	15	2.0	D4	III	I	II	6
Talc	-100M	40-60	30B	0.8	B4	II	I	III	2, 8
Talc	-1/2	80-90	30B	0.9	B4	II	I	II	
Tanbark, ground	●	55	30A	0.7	●	●	●	●	●
Titanium Dioxide (Ilmenite)	-1/8	140	15	2.0	C4	III	I	II	
Thenardite (Sodium Sulfate)	●	●	●	●	●	●	●	●	
Tobacco, scraps	+1/2	15-25	30A	0.8	B1	I	I	III	7
Tobacco, snuff	-100M	30	30B	0.9	B4	II	I	III	1, 2, 6
Tricalcium Phosphate	-100M	40-50	30A	1.6	A2	I	I	III	
Trisodium Phosphate	-1/8	60	30B	1.7	B4	II	I	II	
Tung Nut Meats, crushed	+1/2	25	30A	0.8	B1	I	I	II	
Uintaite (Bentonite)	●	●	●	●	●	●	●	●	
Vermiculite, expanded	-1/2	16	30B	0.5	B4	II	I	III	7
Vermiculite Ore	-1/2	80	30B	0.8	B4	II	I	II	
Vulcanite (Ebonite)	-1/2	65-70	30A	0.8	A2	I	I	II	
Walnut Shells, crushed	-1/8	35-40	15	1.0	B4	II	I	II	
Wheat	-1/4	45-48	45	0.4	A2	I	I	I	1
Wheat, cracked	-1/8	35-45	30A	0.4	A2	I	I	I	1
Wheat, germ	-1/8	18-28	30A	0.4	A2	I	I	I	
White Lead, dry	-100M	75-100	30B	1.0	B4	II	I	II	2, 5
Wilkinite (Bentonite)	●	●	●	●	●	●	●	●	
Wood Bark	+1/2	10-20	30B	1.2	B4	II	I	III	9
Wood Chips	+1/2	10-30	30A	0.6	B1	I	I	III	7, 9
Wood, flour	-200M	16-36	30A	0.4	A2	I	I	III	7, 8
Zinc, concentrate residue	-1/8	75-80	15	1.0	C4	III	I	II	
Zinc Oxide, heavy	-200M	30-35	30A	1.0	A2	I	I	III	2, 8
Zinc Oxide, light	-200M	10-15	30A	0.8	A2	I	I	III	2, 7, 8

CAPACITY

A capacity table is provided on page 19 to aid you in calculation of proper conveyor size. To use this table, find the capacity at maximum RPM, opposite the recommended percentage of conveyor loading, that equals or exceeds the capacity of material required per hour. The recommended conveyor diameter will then be found in the appropriate column on the same line, as will the maximum particle size recommended for the screw diameter.

If the maximum particle size you plan to convey is larger than the maximum recommended particle size for the conveyor you've chosen from the table, you must then select a larger conveyor, adequate to handle the maximum particle size you intend to use.

CALCULATION OF CONVEYOR SPEED

Conveyor speed can be most conveniently calculated, by use of the nomographs supplied on pages
To use this nomograph first locate the two known values (screw diameter, and required capacity, in cu. ft. per hour) then with a straight edge connect these two points, and the appropriate conveyor speed will be the intersection point on the third value column marked "speed".

Maximum economical capacities will be listed for reference opposite their respective conveyor diameters, and should not be exceeded. Another method of calculating conveyor speed is:

$$CS = \frac{CFH}{CFH \text{ at } 1 \text{ RPM}}$$

Equation Symbols

CS = Conveyor Speed
CFH = Capacity in Cubic Feet per Hour

CAPACITY FACTORS FOR SPECIAL PITCH OR MODIFIED FLIGHT CONVEYORS

Special conveyor types are selected in the same manner as standard conveyors, but the section capacity used for determining size and speed, must be modified to compensate for different characteristics of special conveyors.

Calculation of special screw conveyor capacities is as follows:

$$SC = CFH \times CF$$

Equation Symbols

SC = Selection Capacity
CFH = Required Capacity in Cubic Feed per Hour
CF = Capacity Factor

SPECIAL CONVEYOR PITCH CAPACITY FACTORS

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

SPECIAL CONVEYOR FLIGHT CAPACITY FACTORS

Type	Conveyor Loading			
	15%	30%	45%	95%
Cut flight	1.92	1.57	1.43	*
Cut & folded flight	*	3.75	2.54	*

* NOT RECOMMENDED

FACTORS FOR CONVEYORS WITH PADDLES*

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

* Std. paddles at 45° reverse pitch

RIBBON CONVEYOR CAPACITY FACTORS

Dia.	Ribbon Width	Conveyor Loading 15%	30%	45%
6	1	1.32	1.52	1.79
9	1-1/2	1.34	1.54	1.81
10	1-1/2	1.45	1.67	1.96
12	2	1.32	1.52	1.79
	2-1/2	1.11	1.27	1.50
14	2-1/2	1.27	1.45	1.71
16	2-1/2	1.55	1.69	1.90
18	3	1.33	1.53	1.80
20	3	1.60	1.75	1.96
24	3	2.02	2.14	2.28

EXAMPLE:

A conveyor is required to transport 10 tons per hour of a material weighing 62 pounds per cubic foot and having a maximum particle size of 100 mesh. To further complicate the problem, we will require that the material be mixed in transit, using cut and folded flights. Since the distance the material is to be conveyed is relatively short, we want to use short pitch screws, to insure proper mixing of material. The materials table recommends a loading percentage of 30% A.

Actual calculated volume:

$$\frac{20{,}000 \text{ lbs.}}{62 \text{ lbs./cu. ft.}} = 323 \text{ cu. ft./hr.}$$

For proper calculation of size and speed, this volume must be corrected, by use of capacity factors, to compensate for cut and folded, and short (2/3) pitch flights.

These capacity factors, taken from the preceding charts are:

Cut and folded flights 30% loading = 3.75
Short pitch flights (2/3 pitch) = 1.50

With capacity factors included, capacity will now be calculated:

SC = 3.75x1.50x323
SC = 1817 cu. ft.

This selection capacity value will be used in the capacity table, for calculating correct size and speed. In the appropriate column, under 30% A loading, we find that a 14" conveyor, at the maximum recommended speed will convey 2194 cu. ft. per hr. or 21.1 cu. ft. per revolution.

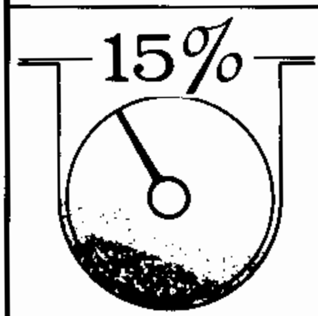
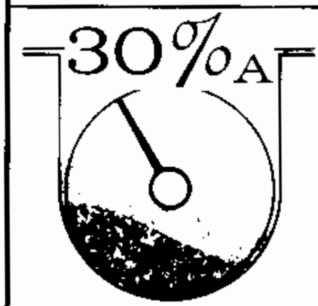
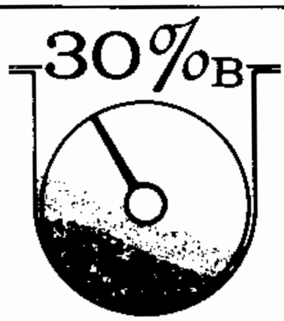
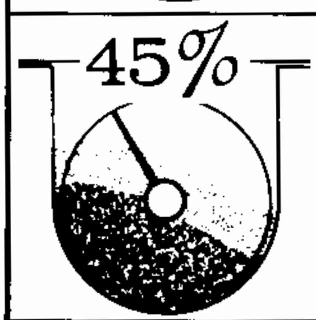
To calculate actual conveyor speed, the following formula shoud be used:

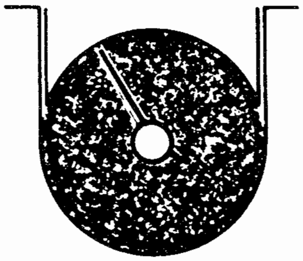
$$\frac{\textbf{1817 cu. ft./hr.}}{\textbf{21.1 cu. ft./hr. at 1 RPM}} = \textbf{86.1 RPM}$$

This is the correct speed at which the 14" conveyor with cut and folded, and short pitch flights will convey the actual capacity of 323 cu. ft. per hour.

Graphic selection of this conveyor could also be accomplished by use of the 30% A nomograph on page 22 and the selection capacity of 1817 cu. ft. per hour.

CAPACITY TABLE

Trough Loading	Screw Dia.	Max. Lump Size (In.)	Max. RPM	Capacity in Cu. Ft. Per Hr.	
				At Max. RPM	At 1 RPM
	4	1/2	69	14.5	.21
	6	3/4	66	49.5	.75
	9	1-1/2	62	173	2.8
	10	1--3/4	60	222	3.7
	12	2	58	389	6.7
	14	2-1/2	56	588	10.5
	16	3	53	832	15.7
	18	3-1/4	50	1,135	22.7
	20	3-1/2	47	1,462	31.1
	24	4	42	2,293	54.6
	4	1/2	139	57	.41
	6	3/4	132	198	1.5
	9	1-1/2	122	683	5.6
	10	1-3/4	118	849	7.2
	12	2	111	1,476	13.3
	14	2-1/2	104	2,194	21.1
	16	3	97	3,046	31.4
	18	3-1/4	90	4,086	45.4
	20	3-1/2	82	5,092	62.1
	24	4	68	7,426	109.2
	4	1/2	69	28	.41
	6	3/4	66	99	1.5
	9	1-1/2	62	347	5.6
	10	1-3/4	60	432	7.2
	12	2	58	771	13.3
	14	2-1/2	56	1,182	21.1
	16	3	53	1,664	31.4
	18	3-1/4	50	2,270	45.4
	20	3-1/2	47	2,919	62.1
	24	4	42	4,586	109.2
	4	1/2	190	116	.61
	6	3/4	182	413	2.27
	9	1-1/2	170	1,360	8.0
	10	1-3/4	165	1,782	10.8
	12	2	157	3,030	19.3
	14	2-1/2	148	4,558	30.8
	16	3	140	6,524	46.6
	18	3-1/4	131	8,659	66.1
	20	3-1/2	122	11,590	95.0
	24	4	105	17,535	167.0



95%

95% LOADED CONVEYORS

Conveyor loadings may sometime exceed the recommended % of Loading, listed in the materials table. Considerations as to the material characteristics may justify up to 95% loading of tubular or shrouded conveyors. The following table lists maximum speeds limited with regard to the percentage of loading normally recommended for the specific listed materials.

CAPACITY TABLE FOR 95% LOADED CONVEYORS

Screw Dia.	Max. Lump Size (IN.)	Max. Recommended RPM				Capacity in Cubic Feet Per Hour				
		Normal % Loading *				Normal % Loading *				
		15	30A	30B	45	15	30A	30B	45	AT 1 RPM
4	1/4	76	89	80	96	96	113	101	122	1.27
6	3/8	67	78	70	84	318	370	332	399	4.75
9	3/4	58	68	61	73	974	1,142	1,024	1,226	16.8
10	7/8	55	65	58	70	1,309	1,547	1,380	1,666	23.8
12	1	49	58	52	62	1,999	2,366	2,122	2,530	40.8
14	1-1/4	43	51	46	55	2,804	3,325	2,999	3,586	65.2
16	1-1/2	38	45	40	48	3,762	4,455	3,960	4,752	99.0
18	1-3/4	32	38	34	41	4,512	5,358	4,794	5,781	141.0
20	2	26	31	28	34	5,226	6,231	5,628	6,834	201.0
24	3	21	25	23	28	7,434	8,850	8,142	9,912	354.0

* From the materials table

COMPONENT SELECTION

Proper selection of components is very important in the design of conveyor system. This section of the Engineering Catalogue explains the different designs of primary components, and their principle uses. Also, there is a list of special influencing factors for materials with special handling characteristics.

CONVEYOR LOADING AND DISCHARGE

Conveyor loading should be regulated to prevent the components from exceeding their design limits.

REGULATED OUTPUT DEVICES

When delivery to conveyor is from machinery with a regulated material output, the conveyor itself can be designed to handle the anticipated material volume.

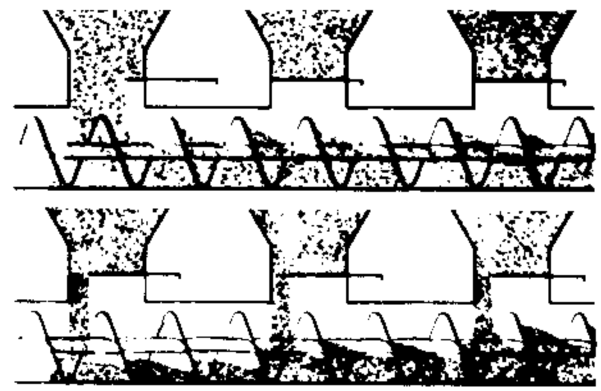
Material is sometimes stored and released intermittently. In this situation, surge loads sometimes cause the conveyor to operate beyond it's recommended capacity. Screw feeders are very effective in regulating these intermittent loads, and should be used if at all possible. Otherwise conveyors must be designed for the maximum momentary or surge loads.

STATIC STORAGE LOADING

When loading from static storage or from manually regulated inlets, a load indicating ammeter can be attached to the meter control, as a simple and effective tool for accomplishing maximum design loading.

MULTIPLE INLET LOADING

When more than one inlet is feeding the screw conveyor, care must be taken to insure the collective total of the inlets does not exceed the conveyors design limits.

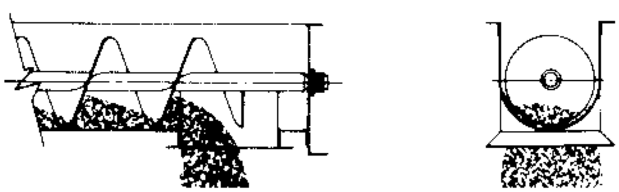


LOADING THROUGH AUTOMATIC CONTROLS

Automatic devices are available to moedulate inlet or feed devices to work within design limits of the conveyor at all times.

DISCHARGE METHODS

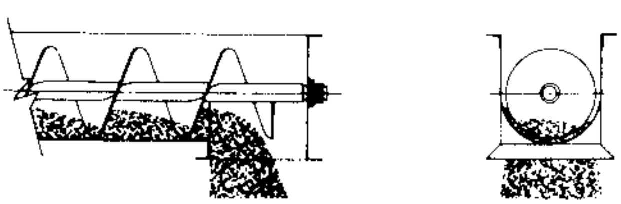
Below are drawings of standard discharge components in a variety of designs. These configurations are listed for individual applications where the standard discharge spouts are not necessarily appropriate. Cautions are inserted when necessary for particular discharge components.



Standard Discharge Spout

This component provides a means of directly coupling most interconnecting spouts, processing machinery, other conveyors or storage facilities. Available with hand, rack and pinion or air actuated cut off gates.

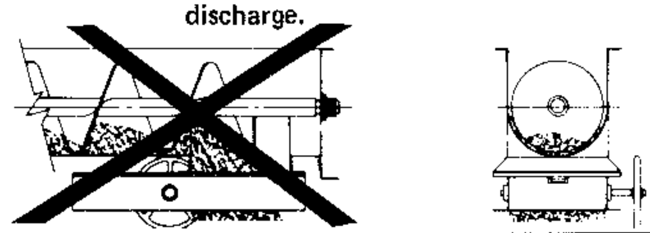
Flush End Discharge



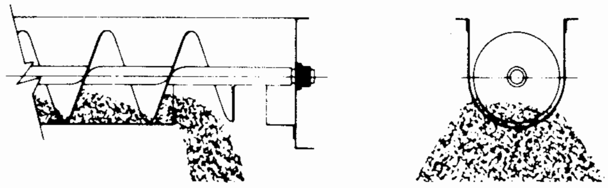
Mechanically Operated Gates
(Manual or Remote Controlled)

CAUTION

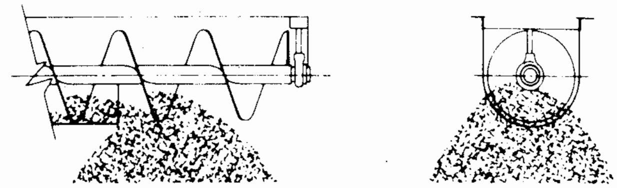
Not to be used on last discharge.



Plain Opening



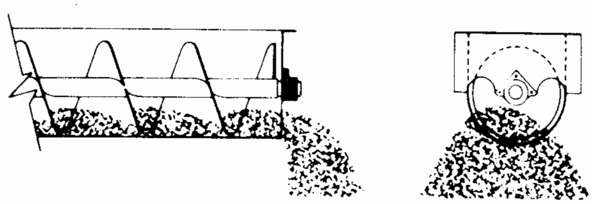
Open Bottom Discharge



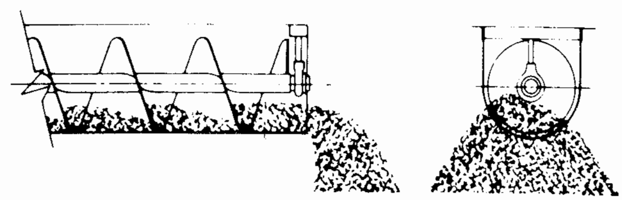
Trough End Discharge

CAUTION

To be used with conveyor loadings of 30% or under only.



Open End Discharge



FACTORS INFLUENCING MATERIALS OF CONSTRUCTION OR SPECIAL MECHANICAL ARRANGEMENT OF SCREW CONVEYOR COMPONENTS

Corrosive Materials

Corrosive materials, or materials which have a tendency to become corrosive under certain conditions, may necessitate the use of corrosion-resistant alloys such as stainless steel.

Abrasive Materials

Abrasive materials which may cause excessive wear of components should be conveyed at a nominal depth in the conveyor. It is often advisable to also specify KWS's Abrasion-Resistant Screw Conveyors or conveyors with flights formed of AR steel plate.

KWS's Abrasion-Resistant Screw Conveyors, which have a Rockwell C hardness of 68-70, are covered in the Component Section. A table listing the standard width of application of hard surfacing is included.

Contaminable Materials

Materials whose usefulness or value may be altered by contamination may require the use of non-lubricated bearings, as well as a tightly sealed system.

Hygroscopic Materials

Materials that readily absorb moisture require a tightly sealed conveyor. It may be necessary also to jacket the conveyor trough or housing with a circulating medium to maintain an elevated temperature. Purging the system with dry gas or air may be necessary.

Interlocking Materials

Materials which tend to mat or interlock are sometimes effectively conveyed by using special devices to load the conveyor.

Fluidizing Materials

Some materials tend to assume hydraulic properties when aerated or mechanically agitated. Such materials may "flow" in the conveyor much the same as a liquid. These materials should be referred to KWS's engineering department for recommendations.

Explosive Materials

Dangerous explosive materials can be handled by sealing the system and/or the use of non-sparking components. It is also possible to utilize exhaust systems for hazardous dust removal.

Materials Which Tend to Pack

Materials that tend to pack under pressure can frequently be handled by using aerating devices (for fine materials) or special feeding devices (for large or fibrous particles).

Viscous or Sticky Materials

Viscous or sticky materials are transported most effectively by ribbon conveyors.

Degradable Materials

Materials with particles that are easily broken may be effectively handled by selection of a larger, slower conveyor.

Elevated Temperatures

Materials handled at elevated temperatures may require components manufactured of high-temperature alloys. If it is feasible to cool the material in transit, a jacketed trough used as a cooling device may also be employed.

Toxic Materials

Materials which emit harmful vapors or dusts require tightly sealed systems. Exhaust devices may also be used to remove the vapors or dusts from the conveyor housing.

DESCRIPTION OF COMPONENTS

Conveyor Screws

The recommended screws listed in the Component Series Table are standard KWS helicoid and sectional screw conveyors. The use of helicoid or sectional conveyors is largely a matter of individual preference.

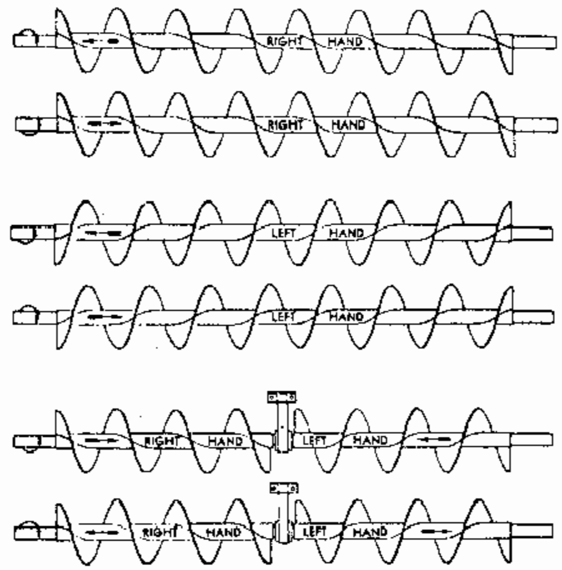
It is advisable to use, whenever possible, standard conveyors in standard lengths. When a special short length must be used to make up the total conveyor length, it is preferably located at the discharge end.

Screw conveyors are structurally reinforced at the ends by the use of end lugs which are welded to the non-carrying side of the flights so that material flow will not be obstructed.

Screw conveyors which move material in a single direction should not be turned end-for-end unless the direction of screw rotation is reversed. Likewise, the direction of rotation should not be reversed unless the conveyor is turned end-for-end. Requirements for reversible conveyors should be referred to KWS's Engineering Department. Flighting should be omitted at the final discharge, so that material will not carry past the discharge point.

To assure proper material flow past hanger bearing points, flight ends should be positioned to each other at 180 degrees.

The "hand" of a conveyor, in conjunction with the direction the conveyor is rotated, determines the direction of material flow. The diagram below illustrates flow direction for "right-hand" and "left-hand" conveyors when rotated clockwise or counterclockwise.



A right-hand screw conveyor pulls the material toward the end which is being rotated clockwise. The direction of flow is reversed when the direction of rotation is reversed.

A left-hand conveyor pushes the material away from the end which is being rotated clockwise. Again, the direction of material flow is reversed when the direction of rotation is reversed.

To determine the hand of a conveyor, observe the slope of the near side of the flighting. If the slope is downward to the right, the conveyor is right-hand. If the slope is downward to the left, the conveyor is left-hand. Right-hand conveyor is furnished unless otherwise specified.

Troughs and Tubular Housings

KWS troughs and tubular housings are available in standard lengths. Special lengths are available when required. All conveyor troughs or tubular housings should be supported by flange feet or saddles at standard intervals. Extreme end flanges should be supported with feet so that the conveyor ends may be removed without disturbing trough or housing alignment.

Inlets and Discharges

The proper methods of conveyor loading and discharge were covered previously in this section.

Shafts

The primary consideration in determining the type and size of coupling and drive shafts is whether the shafts selected are adequate to transmit the horsepower required, including any overload. Normally, cold-rolled shafts are adequate. However, high-tensile shafts may be required due to torque limitations. Also, stainless steel shafts may be necessary when corrosive or contaminable materials are to be handled. Conveyors equipped with non-lubricated iron hanger bearings require hardened coupling shafts, and hard-surfaced hanger bearings require hard-surfaced shafts. Specific shaft size determination is covered in the Torque Capacities Section.

Shaft Seals

Several conveyor end seal types are available to prevent contamination of the conveyed material or to prevent the escaped of material from the system.

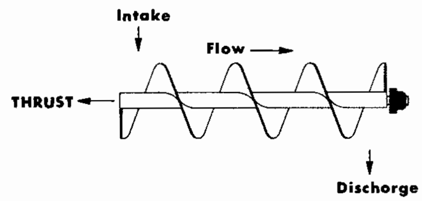
Bearings

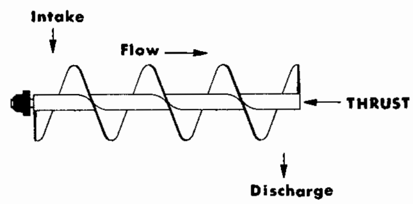
Hanger Bearings - The purpose of hanger bearings is to provide intermediate support when multiple screw sections are used. Hanger bearings are designed primarily for radial loads. Adequate clearance should be allowed between the bearings and the conveyor pipe ends to prevent damage by the thrust load which is transmitted through the conveyor pipe. The hanger bearing recommendations listed in the Component Series Table are generally adequate for the material to be handled. Often, however, unusual characteristics of the material or the conditions under which the conveyor must operate make it desirable to use special bearing materials. A list of available special bearing materials is provided in this section. For specific recommendations regarding the use of special bearing materials, consult KWS's Engineering Department.

End Bearings - Several end bearing types are available, and their selection depends on two basic factors: Radial load and thrust load. The relative values of these loads determines end bearing types.

Radial load is negligible at the conveyor tail shaft. However, drive ends (unless integrated with the conveyor end plate) are subject to radial loading due to overhung drive loads, such as chain sprockets or shaft-mounted speed reducers.

Thrust is the reaction, through the conveyor screw or screws, resulting from movement of the material. Therefore, the end bearing must prevent axial movement of the screw which would allow contact with hanger bearings or ends. Thrust bearings should be located at the discharge end of the conveyor. This places the conveyor in tension, preventing deflection in the screws when the system is heavily loaded. The following diagrams illustrate discharge and inlet end positions of the thrust bearing.





COMPONENT SERIES

The recommended Component Series for the material to be conveyed may be found in the Materials Table at the beginning of the Engineering Section. The alphabetical code relates to the general component series, and the numerical code refers to bearings and coupling shafts. The Component Series Table follows on the next page. Bearing and coupling shaft recommendations are listed in the table below. The Component Series Table lists the screw conveyor numbers for both helicoid and sectional screws and gives the trough and cover thicknesses. The Bearing and Coupling Shaft Table lists the recommended materials of construction.

Series	Coupling Shaft	Bearing Material
1	Standard or High Torque	Babbitt Wood Bronze
2	Standard or High Torque	Babbitt Wood Bronze Ball
3	Standard or High Torque	Babbitt
4	Hardened or Hard Surfaced	Hard Iron Hard Surfaced

Other Bearing Materials Available

- Graphite Bronze
- Graphite-Impregnated Plastic
- Machined Nylon
- Molded Nylon
- Oil-Impregnated Bronze
- Plastic, Laminated Fabric-Base
- Teflon

COMPONENT SERIES TABLE

Screw Dia.	Shaft Dia.	Cover Thickness	Series A			Series B		
			Screw Number		Tube or Trough Thickness	Screw Number		Tube or Trough Thickness
			Helicoid	Sectional		Helicoid	Sectional	
4	1	16 Ga.	4H204		16 Ga.	4H206		14 Ga.
6	1½	16	6H304	6S309	16	6H308	6S309	14
9	1½ 2	16	9H306 9H406	9S309 9S409	14	9H312 9H412	9S309 9S409	10
10	1½ 2	16	10H306 10H412	10S309 10S409	14	10H306* 10H412	10S312 10S412	10
12	2 2 7/16 3	14	12H408 12H508 12H614	12S409 12S509 12S609	12	12H412 12H512 12H614	12S412 12S512 12S612	3/16"
14	2 7/16 3	14	14H508 14H614	14S509 14S609	12	14H508 14H614	14S512 14S612	3/16"
16	3	14	16H610	16S612	12	16H614	16S616	3/16"
18	3 3 7/16	14		18S612 18S712	12		18S616 18S716	3/16"
20	3 3 7/16	14		20S612 20S712	10		20S616 20S716	3/16"
24	3 7/16	12		24S712	10		24S716	3/16"

Screw Dia.	Shaft Dia.	Cover Thickness	Series C			Series D		
			Screw Number		Tube or Trough Thickness	Screw Number		Tube or Trough Thickness
			Helicoid	Sectional		Helicoid	Sectional	
4	1	16 Ga.	4H206		14 Ga.	4H206*		
6	1½	16	6H312	6S312	14	6H312	6S316	10
9	1½ 2	16	9H312 9H414	9S312 9S412	10	9H312 9H414	9S316 9S416	3/16"
10	1½ 2	16	10H306* 10H412	10S312 10S412	10	10H306* 10H412*	10S316 10S416	3/16"
12	2 2 7/16 3	14	12H412 12H512 12H614	12S416 12S516 12S616	3/16"	12H412* 12H512* 12H614	12S424 12S524 12S624	1/4"
14	2 7/16 3	14	14H508* 14H614	14S524 14S624	3/16"	14H508* 14H614*	14S524 14S624	1/4"
16	3	14	16H614	16S616	3/16"	16H614*	16S624	1/4"
18	3 3 7/16	14		18S624 18S724	3/16"		18S624 18S724	1/4"
20	3 3 7/16	14		20S624 20S724	3/16"		20S624 20S724	1/4"
24	3 7/16	12		24S724	3/16"		24S724	1/4"

***Hard-Surfacing Recommended*

HORSEPOWER CALCULATION

1. Graphic Method of Calculation

The total horsepower (TSHP) required at the drive shaft to drive the loaded conveyor system may be calculated graphically by use of the nomographs, pages 24 and 25. The friction horsepower (FHP), determined with the first nomograph, added to the Material Horsepower (MHP), determined with the second nomograph, equals the Total Shaft Horsepower (TSHP).

Friction Horsepower – A straight edge placed at the first two known values, conveyor size (related to hanger bearing class as listed in hanger bearing factor table) and length, will intersect a reference point on the centerline. A straight edge placed from this reference point to the third known value, conveyor speed, will intersect the unknown value, Friction Horsepower, on the last line.

Material Horsepower – A straight edge placed at the first two known values, conveyor capacity and Material Horsepower Factor, will intersect a reference point on the centerline. A straight edge from the reference point to the third known value, conveyor length, will intersect the unknown value, Material Horsepower, on the last line.

2. Calculation by Equation

TSHP may also be calculated by equation using the following formulas:

1. FRICTION H.P. CALCULATION

$$FHP = \frac{DF \times HBF \times L \times S}{1{,}000{,}000}$$

2. MATERIAL H.P. CALCULATION

$$MHP = \frac{CFH \times W \times MF \times L}{1{,}000{,}000}$$

OR

$$MHP = \frac{CP \times MF \times L}{1{,}000{,}000}$$

NOTE If calculated Material Horsepower is less than 5 it should be corrected for potential overload. The corrected horsepower value corresponding to the calculated Material Horsepower will be found on the lower scale of the Material Horsepower Overload Correction Chart, page 23

3. TOTAL SHAFT H.P. CALCULATION

$$TSHP = FHP + MHP^*$$

***Corrected if below 5 HP.**

NOTE The actual motor horsepower required to drive the loaded conveyor system is dependent on the method used to reduce the speed the motor to the required speed of the conveyor. Drive losses must be taken into consideration when selecting the motor and drive equipment.

EQUATION SYMBOLS

TSHP = Total Shaft H.P.
FHP = Friction H.P. (H.P. required to drive the conveyor empty)
MHP = Material H.P. (H.P. required to move the material)
L = Conveyor Length
S = Conveyor Speed
DF = Conveyor Diameter Factor
HBF = Hanger Bearing Factor
CFH = Conveyor Capacity
W = Weight per cu. ft.
CP = Capacity, lbs. per hr.
MF = Material H.P Factor (From the Materials Table)

DIAMETER FACTORS

Diameter	Factor
4	12
6	18
9	31
10	37
12	55
14	78
16	106
18	135
20	165
24	235

HANGER BEARING FACTORS

Bearing Type	Bearing Factor	Bearing Class
Ball	1.0	I
Babbit Bronze *Graphite Bronze Plastic, laminated fabric-base Nylon *Bronze, oil-impregnated Wood	1.7	II
*Plastic, graphite-impregnated *Nylon *Teflon	2.0	III
*Hard Iron *Hard-Surfaced	4.4	IV

*Non-Lubricated

CONVEYORS WITH MODIFIED FLIGHTS

The procedure for calculation of horsepower for conveyors with special or modified flights is identical to that used for standard conveyors except that the Material Horsepower must be multiplied by one or more of the following applicable factors.

MODIFIED FLIGHT FACTORS

Flight Type	Conveyor Loading			
	15	30	45	95
Cut Flight	1.1	1.15	1.2	*
Cut & Folded Flight	*	1.5	1.7	*
Ribbon Flight	1.05	1.14	1.20	*

*Not Recommended

CONVEYORS WITH PADDLES*

	Paddles Per Pitch			
	1	2	3	4
Factor	1.29	1.58	1.87	2.16

* Std. paddles at 45° reverse pitch

Total Shaft Horsepower (TSHP) is calculated by adding Material Horsepower, multiplied by the appropriate modified flight factor or factors, to Friction Horsepower.

NOTE Conveyors which have deviation in pitch only do not require special consideration, and their horsepower calculations are as described for standard conveyors.

EXAMPLE

A 10-inch conveyor 35 feet long with a capacity of 10 tons per hour at 45 RPM has been selected.

From the Materials Table, a Horsepower Factor of 0.8 is found for the material to be conveyed. The table also indicates Series 4 hanger bearings and shafts. Hard iron bearings and hardened coupling shafts have been selected to suit this requirement.

Friction Horsepower, the horsepower required to drive the conveyor empty, is calculated as follows:

Diameter Factor = 37
Hanger Bearing Factor = 4.4
Length = 35
RPM = 45

$$FHP = \frac{37 \times 4.4 \times 35 \times 45}{1{,}000{,}000} = 0.256$$

Material Horsepower, the horsepower required to move the material, is calculated by the following equation:

Capacity (in lbs. per hr.) = 20,000
Horsepower Factor = 4.4
Length = 35
RPM = 45

$$MHP = \frac{20{,}000 \times 0.8 \times 35}{1{,}000{,}000} = 0.560$$

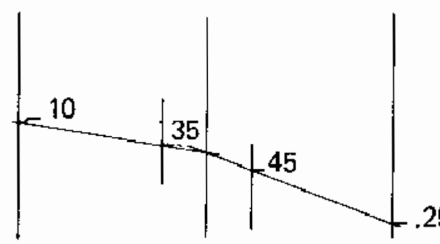
Since the calculated Material Horsepower is less than 5, it is necessary to find the corrected horsepower value corresponding to 0.56 horsepower on the Overload Correction Chart below. This value is found to be 1.320 horsepower.

Total Shaft Horsepower (TSHP) is the sum of Friction horsepower and the corrected Material Horsepower. Thus TSHP is calculated as follows:

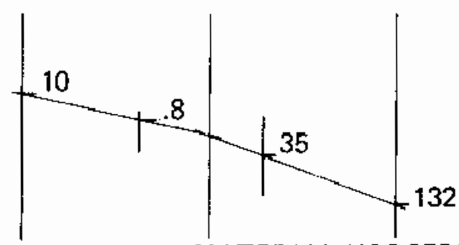
$$TSHP = 0.256 + 1.320 = 1.576 \text{ H.P.}$$

Assuming a drive efficiency of 85% resulting in a total drive horsepower of 1.853, a standard 2 horsepower motor would be selected for the drive input.

The horsepower required for the above conveyor may also be determined graphically by the use of the two horsepower nomographs. The first nomograph determines Friction Horsepower. The second determines Material Horsepower. Total Shaft Horsepower is determined by adding the two values.



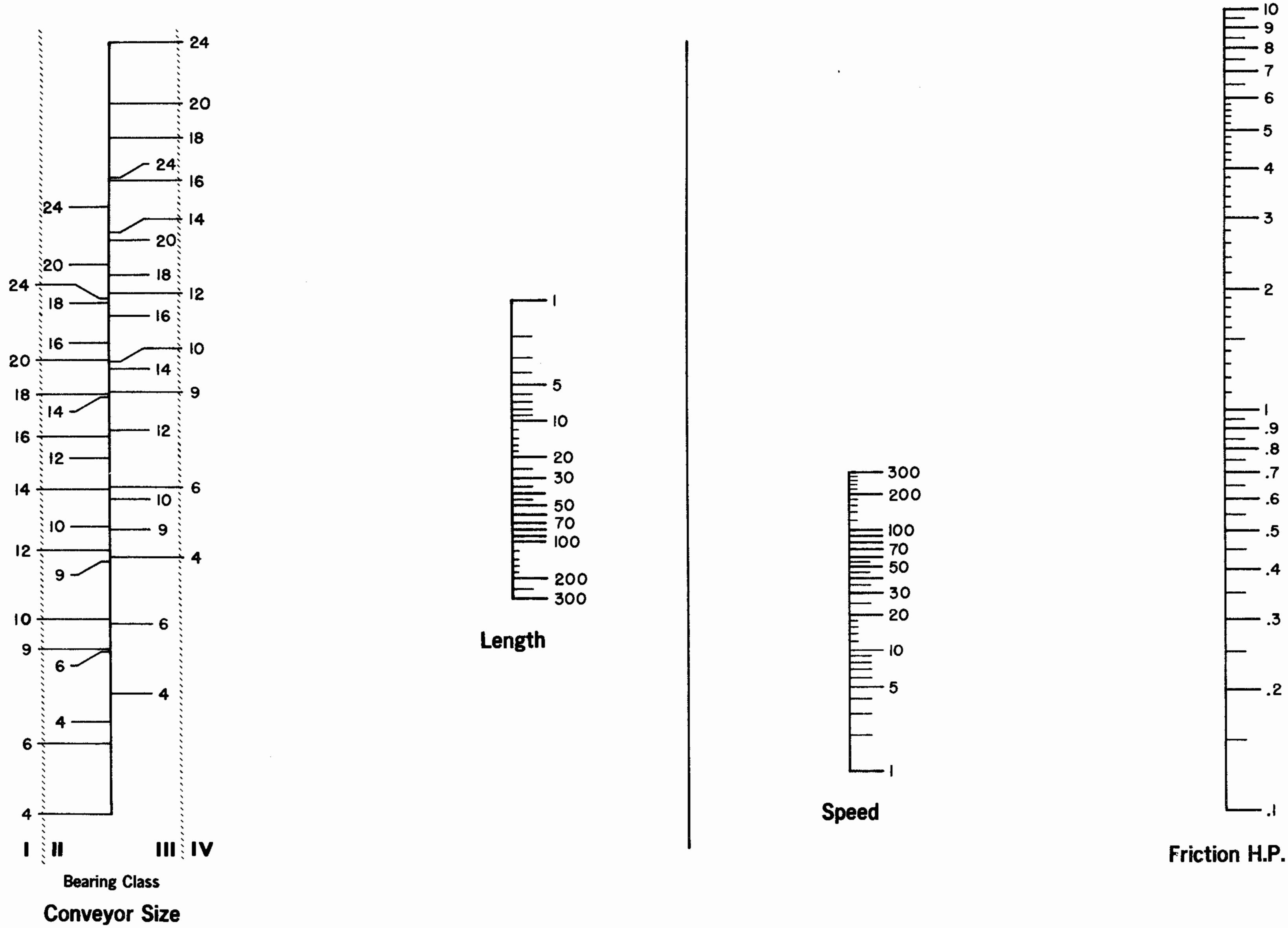
FRICTION HORSEPOWER



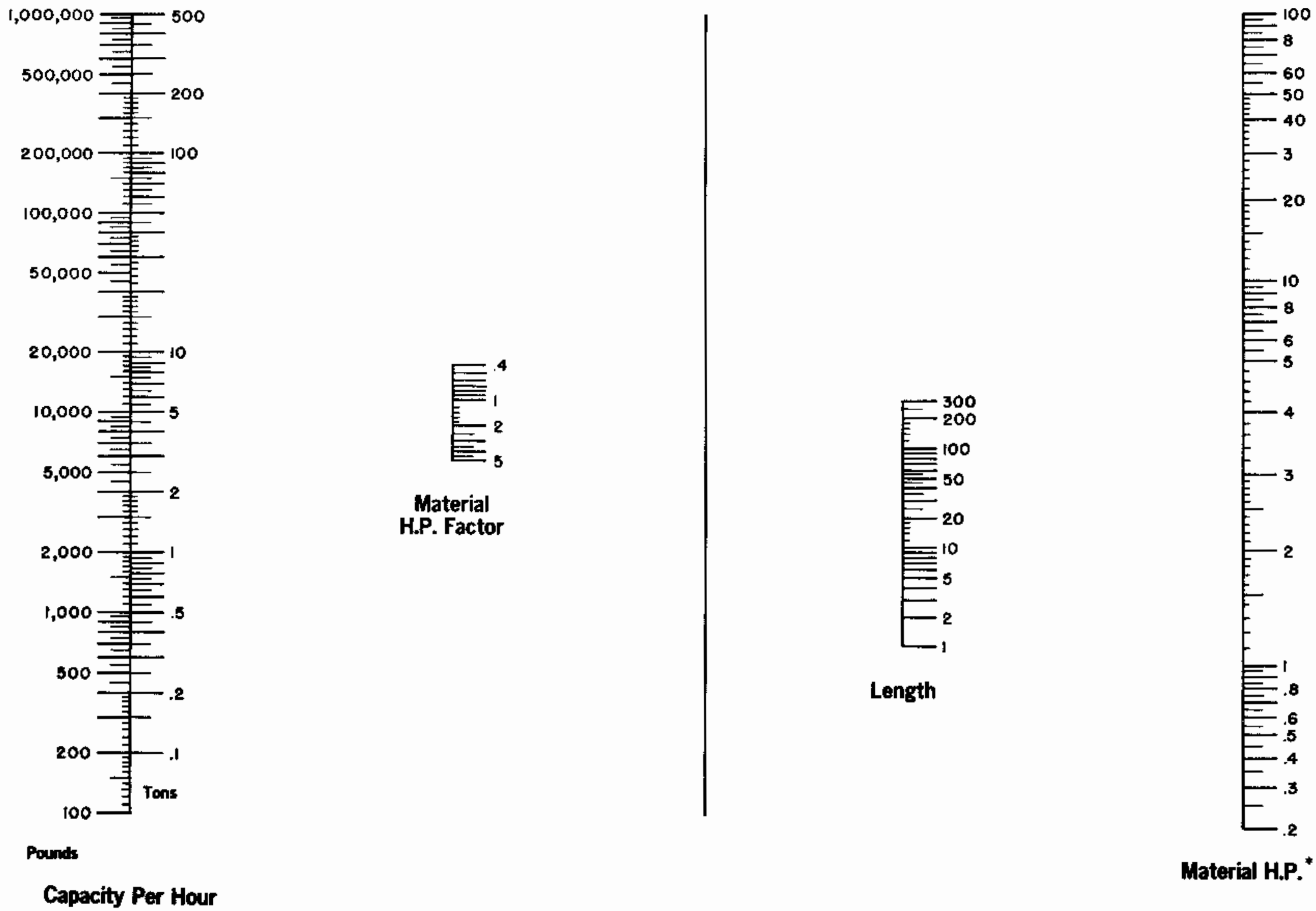
MATERIAL HORSEPOWER

CORRECTED MATERIAL H.P.

Friction Horsepower Nomograph



Material Horsepower Nomograph



TORQUE CAPACITIES

Although a given conveyor may be adequate insofar as material conveying capacity is concerned, the horsepower available to operate the system may exceed the torque capacities of standard components during overloaded or stalled conditions.

To insure adequate torque capacities without undue additional cost, means are provided in the Industrial standard series of conveyor components for more than one maximum allowable horsepower value. This is accomplished by not only a choice of power-transmitting component sizes but also of the materials of construction.

Analysis of a specific conveyor system with regard to component torque adequacy may be conveniently and quickly made by use of the two following nomographs.

CARBON STEEL CONVEYORS

The first nomograph covers carbon and high-tensile steel coupling bolts and shafts (drive and coupling) and conveyor pipe (in Schedule 40 and for high capacity, Schedule 80).

These components are listed according to their associated standard conveyor shaft diameters.

The following table lists actual nominal pipe diameters corresponding to the standard conveyor shaft diameter.

Shaft Diameter	1	1-1/2	2	2-7/16	3	3-7/16
Nominal Pipe Size	1-1/4	2	2-1/2	3	3-1/2	4

STAINLESS STEEL CONVEYORS

The second nomograph covers stainless steel coupling bolts, shafts and conveyor pipe. Coupling bolts are listed by the corresponding standard conveyor shaft diameter with which they are used.

Conveyor pipes are listed in both Schedule 40s and 80s by their nominal pipe sizes.

The pipe size selected should correspond to the standards listed for carbon steel pipe. Deviations from this standard are sometimes possible, in sectional conveyors, by the use of smaller pipe sizes (for economy) when the torque rating is adequate. This procedure requires reaming of the pipe bore for shaft insertion rather than the use of a bushing. It is recommended that requirements for such conveyors be referred to KWS's Engineering Department.

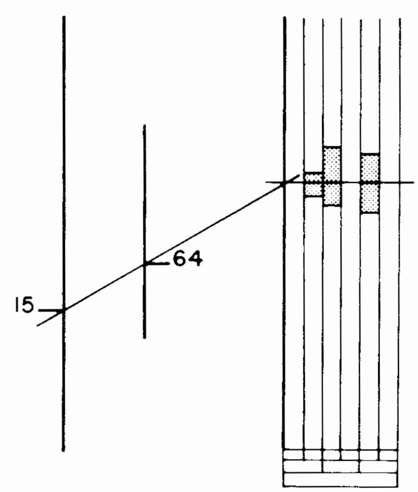
NOTE

High starting torque motors must not be used without design verification by KWS's Engineering Department.

EXAMPLE

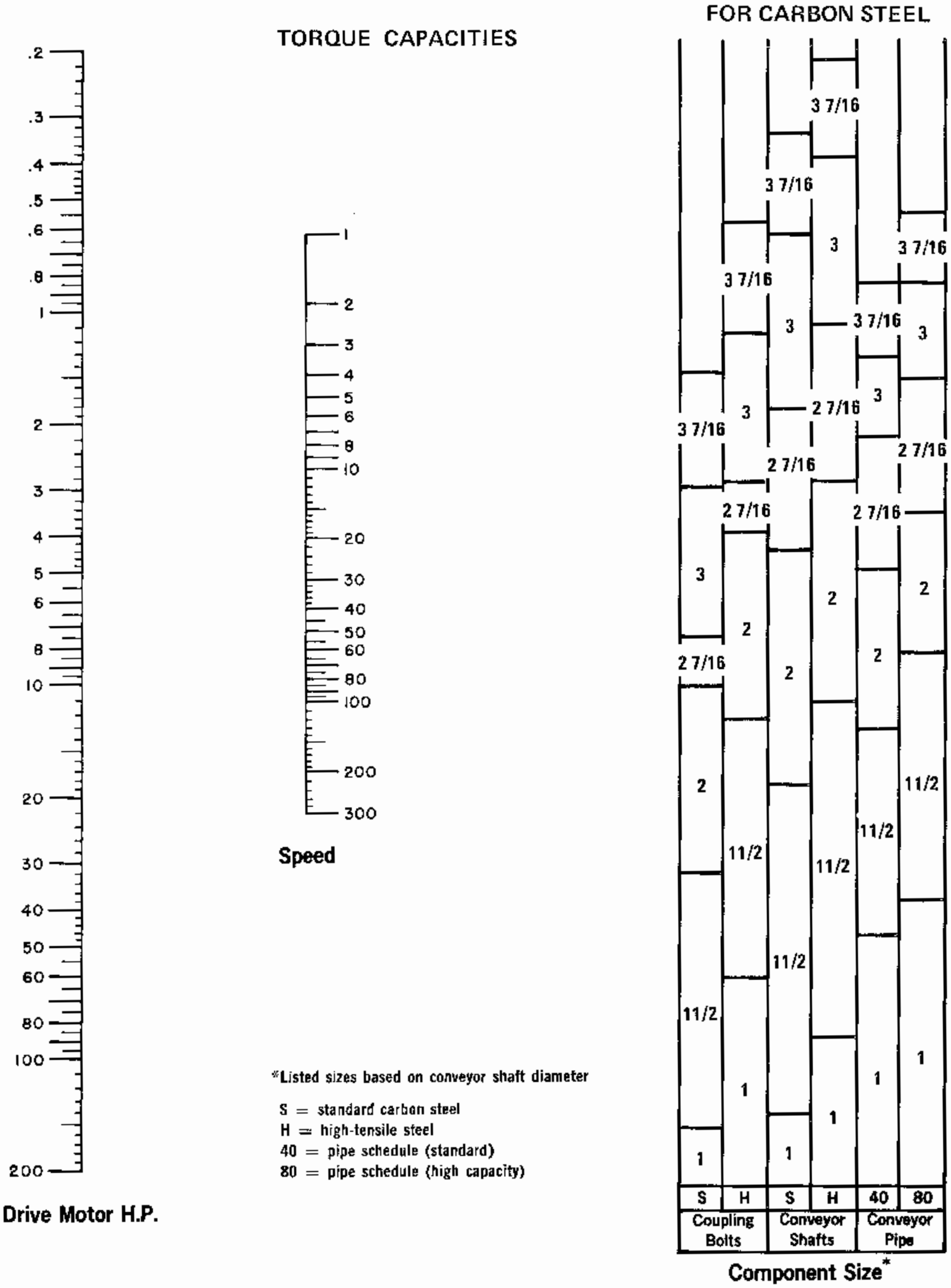
A 12-inch carbon steel conveyor has been selected with a required shaft horsepower of 8.9 and a speed of 64 RPM. The drive to be used has an efficiency of 85%, thus requiring a drive input of 10.46 horsepower. Therefore, a 15 horsepower motor must be used. This total motor horsepower could be transmitted to the conveyor components if overloaded or stalled.

Three standard shaft sizes are available for 12-inch conveyors. They are 2″, 2-7/16″ and 3″.



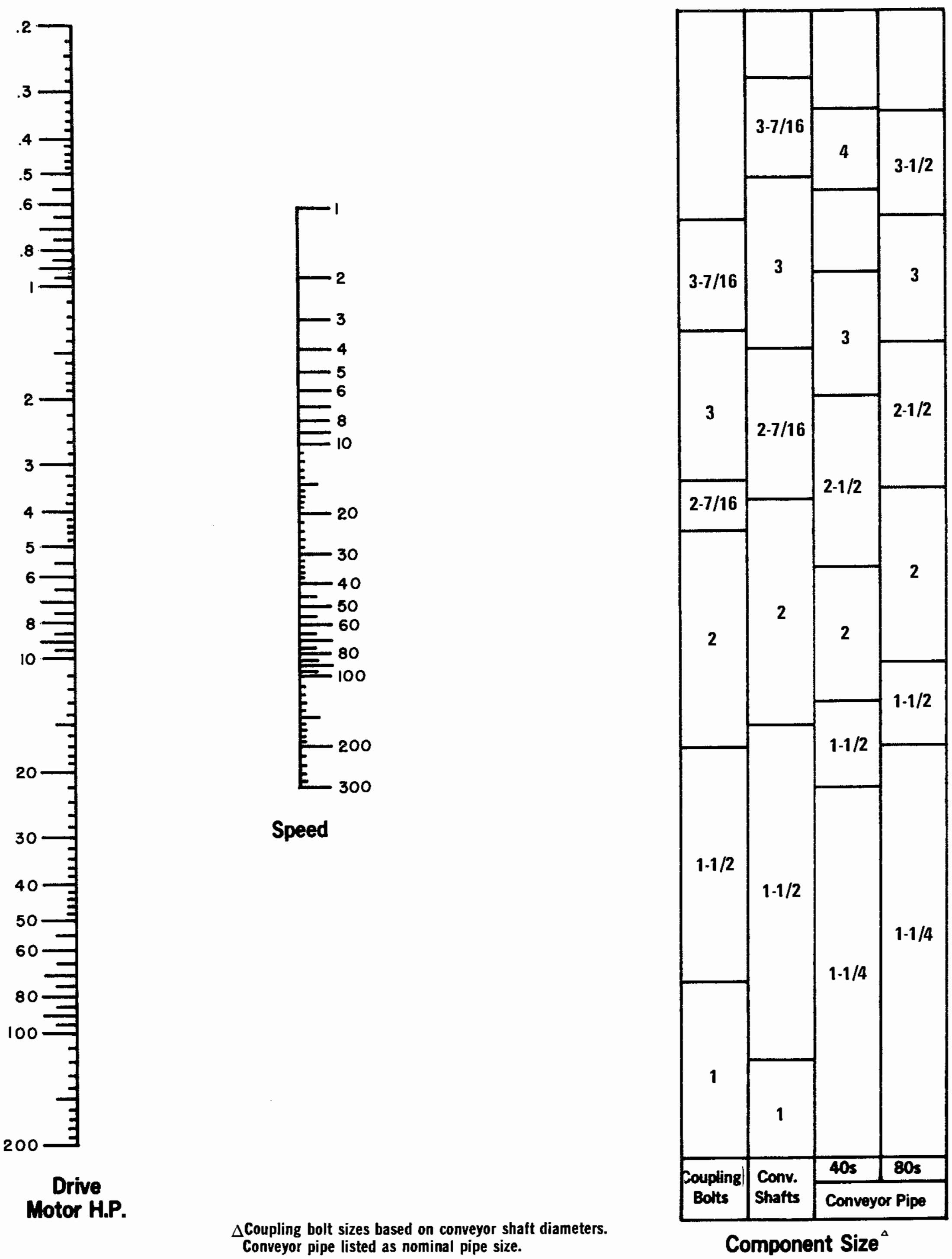
A straight edge is placed from 15 horsepower on the left scale to 64 RPM on the center scale. Project the straight line to the left vertical line of the chart at the right. A horizontal line from this point will pass through component groups suitable for the torque.

For the conveyor under consideration, it is found that standard components will be adequate, with the exception of coupling bolts which must be high tensile.



TORQUE CAPACITIES

FOR STAINLESS STEEL



△Coupling bolt sizes based on conveyor shaft diameters.
Conveyor pipe listed as nominal pipe size.

DRIVE ARRANGEMENTS

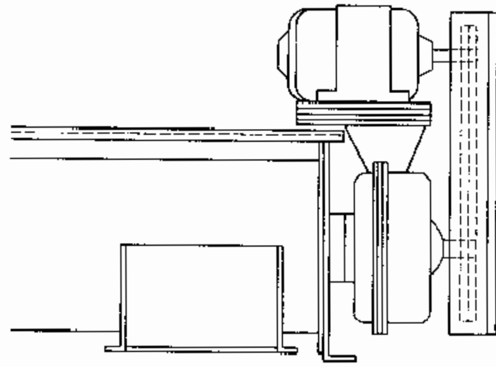
KWS offers a complete line of power-transmission equipment. Local distributors provide us with a large stock inventory.

Numerous combinations and types of drives are available for screw conveyor equipment. Some of the more frequently used drives and mechanical arrangements are described below:

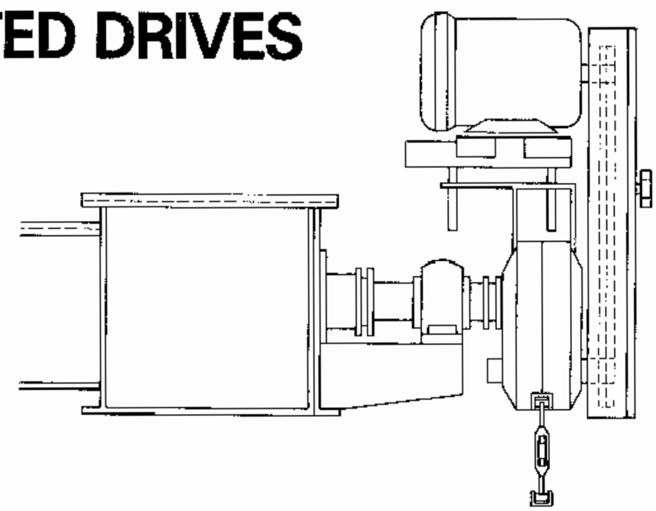
SCREW CONVEYOR DRIVES

A screw conveyor drive consists of a standard single or double reduction shaft-mounted speed reducer, a steel motor mounting bracket, an adapter with CEMA drilling containing shaft seals, and a removable steel shaft, all mounted on a screw conveyor trough end. The motor bracket is rigidly mounted with clearance over the trough end for easy trough cover removal without disassembling any part of the drive.

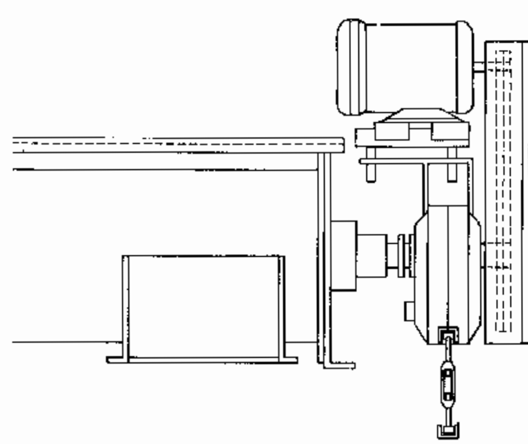
A variety of mounting arrangements makes it possible to locate the drive to avoid interference with other equipment. Correct V-belt tension can be easily maintained by simple adjustment of the motor mounting plate. The drive assembly can be quickly removed by removing the bracket mounting bolts.



SHAFT MOUNTED DRIVES

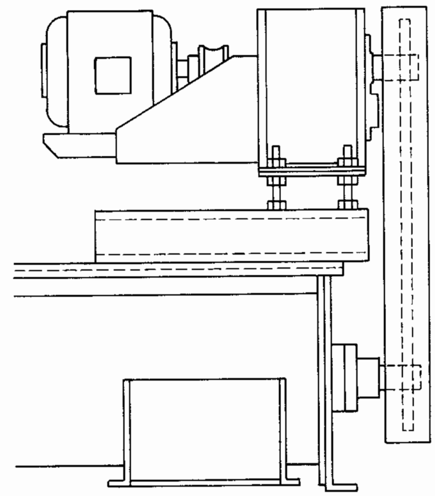


The helical gear shaft mount speed reducer uses the screw conveyor drive shaft as an "output shaft," making a mounting base and low speed coupling unnecessary. Because it does not mount to the trough end it offers several advantages. It can be used in limited, higher temperature applications where damaging heat can be dissipated before it affects the reducer. You have a greater variety of seals and bearings to choose from. You can utilize heavy duty bearing for higher than usual bearing loads. The reducer can be rotated in any position around the shaft.



V-belt tension is maintained in the same manner as the screw conveyor drive when using the adjustable motor mount. A tie-rod turnbuckle locks the shaft-mounted reducer into position. (We believe this is best accomplished in the field, consequently we do not normally support the tie-rod from the conveyor.)

COMBINATION MOTOR-REDUCER



Integral motor-reducer drives consist of a combination motor and speed reducer which may be mounted directly to the conveyor cover with an adapter base. The motor-reducer may also be mounted in other positions, depending on available space and accessibility.

The motor-reducer output shaft is connected to the conveyor drive shaft through roller chain and sprockets. Speed changes in the field are possible by replacement of one or both sprockets. Suitable conveyor drive end bearings are required for the overhung sprocket loads.

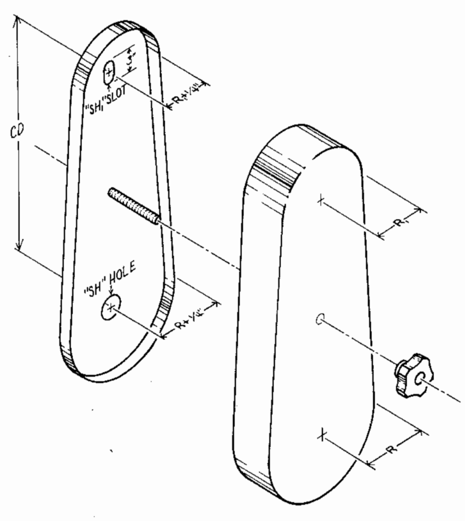
OTHER DRIVES

Other drive equipment which may be required includes variable speed units which allow manual or automatic adjustment of conveyor capacity by speed deviation. Such drives are especially useful for regulating the flow of material into a process.

NOTE

Fluid, pneumatic or resilient couplings may be used for starting heavily loaded conveyors and to prevent drive component damage due to heavy intermittent overloads.

KWS BELT GUARDS



Our belt guards are custom designed to meet your specific requirements. They are O.S.H.A. approved and will accent the best of drives.

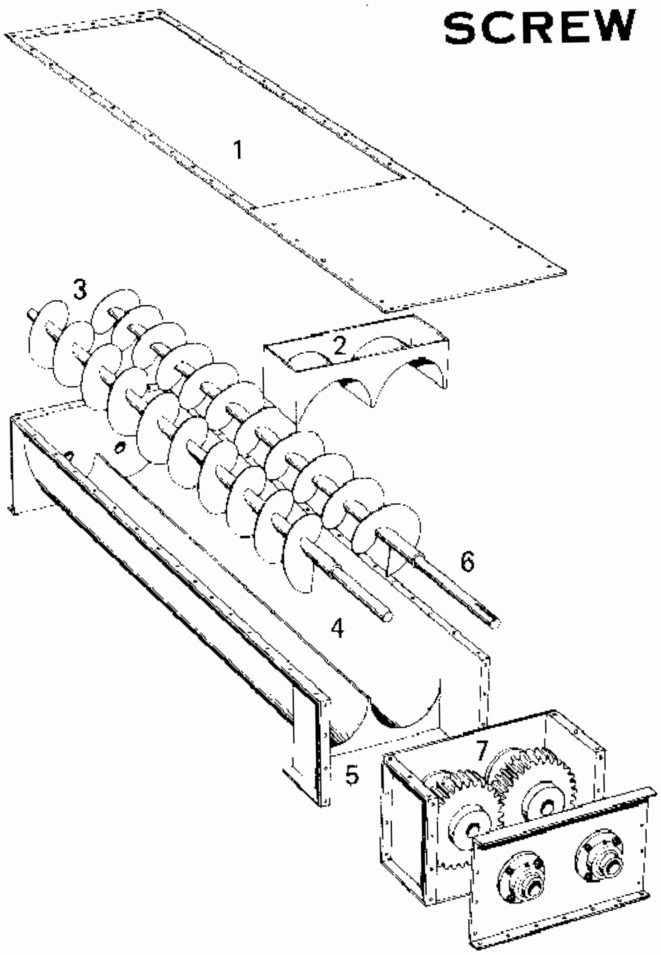
Our two piece construction provides you with the best available features. The back panel is designed to be securely supported. The front panel with sides is easily removable by loosening a hand knob. This permits complete access to sheaves, bushing and V-belts.

Standard Features

- Painted O.S.H.A. yellow enamel
- Slotted for belt adjustment
- 16 ga. steel construction
- Fully enclosed
- Safe—rounded ends

R—Driver, ½" P.D. + 2" *CD—Center Distance*
SH—Shaft Diameter + ½" *R_1—Driver, ½" P.D. + 2"*
W—Longest Hub + 2" (min 4") *SH_1—Shaft Diameter + 1"*

SCREW FEEDERS



1. Inlet opening matches bin or hopper discharge.
2. Shroud cover prevents material flooding.
3. Twin tapered, variable pitch Screw Conveyor permits even draw off of material.
4. Twin tapered trough. Also available with drop bottom feature.
5. Discharge opening.
6. Solid shafting transmits rotary motion to driving gears.
7. Driving gears synchronize the action of the screw conveyors.

Normally short in length, Screw Feeders are designed to regulate the volumetric rate of material flow from a hopper, bin or storage unit.

The inlet is usually flooded with material (100% load capacity) but by incorporating changes in the construction of the flighting (diameter, pitch, etc.) and the speed of the feeder screw, the material discharge can be governed to the desired rate. Feeders can be built with variable diameter or stepped pitch or both in units composed of one, two or a multiple number of screws (i.e., Live Bottom Bin) depending on the application.

Screw Feeders are normally equipped with a shroud (curved) cover for a short distance beyond the inlet opening. This prevents flooding of the conveyor with material. When handling very freely flowing materials, extended shroud covers, tubular housing construction or short pitch flights are occasionally required for positive control.

Screw Feeders with uniform diameter and pitch normally convey the material from the rear of the inlet opening first. To draw off material evenly across the full length of the inlet, a tapered screw or stepped pitch conveyor screw is required. While Screw Feeders are available in many designs to fit your particular requirements, several commonly used types are described below.

MULTIPLE DIAMETER FEEDER

This is a combination feeder and conveyor and the physical dimensions are variable on each. The small diameter feed end will operate at a full cross sectional load. When the material reaches the larger section, the cross sectional load will be at a controlled safe maximum.

SHORT PITCH FEEDER

This is also a combination feeder and conveyor. The short pitch end will handle full cross sectional loads. The material is then discharged into the standard section where the cross sectional load is reduced to the required maximum by the increase in screw pitch.

VARIABLE PITCH TWIN-TAPERED FEEDER

This feeder is popularly used to unload bins or hoppers at a controlled rate. The feed opening under the bin is designed large enough to prevent material bridging and accepts materials uniformly across the length and width of the opening. This eliminates dead areas in the bin and reduces the chance of material bridging or spoiling.

LIVE BOTTOM FEEDER

Designed for use on straight sided bins, this feeder is composed of a number of feeder screws in tandum which serve as the bottom of the bin. Material is, therefore, drawn out equally from the full width. The Live Bottom Feeder is used to its best advantage on materials which tend to pack or bridge easily.

SCREW FEEDER CAPACITY

The capacity table on pg. 20 shows Screw Feeder Capacities in cubic feet per hour per RPM. This table relates to full pitch or standard conveyors only. Shorter pitch flighting will convey a capacity in direct ratio to the capacity of the full pitch. For instance, a 9" conveyor with standard pitch (9") flighting on a 2-1/2" standard pipe, will convey 16.8 cu. ft./hr./RPM.

The same conveyor, but with 3" pitch, will convey 1/3 this amount, or 5.6 cu. ft./hr./RPM. The capacity figure is theoretical. Actual capacity will often vary due to variation in head of material in the bin and variation in material characteristics.

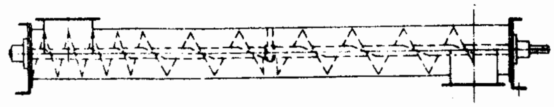
SCREW FEEDER SPEED

The speed of the feeder screw can be determined by dividing the desired capacity in cu. ft./hr. by the figure found in CAPACITY TABLE. For maximum efficiency, feeder screw speeds should be slower than standard screw conveyor speeds and allowances must be made for slippage of the material in the screw.

Factors Affecting the Design Of A Screw Feeder

1. The material class
2. The material physical characteristics
3. The capacity required
4. Material factor "F"
5. Weight of material resting on the Feeder Screw
6. The dimensions of the feeder opening..

In designing a Screw Feeder, virtually every situation is unique in one respect or another. For this reason, we recommend that you consult KWS Engineering Department for proper recommendations concerning your particular needs.



INCLINED SCREW CONVEYORS

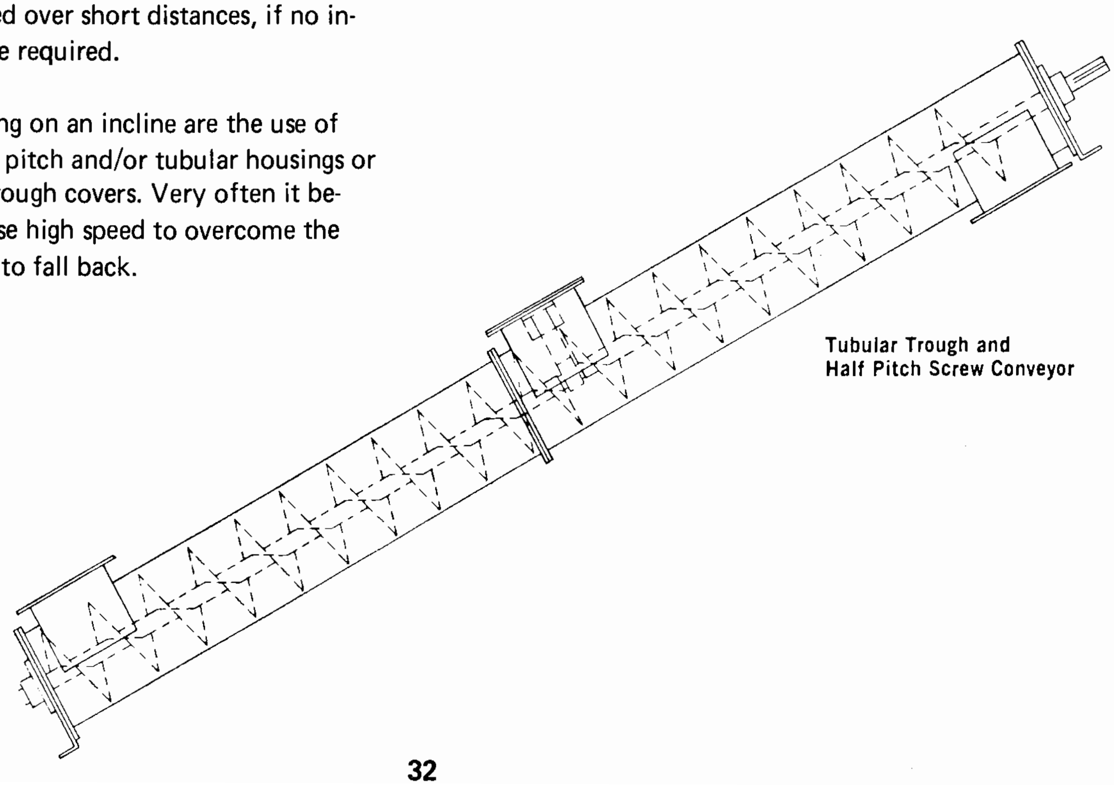
Screw Conveyors can be operated with the flow of material inclined upward. When space allows, this is a very economical method of elevating and conveying. It is important to understand, however, that as the angle of inclination increases, the allowable capacity of a given unit rapidly decreases.

A standard Screw Conveyor inclined 15° upward will carry 75% of its rated horizontal capacity. At an inclination of 25°, a standard conveyor may only handle 50% of its horizontal capacity. These are estimated figures and will vary with the characteristic of the material being handled. Inclined Screw Conveyor capacities can be increased over short distances, if no intermediate hangers are required.

Other aids in conveying on an incline are the use of shorter than standard pitch and/or tubular housings or shrouded conveyor trough covers. Very often it becomes necessary to use high speed to overcome the tendency of material to fall back.

The above aids are resorted to in order to overcome the tendency of a screw conveyor to become less efficient as the angle of incline increases. Vertical conveying by Screw Conveyor, on the other hand, is quite successful and it remains that a 45° incline or angles approaching this figure, are the most difficult on which to achieve successful conveying.

Additional power is needed to convey on an incline. This added power is a function of the power required to lift the material. Judgment and experience in the art of conveying are required.



Tubular Trough and
Half Pitch Screw Conveyor