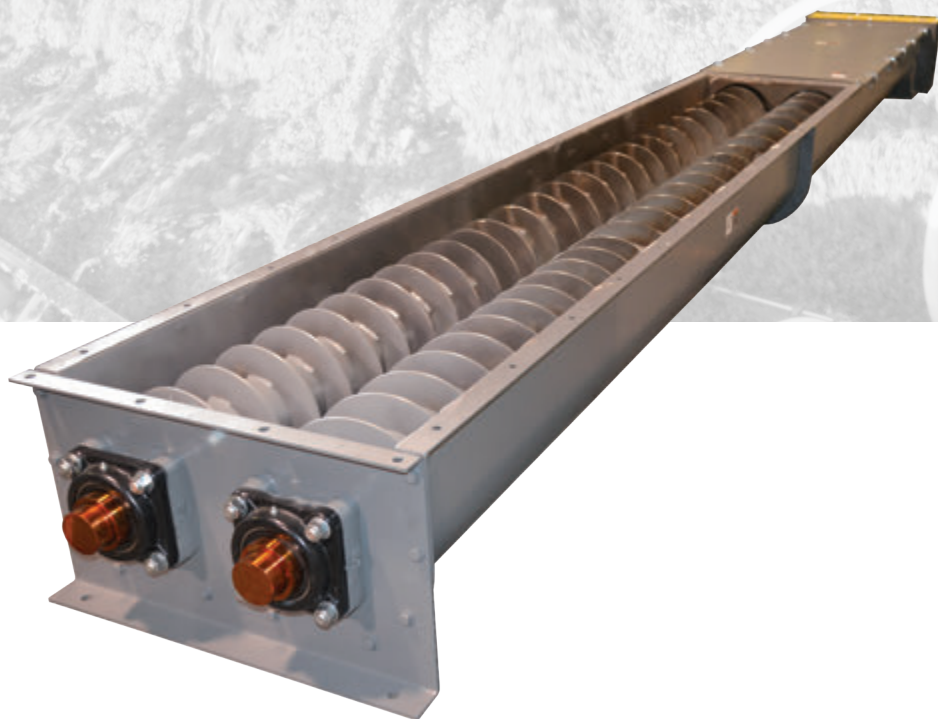Catalog | **Material Handling**

Terms & Conditions of Sale

These Terms and Conditions of Sale, along with Seller's Standard Limited Warranty, the contents of Seller's written acknowledgement, if any, to a purchase order or any other writing submitted by Purchaser to Seller;Seller's written proposal, if any, submitted by Seller to Purchaser; and the contents of any invoice submitted by Seller to Purchaser shall establish the commercial terms of the contract (the"Order") under which Martin Sprocket & Gear, Inc. ("Seller ") agrees to sell parts and equipment ("Products") to the purchaser (the "Purchaser") and Purchaser agrees to purchase Products from Seller.

1. **AGREEMENT:** Notwithstanding any additional, differing, or conflicting terms in a purchase order or any other writing submitted by Purchaser to Seller, the terms of the Order shall constitute the entire agreement between Seller and Purchaser. Writings transmitted from Purchaser to Seller, such as a purchaser order, that contain additional, conflicting, or differing terms from the Order shall not apply or in any way modify or alter the terms and conditions of the Order. Furthermore, writings with terms and/or conditions different from, or in addition to, the terms and conditions appearing in the Order, including any additional or differing terms and conditions contained in any purchase order submitted by the Purchaser, are expressly rejected. Purchaser's submission to Seller of an offer to purchaser Products or Purchaser's acceptance of Seller's offer to sell Products, by whatever means, constitutes Purchaser's agreement that the Order contains the entire agreement between Purchaser and Seller. Purchaser's acceptance of the Order is expressly limited to the terms and conditions of the Order. Purchaser understands and acknowledges that the price Seller quoted for the Products is based upon Purchaser's acceptance of the terms and conditions of the Order and that the price for the Products would be different if other terms and conditions of sale were to apply.

2. **ACCEPTANCE:** If Seller is making an offer to sell Products, Purchaser may accept Seller's offer only on the terms and conditions set forth in the Order. If the Purchaser is making an offer to purchase Products from Seller, Seller's acceptance of Purchaser's offer is expressly conditioned on Purchaser's assent to the terms and conditions of the Order, and any commencement of performance by Purchaser shall be deemed to constitute such assent. Any additional and/or different terms and conditions proposed by Purchaser and/or any attempt by Purchaser to vary any of the terms and conditions of the Order shall be deemed a material alteration and is hereby objected to and rejected. Seller's shipment of any Products in response to a writing that attempts to vary any of the terms and conditions of the Order or Seller's acceptance of any payment by Purchaser shall not be deemed to constitute such as sent to any additional and/or different terms and conditions proposed by Purchaser.

3. **RISK OF LOSS:** Unless a specific term of the Order provides otherwise, all shipments shall be shipped F.O.B. Seller's facility and risk of loss as to such Products shall pass and remain with Purchaser once Products depart Seller's facility.

4. **SPECIFICATIONS:** Seller shall furnish all stock Products as specified in the Order. Made-to-order Products shall be furnished in accordance with the specifications, details, requirements and/or drawings supplied by Purchaser, or prepared by Seller at Purchaser's direction. Any drawings, specifications, and calculations submitted by Seller to Purchaser shall be reviewed and approved by Purchaser. Seller warrants that all Products covered by the Order will conform to the specifications, drawings, samples or other descriptions furnished to Seller or adopted by the Purchaser. If it is determined that the Products delivered under the Order fail to meet the specifications, then Purchaser will contact Seller and Seller shall make corrections in accordance with Seller's Limited Warranty.

5. **LIMITED WARRANTY:** Seller's Standard Limited Warranty is attached hereto and incorporated herein for all purposes.

6. **PRICING, PACKAGING, DELIVERY AND PAYMENT:** All Products shall be sold on the terms, conditions and at the price quoted in the Order. All terms of pricing, packaging, shipment, delivery and payment are included in the Order.

7. **INSPECTION:** Purchaser shall have reasonable time after delivery to inspect the Products covered by the Order. Purchaser shall accept or reject the Products promptly after inspection. Payment by Purchaser prior to its inspection will not constitute acceptance of items covered by the Order.

8. **INDEMNIFICATION:**

   8.1 Seller agrees to indemnify and hold harmless the Purchaser, its successors and assigns against any and all liabilities, loss and expense (including attorney's fees) arising out of a third party product liability claim that results in a judicially determined, final, and non-appealable order finding that the Products were defective provided that no indemnification shall be provided for any loss (or any portion of any loss) determined to have resulted from the acts or omissions of the party seeking indemnification. Seller agrees to carry adequate product liability insurance to support this obligation and agrees to provide certificate(s) of insurance showing such coverage, as requested by Purchaser.

   8.2 Notwithstanding any of the other provisions in this Section 8., Seller's obligation to indemnify the Purchaser is limited to the extent of Seller's product liability insurance and the coverages and exclusions provided for thereunder. In the event Seller's product liability insurance will not cover any of the claims described in Section 8.1., then Seller shall have no obligation to indemnify Purchaser. Seller's obligation to pay any judgment, award, or settlement is likewise limited by the product liability insurance coverage amounts and policy limits provided for under Seller's liability insurance policies. Seller's obligation to indemnify Purchaser shall not apply to any Product which Purchaser (or Purchaser's employees, contractors, customers, or assigns) have altered, tampered with, misused or neglected, or for which Seller's operating instructions and warnings have been ignored or removed or to the extent of the negligence or legal fault of any party other than Seller. Indemnification provided herein is conditioned upon Purchaser providing Seller prompt notice of any claim and allowing Seller, or its insurance company, control over the defense and/or settlement of any such claim.

   8.3 Seller shall defend any suit or proceeding brought against Purchaser to the extent such suit or proceeding is based on a claim that any Product or part thereof (not developed, proposed or specifically mandated by Purchaser), constitutes an infringement of any patent. In the event that the sale or use of such Product, or any part thereof, is enjoined, Seller shall, at its own expense and its option, either: (a) procure for Purchaser, the right to continue using said Product; (b) replace same with a non-infringing Product; or (c) modify same so that it becomes non-infringing.

   8.4 The obligations of Seller with respect to indemnification for third party product liability claims and patent infringement are solely and exclusively as stated herein. **THE INDEMNITY OBLIGATIONS RECITED ABOVE ARE IN LIEU OF ALL OTHER INDEMNITIES WHATSOEVER, WHETHER ORAL, WRITTEN, EXPRESS, OR IMPLIED.**

9. **TERMINATION:**

   9.1 **Termination for Convenience:** Purchaser, by written notice, shall have the right to terminate the Order, in whole or in part, at any time for its convenience. Upon receipt of written notice, Seller and any subcontractors and suppliers shall immediately cease all work with respect to the Products. Within thirty (30) days of Seller's receipt of any termination notice, Seller shall submit its claim for its costs of performance to the date of termination. The termination charges shall consist of a percentage of the contract price of the Products reflecting the percentage of the work performed prior to the date of termination, plus any additional direct costs reasonably incurred as a result of the termination. Percentage of work performed and other charges must be verifiable by Purchaser. Upon payment of the termination charges, title to all Products for which Seller has been paid shall be vested in Purchaser.

   9.2 **Termination for Default:** The Purchaser may terminate the whole or any part of the Seller's performance under the Order in any one of the following circumstances: (1) if the Seller fails to make delivery of the Products or to perform within the time specified herein or any extension thereof;(2) if the Seller delivers Products which do not conform to the specifications; or (3) if the Seller fails to perform any of the other provisions of the Order in accordance with its terms or so fails to make progress as to endanger performance hereunder. In the event of any such failure, Purchaser will provide Seller with written notice of the nature of the failure and Purchaser's intention to terminate for default. Such notice shall provide Seller a commercially reasonable opportunity to cure such failure. In the event Seller does not cure such failure within a commercially reasonable time of such notice, Purchaser may provide Seller with a written Notice of Termination for Default. In the event the Purchaser terminates the Order for default, as provided in this clause, the Purchaser's exclusive remedy for such default is to (i) receive a refund of the price actually paid to Seller upon the return of the Products to Seller's facility from which the Products were originally shipped or (ii) accept the Product as delivered with a mutually agreed to adjustment to the price.

10. **CONFIDENTIAL INFORMATION:**

    10.1 In the performance of its obligations under the Order, Seller may have access to trade secrets and other confidential information, including but not limited to, drawings, data, costs, operating procedures, customers and methods of doing business, which may be owned or controlled by Purchaser and its affiliates ("Confidential Information'). If Seller does in fact have access to any of the Purchaser's Confidential Information in connection with the Order, Seller agrees that any such Confidential Information shall at all times remain the exclusive property of Purchaser and shall be used by Seller and its authorized employees, agents or subcontractors solely for the purpose of performing its obligations hereunder. Seller agrees to keep such Confidential Information in confidence and not to copy or permit others to copy the Confidential Information or disclose the same to unauthorized persons for a period of three (3) years, or for any trade secret for the period of time during which such item is considered a trade secret under applicable law.

    10.2 If Seller is required to disclose the Confidential Information pursuant to any legal proceeding, Seller shall notify Purchaser in writing and allow Purchaser to seek appropriate judicial relief.

    10.3 Notwithstanding the foregoing, nothing herein shall limit the Seller's right to disclose any information which: (1) was in or enters the public domain without fault of the Seller; (2) is received by Seller from a third party without restriction or breach of any duty of confidentiality; (3) was known to Seller prior to receipt and such prior knowledge is demonstrated by competent evidence; or (4) is required to be disclosed pursuant to government process, law, order, rule or regulation.

11. **FORCE MAJEURE:** Neither Purchaser nor Seller shall be deemed to have breached the Order as a result of delays in performance where such delays result from acts of God, fires, strikes, pandemic, or occurrences, beyond the control, and without the fault, of the party seeking excuse. Any party seeking excuse under Section 11 shall promptly notify the other party in writing and take all reasonable steps to mitigate the effect of such delay on the other party. The time for performance by Seller shall be extended by a period equal to the length of any such excused delay. If any event of delay as identified in Section 11 is encountered by Seller and continues for more than ninety (90) days, the Purchaser shall have the right, but not the obligation, to terminate the Agreement for its Convenience in accordance with Section 9.1. entitled, "Termination For Convenience."

12. **COMPLIANCE WITH LAWS:** Seller certifies that its operations are in compliance with all applicable laws, executive orders, rules and regulations relating to Equal Employment Opportunity.

13. **INSURANCE:** Seller shall not insure the Product's for Purchaser's account, unless otherwise indicated in the Order.

14. **ASSIGNMENT:** The Order may not be assigned by either party without the written consent of the other party.

15. **GOVERNING LAW:** All disputes relating to the execution, interpretation, construction, performance, or enforcement of the Order and the rights and obligations of the parties shall be governed by the laws of, and resolved in the State or Federal courts in, the State of Texas. Purchaser hereby consents to and waives any objection to venue and jurisdiction in such courts.

16. **CUMULATIVE REMEDIES:** SELLER SHALL IN NO EVENT BE LIABLE TO PURCHASER, ANY PERSON WHO SHALL PURCHASE FROM PURCHASER, OR ANY PERSON THAT USES ANY PRODUCTS SOLO PURSUANT TO THE ORDER FOR DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, DIRECT, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS OF PRODUCTION OR LOSS OF PROFITS RESULTING FROM ANY CAUSE WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, ANY DELAY, ACT, ERROR, OR OMISSION OF SELLER, OR ANY DEFECT, FAILURE, OR MALFUNCTION OF THE PRODUCTS, AND SELLER'S SOLE LIABILITY SHALL BE TO REPAIR OR REPLACE ANY PRODUCTS COVERED BY THE ORDER F.O.B. SELLER'S FACILITY, WHETHER THE CLAIM FOR SUCH DAMAGES IS BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, OR OTHERWISE.

17. **SEVERABILITY:** The terms and conditions of the Order are subject to all applicable laws and regulations. The unenforceability or invalidity of any provision of any of the writings that collectively constitute the Order shall not affect the validity or enforceability of the remaining provisions thereof,but such remaining provisions shall be construed and interpreted in such a manner as to carry out fully the intent of the parties.

18. **DISPUTE RESOLUTION:** The parties agree to attempt to resolve disputes prior to submitting such disputes to determination by litigation by good-faith negotiations between knowledgeable, responsible representatives of each party who are fully authorized to settle any such dispute.

19. **WAIVER:** Seller's failure to insist on performance of any term, condition, or instruction, or failure to exercise any right or privilege, or its waiver of any breach, shall not thereafter waive any such term, condition, instruction, right, or privilege.

MATERIAL HANDLING CATALOG INDEX

WARNING AND SAFETY REMINDERS FOR
SCREW , DRAG , AND BUCKET ELEVATOR CONVEYORS

Approved for Distribution By The Joint Screw Conveyor and Bucket Elevator Section Of The Conveyor Equipment Manufacturers Association (CEMA)

It is the responsibility of the contractor, installer, owner and user to install, maintain and operate the conveyor, components and, conveyor assemblies in such a manner as to comply with the Occupational Safety and Health Act and with all state and local laws and ordinances and the American National Standards Institute (ANSI) B20.1 Safety Code.

Paragraph 5.16 of ANSI B20.1 addresses risk assessment and risk reduction. Risk assessment and related risk reduction should be performed by the owner and user at each phase of a conveyor or conveyor system's life cycle. Examples of risk assessment processes can be found in the following:

1. CEMA Technical Report 2015-01
2. ASSE Z590.3 (American Society of Safety Engineers)
3. MIL-STD-882 (U.S. Military Standard)

In order to avoid an unsafe or hazardous condition, the assemblies or parts must be installed and operated in accordance with the following minimum provisions.

1. Conveyors shall not be operated unless all covers and/or guards for the conveyor and drive unit are in place. If the conveyor is to be opened for inspection cleaning, maintenance or observation, the electric power to the motor driving the conveyor must be LOCKED OUT in such a manner that the conveyor cannot be restarted by anyone; however remote from the area, until conveyor cover or guards and drive guards have been properly replaced.

2. If the conveyor must have an open housing as a condition of its use and application, the entire conveyor is then to be guarded by a railing or fence in accordance with ANSI standard B20.1.(Request current edition and addenda)

3. Feed openings for shovel, front loaders or other manual or mechanical equipment shall be constructed in such a way that the conveyor opening is covered by a grating. If the nature of the material is such that a grating cannot be used, then the exposed section of the conveyor is to be guarded by a railing or fence and there shall be a warning sign posted.

4. Do not attempt any maintenance or repairs of the conveyor until power has been LOCKED OUT.

5. Always operate conveyor in accordance with these instructions and those contained on the caution labels affixed to the equipment.

6. Do not place hands, feet, or any part of your body, in the conveyor.

7. Never walk on conveyor covers, grating or guards.

8. Do not use conveyor for any purpose other than that for which it was intended.

9. Do not poke or prod material into the conveyor with a bar or stick inserted through the openings.

10. Keep area around conveyor drive and control station free of debris and obstacles.

11. Eliminate all sources of stored energy (materials or devices that could cause conveyor components to move without power applied) before opening the conveyor

12. Do not attempt to clear a jammed conveyor until power has been LOCKED OUT.

13. Do not attempt field modification of conveyor or components.

14. Conveyors are not normally manufactured or designed to handle materials that are hazardous to personnel. These materials which are hazardous include those that are explosive, flammable, toxic or otherwise dangerous to personnel. Conveyors may be designed to handle these materials. Conveyors are not manufactured or designed to comply with local, state or federal codes for unfired pressure vessels. If hazardous materials are to be conveyed or if the conveyor is to be subjected to internal or external pressure, manufacturer should be consulted prior to any modifications.

CEMA insists that disconnecting and locking out the power to the motor driving the unit provides the only real protection against injury. Secondary safety devices are available; however, the decision as to their need and the type required must be made by the owner-assembler as we have no information regarding plant wiring, plant environment, the interlocking of the screw conveyor with other equipment, extent of plant automation, etc. Other devices should not be used as a substitute for locking out the power prior to removing guards or covers. We caution that use of the secondary devices may cause employees to develop a false sense of security and fail to lock out power before removing covers or guards. This could result in a serious injury should the secondary device fail or malfunction.

There are many kinds of electrical devices for interlocking of conveyors and conveyor systems such that if one conveyor in a system or process is stopped other equipment feeding it, or following it can also be automatically stopped.

Electrical controls, machinery guards, railings, walkways, arrangement of installation, training of personnel, etc., are necessary ingredients for a safe working place. It is the responsibility of the contractor, installer, owner and user to supplement the materials and services furnished with these necessary items to make the conveyor installation comply with the law and accepted standards.

Conveyor inlet and discharge openings are designed to connect to other equipment or machinery so that the flow of material into and out of the conveyor is completely enclosed.

One or more warning labels should be visible on conveyor housings, conveyor covers and elevator housings. If the labels attached to the equipment become illegible, please order replacement warning labels from the OEM or CEMA.

The Conveyor Equipment Manufacturers Association (CEMA) has produced a DVD presentation entitled "Screw Conveyor, Drag Conveyor, and Bucket Elevator Safety DVD." CEMA encourages acquisition and use of this source of safety information to supplement your safety program.

SEE NEXT PAGE FOR SAFETY LABELS

CEMA Safety Labels

The CEMA safety labels shown below should be used on screw conveyors, drag conveyors, and bucket elevators. Safety labels should be placed on inlets, discharges, troughs, covers, inspection doors & drive guards. See CEMA Safety Label Placement Guidelines on CEMA Website: www.cemanet.org

⚠ WARNING
Exposed moving parts can cause severe injury

LOCK OUT POWER before removing guard

CHR930001
http://www.cemanet.org

⚠ WARNING
Walking or standing on conveyor covers or gratings can cause severe injury

STAY OFF

CHS991026
http://www.cemanet.org

⚠ WARNING
Exposed screw and moving parts can cause severe injury

LOCK OUT POWER before removing cover or servicing

CHR930011
http://www.cemanet.org

⚠ WARNING

CVS930010

Exposed conveyors and moving parts can cause severe injury

LOCK OUT POWER before removing cover or servicing

http://www.cemanet.org

⚠ WARNING

CVS930012

Exposed buckets and moving parts can cause severe injury

LOCK OUT POWER before removing cover or servicing

http://www.cemanet.org

⚠ WARNING

CVS930011

Exposed screw and moving parts can cause severe injury

LOCK OUT POWER before removing cover or servicing

http://www.cemanet.org

PROMINENTLY DISPLAY THESE SAFETY LABELS ON INSTALLED EQUIPMENT
SEE PREVIOUS PAGE FOR SAFETY REMINDERS

Note: Labels alone do not substitute for a thorough in-plant safety training program centered on the hazards associated with operating your installed equipment.

Contact CEMA or Your Equipment Manufacturer for Replacement Labels

CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION
5624 Strand Ct., Suite 2., Naples, Florida 34110-3314
239-514-3441
www.cemanet.org / www.cemastore.com

MATERIAL HANDLING

Stock & MTO Screw Conveyor Components

Screw Conveyor Components and Accessories

ANGLE FLANGED U-TROUGH

FORMED FLANGED U-TROUGH

SECTIONAL SCREWS

SPECIAL SCREWS

TUBULAR HOUSING

FLAT RACK AND PINION
DISCHARGE GATE

TROUGH ENDS
WITH AND WITHOUT FEET

SECTIONAL FLIGHTS

COUPLING SHAFTS

ELEVATOR BUCKETS

HANGER
STYLE 220

HANGER
STYLE 226

HANGER
STYLE 216

THRUST ASSEMBLY
TYPE E
WITH DRIVE SHAFT
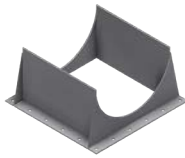
INLET AND DISCHARGE
SPOUTS

SPLIT GLAND

HANGER
STYLE 70

HANGER
STYLE 19B

TROUGH END BEARING
BALL AND ROLLER

PACKING GLAND
SHAFT SEAL
COMPRESSION TYPE

WASTE PACK
SHAFT SEAL

PLATE
SHAFT SEAL

DROP-OUT
SHAFT SEAL
FLANGED PRODUCT

HANGER BEARINGS STYLE 220/226
MARTIN HARD IRON
MARTIN BRONZE
NYLATRON
WHITE NYLON
WOOD
CERAMIC

SADDLES AND FEET

HELICOID SCREWS

HELICOID FLIGHTING
RIGHT HAND AND LEFT HAND

SHAFTLESS SCREWS
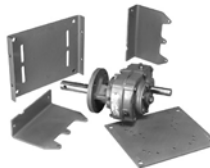
SCREW CONVEYOR DRIVE
WITH ACCESSORIES

SPEED REDUCER
SHAFT MOUNTED
WITH ACCESSORIES

FLANGED COVER
WITH ACCESSORIES

Martin manufacturers the most complete line of stock components in the industry. We stock mild steel, stainless, galvanized, and many other items that are "special order" from the others in the industry.

ENGINEERING   PAGE

Introduction

The following section is designed to present the necessary engineering information to properly design and layout most conveyor applications. The information has been compiled from many years of experience in successful design and application and from industry standards.

We hope that the information presented will be helpful to you in determining the type and size of screw conveyor that will best suit your needs.

The "screw conveyor design procedure" on the following page gives ten step-by-step instructions for properly designing a screw conveyor. These steps, plus the many following tables and formulas throughout the engineering section will enable you to design and detail screw conveyor for most applications.

If your requirements present any complications not covered in this section, we invite you to contact our engineering department for recommendations and suggestions.

Design

Screw Conveyor Design Procedure		
STEP 1	Establish Known Factors	1. Type of material to be conveyed. 2. Maximum size of hard lumps. 3. Percentage of hard lumps by volume. 4. Capacity required, in cu.ft./hr. 5. Capacity required, in lbs./hr. 6. Distance material to be conveyed. 7. Any additional factors that may affect conveyor or operations.
STEP 2	Classify Material	Classify the material according to the system shown in Table 1-1. Or, if the material is included in Table 1-2, use the classification shown in Table 1-2.
STEP 3	Determine Design Capacity	Determine design capacity as described on pages H-16–H-18.
STEP 4	Determine Diameter and Speed	Using known capacity required in cu.ft./hr., material classification, and % trough loading (Table 1-2) determine diameter and speed from Table 1-6.
STEP 5	Check Minimum Screw Diameter for Lump Size Limitations	Using known screw diameter and percentage of hard lumps, check minimum screw diameter from Table 1-7.
STEP 6	Determine Type of Bearings	From Table 1-2, determine hanger bearing group for the material to be conveyed. Locate this bearing group in Table 1-11 for the type of bearing recommended.
STEP 7	Determine Horsepower	From Table 1-2, determine Horsepower Factor "Fm" for the material to be conveyed. Refer to page H-23 and calculate horsepower by the formula method.
STEP 8	Check Torsional and/or Horsepower ratings of Standard Conveyor Components	Using required horsepower from step 7 refer to pages H-26 and H-27 to check capacities of standard conveyor pipe, shafts and coupling bolts.
STEP 9	Select Components	Select basic components from Tables 1-8, 1-9, and 1-10 in accordance with Component Group listed in Table 1-2 for the material to be conveyed. Select balance of components from the Components Section of catalog.
STEP 10	Conveyor Layouts	Refer to pages H-39 and H-40 for typical layout details.

Table 1-1
Material Classification Code Chart

Major Class	Material Characteristics Included		Code Designation
Density	Bulk Density, Loose		Actual lbs/PC
Size	Very Fine	No. 200 Sieve (.0029") and Under	A200
		No. 100 Sieve (.0059") and Under	A100
		No. 40 Sieve (.016") and Under	A40
	Fine	No. 6 Sieve (.132") and Under	B6
	Granular	1/2" And Under (6" Sieve to 1/2")	C1/2
		3" And Under (1/2" to 3")	D3
		7" And Under (3" to 7")	D7
	Lumpy	16" And Under (0" to 16")	D16
		Over 16" To Be Specified, X = Actual Maximum Size	DX
	Irregular	Irregular Stringy, Fibrous, Cylindrical, Slabs, Etc.	E
Flowability	Very Free Flowing		1
	Free Flowing		2
	Average Flowability		3
	Sluggish		4
Abrasiveness	Mildly Abrasive		5
	Moderately Abrasive		6
	Extremely Abrasive		7
Miscellaneous Properties or Hazards	Builds Up and Hardens		F
	Generates Static Electricity		G
	Decomposes — Deteriorates in Storage		H
	Flammability		J
	Becomes Plastic or Tends to Soften		K
	Very Dusty		L
	Aerates and Becomes a Fluid		M
	Explosiveness		N
	Stickiness — Adhesion		O
	Contaminable, Affecting Use		P
	Degradable, Affecting Use		Q
	Gives Off Harmful or Toxic Gas or Fumes		R
	Highly Corrosive		S
	Mildly Corrosive		T
	Hygroscopic		U
	Interlocks, Mats or Agglomerates		V
	Oils Present		W
	Packs Under Pressure		X
	Very Light and Fluffy — May Be Windswept		Y
	Elevated Temperature		Z

Table 1-2
Material Characteristics

Material Characteristics

The material characteristics table (page H-7 or H-15) lists the following Design Data for many materials.

- A. The weight per cubic foot data may be used to calculate the required capacity of the conveyor in cubic feet per hour.
- B. B. The material code for each material is as described in Table 1-1, and as interpreted below.
- C. The Intermediate Bearing Selection Code is used to properly select the intermediate hanger bearing from Table 1-11 (Page H-22).
- D. The Component Series Code is used to determine the correct components to be used as shown on page H-21.
- E. The Material Factor Fm is used in determining horsepower as described on pages H-23 thru H-25.
- F. The Trough Loading column indicates the proper percent of cross section loading to use in determining diameter and speed of the conveyor.

For screw conveyor design purposes, conveyed materials are classified in accordance with the code system in Table 1-1, and listed in Table 1-2.

Table 1-2 lists many materials that can be effectively conveyed by a screw conveyor. If a material is not listed in Table 1-2, it must be classified according to Table 1-1 or by referring to a listed material similar in weight, particle size and other characteristics.
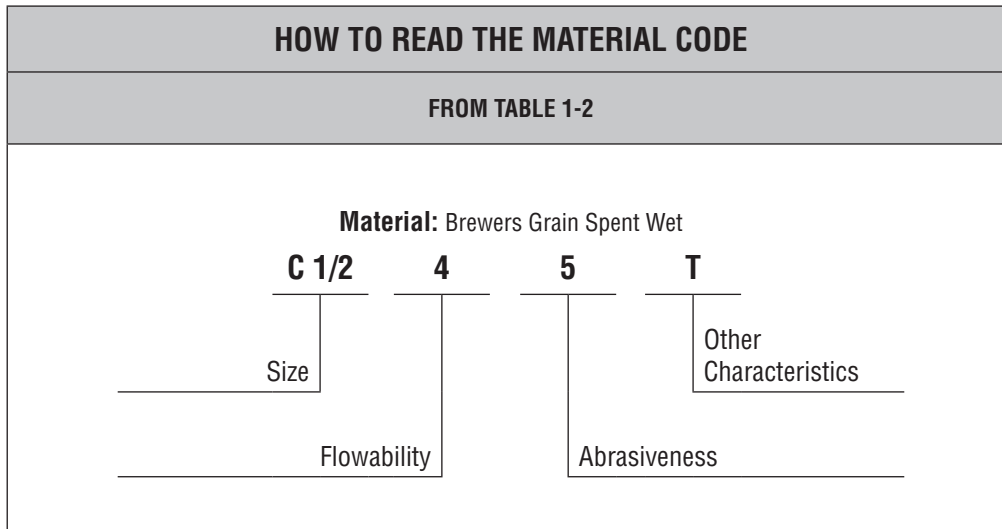
HOW TO READ THE MATERIAL CODE
FROM TABLE 1-2
Material: Brewers Grain Spent Wet
C 1/2   4   5   T
Size — Other Characteristics
Flowability — Abrasiveness

Table 1-2
Material Characteristics

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Adipic Acid	45	A100-35	S	2	.5	30A
Alfalfa Meal	14-22	B6-45WY	H	2	.6	30A
Alfalfa Pellets	41-43	C1/2-25	H	2	.5	45
Alfalfa Seed	10-15	B6-15N	L-S-B	1	.4	45
Almonds, Broken	27-30	C1/2-35Q	H	2	.9	30A
Almonds, Whole Shelled	28-30	C1/2-35Q	H	2	.9	30A
Alum, Fine	45-50	B6-35U	L-S-B	1	.6	30A
Alum, Lumpy	50-60	B6-25	L-S	2	1.4	45
Alumina	55-65	B6-27MY	H	3	1.8	15
Alumina, Fine	35	A100-27MY	H	3	1.6	15
Alumina Sized or Briquette	65	D3-37	H	3	2.0	15
Aluminate Gel (Aluminate Hydroxide)	45	B6-35	H	2	1.7	30A
Aluminum Chips, Dry	7-15	E-45V	H	2	1.2	30A
Aluminum Chips, Oily	7-15	E-45V	H	2	.8	30A
Aluminum Hydrate	13-20	C1/2-35	L-S-B	1	1.4	30A
Aluminum Ore (See Bauxite)	—	—	—	—	—	—
Aluminum Oxide	60-120	A100-17M	H	3	1.8	15
Aluminum Silicate (Andalusite)	49	C1/2-35S	L-S	3	.8	30A
Aluminum Sulfate	45-58	C1/2-25	L-S-B	1	1.0	45
Ammonium Chloride, Crystalline	45-52	A100-45FRS	L-S	3	.7	30A
Ammonium Nitrate	45-62	A40-35NTU	H	3	1.3	30A
Ammonium Sulfate	45-58	C1/2-35FOTU	L-S	1	1.0	30A
Antimony Powder	—	A100-35	H	2	1.6	30A
Apple Pomace, Dry	15	C1/2-45Y	H	2	1.0	30A
Arsenate Of Lead (See Lead Arsenate)	—	—	—	—	—	—
Arsenic Oxide (Arsenolite)	100-120	A100-35R	L-S-B	—	—	30A
Arsenic Pulverized	30	A100-25R	H	2	.8	45
Asbestos — Rock (Ore)	81	D3-37R	H	3	1.2	15
Asbestos — Shredded	20-40	E-46XY	H	2	1.0	30B
Ash, Black Ground	105	B6-35	L-S-B	1	2.0	30A
Ashes, Coal, Dry — 1/2"	35-45	C1/2-46TY	H	3	3.0	30B
Ashes, Coal, Dry — 3"	35-40	D3-46T	H	3	2.5	30B
Ashes, Coal, Wet — 1/2"	45-50	C1/2-46T	H	3	3.0	30B
Ashes, Coal, Wet — 3"	45-50	D3-46T	H	3	4.0	30B
Ashes, Fly (See Fly Ash)	—	—	—	—	—	—
Asphalt, Crushed — 1/2"	45	C1/2-45	H	2	2.0	30A
Bagasse	7-10	E-45RVXY	L-S-B	2	1.5	30A
Bakelite, Fine	30-45	B6-25	L-S-B	1	1.4	45
Baking Powder	40-55	A100-35	S	1	.6	30A
Baking Soda (Sodium Bicarbonate)	40-55	A100-25	S	1	.6	45
Barite (Barium Sulfate) + 1/2" — 3"	120-180	D3-36	H	3	2.6	30B
Barite, Powder	120-180	A100-35X	H	2	2.0	30A
Barium Carbonate	72	A100-45R	H	2	1.6	30A
Bark, Wood, Refuse	10-20	E-45TVY	H	3	2.0	30A
Barley, Fine, Ground	24-38	B6-35	L-S-B	1	.4	30A
Barley, Malted	31	C1/2-35	L-S-B	1	.4	30A
Barley, Meal	28	C1/2-35	L-S-B	1	.4	30A
Barley, Whole	36-48	B6-25N	L-S-B	1	.5	45
Basalt	80-105	B6-27	H	3	1.8	15
Bauxite, Dry, Ground	68	B6-25	H	2	1.8	45
Bauxite, Crushed — 3"	75-85	D3-36	H	3	2.5	30B
Beans,Castor, Meal	35-40	B6-35W	L-S-B	1	.8	30A
Beans, Castor, Whole Shelled	36	C1/2-15W	L-S-B	1	.5	45
Beans, Navy, Dry	48	C1/2-15	L-S-B	1	.5	45
Beans, Navy, Steeped	60	C1/2-25	L-S-B	1	.8	45
Bentonite, Crude	34-40	D3-45X	H	2	1.2	30A

Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Bentonite, –100 Mesh	50-60	A100-25MXY	H	2	0.7	45
Benzene Hexachloride	56	A100-45R	L-S-B	1	0.6	30A
Bicarbonate of Soda (Baking Soda)	—	—	S	1	0.6	—
Blood, Dried	35-45	D3-45U	H	2	2	30A
Blood, Ground, Dried	30	A100-35U	L-S	1	1	30A
Bone Ash (Tricalcium Phosphate)	40-50	A100-45	L-S	1	1.6	30A
Boneblack	20-25	A100-25Y	L-S	1	1.5	45
Bonechar	27-40	B6-35	L-S	1	1.6	30A
Bonemeal	50-60	B6-35	H	2	1.7	30A
Bones, Whole*	35-50	E-45V	H	2	3	30A
Bones, Crushed	35-50	D3-45	H	2	2	30A
Bones, Ground	50	B6-35	H	2	1.7	30A
Borate of Lime	60	A100-35	L-S-B	1	0.6	30A
Borax, Fine	45-55	B6-25T	H	3	0.7	30B
Borax Screening — 1/2"	55-60	C1/2-35	H	2	1.5	30A
Borax, 11/2" - 2" Lump	55-60	D3-35	H	2	1.8	30A
Borax, 2" - 3" Lump	60-70	D3-35	H	2	2	30A
Boric Acid, Fine	55	B6-25T	H	3	0.8	30A
Boron	75	A100-37	H	2	1	30B
Bran, Rice — Rye — Wheat	16-20	B6-35NY	L-S-B	1	0.5	30A
Braunite (Manganese Oxide)	120	A100-36	H	2	2	30B
Bread Crumbs	20-25	B6-35PQ	L-S-B	1	0.6	30A
Brewer's Grain, Spent, Dry	14-30	C1/2-45	L-S-B	1	0.5	30A
Brewer's Grain, Spent, Wet	55-60	C1/2-45T	L-S	2	0.8	30A
Brick, Ground — 1/8"	100-120	B6-37	H	3	2.2	15
Bronze Chips	30-50	B6-45	H	2	2	30A
Buckwheat	37-42	B6-25N	L-S-B	1	0.4	45
Calcine, Flour	75-85	A100-35	L-S-B	1	0.7	30A
Calcium Carbide	70-90	D3-25N	H	2	2	30A
Calcium Carbonate (See Limestone)	—	—	—	—	—	—
Calcium Fluoride (See Fluorspar)	—	—	—	—	—	—
Calcium Hydrate (See Lime, Hydrated)	—	—	—	—	—	—
Calcium Hydroxide (See Lime, Hydrated)	—	—	—	—	—	—
Calcium Lactate	26-29	D3-45QTR	L-S	2	0.6	30A
Calcium Oxide (See Lime, Unslaked)	—	—	—	—	—	—
Calcium Phosphate	40-50	A100-45	L-S-B	1	1.6	30A
Calcium Sulfate (See Gypsum)	—	—	—	—	—	—
Carbon, Activated, Dry Fine*	—	—	—	—	—	—
Carbon Black, Pelleted*	—	—	—	—	—	—
Carbon Black, Powder*	—	—	—	—	—	—
Carborundum	100	D3-27	H	3	3	15
Casein	36	B6-35	H	2	1.6	30A
Cashew Nuts	32-37	C1/2-45	H	2	0.7	30A
Cast Iron, Chips	130-200	C1/2-45	H	2	4	30A
Caustic Soda	88	B6-35RSU	H	3	1.8	30A
Caustic Soda, Flakes	47	C1/2-45RSUX	L-S	3	1.5	30A
Celite (See Diatomaceous Earth)	—	—	—	—	—	—
Cement, Clinker	75-95	D3-36	H	3	1.8	30B
Cement, Mortar	133	B6-35Q	H	3	3	30A
Cement, Portland	94	A100-26M	H	2	1.4	30B
Cement, Aerated (Portland)	60-75	A100-16M	H	2	1.4	30B
Cerrusite (See Lead Carbonate)	—	—	—	—	—	—
Chalk, Crushed	75-95	D3-25	H	2	1.9	30A
Chalk, Pulverized	67-75	A100-25MXY	H	2	1.4	45
Charcoal, Ground	18-28	A100-45	H	2	1.2	30A
Charcoal, Lumps	18-28	D3-45Q	H	2	1.4	30A

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Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Chocolate, Cake Pressed	40-45	D3-25	S	2	1.5	30A
Chrome Ore	125-140	D3-36	H	3	2.5	30B
Cinders, Blast Furnace	57	D3-36T	H	3	1.9	30B
Cinders, Coal	40	D3-36T	H	3	1.8	30B
Clay (See Bentonite, Diatomaceous Earth, Fuller's Earth, Kaolin & Marl)	—	—	—	—	—	—
Clay, Ceramic, Dry, Fines	60-80	A100-35P	L-S-B	1	1.5	30A
Clay, Calcined	80-100	B6-36	H	3	2.4	30B
Clay, Brick, Dry, Fines	100-120	C1/2-36	H	3	2.0	30B
Clay, Dry, Lumpy	60-75	D3-35	H	2	1.8	30A
Clinker, Cement (See Cement Clinker)	—	—	—	—	—	—
Clover Seed	45-48	B6-25N	L-S-B	1	.4	45
Coal, Anthracite (River & Culm)	55-61	B6-35TY	L-S	2	1.0	30A
Coal, Anthracite, Sized-1/2"	49-61	C1/2-25	L-S	2	1.0	45
Coal, Bituminous, Mined	40-60	D3-35LNXY	L-S	1	.9	30A
Coal, Bituminous, Mined, Sized	45-50	D3-35QV	L-S	1	1.0	30A
Coal, Bituminous, Mined, Slack	43-50	C1/2-45T	L-S	2	.9	30A
Coal, Lignite	37-45	D3-35T	H	2	1.0	30A
Cocoa Beans	30-45	C1/2-25Q	L-S	1	.5	45
Cocoa, Nibs	35	C1/2-25	H	2	.5	45
Cocoa, Powdered	30-35	A100-45XY	S	1	.9	30A
Cocoanut, Shredded	20-22	E-45	S	2	1.5	30A
Coffee, Chaff	20	B6-25MY	L-S	1	1.0	45
Coffee, Green Bean	25-32	C1/2-25PQ	L-S	1	.5	45
Coffee, Ground, Dry	25	A40-35P	L-S	1	.6	30A
Coffee, Ground, Wet	35-45	A40-45X	L-S	1	.6	30A
Coffee, Roasted Bean	20-30	C1/2-25PQ	S	1	.4	45
Coffee, Soluble	19	A40-35PUY	S	1	.4	45
Coke, Breeze	25-35	C1/2-37	H	3	1.2	15
Coke, Loose	23-35	D7-37	H	3	1.2	15
Coke, Petrol, Calcined	35-45	D7-37	H	3	1.3	15
Compost	30-50	D7-45TV	L-S	3	1.0	30A
Concrete, Pre-Mix Dry	85-120	C1/2-36U	H	3	3.0	30B
Copper Ore	120-150	DX-36	H	3	4.0	30B
Copper Ore, Crushed	100-150	D3-36	H	3	4.0	30B
Copper Sulphate, (Bluestone)	75-95	C1/2-35S	L-S	2	1.0	30A
Copperas (See Ferrous Sulphate)	—	—	—	—	—	—
Copra, Cake Ground	40-45	B6-45HW	L-S-B	1	.7	30A
Copra, Cake, Lumpy	25-30	D3-35HW	L-S-B	2	.8	30A
Copra, Lumpy	22	E-35HW	L-S-B	2	1.0	30A
Copra, Meal	40-45	B6-35HW	H	2	.7	30A
Cork, Fine Ground	5-15	B6-35JNY	L-S-B	1	.5	30A
Cork, Granulated	12-15	C1/2-35JY	L-S-B	1	.5	30A
Corn, Cracked	40-50	B6-25P	L-S-B	1	.7	45
Corn Cobs, Ground	17	C1/2-25Y	L-S-B	1	.6	45
Corn Cobs, Whole*	12-15	E-35	L-S	2		30A
Corn Ear*	56	E-35	L-S	2		30A
Corn Germ	21	B6-35PY	L-S-B	1	.4	30A
Corn Grits	40-45	B6-35P	L-S-B	1	.5	30A
Cornmeal	32-40	B6-35P	L-S	1	.5	30A
Corn Oil, Cake	25	D7-45HW	L-S	1	.6	30A
Corn Seed	45	C1/2-25PQ	L-S-B	1	.4	45
Corn Shelled	45	C1/2-25	L-S-B	1	.4	45
Corn Sugar	30-35	B6-35PU	S	1	1.0	30A
Cottonseed, Cake, Crushed	40-45	C1/2-45HW	L-S	1	1.0	30A
Cottonseed, Cake, Lumpy	40-45	D7-45HW	L-S	2	1.0	30A

Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Cottonseed, Dry, Delinted	22-40	C1/2-25X	L-S	1	.6	45
Cottonseed, Dry, Not Delinted	18-25	C1/2-45XY	L-S	1	.9	30A
Cottonseed, Flakes	20-25	C1/2-35HWY	L-S	1	.8	30A
Cottonseed, Hulls	12	B6-35Y	L-S	1	.9	30A
Cottonseed, Meal, Expeller	25-30	B6-45HW	L-S	3	.5	30A
Cottonseed, Meal, Extracted	35-40	B6-45HW	L-S	1	.5	30A
Cottonseed, Meats, Dry	40	B6-35HW	L-S	1	.6	30A
Cottonseed, Meats, Rolled	35-40	C1/2-45HW	L-S	1	.6	30A
Cracklings, Crushed	40-50	D3-45HW	L-S-B	2	1.3	30A
Cryolite, Dust	75-90	A100-36L	H	2	2.0	30B
Cryolite, Lumpy	90-110	D16-36	H	2	2.1	30B
Cullet, Fine	80-120	C1/2-37	H	3	2.0	15
Cullet, Lump	80-120	D16-37	H	3	2.5	15
Culm, (See Coal, Anthracite)	—	—	—	—	—	—
Cupric Sulphate (Copper Sulfate)	—	—	—	—	—	—
Detergent (See Soap Detergent)	—	—	—	—	—	—
Diatomaceous Earth	11-17	A40-36Y	H	3	1.6	30B
Dicalcium Phosphate	40-50	A40-35	L-S-B	1	1.6	30A
Disodium Phosphate	25-31	A40-35	H	3	.5	30A
Distiller's Grain, Spent Dry	30	B6-35	H	2	.5	30A
Distiller's Grain, Spent Wet	40-60	C1/2-45V	L-S	3	.8	30A
Dolomite, Crushed	80-100	C1/2-36	H	2	2.0	30B
Dolomite, Lumpy	90-100	DX-36	H	2	2.0	30B
Earth, Loam, Dry, Loose	76	C1/2-36	H	2	1.2	30B
Ebonite, Crushed	63-70	C1/2-35	L-S-B	1	.8	30A
Egg Powder	16	A40-35MPY	S	1	1.0	30A
Epsom Salts (Magnesium Sulfate)	40-50	A40-35U	L-S-B	1	.8	30A
Feldspar, Ground	65-80	A100-37	H	2	2.0	15
Feldspar, Lumps	90-100	D7-37	H	2	2.0	15
Feldspar, Powder	100	A200-36	H	2	2.0	30B
Feldspar, Screenings	75-80	C1/2-37	H	2	2.0	15
Ferrous Sulfide — 1/2"	120-135	C1/2-26	H	2	2.0	30B
Ferrous Sulfide — 100M	105-120	A100-36	H	2	2.0	30B
Ferrous Sulphate	50-75	C1/2-35U	H	2	1.0	30A
Fish Meal	35-40	C1/2-45HP	L-S-B	1	1.0	30A
Fish Scrap	40-50	D7-45H	L-S-B	2	1.5	30A
Flaxseed	43-45	B6-35X	L-S-B	1	.4	30A
Flaxseed Cake (Linseed Cake)	48-50	D7-45W	L-S	2	.7	30A
Flaxseed Meal (Linseed Meal)	25-45	B6-45W	L-S	1	.4	30A
Flour Wheat	33-40	A40-45LP	S	1	.6	30A
Flue Dust, Basic Oxygen Furnace	45-60	A40-36LM	H	3	3.5	30B
Flue Dust, Blast Furnace	110-125	A40-36	H	3	3.5	30B
Flue Dust, Boiler H. Dry	30-45	A40-36LM	H	3	2.0	30B
Fluorspar, Fine (Calcium Fluoride)	80-100	B6-36	H	2	2.0	30B
Fluorspar, Lumps	90-110	D7-36	H	2	2.0	30B
Fly Ash	30-45	A40-36M	H	3	2.0	30B
Foundry Sand, Dry (See Sand)	—	—	—	—	—	—
Fuller's Earth, Dry, Raw	30-40	A40-25	H	2	2.0	15
Fuller's Earth, Oily, Spent	60-65	C1/2-450W	H	3	2.0	30A
Fuller's Earth, Calcined	40	A100-25	H	3	2.0	15
Galena (See Lead Sulfide)	—	—	—	—	—	—
Gelatine, Granulated	32	B6-35PU	S	1	.8	30A
Gilsonite	37	C1/2-35	H	3	1.5	30A
Glass, Batch	80-100	C1/2-37	H	3	2.5	15
Glue, Ground	40	B6-45U	H	2	1.7	30A
Glue, Pearl	40	C1/2-35U	L-S-B	1	.5	30A

Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Glue, Veg. Powdered	40	A40-45U	L-S-B	1	.6	30A
Gluten, Meal	40	B6-35P	L-S	1	.6	30A
Granite, Fine	80-90	C1/2-27	H	3	2.5	15
Grape Pomace	15-20	D3-45U	H	2	1.4	30A
Graphite Flake	40	B6-25LP	L-S-B	1	.5	45
Graphite Flour	28	A100-35LMP	L-S-B	1	.5	30A
Graphite Ore	65-75	DX-35L	H	2	1.0	30A
Guano Dry*	70	C1/2-35	L-S	3	2.0	30A
Gypsum, Calcined	55-60	B6-35U	H	2	1.6	30A
Gypsum, Calcined, Powdered	60-80	A100-35U	H	2	2.0	30A
Gypsum, Raw — 1"	70-80	D3-25	H	2	2.0	30A
Hay, Chopped*	8-12	C1/2-35JY	L-S	2	1.6	30A
Hexanedioic Acid (See Adipic Acid)	—	—	—	—	—	—
Hominy, Dry	35-50	C1/2-25	L-S-B	1	.4	45
Hops, Spent, Dry	35	D3-35	L-S-B	2	1.0	30A
Hops, Spent, Wet	50-55	D3-45V	L-S	2	1.5	30A
Ice, Crushed	35-45	D3-35Q	L-S	2	.4	30A
Ice, Flaked*	40-45	C1/2-35Q	S	1	.6	30A
Ice, Cubes	33-35	D3-35Q	S	1	.4	30A
Ice, Shell	33-35	D3-45Q	S	1	.4	30A
Ilmenite Ore	140-160	D3-37	H	3	2.0	15
Iron Ore Concentrate	120-180	A40-37	H	3	2.2	15
Iron Oxide Pigment	25	A100-36LMP	H	2	1.0	30B
Iron Oxide, Millscale	75	C1/2-36	H	2	1.6	30B
Iron Pyrites (See Ferrous Sulfide)	—	—	—	—	—	—
Iron Sulphate (See Ferrous Sulfate)	—	—	—	—	—	—
Iron Sulfide (See Ferrous Sulfide)	—	—	—	—	—	—
Iron Vitriol (See Ferrous Sulfate)	—	—	—	—	—	—
Kafir (Corn)	40-45	C1/2-25	H	3	.5	45
Kaolin Clay	63	D3-25	H	2	2.0	30A
Kaolin Clay-Talc	32-56	A40-35LMP	H	2	2.0	30A
Kryalith (See Cryolite)	—	—	—	—	—	—
Lactose	32	A40-35PU	S	1	.6	30A
Lamp Black (See Carbon Black)	—	—	—	—	—	—
Lead Arsenate	72	A40-35R	L-S-B	1	1.4	30A
Lead Arsenite	72	A40-35R	L-S-B	1	1.4	30A
Lead Carbonate	240-260	A40-35R	H	2	1.0	30A
Lead Ore — 1/8"	200-270	B6-35	H	3	1.4	30A
Lead Ore — 1/2"	180-230	C1/2-36	H	3	1.4	30B
Lead Oxide (Red Lead) — 100 Mesh	30-150	A100-35P	H	2	1.2	30A
Lead Oxide (Red Lead) — 200 Mesh	30-180	A200-35LP	H	2	1.2	30A
Lead Sulphide — 100 Mesh	240-260	A100-35R	H	2	1.0	30A
Lignite (See Coal Lignite)	—	—	—	—	—	—
Limanite, Ore, Brown	120	C1/2-47	H	3	1.7	15
Lime, Ground, Unslaked	60-65	B6-35U	L-S-B	1	.6	30A
Lime Hydrated	40	B6-35LM	H	2	.8	30A
Lime, Hydrated, Pulverized	32-40	A40-35LM	L-S	1	.6	30A
Lime, Pebble	53-56	C1/2-25HU	L-S	2	2.0	45
Limestone, Agricultural	68	B6-35	H	2	2.0	30A
Limestone, Crushed	85-90	DX-36	H	2	2.0	30B
Limestone, Dust	55-95	A40-46MY	H	2	1.6-2.0	30B
Lindane (Benzene Hexachloride)	—	—	—	—	—	—
Linseed (See Flaxseed)	—	—	—	—	—	—
Litharge (Lead Oxide)	—	—	—	—	—	—
Lithopone	45-50	A325-35MR	L-S	1	1.0	30A
Maize (See Milo)	—	—	—	—	—	—

*Consult Factory

Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Malt, Dry, Ground	20-30	B6-35NP	L-S-B	1	.5	30A
Malt, Meal	36-40	B6-25P	L-S-B	1	.4	45
Malt, Dry Whole	20-30	C1/2-35N	L-S-B	1	.5	30A
Malt, Sprouts	13-15	C1/2-35P	L-S-B	1	.4	30A
Magnesium Chloride (Magnesite)	33	C1/2-45	L-S	1	1.0	30A
Manganese Dioxide*	70-85	A100-35NRT	L-S	2	1.5	30A
Manganese Ore	125-140	DX-37	H	3	2.0	15
Manganese Oxide	120	A100-36	H	2	2.0	30B
Manganese Sulfate	70	C1/2-37	H	3	2.4	15
Marble, Crushed	80-95	B6-37	H	3	2.0	15
Marl, (Clay)	80	DX-36	H	2	1.6	30B
Meat, Ground	50-55	E-45HQTX	L-S	2	1.5	30A
Meat, Scrap (w/bone)	40	E-46H	H	2	1.5	30B
Mica, Flakes	17-22	B6-16MY	H	2	1.0	30B
Mica, Ground	13-15	B6-36	H	2	.9	30B
Mica, Pulverized	13-15	A100-36M	H	2	1.0	30B
Milk, Dried, Flake	5-6	B6-35PUY	S	1	.4	30A
Milk, Malted	27-30	A40-45PX	S	1	.9	30A
Milk, Powdered	20-45	B6-25PM	S	1	.5	45
Milk Sugar	32	A100-35PX	S	1	.6	30A
Milk, Whole, Powdered	20-36	B6-35PUX	S	1	.5	30A
Mill Scale (Steel)	120-125	E-46T	H	3	3.0	30B
Milo, Ground	32-36	B6-25	L-S-B	1	.5	45
Milo Maize (Kafir)	40-45	B6-15N	L-S-B	1	.4	45
Molybdenite Powder	107	B6-26	H	2	1.5	30B
Monosodium Phosphate	50	B6-36	H	2	.6	30B
Mortar, Wet*	150	E-46T	H	3	3.0	30B
Mustard Seed	45	B6-15N	L-S-B	1	.4	45
Naphthalene Flakes	45	B6-35	L-S-B	1	.7	30A
Niacin (Nicotinic Acid)	35	A40-35P	H	2	2.5	30A
Oats	26	C1/2-25MN	L-S-B	1	.4	45
Oats, Crimped	19-26	C1/2-35	L-S-B	1	.5	30A
Oats, Crushed	22	B6-45NY	L-S-B	1	.6	30A
Oats, Flour	35	A100-35	L-S-B	1	.5	30A
Oat Hulls	8-12	B6-35NY	L-S-B	1	.5	30A
Oats, Rolled	19-24	C1/2-35NY	L-S-B	1	.6	30A
Oleo Margarine (Margarine)	59	E-45HKPWX	L-S	2	.4	30A
Orange Peel, Dry	15	E-45	L-S	2	1.5	30A
Oxalic Acid Crystals — Ethane Diacid Crystals	60	B6-35QS	L-S	1	1.0	30A
Oyster Shells, Ground	50-60	C1/2-36T	H	3	1.6-2.0	30B
Oyster Shells, Whole	80	D3-36TV	H	3	2.1-2.5	30B
Paper Pulp (4% or less)	62	E-45	L-S	2	1.5	30A
Paper Pulp (6% to 15%)	60-62	E-45	L-S	2	1.5	30A
Paraffin Cake — 1/2"	45	C1/2-45K	L-S	1	.6	30A
Peanuts, Clean, in shell	15-20	D3-35Q	L-S	2	.6	30A
Peanut Meal	30	B6-35P	S	1	.6	30A
Peanuts, Raw, Uncleaned (unshelled)	15-20	D3-36Q	H	3	.7	30B
Peanuts, Shelled	35-45	C1/2-35Q	S	1	.4	30A
Peas, Dried	45-50	C1/2-15NQ	L-S-B	1	.5	45
Perlite — Expanded	8-12	C1/2-36	H	2	.6	30B
Phosphate Acid Fertillizer	60	B6-25T	L-S	2	1.4	45
Phosphate Disodium (See Sodium Phosphate)	—	—	—	—	—	—
Phosphate Rock, Broken	75-85	DX-36	H	2	2.1	30B
Phosphate Rock, Pulverized	60	B6-36	H	2	1.7	30B
Phosphate Sand	90-100	B6-37	H	3	2.0	15
Plaster of Paris (See Gypsum)	—	—	—	—	—	—

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Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Plumbago (See Graphite)	—	—	—	—	—	—
Polystyrene Beads	40	B6-35PQ	S	1	.4	30A
Polyvinyl, Chloride Powder	20-30	A100-45KT	S	2	1.0	30A
Polyvinyl, Chloride Pellets	20-30	E-45KPQT	S	1	.6	30A
Polyethylene, Resin Pellets	30-35	C1/2-45Q	L-S	1	.4	30A
Potash (Muriate) Dry	70	B6-37	H	3	2.0	15
Potash (Muriate) Mine Run	75	DX-37	H	3	2.2	15
Potassium Carbonate	51	B6-36	H	2	1.0	30B
Potassium Chloride Pellets	120-130	C1/2-25TU	H	3	1.6	45
Potassium Nitrate — 1/2"	76	C1/2-16NT	H	3	1.2	30B
Potassium Nitrate — 1/8"	80	B6-26NT	H	3	1.2	30B
Potassium Sulfate	42-48	B6-46X	H	2	1.0	30B
Potato Flour	48	A200-35MNP	L-S	1	.5	30A
Pumice — 1/8"	42-48	B6-46	H	3	1.6	30B
Pyrite, Pellets	120-130	C1/2-26	H	3	2.0	30B
Quartz — 100 Mesh	70-80	A100-27	H	3	1.7	15
Quartz — 1/2"	80-90	C1/2-27	H	3	2.0	15
Rice, Bran	20	B6-35NY	L-S-B	1	.4	30A
Rice, Grits	42-45	B6-35P	L-S-B	1	.4	30A
Rice, Polished	30	C1/2-15P	L-S-B	1	.4	45
Rice, Hulled	45-49	C1/2-25P	L-S-B	1	.4	45
Rice, Hulls	20-21	B6-35NY	L-S-B	1	.4	30A
Rice, Rough	32-36	C1/2-35N	L-S-B	1	.6	30A
Rosin — 1/2"	65-68	C1/2-45Q	L-S-B	1	1.5	30A
Rubber, Reclaimed Ground	23-50	C1/2-45	L-S-B	1	.8	30A
Rubber, Pelleted	50-55	D3-45	L-S-B	2	1.5	30A
Rye	42-48	B6-15N	L-S-B	1	.4	45
Rye Bran	15-20	B6-35Y	L-S-B	1	.4	45
Rye Feed	33	B6-35N	L-S-B	1	.5	30A
Rye Meal	35-40	B6-35	L-S-B	1	.5	30A
Rye Middlings	42	B6-35	L-S	1	.5	30A
Rye, Shorts	32-33	C1/2-35	L-S	2	.5	30A
Safflower, Cake	50	D3-26	H	2	.6	30B
Safflower, Meal	50	B6-35	L-S-B	1	.6	30A
Safflower Seed	45	B6-15N	L-S-B	1	.4	45
Saffron (See Safflower)	—	—	—	—	—	—
Sal Ammoniac (Ammonium Chloride)	—	—	—	—	—	—
Salt Cake, Dry Coarse	85	B6-36TU	H	3	2.1	30B
Salt Cake, Dry Pulverized	65-85	B6-36TU	H	3	1.7	30B
Salicylic Acid	29	B6-37U	H	3	.6	15
Salt, Dry Coarse	45-60	C1/2-36TU	H	3	1.0	30B
Salt, Dry Fine	70-80	B6-36TU	H	3	1.7	30B
Saltpeter — (See Potassium Nitrate)	—	—	—	—	—	—
Sand Dry Bank (Damp)	110-130	B6-47	H	3	2.8	15
Sand Dry Bank (Dry)	90-110	B6-37	H	3	1.7	15
Sand Dry Silica	90-100	B6-27	H	3	2.0	15
Sand Foundry (Shake Out)	90-100	D3-37Z	H	3	2.6	15
Sand (Resin Coated) Silica	104	B6-27	H	3	2.0	15
Sand (Resin Coated) Zircon	115	A100-27	H	3	2.3	15
Sawdust, Dry	10-13	B6-45UX	L-S-B	1	1.4	15
Sea — Coal	65	B6-36	H	2	1.0	30B
Sesame Seed	27-41	B6-26	H	2	.6	30B
Shale, Crushed	85-90	C1/2-36	H	2	2.0	30B
Shellac, Powdered or Granulated	31	B6-35P	S	1	.6	30A
Silicon Dioxide (See Quartz)	—	—	—	—	—	—
Silica, Flour	80	A40-46	H	2	1.5	30B

Table 1-2
Material Characteristics (Cont'd)

Martin

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Silica Gel + 1/2" - 3"	45	D3-37HKQU	H	3	2.0	15
Slag, Blast Furnace Crushed	130-180	D3-37Y	H	3	2.4	15
Slag, Furnace Granular, Dry	60-65	C1/2-37	H	3	2.2	15
Slate, Crushed, — 1/2"	80-90	C1/2-36	H	2	2.0	30B
Slate, Ground, — 1/8"	82-85	B6-36	H	2	1.6	30B
Sludge, Sewage, Dried	40-50	E-47TW	H	3	.8	15
Sludge, Sewage, Dry Ground	45-55	B-46S	H	2	.8	30B
Soap, Beads or Granules	15-35	B6-35Q	L-S-B	1	.6	30A
Soap, Chips	15-25	C1/2-35Q	L-S-B	1	.6	30A
Soap Detergent	15-50	B6-35FQ	L-S-B	1	.8	30A
Soap, Flakes	5-15	B6-35QXY	L-S-B	1	.6	30A
Soap, Powder	20-25	B6-25X	L-S-B	1	.9	45
Soapstone, Talc, Fine	40-50	A200-45XY	L-S-B	1	2.0	30A
Soda Ash, Heavy	55-65	B6-36	H	2	2.0	30B
Soda Ash, Light	20-35	A40-36Y	H	2	1.6	30B
Sodium Aluminate, Ground	72	B6-36	H	2	1.0	30B
Sodium Aluminum Fluoride (See Kryolite)	—	—	—	—	—	—
Sodium Aluminum Sulphate*	75	A100-36	H	2	1.0	30B
Sodium Bentonite (See Bentonite)	—	—	—	—	—	—
Sodium Bicarbonate (See Baking Soda)	—	—	—	—	—	—
Sodium Chloride (See Salt)	—	—	—	—	—	—
Sodium Carbonate (See Soda Ash)	—	—	—	—	—	—
Sodium Hydrate (See Caustic Soda)	—	—	—	—	—	—
Sodium Hydroxide (See Caustic Soda)	—	—	—	—	—	—
Sodium Borate (See Borax)	—	—	—	—	—	—
Sodium Nitrate	70-80	D3-25NS	L-S	2	1.2	30A
Sodium Phosphate	50-60	A-35	L-S	1	.9	30A
Sodium Sulfate (See Salt Cake)	—	—	—	—	—	—
Sodium Sulfite	96	B6-46X	H	2	1.5	30B
Sorghum, Seed (See Kafir or Milo)	—	—	—	—	—	—
Soybean, Cake	40-43	D3-35W	L-S-B	2	1.0	30A
Soybean, Cracked	30-40	C1/2-36NW	H	2	.5	30B
Soybean, Flake, Raw	18-25	C1/2-35Y	L-S-B	1	.8	30A
Soybean, Flour	27-30	A40-35MN	L-S-B	1	.8	30A
Soybean Meal, Cold	40	B6-35	L-S-B	1	.5	30A
Soybean Meal Hot	40	B6-35T	L-S	2	.5	30A
Soybeans, Whole	45-50	C1/2-26NW	H	2	1.0	30B
Starch	25-50	A40-15M	L-S-B	1	1.0	45
Steel Turnings, Crushed	100-150	D3-46WV	H	3	3.0	30B
Sugar Beet, Pulp, Dry	12-15	C1/2-26	H	2	.9	30B
Sugar Beet, Pulp, Wet	25-45	C1/2-35X	L-S-B	1	1.2	30A
Sugar, Refined, Granulated Dry	50-55	B6-35PU	S	1	1.0-1.2	30A
Sugar, Refined, Granulated Wet	55-65	C1/2-35X	S	1	1.4-2.0	30A
Sugar, Powdered	50-60	A100-35PX	S	1	.8	30A
Sugar, Raw	55-65	B6-35PX	S	1	1.5	30A
Sulphur, Crushed — 1/2"	50-60	C1/2-35N	L-S	1	.8	30A
Sulphur, Lumpy, — 3"	80-85	D3-35N	L-S	2	.8	30A
Sulphur, Powdered	50-60	A40-35MN	L-S	1	.6	30A
Sunflower Seed	19-38	C1/2-15	L-S-B	1	.5	45
Talcum, — 1/2"	80-90	C1/2-36	H	2	.9	30B
Talcum Powder	50-60	A200-36M	H	2	.8	30B
Tanbark, Ground*	55	B6-45	L-S-B	1	.7	30A
Timothy Seed	36	B6-35NY	L-S-B	1	.6	30A
Titanium Dioxide (See Ilmenite Ore)	—	—	—	—	—	—
Tobacco, Scraps	15-25	D3-45Y	L-S	2	.8	30A
Tobacco, Snuff	30	B6-45MQ	L-S-B	1	.9	30A

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Table 1-2
Material Characteristics (Cont'd)

Material	Weight lbs. per cu. ft	Intermediate Material Code	Bearing Selection	Component Series	Material Factor Fm	Trough Loading
Tricalcium Phosphate	40-50	A40-45	L-S	1	1.6	30A
Triple Super Phosphate	50-55	B6-36RS	H	3	2.0	30B
Trisodium Phosphate	60	C1/2-36	H	2	1.7	30B
Trisodium Phosphate Granular	60	B6-36	H	2	1.7	30B
Trisodium Phosphate, Pulverized	50	A40-36	H	2	1.6	30B
Tung Nut Meats, Crushed	28	D3-25W	L-S	2	.8	30A
Tung Nuts	25-30	D3-15	L-S	2	.7	30A
Urea Prills, Coated	43-46	B6-25	L-S-B	1	1.2	45
Vermiculite, Expanded	16	C1/2-35Y	L-S	1	.5	30A
Vermiculite, Ore	80	D3-36	H	2	1.0	30B
Vetch	48	B6-16N	L-S-B	1	.4	30B
Walnut Shells, Crushed	35-45	B6-36	H	2	1.0	30B
Wheat	45-48	C1/2-25N	L-S-B	1	.4	45
Wheat, Cracked	40-45	B6-25N	L-S-B	1	.4	45
Wheat, Germ	18-28	B6-25	L-S-B	1	.4	45
White Lead, Dry	75-100	A40-36MR	H	2	1.0	30B
Wood Chips, Screened	10-30	D3-45VY	L-S	2	.6	30A
Wood Flour	16-36	B6-35N	L-S	1	.4	30A
Wood Shavings	8-16	E-45VY	L-S	2	1.5	30A
Zinc, Concentrate Residue	75-80	B6-37	H	3	1.0	15
Zinc Oxide, Heavy	30-35	A100-45X	L-S	1	1.0	30A
Zinc Oxide, Light	10-15	A100-45XY	L-S	1	1.0	30A

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Selection of Conveyor Size and Speed

In order to determine the size and speed of a screw conveyor, it is necessary first to establish the material code number. It will be seen from what follows that this code number controls the cross-sectional loading that should be used. The various cross-sectional loadings shown in the Capacity Table (Table 1-6) are for use with the standard screw conveyor components indicated in the Component Group Selection Guide on page H-21 and are for use where the conveying operation is controlled with volumetric feeders and where the material is uniformly fed into the conveyor housing and discharged from it. Check lump size limitations before choosing conveyor diameter. See Table 1-7 on page H-18.

Capacity Table

The capacity table, (Table 1-6), gives the capacities in cubic feet per hour at one revolution per minute for various size screw conveyors for four cross-sectional loadings. Also shown are capacities in cubic feet per hour at the maximum recommended revolutions per minute.

The capacity values given in the table will be found satisfactory for most applications. Where the capacity of a screw conveyor is very critical, especially when handling a material not listed in Table 1-2, it is best to consult our engineering department.

The maximum capacity of any size screw conveyor for a wide range of materials, and various conditions of loading, may be obtained from Table 1-6 by noting the values of cubic feet per hour at maximum recommended speed.

Conveyor Speed

For screw conveyors with screws having standard pitch helical flights the conveyor speed may be calculated by the formula:

$$N= \frac{\text{Required capacity, cubic feet per hour}}{\text{Cubic feet per hour at 1 revolution per minute}}$$

$N=$ Revolutions per minute of screw
(but not greater than the maximum recommended speed.)

For the calculation of conveyor speeds where special types of screws are used, such as short pitch screws, cut flights, cut and folded flights and ribbon flights, an equivalent required capacity must be used, based on factors in the Tables 1-3, 4, 5.

Factor CF_1 relates to the pitch of the screw. Factor CF_2 relates to the type of the flight. Factor CF_3 relates to the use of mixing paddles within the flight pitches.

The equivalent capacity then is found by multiplying the required capacity by the capacity factors. See Tables 1-3, 4, 5 for capacity factors.

$$\left(\begin{array}{c} \text{Equiv. Capacity} \\ \text{Cubic Feet Per Hour} \end{array} \right) = \left(\begin{array}{c} \text{Required Capacity} \\ \text{Cubic Feet Per Hour} \end{array} \right) (CF_1)\,(CF_2)\,(CF_3)$$

Table 1-3

Special Conveyor Pitch Capacity Factor CF_1		
Pitch	**Description**	**CF_1**
Standard	Pitch = Diameter of Screw	1.00
Short	Pitch = 2/3 Diameter of Screw	1.50
Half	Pitch = 1/2 Diameter of Screw	2.00
Long	Pitch = 1 1/2 Diameter of Screw	0.67

Table 1-4

Special Conveyor Pitch Capacity Factor CF_2			
Type of Flight	**Conveyor Loading**		
	15%	**30%**	**45%**
Cut Flight	1.95	1.57	1.43
Cut & Folded Flight	N.R.*	3.75	2.54
Ribbon Flight	1.04	1.37	1.62

*Not recommended
If none of the above flight modifications are used: CF_2 = 1.0

Table 1-5

Special Conveyor Pitch Capacity Factor CF_3					
Standard Paddles at 45º Reverse Pitch	**Paddles Per Pitch**				
	None	**1**	**2**	**3**	**4**
Factor CF_3	1.00	1.08	1.16	1.24	1.32
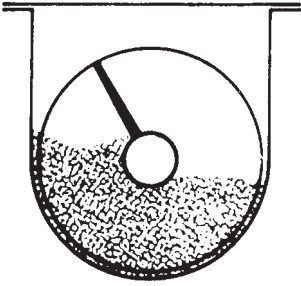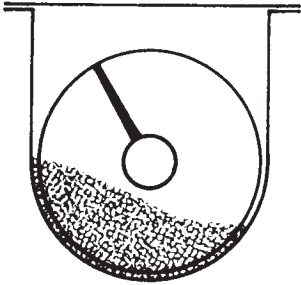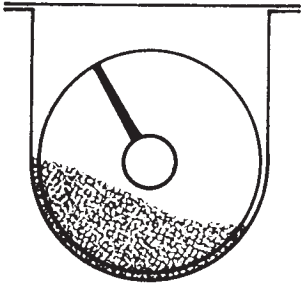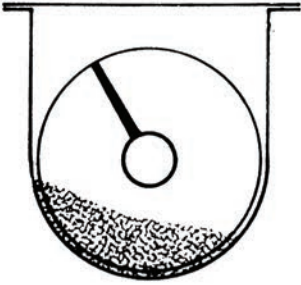
Table 1-6

Trough Loading		Screw Diameter Inch	Capacity Cubic Feet Per Hour (Full Pitch)		Max. RPM
			At One RPM	At Max. RPM	
45%		4	0.62	114	184
		6	2.23	368	165
		9	8.20	1270	155
		10	11.40	1710	150
		12	19.40	2820	145
		14	31.20	4370	140
		16	46.70	6060	130
		18	67.60	8120	120
		20	93.70	10300	110
		24	164.00	16400	100
		30	323.00	29070	90
		36	553.20	4142	75
30% A		4	0.41	53	130
		6	1.49	180	120
		9	5.45	545	100
		10	7.57	720	95
		12	12.90	1160	90
		14	20.80	1770	85
		16	31.20	2500	80
		18	45.00	3380	75
		20	62.80	4370	70
		24	109.00	7100	65
		30	216.00	12960	60
		36	368.80	18400	50
30% B		4	0.41	29	72
		6	1.49	90	60
		9	5.45	300	55
		10	7.60	418	55
		12	12.90	645	50
		14	20.80	1040	50
		16	31.20	1400	45
		18	45.00	2025	45
		20	62.80	2500	40
		24	109.00	4360	40
		30	216.00	7560	35
		36	368.80	11064	30
15%		4	0.21	15	72
		6	0.75	45	60
		9	2.72	150	55
		10	3.80	210	55
		12	6.40	325	50
		14	10.40	520	50
		16	15.60	700	45
		18	22.50	1010	45
		20	31.20	1250	40
		24	54.60	2180	40
		30	108.00	3780	35
		36	184.40	5537	30

The size of a screw conveyor not only depends on the capacity required, but also on the size and proportion of lumps in the material to be handled. The size of a lump is the maximum dimension it has. If a lump has one dimension much longer than its transverse cross-section, the long dimension or length would determine the lump size.

The character of the lump also is involved. Some materials have hard lumps that won't break up in transit through a screw conveyor. In that case, provision must be made to handle these lumps. Other materials may have lumps that are fairly hard, but degradable in transit through the screw conveyor, thus reducing the lump size to be handled. Still other materials have lumps that are easily broken in a screw conveyor and lumps of these materials impose no limitations.

Three classes of lump sizes are shown in TABLE 1-7 and as follows.

Class I

A mixture of lumps and fines in which not more than 10% are lumps ranging from maximum size to one half of the maximum; and 90% are lumps smaller than one half of the maximum size.

Class II

A mixture of lumps and fines in which not more than 25% are lumps ranging from the maximum size to one half of the maximum; and 75% are lumps smaller than one half of the maximum size.

Class III

A mixture of lumps only in which 95% or more are lumps ranging from maximum size to one half of the maximum size; and 5% or less are lumps less than one tenth of the maximum size.

Table 1-7

Maximum Lump Size Table (Inches)					
Screw Diameter	Pipe O.D.*	Radial Clearance △	Class I 10% Lumps Max. Lump	Class II 25% Lumps Max. Lump	Class III 95% Lumps Max. Lump
6	2 3/8	2 5/16	1 1/4	3/4	1/2
9	2 3/8	3 3/16	2 1/4	1 1/2	3/4
9	2 7/8	3 9/16	2 1/4	1 1/2	3/4
12	2 7/8	5 1/16	2 3/4	2	1
12	3 1/2	4 3/4	2 3/4	2	1
12	4	4 1/2	2 3/4	2	1
14	3 1/2	5 3/4	3 1/4	2 1/2	1 1/4
14	4	5 1/2	2 1/2	1 1/4	1 1/4
16	4	6 1/2	3 3/4	2 3/4	1 1/2
16	4 1/2	6 1/4	3 3/4	2 3/4	1 1/2
18	4	7 1/2	4 1/4	3	1 3/4
18	4 1/2	7 1/2	4 1/4	3	1 3/4
20	4	8 1/2	4 3/4	3 1/2	2
20	4 1/2	8 1/4	4 3/4	3 1/2	2
24	4 1/2	10 1/4	6	3 3/4	2 1/2
30	4 1/2	13 1/4	8	5	4
36	5 3/8	14 1/2	9 1/2	7 1/2	6

* For special pipe sizes, consult factory.

△ Radial clearance is the distance between the bottom of the trough and the bottom of the conveyor pipe.

EXAMPLE: Lump Size Limitations

To illustrate the selection of a conveyor size from the Maximum Lump Size Table, Table 1-7, consider crushed ice as the conveyed material. Refer to the material charts Table 1-2 and find crushed ice and its material code D3-35Q and weight of 35-45 lbs./C.F. D3 means that the lump size is 1/2" to 3", this is noted by referring to the material classification code chart on page H-5. From actual specifications regarding crushed ice it is known that crushed ice has a maximum lump size of 1 1/2" and only 25% of the lumps are 1 1/2". With this information refer to Table 1-7, Maximum Lump Size Table. Under the column Class II and 1 1/2" Max. lump size read across to the minimum screw diameter which will be 9".
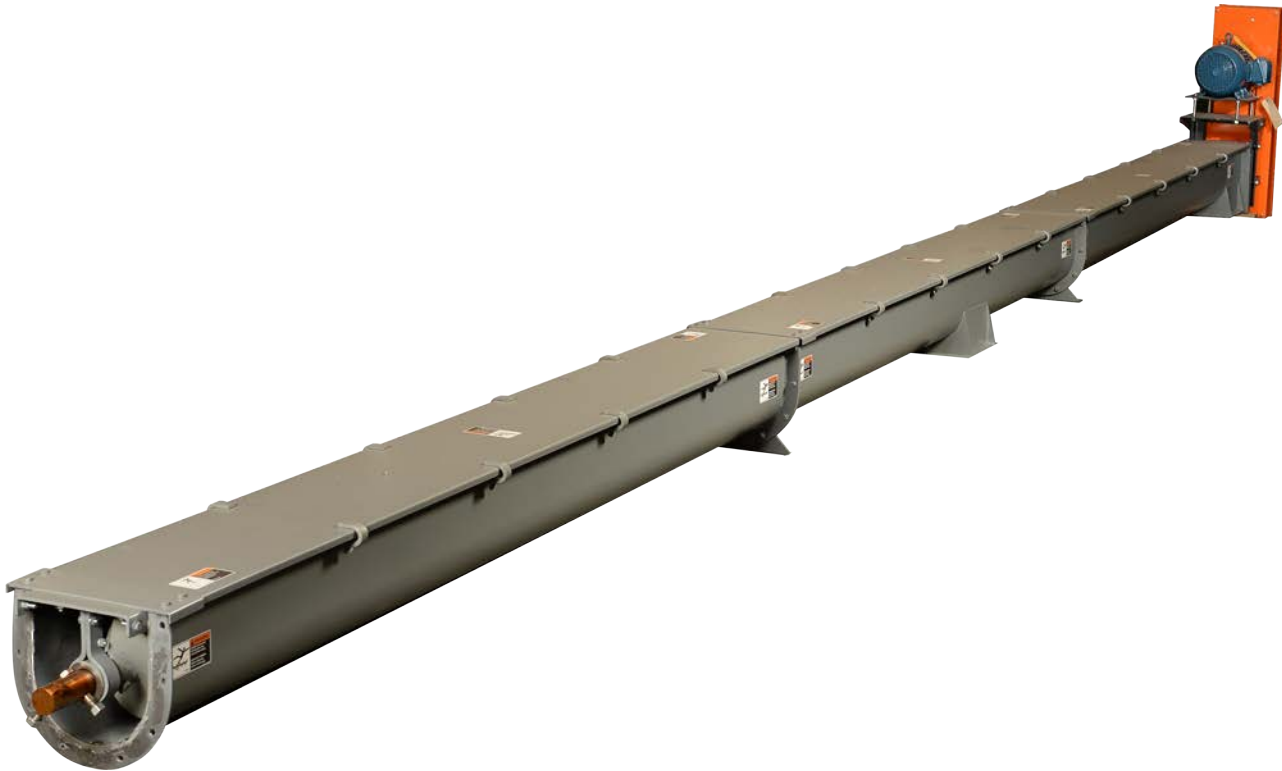
Component Groups

To facilitate the selection of proper specifications for a screw conveyor for a particular duty, screw conveyors are broken down into three component groups. These groups relate both to the material classification code and also to screw size, pipe size, type of bearings and trough thickness. This can be effectively thought of as light duty, medium duty, and heavy duty materials construction.

Referring to table 1-2, find the component series designation of the material to be conveyed.

Having made the component series selection, refer to tables 1-8, 9, 10 which give the specifications of the various sizes of conveyor screws. (The tabulated screw numbers in this table refer to standard specifications for screws found on pages h-77 – H-85 component section.) These standards give complete data on the screws such as the length of standard sections, minimum edge thickness of screw flight, bushing data, bolt size, bolt spacing, etc.

EXAMPLE: For a screw conveyor to handle brewers grain, spent wet, refer to the material characteristics table 1-2. Note that the component series column refers to series 2. Refer now to page H-21, component selection, table 1-9, component group 2. The standard shaft sizes, screw flight designations, trough gauges and cover gauges are listed for each screw diameter.

Table 1-8

Screw Diameter Inches	Coupling Diameter Inches	Screw Number		Thickness, U.S. Standard Gauge or Inches	
		Component Group 1			
		Helicoid Flights	Sectional Flights	Trough	Cover
6	1 1/2	6H304	6S307	16Ga.	16Ga.
9	1 1/2	9H306	9S307	14Ga.	14Ga.
9	2	9H406	9S409	14Ga.	14Ga.
12	2	12H408	12S409	12Ga.	14Ga.
12	2 7/16	12H508	12S509	12Ga.	14Ga.
14	2 7/16	14H508	14S509	12Ga.	14Ga.
16	3	16H610	16S612	12Ga.	14Ga.
18	3	—	18S612	10Ga.	12Ga.
20	3	—	20S612	10Ga.	12Ga.
24	3 7/16	—	24S712	10Ga.	12Ga.
30	3 15/16	—	30S816	3/16"	10Ga.
36	4 7/16	—	36S916	1/4"	10Ga.

Table 1-9

Screw Diameter Inches	Coupling Diameter Inches	Screw Number		Thickness, U.S. Standard Gauge or Inches	
		Component Group 2			
		Helicoid Flights	Sectional Flights	Trough	Cover
6	1 1/2	6H308	6S309	14Ga.	16Ga.
9	1 1/2	9H312	9S309	10Ga.	14Ga.
9	2	9H412	9S412	10Ga.	14Ga.
12	2	12H412	12S412	3/16"	14Ga.
12	2 7/16	12H512	12S512	3/16"	14Ga.
12	3	12H614	12S616	3/16"	14Ga.
14	2 7/16	—	14S512	3/16"	14Ga.
14	3	14H614	14S616	3/16"	14Ga.
16	3	16H614	16S616	3/16"	14Ga.
18	3	—	18S616	3/16"	12Ga.
20	3	—	20S616	3/16"	12Ga.
24	3 7/16	—	24S716	3/16"	12Ga.
30	3 15/16	—	30S824	1/4"	10Ga.
36	4 7/16	—	36S924	3/8"	3/16"

Table 1-10

Screw Diameter Inches	Coupling Diameter Inches	Screw Number		Thickness, U.S. Standard Gauge or Inches	
		Component Group 3			
		Helicoid Flights	Sectional Flights	Trough	Cover
6	1 1/2	6H312	6S312	10Ga.	16Ga.
9	1 1/2	9H312	9S312	3/16"	14Ga.
9	2	9H414	9S416	3/16"	14Ga.
12	2	12H412	12S412	1/4"	14Ga.
12	2 7/16	12H512	12S512	1/4"	14Ga.
12	3	12H614	12S616	1/4"	14Ga.
14	3	—	14S624	1/4"	14Ga.
16	3	—	16S624	1/4"	14Ga.
18	3	—	18S624	1/4"	12Ga.
20	3	—	20S624	1/4"	12Ga.
24	3 7/16	—	24S724	1/4"	12Ga.
30	3 15/16	—	30S832	3/8"	10Ga.
36	4 7/16	—	36S932	3/8"	3/16"

Bearing Selection

The selection of bearing material for intermediate hangers is based on experience together with a knowledge of the characteristics of the material to be conveyed. By referring to the material characteristic tables, page H-7 thru H-15 the intermediate hanger bearing selection can be made by viewing the Bearing Selection column. The bearing selection will be made from one of the following types: B, L, S, H. The various bearing types available in the above categories can be selected from the following table.

Table 1-11

Hanger Bearing Selection				
Bearing Component Groups	Bearing Types	Recommended Coupling Shaft Material △	Max. Recommended Operating Temperature	F_b
B	Ball	Standard	180°F	1.0
L	Bronze	Standard	300°F	
S	Martin Bronze*	Standard	450°F	2.0
	Graphite Bronze	Standard	500°F	
	Oil Impregnated Bronze	Standard	200°F	
	Oil Impregnated Wood	Standard	160°F	
	Nylatron	Standard	250°F	
	Nylon	Standard	160°F	
	Teflon	Standard	250°F	
	UHMW	Standard	225°F	
	Melamine (MCB)	Standard	250°F	
	Ertalyte® Quadrent	Standard	200°F	
	Urethane	Standard	200°F	
H	Martin Hard Iron*	Hardened	500°F	3.4
	Hard Iron	Hardened	500°F	
	Hard Surfaced	Hardened or Special	500°F	
	Stellite	Special	500°F	4.4
	Ceramic	Special	1,000°F	
	White Iron Alloy	Special	500°F	

* Sintered Metal. Self-lubricating.
△ OTHER TYPES OF COUPLING SHAFT MATERIALS
Various alloys, stainless steel, and other types of shafting can be furnished as required.

Horizontal Screw Conveyors
*Consult Factory for Inclined Conveyors or Screw Feeders

The horsepower required to operate a horizontal screw conveyor is based on proper installation, uniform and regular feed rate to the conveyor and other design criteria as determined in this book.

The horsepower requirement is the total of the horsepower to overcome friction (HP_f) and the horsepower to transport the material at the specified rate (HP_m) multiplied by the overload factor F_o and divided by the total drive efficiency, or:

$$HP_f = \frac{L \, N \, F_d f_b}{1,000,000} = \text{(Horsepower to run an empty conveyor)}$$

$$HP_m = \frac{C \, L \, W \, F_f F_m \, F_p}{1,000,000} = \text{(Horsepower to move the material)}$$

$$\text{Total HP} = \frac{(HP_f + HP_m) \, F_o}{e}$$

The following factors determine the horsepower requirement of a screw conveyor operating under the foregoing conditions.

L   = Total length of conveyor, feet
N   = Operating speed, RPM (revolutions per minute)
F_d = Conveyor diameter factor (See Table 1-12)
F_b = Hanger bearing factor (See Table 1-13)
C   = Capacity in cubic feet per hour
W   = Weight of material, lbs. per cubic foot
F_f = Flight factor (See Table 1-14)
F_m = Material factor (See Table 1-2)
F_p = Paddle factor, when required. (See Table 1-15)
F_o = Overload factor (See Table 1-16)
e   = Drive efficiency (See Table 1-17)

Table 1-12

Conveyor Diameter Factor, F_d	
Screw Diameter (Inches)	Factor F_d
4	12.0
6	18.0
9	31.0
10	37.0
12	55.0
14	78.0
16	106.0
18	135.0
20	165.0
24	235.0
30	365.0
36	540.0

Table 1-13

Hanger Bearing Selection		
	Bearing Types	Hanger Bearing F_b
B	Ball	1.0
L	Martin Bronze	2.0
S	* Graphite Bronze	
	* Oil Impregnated Bronze	
	* Oil Impregnated Wood	
	* Nylatron	
	* Nylon	2.0
	* Teflon	
	* UHMW	
	* Melamine (MCB)	
	* Ertalyte® Quadrent	
	* Urethane	
H	* Martin Hard Iron*	3.4
	* Hard Iron	4.4
	* Stellite	
	* Ceramic	
	* White Iron Alloy	

* Non lubricated bearings, or bearings not additionally lubricated.

Horsepower Factor Tables

Table 1-14

Flight Type	F_f Factor for Percent Conveyor Loading			
	15%	**30%**	**45%**	**95%**
Standard	1.0	1.0	1.0	1.0
Cut Flight	1.10	1.15	1.20	1.3
Cut & Folded Flight	N.R.*	1.50	1.70	2.20
Ribbon Flight	1.05	1.14	1.20	—

*Not Recommended

Table 1-15

Paddle Factor F_p

Standard Paddles per Pitch, Paddles Set at 45º Reverse Pitch

Number of Paddles per Pitch	0	1	2	3	4
Paddle Factor – F_p	1.0	1.29	1.58	1.87	2.16

Table 1-16

F_O – Overload Factor

Horsepower $HP_f + HP_m$
For values of $HP_f + HP_m$ greater than 5.2, F_O is 1.0
Trace the value of ($HP_f + HP_m$) vertically to the diagonal line, then across to the left where the F_O value is listed.
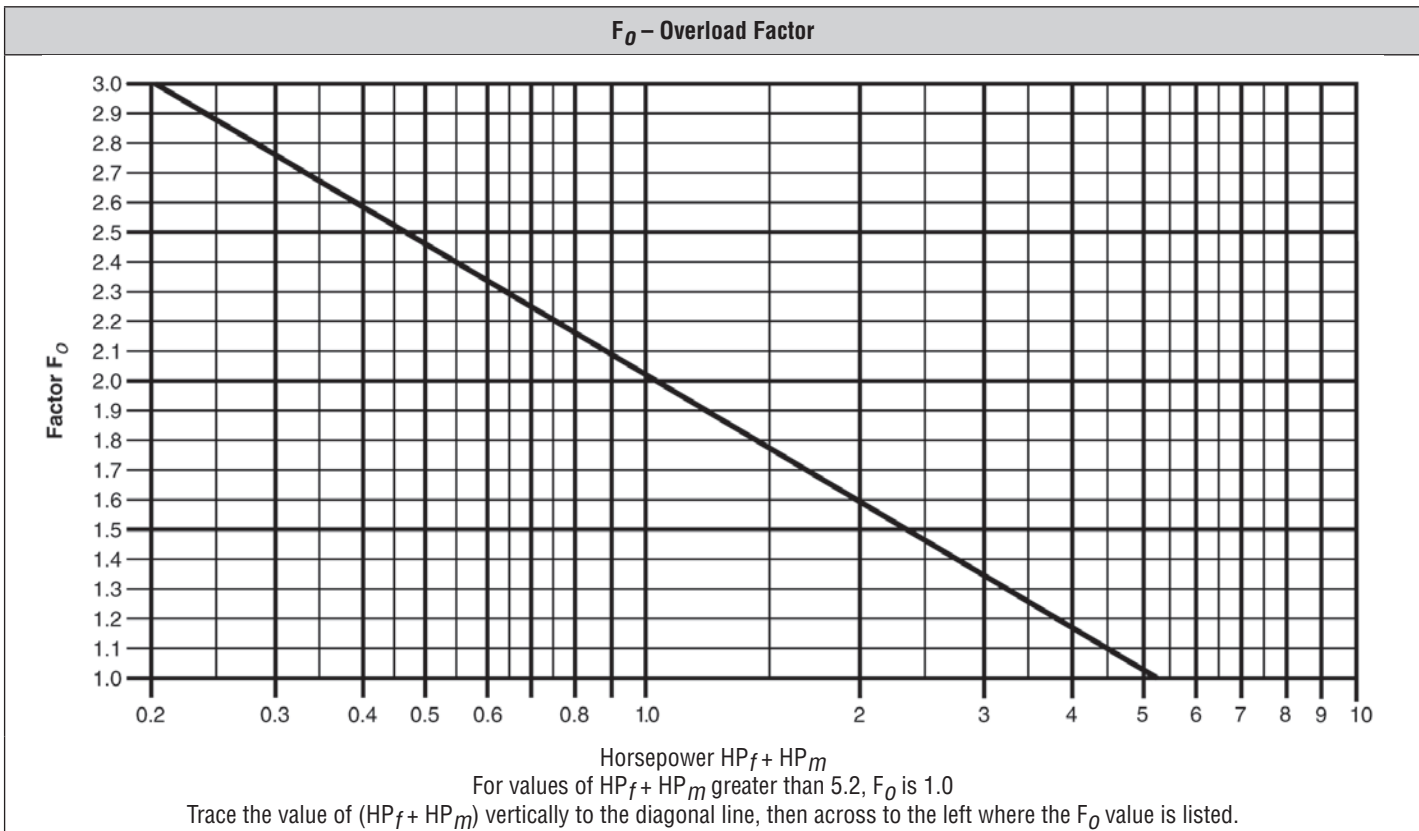
Table 1-17

e Drive Efficiency Factor

Screw Drive or Shaft Mount w/V-Belt Drive	V-Belt to Helical Gear and Coupling	Gearmotor w/ Coupling	Gearmotor w/ Chain Drive	Worm Gear
.88	.87	.95	.87	Consult Manufacturer

EXAMPLE: Horsepower Calculation (See page H-182 for sample worksheet)

PROBLEM: Convey 1,000 cubic feet per hour Brewers grain, spent wet, in a 25'-0" long conveyor driven by a screw conveyor drive with V-belts.

SOLUTION:

1. Refer to material characteristic table 1-2 for Brewers grain, spent wet and find:

    A. wt/cf: 55 - 60

    B. Material code: C1/2 - 45T

    Refer to Table 1-1, material classification code chart where:

    C1/2 =   Fine 1/2" and under

    4 =   Sluggish

    5 =   Mildly abrasive

    T =   Mildly corrosive

    C. Intermediate bearing selection: L or S

    Refer to Table 1-11 Bearing Selection, Find:

    L =   Bronze

    S =   Nylatron, Nylon, Teflon, UHMW Melamine, Graphite Bronze, Oil-impreg. Bronze, and oil-impreg. wood and Urethane.

    D. Material Factor: F_m = .8

    E. Trough Loading: 30%A

    Refer to Table 1-6 capacity table and find 30%A which shows the various capacities per RPM of the standard size screw conveyors and the maximum RPM's for those sizes.

2. From Table 1-6, Capacity table under 30%A note that a 12" screw will convey 1,160 cubic feet per hour at 90 RPM maximum, therefore at 1 RPM a 12" screw will convey 12.9 cubic feet. For 1,000 CFH capacity at 12.9 CFH per RPM, the conveyor must therefore run 78RPM (1000 ÷ 12.9 = 77.52).

3. With the above information and factors from Tables 1-12 through 1-17 refer to the horsepower formulas on H-24 and calculate the required horsepower to convey 1000 CF/H for 25 feet in a 12" conveyor.

    Using the known factors find that:

L = 25'	C = 1000 CFH
N = 78 RPM from step 2 above	W = 60#/CF from step 1A
Fd = 55 see Table 1-12, for 12"	Ff = 1 see Table 1-14, standard 30%
Fb = 2.0 see Table 1-13 for L	Fp = 1 see Table 1-15
e = .88 see Table 1-17	

4. Solve the following horsepower equations:

    A. $HP_f = \dfrac{L \, N \, F_d \, F_b}{1{,}000{,}000} = \dfrac{25 \times 78 \times 55 \times 2.0}{1{,}000{,}000} = 0.215$

    B. $HP_m = \dfrac{C \, L \, W \, F_f \, F_m \, F_p}{1{,}000{,}000} = \dfrac{1000 \times 25 \times 60 \times 1 \times .8 \times 1}{1{,}000{,}000} = 1.2$

    Find the F_o factor from 1-16; by adding HP_f and HP_m and matching this sum to the values on the chart.

    C. $HP_f = \dfrac{(HP_f + HP_m)\,(F_o)}{e} = \dfrac{(1.414)\,(1.9)}{.88} = 3.05$

SOLUTION: 3.05 Horsepower is required to convey 1,000 CFH Brewers grain, spent wet in a 12" conveyor for 25 feet. A 5 H.P. motor should be used.

Torsional Ratings of Conveyor Screw Parts

Screw conveyors are limited in overall design by the amount of torque that can be safely transmitted through the pipes, couplings, and coupling bolts.

The table below combines the various torsional ratings of bolts, couplings and pipes so that it is easy to compare the torsional ratings of all the stressed parts of standard conveyor screws.

Table 1-18

Shaft Dia. In.	Pipe		Couplings		Dia. In.	Bolts in Shear In. Lbs. ▲		Bolts in Bearing In. Lbs.	
	Size In.	Torque In. Lbs.	Torque In. Lbs. *			No. of Bolts Used		No. of Bolts Used	
			C 1018	C 1045		2	3	2	3
1	1 1/4	3,140	820	1,025	3/8	1,380	2,070	1,970	2,955
1 1/2	2	7,500	3,070	3,850	1/2	3,660	5,490	5,000	7,500
2	2 1/2	14,250	7,600	9,500	5/8	7,600	11,400	7,860	11,790
2 7/16	3	23,100	15,030	18,780	5/8	9,270	13,900	11,640	17,460
3	3 1/2	32,100	28,350	35,440	3/4	16,400	24,600	15,540	23,310
3	4	43,000	28,350	35,440	3/4	16,400	24,600	25,000	37,500
3 7/16	4	43,300	42,470	53,080	7/8	25,600	38,400	21,800	32,700
3 15/16	5	65,100	61,190	76,485	1 1/8	48,540	72,810	52,120	78,180
4 7/16	6	101,160	88,212	110,265	1 1/4	67,520	101,280	90,750	136,125

▲ Values shown are for A307 64, Grade 2 Bolts. Values for Grade 5 Bolts are above × 2.5.
 * Values are for unheattreated shafts.

The lowest torsional rating figure for any given component will be the one that governs how much torque may be safely transmitted. For example, using standard unhardened two bolt coupling shafts, the limiting torsional strength of each part is indicated in Table 1-18.

Thus it can be seen that the shaft itself is the limiting factor on 1", 1 1/2" and 2" couplings. The bolts in shear are the limiting factors on the 2-7/16" coupling and on the 3" coupling used in conjunction with 4" pipe. The bolts in bearing are the limiting factors for the 3" coupling used in conjunction with 3 1/2" pipe, and for the 3-7/16" coupling.

FORMULA: Horsepower To Torque (In. Lbs.)

$$\frac{63,025 \times HP}{RPM} = \text{Torque (In. Lbs.)}$$

EXAMPLE: 12" Screw, 78 RPM, 5 Horsepower

$$\frac{63,025 \times 5}{78} = 4,040 \text{ In. Lbs.}$$

From the table above 2" shafts with 2 bolt drilling and 2 1/2" std. pipe are adequate (4,040 < 7600).

If the torque is greater than the values in the above table, such as in 2" couplings (torque > 7600), then hardened shafts can be used as long as the torque is less than the value for hardened couplings (torque < 9500). If the torque is greater than the 2 bolt in shear value but less than the 3 bolt in shear value then 3 bolt coupling can be used. The same applies with bolts in bearing. When the transmitted torque is greater than the pipe size value, then larger pipe or heavier wall pipe may be used. Other solutions include: high torque bolts to increase bolt in shear rating, external collars, or bolt pads welded to pipe to increase bolt in bearing transmission. For solutions other than those outlined in the above table please consult our Engineering Department.

Screw conveyors are limited in overall design by the amount of horsepower that can be safely transmitted through the pipes, couplings, and coupling bolts.

The table below combines the various horsepower ratings of bolts, couplings and pipes so that it is easy to compare the ratings of all the stressed parts of standard conveyor screws.

Table 1-19

Coupling	Pipe		Coupling		Bolts				
			H.P. per R.P.M			Bolts in Shear H.P. per R.P.M. ▲		Bolts in Bearing H.P. per R.P.M.	
Shaft Dia. In.	Size In.	H.P. per R.P.M.	CEMA Std (C-1018)	Martin Std. (C-1045)	Bolt Dia. In.	No. of Bolts Used		No. of Bolts Used	
						2	3	2	3
1	1 1/4	.049	.013	.016	3/8	.021	.032	.031	.046
1 1/2	2	.119	.048	.058	1/2	.058	.087	.079	.119
2	2 1/2	.226	.120	.146	5/8	.120	.180	.124	.187
2 7/16	3	.366	.239	.289	5/8	.147	.220	.184	.277
3	3 1/2	.509	.450	.546	3/4	.260	.390	.246	.369
3	4	.682	.450	.546	3/4	.260	.390	.396	.595
3 7/16	4	.682	.675	.818	7/8	.406	.609	.345	.518

▲ Values shown are for A307 64, Grade 2 Bolts.

The lowest horsepower rating figure for any given component will be the one that governs how much horsepower may be safely transmitted. The limiting strength of each part is indicated by the underlined figures in the table above.

FORMULA: Horsepower To Horsepower @ 1 RPM)

EXAMPLE: 12" Screw, 78 RPM, 5 Horsepower
$$\frac{5\ HP}{78\ RPM} = 0.06\ HP\ at\ 1\ RPM$$

From the table above .038 is less than the lowest limiting factor for 2" couplings, so 2" standard couplings with 2 bolts may be used. Solutions to limitations are the same as shown on H-26.

Screw Conveyor End Thrust Thermal Expansion

End thrust in a Screw Conveyor is created as a reaction to the forces required to move the material along the axis of the conveyor trough. Such a force is opposite in direction to the flow of material. A thrust bearing and sometimes reinforcement of the conveyor trough is required to resist thrust forces. Best performance can be expected if the conveyor end thrust bearing is placed so that the rotating members are in tension; therefore, an end thrust bearing should be placed at the discharge end of a conveyor. Placing an end thrust bearing assembly at the feed end of a conveyor places rotating members in compression which may have undesirable effects, but this is sometimes necessary in locating equipment.

There are several methods of absorbing thrust forces, the most popular methods are:

1. Thrust washer assembly — installed on the shaft between the pipe end and the trough end plate, or on the outside of the end bearing.
2. Type "E" end thrust assembly, which is a Double Roller Bearing and shaft assembly.
3. Screw Conveyor Drive Unit, equipped with double roller bearing thrust bearings, to carry both thrust and radial loads.

Past experience has established that component selection to withstand end thrust is rarely a critical factor and thrust is not normally calculated for design purposes. Standard conveyor thrust components will absorb thrust without resorting to special design in most applications.

Expansion of Screw Conveyors Handling Hot Materials

Screw conveyors often are employed to convey hot materials. It is therefore necessary to recognize that the conveyor will increase in length as the temperature of the trough and screw increases when the hot material begins to be conveyed.

The recommended general practice is to provide supports for the trough which will allow movement of the trough end feet during the trough expansion, and during the subsequent contraction when handling of the hot material ceases. The drive end of the conveyor usually is fixed, allowing the remainder of the trough to expand or contract. In the event there are intermediate inlets or discharge spouts that cannot move, the expansion type troughs are required.

Furthermore, the conveyor screw may expand or contract in length at different rates than the trough. Therefore, expansion hangers are generally recommended. The trough end opposite the drive should incorporate an expansion type ball or roller bearing or sleeve bearing which will safely provide sufficient movement.

The change in screw conveyor length may be determined from the following formula:

$$\Delta L = L (t_1 - t_2) C$$

Where: ΔL = increment of change in length, inch
   L = overall conveyor length in inches
   t_1 = upper limit of temperature, degrees Fahrenheit
   t_2 = limit of temperature, degrees Fahrenheit (or lowest ambient temperature expected)
   C = coefficient of linear expansion, inches per inch per degree Fahrenheit. This coefficient has the following   values for various metals:
   a)   Hot rolled carbon steel, 6.5×10^{-6}, (.0000065)
   b)   Stainless steel, 9.9×10^{-6}, (.0000099)
   c)   Aluminum, 12.8×10^{-6}, (.0000128)

EXAMPLE: A carbon steel screw conveyor 30 feet overall length is subject to a rise in temperature of 200°F, reaching a hot metal temperature of 260°F from an original metal temperature of 60°F.

   $t_1 = 260$ $t_1 - t_2 = 200$
   $t_2 = 60$
   $L = (30)(12) = 360$
   $\Delta L = (360)(200)(6.5 \times 10^{-6})$
      = 0.468 inches, or about 15/32 inches.

When using conveyor screws of standard length, deflection is seldom a problem. However, if longer than standard sections of screw are to be used, without intermediate hanger bearings, care should be taken to prevent the screw flights from contacting the trough because of excessive deflection. The deflection at mid span may be calculated from the following formula.

$$D = \frac{5WL^3}{384 (29,000,000) (I)}$$

Where:
D = Deflection at mid span in inches
W = Total screw weight in pounds, see pages H-79 to H-84
L = Screw length in inches
I   = Movement of inertia of pipe or shaft, see table 1-20 or 1-21 below

Table 1-20

Schedule 40 Pipe									
Pipe Size	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"
I	.666	1.53	3.02	4.79	7.23	15.2	28.1	72.5	161

Table 1-21

Schedule 80 Pipe									
Pipe Size	2"	2 1/2"	3"	3 1/2"	4"	5"	6"	8"	10"
I	.868	1.92	3.89	6.28	9.61	20.7	40.5	106	212

EXAMPLE: Determine the deflection of a 12H512 screw conveyor section mounted on 3" sch 40 pipe, overall length is 16"-0'.

W = 272#
L = 192"
I = 3.02 (From chart above

$$D = \frac{5(272\#)(192^3)}{384 (29,000,000) (3.02)} = .29 \text{ inches}$$

Applications where the calculated deflection of the screw exceeds .25 inches (1/4") should be referred to our Engineering Department for recommendations. Very often the problem of deflection can be solved by using a conveyor screw section with a larger diameter pipe or a heavier wall pipe. Usually, larger pipe sizes tend to reduce deflection more effectively than heavier wall pipe.

Conveyor
Screw Deflection

Martin

Length of Unsupported Span — Feet	Dummy Scale	Deflection Inches	Total Wt. Pounds sch 40	Pipe Size	I

Length of Unsupported Span — Feet:
30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8

Deflection Inches:
10.0, 8, 6, 4, 3, 2, 1.0, .6, .4, .3, .2, .1, .06, .02, .01

Total Wt. Pounds sch 40:
4000, 3500, 3000, 2500, 2000, 1500, 1000, 900, 800, 700, 600, 500, 400, 300, 250, 200

Pipe Size:
2", 2½", 3", 3½", 4", 5", 6"

I:
0.67, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10, 12, 15, 20, 25, 30

I = Moment of inertia of pipe or shaft, see Table 1-20 or 1-21

The above Nomograph can be used for a quick reference to check deflection of most conveyors.

Inclined Screw Conveyors

Inclined screw conveyors have a greater horsepower requirement and a lower capacity rating than horizontal conveyors. The amounts of horsepower increase and capacity loss depend upon the angle of incline and the characteristics of the material conveyed.

Inclined conveyors operate most efficiently when they are of tubular or shrouded cover design, and a minimum number of intermediate hanger bearings. Where possible, they should be operated at relatively high speeds to help prevent fallback of the conveyed material.

Consult our Engineering Department for design recommendations and horsepower requirements for your particular application.
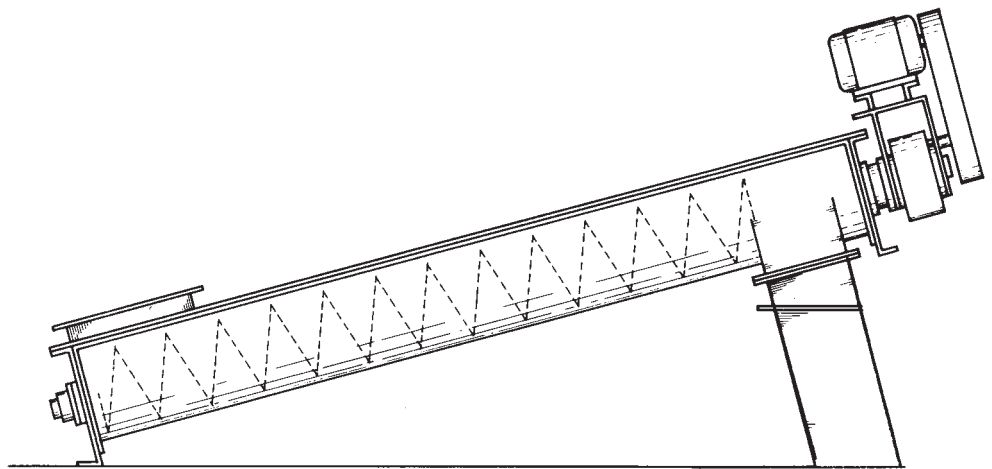
Vertical Screw Conveyors

Vertical screw conveyors provide an efficient method of elevating most materials that can be conveyed in horizontal screw conveyors. Since vertical conveyors must be uniformly loaded in order to prevent choking, they are usually designed with integral feeders.

As with horizontal conveyors, vertical screw conveyors are available with many special features and accessories, including components of stainless steel or other alloys.

Consult our Engineering Department for design recommendations and horsepower requirements for your particular application.

SEE VERTICAL SCREW CONVEYOR SECTION OF CATALOG FOR ADDITIONAL INFORMATION.
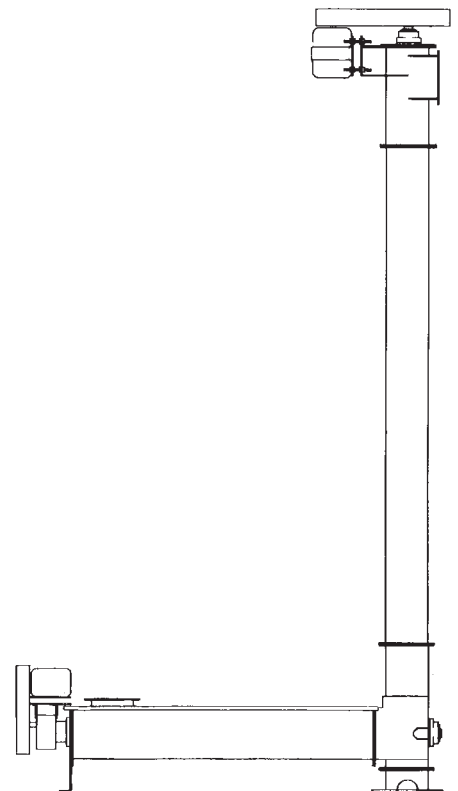
Screw
Feeders

Screw Feeders are designed to regulate the rate of material flow from a hopper or bin. The inlet is usually flooded with material (95% loaded). One or more tapered or variable pitch screws convey the material at the required rate. Screw feeders are regularly provided with shrouded or curved cover plates for a short distance beyond the end of the inlet opening, to obtain feed regulation. As the pitch or diameter increases beyond the shroud the level of the material in the conveyor drops to normal loading levels. Longer shrouds, extra short pitch screws and other modifications are occasionally required to reduce flushing of very free flowing material along the feeder screw.

Feeders are made in two general types: Type 1 with regular pitch flighting and Type 2 with short pitch flighting. Both types are also available with uniform diameter and tapering diameter screws. The various combinations are shown on pages H-33 – H-34. Screw feeders with uniform screws, Types 1B, 1D, 2B, 2D are regularly used for handling fine free flowing materials. Since the diameter of the screw is uniform, the feed of the material will be from the forepart of the inlet and not across the entire length. Where hoppers, bins, tanks, etc. are to be completely emptied, or dead areas of material over the inlet are not objectionable, this type of feeder is entirely satisfactory, as well as economical. Screw feeders with tapering diameter screws will readily handle materials containing a fair percentage of lumps. In addition, they are used extensively where it is necessary or desirable to draw the material uniformly across the entire length of the inlet opening to eliminate inert or dead areas of material at the forepart of the opening. Types 1A, 1C, 2A, and 2C fall into this category. Variable pitch screws can be used in place of tapering diameter screws for some applications. They consist of screws with succeeding sectional flights increasing progressively in pitch. The portion of the screw with the smaller pitch is located under the inlet opening.

Screw feeders with extended screw conveyors are necessary when intermediate hangers are required, or when it is necessary to convey the material for some distance. A screw conveyor of larger diameter than the feeder screw is combined with the feeder to make the extension. See types 1C, 1D, 2C, 2D.

Multiple screw feeders are usually in flat bottom bins for discharging material which have a tendency to pack or bridge under pressure. Frequently, the entire bin bottom is provided with these feeders which convey the material to collecting conveyors. Such arrangements are commonly used for handling hogged fuel, wood shavings, etc.

Screw feeders are available in a variety of types to suit specific materials and applications. We recommend that you contact our Engineering Department for design information.

Typical Type 1

Feeder Type	Inlet Opening	Material Removal	Pitch	Feeder Screw Diameter	Extended Screw
SF1A	Standard	Uniform Full Length of Inlet Opening	Standard	Tapered	None
SF1B	Standard	Forepart Only of Inlet Opening	Standard	Uniform	None
SF1C	Standard	Uniform Full Length of Inlet Opening	Standard	Tapered	As Required
SF1D	Standard	Forepart Only of Inlet Opening	Standard	Uniform	As Required

SF1A	
SF1B	
SF1C	
SF1D	

Feeder Diameter A	Maximum Lump Size	Maximum Speed RPM	Capacity Cubic Feet per Hour		B*	C	D	E	Extended Screw Diameter F		
			At One RPM	At Maximum RPM					Trough Loading %		
									15	30	45
6	3/4"	70	4.8	336	36	12	7	14	12	9	9
9	1 1/2"	65	17	1105	42	18	9	18	18	14	12
12	2"	60	44	2640	48	24	10	22	24	18	16
14	2 1/2"	55	68	3740	54	28	11	24		20	18
16	3"	50	104	5200	56	32	11 1/2	28		24	20
18	3"	45	150	6750	58	36	12 1/8	31			24
20	3 1/2"	40	208	8320	60	40	13 1/2	34			
24	4"	30	340	10200	64	48	16 1/2	40			

* Consult factory if inlet exceeds these lengths.

Screw Feeders

(For Inclined Applications Consult Factory)

Martin

Typical Type 2

Feeder Type	Inlet Opening	Material Removal	Pitch	Feeder Screw Diameter	Extended Screw
SF2A	Long	Uniform Full Length of Inlet Opening	Short (2/3)	Tapered	None
SF2B	Long	Forepart Only of Inlet Opening	Short (2/3)	Uniform	None
SF2C	Long	Uniform Full Length of Inlet Opening	Short (2/3)	Tapered	As Required
SF2D	Long	Forepart Only of Inlet Opening	Short (2/3)	Uniform	As Required

Feeder Diameter A	Maximum Lump Size	Maximum Speed RPM	Capacity Cubic Feet per Hour		B*	C	D	E	Extended Screw Diameter F		
			At One RPM	At Maximum RPM					Trough Loading %		
									15	30	45
6	1/2"	70	3.1	217	60	18	7	14	10	9	9
9	3/4"	65	11	715	66	27	9	18	14	12	10
12	1"	60	29	1740	72	36	10	22	20	16	14
14	1 1/4"	55	44	2420	76	42	11	24	24	18	16
16	1 1/2"	50	68	3400	78	48	11 1/2	28	20	18	20
18	1 3/4"	45	99	4455	80	54	12 1/8	31	24	20	24
20	2"	40	137	5480	82	60	13 1/2	34	24		
24	2 1/2"	30	224	6720	86	72	16 1/2	40			

Classes of Enclosures

Conveyors can be designed to protect the material being handled from a hazardous surrounding or to protect the surroundings from a hazardous material being conveyed.

This section establishes recommended classes of construction for conveyor enclosures — without regard to their end use or application. These several classes call for specific things to be done to a standard conveyor housing to provide several degrees of enclosure protection.

Enclosure Classifications

Class IE — Class IE enclosures are those provided primarily for the protection of operating personnel or equipment, or where the enclosure forms an integral or functional part of the conveyor or structure. They are generally used where dust control is not a factor or where protection for, or against, the material being handled is not necessary — although as conveyor enclosures a certain amount or protection is afforded.

Class IIE — Class IIE enclosures employ constructions which provide some measure of protection against dust or for, or against, the material being handled.

Class IIIE — Class IIIE enclosures employ constructions which provide a higher degree of protection in these classes against dust, and for or against the material being handled.

Class IVE — Class IVE enclosures are for outdoor applications and under normal circumstances provide for the exclusion of water from the inside of the casing. They are not to be construed as being water-tight, as this may not always be the case.

When more than one method of fabrication is shown, either is acceptable.

Enclosures

Enclosure Construction				
Component Classification	**Enclosure Classifications**			
	I E	**II E**	**III E**	**IV E**
A. TROUGH CONSTRUCTION				
Formed & Angle Top Flange				
1. Plate type end flange				
a. Continuous arc weld	X	X	X	X
b. Continuous arc weld on top of end flange and trough top rail	X	X	X	X
2. Trough Top Rail Angles (Angle Top trough only)				
a. Staggered intermittent arc and spot weld	X			
b. Continuous arc weld on top leg of angle on inside of trough and intermittent arc weld on lower leg of angle to outside of trough		X	X	X
c. Staggered intermittent arc weld on top leg of angle on inside of trough and intermittent arc weld on lower leg of angle to outside of trough, or spot weld when mastic is used between leg of angle and trough sheet		X	X	X
B. COVER CONSTRUCTION				
1. Plain flat				
a. Only butted when hanger is at cover joint	X			
b. Lapped when hanger is not at cover joint	X			
2. Semi-Flanged				
a. Only butted when hanger is at cover joint	X	X	X	X
b. Lapped when hanger is not at cover joint	X			
c. With buttstrap when hanger is not at cover joint		X	X	X
3. Flanged				
a. Only butted when hanger is at cover joint		X	X	X
b. Buttstrap when hanger is not at cover joint		X	X	X
4. Hip Roof				
a. Ends with a buttstrap connection				X
C. COVER FASTENERS FOR STANDARD GA. COVERS				
1. Spring, screw or toggle clamp fasteners or bolted construction				
a. Max. spacing plain flat covers	60"			
b. Max. spacing semi-flanged covers	60"	30"	18"	18"
c. Max. spacing flanged and hip-roof covers		40"	24"	24"
D. GASKETS				
1. Covers				
a. Red rubber or felt up to 230° F		X	X	
b. Neoprene rubber, when contamination is a problem		X	X	
c. Closed cell foam type elastic material to suit temperature rating of gasket		X	X	X
2. Trough End flanges				
a. Mastic type compounds		X	X	X
b. Red rubber up to 230° F		X	X	X
c. Neoprene rubber, when contamination is a problem		X	X	
d. Closed cell foam type elastic material to suit temperature rating of gasket		X	X	X
E. TROUGH END SHAFT SEALS*				
1. When handling non-abrasive materials			X	X
2. When handling abrasive materials	X	X	X	X

*NOTES:
- Lip type seals for non-abrasive materials
- Felt type for mildly abrasive materials
- Waste type for highly abrasive materials
- Waste type for moderately abrasive
- Air-Purged Martin Super Pack for extremely abrasive
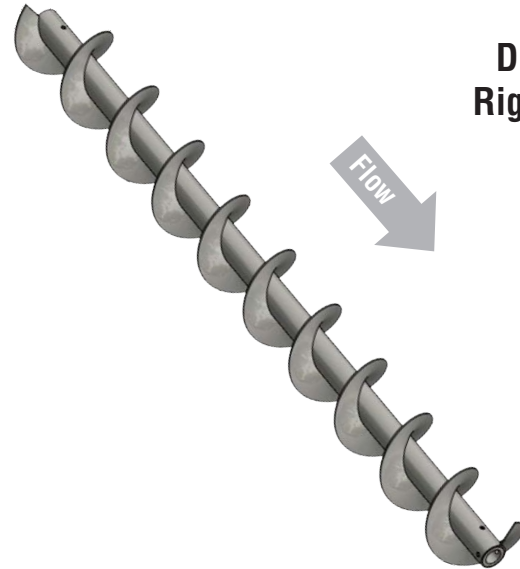- Bulk Heads may be required for abrasive & hot materials
- **WARNING: CHECK MATERIAL TEMPERATURE.**

Left and Right Hand Screw

**Drive End
Left Hand
Screw**

Flow
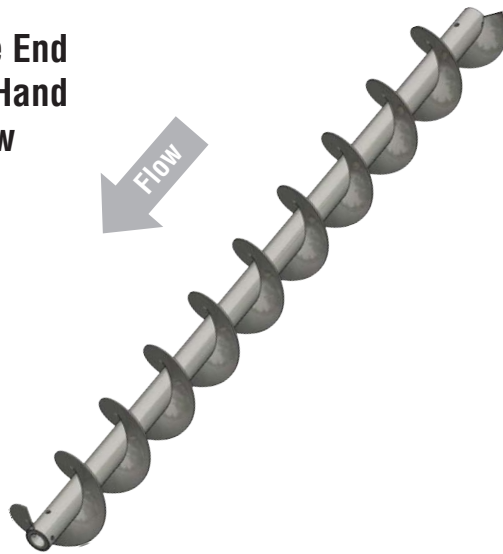
**Drive End
Right Hand
Screw**

Flow

A conveyor screw is either LEFT hand or RIGHT hand depending upon the form of the flights. A conveyor screw can be viewed from either end to determine if it is LEFT hand or RIGHT hand.

How to determine rotation by looking at the DRIVE end of the screw:

CCW Rotation
Pulls Material Towards You

If flight is wrapped around the pipe in a **counter-clockwise** direction, or over the pipe to the left, it is a **LEFT** hand screw.

CW Rotation
Pulls Material Towards You

If flight is wrapped around the pipe in a **clockwise** direction, or over the pipe to your right, it is a **RIGHT** hand screw.

If the end of the screw is not visible, imagine a cross section of the conveyor with the cut end of the screw exposed. Then determine the hand as described above.
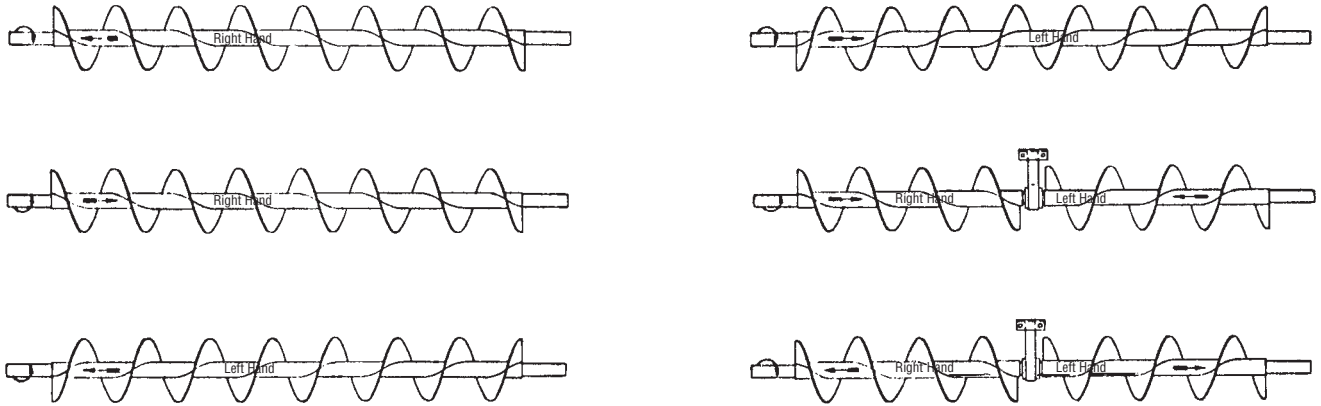
The above diagram indicates the hand of conveyor screw to use when direction of rotation and material flow are known.

Special Screw Conveyor Continuous Weld Finishes

Specifications on screw conveyor occasionally include the term "grind smooth" when referring to the finish on continuous welds. This specification is usually used for stainless steel, but occasionally it will appear in carbon steel specifications as well.

"Grind smooth" is a general term and subject to various interpretations. This Table establishes recommended classes of finishes, which should be used to help find the class required for an application. Note that this is specific to the screw flight weld finish. Surface finishes on flights or pipe, and trough or housing internal weld finish requirements should be additionally specified.

Operation	Weld Finishes			
	I	II	III	IV
Weld spatter and slag removed	X	X	X	X
Rough grind welds to remove heavy weld ripple or unusual roughness (Equivalent to a 40-50 grit finish)		X		
Medium grind welds — leaving some pits and crevices (Equivalent to a 80-100 grit finish)			X	
Fine grind welds — no pits or crevices permissible (Equivalent to a 140-150 grit finish)				X

* Martin IV Finish: CEMA IV welds, polish pipe & flights to 140-150 grit finish.
* Martin IV Polish: Same as above plus Scotch-Brite Finish.

Trough
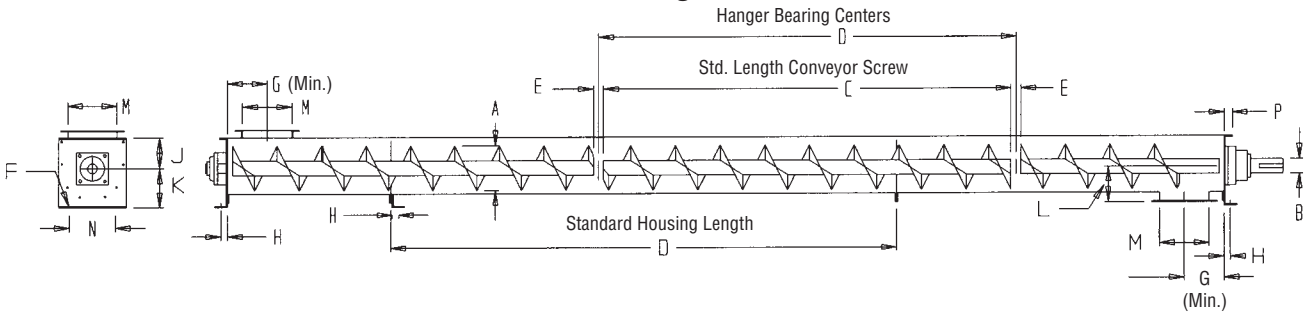
A Screw Dia.	B Coupling Dia.	C Length	D Length	E	F	G (Min.)	H	J	K	L	M	N	P	R
4	1	9 – 10 1/2	10	1 1/2	3/8	4 1/2	7/8	3 5/8	4 5/8	3 3/4	5	5 3/4	1 7/16	1
6	1 1/2	9 – 10	10	2	3/8	6	13/16	4 1/2	5 5/8	5	7	8 1/8	1 1/2	1
9	1 1/2 2	9 – 10	10	2	1/2	8	15/16	6 1/8	7 7/8	7 1/8	10	9 3/8	1 5/8	1 1/2
10	1 1/2 2	9 – 10	10	2	1/2	9	1 9/16	6 3/8	8 7/8	7 7/8	11	9 1/2	1 3/4	1 3/4
12	2 2 7/16 3	11 – 10 11 – 9 11 – 9	12	2 3 3	5/8	10 1/2	1 3/8	7 3/4	9 5/8	8 7/8	13	12 1/4	2	1 5/8
14	2 7/16 3	11 – 9	12	3	5/8	11 1/2	1 3/8	9 1/4	10 7/8	10 1/8	15	13 1/2	2	1 5/8
16	3	11 – 9	12	3	5/8	13 1/2	1 3/4	10 5/8	12	11 1/8	17	14 7/8	2 1/2	2
18	3 3 7/16	11 – 9 11 – 8	12	3 4	5/8	14 1/2	1 3/4	12 1/8	13 3/8	12 3/8	19	16	2 1/2	2
20	3 3 7/16	11 – 9 11 – 8	12	3 4	3/4	15 1/2	2	13 1/2	15	13 3/8	21	19 1/4	2 1/2	2 1/4
24	3 7/16	11 – 8	12	4	3/4	17 1/2	2 1/4	16 1/2	18 1/8	15 3/8	25	20	2 1/2	2 1/2

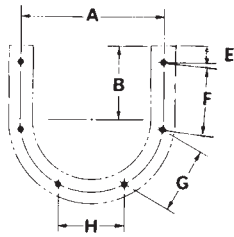Screw clearance at trough end is one half of dimension E.
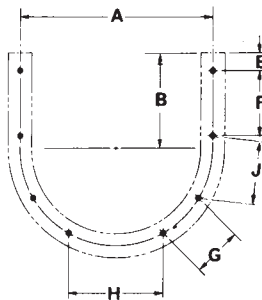
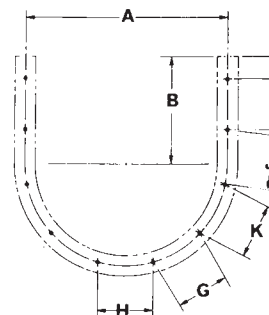## Typical Method of Detailing

9" × 2" × 25'-0" Conveyor

9TCP16 Covers

9S412-R Screws

9CTF10 Troughs

![Martin]

Tubular Housing

Screw clearance at trough end is one half of dimension E.
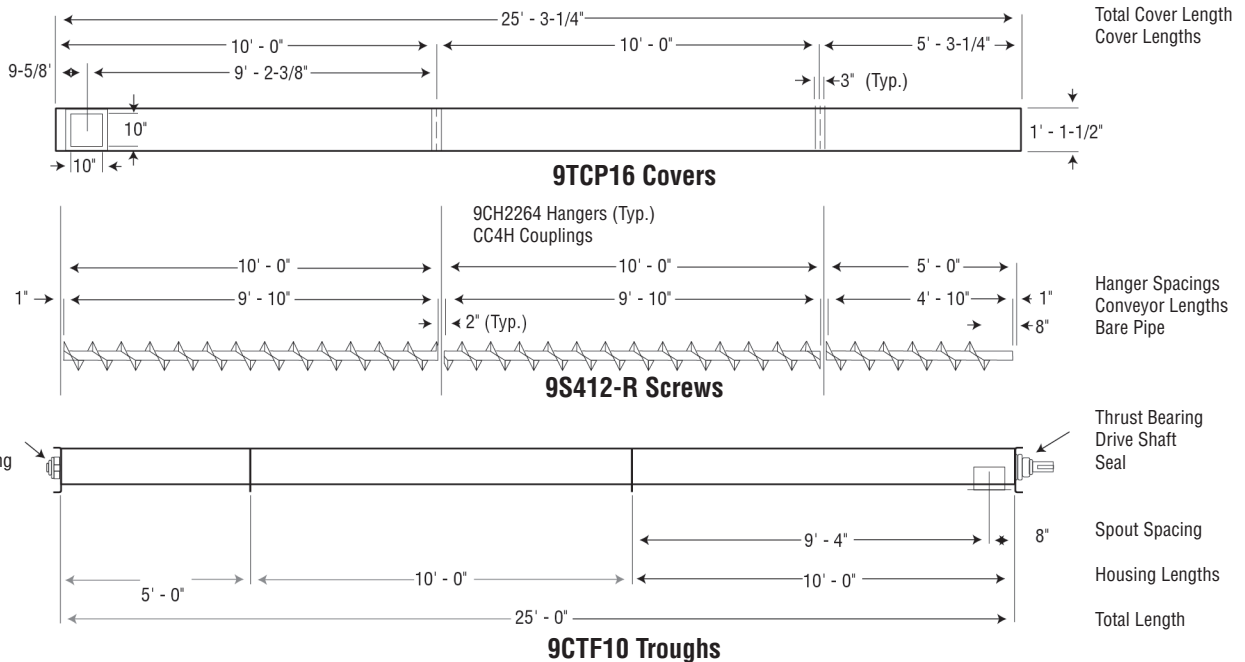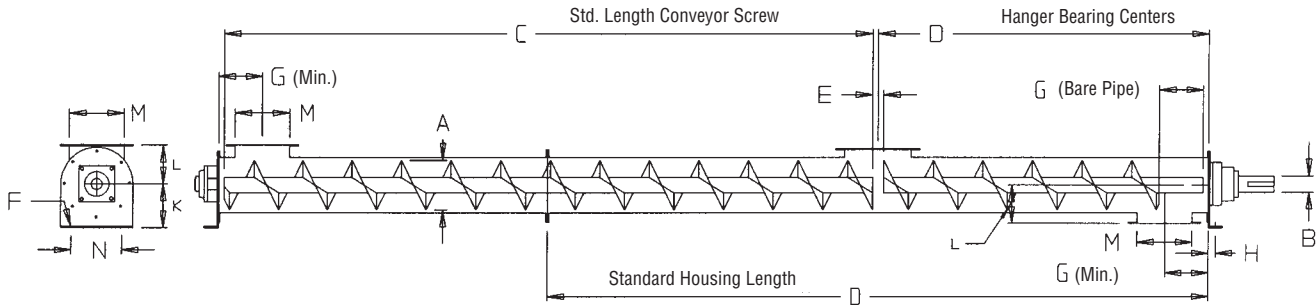
A Screw Dia.	B Coupling Dia.	C Length	D Length	E	F	G (Min.)	H	K	L	M	N	P	R
4	1	9 – 10 1/2	10	1 1/2	3/8	4 1/2	7/8	4 5/8	3 3/4	5	5 3/4	1 7/16	1
6	1 1/2	9 – 10	10	2	3/8	6	13/16	5 5/8	5	7	8 1/8	1 1/2	1
9	1 1/2 2	9 – 10 9 – 10	10	2	1/2	8	1 5/16	7 7/8	7 1/8	10	9 3/8	1 5/8	1 1/2
10	1 1/2 2	9 – 10 9 – 10	10	2	1/2	9	1 9/16	8 7/8	7 7/8	11	9 1/2	1 3/4	1 3/4
12	2 2 7/16 3	11 – 10 11 – 9 11 – 9	12	2 3 3	5/8	10 1/2	1 3/8	9 5/8	8 7/8	13	12 1/4	2	1 5/8
14	2 7/16 3	11 – 9 11 – 9	12	3	5/8	11 1/2	1 3/8	10 7/8	10 1/8	15	13 1/2	2	1 5/8
16	3	11 – 9	12	3	5/8	13 1/2	1 3/4	12	11 1/8	17	14 7/8	2 1/2	2
18	3 3 7/16	11 – 9 11 – 8	12	3 4	5/8 3/4	14 1/2 15 1/2	1 3/4 2	13 3/8 15	12 3/8 13 3/8	19 21	16 19 1/4	2 1/2 2 1/2	2 2 1/4
20	3 3 7/16	11 – 9 11 – 8	12	3 4	3/4	15 1/2	2	15	13 3/8	21	19 1/4	2 1/2	2 1/4
24	3 7/16	11 – 8	12	4	3/4	17 1/2	2 1/4	18 1/8	15 3/8	25	20	2 1/2	2 1/2

Typical Method of Detailing

9" × 2" × 25'-0" Conveyor

H-40

U-Trough End Flanges

6 Bolts **8 Bolts** **10 Bolts** **12 Bolts**

Screw Diameter	Bolts		A	B	E	F	G	H	J	K	L
	Number	Diameter									
4	6	3/8	7	3 5/8	1 1/8	3 1/8	3 1/8	3 1/8	X	X	X
6	6	3/8	8 7/8	4 1/2	1 1/32	4 1/8	4 1/16	4 1/16	X	X	X
9	8	3/8	12 1/2	6 1/8	1 3/16	4 1/8	3 3/4	5 1/8	4 1/8	X	X
10	8	3/8	13 1/4	6 3/8	2 1/4	3 1/2	4 3/16	5 1/16	4 1/8	X	X
12	8	1/2	15 7/8	7 3/4	1 1/2	5 5/16	4 1/16	7 3/4	5 3/16	X	X
14	8	1/2	17 7/8	9 1/4	2 17/32	5 5/8	5 15/16	6	5 15/16	X	X
16	8	5/8	20	10 5/8	2 5/8	6 3/8	6 5/8	7 1/2	6 5/8	X	X
18	10	5/8	22	12 1/8	2 23/32	5 15/16	5 7/8	5 7/8	5 7/8	5 7/8	X
20	10	5/8	24 3/8	13 1/2	2 25/32	6 1/4	6 11/16	6 11/16	6 11/16	6 11/16	X
24	12	5/8	28 1/2	16 1/2	2 25/32	6 1/8	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8

Flared Trough End Flanges
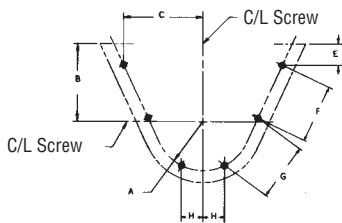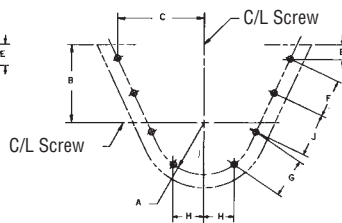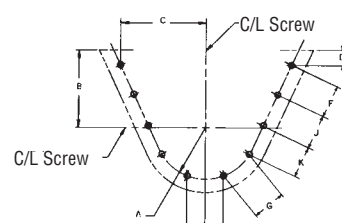
6 Bolts **8 Bolts** **10 Bolts** **12 Bolts**
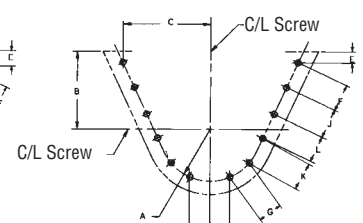
Screw Diameter	Bolts		A	B	C	E	F	G	H	J	K	L
	Diameter Number	Holes										
6	3/8	6	4 7/16	7	7 3/16	1 27/32	5 1/4	5 1/4	2 1/32	—	—	—
9	3/8	8	6 1/4	9	9 21/32	1 43/64	5	5	2 9/16	5	—	—
12	1/2	8	7 15/16	10	11 13/16	1 13/16	5 3/4	5 3/4	3 7/8	5 3/4	—	—
14	1/2	10	8 15/16	11	12 49/64	2 1/16	5 1/8	5 1/8	3	5 1/8	5 1/8	—
16	5/8	10	10	11 1/2	14 11/16	2 15/64	5 1/2	5 1/2	3 3/4	5 1/2	5 1/2	—
18	5/8	10	11	12 1/8	16	2 5/8	6 3/16	6 3/16	2 15/16	6 3/16	6 3/16	—
20	5/8	10	12 3/16	13 1/2	17 7/8	2 9/32	7	7	3 11/32	7	7	—
24	5/8	12	14 1/4	16 1/2	20 61/64	2 5/16	6 7/8	6 7/8	3 5/16	6 7/8	6 7/8	6 7/8

Bolt Patterns

Tubular Housing Flanges
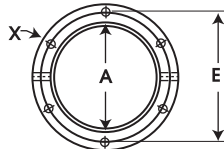
6 Bolts
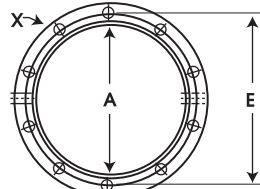
10 Bolts
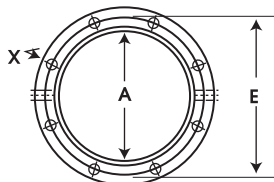
8 Bolts
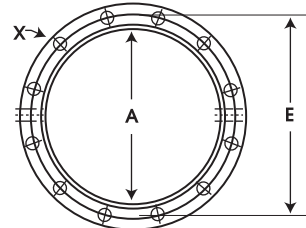
12 Bolts

Intake & Discharge Flanges
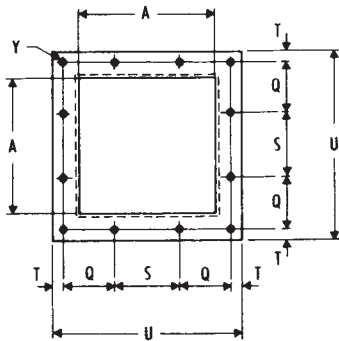
12 Bolts
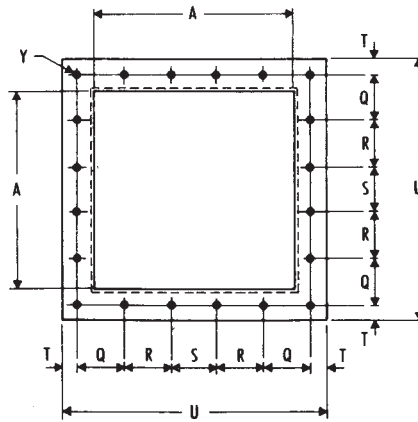
20 Bolts

Screw Size	Flange Bolts		A	E	Q	R	S	T	U
	Tabular X	Discharge Y							
4	6 – 3/8	12 – 1/4	5	7	2 1/4	—	2 1/4	3/8	7 1/2
6	8 – 3/8	12 – 3/8	7	8 7/8	2 13/16	—	3	11/16	10
9	8 – 3/8	12 – 3/8	10	11 7/8	4	—	4	1/2	13
10	8 – 3/8	12 – 3/8	11	13 1/4	4 5/16	—	4 3/8	5/8	14 1/4
12	8 – 1/2	12 – 3/8	13	15	5 1/8	—	5 1/4	7/8	17 1/4
14	8 – 1/2	20 – 3/8	15	17	3 1/2	3 1/2	3 1/2	7/8	19 1/4
16	8 – 5/8	20 – 3/8	17	19 1/2	3 3/4	4	4	7/8	21 1/4
18	10 – 5/8	20 – 1/2	19	22	4 7/16	4 3/8	4 3/8	1 1/8	24 1/4
20	10 – 5/8	20 – 1/2	21	24 3/8	4 7/8	4 3/4	4 3/4	1 1/8	26 1/4
24	12 – 5/8	20 – 1/2	25	28 1/2	5 5/8	5 5/8	5 1/2	1 1/8	30 1/4

Part Name	4	6	9	10	12	14	16	18	20	24
Flange, Trough	6 – 3/8 × 1 1/4	6 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 1/2 × 1 1/2	8 – 1/2 × 1 1/2	8 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	12 – 5/8 × 1 3/4
Flange, Tubular Housing	6 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 1/2 × 1 1/2	8 – 1/2 × 1 1/2	8 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	12 – 5/8 × 1 3/4
End, Trough										
Inside	6 – 1/4 × 3/4	7 3/8 × 1	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 1/2 × 1 1/4	8 – 1/2 × 1 1/4	8 – 5/8 × 1 1/4	10 – 5/8 × 1 1/4	10 – 5/8 × 1 1/2	12 – 5/8 × 1 1/2
Inside Discharge	4 – 3/8 × 1	4 – 3/8 × 1	4 – 3/8 × 1 1/4	6 – 3/8 × 1 1/4	6 – 1/2 × 1 1/4	6 – 1/2 × 1 1/4	6 – 5/8 × 1 1/4	6 – 5/8 × 1 1/2	6 – 5/8 × 1 1/2	6 – 5/8 × 1 1/2
Inside Rectangular	5 1/4 × 3/4	6 – 3/8 × 1	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	10 – 1/2 × 1 1/4	11 – 1/2 × 1 1/4	12 – 5/8 × 1 1/4	12 – 5/8 × 1 1/4	12 – 5/8 × 1 1/2	12 – 5/8 × 1 1/2
Outside Type	6 – 3/8 × 1 1/4	6 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 1/2 × 1 1/2	8 – 1/2 × 1 1/2	8 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	12 – 5/8 × 1 3/4
Outside Discharge	4 – 3/8 × 1	2 – 3/8 × 1	4 – 3/8 × 1 1/4	4 – 3/8 × 1 1/4	4 – 1/2 × 1 1/4	4 – 1/2 × 1 1/4	4 – 5/8 × 1 1/2	4 – 5/8 × 1 1/2	4 – 5/8 × 1 1/2	6 – 5/8 × 1 1/2
Ends, Tubular Housing	6 – 3/8 × 1	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 3/8 × 1 1/4	8 – 1/2 × 1 1/2	8 – 1/2 × 1 1/2	8 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	10 – 5/8 × 1 3/4	12 – 5/8 × 1 3/4
Hanger, Trough										
Style 60		2 – 1/2 × 2	2 – 1/2 × 2	2 – 1/2 × 2	2 – 1/2 × 2 1/2	2 – 1/2 × 2 1/2	2 – 5/8 × 2 3/4	2 – 5/8 × 2 3/4	2 – 5/8 × 2 3/4	
Style 70		4 – 3/8 × 1	4 – 3/8 × 1 1/4	4 – 3/8 × 1 1/4	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 1/2 × 13/4	4 – 5/8 × 2	
Style 216		4 – 3/8 × 1 1/4	4 – 3/8 × 1 1/4	4 – 3/8 × 1 1/4	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 5/8 × 13/4	4 – 5/8 × 2	4 – 5/8 × 2 1/2
Style 220	4 – 1/4 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 1/2 × 1 1/4	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 5/8 × 13/4	4 – 5/8 × 1 3/4	4 – 5/8 × 1 3/4
Style 226	4 – 1/4 × 1	4 – 3/8 × 1 1/4	4 – 3/8 × 1 1/4	4 – 3/8 × 1 1/4	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 5/8 × 13/4	4 – 5/8 × 2	4 – 5/8 × 2 1/2
Style 230		4 – 3/8 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 1/2 × 1 1/4	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/2	4 – 5/8 × 13/4	4 – 5/8 × 1 3/4	4 – 5/8 × 1 3/4
Style 316	4 – 1/4 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 1/2 × 1 1/2	4 – 1/2 × 1 1/4	4 – 1/2 × 1 1/4	4 – 5/8 × 1 1/2	4 – 5/8 × 1 1/2	4 – 5/8 × 1 1/2
Style 326	4 – 1/4 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 3/8 × 1	4 – 1/2 × 1 1/4	4 – 1/2 × 1 1/4	4 – 1/2 × 1 1/4	5 5/8 × 1 1/2	4 – 5/8 × 1 1/2	4 – 5/8 × 1 1/2
Covers, Trough (Std. 10 ft.)	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1	10 – 5/16 × 1
Saddle – Feet										
Flanged Feet										
Saddle (Now Welded)	2 – 3/8 × 1 1/2	2 – 3/8 × 1 1/2	2 – 3/8 × 1 1/2	2 – 3/8 × 1 1/2	2 – 1/2 × 13/4	2 – 1/2 × 13/4	2 – 5/8 × 2	2 – 5/8 × 2	2 – 5/8 × 2	2 – 5/8 × 2
Spouts, Discharge										
Attaching Bolts	8 – 3/8 × 1 1/2	8 – 3/8 × 1 1/2	8 – 3/8 × 1 1/2	8 – 3/8 × 1 1/2	8 – 3/8 × 1 1/2	12 – 3/8 × 1 1/2	12 – 3/8 × 1 1/2	12 – 1/2 × 1 1/2	12 – 1/2 × 1 1/2	12 – 1/2 × 1 1/2
Flange	12 – 3/8 × 1	12 – 3/8 × 1	12 – 3/8 × 1	12 – 3/8 × 1	12 – 3/8 × 1	20 – 3/8 × 1	20 – 3/8 × 1	20 – 1/2 × 1	20 – 1/2 × 1	20 – 1/2 × 1
Flange w/Slide	10 – 3/8 × 1	10 – 3/8 × 1	10 – 3/8 × 1	10 – 3/8 × 1	10 – 3/8 × 1	16 – 3/8 × 1	16 – 3/8 × 1	16 – 1/2 × 1 1/4	16 – 1/2 × 1 1/4	16 – 1/2 × 1 1/4

All bolts hex head cap screws with hex nuts and lock washers.

Bolt
Requirements

Part Name	1	1 1/2	2	2 7/16	3	3 7/16
Bearings, End						
Discharge Bronze	3 – 3/8 × 1 1/4	3 – 1/2 × 1 1/2	3 – 5/8 × 1 3/4	3 – 5/8 × 1 3/4	3 – 3/4 × 2	3 – 3/4 × 2 1/4
Discharge Ball	3 – 3/8 × 1 1/4	3 – 1/2 × 1 1/2	3 – 5/8 × 1 1/2	3 – 5/8 × 13/4	3 – 3/4 × 2	3 – 3/4 × 2 1/4
Flanged Bronze	4 – 3/8 × 1 1/4	4 – 1/2 × 1 1/2	4 – 5/8 × 1 3/4	4 – 5/8 × 13/4	4 – 3/4 × 2	4 – 3/4 × 2 1/4
Flanged Ball	4 – 3/8 × 1 1/4	4 – 1/2 × 1 1/2	4 – 5/8 × 1 3/4	4 – 5/8 × 13/4	4 – 3/4 × 2 1/2	4 – 3/4 × 2 3/4
Flanged Roller		4 – 1/2 × 2 1/2	4 – 1/2 × 2 1/2	4 – 5/8 × 3	4 – 3/4× 3	4 – 3/4 × 3 1/4
Pillow Block Bronze	2 – 3/8 × 1 1/2	2 – 1/2 × 1 3/4	2 – 5/8 × 2	2 – 5/8 × 21/4	2 – 3/4 × 2 1/2	2 – 7/8 × 2 3/4
Pillow Block Ball	2 – 3/8 × 1 3/4	2 – 1/2 × 2 1/4	2 – 5/8 × 2 1/2	2 – 5/8 × 23/4	2 – 7/8 × 3 1/2	2 – 7/8 × 3 3/4
Pillow Block, Roller		2 – 1/2 × 2 1/4	2 – 5/8 × 2 1/2	2 – 5/8 × 23/4	2 – 3/4 × 3	2 – 7/8 × 3 1/2
Bearings, Thrust						
Type "E" Roller		4 – 1/2 × 2 3/4	4 – 1/2 ×2 3/4	4 – 5/8 × 3 1/4	4 – 3/4 × 3 1/2	4 – 3/4 × 3 3/4
Coupling Bolts	3/8 × 2 1/16	1/2 × 3	5/8 × 3 5/8	5/8 × 4 3/8	3/4 × 5 – 3" Pipe 3/4 × 5 1/2 – 4" Pipe	7/8 × 5 1/2
Seals, Shafts						
Flanged Gland		4 – 1/2 × 1 1/2	4 – 5/8 × 1 1/2	4 – 5/8 × 1 1/2	4 – 3/4 × 1 3/4	4 – 3/4 × 1 3/4
Plate w/Ball or Bronze		4 – 1/2 × 2	4 – 5/8 × 2 1/4	4 – 5/8 × 2 1/4	4 – 3/4 × 3	4 – 3/4 × 3 1/2
Plate w/Roller		4 – 1/2 × 3	4 1/2 × 3	4 – 5/8 × 3 1/2	4 – 3/4 × 3 1/2	4 – 3/4 × 4
Split Gland		2 – 1/2 × 1 1/2	2 – 1/2 × 1 1/2	2 – 5/8 × 1 3/4	2 – 5/8 × 1 3/4	2 – 3/4 × 2 1/4
Waste Pack, w/Ball or Bronze		4 – 1/2 × 3 1/2	4 – 5/8 × 3 1/2	4 – 5/8 × 4	4 – 3/4 × 4	4 – 3/4 × 5
Waste Pack, w/Roller		4 – 1/2 × 4	4 – 1/2 × 4	4 – 5/8 × 4 1/2	4 – 3/4 × 5	4 – 3/4 × 5 1/2

All other bolts hex head cap screws with hex nuts and lock washers.

Pipe Sizes, Dimensions and Weights

Nominal Pipe Size	Outside Diameter	I.P.S Schedule			Wall	Inside Diameter	Wt./Ft. (lb)
1/8	.405		10S		.049	.307	.1863
		40	40S	Standard	.068	.269	.2447
		80	80S	Extra Heavy	.095	.215	.3145
1/4	.540		10S		.065	.410	.3297
		40	40S	Standard	.088	.364	.4248
		80	80S	Extra Heavy	.119	.302	.5351
3/8	.675		10S		.065	.545	.4235
		40	40S	Standard	.091	.493	.5676
		80	80S	Extra Heavy	.126	.423	.7388
1/2	.840		5S		.065	.710	.5383
			10S		.083	.674	.6710
		40	40S	Standard	.109	.622	.8510
		80	80S	Extra Heavy	.147	.546	1.088
		160			.187	.466	1.304
				XX Heavy	.294	.252	1.714
3/4	1.050		5S		.065	.920	.6838
			10S		.083	.884	.8572
		40	40S	Standard	.113	.824	1.131
		80	80S	Extra Heavy	.154	.742	1.474
		160			.218	.614	1.937
				XX Heavy	.308	.434	2.441
1	1.315		5S		.065	1.185	.8678
			10S		.109	1.097	1.404
		40	40S	Standard	.133	1.049	1.679
		80	80S	Extra Heavy	.179	.957	2.172
		160			.250	.815	2.844
				XX Heavy	.358	.599	3.659
1 1/4	1.660		5S		.065	1.530	1.107
			10S		.109	1.442	1.806
		40	40S	Standard	.140	1.380	2.273
		80	80S	Extra Heavy	.191	1.278	2.997
		160			.250	1.160	3.765
				XX Heavy	.382	.896	5.214
1 1/2	1.900		5S		.065	1.770	1.274
			10S		.109	1.682	2.085
		40	40S	Standard	.145	1.610	2.718
		80	80S	Extra Heavy	.200	1.500	3.631
		160			.281	1.338	4.859
				XX Heavy	.400	1.100	6.408
2	2.375		5S		.065	2.245	1.604
			10S		.109	2.157	2.638
		40	40S	Standard	.154	2.067	3.653
		80	80S	Extra Heavy	.218	1.939	5.022
		160			.343	1.689	7.444
				XX Heavy	.436	1.503	9.029
2 1/2	2.875		5S		.083	2.709	2.475
			10S		.120	2.635	3.531
		40	40S	Standard	.203	2.469	5.793
		80	80S	Extra Heavy	.276	2.323	7.661
		160			.375	2.125	10.01
				XX Heavy	.552	1.771	13.69

Nominal Pipe Size	Outside Diameter	I.P.S Schedule			Wall	Inside Diameter	Wt./Ft. (lb)
3	3.500		5S		.083	3.334	3.029
			10S		.120	3.260	4.332
		40	40S	Standard	.216	3.068	7.576
		80	80S	Extra Heavy	.300	2.900	10.25
		160			.438	2.624	14.32
				XX Heavy	.600	2.300	18.58
3 1/2	4.000		5S		.083	3.834	3.472
			10S		.120	3.760	4.973
		40	40S	Standard	.226	3.548	9.109
		80	80S	Extra Heavy	.318	3.364	12.50
4	4.500		5S		.083	4.334	3.915
			10S		.120	4.260	5.613
		40	40S	Standard	.237	4.026	10.79
		80	80S	Extra Heavy	.337	3.826	14.98
		120			.438	3.624	19.00
		160			.531	3.438	22.51
				XX Heavy	.674	3.152	27.54
5	5.563		5S		.109	5.345	6.349
			10S		.134	5.295	7.770
		40	40S	Standard	.258	5.047	14.62
		80	80S	Extra Heavy	.375	4.813	20.78
		120			.500	4.563	27.04
		160			.625	4.313	32.96
				XX Heavy	.750	4.063	38.55
6	6.625		5S		.109	6.407	7.585
			10S		.134	6.357	9.289
		40	40S	Standard	.280	6.065	18.97
		80	80S	Extra Heavy	.432	5.761	28.57
		120			.562	5.491	36.39
		160			.718	5.189	45.30
				XX Heavy	.864	4.897	53.16
8	8.625		5S		.109	8.407	9.914
			10S		.148	8.329	13.40
		20			.250	8.125	22.36
		30			.277	8.071	24.70
		40	40S	Standard	.322	7.981	28.55
		60			.406	7.813	35.64
		80	80S	Extra Heavy	.500	7.625	43.39
		100			.593	7.439	50.87
		120			.718	7.189	60.63
		140			.812	7.001	67.76
				XX Heavy	.875	6.875	72.42
		160			.906	6.813	74.69
10	10.750		5S		.134	10.482	15.19
			10S		.165	10.420	18.70
		20			.250	10.250	28.04
		30			.307	10.136	34.24
		40	40S	Standard	.365	10.020	40.48
		60	80S	Extra Heavy	.500	9.750	54.74
		80			.593	9.564	64.33
		100			.718	9.224	76.93
		120			.843	9.064	89.20
		140			1.000	8.750	104.1
		160			1.125	8.500	115.7

NOTE: Weights shown are in pounds per foot, based on the average wall of the pipe. The following formula was used in calculating the weight per foot.

W = 10.68 (D — t)t
W = Weight in pounds per foot (to 4 digits)
D = Outside Diameter in inches (to 3 decimal places)
t = Wall thickness in decimals (to 3 decimal places)

All weights are carried to four digits only, the fifth digit being carried forward if five or over, or dropped if under five.
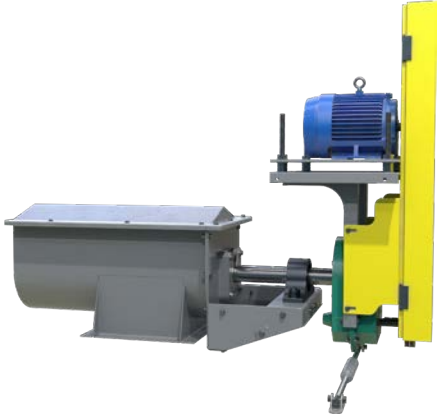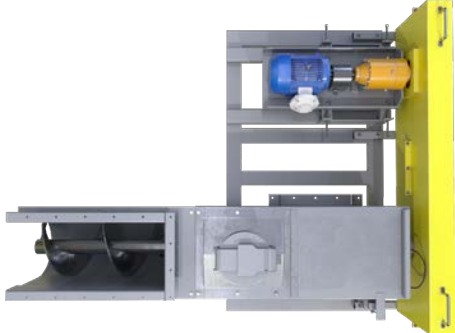
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Typical Drive Arrangements

The most common types of drives for screw conveyors are illustrated below.
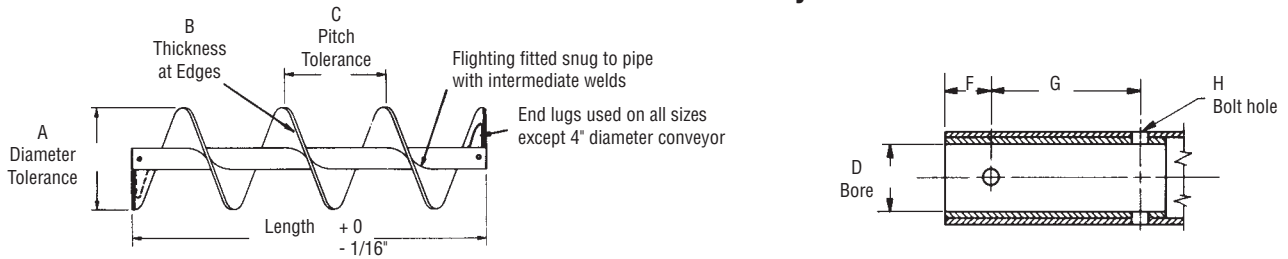
In addition to those shown, other types available are: variable speed drives, hydraulic drives, and take-off drives for connection to other equipment.

For special drive requirements, consult our engineering department.

|		
SCREW DRIVER REDUCER		Reducer mounts on trough end, and is directly connected to the conveyor screw and includes integral thrust bearing, seal gland, and drive shaft. Motor mount may be positioned at top, either side, or below. Separate drive shaft, end bearing, and seal are not required.
SHAFT MOUNTED REDUCER		Reducer mounts on conveyor drive shaft. Motor and V-belt drive may be in any convenient location. The torque arm may be fastened to the floor, or fitted to trough end. Requires extended drive shaft, end bearing, and seal. Note: Requires thrust unit or collars to hold thrust.
GEARMOTOR DRIVE		Integral or C-face motor is bolted directly on the reducer for a compact size. It is pictured as a screw conveyor drive but can also be shaft mounted.
BASE TYPE REDUCER DRIVE		Motor direct-coupled to base type reducer, with chain drive to conveyor drive shaft. Usually mounted on floor or platform as close as possible to conveyor.

Helicoid Screw Conveyors

Listed Screw Diameter and Pitch	Coupling Diameter	Size Designation	Pipe Size Schedule 40	Length Feet and Inches	A Diameter Tolerance		B Thickness		C Pitch Tolerance		D Bushing Bore Inside Diameter		F Spacing 1st Bolt Hole	G Centers 2nd Bolt Hole	H Nominal Bolt Hole Size
					Plus	Minus	Inner Edge	Outer Edge	Plus	Minus	Min.	Max.			
4	1	4H206	1 1/4	9 – 10 1/2	1/16	1/8	3/16	3/32	1/2	1/4	1.005	1.016	1/2	2	13/32
6	1 1/2	6H304	2	9 – 10	1/16	3/16	1/8	1/16	1/2	1/4	1.505	1.516	7/8	3	17/32
6	1 1/2	6H308	2	9 – 10	1/16	3/16	1/4	1/8	3/4	1/4	1.505	1.516	7/8	3	17/32
6	1 1/2	6H312	2	9 – 10	1/16	3/16	3/8	3/16	3/4	1/4	1.505	1.516	7/8	3	17/32
9	1 1/2	9H306	2	9 – 10	1/16	3/16	3/16	3/32	3/4	1/4	1.505	1.516	7/8	3	17/32
9	1 1/2	9H312	2	9 – 10	1/16	3/16	3/8	3/16	3/4	1/4	1.505	1.516	7/8	3	17/32
9	2	9H406	2 1/2	9 – 10	1/16	3/16	3/16	3/32	3/4	1/4	2.005	2.016	7/8	3	21/32
9	2	9H412	2 1/2	9 – 10	1/16	1/4	3/8	3/16	3/4	1/4	2.005	2.016	7/8	3	21/32
9	2	9H414	2 1/2	9 – 10	1/16	1/4	7/16	7/32	3/4	1/4	2.005	2.016	7/8	3	21/32
10	1 1/2	10H306	2	9 – 10	1/16	3/16	3/16	3/32	3/4	1/4	1.505	1.516	7/8	3	17/32
10	2	10H412	2 1/2	9 – 10	1/16	1/4	3/8	3/16	3/4	1/4	2.005	2.016	7/8	3	21/32
12	2	12H408	2 1/2	11 – 10	1/8	5/16	1/4	1/8	1	1/4	2.005	2.016	7/8	3	21/32
12	2	12H412	2 1/2	11 – 10	1/8	5/16	3/8	3/16	1	1/4	2.005	2.016	7/8	3	21/32
12	2 7/16	12H508	3	11 – 9	1/8	5/16	1/4	1/8	1	1/4	2.443	2.458	15/16	3	21/32
12	2 7/16	12H512	3	11 – 9	1/8	5/16	3/8	3/16	1	1/4	2.443	2.458	15/16	3	21/32
12	3	12H614	3 1/2	11 – 9	1/8	3/8	7/16	7/32	1	1/4	3.005	3.025	1	3	25/32
14	2 7/16	14H508	3	11 – 9	1/8	5/16	1/4	1/8	1	1/4	2.443	2.458	15/16	3	21/32
14	3	14H614	3 1/2	11 – 9	1/8	3/8	7/16	7/32	1	1/4	3.005	3.025	1	3	25/32
16	3	16H610	3 1/2	11 – 9	1/8	3/8	5/16	5/32	1 1/2	1/4	3.005	3.025	1	3	25/32
16	3	16H614	4	11 – 9	1/8	3/8	7/16	7/32	1 1/2	1/4	3.005	3.025	1	3	25/32

NOTE: All dimensions in inches.

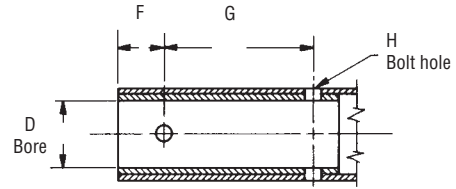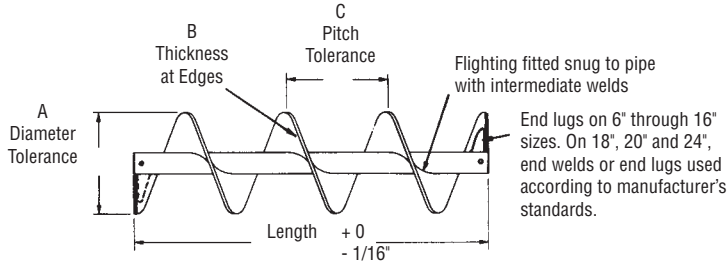## Cut Flight / Cut & Folded Flight Conveyors
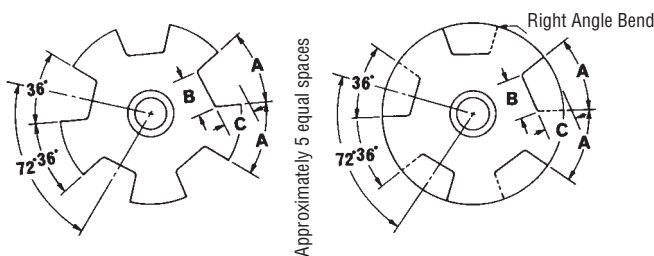
Screw Diameter	A	B	C
4	1 3/8	1	5/8
6	2	1 1/2	7/8
9	3	2 1/8	1 1/2
10	3 3/8	2 1/4	1 3/4
12	4	2 3/4	2
14	4 5/8	3 1/8	2 1/2
16	5 1/4	3 1/2	3
18	6	3 7/8	3 3/8
20	6 5/8	4 1/4	3 7/8
24	7 7/8	4 7/8	4 7/8

Depth of cut "C" is one half the flight width for normal maximum pipe size. Lengths "A" and "B" are calculated from the developed O.D. for standard pitch.

Sectional Screw Conveyors

A — Diameter Tolerance
B — Thickness at Edges
C — Pitch Tolerance
Flighting fitted snug to pipe with intermediate welds
End lugs on 6" through 16" sizes. On 18", 20" and 24", end welds or end lugs used according to manufacturer's standards.
Length + 0 - 1/16"

F — G — H Bolt hole
D Bore

Listed Screw Diameter and Pitch	Coupling Diameter	Size Designation	Pipe Size Schedule 40	Length Feet and Inches	A Diameter Tolerance		B Thickness	C Pitch Tolerance		D Bushing Bore Inside Diameter		F Spacing 1st Bolt Hole	G Centers 2nd Bolt Hole	H Nominal Bolt Hole Size
					Plus	Minus		Plus	Minus	Min.	Max.			
6	1 1/2	6S312	2	9 – 10	1/16	3/16	3/16	3/8	1/4	1.505	1.516	7/8	3	17/32
9	1 1/2	9S312	2	9 – 10	1/16	3/16	3/16	1/2	1/4	1.505	1.516	7/8	3	17/32
	2	9S412	2 1/2	9 – 10	1/16	3/16	3/16	1/2	1/4	2.005	2.016	7/8	3	21/32
	2	9S416	2 1/2	9 – 10	1/16	1/4	1/4	1/2	1/4	2.005	2.016	7/8	3	21/32
10	2	10S412	2 1/2	9 – 10	1/16	3/16	3/16	1/2	1/4	2.005	2.016	7/8	3	21/32
12	2	12S412	2 1/2	11 – 10	1/8	5/16	3/16	3/4	1/4	2.005	2.016	7/8	3	21/32
	2 7/16	12S512	3	11 – 9	1/8	5/16	3/16	3/4	1/4	2.443	2.458	15/16	3	21/32
	2 7/16	12S516	3	11 – 9	1/8	5/16	1/4	3/4	1/4	2.443	2.458	15/16	3	21/32
	3	12S616	3 1/2	11 – 9	1/8	5/16	1/4	3/4	1/4	3.005	3.025	1	3	25/32
	3	12S624	3 1/2	11 – 9	1/8	3/8	3/8	3/4	1/4	3.005	3.025	1	3	25/32
14	2 7/16	14S512	3	11 – 9	1/8	5/16	3/16	3/4	1/4	2.443	2.458	15/16	3	21/32
	3	14S616	3 1/2	11 – 9	1/8	5/16	1/4	3/4	1/4	3.005	3.025	1	3	25/32
	3	14S624	3 1/2	11 – 9	1/8	3/8	3/8	3/4	1/4	3.005	3.025	1	3	25/32
16	3	16S612	3 1/2	11 – 9	1/8	3/8	3/16	3/4	1/4	3.005	3.025	1	3	25/32
	3	16S616	3 1/2	11 – 9	1/8	3/8	1/4	3/4	1/4	3.005	3.025	1	3	25/32
	3	16S624	3 1/2	11 – 9	1/8	3/8	3/8	3/4	1/4	3.005	3.025	1	3	25/32
	3	16S632	3 1/2	11 – 9	1/8	1/2	1/2	3/4	1/4	3.005	3.025	1	3	25/32
18	3	18S612	3 1/2	11 – 9	3/16	3/8	3/16	3/4	1/2	3.005	3.025	1	3	25/32
	3	18S616	3 1/2	11 – 9	3/16	3/8	1/4	3/4	1/2	3.005	3.025	1	3	25/32
	3	18S624	3 1/2	11 – 9	3/16	3/8	3/8	3/4	1/2	3.005	3.025	1	3	25/32
	3	18S632	3 1/2	11 – 9	3/16	1/2	1/2	3/4	1/2	3.005	3.025	1	3	25/32
20	3	20S612	3 1/2	11 – 9	3/16	3/8	3/16	7/8	1/2	3.005	3.025	1	3	25/32
	3	20S616	3 1/2	11 – 9	3/16	3/8	1/4	7/8	1/2	3.005	3.025	1	3	25/32
	3	20S624	3 1/2	11 – 9	3/16	3/8	3/8	7/8	1/2	3.005	3.025	1	3	25/32
24	3 7/16	24S712	4	11 – 8	3/16	3/8	3/16	7/8	1/2	3.443	3.467	1 1/2	4	29/32
	3 7/16	24S716	4	11 – 8	3/16	3/8	1/4	7/8	1/2	3.443	3.467	1 1/2	4	29/32
	3 7/16	24S724	4	11 – 8	3/16	3/8	3/8	7/8	1/2	3.443	3.467	1 1/2	4	29/32
	3 7/16	24S732	4	11 – 8	3/16	1/2	1/2	7/8	1/2	3.443	3.467	1 1/2	4	29/32

NOTE: All dimensions in inches.

Component Selection

Required Information

Screw diameter

Shaft diameter

Material component group

Unusual material characteristics

Conveyor Screws

Standard length conveyor screws should be used whenever possible to reduce the number of hanger bearings required.

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

Right hand screw conveyors pull material toward the end which is being rotated in a clockwise direction. If the rotation is reversed (counterclockwise), the material is pushed away from that end.

In left hand screw conveyors, the material flow is opposite to that of right hand screws, the direction of rotation being unchanged.

To determine hand of screw see pages H-37 and H-38.

The material is carried on one face of the conveyor flighting in conveyors which are required to transport material in one direction, therefore, conveyor end lugs are located on the opposite face to facilitate unimpeded flow of the material. Conveyor sections must be installed in such a manner that all end lugs are toward the inlet end of the conveyor. Conveyor sections must not be turned end for end without reversing the direction of rotation, or conversely, the direction of rotation must not be reversed without turning the conveyor sections end for end.

Requirements for reversible conveyor screws intended for material transport in either direction should be referred to our Engineering Department.

Flighting should be omitted from the conveyor pipe over the last discharge opening to ensure complete discharge of material without carryover.

Continuity of material flow at hanger points is accomplished by opposing adjacent flight ends approximately 180º. (As close to 180° as the predrilled holes will allow.)

Conveyor Trough and Tubular Housing

Standard trough and housing sections are available in five, six, ten, and 12 foot lengths. Standard five and six foot lengths should be used when connecting flanges coincide with discharge openings or hanger bearings.

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 hard iron hanger bearings require hardened coupling shafts. Specific shaft size determination is covered in the Torsional Rating Section, page H-26.

Shaft Seals

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

Bearings

Hanger Bearing. The purpose of hanger bearings is to provide intermediate support when multiple screw sections are used. Hanger bearings are designed primarily for radial loads. Therefore, 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 Material Characteristic Tables 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. Regarding the use of special bearing materials, consult our 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. Screw Conveyor Drive Reducers at the drive end will adequately carry both thrust and radial loads.

Discharge Spouts and Gates

Standard discharge spouts and gates are available for either conveyor trough or tubular housing in several designs, operated either manually or by remote controls.

In installations where it is possible to overfill the device to which material is being transported, an additional overflow discharge opening or overflow relief device should be provided. Consult our Engineering Department for suggested electrical interlock and safety devices to prevent overflow or damage to equipment.

It is sometimes found that the material characteristics are such that standard component specifications are inadequate. Should unusual material characteristics or severe conditions exist, our Engineering Department should be consulted.

Conveyor Ends

A complete line of conveyor ends are available as standard for either conveyor trough or tubular housing with a choice of many bearing types and combinations.

Special Applications

More common of the unusual material characteristics which require other than the recommended components are:

Corrosive Materials. Components may be fabricated from alloys not affected by the material or may be coated with a protective substance.

Contaminable Materials. Require the use of oil impregnated, sealed, or dry type hanger bearings. End shafts should be sealed to prevent entrance of contaminants from the outside. Due to the necessity for frequent cleaning conveyor components should be designed for convenient disassembly.

Abrasive Materials. These materials may be handled in conveyors, troughs, or housings constructed of abrasion resistant alloys with hard surfaced screws. Lining of all exposed surfaces with rubber or special resins also materially reduces abrasive damage.

Interlocking or Matting Materials. Conveying with standard components is sometimes possible by the use of special feeding devices at the conveyor inlet.

Hygroscopic Materials. Frequently these materials may be handled successfully in a conveyor which is substantially sealed from the exterior atmosphere. In extreme cases it is necessary to provide jacketed trough or housing with an appropriate circulating medium to maintain the material at an elevated temperature. Purging of the conveyor with a suitable dry gas is also used in some installations.

Viscous or Sticky Materials. Ribbon flight conveyor screws are most frequently used for conveying these materials although standard components may be specially coated to improve the flow of material.

Harmful Vapors or Dusts. These materials may be safely handled in dust sealed trough, plain tubular housing, or gasketed flanged tubular housing with particular attention to shaft sealing. Trough or housing exhaust systems have also been successfully used in some installations.

Blending in Transit. Ribbon, cut flight, paddle, or a combination of these screw types may be designed to produce the desired degree of blending, aeration or mixing.

Explosive Dusts. The danger of this condition may be minimized in most installations by the use of components which are fabricated from non-ferrous materials and proper conveyor sealing techniques observed. Exhaust systems are also advisable for the removal of explosive dusts.

Materials Subject to Packing. This condition requires the use of aerating devices at the conveyor inlet when materials are pulverulent and a special feeder device when material particles are large or fibrous.

Materials which are Fluid when Aerated. This condition may be used to advantage in some installations by declining the conveyor system toward the discharge end.

Degradable Materials. Some particles that are easily broken or distorted may usually be handled in screw conveyors by reducing the speed and selecting a larger conveyor size sufficient to deliver the required volume of material.

Elevated Temperature. Components should be fabricated from high temperature alloys. Should the process be such that cooling of the material in the conveyor is permissible, jacketed trough or housing may be used at the inlet end to cool the material and standard components used after the point where material temperature has been reduced to a safe degree.

Conveyor Trough

FORMED FLANGE U-TROUGH		Commonly used economical trough. One piece construction. Standard lengths in stock
ANGLE FLANGE U-TROUGH		Rigid construction. Standard lengths in stock.
FORMED FLANGE TUBULAR U-TROUGH		Loadable to full cross section for feeder applications. Minimizes fall back in inclined applications. Easily taken apart for maintenance. Can be gasketed for dust tight enclosure. Hanger pockets required for use with standard hangers.
SOLID TUBULAR TROUGH		One piece construction for totally enclosed or inclined applications. Hanger pockets required for use with standard hangers.
FLARED TROUGH		Used where materials tend to bridge or when flared inlets are needed.
CHANNEL TROUGH		Adds structural support for longer than standard spans.
DROP BOTTOM TROUGH		Used when complete material clean-out is critical. Can be furnished with hinges either side and bolts or clamps opposite side.
FORMED FLANGE RECTANGULAR TROUGH		Material being conveyed forms its own trough thereby reducing trough wear. One piece construction.
ANGLE FLANGE RECTANGULAR TROUGH		The same as formed flange rectangular except top flanges are made from structural angle.
JACKTED TROUGH		Jacket allows heating or cooling of material being conveyed.

Standard conveyor troughs have a U-shaped steel body with angle iron top flanges or formed top flanges and jig drilled end flanges.

Angle Flange
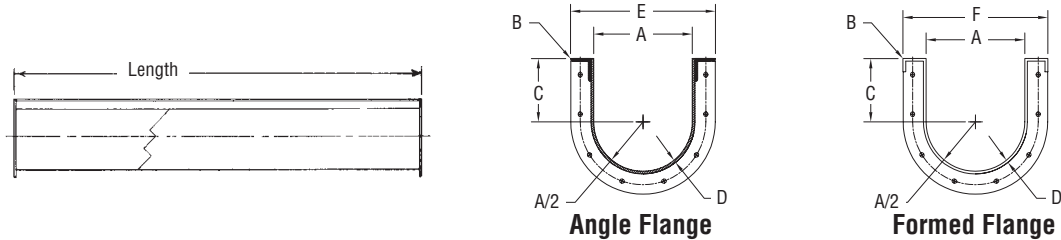
Formed Flange

Conveyor Diameter	D Trough Thickness	Angle Flanged Trough					Formed Flanged Trough ▲					A	B	C	E	F
		Part Number	Weight				Part Number	Weight								
			10'* Length	5' Length	12' Length	6' Length		10' Length	5' Length	12' Length	6' Length					
4	□ 16 GA.	4CTA16	53	29	—	—	4CTF16	41	23	—	—	5	1 1/4	3 5/8	7 3/4	2 1/2
	14	4CTA14	60	33	—	—	4CTF14	50	28	—	—				7 13/16	
	12	4CTA12	78	42	—	—	4CTF12	70	38	—	—				7 15/16	
6	□ 16 GA.	6CTA16	67	44	—	—	6CTF16	55	32	—	—	7	1 1/4	4 1/2	9 3/4	3 1/2
	14	6CTA14	78	49	—	—	6CTF14	67	38	—	—				9 13/16	
	12	6CTA12	101	60	—	—	6CTF12	91	50	—	—				9 15/16	
	10	6CTA10	123	73	—	—	6CTF10	117	64	—	—				10 1/16	
	3/16	6CTA7	164	86	—	—	6CTF7	150	79	—	—				9 7/8	
9	16 GA.	9CTA16	113	66	—	—	9CTF16	83	51	—	—	10	1 1/2	6 1/8	13 1/4	5
	□ 14	9CTA14	127	73	—	—	9CTF14	99	59	—	—				13 5/16	
	12	9CTA12	156	87	—	—	9CTF12	132	75	—	—				13 7/16	
	10	9CTA10	176	102	—	—	9CTF10	164	91	—	—				13 9/16	
	3/16	9CTA7	230	124	—	—	9CTF7	214	116	—	—				13 3/8	
	1/4	9CTA3	286	152	—	—	9CTF3	276	147	—	—				13 1/2	
10	16 GA.	10CTA16	118	69	—	—	10CTF16	88	54	—	—	11	1 1/2	6 3/8	14 1/4	5 1/2
	□ 14	10CTA14	133	76	—	—	10CTF14	105	62	—	—				14 5/16	
	12	10CTA12	164	92	—	—	10CTF12	140	80	—	—				14 7/16	
	10	10CTA10	178	102	—	—	10CTF10	167	91	—	—				14 9/16	
	3/16	10CTA7	233	131	—	—	10CTF7	217	123	—	—				14 3/8	
	1/4	10CTA3	306	163	—	—	10CTF3	296	158	—	—				14 1/2	
12	□ 12 GA.	12CTA12	197	113	236	135	12CTF12	164	95	197	114	13	2	7 3/4	17 7/16	6 1/2
	10	12CTA10	234	133	281	160	12CTF10	187	117	224	140				17 9/16	
	3/16	12CTA7	294	164	353	197	12CTF7	272	150	326	180				17 3/8	
	1/4	12CTA3	372	203	446	244	12CTF3	357	194	428	233				17 1/2	
14	□ 12 GA.	14CTA12	214	121	257	145	14CTF12	183	102	219	122	15	2	9 1/4	19 7/16	7 1/2
	10	14CTA10	258	143	309	172	14CTF10	207	127	248	152				19 9/16	
	3/16	14CTA7	328	180	394	216	14CTF7	304	168	365	202				19 3/8	
	1/4	14CTA3	418	224	501	269	14CTF3	403	215	483	258				19 1/2	
16	□ 12 GA.	16CTA12	238	133	285	160	16CTF12	206	107	247	128	17	2	10 5/8	21 7/16	8 1/2
	10	16CTA10	288	159	345	191	16CTF10	234	144	281	173				21 9/16	
	3/16	16CTA7	368	200	442	240	16CTF7	345	188	414	226				21 3/8	
	1/4	16CTA3	471	243	565	291	16CTF3	455	228	546	273				21 1/2	
18	□ 12 GA.	18CTA12	252	159	302	191	18CTF12	240	133	288	160	19	2 1/2	12 1/8	24 7/16	9 1/2
	10	18CTA10	353	170	423	204	18CTF10	269	165	323	198				24 9/16	
	3/16	18CTA7	444	243	533	291	18CTF7	394	217	473	260				24 3/8	
	1/4	18CTA3	559	298	671	358	18CTF3	520	275	624	330				24 1/2	
20	□ 10 GA.	20CTA10	383	228	460	274	20CTF10	296	190	355	228	21	2 1/2	13 1/2	26 9/16	10 1/2
	3/16	20CTA7	484	271	581	325	20CTF7	434	247	521	296				26 3/8	
	1/4	20CTA3	612	334	734	401	20CTF3	573	315	687	378				26 1/2	
24	□ 10 GA.	24CTA10	443	255	531	306	24CTF10	384	227	461	272	25	2 1/2	16 1/2	30 9/16	12 1/2
	3/16	24CTA7	563	319	676	383	24CTF7	514	293	617	352				30 3/8	
	1/4	24CTA3	717	363	860	435	24CTF3	678	339	813	406				30 1/2	

□ **Standard Gauge Bolt Patterns** on page H-41

▲ Double formed flange standard on all sizes through 10 ga.

All troughs available in other materials such as stainless, aluminum, abrasion resistant, etc.

Tubular Housing

Tubular conveyor housings are inherently dust and weather-tight, and may be loaded to a full cross section. Conveyors with tubular housings are rigid and are highly suitable for conveying material on an incline. Three types shown are available.


Tubular Housing   **Flanged Tubular Housing**   **Angle Flanged Tubular Housing**
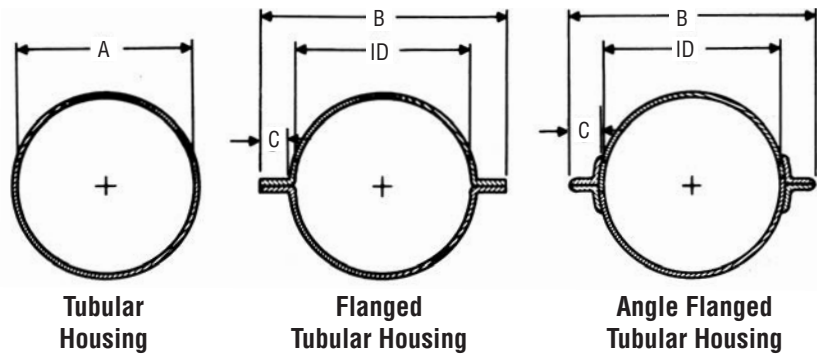
Conveyor Diameter	Trough Thickness	Tubular Housing			Formed Flanged		Angle Flanged		A	B	C
		Part Number	Weight 10' Length	Weight 5' Length	Part Number	Weight 10' Length	Part Number	Weight 10' Length			
4	☐ 16 GA.	4CHT16			4CHT16-F	43	4CHT16-A	81	5	7 1/8	1
	14	4CHT14	60	31	4CHT14-F	53	4CHT14-A	89		7 3/16	
	12	4CHT12			4CHT12-F	74	4CHT12-A	106		7 1/4	
6	☐ 16 GA.	6CHT16	50	27	6CHT16-F	60	6CHT16-A	110	7	9 5/8	
	14	6CHT14	62	33	6CHT14-F	75	6CHT14-A	122		9 11/16	
	12	6CHT12	85	44	6CHT12-F	103	6CHT12-A	145		9 3/4	1 1/4
	10	6CHT10	109	56	6CHT10-F	133	6CHT10-A	187		9 13/16	
	3/16	6CHT7	145	74	6CHT7-F	168	6CHT7-A	205		9 7/8	
9	16 GA.	9CHT16	72	39	9CHT16-F	84	9CHT16-A	131	10	12 5/8	
	☐ 14	9CHT14	89	47	9CHT14-F	104	9CHT14-A	148		12 11/16	
	12	9CHT12	122	64	9CHT12-F	143	9CHT12-A	181		12 3/4	1 1/4
	10	9CHT10	155	80	9CHT10-F	182	9CHT10-A	214		12 13/16	
	3/16	9CHT7	208	107	9CHT7-F	245	9CHT7-A	267		12 7/8	
	1/4	9CHT3	275	140	9CHT3-F	324	9CHT3-A	334		13	
10	16 GA.	10CHT16	79	42	10CHT16-F	91	10CHT16-A	138	11	13 5/8	
	☐ 14	10CHT14	97	52	10CHT14-F	112	10CHT14-A	156		13 11/16	
	12	10CHT12	133	70	10CHT12-F	154	10CHT12-A	192		13 3/4	1 1/4
	10	10CHT10	169	88	10CHT10-F	196	10CHT10-A	228		13 13/16	
	3/16	10CHT7	227	117	10CHT7-F	264	10CHT7-A	286		13 7/8	
	1/4	10CHT3	301	154	10CHT3-F	350	10CHT3-A	360		14	
12	☐ 12 GA.	12CHT12	163	88	12CHT12-F	193	12CHT12-A	235	13	16 1/4	
	10	12CHT10	208	111	12CHT10-F	247	12CHT10-A	280		16 5/16	1 1/2
	3/16	12CHT7	275	144	12CHT7-F	328	12CHT7-A	347		16 3/8	
	1/4	12CHT3	362	188	12CHT3-F	432	12CHT3-A	434		16 1/2	
14	☐ 12 GA.	14CHT12	187	101	14CHT12-F	217	14CHT12-A	259	15	18 1/4	
	10	14CHT10	236	126	14CHT10-F	275	14CHT10-A	308		18 5/16	1 1/2
	3/16	14CHT7	316	166	14CHT7-F	369	14CHT7-A	388		18 3/8	
	1/4	14CHT3	416	216	14CHT3-F	486	14CHT3-A	488		18 1/2	
16	☐ 12 GA.	16CHT12	212	114	16CHT12-F	242	16CHT12-A	310	17	21 1/4	
	10	16CHT10	268	142	16CHT10-F	307	16CHT10-A	366		21 5/16	2
	3/16	16CHT7	358	187	16CHT7-F	411	16CHT7-A	456		21 3/8	
	1/4	16CHT3	472	244	16CHT3-F	542	16CHT3-A	570		21 1/2	
18	☐ 12 GA.	18CHT12	242	133	18CHT12-F	280	18CHT12-A	340	19	23 1/4	
	10	18CHT10	304	164	18CHT10-F	352	18CHT10-A	402		23 5/16	2
	3/16	18CHT7	405	214	18CHT7-F	471	18CHT7-A	503		23 3/8	
	1/4	18CHT3	533	278	18CHT3-F	621	18CHT3-A	631		23 1/2	
20	☐ 10 GA.	20CHT10	335	188	20CHT10-F	381	20CHT10-A	433	21	25 5/16	
	3/16	20CHT7	446	237	20CHT7-F	510	20CHT7-A	544		25 3/8	2
	1/4	20CHT3	586	307	20CHT3-F	671	20CHT3-A	684		25 1/2	
24	☐ 10 GA.	24CHT10	399	215	24CHT10-F	445	24CHT10-A	497	25	29 5/16	
	3/16	24CHT7	531	281	24CHT7-F	594	24CHT7-A	629		29 3/8	2
	1/4	24CHT3	699	365	24CHT3-F	784	24CHT3-A	797		29 1/2	

☐ **Standard Gauge Bolt Patterns** on page H-42

Flared troughs are used primarily to convey materials which are not free-flowing or which have a tendency to stick to the trough.
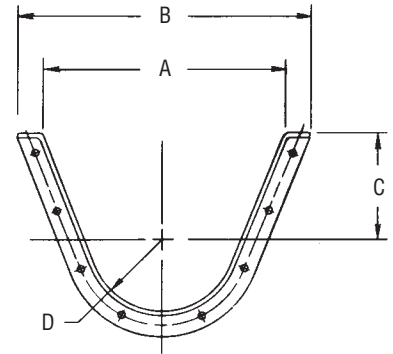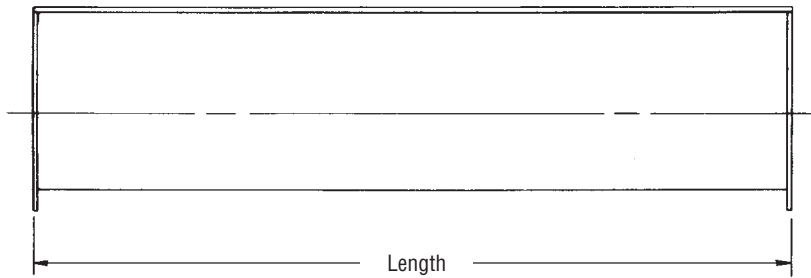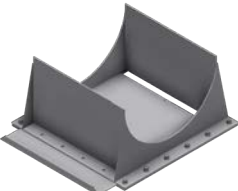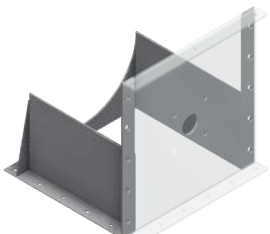
Conveyor Diameter	Trough Thickness	Part Number	Weight Per Foot	A	B	C	D	Standard Length Foot
6	☐ 14 GA.	6FCT14	9	14	16 5/8	7	3 1/2	10
	12	6FCT12	12		16 3/4			
9	☐ 14 GA.	9FCT14	13	18	21 3/16	9	5	10
	12	9FCT12	14		21 1/4			
	10	9FCT10	19		21 1/4			
	3/16	9FCT7	22		21 3/8			
	1/4	9FCT3	25		21 1/2			
12	☐ 12 GA.	12FCT12	20	22	26 1/4	10	6 1/2	12
	10	12FCT10	24		26 1/4			
	3/16	12FCT7	32		26 3/8			
	1/4	12FCT3	43		26 1/2			
14	☐ 12 GA.	14FCT12	23	24	28 1/4	11	7 1/2	12
	10	14FCT10	27		28 1/4			
	3/16	14FCT7	37		28 3/8			
	1/4	14FCT3	49		28 1/2			
16	☐ 12 GA.	16FCT12	25	28	32 1/4	11 1/2	8 1/2	12
	10	16FCT10	31		32 1/4			
	3/16	16FCT7	39		32 3/8			
	1/4	16FCT3	52		32 1/2			
18	☐ 12 GA.	18FCT12	27	31	36 1/4	12 1/8	9 1/2	12
	10	18FCT10	35		36 1/4			
	3/16	18FCT7	45		36 3/8			
	1/4	18FCT3	56		36 1/2			
20	☐ 10 GA.	20FCT10	36	34	39 1/4	13 1/2	10 1/2	12
	3/16	20FCT7	48		39 3/8			
	1/4	20FCT3	60		39 1/2			
24	☐ 10 GA.	24FCT10	41	40	45 1/4	16 1/2	12 1/2	12
	3/16	24FCT7	54		45 3/8			
	1/4	24FCT3	69		45 1/2			

☐ **Standard Gauge Bolt Patterns** on page H-41

Discharge Spout Index

14	TSD	12

Conveyor Diameter

TSD - Plain, Fixed Spout
TSDS - Plain Fixed Spout W/Slide
TSDF - Flush End Spout
RPF - Rack & Pinion/Flat Side

Types

RPFD - Rack & Pinion/Flat Slide Dust Tight
RPC - Rack & Pinion/Curved Slide
RPCD - Rack & Pinion/Curved Slide Dust Tight

Spout Thickness
16 - 16 Gauge
14 - 14 Gauge
12 - 12 Gauge
10 - 10 Gauge
7 - 3/16

|		
STANDARD DISCHARGE SPOUT		Most commonly used. Flanged hole drilling is per CEMA Standards.
STANDARD DISCHARGE		Standard spout shown above with the addition of the slide and side guides.
FLUSH END DISCHARGE SPOUT		Reduces distance from centerline of discharge to end of the conveyor which eliminates ledge at end of trough and product build-up. Special flush-end trough ends required when this style of discharge is used.
FLAT SLIDE GATE		Rack & pinion type available with hand wheel, rope wheel, pocket wheel and chain. Discharge spout is included when fitted. Flat slide (less rack & pinion) can be furnished with pneumatic, hydraulic, or electric actuators. (Not dust-tight)
CURVED SLIDE GATE		Contoured shape of slide eliminates pocket found in flat slide type. Rack & pinion type available with handwheel, or rope wheel, or pocket wheel with chain. Curved slide (less rack & pinion) can be furnished with pneumatic, hydraulic, or electric actuators. (Standard curved slide gate is not dust-tight) All curved slide gates should be <u>installed at factory.</u>
DUST TIGHT RACK AND PINION FLAT SLIDE		Dust tight rack and pinions are totally enclosed and can be furnished with either flat or curved slide. Handwheel is normally furnished but is also available with chain or rope wheel.

Plain Opening
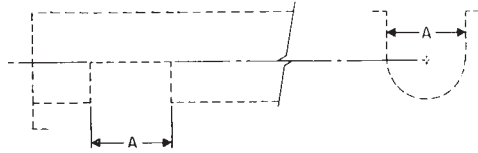
Plain spout openings are cut in the trough permitting free material discharge.
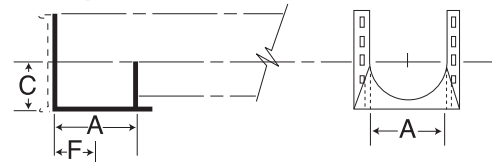
Fixed Spout with Slide Gate
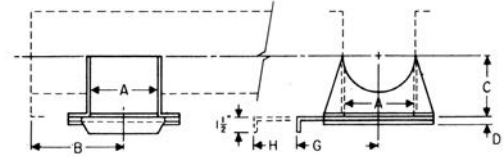
Fixed spouts with slide gates are used where distribution of material is to be controlled. Bolted flange permits slide to be operated from any side

Fixed Spout
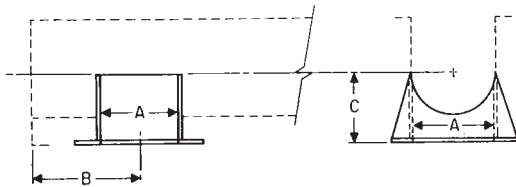
Fixed spouts are fabricated in proportion to size and thickness of trough. Can be furnished loose or welded to trough.

Flush End Spout

Flush end discharge spouts are designed for use at the final discharge point. The end of the spout is comprised of a housing end with bottom flange drilled with standard discharge flange bolt pattern. Because it is located at the extreme end of the conveyor, there is no carryover of material past the final discharge point. The flush end arrangement eliminates the unnecessary extension of trough and interior components beyond the actual discharge point.

Screw Diameter	A	B	C	D	G	H	F
4	5	4 1/2	3 3/4	5/16	5 5/8	11	2 1/2
6	7	6	5	5/16	6 5/8	14	3 1/2
9	10	8	7 1/8	5/16	8	19	5
10	11	9	7 7/8	5/16	8 3/8	20	5 1/2
12	13	10 1/2	8 7/8	5/16	10 1/8	24	6 1/2
14	15	11 1/2	10 1/8	5/16	11 1/4	27	7 1/2
16	17	13 1/2	11 1/8	5/16	12 3/8	30	8 1/2
18	19	14 1/2	12 3/8	5/16	13 3/8	33	9 1/2
20	21	15 1/2	13 3/8	3/8	14 3/8	36	10 1/2
24	25	17 1/2	15 3/8	3/8	16 3/8	42	12 1/2

| Screw Diameter	Trough Thickness Gauge	Spout and Gate Thickness Gauge	Part Number			Weight		
			Fixed Spout		Flush End Spout	Fixed Spout		Flush End Spout
			Plain	With Slide		Plain	Slide	
4	16 – 14	□ 14	4TSD14	4TSDS14	4TSDF14	2	6	1.5
	12	12	4TSD12	4TSDS12	4TSDF12	3	7	2.25
6	14 – 12	□ 14	6TSD14	6TSDS14	6TSDF14	4	11	3.0
	3/16	12	6TSD12	6TSDS12	6TSDF12	6	13	4.50
9	16 – 14 – 12 – 10	□ 14	9TSD14	9TSDS14	9TSDF14	8	18	6.0
	3/16 – 1/4	10	9TSD10	9TSDS10	9TSDF10	13	22	9.75
10	14 – 12 – 10	□ 14	10TSD14	10TSDS14	10TSDF14	10	21	7.5
	3/16 – 1/4	10	10TSD10	10TSDS10	10TSDF10	16	27	12.0
12	12 – 10	□ 12	12TSD12	12TSDS12	12TSDF12	17	36	12.75
	3/16 – 1/4	3/16	12TSD7	12TSDS7	12TSDF7	29	48	21.75
14	12 – 10	□ 12	14TSD12	14TSDS12	14TSDF12	22	46	16.50
	3/16 – 1/4	3/16	14TSD7	14TSDS7	14TSDF7	38	62	28.50
16	12 – 10	□ 12	16TSD12	16TSDS12	16TSDF12	21	49	15.75
	3/16 – 1/4	3/16	16TSD7	16TSDS7	16TSDF7	40	68	30.0
18	12 – 10	□ 12	18TSD12	18TSDS12	18TSDF12	32	69	24.0
	3/16 – 1/4	3/16	18TSD7	18TSDS7	18TSDF7	60	97	45.0
20	10	□ 12	20TSD12	20TSDS12	20TSDF12	40	91	30.0
	3/16 – 1/4	3/16	20TSD7	20TSDS7	20TSDF7	67	118	50.25
24	10	□ 12	24TSD12	24TSDS12	24TSDF12	52	116	39.0
	3/16 – 1/4	3/16	24TSD7	24TSDS7	24TSDF7	87	151	65.25

□ **Standard Gauge Bolt Patterns** on page H-42

Discharge Gates

Martin

Rack and Pinion Flat Slide

Flat rack and pinion slide gates can be bolted to standard discharge spouts at any of the four positions desired. Hand wheel is normally furnished but is also available with chain or rope wheel.
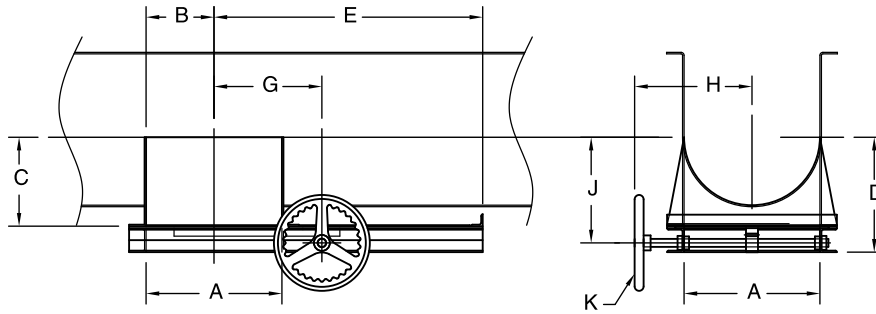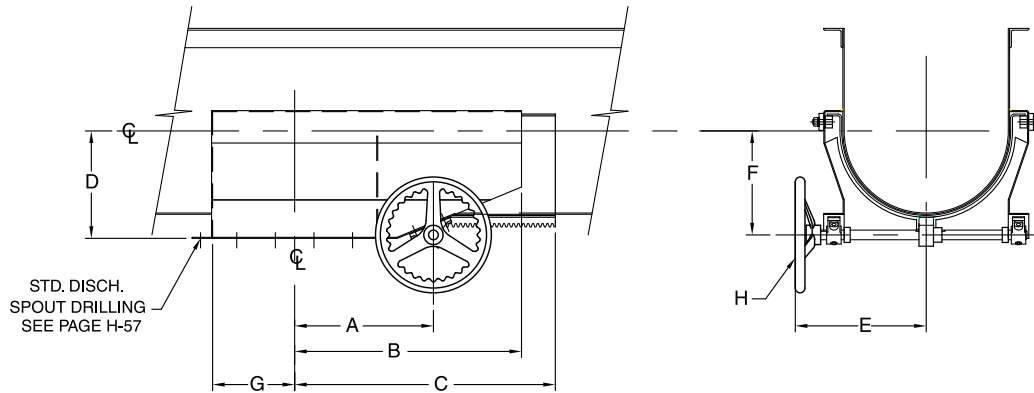

Screw Diameter	A	B	C	D	E	G	H	J	K Diameter
4	5	2 1/2	3 3/4	7	13 1/2	6 1/2	5	5 1/2	12
6	7	3 1/2	5	8 1/4	16	7 1/2	6	6 3/4	12
9	10	5	7 1/8	10 3/8	20 1/4	9	9 1/2	8 7/8	12
10	11	5 1/2	7 7/8	11 1/8	23 1/2	10 1/2	10	9 7/8	12
12	13	6 1/2	8 7/8	12 1/8	25 1/2	11	12 1/4	10 7/8	12
14	15	7 1/2	10 1/8	13 3/8	31 1/4	12 1/2	13 1/4	12	12
16	17	8 1/2	11 1/8	14 3/8	33 5/8	13 1/2	14 1/4	13	12
18	19	9 1/2	12 3/8	15 5/8	37 7/8	14 1/2	15 3/4	14 1/8	12
20	21	10 1/2	13 3/8	16 11/16	40 3/4	15 1/2	16 3/4	15 1/8	12
24	25	12 1/2	15 3/8	18 11/16	46 1/2	17 1/2	18 3/4	17 3/8	12

Screw Diameter	Trough Thickness Gauge	Spout and Gate Thickness Gauge	Part Number Rack and Pinion †	Weight Rack and Pinion
4	16 – 14	□ 14	4RPF14	18
	12	12	4RPF12	21
6	16 – 14 – 12	□ 14	6RPF14	28
	3/16	12	6RPF12	31
9	14 – 12 – 10	□ 14	9RPF14	49
	3/16 – 1/4	10	9RPF10	54
10	14 – 12 – 10	□ 14	10RPF14	56
	3/16 – 1/4	10	10RPF10	62
12	12 – 10	□ 12	12RPF12	94
	3/16 – 1/4	3/16	12RPF7	106
14	12 – 10	□ 12	14RPF12	107
	3/16 – 1/4	3/16	14RPF7	123
16	12 – 10	□ 12	16RPF12	112
	3/16 – 1/4	3/16	16RPF7	131
18*	12 – 10	□ 12	18RPF12	157
	3/16 – 1/4	3/16	18RPF7	185
20*	10	□ 12	20RPF12	185
	3/16 – 1/4	3/16	20RPF7	212
24*	10	□ 12	24RPF12	233
	3/16 – 1/4	3/16	24RPF7	268

□ **Standard Gauge Bolt Patterns** on page H-42
* Hand Wheels supplied as Standard Assembly
– C Chain Wheel
– R Rope Wheel
† **All Rack and Pinion Gates 18" and Larger Have Double Rack and Pinion**

Rack and Pinion Curved Slide

STD. DISCH.
SPOUT DRILLING
SEE PAGE H-57

Screw Diameter	Trough Thickness	Spout Thickness	Part Number*	Weight	A	B	C	D	E	F	G	H Diameter
4	14,16 GA.	☐ 14 GA.	4RPC14	20	6 1/4	8 3/4	12	3 3/4	6	4 1/2	2 1/2	12
	12 GA.	12 GA.	4RPC12	22						4 5/8		
6	16,14,12 GA.	☐ 14 GA.	6RPC14	25	7 1/2	10 1/2	15	5	8	5 1/2	3 1/2	12
	3/16	12 GA.	6RPC12	28						5 5/8		
9	14,12,10 GA.	☐ 14 GA.	9RPC14	46	9	15	20 1/2	7 1/8	8 3/4	7	5	12
	3/16,1/4	10 GA.	9RPC10	54						7 1/8		
10	14,12,10 GA.	☐ 14 GA.	10RPC14	53	9 1/2	14 1/2	21	7 7/8	9 1/8	7 1/2	5 1/2	12
	3/16,1/4	10 GA.	10RPC10	62						7 5/8		
12	12,10 GA.	☐ 12 GA.	12RPC12	81	11 3/8	17 1/2	25 3/4	8 7/8	11	8 1/2	6 1/2	12
	3/16,1/4	3/16	12RPC7	97						8 5/8		
14	10,12 GA.	☐ 12 GA.	14RPC12	95	12 7/8	20 1/2	30 1/4	10 1/8	12	9 1/2	7 1/2	12
	3/16,1/4	3/16	14RPC7	114						9 5/8		
16	10,12 GA.	☐ 12 GA.	16RPC12	103	14 3/8	23 1/2	36	11 1/8	13	10 1/2	8 1/2	12
	3/16,1/4	3/16	16RPC7	116						10 5/8		
18*	10,12 GA.	☐ 12 GA.	18RPC12	157	15 7/8	25 1/2	37 1/4	12 3/8	15 3/8	11 1/2	9 1/2	12
	3/16,1/4	3/16	18RPC7	187						11 5/8		
20*	12 GA.	☐ 12 GA.	20RPC12	175	17 3/8	28 1/2	39	13 3/8	16 3/8	12 1/2	10 1/2	12
	3/16,1/4	3/16	20RPC7	208						12 5/8		
24*	10 GA.	☐ 12 GA.	24RPC12	220	19 3/8	35 1/2	47	15 3/8	18 3/8	14 1/2	12 1/2	12
	3/16,1/4	3/16	24RPC7	265						14 5/8		

☐ **Standard Gauge Bolt Patterns** on page H-42
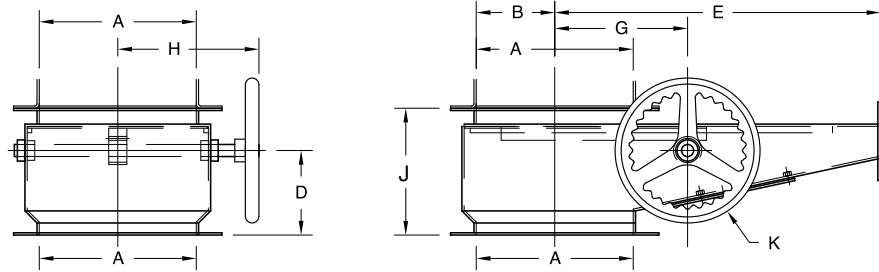 * Hand Wheels supplied as Standard Assembly
– C Chain Wheel
– R Rope Wheel
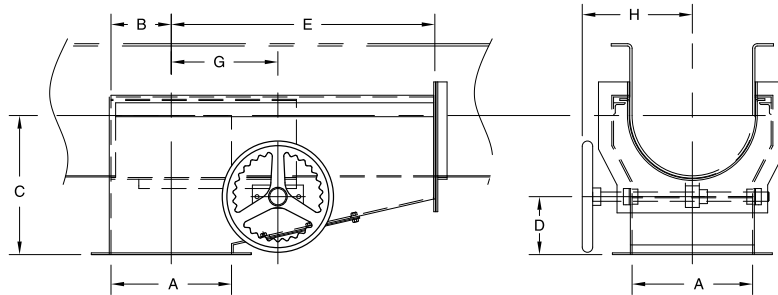
Discharge Gates

Martin

Dust Tight Rack and Pinion Flat Slide

Dust tight rack and pinions are totally enclosed and can be furnished with either flat or curved slide. Hand Wheel is normally furnished but is also available with chain or rope wheel.

Dust Tight Rack and Pinion Curved Slide

Screw Diameter	A	B	C	D	E	G	H	J	K Diameter
4	5	2 1/2	7 1/2	2 1/2	12	6	7	7 1/2	12
6	7	3 1/2	10	4	18 1/2	7 1/2	8	9	12
9	10	5	12 1/2	5	23	9	11	10	12
10	11	5 1/2	13	5	25	10	11 1/2	10 1/2	12
12	13	6 1/2	15	5	28	11 1/2	13	10 1/2	12
14	15	7 1/2	15 1/2	5 1/2	31	12 1/2	14	10 1/2	12
16	17	8 1/2	16 1/2	5 1/2	34	13 1/2	15	10 1/2	12
18	19	9 1/2	18 1/2	6 1/2	38 1/2	15	16 1/2	11 1/2	12
20	21	10 1/2	20	7	40 1/2	16	17 1/2	12	12
24	25	12 1/2	23	8	47 1/2	18	19 1/2	13	12

Screw Diameter	Trough Thickness Gauge	Spout and Gate Thickness Gauge	Part Number			
			Flat Slide *	Weight	Curved Slide *	Weight
4	16 – 14	14	4RPFD14	27	4RPCD16	30
	12	12	4RPFD12	32	4RPCD12	35
6	16 – 14 – 12	14	66RPFD14	42	6RPCD16	46
	3/16	12	6RPFD12	47	6RPCD12	52
9	14 – 12 – 10	14	9RPFD12	74	9RPCD12	81
	3/16 – 1/4	10	9RPFD10	81	9RPCD10	89
10	14 – 12 – 10	14	10RPFD14	84	10RPCD14	92
	3/16 – 1/4	10	10RPFD10	93	104PCD10	102
12	12 – 10	12	12RPFD12	141	12RPCD12	155
	3/16 – 1/4	3/16	12RPFD7	158	12RPCD7	174
14	12 – 10	12	14RPFD12	160	14RPCD12	176
	3/16 – 1/4	3/16	14RPFD7	185	14RPCD7	204
16	12 – 10	12	16RPFD12	168	16RPCD12	185
	3/16 – 1/4	3/16	16RPFD7	197	16RPCD7	217
18	12 – 10	12	18RPFD12	240	18RPCD12	264
	3/16 – 1/4	3/16	18RPFD7	277	18RPCD7	305
20	10	12	20RPFD12	278	20RPCD12	306
	3/16 – 1/4	3/16	20RPFD7	318	20RPCD7	350
24	10	12	24RPFD12	350	24RPCD12	385
	3/16 – 1/4	3/16	24RPFD7	402	24RPCD7	442

* Hand Wheels supplied as Standard Assembly

– C Chain Wheel

– R Rope Wheel

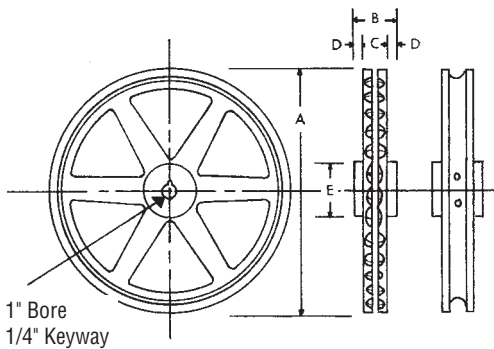Flange drilling in standard. See page H-43
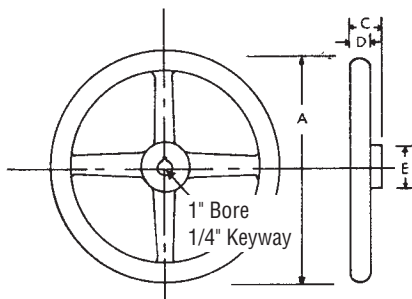
Hand Wheel

Wheel Diameter	Part Number	Weight	C	D	E
12	12HW1	11	2	1 1/8	1 7/8

The hand wheel is regularly furnished to rotate the pinion shaft when the slide gate is readily accessible.
NOTE: Zinc or nickel plated hand wheels available on request.

1" Bore
1/4" Keyway

Pocket Chain Wheel & Rope Wheel

Wheel	Part Number	Weight	A	B	C	D	E
Chain Wheel	20PW1	11	12 3/4	2	1 3/8	5/16	2
Rope Wheel	12RW1	13	12 5/8	2 1/4	1 5/8	1 1/4	1 7/8

Pocket chain and rope wheels are used to rotate pinion shaft where remote operation is desired. It is designed to be used with number 3/16 pocket chain.
NOTE:
Zinc or nickel plated hand wheels available on request.
316 PC Pocket Chain in Stock.

1" Bore
1/4" Keyway

Hanger Pockets

Hanger pockets are used with tubular trough and are mounted on the trough at bearing connections. The hanger pocket forms a "U" shaped section for a short distance, allowing the use of standard hangers and providing easy access to them.
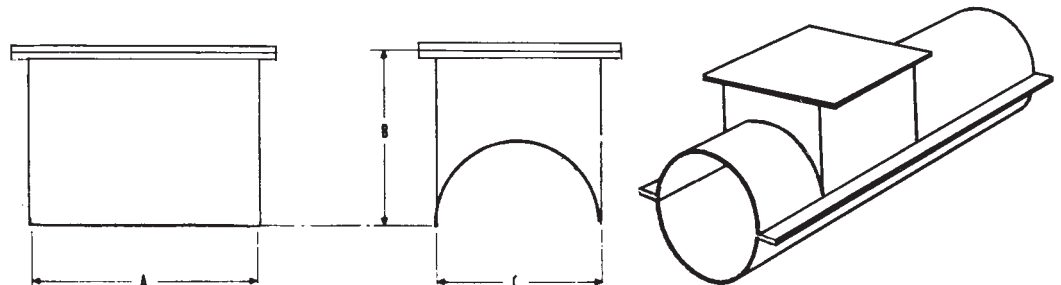
Conveyor Diameter	Part Number	A	B	C	Weight Each
4	4CPH16	8	3 3/4	5	2
6	6CPH16	12	4 3/4	7	3
9	9CPH14	12	6 3/8	10	4
10	10CPH14	12	6 5/8	11	9
12	12CPH12	18	8	13	18
14	14CPH12	18	9 1/2	15	24
16	16CPH12	18	10 7/8	17	26
18	18CPH12	18	12 3/8	19	55
20	20CPH10	18	13 3/4	21	70
24	24CPH10	18	16 3/4	25	85

Trough Ends

Trough Ends

| 9 | TEF | 3 | -BB | -P |

Conveyor Diameter

Type
TE — Outside W/O Feet
TEF — Outside W/Feet
TEI — Inside
TER — Inside Rectangular
TEO — Single Bearing Pedestal
TEOD — Double Bearing Pedestal
FTEF — Outside Flared W/Feet
FTE — Outside Flared W/O Feet
FTEO — Single Bearing Flared Pedestal
FTDO — Flared Discharge End
TDO — Outside Discharge End
TDI — Inside Discharge End
CHTE — Outside Tubular W/O Feet
CHTEF — Outside Tubular W/Feet
SCD — Dorris Screw Drive

Bearing Type
BB - Ball
RB - Roller
BR - Bronze

Plate Only

Coupling Diameter
2 — 1"   5 — 2-7/16"
3 — 1-1/2"   6 — 3"
4 — 2"   7 —3-7/16"

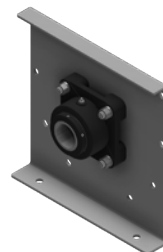|	U-TROUGH	TUBULAR TROUGH	FLARED TROUGH	RECTANGULAR TROUGH	
OUTSIDE TROUGH ENDS WITH FEET					Most common type used as trough support is included
OUTSIDE TROUGH ENDS WITHOUT FEET					Trough support not included
INSIDE PATTERN TROUGH ENDS		Available on application	Available on application		Used where space is limited or trough does not have end flange
DISCHARGE TROUGH ENDS		Available on application			For end discharge conveyors. Special flange bearing required
OUTBOARD BEARING TROUGH END SINGLE					Used when compression type packing gland seal or split gland seal required

Outside Less Feet

Outside trough ends less feet are used to support end bearing and cover when no trough support is required. Drilling for bronze bearing or flanged ball bearing is standard.
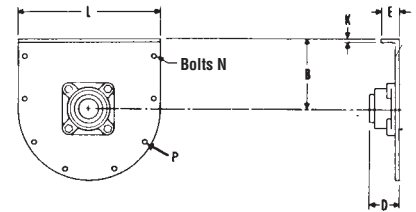
Conveyor Diameter	Shaft Diameter	▲ Part Number	B	D Friction Bearing	D Ball Bearing	D Roller Bearing	E	K	L	N	Weight	P Slot
4	1	4TE2–*	3 5/8	2 3/16	1 5/8		1 7/16	1/4	8 1/8	3/8	3	7/16 × 9/16
6	1 1/2	6TE3–*	4 1/2	3 3/16	2 3/16	3 11/16	1 1/2	1/4	10 1/8	3/8	4	7/16 × 9/16
9	1 1/2	9TE3–*	6 1/8	3 1/4	2 3/16	3 11/16	1 5/8	1/4	13 3/4	3/8	9	7/16 × 9/16
9	2	9TE4–*	6 1/8	4 1/4	2 1/2	3 13/16	1 5/8	1/4	13 3/4	3/8	9	
10	1 1/2	10TE3–*	6 3/8	3 1/4	2 3/16	3 11/16	1 3/4	1/4	14 3/4	3/8	11	7/16 × 9/16
10	2	10TE4–*	6 3/8	4 1/4	2 1/2	3 13/16	1 3/4	1/4	14 3/4	3/8	11	
12	2	12TE4–*	7 3/4	4 1/4	2 9/16	3 7/8	2	1/4	17 1/4	1/2	20	9/16 × 11/16
12	2 7/16	12TE5–*	7 3/4	5 1/4	2 15/16	4 7/16	2	1/4	17 1/4	1/2	20	
12	3	12TE6–*	7 3/4	6 1/4	3 3/4	4 15/16	2	1/4	17 1/4	1/2	20	
14	2 7/16	14TE5–*	9 1/4	5 5/16	2 15/16	4 7/16	2	1/4	19 1/4	1/2	35	9/16 × 11/16
14	3	14TE6–*	9 1/4	5 5/16	3 3/4	4 15/16	2	1/4	19 1/4	1/2	35	
16	3	16TE6–*	10 5/8	6 5/16	3 13/16	5	2 1/2	5/16	21 1/4	5/8	42	11/16 × 13/16
18	3	18TE6–*	12 1/8	6 3/8	3 13/16	5	2 1/2	3/8	24 1/4	5/8	60	11/16 × 13/16
18	3 7/16	18TE7–*	12 1/8	7 3/8	4 5/16	5 9/16	2 1/2	3/8	24 1/4	5/8	60	
20	3	20TE6–*	13 1/2	6 3/8	3 7/8	5 1/16	2 1/2	3/8	26 1/4	5/8	90	11/16 × 13/16
20	3 7/16	20TE7–*	13 1/2	7 3/8	4 3/8	5 5/8	2 1/2	3/8	26 1/4	5/8	90	
24	3 7/16	24TE7–*	16 1/2	7 3/8	4 3/8	5 5/8	2 1/2	3/8	30 1/4	5/8	120	11/16 × 13/16

Outside With Feet

Outside trough ends with feet are used to support end bearing, cover and trough. Drilling for bronze or flanged ball bearing is standard.

Conveyor Diameter	Shaft Diameter	▲ Part Number	B	C	D Friction Bearing	D Ball Bearing	D Roller Bearing	E	F	H	J	K	L	M	N	Weight	P Slot
4	1	4TEF2–*	3 5/8	4 5/8	2 15/16	1 5/8	—	1 7/16	5 3/4	1	1 5/8	1/4	8 1/8	3/8	3/8	4	7/16 × 9/16
6	1 1/2	6TEF3–*	4 1/2	5 5/8	3 15/16	2 3/16	3 11/16	1 1/2	8 1/8	1	1 3/4	1/4	10 1/8	3/8	3/8	7	7/16 × 9/16
9	1 1/2	9TEF3–*	6 1/8	7 7/8	3 15/16	2 3/16	3 11/16	1 5/8	9 3/8	1 1/2	2 5/8	1/4	13 3/4	1/2	3/8	12	7/16 × 9/16
9	2	9TEF4–*	6 1/8	7 7/8	4 15/16	2 1/2	3 13/16	1 5/8	9 3/8	1 1/2	2 5/8	1/4	13 3/4	1/2	3/8	12	
10	1 1/2	10TEF3–*	6 3/8	8 7/8	3 15/16	2 3/16	3 11/16	1 3/4	9 1/2	1 3/4	2 7/8	1/4	14 3/4	1/2	3/8	14	7/16 × 9/16
10	2	10TEF4–*	6 3/8	8 7/8	4 15/16	2 1/2	3 13/16	1 3/4	9 1/2	1 3/4	2 7/8	1/4	14 3/4	1/2	3/8	14	
12	2	12TEF4–*	7 3/4	9 5/8	5	2 9/16	3 7/8	2	12 1/4	1 5/8	2 3/4	1/4	17 1/4	5/8	1/2	23	9/16 × 11/16
12	2 7/16	12TEF5–*	7 3/4	9 5/8	5 1/2	2 15/16	4 7/16	2	12 1/4	1 5/8	2 3/4	1/4	17 1/4	5/8	1/2	23	
12	3	12TEF6–*	7 3/4	9 5/8	5 5/8	3 3/4	4 15/16	2	12 1/4	1 5/8	2 3/4	1/4	17 1/4	5/8	1/2	23	
14	2 7/16	14TEF5–*	9 1/4	10 7/8	5 1/2	2 15/16	4 7/16	2	13 1/2	1 5/8	2 7/8	1/4	19 1/4	5/8	1/2	38	9/16 × 11/16
14	3	14TEF6–*	9 1/4	10 7/8	5 5/8	3 3/4	4 15/16	2	13 1/2	1 5/8	2 7/8	1/4	19 1/4	5/8	1/2	38	
16	3	16TEF6–*	10 5/8	12	5 11/16	3 13/16	5	2 1/2	14 7/8	2	3 1/4	5/16	21 1/4	5/8	5/8	45	11/16 × 13/16
18	3	18TEF6–*	12 1/8	13 3/8	5 11/16	3 13/16	5	2 1/2	16	2	3 1/4	3/8	24 1/4	5/8	5/8	67	11/16 × 13/16
18	3 7/16	18TEF7–*	12 1/8	13 3/8	6 15/16	4 5/16	5 9/16	2 1/2	16	2	3 1/4	3/8	24 1/4	5/8	5/8	67	
20	3	20TEF6–*	13 1/2	15	5 3/4	3 7/8	5 1/16	2 1/2	19 1/4	2 1/4	3 3/4	3/8	26 1/4	3/4	5/8	120	11/16 × 13/16
20	3 7/16	20TEF7–*	13 1/2	15	7	4 3/8	5 5/8	2 1/2	19 1/4	2 1/4	3 3/4	3/8	26 1/4	3/4	5/8	120	
24	3 7/16	24TEF7–*	16 1/2	18 1/8	7	4 3/8	5 5/8	2 1/2	20	2 1/2	4 1/8	3/8	30 1/4	3/4	5/8	162	11/16 × 13/16

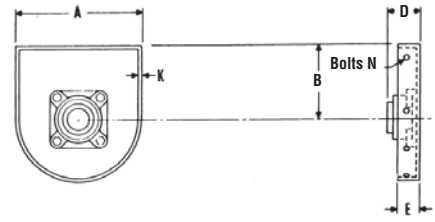▲ Can be furnished with CSP, CSW, or CSFP seals
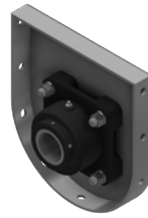
−*BB   Ball Bearing
−*BR   Bronze Bearing
−*RB   Roller Bearing
−*PLess Bearing

Trough Ends

Inside

Inside trough ends are used in place of outside type where no trough end flanges are required. Drilling for bronze bearings or flanged ball bearing is standard.

Conveyor Diameter	Shaft Diameter	▲ Part Number	A	B	D			E	K	N	Weight
					Friction Bearing	Ball Bearing	Roller Bearing				
4	1	4TEI2–*	5	3 5/8	2 3/16	1 5/8	—	2	1/4	1/4	3
6	1 1/2	6TEI3–*	7	4 1/2	3 3/16	2 3/16	3 11/16	2	1/4	5/16	5
9	1 1/2	9TEI3–*	10	6 1/8	3 1/4	2 3/16	3 11/16	2	1/4	3/8	9
	2	9TEI4–*	10	6 1/8	4 1/4	2 1/2	3 13/16	2	1/4	3/8	9
10	1 1/2	10TEI3–*	11	6 3/8	3 1/4	2 3/16	3 11/16	2	1/4	3/8	11
	2	10TEI4–*	11	6 3/8	4 1/4	2 1/2	3 13/16	2	1/4	3/8	11
12	2	12TEI4–*	13	7 3/4	4 1/4	2 9/16	3 7/8	2	1/4	1/2	19
	2 7/16	12TEI5–*	13	7 3/4	5 1/4	2 15/16	4 7/16	2	1/4	1/2	19
	3	12TEI6–*	13	7 3/4	6 1/4	3 3/4	4 15/16	2	1/4	1/2	19
14	2 7/16	14TEI5–*	15	9 1/4	5 5/16	2 15/16	4 7/16	2	1/4	1/2	34
	3	14TEI6–*	15	9 1/4	6 5/16	3 3/4	4 15/16	2	1/4	1/2	34
16	3	16TEI6–*	17	10 5/8	6 5/16	3 13/16	5	2	5/16	5/8	40
18	3	18TEI6–*	19	12 1/8	6 3/8	3 13/16	5	2	3/8	5/8	58
	3 7/16	18TEI7–*	19	12 1/8	7 3/8	4 5/16	5 9/16	2	3/8	5/8	58
20	3	20TEI6–*	21	13 1/2	6 3/8	3 7/8	5 1/16	2	3/8	5/8	83
	3 7/16	20TEI7–*	21	13 1/2	7 3/8	4 3/8	5 5/8	2	3/8	5/8	83
24	3 7/16	24TEI7–*	25	16 1/2	7 3/8	4 3/8	5 5/8	2	3/8	5/8	116

Inside Rectangular

Rectangular trough ends are used inside of rectangular trough. Drilling for bronze bearing or flanged ball bearing is standard
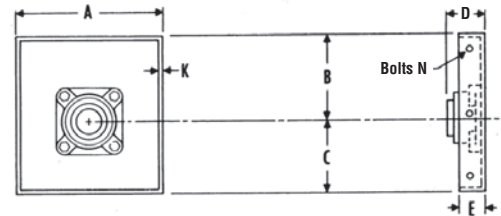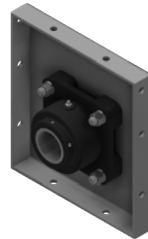
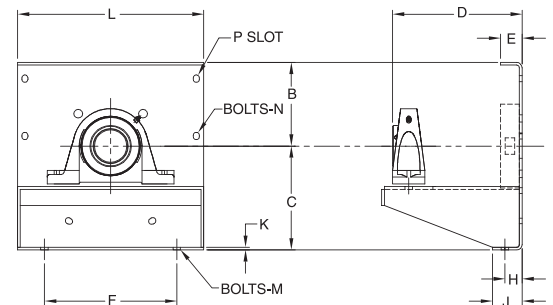| Conveyor Diameter	Shaft Diameter	▲ Part Number	A	B	C	D			E	K	N	Weight
						Friction Bearing	Ball Bearing	Roller Bearing				
4	1	4TER2–*	5	3 5/8	2 1/2	2 3/16	1 5/8	—	2	1/4	1/4	4
6	1 1/2	6TER3–*	7	4 1/2	3 1/2	3 3/16	2 3/16	3 11/16	2	1/4	5/16	6
9	1 1/2	9TER3–*	10	6 1/8	5	3 1/4	2 3/16	3 11/16	2	1/4	3/8	9
	2	9TER4–*	10	6 1/8	5	4 1/4	2 1/2	3 13/16	2	1/4	3/8	9
10	1 1/2	10TER3–*	11	6 3/8	5 1/2	3 1/4	2 3/16	3 11/16	2	1/4	3/8	12
	2	10TER4–*	11	6 3/8	5 1/2	4 1/4	2 1/2	3 13/16	2	1/4	3/8	12
12	2	12TER4–*	13	7 3/4	6 1/2	4 1/4	2 9/16	3 7/8	2	1/4	1/2	21
	2 7/16	12TER5–*	13	7 3/4	6 1/2	5 1/4	2 15/16	4 7/16	2	1/4	1/2	21
	3	12TER6–*	13	7 3/4	6 1/2	6 1/4	3 3/4	4 15/16	2	1/4	1/2	21
14	2 7/16	14TER5–*	15	9 1/4	7 1/2	5 5/16	2 15/16	4 7/16	2	1/4	1/2	35
	3	14TER6–*	15	9 1/4	7 1/2	6 5/16	3 3/4	4 15/16	2	1/4	1/2	35
16	3	16TER6–*	17	10 5/8	8 1/2	6 5/16	3 13/16	5	2	5/16	5/8	41
18	3	18TER6–*	19	12 1/8	9 1/2	6 3/8	3 13/16	5	2	3/8	5/8	60
	3 7/16	18TER7–*	19	12 1/8	9 1/2	7 3/8	4 5/16	5 9/16	2	3/8	5/8	60
20	3	20TER6–*	21	13 1/2	10 1/2	6 3/8	3 7/8	5 1/16	2	3/8	5/8	88
	3 7/16	20TER7–*	21	13 1/2	10 1/2	7 3/8	4 3/8	5 5/8	2	3/8	5/8	88
24	3 7/16	24TER7–*	25	16 1/2	12 1/2	7 3/8	4 3/8	5 5/8	2	3/8	5/8	125

▲ Can be furnished with CSP, CSW, or CSFP seals

−*BB   Ball Bearing
−*BR   Bronze Bearing

−*RB   Roller Bearing
−*PLess Bearing

Single Bearing

Single bearing pedestal type trough ends are constructed with base for mounting pillow block bearings and shaft seal or packing gland.
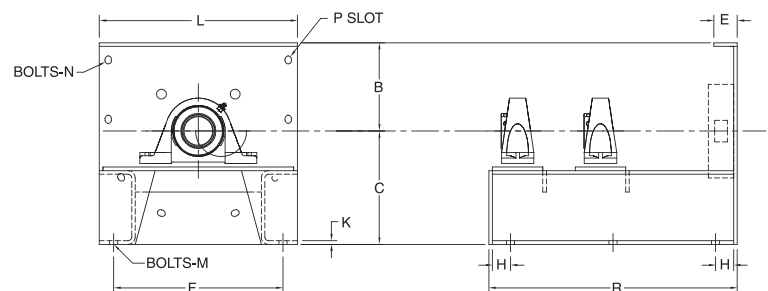

Conveyor Diameter	Shaft Diameter	Part Number	B	C	D	E	F	H	J	K	L	M	N	P Slot	Weight
6	1 1/2	6TEO3													
9	1 1/2	9TEO3													
	2	9TEO4													
10	1 1/2	10TEO3													
	2	10TEO4													
12	2	12TEO4													
	2 7/16	12TEO5													
	3	12TEO6													
14	2 7/16	14TEO5													
	3	14TEO6													
16	3	16TEO6													
18	3	18TEO6													
	3 7/16	18TEO7													
20	3	20TEO6													
	3 7/16	20TEO7													
24	3 7/16	24TEO7													

Custom designed for shaft seal and bearing requirement.

Contact Martin sales for common MTO dimensions

Double Bearing

Double bearing pedestal type trough ends are for use with pillow block bearing in conjunction with a flanged bearing providing extra shaft support.

Conveyor Diameter	Shaft Diameter	Part Number	B	C	E	F	H	K	L	M	R	P Slot	Weight
6	1 1/2	6TEOD3											
9	1 1/2	9TEOD3											
	2	9TEOD4											
10	1 1/2	10TEOD3											
	2	10TEOD4											
12	2	12TEOD4											
	2 7/16	12TEOD5											
	3	12TEOD6											
14	2 7/16	14TEOD5											
	3	14TEOD6											
16	3	16TEOD6											
18	3	18TEOD6											
	3 7/16	18TEOD7											
20	3	20TEOD6											
	3 7/16	20TEOD7											
24	3 7/16	24TEOD7											

Custom designed for shaft seal and bearing requirement.

Contact Martin sales for common MTO dimensions

Trough Ends

Martin

Outside With Feet | **Outside Less Feet** | **Outboard Bearing** | **Discharge**
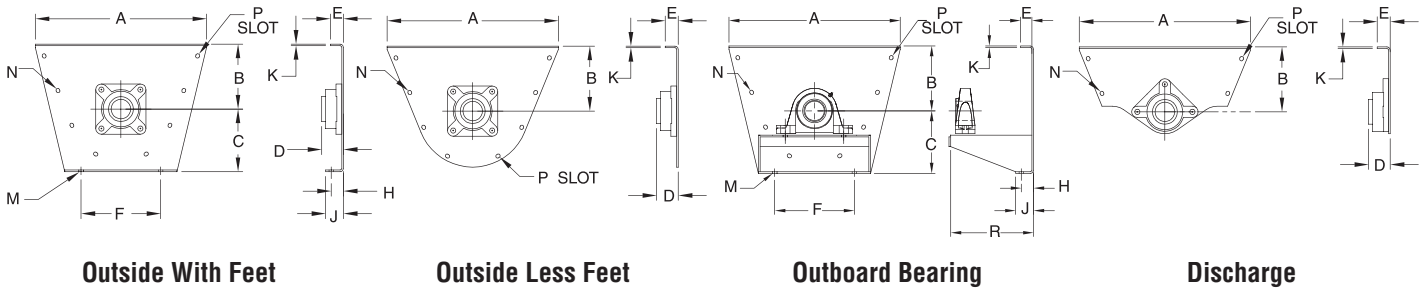
Application: same as standard trough ends except for flared trough.

Conveyor Diameter	Shaft Diameter	A	B	C	D			E	F	H	J	K	M	N	R	P Slot
					Friction Bearing	Ball Bearing	Roller Bearing									
6	1 1/2	16 5/8	7	5 5/8	3 3/16	2 3/16	3 3/4	1 1/2	8 1/8	1	1 3/4	1/4	3/8	3/8		7/16 × 9/16
9	1 1/2	21 1/4	9	7 7/8	3 1/4	2 3/16	3 3/4	1 5/8	9 3/8	1 1/2	2 5/8	1/4	1/2	3/8		7/16 × 9/16
	2	21 1/4	9	7 7/8	4 1/4	2 1/2	3 7/8	1 5/8	9 3/8	1 1/2	2 5/8	1/4	1/2	3/8		7/16 × 9/16
12	2	26 3/8	10	9 5/8	4 1/4	2 9/16	3 7/8	2	12 1/4	1 5/8	2 3/4	1/4	5/8	1/2		9/16 × 11/16
	2 7/16	26 3/8	10	9 5/8	5 1/4	2 15/16	4 1/2	2	12 1/4	1 5/8	2 3/4	1/4	5/8	1/2	Consult Factory	9/16 × 11/16
	3	26 3/8	10	9 5/8	6 1/4	3 3/4	5	2	12 1/4	1 5/8	2 3/4	1/4	5/8	1/2		9/16 × 11/16
14	2 7/16	28 3/8	11	10 7/8	5 5/16	2 15/16	4 1/2	2	13 1/2	1 5/8	2 7/8	1/4	5/8	1/2		9/16 × 11/16
	3	28 3/8	11	10 7/8	6 5/16	3 3/4	5	2	13 1/2	1 5/8	2 7/8	5/16	5/8	1/2		9/16 × 11/16
16	3	32 1/2	11 1/2	12	6 5/16	3 13/16	5	2 1/2	14 7/8	2	3 1/4	5/16	5/8	5/8		11/16 × 13/16
18	3	36 1/2	12 1/8	13 3/8	6 3/8	3 13/16	5	2 1/2	16	2	3 1/4	3/8	5/8	5/8		11/16 × 13/16
	3 7/16	36 1/2	12 1/8	13 3/8	7 3/8	4 5/16	5 5/8	2 1/2	16	2	3 1/4	3/8	5/8	5/8		11/16 × 13/16
20	3	39 1/2	13 1/2	15	6 3/8	3 7/8	5	2 1/2	19 1/4	2 1/4	3 3/4	3/8	3/4	5/8		11/16 × 13/16
	3 7/16	39 1/2	13 1/2	15	7 3/8	4 3/8	5 5/8	2 1/2	19 1/4	2 1/4	3 3/4	3/8	3/4	5/8		11/16 × 13/16
24	3 7/16	45 1/2	16 1/2	18 1/8	7 3/8	4 3/8	5 5/8	2 1/2	20	2 1/2	4 1/8	3/8	3/4	5/8		11/16 × 13/16

Conveyor Diameter	Shaft Diameter	Part Number							
		Outside With Feet	Weight	Outside Less Feet	Weight	Outboard Bearing	Weight	Discharge	Weight
6	1 1/2	6FTEF3.*	15	6FTE3–*	13	6FTEO3–*	22	6FTDO3–**	11
9	1 1/2	9FTEF3–*	22	9FTE3–*	19	9FTEO3–*	31	9FTDO3–**	15
	2	9FTEF4–*	27	9FTE4–*	24	9FTEO4–*	36	9FTDO4–**	20
12	2	12FTEF4–*	43	12FTE4–*	36	12FTEO4–*	63	12FTDO4–**	28
	2 7/16	12FTEF5–*	44	12FTE5–*	37	12FTEO5–*	64	12FTDO5–**	29
	3	12FTEF6–*	56	12FTE6–*	49	12FTEO6–*	76	12FTDO6–**	41
14	2 7/16	14FTEF5–*	52	14FTE5–*	43	14FTEO5–*	75	14FTDO5–**	33
	3	14FTEF6–*	64	14FTE6–*	55	14FTEO6–*	87	14FTDO6–**	45
16	3	16FTEF6–*	85	16FTE6–*	72	16FTEO6–*	125	16FTDO6–**	56
18	3	18FTEF6–*	98	18FTE6–*	83	18FTEO6–*	138	18FTDO6–**	63
	3 7/16	18FTEF7–*	104	18FTE7–*	89	18FTEO7–*	144	18FTDO7–**	69
20	3	20FTEF6–*	133	20FTE6–*	103	20FTEO6–*	196	20FTDO6–**	75
	3 7/16	20FTEF7–*	139	20FTE7–*	109	20FTEO7–*	202	20FTDO7–**	81
24	3 7/16	24FTEF7–*	179	24FTE7–*	132	24FTEO7–*	250	24FTDO7–**	96

–*BB-P   Ball Bearing Plate Only
–*RB-P   Roller Bearing Plate Only

For Bolt Pattern see Page H-41

Outside Discharge

Outside discharge trough ends are used to support end bearing and will allow material to discharge or overflow through the end of the trough. Drilling for three bolt bronze or flanged ball bearing is standard.
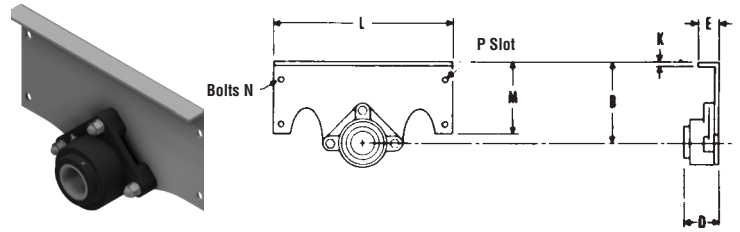
Conveyor Diameter	Shaft Diameter	Part Number	B	D			E	K	L	M	N	P Slot	Weight
				Friction Bearing	Ball Bearing	Roller Bearing							
4	1	4TDO2.*	3 5/8	2 1/4	1 5/8		1 7/16	1/4	8	3 5/8	3/8	7/16 × 9/16	2
6	1 1/2	6TDO3–*	4 1/2	3 1/2	2 1/8	3 3/4	1 1/2	1/4	9 3/4	4 1/2	3/8	7/16 × 9/16	3
9	1 1/2	9TDO3–*	6 1/8	3 1/2	2 1/8	3 3/4	1 5/8	1/4	13 3/4	6 1/8	3/8	7/16 × 9/16	5
	2	9TDO4–*	6 1/8	4 7/16	2 1/2	3 7/8	1 5/8	1/4	13 3/4	6 1/8	3/8	7/16 × 9/16	5
10	1 1/2	10TDO3–*	6 3/8	3 1/2	2 1/8	3 3/4	1 3/4	1/4	14 3/4	6 3/8	3/8	7/16 × 9/16	6
	2	10TDO4–*	6 3/8	4 7/16	2 1/2	3 7/8	1 3/4	1/4	14 3/4	6 3/8	3/8	7/16 × 9/16	6
12	2	12TDO4–*	7 3/4	4 7/16	2 1/2	3 7/8	2	1/4	17 1/4	7 3/4	1/2	9/16 × 11/16	12
	2 7/16	12TDO5–*	7 3/4	5 5/16	2 9/16	4 7/16	2	1/4	17 1/4	7 3/4	1/2	9/16 × 11/16	12
	3	12TDO6–*	7 3/4	5 15/16	3 3/4	4 15/16	2	1/4	17 1/4	7 3/4	1/2	9/16 × 11/16	12
14	2 7/16	14TDO5–*	9 1/4	5 5/16	2 9/16	4 7/16	2	1/4	19 1/4	9 1/4	1/2	9/16 × 11/16	17
	3	14TDO6–*	9 1/4	5 15/16	3 3/8	4 15/16	2	1/4	19 1/4	9 1/4	1/2	9/16 × 11/16	17
16	3	16TDO6–*	10 5/8	6	3 7/16	5	2 1/2	5/16	21 1/4	10 5/8	5/8	11/16 × 13/16	26
18	3	18TDO6–*	12 1/8	6 1/16	3 1/2	5 1/16	2 1/2	3/8	24 1/4	12 1/8	5/8	11/16 × 13/16	33
	3 7/16	18TDO7–*	12 1/8	6 5/8	3 3/4	5 5/8	2 1/2	3/8	24 1/4	12 1/8	5/8	11/16 × 13/16	33
20	3	20TDO6–*	13 1/2	6 1/16	3 1/2	5 1/16	2 1/2	3/8	26 1/4	13 1/2	5/8	11/16 × 13/16	55
	3 7/16	20TDO7–*	13 1/2	6 5/8	3 3/4	5 5/8	2 1/2	3/8	26 1/4	13 1/2	5/8	11/16 × 13/16	55
24	3 7/16	24TDO7–*	16 1/2	6 5/8	3 3/4	5 5/8	2 1/2	3/8	30 1/2	16 1/2	5/8	11/16 × 13/16	81

Inside Discharge

Inside discharge trough ends are used to support end bearing and will allow material to discharge or overflow through the end of the trough. This trough end is used inside the trough where no trough end flanges are required. Drilling for three bolt bronze or flanged ball bearing is standard.
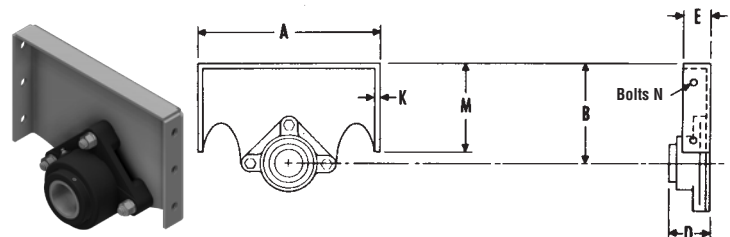
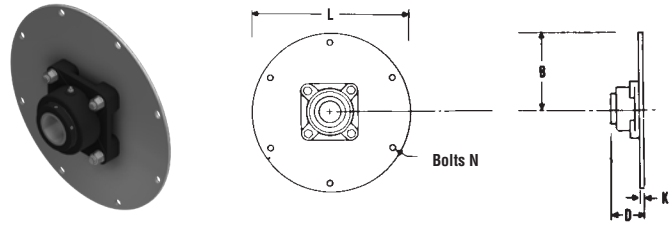| Conveyor Diameter	Shaft Diameter	Part Number	A	B	D			E	K	M	N	Weight
					Friction Bearing	Ball Bearing	Roller Bearing					
4	1	4TDI2–*	5	3 5/8	2 1/4	1 5/8		2	1/4	3 5/8	3/8	2
6	1 1/2	6TDI3–*	7	4 1/2	3 1/2	2 1/8	3 3/4	2	1/4	4 1/2	3/8	3
9	1 1/2	9TDI3–*	10	6 1/8	3 1/2	2 1/8	3 3/4	2	1/4	6 1/8	3/8	5
	2	9TDI4–*	10	6 1/8	4 7/16	2 1/2	3 7/8	2	1/4	6 1/8	3/8	5
10	1 1/2	10TDI3–*	11	6 3/8	3 1/2	2 1/8	3 3/4	2	1/4	6 3/8	3/8	6
	2	10TDI4–*	11	6 3/8	4 7/16	2 1/2	3 7/8	2	1/4	6 3/8	3/8	6
12	2	12TDI4–*	13	7 3/4	4 7/16	2 1/2	3 7/8	2	1/4	7 3/4	1/2	12
	2 7/16	12TDI5–*	13	7 3/4	5 5/16	2 9/16	4 7/16	2	1/4	7 3/4	1/2	12
	3	12TDI6–*	13	7 3/4	5 15/16	3 3/4	4 15/16	2	1/4	7 3/4	1/2	12
14	2 7/16	14TDI5–*	15	9 1/4	5 5/16	2 9/16	4 7/16	2	1/4	9 1/4	5/8	16
	3	14TDI6–*	15	9 1/4	5 15/16	3 3/8	4 15/16	2	1/4	9 1/4	5/8	16
16	3	16TDI6–*	17	10 5/8	6	3 7/16	5	2	5/16	10 5/8	5/8	25
18	3	18TDI6–*	19	12 1/8	6 1/16	3 1/2	5 1/16	2	3/8	12 1/8	5/8	32
	3 7/16	18TDI7–*	19	12 1/8	6 5/8	3 3/4	5 5/8	2	3/8	12 1/8	5/8	32
20	3	20TDI16–*	21	13 1/2	6 1/16	3 1/2	5 1/16	2	3/8	13 1/2	5/8	50
	3 7/16	20TDI7–*	21	13 1/2	6 5/8	3 3/4	5 5/8	2	3/8	13 1/2	5/8	50
24	3 7/16	24TDI7–*	25	16 1/2	6 5/8	3 3/4	5 5/8	2	3/8	16 1/2	5/8	76

−*BB-P   Ball Bearing Plate Only
−*RB-P   Roller Bearing Plate Only

Trough Ends

Outside

Outside tubular trough ends less feet are used to support end bearings on tubular trough where no foot or support is required. Drilling for bronze or flanged ball bearing is standard.

Conveyor Diameter	Shaft Diameter	Part Number	B	D Friction Bearing	D Ball Bearing	D Roller Bearing	K	L	N	Weight
4	1	4CHTE2–*	4	2 1/4	1 5/8		1/4	8	3/8	2
6	1 1/2	6CHTE3–*	5 1/16	3 1/2	2 1/8	3 3/4	1/4	10 1/8	3/8	3
9	1 1/2	9CHTE3–*	6 5/8	3 1/2	2 1/8	3 3/4	1/4	13 1/4	3/8	6
	2	9CHTE4–*	6 5/8	4 7/16	2 1/2	3 7/8	1/4	13 1/4	3/8	6
10	1 1/2	10CHTE3–*	7 3/8	3 1/2	2 1/8	3 3/4	1/4	14 3/4	3/8	7
	2	10CHTE4–*	7 3/8	4 7/16	2 1/2	3 7/8	1/4	14 3/4	3/8	7
12	2	12CHTE4–*	8 1/8	4 7/16	2 1/2	3 7/8	1/4	16 1/4	1/2	13
	2 7/16	12CHTE5–*	8 1/8	5 5/16	2 9/16	4 7/16	1/4	16 1/4	1/2	13
	3	12CHTE6–*	8 1/8	5 15/16	3 3/4	4 15/16	1/4	16 1/4	1/2	13
14	2 7/16	14CHTE5–*	9 1/8	5 5/16	2 9/16	4 7/16	1/4	18 1/4	1/2	19
	3	14CHTE6–*	9 1/8	5 15/16	3 3/8	4 15/16	1/4	18 1/4	1/2	19
16	3	16CHTE6–*	10 5/8	6	3 7/16	5	5/16	21 1/4	5/8	29
18	3	18CHTE6–*	12 1/8	6 1/16	3 1/2	5 1/16	3/8	24 1/4	5/8	39
	3 7/16	18CHTE7–*	12 1/8	6 5/8	3 3/4	5 5/8	3/8	24 1/4	5/8	39
20	3	20CHTE6–*	13 1/8	6 1/16	3 1/2	5 1/16	3/8	26 1/4	5/8	63
	3 7/16	20CHTE7–*	13 1/8	6 5/8	3 3/4	5 5/8	3/8	26 1/4	5/8	63
24	3 7/16	24CHTE7–*	15 1/8	6 5/8	3 3/4	5 5/8	3/8	30 1/4	5/8	87

Outside with Feet

Outside tubular trough ends with feet are used to support end bearing where trough support is required. Drilling for bronze bearing or flanged ball bearing is standard.
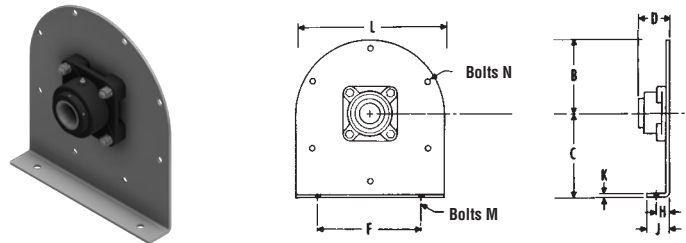
Conveyor Diameter	Shaft Diameter	Part Number	B	C	D Friction Bearing	D Ball Bearing	D Roller Bearing	F	H	J	K	L	M	N	Weight
4	1	4CHTEF2–*	4	4 5/8	2 1/4	1 5/8		5 3/4	1	1 5/8	1/4	8	3/8	3/8	3
6	1 1/2	6CHTEF3–*	5 1/16	5 5/8	3 1/2	2 1/8	3 3/4	8 1/8	1	1 3/4	1/4	10 1/8	3/8	3/8	5
9	1 1/2	9CHTEF3–*	6 5/8	7 7/8	3 1/2	2 1/8	3 3/4	9 3/8	1 1/2	2 5/8	1/4	13 1/4	1/2	3/8	10
	2	9CHTEF4–*	6 5/8	7 7/8	4 7/16	2 1/2	3 7/8	9 3/8	1 1/2	2 5/8	1/4	13 1/4	1/2	3/8	10
10	1 1/2	10CHTEF3–*	7 3/8	8 7/8	3 1/2	2 1/8	3 3/4	9 1/2	1 3/4	2 7/8	1/4	14 3/4	1/2	3/8	12
	2	10CHTEF4–*	7 3/8	8 7/8	4 7/16	2 1/2	3 7/8	9 1/2	1 3/4	2 7/8	1/4	14 3/4	1/2	3/8	12
12	2	12CHTEF4–*	8 1/8	9 5/8	4 7/16	2 1/2	3 7/8	12 1/4	1 5/8	2 3/4	1/4	16 1/4	5/8	1/2	22
	2 7/16	12CHTEF5–*	8 1/8	9 5/8	5 5/16	2 9/16	4 7/16	12 1/4	1 5/8	2 3/4	1/4	16 1/4	5/8	1/2	22
	3	12CHTEF6–*	8 1/8	9 5/8	5 15/16	3 3/4	4 15/16	12 1/4	1 5/8	2 3/4	1/4	16 1/4	5/8	1/2	22
14	2 7/16	14CHTEF5–*	9 1/8	10 7/8	5 5/16	2 9/16	4 7/16	13 1/2	1 5/8	2 7/8	1/4	18 1/4	5/8	1/2	24
	3	14CHTEF6–*	9 1/8	10 7/8	5 15/16	3 3/8	4 15/16	13 1/2	1 5/8	2 7/8	1/4	18 1/4	5/8	1/2	24
16	3	16CHTEF6–*	10 5/8	12	6	3 7/16	5	14 7/8	2	3 1/4	5/16	21 1/4	5/8	5/8	44
18	3	18CHTEF6–*	12 1/8	13 3/8	6 1/16	3 1/2	5 1/16	16	2	3 1/4	3/8	24 1/4	5/8	5/8	56
	3 7/16	18CHTEF7–*	12 1/8	13 3/8	6 5/8	3 3/4	5 5/8	16	2	3 1/4	3/8	24 1/4	5/8	5/8	56
20	3	20CHTEF6–*	13 1/8	15	6 1/16	3 1/2	5 1/16	19 1/4	2 1/4	3 3/4	3/8	26 1/4	3/4	5/8	92
	3 7/16	20CHTEF7–*	13 1/8	15	6 5/8	3 3/4	5 5/8	19 1/4	2 1/4	3 3/4	3/8	26 1/4	3/4	5/8	92
24	3 7/16	24CHTEF7–*	15 1/8	18 1/8	6 5/8	3 3/4	5 5/8	20	2 1/2	4 1/8	3/8	30 1/4	3/4	5/8	134

–*BB-P   Ball Bearing Plate Only
–*RB-P   Roller Bearing Plate Only

For Bolt Pattern see Page H-42
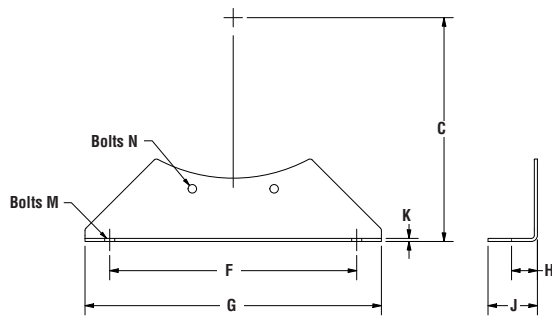
Flange Foot

Trough feet are used to support trough at trough connections.
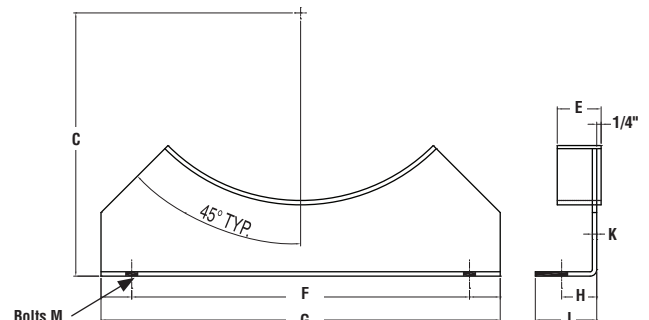
Saddle

Trough saddles are used to support trough where flange feet cannot be used at connections

Conveyor Diameter	Part Number			Weight		
	Saddle	Tubular	Flange Foot	Saddle	Tubular	Flange Foot
4	4TS	4CHTFF	4TFF	1.5	1	1.5
6	6TS	6CHTFF	6TFF	2.0	2	2.0
9	9TS	9CHTFF	9TFF	4.5	4.5	4.5
10	10TS	10CHTFF	10TFF	5.0	4.5	5.0
12	12TS	12CHTFF	12TFF	6.0	5	6.0
14	14TS	14CHTFF	14TFF	7.0	7	7.0
16	16TS	16CHTFF	16TFF	8.0	8	7.5
18	18TS	18CHTFF	18TFF	10.0	10	9.5
20	20TS	20CHTFF	20TFF	13.0	11	12.5
24	24TS	24CHTFF	24TFF	15.0	12	14.5

Conveyor Diameter	C	E	F	G	H	J	K	M*	N
4	4 5/8	1 7/16	5 3/4	7 3/8	1	1 5/8	3/16	3/8	3/8
6	5 5/8	1 7/16	8 1/8	10	1 1/4	2	3/16	3/8	3/8
9	7 7/8	1 3/4	9 3/8	12	1 1/2	2 5/8	3/16	1/2	3/8
10	8 7/8	1 3/4	9 1/2	12 3/8	1 3/4	2 7/8	3/16	1/2	3/8
12	9 5/8	1 3/4	12 1/4	15	1 5/8	2 3/4	1/4	5/8	1/2
14	10 7/8	2	13 1/2	16 1/2	1 5/8	2 7/8	1/4	5/8	1/2
16	12	2	14 7/8	18	2	3 1/4	1/4	5/8	5/8
18	13 3/8	2	16	19 1/8	2	3 1/4	1/4	5/8	5/8
20	15	2 1/2	19 1/4	22 3/4	2 1/4	3 3/4	1/4	3/4	5/8
24	18 1/8	2 1/2	20	24	2 1/2	4	1/4	3/4	5/8

* Holes for Bolt M Slotted

Trough End Flanges
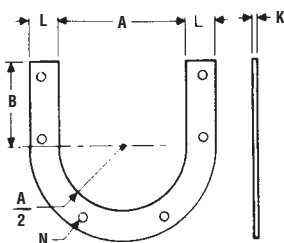
Size	Part Number	A		B	K	L	N	Weight	Red Rubber Gasket
		Trough Thickness							Part Number
		Thru 10 Ga.	3/16 & 1/4						
4	4TF*	5 1/4	5 3/8	3 3/8	1/4	1 1/4	3/8	.09	4TFG
6	6TF*	7 1/4	7 3/8	4 1/4	1/4	1 1/2	3/8	1.5	6TFG
9	9TF*	10 1/4	10 1/2	5 7/8	1/4	1 3/4	3/8	2.4	9TFG
10	10TF*	11 1/4	11 1/2	6 1/8	1/4	1 3/4	3/8	2.6	10TFG
12	12TF*	13 1/4	13 1/2	7 1/2	1/4	2	1/2	5.6	12TFG
14	14TF*	15 1/4	15 1/2	9	1/4	2	1/2	6.5	14TFG
16	16TF*	17 1/4	17 1/2	10 3/8	1/4	2	5/8	7.4	16TFG
18	18TF*	19 1/4	19 1/2	11 13/16	1/4	2 1/2	5/8	10.2	18TFG
20	20TF*	21 1/4	21 1/2	13 3/16	1/4	2 1/2	5/8	11.3	20TFG
24	24TF*	25 1/4	25 1/2	16 1/2	1/4	2 1/2	5/8	15.5	24TFG

*–10 used for troughs through 10 ga., –3 used for troughs 3/16 and 1/4 thick.
*** For White Rubber Gasket Add WN

End
Bearing

KEEP THE HOUSING REPLACE THE INSERT.
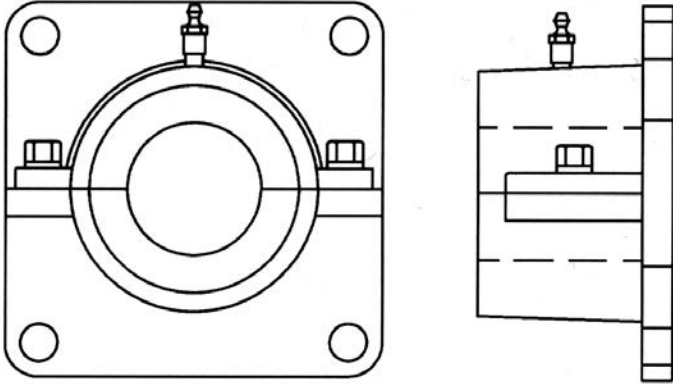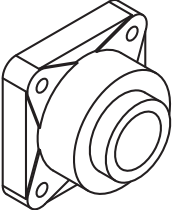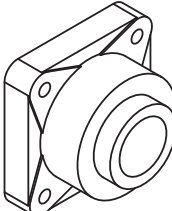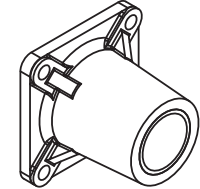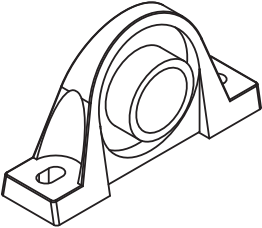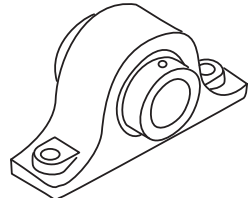
TEBH- Split Bearing Housings will help cut down on a plant's repair parts inventory, as well as the cost of the bearing. The rugged cast iron housing is not subject to wear, only the Style 220 Hanger bearing insert needs to be replaced.

The housings match CEMA standard ball bearing bolt pattern, so they can be used with most seals.

Split bearing housings are stocked in all Martin stocking facilities. Call your Martin distributor for more information.

TROUGH END BEARING HOUSINGS

Martin Split Bearing Housings utilize Martin Style 220 Hanger Bearings.

FLANGE UNITS	Mounted on trough end plate		**Ball Bearing Flange Unit**
			Roller Bearing Flange Unit
			Bronze Sleeve Bearing Flange Unit
PILLOW BLOCKS	Mounted on pedestal of outboard bearing trough end.		**Ball Bearing Pillow Block**
			Roller Bearing Pillow Block

Bronze Flange Unit
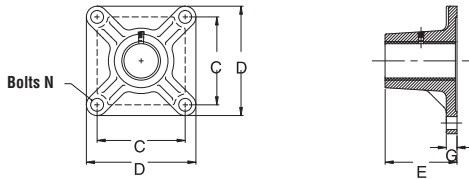
Bore	Part Number	C	D	E	G	N
1	TEB2BR	2 3/4	3 3/4	2	17/32	3/8
1 1/2	TEB3BR	4	5 1/8	3 1/4	9/16	1/2
2	TEB4BR	5 1/8	6 3/8	4 3/16	5/8	5/8
2 7/16	TEB5BR	5 5/8	6 7/8	4 15/16	13/16	5/8
3	TEB6BR	6	7 3/4	5 11/16	7/8	5/8
3 7/16	TEB7BR	6 3/4	8 7/16	6 1/4	1	13/16

Ball Bearing Flange Unit
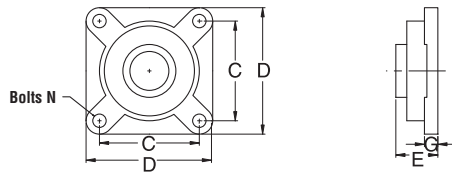
Bore	Part Number	C	D	E	G	N
1	TEB2BB	2 3/4	3 3/4	1 3/8	1/2	3/8
1 1/2	TEB3BB	4	5 1/8	1 7/8	9/16	1/2
2	TEB4BB	5 1/8	6 1/2	2 3/8	11/16	5/8
2 7/16	TEB5BB	5 5/8	7	2 5/16	11/16	5/8
3	TEB6BB	6	7 3/4	3 1/8	7/8	3/4
3 7/16	TEB7BB	6 3/4	8 7/16	3 3/8	1	3/4

Roller Bearing Flange Unit
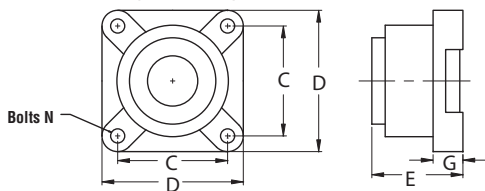
Bore	Part Number	C	D	E	G	N
1 1/2	TEB3R	4 1/8	5 3/8	3 1/2	1 3/16	1/2
2	TEB4R	4 3/8	5 5/8	3 5/8	1 3/16	1/2
2 7/16	TEB5R	5 3/8	6 7/8	4 3/16	1 1/2	5/8
3	TEB6R	6	7 3/4	4 11/16	1 5/8	3/4
3 7/16	TEB7R	7	9 1/4	5 1/4	1 7/8	3/4

Bronze Discharge Unit
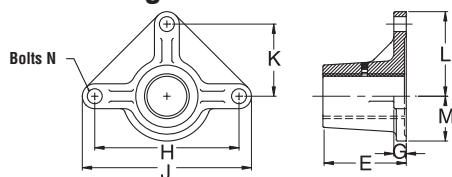
Bore	Part Number	E	G	H	J	K	L	M	N
1	TDB2BR	2	1/2	3 7/8	5 3/8	1 15/16	2 11/16	1	3/8
1 1/2	TDB3BR	3 1/4	9/16	5 5/8	7 1/4	2 13/16	3 5/8	1 1/4	1/2
2	TDB4BR	4 3/16	5/8	7 1/4	8	3 5/8	4	1 5/8	5/8
2 7/16	TDB5BR	4 15/16	11/16	8	9 7/8	4	4 15/16	1 7/8	5/8
3	TDB6BR	5 11/16	7/8	8 1/2	11	4 1/4	5 1/2	2 1/8	5/8
3 7/16	TDB7BR	6 1/4	1	9 1/2	12	4 3/4	6	2 1/2	3/4

Ball Bearing Discharge Unit
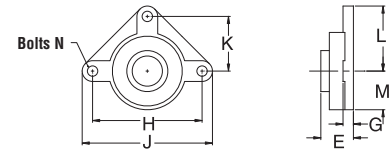
Bore	Part Number	E	G	H	J	K	L	M	N
1	TDB2BB	1 3/8	1/2	3 7/8	5 3/8	1 15/16	2 11/16	2	3/8
1 1/2	TDB3BB	2	9/16	5 5/8	7 1/4	2 13/16	3 5/8	2 1/2	1/2
2	TDB4BB	2 1/8	5/8	7 1/4	8	3 5/8	4	3	5/8
2 7/16	TDB5BB	2 1/2	11/16	8	9 7/8	4	4 15/16	3 1/2	5/8
3	TDB6BB	3 1/2	7/8	8 1/2	11	4 1/4	5 1/2	4	3/4
3 7/16	TDB7BB	4	1	9 1/2	12	4 3/4	6	4 1/2	3/4

Trough End Bearing Housing
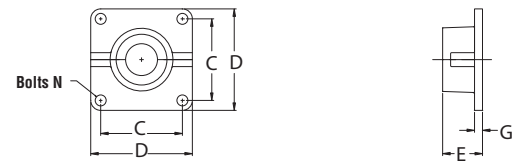
Bore	Part Number	C	D	E	G	N
1 1/2	TEBH3	4	5 1/4	2 1/2	1/2	1/2
2	TEBH4	5 1/8	6 3/8	2 1/2	1/2	5/8
2 7/16	TEBH5	5 5/8	6 7/8	3 9/16	9/16	5/8
3	TEBH6	6	7 3/4	3 5/8	5/8	3/4
3 7/16	TEBH7	7	9 1/4	4 3/4	3/4	3/4

Use #220 Type Hanger Bearings, See Page H-93.

Ball Bearing Pillow Block
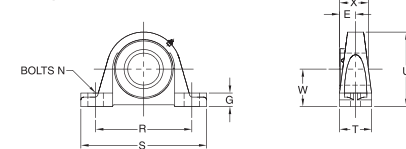
Bore	Part Number	E	G	N	R	S	T	U	W	X
1	TPB2BB	51/64	19/32	3/8	4 1/8	5 1/2	1 1/16	2 13/16	1 7/16	1 11/64
1 1/2	TPB3BB	1 11/64	7/8	1/2	5 1/2	7 1/4	1 7/8	4 1/8	2 1/8	1 21/64
2	TPB4BB	1 17/64	1	5/8	6 3/8	8 1/4	2 1/8	4 17/64	2 1/4	1 13/16
2 7/16	TPB5BB	1 15/16	1 1/16	5/8	7 3/8	9 5/8	2 3/8	5 15/32	2 3/4	1 57/64
3	TPB6BB	1 1/2	1 1/4	7/8	9	11 3/4	3	6 31/32	3 1/2	2 3/8
3 7/16	TPB7BB	1 9/16	1 11/32	7/8	11	14	3 3/8	7 7/8	4	2 23/64

Roller Bearing Pillow Block
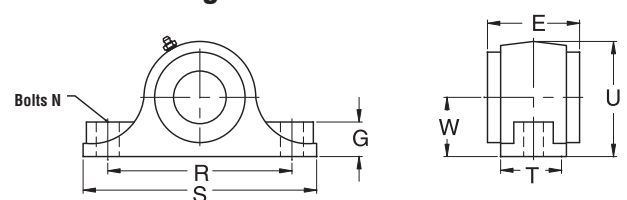
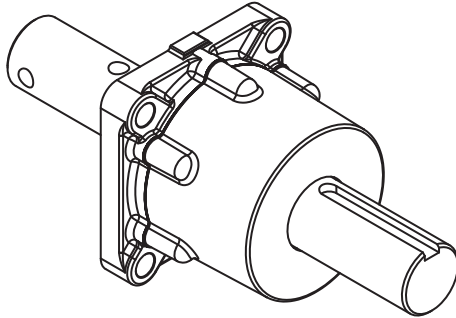| Bore	Part Number	E	G	N	R	S	T	U	W
1 1/2	TPB3R	3 3/8	1 1/4	1/2	6 1/4	7 7/8	2 3/8	4 1/4	2 1/8
2	TPB4R	3 1/2	1 3/8	5/8	7	8 7/8	2 1/2	4 1/2	2 1/4
2 7/16	TPB5R	4	1 5/8	5/8	8 1/2	10 1/2	2 7/8	5 1/2	2 3/4
3	TPB6R	4 1/2	1 7/8	3/4	9 1/2	12	3 1/8	6 1/4	3 1/8
3 7/16	TPB7R	5	2 1/4	7/8	11	14	3 5/8	7 1/2	3 3/4

Thrust
Bearings

**TYPE E
THRUST
BEARINGS**
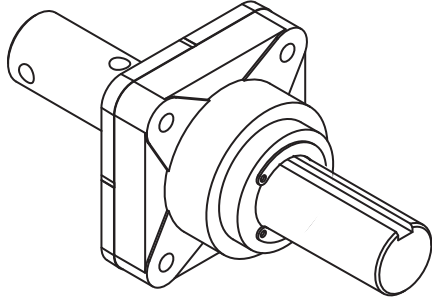
Most common and economical thrust unit when a screw conveyor type drive is not being used.

**TYPE H
THRUST
BEARINGS**

For heavy-duty thrust requirements.

**BRONZE
WASHER**
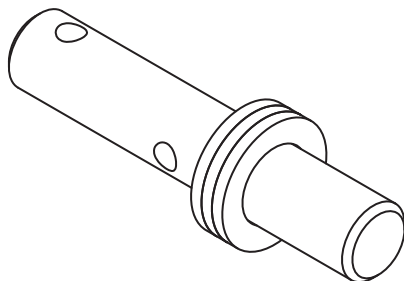
Light duty applications only.
Used inside the trough and when screw used in compression.

Type E Thrust Assembly

Type E roller thrust bearings are designed to carry thrust in both directions and carry radial load under normal conditions. This double roller bearing is furnished with a lip type seal plate and either drive or tail shaft whichever is applicable to conveyor design.
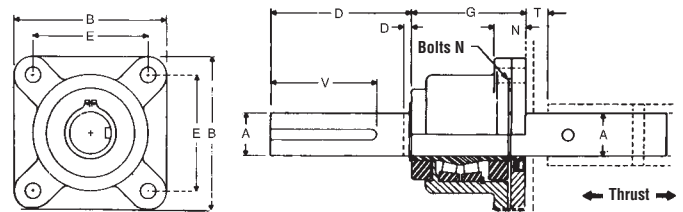
A	Part Number		B	D		E	G	H	N	T	V	Weight	
	Drive Shaft	End Shaft		Drive Shaft	End Shaft							Drive Shaft	End Shaft
1 1/2	CT3D	CT3E	5 3/8	4 3/4	3/4	4 1/8	4	1 11/16	1/2	1 1/4	4	22	20
2	CT4D	CT4E	5 5/8	5	3/4	4 3/8	4 1/8	1 11/16	1/2	1 1/4	4 1/2	32	29
2 7/16	CT5D	CT5E	6 7/8	5 1/2	3/4	5 3/8	4 11/16	2	5/8	1 13/16	5	50	44
3	CT6D	CT6E	7 3/4	6 1/2	3/4	6	5 3/16	2 1/8	3/4	1 7/8	6	73	60
3 7/16	CT7D	CT7E	9 1/4	7 1/2	3/4	7	6	2 5/8	3/4	2 3/8	7	111	88

Heavy-Duty RB End Thrust Bearings

Type E roller thrust bearings are designed to carry thrust in both directions and carry radial load under normal conditions. This double roller bearing is furnished with a lip type seal plate and either drive or tail shaft whichever is applicable to conveyor design.
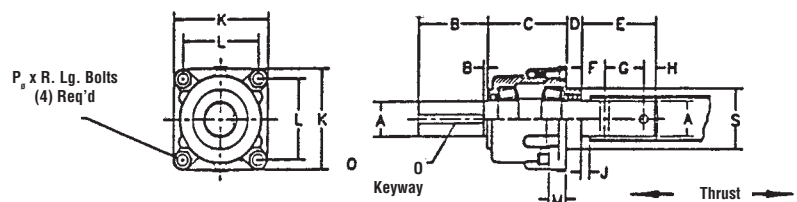
A	With Drive Shaft		With Tail Shaft		B		C	D	E	F	G	H	J	K	L	M	O	P	R	S
Shaft Dia.	Part Number	Wt.	Part Number	Wt.	Drive Shaft	End Shaft											Keyway			
1 1/2	CTH3D	60	CTH3E	52	4 1/2	1/4	6 3/4	1 1/8	4 7/8	1	3	7/8	1/8	7 1/4	5 3/4	1 3/16	3/8 × 4 1/4	3/4	2 1/2	4 3/4
2	CTH4D	65	CTH4E	56	4 1/2	1/4	6 3/4	1 1/8	4 7/8	1	3	7/8	1/8	7 1/4	5 3/4	1 3/16	1/2 × 4 1/4	3/4	2 1/2	4 3/4
2 7/16	CTH5D	80	CTH5E	66	5 9/16	5/16	6 1/4	1 1/4	5 7/16	1 1/2	3	15/16	9/16	8	6 1/4	1 1/2	5/8 × 5 1/4	3/4	3	5 1/2
3	CTH6D	145	CTH6E	119	6 1/8	1/4	8 1/4	1 1/2	5 3/8	1 3/8	3	1	3/8	10	8	1 3/4	3/4 × 5 3/4	1	3 1/2	6
3 7/16	CTH7D	170	CTH7E	140	7 1/8	3/8	8 1/4	1 1/2	7 5/8	2 3/8	4	1 1/4	7/8	10	8	1 3/4	7/8 × 6 3/4	1	3 1/2	6

Dimensions in inches and average weight in pounds.
Other shaft sizes available are 3 15/16", 4 7/16" & 4 15/16". Please consult factory.
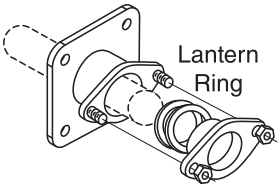
Thrust Washers

Thrust washers are designed for use where light thrust loads prevail. Style A or B mounting may be used depending on direction of thrust. This unit consists of two steel washers separated by one bronze washer, and Style B is not recommended for use in conveyors handling abrasive materials.
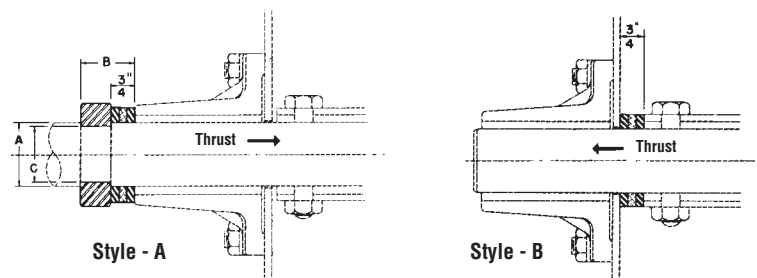
Style - A   **Style - B**

A	Washers & Collar Style A		Washer Set Style B		B	C
Size Shaft	Part Number	Weight	Part Number	Weight		
1 1/2	CTCW3	2.4	CTW3	1	1 1/4	1 1/4
2	CTCW4	2.8	CTW4	1.25	1 7/16	1 3/4
2 7/16	CTCW5	3.9	CTW5	1.5	1 1/2	2 1/8
3	CTCW6	4.6	CTW6	2	1 1/2	2 3/4
3 7/16	CTCW7	6.1	CTW7	3	1 5/8	3 1/4

Shaft Seals

Martin

|		
WASTE PACK SEAL		Waste pack seals can be furnished with waste packing or in combination with lip seal. This type seal is normally installed between the trough end and bearing, but may be used separately on pedestal type trough ends. An opening is provided at top for repacking without removing seal from trough end. Can be used with flanged ball, roller or other standard 4-bolt bearings.
MARTIN SUPER PACK SEAL		Martin Super Pack Seal combines the heavy duty waste pack housing with the superior sealing characteristics of a Super Pack Seal. Seal may also be air or grease purged for difficult sealing applications.
PRODUCT DROP OUT SEAL		This flange type dust seal is designed for insertion between trough end and flanged ball bearing. The cast iron housing is open on all four sides for exit of material that might work past seal or lubricant from bearing.
PLATE SEAL		Plate seals are the most common and economical seal. It is normally furnished with a lip seal. This type seal is normally installed between the trough end and bearing, but may be used separately on pedestal type trough ends. Can be used with flanged ball, roller or other standard 4-bolt bearings.
SPLIT GLAND SEAL		Split gland compression type seals provide for easy replacement and adjustment of packing pressure on the shaft without removal of the conveyor. These seals can be installed inside or outside the end plates.
COMPRESSION TYPE PACKING GLAND SEAL		Flanged packing gland seals consist of an external housing and an internal gland which is forced into the housing to compress the packing. This is the most positive type shaft seal and may be used where minor pressure requirements are desired.
AIR-PURGED SEAL	Lantern Ring	Air purge shaft seals are arranged for attaching to standard or special trough ends. A constant air pressure is maintained to prevent material from escaping from the trough along the shaft. The air purge seal is desirable for sealing highly abrasive materials. May be purged with grease or water.

Compression Type Packing Gland Seal

Flanged gland seals consist of an external housing and an internal gland which is forced into the housing to compress the packing. This is the most positive type shaft seal and may be used where pressure requirements are desired.
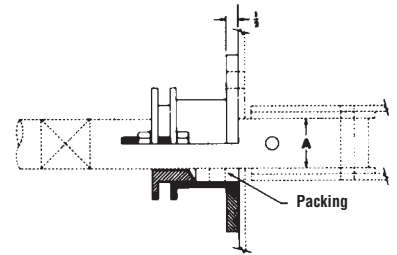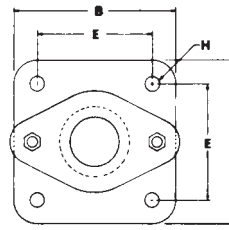
Shaft Diameter	Part Number	B	E	H Bolts	Weight
1 1/2	PGC3	5 1/4	4	1/2	14
2	PGC4	7 1/8	5 1/8	5/8	18
2 7/16	PGC5	7 5/8	5 5/8	5/8	21
3	PGC6	8 1/2	6	3/4	27
3 7/16	PGC7	9 1/4	6 3/4	3/4	30

*Braided rope graphite packing is standard. Other types available on request.

Split Gland Seal

Split gland compression type seals provide for easy replacement and adjustment of packing pressure on the shaft without removal of the conveyor. These seals are normally installed inside the end plates.
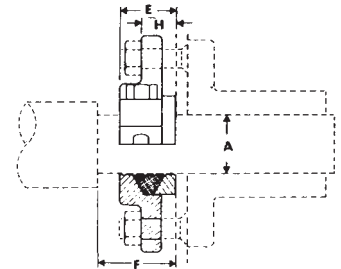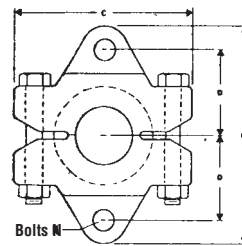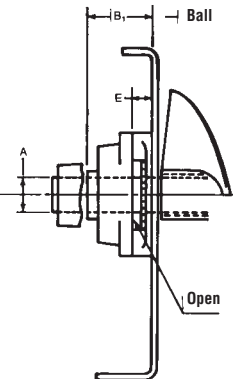
Shaft Diameter	Part Number	C	D	E	F	G	H	N	Weight
1 1/2	CSS3	4 3/4	2 3/16	1 7/16	2 1/2	5 7/8	7/8	1/2	5
2	CSS4	6 1/4	2 5/8	1 1/2	2 1/2	6 1/2	7/8	1/2	10
2 7/16	CSS5	6 7/8	3 1/16	1 5/8	3 1/4	7 5/8	1	5/8	15
3	CSS6	7 1/2	3 9/16	1 5/8	3 1/4	8 5/8	1	5/8	22
3 7/16	CSS7	8 3/4	4 1/8	2 1/8	3 3/4	10 1/4	1 1/4	3/4	30

Flanged Product Drop-Out Seal

This flange type dust seal is designed for insertion between trough end and flanged bearing. The cast iron housing is open on all four sides for exit of material that might work past seal or lubricant from bearing.
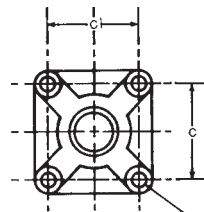
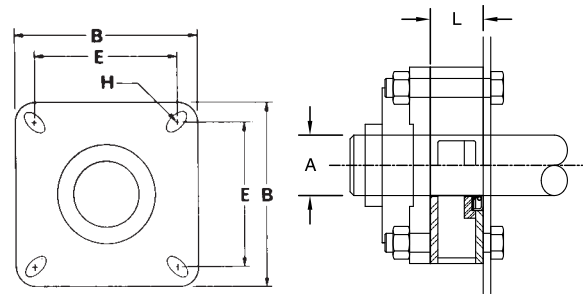| Shaft Diameter	Part Number	Weight	B₁	C	E	D
1	CSFP2	1.75	2 1/8	2 3/4	11/16	3/8
1 1/2	CSFP3	3.4	2 57/64	4	7/8	1/2
2	CSFP4	5.3	3 3/16	5 1/8	7/8	5/8
2 7/16	CSFP5	5.8	3 9/16	5 5/8	7/8	5/8
3	CSFP6	7.2	4 3/8	6	7/8	3/4
3 7/16	CSFP7	10.3	4 31/32	6 3/4	1	3/4

Shaft Seals

Martin Super Pack Seal

Martin super pack seal combines the heavy duty waste pack housing with the superior sealing characteristics of a super pack seal. Seal may also be air or grease purged for difficult sealing applications.

With Super Pack Seal

A Shaft Diameter	Part Number	B	L	E (-B)	E (-R)	H Bolts (-B)	H Bolts (-R)	Weight
1 1/2	MSP3-SD	5 3/8	1 3/4	4	4 1/8	1/2	1/2	6
2	MSP4-SD	6 1/2	1 3/4	5 1/8	4 3/8	5/8	1/2	8
2 7/16	MSP5-SD	7 3/8	1 3/4	5 5/8	5 3/8	5/8	5/8	10
3	MSP6-SD	7 3/4	1 3/4	6	6	3/4	3/4	13
3 7/16	MSP7-SD	9 1/4	2 1/4	6 3/4	7	3/4	3/4	16

Waste Pack Seal

Waste pack seals are furnished with waste packing in combination with lip seal. This type seal is normally installed between the trough end and bearing, but may be used separately on pedestal type trough ends. An opening is provided at top for repacking without removing seal from trough end.
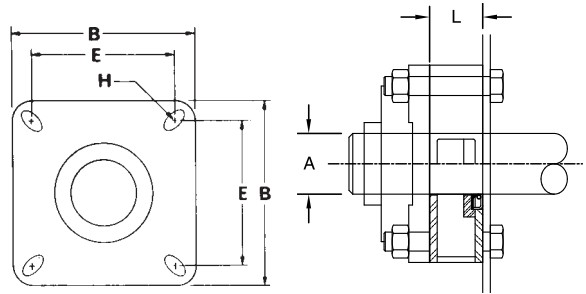
With Lip Seal

| A Shaft Diameter	Part Number	B	L	E (-B)	E (-R)	H Bolts (-B)	H Bolts (-R)	Weight
1 1/2	CSW3	5 3/8	1 3/4	4	4 1/8	1/2	1/2	6
2	CSW4	6 1/2	1 3/4	5 1/8	4 3/8	5/8	1/2	8
2 7/16	CSW5	7 3/8	1 3/4	5 5/8	5 3/8	5/8	5/8	10
3	CSW6	7 3/4	1 3/4	6	6	3/4	3/4	13
3 7/16	CSW7	9 1/4	2 1/4	6 3/4	7	3/4	3/4	16

Plate Seal

Plate seals are the most common and economical seal. They are furnished with a lip seal. This type seal is normally installed between the trough end and bearing, but may be used separately on pedestal type trough ends. Slotted mounting holes allow use with both ball and roller flanged bearings.
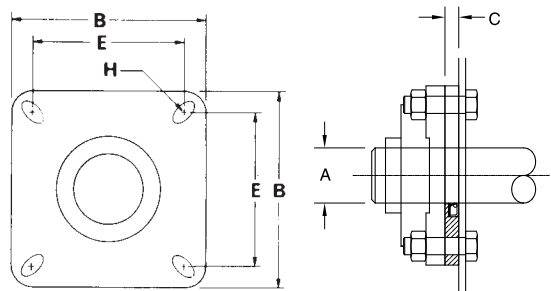
A Shaft Diameter	Part Number	B	C	E (-B)	E (-R)	H Bolts (-B)	H Bolts (-R)	Weight
1 1/2	CSP3	5 3/8	1/2	4	4 1/8	1/2	1/2	2
2	CSP4	6 1/2	1/2	5 1/8	4 3/8	5/8	1/2	3
2 7/16	CSP5	7 3/8	1/2	5 5/8	5 3/8	5/8	5/8	4
3	CSP6	7 3/4	1/2	6	6	3/4	3/4	5
3 7/16	CSP7	9 1/4	3/4	6 3/4	7	3/4	3/4	8

STANDARD PITCH, SINGLE FLIGHT
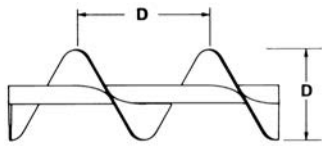
Conveyor screws with pitch equal to screw diameter are considered standard. They are suitable for a whole range of materials in most conventional applications.
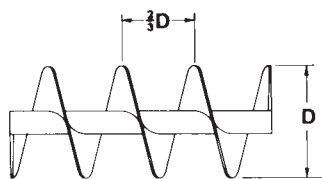
## TAPERED, STANDARD PITCH, SINGLE FLIGHT
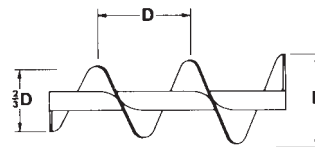
Screw flights increase from 2/3 to full diameter. Used in screw feeders to provide uniform withdrawal of lumpy materials. Generally equivalent to and more economical than variable pitch.

Price on Application

SHORT PITCH, SINGLE FLIGHT

Flight pitch is reduced to 2/3 diameter. Recommended for inclined or vertical applications. Used in screw feeders. Shorter pitch reduces flushing of materials which fluidize.

SINGLE CUT-FLIGHT, STANDARD PITCH
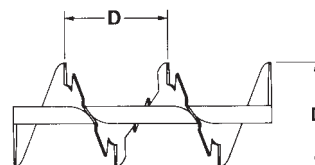
Screws are notched at regular intervals at outer edge. Affords mixing action and agitation of material in transit. Useful for moving materials which tend to pack.

HALF PITCH, SINGLE FLIGHT
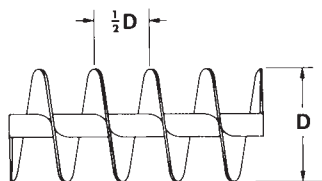
Similar to short pitch except pitch is reduced to 1/2 standard pitch. Useful for inclined applications, for screw feeders and for handling extremely fluid materials.

CUT & FOLDED FLIGHT, STANDARD PITCH
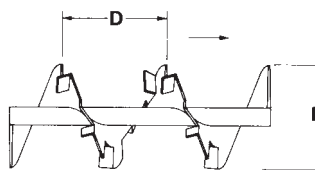
Folded flight segments lift and spill the material. Partially retarded flow provides thorough mixing action. Excellent for heating, cooling or aerating light substances.

END DISC ON CONVEYOR SCREW
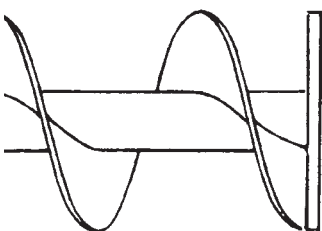
An end disc is the same diameter as the screw and is welded flush with the end of the pipe shaft at its discharge end and, of course, rotates with the screw. The end disc helps to keep discharging material away from the trough end seal.

Price on Application

SINGLE FLIGHT RIBBON
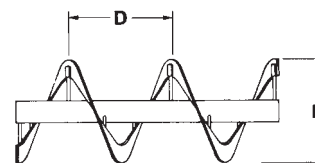
Excellent for conveying sticky or viscous materials. Open space between flighting and pipe eliminate collection and build-up of material.

VARIABLE PITCH, SINGLE FLIGHT
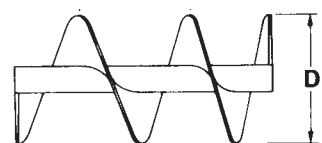
Flights have increasing pitch and are used in screw feeders to provide uniform withdrawal of fine, free flowing materials over the full length of the inlet opening.

Price on Application

STANDARD PITCH WITH PADDLES
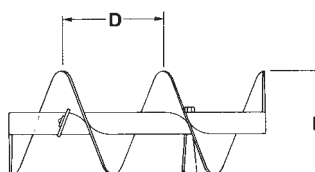
Adjustable paddles positioned between screw flights opposed flow to provide gentle but thorough mixing action.

DOUBLE FLIGHT, STANDARD PITCH
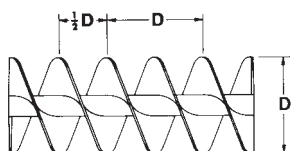
Double flight, standard pitch screws provide smooth regular material flow and uniform movement of certain types or materials.

PADDLE
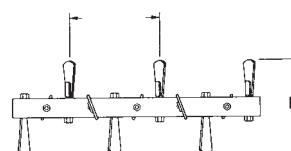
Adjustable paddles provide complete mixing action, and controlled material flow.

Conveyor Screws

Helicoid flights are formed in a special rolling machine by forming a steel strip into a continuous one-piece helix of the desired diameter, pitch and thickness to fit conveyor screw pipes. The helicoid flight is tapered in cross section, with the thickness at the inner edge approximately twice the thickness of the outer edge.

Sectional flights are individual flights or turns blanked from steel plates and formed into a spiral or helix of the desired diameter and pitch to fit conveyor screw pipes. The flights are butt welded together to form a continuous conveyor screw. Modifications can be furnished, such as, fabrication from various metals, different flight thicknesses, other diameters and pitches. The buttweld flight is the same thickness in the full cross section.

Helicoid Flight   **Sectional Flight**

Key to Conveyor Size Designation

The letter "H" indicates screw conveyor with helicoid flighting. The figures to the left of the letters indicate the nominal outside diameter of the conveyor in inches. The first figure following the letters is approximately twice the diameter of the couplings in inches. The last two figures indicate the nominal thickness of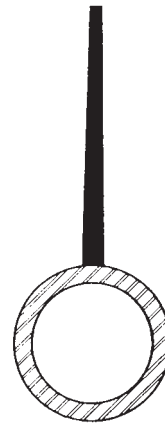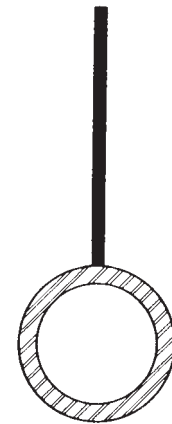 flighting at the outer edge in 1/64". Thus conveyor 12H408 indicates 12" diameter helicoid conveyor for 2" couplings with flighting 8/64" or 1/8" thickness at outer edge. Hand of conveyor is indicated by "R" or "L" following the designation.

Comparison Table • helicoid flight and sectional flight conveyor screws

Screw Diameter	Helicoid Flight						Sectional Flight			
	Conveyor Screw Size Designation ▽	Former Designation	Coupling Diameter	Nominal Inside Diameter of Pipe	Thickness of Flight		Conveyor Screw Size Designation ▽	Coupling Diameter	Nominal Inside Diameter of Pipe	Thickness of Flight*
					Inner Edge	Outer Edge				
4	4H206	4 X	1	1 3/8	3/16	3/32	–	–	–	–
6	6H304	6 Standard	1 1/2	2	1/8	1/16	–	–	–	–
	6H308	6 X	1 1/2	2	1/4	1/8	6S309	1 1/2	2	10 ga.
	6H312	6 XX	1 1/2	2	3/8	3/16	6S312	1 1/2	2	3/16 in.
9	9H306	9 Standard	1 1/2	2	3/16	3/32	9S307	1 1/2	2	12 ga.
	9H406	9 Special	2	2 1/2	3/16	3/32	9S407	2	2 1/2	12 ga.
	9H312	9 X	1 1/2	2	3/8	3/16	9S312	1 1/2	2	3/16 in.
	9H412	9 XX	2	2 1/2	3/8	3/16	9S412	2	2 1/2	3/16 in.
	9H414	—	2	2 1/2	7/16	7/32	9S416	2	2 1/2	1/4 in.
10	10H306	10 Standard	1 1/2	2	3/16	3/32	10S309	1 1/2	2	10 ga.
	10H412	10 XX	2	2 1/2	3/8	3/16	10S412	2	2 1/2	3/16 in.
12	12H408	12 Standard	2	2 1/2	1/4	1/8	12S409	2	2 1/2	10 ga.
	12H508	12 Special	2 7/16	3	1/4	1/8	12S509	2 7/16	3	10 ga.
	12H412	12 X	2	2 1/2	3/8	3/16	12S412	2	2 1/2	3/16 in.
	12H512	12 XX	2 7/16	3	3/8	3/16	12S512	2 7/16	3	3/16 in.
	12H614	—	3	3 1/2	7/16	7/32	12S616	3	3 1/2	1/4 in.
14	14H508	14 Standard	2 7/16	3	1/4	1/8	14S509	2 7/16	3	10 ga.
	14H614	14 XX	3	3 1/2	7/16	7/32	14S616	3	3 1/2	1/4 in.
16	16H610	16 Standard	3	3 1/2	5/16	5/32	16S609	3	3 1/2	10 ga.
	16H614	—	3	4	7/16	7/32	16S616	3	3 1/2	1/4 in.

▽ Size designation: Examples: 12H412 and 12S412.
       12 = screw diameter in inches
       H = helicoid flight
       S = sectional flight
       4 = 2 times 2" coupling diameter
       12 = thickness of flight at periphery in increments of 1/64"

* Sectional flights are typically made with 3/16" thick minimum plate.
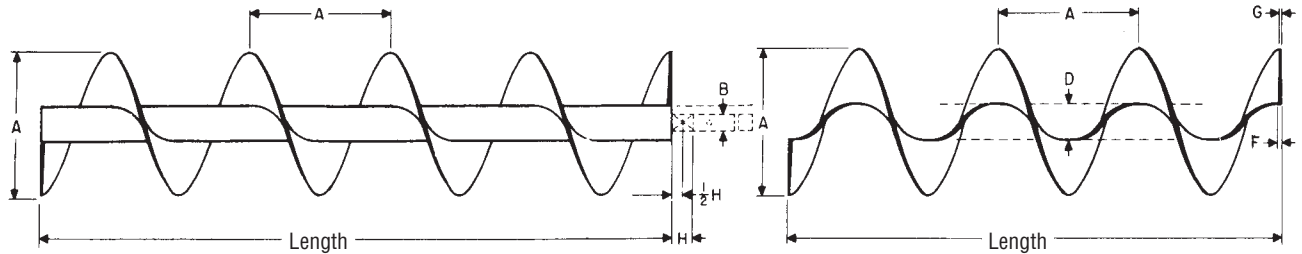
Helicoid Conveyor Screw

Flighting

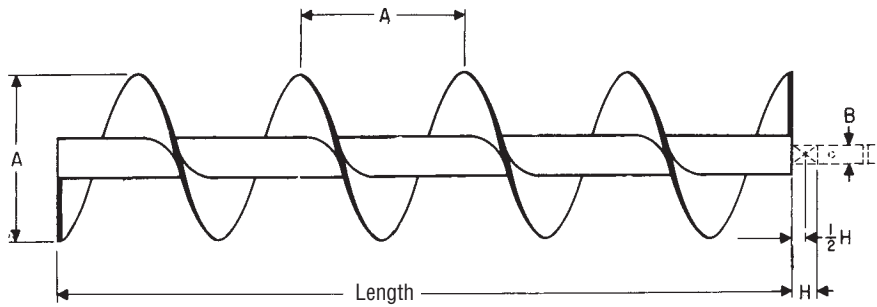| A	B	Size Part No. Conveyor Mounted	Size Part No. Flighting Only	D Pipe Size		Flight Thickness		H	Standard Length Feet – Inches	Average Weight			
Screw Diameter	Coupling Diameter			Nominal Inside	Outside	F Inside	G Outside	Coupling Bearing Length		Complete Screw		Flighting Only	
										Standard Length	Per Foot	Standard Length	Per Foot
4	1	4H206–*	4HF206–*	1 3/8	1 5/8	3/16	3/32	1 1/2	9 – 10 1/2	40	4	16	1.3
6	1 1/2	6H304–*	6HF304–*	2	2 3/8	1/8	1/16	2	9 – 10	52	5	14	1.4
	1 1/2	6H308–*	6HF308–*	2	2 3/8	1/4	1/8	2	9 – 10	62	6	28	2.8
	1 1/2	6H312–*	6HF312–*	2	2 3/8	3/8	3/16	2	9 – 10	72	7	42	4.3
9	1 1/2	9H306–*	9HF306–*	2	2 3/8	3/16	3/32	2	9 – 10	70	7	31	3.2
	1 1/2	9H312–*	9HF312–*	2	2 3/8	3/8	3/16	2	9 – 10	101	10	65	6.1
	2	9H406–*	9HF406–*	2 1/2	2 7/8	3/16	3/32	2	9 – 10	91	9	30	3.0
	2	9H412–*	9HF412–*	2 1/2	2 7/8	3/8	3/16	2	9 – 10	121	12	60	6.6
	2	9H414–*	9HF414–*	2 1/2	2 7/8	7/16	7/32	2	9 – 10	131	13	70	6.3
10	1 1/2	10H306–*	10HF306–*	2	2 3/8	3/16	3/32	2	9 – 10	81	8	48	4.9
	2	10H412–*	10HF412–*	2 1/2	2 7/8	3/8	3/16	2	9 – 10	130	13	76	7.7
12	2	12H408–*	12HF408–*	2 1/2	2 7/8	1/4	1/8	2	11 – 10	140	12	67	5.7
	2	12H412–*	12HF412–*	2 1/2	2 7/8	3/8	3/16	2	11 – 10	180	15	102	8.6
	2 7/16	12H508–*	12HF508–*	3	3 1/2	1/4	1/8	3	11 – 9	168	14	64	5.4
	2 7/16	12H512–*	12HF512–*	3	3 1/2	3/8	3/16	3	11 – 9	198	17	96	8.2
	3	12H614–*	12HF614–*	3 1/2	4	7/16	7/32	3	11 – 9	220	18	112	9.3
14	2 7/16	14H508–*	14HF508–*	3	3 1/2	1/4	1/8	3	11 – 9	170	14	84	7.1
	3	14H614–*	14HF614–*	3 1/2	4	7/16	7/32	3	11 – 9	254	22	132	11.2
16	3	16H610–*	16HF610–*	3 1/2	4	5/16	5/32	3	11 – 9	228	19	120	10.0
▽	3	16H614–*	16HF614–*	4	4 1/2	7/16	7/32	3	11 – 9	285	24	154	11.7

▽ Offered only in full pitch helicoid flighting.
–* R   For Right Hand
–* L   For Left Hand
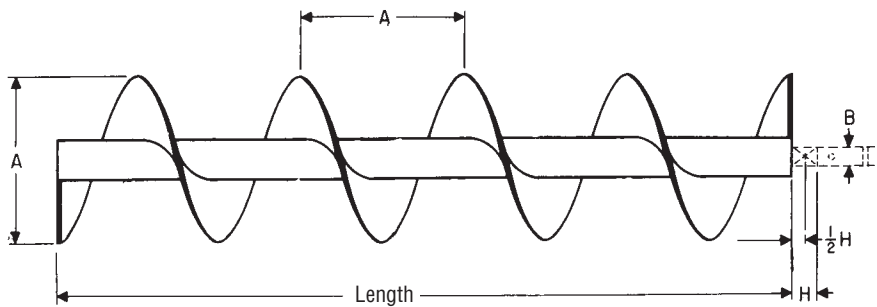
Conveyor Screws
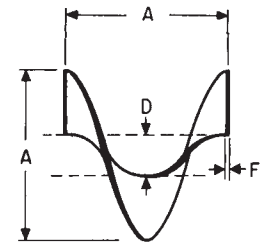# (Sectional)

Martin

Sectional Conveyor Screw

Flight

A	B	Size Part No. Conveyor Mounted	Size Part No. Flighting Only	Pipe Size		F	H	Standard Length Feet-Inches	Average Weight			
Screw Diameter	Coupling Diameter			Nominal Inside	D Outside	Flight Thickness	Coupling Bearing Length		Standard Length	Per Foot	Flight Each	Approx. Flight Per Foot
6	1 1/2	6S312–*	6SF312–*	2	2 3/8	3/16	2	9 - 10	75	7.5	1.7	2.0
	1 1/2	6S316–*	6SF316–*	2	2 3/8	1/4	2	9 - 10	90	8.0	2.2	2.0
9	1 1/2	9S312–*	9SF312–*	2	2 3/8	3/16	2	9 - 10	95	9.5	4.3	1.33
	1 1/2	9S316–*	9SF316–*	2	2 3/8	1/4	2	9 - 10	130	13.0	5.5	1.33
	1 1/2	9S324–*	9SF324–*	2	2 3/8	3/8	2	9 - 10	160	16.0	7.9	1.33
	2	9S412–*	9SF412–*	2 1/2	2 7/8	3/16	2	9 - 10	115	11.5	4.3	1.33
	2	9S416–*	9SF416–*	2 1/2	2 7/8	1/4	2	9 - 10	130	13.0	5.5	1.33
	2	9S424–*	9SF424–*	2 1/2	2 7/8	3/8	2	9 - 10	160	16.0	7.9	1.33
10	1 1/2	10S312–*	10SF312–*	2	2 3/8	3/16	2	9 - 10	120	12.0	5.0	1.2
	1 1/2	10S316–*	10SF316–*	2	2 3/8	1/4	2	9 - 10	135	13.5	6.7	1.2
	1 1/2	10S324–*	10SF324–*	2	2 3/8	3/8	2	9 - 10	165	16.5	8.7	1.2
	2	10S412–*	10SF412–*	2 1/2	2 7/8	3/16	2	9 - 10	120	12.0	5.0	1.2
	2	10S416–*	10SF416–*	2 1/2	2 7/8	1/4	2	9 - 10	135	13.5	6.7	1.2
	2	10S424–*	10SF424–*	2 1/2	2 7/8	3/8	2	9 - 10	165	16.5	8.7	1.2
12	2	12S412–*	12SF412–*	2 1/2	2 7/8	3/16	2	11 - 10	156	13.0	7.2	1.0
	2	12S416–*	12SF416–*	2 1/2	2 7/8	1/4	2	11 - 10	204	17.0	9.7	1.0
	2	12S424–*	12SF424–*	2 1/2	2 7/8	3/8	2	11 - 10	268	22.3	12.7	1.0
	2 7/16	12S512–*	12SF512–*	3	3 1/2	3/16	3	11 - 9	178	14.8	7.2	1.0
	2 7/16	12S516–*	12SF516–*	3	3 1/2	1/4	3	11 - 9	210	17.5	9.7	1.0
	2 7/16	12S524–*	12SF524–*	3	3 1/2	3/8	3	11 - 9	274	22.5	12.7	1.0
	3	12S612–*	12SF612–*	3 1/2	4	3/16	3	11 - 9	198	16.5	7.2	1.0
	3	12S616–*	12SF616–*	3 1/2	4	1/4	3	11 - 9	216	18.0	9.7	1.0
	3	12S624–*	12SF624–*	3 1/2	4	3/8	3	11 - 9	280	24.0	12.7	1.0

–* R   For Right Hand
–* L   For Left Hand

Sectional Conveyor Screw

Flight

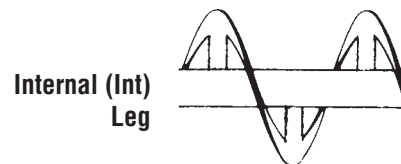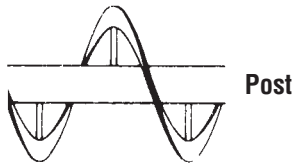| A	B	Size Part No. Conveyor Mounted	Size Part No. Flighting Only	Pipe Size		F	H	Standard Length Feet-Inches	Average Weight			Approx. Flight Per Foot
Screw Diameter	Coupling Diameter			Nominal Inside	D Outside	Flight Thickness	Coupling Bearing Length		Standard Length	Per Foot	Flight Each	
14	2 7/16	14S512–*	14SF512–*	3	3 1/2	3/16	3	11 - 9	214	18.0	9.9	.86
	2 7/16	14S516–*	14SF516–*	3	3 1/2	1/4	3	11 - 9	240	20.0	13.2	.86
	2 7/16	14S524–*	14SF524–*	3	3 1/2	3/8	3	11 - 9	330	27.5	19.8	.86
	3	14S612–*	14SF612–*	3 1/2	4	3/16	3	11 - 9	222	19.0	9.9	.86
	3	14S616–*	14SF616–*	3 1/2	4	1/4	3	11 - 9	246	21.0	13.2	.86
	3	14S624–*	14SF624–*	3 1/2	4	3/8	3	11 - 9	342	29.0	19.8	.86
16	3	16S612–*	16SF612–*	3 1/2	4	3/16	3	11 - 9	234	20.0	14.0	.75
	3	16S616–*	16SF616–*	3 1/2	4	1/4	3	11 - 9	282	24.0	18.0	.75
	3	16S624–*	16SF624–*	3 1/2	4	3/8	3	11 - 9	365	31.0	25.5	.75
	3	16S632–*	16SF632–*	3 1/2	4	1/2	3	11 - 9	402	33.5	36.0	.75
18	3	18S612–*	18SF612–*	3 1/2	4	3/16	3	11 - 9	246	21.0	18.0	.67
	3	18S616–*	18SF616–*	3 1/2	4	1/4	3	11 - 9	294	25.0	24.0	.67
	3	18S624–*	18SF624–*	3 1/2	4	3/8	3	11 - 9	425	36.0	34.5	.67
	3	18S632–*	18SF632–*	3 1/2	4	1/2	3	11 - 9	530	44.0	46.0	.67
	3 7/16	18S712–*	18SF712–*	4	4 1/2	3/16	4	11 - 8	293	24.4	18.0	.67
	3 7/16	18S716–*	18SF716–*	4	4 1/2	1/4	4	11 - 8	345	28.8	24.0	.67
	3 7/16	18S724–*	18SF724–*	4	4 1/2	3/8	4	11 - 8	470	39.2	34.5	.67
	3 7/16	18S732–*	18SF732–*	4	4 1/2	1/2	4	11 - 8	570	47.5	46.0	.67
20	3	20S612–*	20SF612–*	3 1/2	4	3/16	3	11 - 9	300	26.0	20.0	.60
	3	20S616–*	20SF616–*	3 1/2	4	1/4	3	11 - 9	360	31.0	28.0	.60
	3	20S624–*	20SF624–*	3 1/2	4	3/8	3	11 - 9	410	33.4	40.0	.60
	3	20S632–*	20SF632–*	3 1/2	4	1/2	3	11 - 9	506	42.2	56.0	.60
	3 7/16	20S712–*	20SF712–*	4	4 1/2	3/16	4	11 - 8	310	27.0	20.0	.60
	3 7/16	20S716–*	20SF716–*	4	4 1/2	1/4	4	11 - 8	370	32.0	28.0	.60
24	3 7/16	24S724–*	24SF724–*	4	4 1/2	3/8	4	11 - 8	424	36.0		

–* R For Right Hand
–* L For Left Hand

Conveyor Screws (Ribbon)

Ribbon flight conveyor screws consist of sectional flights, buttwelded together to form a continuous helix. Flights are secured to the pipe by supporting legs. Both ends of the pipe are prepared with internal collars and drilling to accept couplings, drive shafts, and end shafts. They are used to convey sticky, gummy, or viscous substances, or where the material tends to adhere to flighting and pipe.
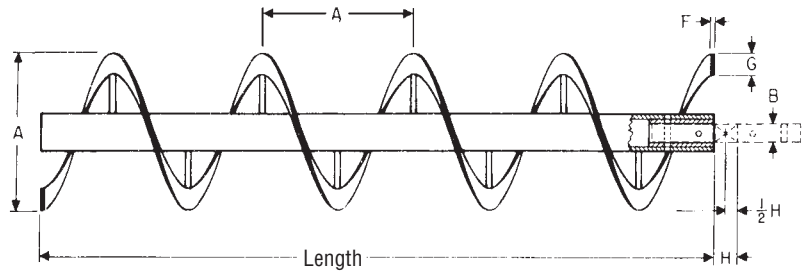
Ribbon Conveyor Screw

Post

Internal (Int) Leg

A	B	Size Part No. Conveyor Mounted	Pipe Size		Flight Size		H Coupling Bearing Length	Standard Length Feet-Inches	Weight Complete Screw	
Screw Diameter	Coupling Diameter		Inside	Outside	F Thickness	G Width			Standard Length	Per Foot
6	1 1/2	6R312–*	2	2 3/8	3/16	1	2	9 - 10	65	6.5
9	1 1/2	9R316–*	2	2 3/8	1/4	1 1/2	2	9 - 10	100	10
10	1 1/2	10R316–*	2	2 3/8	1/4	1 1/2	2	9 - 10	110	11
12	2	12R416–*	2 1/2	2 7/8	1/4	2	2	11 - 10	180	15
	2	12R424–*	2 1/2	2 7/8	3/8	2 1/2	2	11 - 10	216	19
	2 7/16	12R524–*	3	3 1/2	3/8	2 1/2	3	11 - 9	240	21
14	2 7/16	14R516–*	3	3 1/2	1/4	2 1/2	3	11 - 9	228	19
	2 7/16	14R524–*	3	3 1/2	3/8	2 1/2	3	11 - 9	264	22
	3	14R624–*	3 1/2	4	3/8	2 1/2	3	11 - 9	288	25
16	3	16R616–*	3 1/2	4	1/4	2 1/2	3	11 - 9	276	24
	3	16R624–*	3 1/2	4	3/8	2 1/2	3	11 - 9	324	28
18	3	18R624–*	3 1/2	4	3/8	3	3	11 - 9	384	33
20	3 7/16	20R724–*	4	4 1/2	3/8	3	4	11 - 8	408	35
24	3 7/16	24R724–*	4	4 1/2	3/8	3	4	11 - 8	424	36

–* R   For Right Hand
–* L   For Left Hand

Quick Detachable (QD) Helicoid Conveyor

QD — Quick Detachable conveyor screws are designed for convenient removal from the conveyor assembly. Each section of screw has a QD cap at one end of the pipe. By removing this cap, a conveyor screw section can quickly and easily be removed and returned to the conveyor assembly without disturbing the other screw sections. Quick Detachable conveyor can be furnished both in helicoid and buttweld construction.
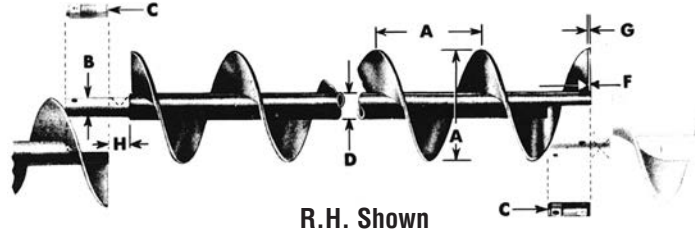
R.H. Shown

A	Size Part No.	B	Standard Length Feet-Inches	C	D Pipe Size		Flight Thickness Ft.-In.		H	Average Weight	
Nominal Screw Diameter	Conveyor Mounted	Coupling Diameter	End to End of Pipe	Cap Part Number	Inside	Outside	F Inside	G Outside	Coupling Bearing Length	Standard Length	Per Foot
6	6HQ304–*	1 1/2	9-10	3QDC2	2	2 3/8	1/8	1/16	2	52	5
	6HQ308–*						1/4	1/8	2	62	6
	6HQ312–*						3/8	3/16	2	72	7
9	9HQ306–*	1 1/2	9-10	3QDC2	2	2 3/8	3/16	3/32	2	70	7
	9HQ312–*						3/8	3/16	2	101	10
	9HQ406–*	2	9-10	4QDC25	2 1/2	2 7/8	3/16	3/32	2	91	9
	9HQ412–*						3/8	3/16	2	121	12
	9HQ414–*						7/16	7/32	2	131	13
10	10HQ306–*	1 1/2	9-10	3QDC2	2	2 3/8	3/16	3/32	2	81	8
	10HQ412–*	2	9-10	4QDC25	2 1/2	2 7/8	3/8	3/16	2	130	13
12	12HQ408–*	2	11-10	4QDC25	2 1/2	2 7/8	1/4	1/8	2	140	12
	12HQ412–*						3/8	3/16	2	180	15
	12HQ508–*	2 7/16	11-9	5QDC3	3	3 1/2	1/4	1/8	3	168	14
	12HQ512–*						3/8	3/16	3	198	17
	12HQ614–*	3	11-9	6QDC35	3 1/2	4	7/16	7/32	3	220	18
14	14HQ508–*	2 7/16	11-9	5QDC3	3	3 1/2	1/4	1/8	3	170	14
	14HQ614–*	3	11-9	6QDC35	3 1/2	4	7/16	7/32	3	254	22
16	16HQ610–*	3	11-9	6QDC35	3 1/2	4	5/16	5/32	3	228	19
	16HQ614–*	3	11-9	6QDC4	4	4 1/2	7/16	7/32	3	285	23.8

–* R   For Right Hand
–* L   For Left Hand

Quick Detachable (QD) Sectional Spiral Conveyors

R.H. Shown

A	Size Part No.	B	Standard Length Feet-Inches	C	D Pipe Size		F	H	Average Weight	
Nominal Screw Diameter	Conveyor Mounted	Coupling Diameter	End to End of Pipe	Cap Part Number	Inside	Outside	Flight Thickness	Coupling Bearing Length	Standard Length	Per Foot
6	6SQ307–*	1 1/2	9-10	3QDC2	2	2 3/8	12	2	62	6.2
	6SQ309–*						10		65	6.5
	6SQ312–*						3/16		75	7.5
	6SQ316–*						1/4		90	8.0
9	9SQ307–*	1 1/2	9-10	3QDC2	2	2 3/8	12	2	73	7.3
	9SQ309–*						10		80	8.0
	9SQ312–*						3/16		95	9.5
	9SQ316–*						1/4		120	13
	9SQ407–*	2	9-10	4QDC25	2 1/2	2 7/8	12	2	90	9
	9SQ409–*						10		100	10
	9SQ412–*						3/16		115	11.5
	9SQ416–*						1/4		130	13.0
	9SQ424–*						3/8		160	16
10	10SQ309–*	1 1/2	9-10	3QDC2	2	2 3/8	10	2	85	8.5
	10SQ412–*	2	9-10	4QDC25	2 1/2	2 7/8	3/16	2	120	12.0
	10SQ416–*						1/4		135	13.5
12	12SQ409–*	2	11-10	4QDC25	2 1/2	2 7/8	10	2	140	12.0
	12SQ412–*						3/16		156	13.0
	12SQ416–*						1/4		204	17
	12SQ509–*	2 7/16	11-9	5QDC3	3	3 1/2	10	3	160	14
	12SQ512–*						3/16		178	15
	12SQ612–*	3	11-9	6QDC35	3 1/2	4	3/16	3	191	16.5
	12SQ616–*						1/4		216	18.0
	12SQ624–*						3/8		280	24
14	14SQ509–*	2 7/16	11-9	5QDC3	3	3 1/2	10	3	185	16
	14SQ512–*						3/16		214	18
	14SQ612–*	3	11-9	6QDC35	3 1/2	4	3/16	3	222	19
	14SQ616–*						1/4		246	21
	14SQ624–*						3/8		342	29
16	16SQ609–*	3	11-9	6QDC35	3 1/2	4	10	3	210	18
	16SQ612–*						3/16		234	20
	16SQ616–*						1/4		282	24
	16SQ624–*						3/8		365	31
18	18SQ612–*	3	11-9	6QDC35	3 1/2	4	3/16	3	246	21
	18SQ616–*						1/4		294	25
	18SQ624–*						3/8		425	36
20	20SQ612–*	3	11-9	6QDC35	3 1/2	4	3/16	3	300	26
	20SQ616–*						1/4		360	31
	20SQ724–*	3 7/16	11-8	7QDC4	4	4 1/2	3/8	4	475	40
24	24SQ712–*	3 7/16	11-8	7QDC4	4	4 1/2	3/16	4	410	37
	24SQ716–*						1/4		510	43
	24SQ724–*						3/8		595	50

–* R   For Right Hand
–* L   For Left Hand

Coupling Bolts
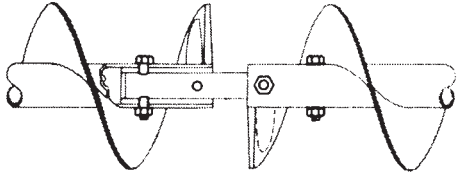
Conveyor coupling bolts are manufactured from special analysis high-torque steel. Close tolerance for a minimum of wear. Lock nuts are furnished with each bolt.

| Coupling Diameter	Outside Pipe Diameter	Bolt Size	Part Number Standard	Weight Each (lb)
1	1 5/8	3/8 × 2 1/16	CCB2	.13
1 1/2	2 3/8	1/2 × 3	CCB3	.2
2	2 7/8	5/8 × 3 5/8	CCB4	.45
2 7/16	3 1/2	5/8 × 4 3/8	CCB5	.5
3	4	3/4 × 5	CCB6	.85
3	4 1/2	3/4 × 5 1/2	CCB6A	.9
3 7/16	4 1/2	7/8 × 5 1/2	CCB7	1.29

Internal Collar
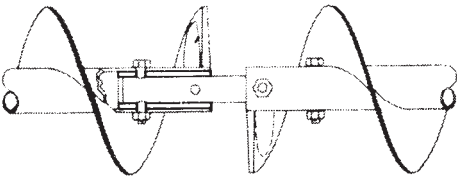
Internal collars are made from seamless tubing machined for a press fit in the conveyor pipe. When installed at the factory collars are jig drilled and plug welded into the pipe. No drilling in replacement collars is furnished allowing for field drilling to match existing bolt holes.

Coupling Diameter	Inside Pipe Diameter	Part Number Standard	Weight Each (lb)
1	1 1/4	CIC2	.58
1 1/2	2	CIC3	2.06
2	2 1/2	CIC4	2.16
2 7/16	3	CIC5	3.72
3	3 1/2	CIC6	4.03
3	4	CIC6A	8.03
3 7/16	4	CIC7	6.52

End Lugs
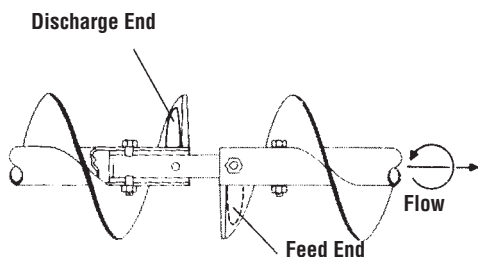
Discharge End

Flow

Feed End

Internal collars are made from seamless tubing machined for a press fit in the conveyor pipe. When installed at the factory collars are jig drilled and plug welded into the pipe. No drilling in replacement collars is furnished allowing for field drilling to match existing bolt holes.

Conveyor Diameter	Part Number		Weight Each (lb)
	Intake End Standard	Discharge End Standard	
6	6CELI–*	6CELD–*	.06
9	9CELI–*	9CELD–*	.15
10	9CELI–*	9CELD–*	.15
12	12CELI–*	12CELD–*	.2
14	12CELI–*	12CELD–*	.2
16	16CELI–*	16CELD–*	.4
18	16CELI–*	16CELD–*	.4
20	16CELI–*	16CELD–*	.4
24	16CELI–*	16CELD–*	.4

–* R   For Right Hand
–* L   For Left Hand

Shaft

Martin

Coupling Shafts

| CC | 5 |

Coupling Part
CC — Coupling Shaft Std.*
CCC — Close Coupling Shaft
CHE — Hanger End Shaft*

Coupling Diameter
2 — 1"   5 — 2 7/16"
3 — 1 1/2"   6 — 3"
4 — 2"   7 — 3 7/16"

* Add suffix H if Hardened

COUPLING		Conveyor couplings are used to join individual lengths of conveyor screws and allow for rotation within the hanger bearing. C-1045 steel couplings are normally furnished; however couplings with hardened bearing surfaces may be furnished where highly abrasive materials are being conveyed. Jig drilling allows for ease of installation.
CLOSE		Close couplings are used to adjoin conveyor screws where no hanger is required. Jig drilling allows for ease of installation.

Drive & End Shafts

| 1 | CD | 5 | BB | W |

Drive Shaft Number
1 — #1 Drive Shaft Only
2 — #2 Single Bearing Pedestal
3 — #3 Double Bearing Pedestal

Type
CD — Drive Shaft
CE — End Shaft

Coupling Diameter
2 — 1"   5 — 2 7/16"
3 — 1 1/2"   6 — 3"
4 — 2"   7 — 3 7/16"

Bearing Type
BB — Ball
RB — Roller

Seal Type
(Delete if without seal)
P — Plate
W — Waste Pack

END		End shafts serve only to support the end conveyor section and are therefore usually supplied in cold rolled steel. End shafts are jig drilled for ease of assembly and close diametral tolerances are held for proper bearing operation.
HANGER END		Hanger end shafts are designed to connect only one conveyor section to a hanger bearing. These shafts may also be used in pairs to divide an excessively long conveyor assembly between two drives.
#1 DRIVE		No. 1 drive shafts are normally used where standard end plates are furnished. Jig drilling allows for ease of installation.
SPECIAL DRIVE		Length, bearing location, seals and keyway location and size as required.

No. 1 drive shafts are normally used where standard end plates are furnished. Jig drilling allows for ease of installation.
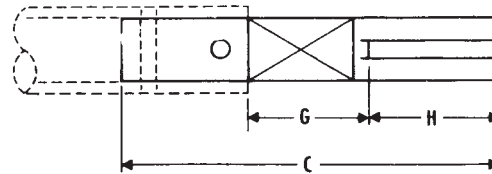
No. 1 Drive Shaft Used Without Seal*

Bronze Bearing						Ball Bearing					
Shaft Diameter	Part Number	C	G	H	Weight	Shaft Diameter	Part Number	C	G	H	Weight
1	1CD2B	9 1/2	31/2	3	2.0	1	1CD2BB	9	3	3	1.8
1 1/2	1CD3B	12 3/4	43/4	3 1/4	6.3	1 1/2	1CD3BB	11 1/2	31/2	3 1/4	5.6
2	1CD4B	15	53/4	4 1/2	13.3	2	1CD4BB	13 1/8	37/8	4 1/2	11.5
2 7/16	1CD5B	17 3/8	7	5 1/2	21.0	2 7/16	1CD5BB	15 1/8	43/4	5 1/2	18.0
3	1CD6B	19 1/8	81/8	6	37.0	3	1CD6BB	16 5/8	55/8	6	32.0
3 7/16	1CD7B	23	9	7 1/4	60.4	3 7/16	1CD7BB	20 5/8	65/8	7 1/4	52.5

*Consult Factory

No. 1 Drive Shaft Used With Plate or Product Drop Out Seals*

Bronze Bearing						Ball Bearing					
Shaft Diameter	Part Number	C	G	H	Weight	Shaft Diameter	Part Number	C	G	H	Weight
1	1CD2B-P	10	4	3	2.1	1	1CD2BB-P	9 1/2	3 1/2	3	2.0
1 1/2	1CD3B-P	13 1/4	5 1/4	3 1/4	6.6	1 1/2	1CD3BB-P	12 3/8	4 3/8	3 1/4	6.2
2	1CD4B-P	15 1/4	6 1/4	4 1/2	14.1	2	1CD4BB-P	14	4 3/4	4 1/2	12.5
2 7/16	1CD5B-P	18 3/8	8	5 1/2	24.3	2 7/16	1CD5BB-P	15 7/8	5 1/2	5 1/2	21.0
3	1CD6B-P	19 5/8	8 5/8	6	38.0	3	1CD6BB-P	17 1/2	6 1/2	6	35.0
3 7/16	1CD7B-P	24 1/8	10 1/8	7 1/4	61.0	3 7/16	1CD7BB-P	21 1/2	7 1/2	7 1/4	56.5

*Consult Factory

No. 1 Drive Shaft Used With Waste Pack Seal*

Bronze Bearing						Ball Bearing					
Shaft Diameter	Part Number	C	G	H	Weight	Shaft Diameter	Part Number	C	G	H	Weight
1	1CD2B-W	11	4 1/4	3	2.2	1	1CD2BB-W	10 1/2	3 3/4	3.0	2.0
1 1/2	1CD3B-W	14 1/2	6 1/2	3 1/4	7.2	1 1/2	1CD3BB-W	13 1/4	5 1/4	3.3	6.4
2	1CD4B-W	16 3/4	7 1/4	4 1/2	14.9	2	1CD4BB-W	14 7/8	5 5/8	4.5	13.0
2 7/16	1CD5B-W	19 1/8	8 3/4	5 1/2	23.3	2 7/16	1CD5BB-W	16 7/8	6 1/2	5.5	20.5
3	1CD6B-W	20 7/8	9 7/8	6	40.5	3	1CD6BB-W	18 3/8	7 3/8	6.0	35.5
3 7/16	1CD7B-W	25 7/8	11 7/8	7 1/4	66.3	3 7/16	1CD7BB-W	22 7/8	8 7/8	7.3	58.4

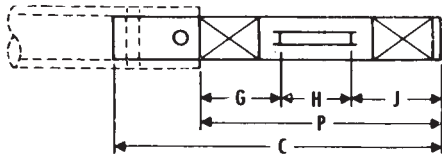Shaft length allows for 1/2 hanger bearing length as clearance between end plate and screw
*Consult Factory

No. 2 and No. 3
Drive Shafts

Martin

No. 2 Drive Shaft

No. 2 drive shafts are used where pedestal type trough ends with single bearing are furnished. Jig drilling allows for ease of installation.

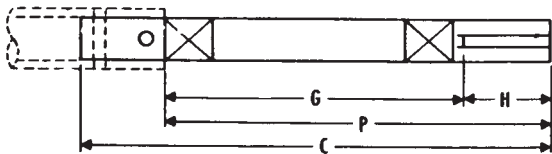| Shaft Diameter	Part Number	C	G	H	J	P	Weight
1	2CD2	11	3 1/4	2 1/4	2 1/2	8	2.5
1 1/2	2CD3	16 1/2	5	3 1/4	3 1/2	11 3/4	8.3
2	2CD4	18 3/4	5 1/4	4 1/4	4 1/2	14	17.0
2 7/16	2CD5	21 7/8	6	5 1/2	5 1/2	17	29.0
3	2CD6	23 1/2	6 1/2	5 1/2	6 1/2	18 1/2	49.0
3 7/16	2CD7	27	6 3/4	6	7 1/2	20 1/4	75.0

No. 3 Drive Shaft

No. 3 drive shafts are used where pedestal type trough ends with double bearings are furnished. Jig drilling allows for ease of installation.

Shaft Diameter	Part Number	C	G	H	P	Weight
1	3CD2	15 1/2	9 1/4	3	12 1/4	3
1 1/2	3CD3	20 1/4	12 1/2	3 1/4	15 3/4	10
2	3CD4	22	12 3/4	4 1/2	17 1/4	21
2 7/16	3CD5	24 5/8	14 1/4	5 1/2	19 3/4	36
3	3CD6	25 7/8	14 3/4	6	20 3/4	62
3 7/16	3CD7	29 7/8	15 7/8	7 1/4	23 1/8	95

Drive Shaft Keyways
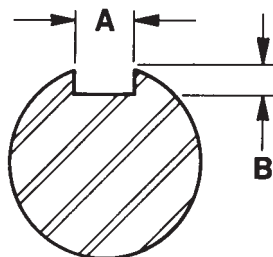
Shaft Diameter	A	B
1	1/4	1/8
1 1/2	3/8	3/16
2	1/2	1/4
2 7/16	5/8	5/16
3	3/4	3/8
3 7/16	7/8	7/16

Coupling

Conveyor couplings are used to join individual lengths of conveyor screws and allow for rotation within the hanger bearing. Mild steel couplings are normally furnished; however induction hardened bearing area couplings may be furnished where highly abrasive materials are being conveyed. Jig drilling allows for ease of installation.
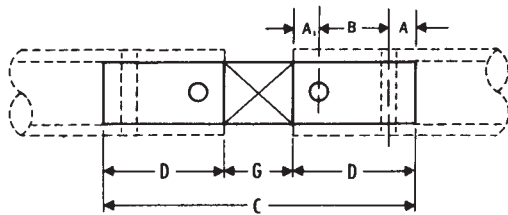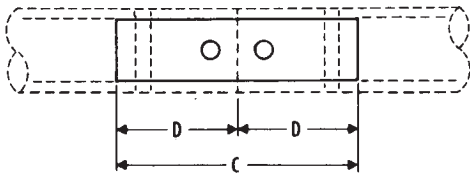
Shaft Diameter	Part Number*	A₁	A	B	C	D	G	Weight
1	CC2	1/2	1/2	2	7 1/2	3	1 1/2	1.5
1 1/2	CC3	7/8	7/8	3	11 1/2	4 3/4	2	5.6
2	CC4	7/8	7/8	3	11 1/2	4 3/4	2	9.8
2 7/16	CC5	15/16	15/16	3	12 13/16	4 7/8	3	15.4
3	CC6	1	1	3	13	5	3	23.8
3 7/16	CC7	1 1/2	1 1/4	4	17 1/2	6 3/4	4	44.5

*Add — H for Hardened Shaft.

Shaft is induction hardened in bearing area only to 40-50 RC.


Close Coupling

Close couplings are used to adjoin conveyor screws where no hanger is required. Jig drilling allows for ease of installation.

Shaft Diameter	Part Number*	C	D	Weight
1	CCC2	6	3	1.3
1 1/2	CCC3	9 1/2	4 3/4	4.8
2	CCC4	9 1/2	4 3/4	8.5
2 7/16	CCC5	9 3/4	4 7/8	13.0
3	CCC6	10	5	20.0
3 7/16	CCC7	13 1/2	6 3/4	37.0

Hanger End

Hanger end shafts are designed to connect only one conveyor section to a hanger bearing. These shafts may also be used in pairs to divide an excessively long conveyor assembly beween two drives.
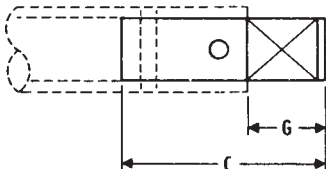
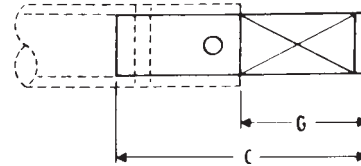| Shaft Diameter	Part Number*	C	G	Weight
1	CHE2	4 5/8	1 5/8	1.0
1 1/2	CHE3	6 7/8	2 1/8	3.5
2	CHE4	6 7/8	2 1/8	6.2
2 7/16	CHE5	8 1/8	3 1/4	10.6
3	CHE6	8 1/4	3 1/4	16.5
3 7/16	CHE7	11 1/4	4 1/4	29.7

*Add — H for Hardened Shaft
Shaft is induction hardened in bearing area only to 40-50 RC.

End
Shaft

End shafts serve only to support the end conveyor section and are therefore usually supplied in cold rolled steel. End shafts are jig drilled for ease of assembly and close diametrical tolerances are held for proper bearing operation.

End Shaft Used Without Seal**

Bronze Bearing					Ball Bearing				
Shaft Diameter	Part Number*	C	G	Weight	Shaft Diameter	Part Number*	C	G	Weight
1	CE2B	6 1/2	3 1/2	1.4	1	CE2BB	6	3	1.2
1 1/2	CE3B	9 1/4	4 1/2	4.5	1 1/2	CE3BB	8 1/4	3 1/2	3.8
2	CE4B	10 1/4	5 1/2	9.0	2	CE4BB	8 5/8	3 7/8	7.5
2 7/16	CE5B	11 7/8	7	15.4	2 7/16	CE5BB	9 5/8	4 3/4	12.4
3	CE6B	13 1/8	8 1/8	25.6	3	CE6BB	10 5/8	5 5/8	20.8
3 7/16	CE7B	16 3/8	9 5/8	42.4	3 7/16	CE7BB	13 3/8	6 5/8	34.4

*Add – H for Hardened Shaft.
**Shaft length allows for 1/2 hanger bearing length, clearance between end plate and screw.
Consult Factory

End Shaft Used With Plate or Product Drop Out Seal**

Bronze Bearing					Ball Bearing				
Shaft Diameter	Part Number*	C	G	Weight	Shaft Diameter	Part Number*	C	G	Weight
1	CE2B-P	7	4	1.5	1	CE2BB-P	6 1/2	3 1/2	1.4
1 1/2	CE3B-P	10 1/4	5 1/2	5.1	1 1/2	CE3BB-P	9	4 5/16	4.5
2	CE4B-P	11 1/4	6 1/2	10.0	2	CE4BB-P	9 3/8	4 5/8	8.3
2 7/16	CE5B-P	12 7/8	8	17.0	2 7/16	CE5BB-P	10 1/8	5 5/16	13.1
3	CE6B-P	13 5/8	8 5/8	29.8	3	CE6BB-P	11 1/2	6 1/2	23.0
3 7/16	CE7B-P	16 7/8	10 1/8	44.0	3 7/16	CE7BB-P	14 1/8	7 3/8	37.1

*Add – H for Hardened Shaft.
**Shaft length allows for 1/2 hanger bearing length, clearance between end plate and screw.
Consult Factory

End Shaft Used With Waste Pack Seal**

Bronze Bearing					Ball Bearing				
Shaft Diameter	Part Number*	C	G	Weight	Shaft Diameter	Part Number*	C	G	Weight
1	CE2B-W	8	5	1.6	1	CE2BB-W	7 1/2	3 3/4	1.4
1 1/2	CE3B-W	11	6 1/4	5.2	1 1/2	CE3BB-W	10	5 1/4	4.8
2	CE4B-W	12	7 1/4	10.4	2	CE4BB-W	10 3/8	5 5/8	9.0
2 7/16	CE5B-W	13 5/8	8 3/4	17.6	2 7/16	CE5BB-W	11 3/8	6 1/2	14.8
3	CE6B-W	14 7/8	9 7/8	28.2	3	CE6BB-W	12 3/8	7 3/8	24.0
3 7/16	CE7B-W	18 5/8	11 7/8	48.0	3 7/16	CE7BB-W	15 5/8	8 7/8	40.2

*Add – H for Hardened Shaft.
**Shaft length allows for 1/2 hanger bearing length, clearance between end plate and screw.
Consult Factory

|		
STYLE 226		No. 226 hangers are designed for flush mounting inside the trough permitting dust-tight or weather-proof operation. This type hanger allows for minimum obstruction of material flow in high capacity conveyors. Available with friction type bearing.
STYLE 216		No. 216 hangers are designed for heavy duty applications. This hanger is flush mounted inside the trough permitting dust tight or weather proof operation. Hard iron or bronze bearings are normally furnished; however, the hanger can be furnished with other bearings.
STYLE 220		No. 220 hangers are designed for mount on top of the trough flanges and may be used where dust-tight or weather proof operation is not required. This type hanger allows for minimum obstruction of material flow in high capacity conveyors. Available with friction type bearing.
STYLE 230		No. 230 hangers are designed for heavy duty applications where mounting on top of the trough flanges is required. Hard iron or bronze bearings are normally furnished; however, other bearings are available.
STYLE 316		No. 316 hangers are designed for heavy duty use in conveyors where abnormal heat requires unequal expansion between the screw and conveyor trough. Hard iron or bronze bearings are normally furnished; however, this hanger can be furnished with other bearings.
STYLE 326		No. 326 hangers are designed to permit minimum obstruction of material flow and are used in conveyors where abnormal heat requires unequal expansion between the screw and the conveyor trough. Hard iron or bronze bearings are normally furnished, but other type bearings are available.

Hangers

STYLE 60		No. 60 hangers are furnished with a heavy duty, permanently lubricated and sealed, self aligning ball bearing which permits temperatures up to 245° F. and will allow for up to 4° shaft misalignment. This hanger is mounted on top of the trough flanges. Grease fitting can be furnished if specified.
STYLE 70		No. 70 hangers are furnished with a heavy duty, permanently lubricated and sealed, self aligning ball bearing which permit temperatures up to 245° F. and will allow for up to 4° shaft misalignment. This hanger is mounted inside the trough. Grease fittings can be furnished if specified.
STYLE 30		No. 30 hangers are designed for side mounting within the conveyor trough on the noncarrying side and permit a minimum of obstruction of material flow. Available with friction type bearing.
STYLE 216F		No. 216F hangers are designed for heavy duty applications and are mounted inside of flared trough. Hard iron or bronze bearings are normally furnished; however, other bearings are available.
STYLE 19B		The No. 19B hanger is similar in construction to the No. 18B except they are mounted on top of the trough angles. Built-in ledges provide supports for the ends of the cover. They are streamline in design and permit free passage of the material. They are regularly furnished with Arguto oil impregnated wood, hard iron, bronze, or other special caps can be furnished.
AIR-PURGED HANGER		Air-Purged hangers are recommended when handling dusty and abrasive materials which contribute to shutdowns and hanger bearing failures. Air-swept hangers are available for 9"-24" conveyors. They should not be used when handling hot materials (over 250° F) or wet sticky materials or when handling non abrasive materials when an inexpensive hanger will do the job satisfactorily. In service, air-purged hangers deliver relatively trouble-free operation. They help solve noise nuisance problems, and they help reduce power requirement because of the low coefficient of fraction. Maximum trough loading should not exceed 15%. The air, at approximately 1-1/4 PSI enters the housing at the top, passes over and around the bearing, and is dissipated around the coupling shaft on both sides of the housing. Thus the bearing is protected from dust and the material in the trough at all times. Only 3 to 7 cu. ft. of air per minute is required to keep each hanger bearing clean.

Style 220

Conveyor couplings are used to join individual lengths of conveyor screws and allow for rotation within the hanger bearing. Mild steel couplings are normally furnished; however induction hardened bearing area couplings may be furnished where highly abrasive materials are being conveyed. Jig drilling allows for ease of installation.


Pipe Tap 1/8"
Bolts E
M SLOT
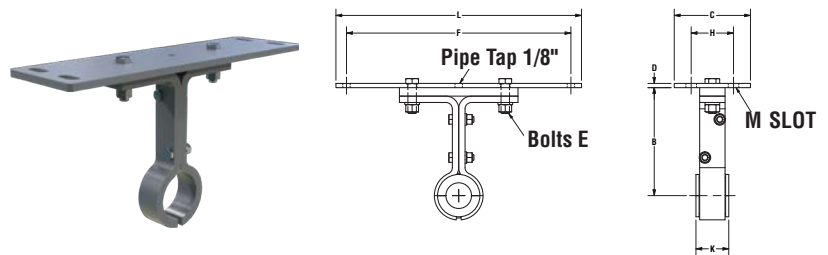
Conveyor Diameter	Coupling Size	Part Number*	B	C	D	E	F	H	K	L	M Slot	Weight Each
4	1	4CH2202	3 5/8	3 1/2	3/16	1/4	6 1/2	2	1 1/2	7 1/4	5/16 × 3 /4	5
6	1 1/2	6CH2203	4 1/2	4 1/2	3/16	3/8	8 3/4	2 1/2	2	9 3/4	7/16 × 1 1/16	7
9	1 1/2	9CH2203	6 1/8	4 1/2	1/4	3/8	12 1/4	2 1/2	2	13 1/2	7/16 × 1 1/16	9
	2	9CH2204	6 1/8	4 1/2	1/4	3/8	12 1/4	2 1/2	2	13 1/2		11
10	1 1/2	10CH2203	6 3/8	4 1/2	1/4	3/8	13 1/4	2 1/2	2	14 1/2	7/16 × 1 1/16	10
	2	10CH2204	6 3/8	4 1/2	1/4	3/8	13 1/4	2 1/2	2	14 1/2		12
12	2	12CH2204	7 3/4	5	3/8	1/2	15 3/4	2 1/2	2	17 1/2	9/16 × 1 5/16	16
	2 7/16	12CH2205	7 3/4	5	3/8	1/2	15 3/4	2 1/2	3	17 1/2		21
	3	12CH2206	7 3/4	5	3/8	1/2	15 3/4	2 1/2	3	17 1/2		28
14	2 7/16	14CH2205	9 1/4	5	1/2	1/2	17 3/4	2 1/2	3	19 1/2	9/16 × 1 5/16	26
	3	14CH2206	9 1/4	5	1/2	1/2	17 3/4	2 1/2	3	19 1/2		33
16	3	16CH2206	10 5/8	5	1/2	1/2	19 3/4	2 1/2	3	21 1/2	9/16 × 1 5/16	39
18	3	18CH2206	12 1/8	6	1/2	5/8	22 1/4	3 1/2	3	24 1/2	11/16 × 13/16	41
	3 7/16	18CH2207	12 1/8	6	1/2	5/8	22 1/4	3 1/2	4	24 1/2		49
20	3	20CH2206	13 1/2	6	1/2	5/8	24 1/4	3 1/2	3	26 1/2	11/16 × 13/16	43
	3 7/16	20CH2207	13 1/2	6	1/2	5/8	24 1/4	3 1/2	4	26 1/2		51
24	3 7/16	24CH2207	16 1/2	6	5/8	5/8	28 1/4	3 1/2	4	30 1/2	11/16 Hole	57

*Refer to Page H-99 for bearings. For hangers with oil pipe add –0 to part number

Style 226

No. 226 hangers are designed for flush mounting inside the trough permitting dust-tight or weather-proof operation. This type hanger allows for minimum obstruction of material flow in high capacity conveyors. Also available with friction type bearing.


Bolts E
Pipe Tap 1/8"
M SLOT
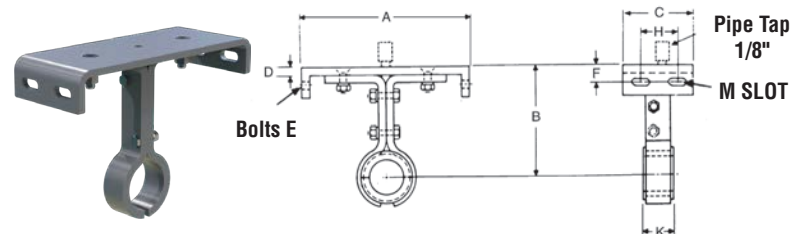
Conveyor Diameter	Coupling Size	Part Number*	A	B	C	D	E	F	H	K	M Slot	Weight Each
4	1	4CH2262	5	3 5/8	3 1/2	3/16	1/4	11/16	2	1 1/2	5/16 × 5/16	5
6	1 1/2	6CH2263	7	4 1/2	4 1/2	3/16	3/8	3/4	2 1/2	2	7/16 × 1 1/16	7
9	1 1/2	9CH2263	10	6 1/8	4 1/2	1/4	3/8	1	2 1/2	2	7/16 × 1 1/16	9
	2	9CH2264	10	6 1/8	4 1/2	1/4	3/8	1				11
10	1 1/2	10CH2263	11	6 3/8	4 1/2	1/4	3/8	1	2 1/2	2	7/16 × 1 1/16	10
	2	10CH2264	11	6 3/8	4 1/2	1/4	3/8	1				12
12	2	12CH2264	13	7 3/4	5	3/8	1/2	1 1/4		2	9/16 × 1 5/16	16
	2 7/16	12CH2265	13	7 3/4	5	3/8	1/2	1 1/4	2 1/2	3		21
	3	12CH2266	13	7 3/4	5	3/8	1/2	1 1/4		3		28
14	2 7/16	14CH2265	15	9 1/4	5	1/2	1/2	1 3/8	2 1/2	3	9/16 × 1 5/16	26
	3	14CH2266	15	9 1/4	5	1/2	1/2	1 3/8				33
16	3	16CH2266	17	10 5/8	5	1/2	1/2	1 3/8	2 1/2	3	9/16 × 1 5/16	39
18	3	18CH2266	19	12 1/8	6	1/2	5/8	1 1/2	3 1/2	3	11/16 × 1 11/16	41
	3 7/16	18CH2267	19	12 1/8	6	1/2	5/8	1 1/2		4		49
20	3	20CH2266	21	13 1/2	6	1/2	5/8	1 1/2	3 1/2	4	11/16 × 1 11/16	43
	3 7/16	20CH2267	21	13 1/2	6	1/2	5/8	1 1/2				51
24	3 7/16	24CH2267	25	16 1/2	6	5/8	5/8	1 5/8	3 1/2	4	11/16 × 1 11/16	57

*Refer to Page H-99 for bearings. For hangers with oil pipe add –0 to part number

Hangers

Style 216

No. 216 hangers are designed for heavy duty applications. This hanger is flush mounted inside the trough permitting dust tight or weather proof operation. Hard iron or bronze bearings are normally furnished; however, the hanger can be furnished with other bearings.
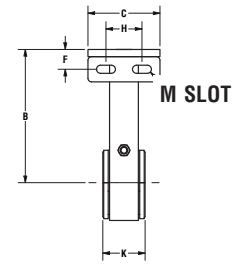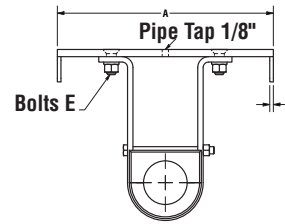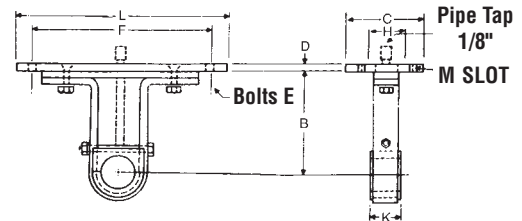
Conveyor Diameter	Coupling Size	Part Number*	A	B	C	D	E	F	H	K	M Slot	Weight Each
6	1 1/2	6CH2163	7	4 1/2	4 1/2	3/16	3/8	3/4	2 1/2	2	7/16 × 1 1/16	5
9	1 1/2	9CH2163	10	6 1/8	4 1/2	1/4	3/8	1	2 1/2	2	7/16 × 1 1/16	7
	2	9CH2164	10	6 1/8	4 1/2	1/4	3/8	1	2 1/2	2		9
10	1 1/2	10CH2163	11	6 3/8	4 1/2	1/4	3/8	1	2 1/2	2	7/16 × 1 1/16	8
	2	10CH2164	11	6 3/8	4 1/2	1/4	3/8	1	2 1/2	2		10
12	2	12CH2164	13	7 3/4	5	3/8	1/2	1 1/4	2 1/2	2	9/16 × 1 5/16	14
	2 7/16	12CH2165	13	7 3/4	5	3/8	1/2	1 1/4	2 1/2	3		18
	3	12CH2166	13	7 3/4	5	3/8	1/2	1 1/4	2 1/2	3		21
14	2 7/16	14CH2165	15	9 1/4	5	1/2	1/2	1 3/8	2 1/2	3	9/16 × 1 5/16	23
	3	14CH2166	15	9 1/4	5	1/2	1/2	1 3/8	2 1/2	3		25
16	3	16CH2166	17	10 5/8	5	1/2	1/2	1 3/8	2 1/2	3	9/16 × 1 5/16	28
18	3	18CH2166	19	12 1/8	6	1/2	5/8	1 1/2	3 1/2	3	11/16 × 1 11/16	34
	3 7/16	18CH2167	19	12 1/8	6	1/2	5/8	1 1/2	3 1/2	4		44
20	3	20CH2166	21	13 1/2	6	1/2	5/8	1 1/2	3 1/2	3	11/16 × 1 11/16	36
	3 7/16	20CH2167	21	13 1/2	6	1/2	5/8	1 1/2	3 1/2	4		47
24	3 7/16	24CH2167	25	16 1/2	6	5/8	5/8	1 5/8	3 1/2	4	11/16 × 1 11/16	53

*Refer to Page H-99 for bearings. For hangers with oil pipe add –0 to part number

Style 230

No. 230 hangers are designed for heavy duty applications where mounting on top of the trough flange is required. Hard iron or bronze bearings are normally furnished; however, other bearings are available.

Conveyor Diameter	Coupling Size	Part Number*	B	C	D	E	F	H	K	L	M Slot	Weight Each
6	1 1/2	6CH2303	4 1/2	4 1/2	3/16	3/8	8 3/4	2 1/2	2	9 3/4	7/16 × 1 1/16	6
9	1 1/2	9CH2303	6 1/8	4 1/2	1/4	3/8	12 1/4	2 1/2	2	13 1/2	7/16 × 1 1/16	8
	2	9CH2304	6 1/8	4 1/2	1/4	3/8	12 1/4	2 1/2	2	13 1/2		10
10	1 1/2	10CH2303	63/8	4 1/2	1/4	3/8	13 1/4	2 1/2	2	14 1/2	7/16 × 1 1/16	9
	2	10CH2304	63/8	4 1/2	1/4	3/8	13 1/4	2 1/2	2	14 1/2		11
12	2	12CH2304	7 3/4	5	3/8	1/2	15 3/4	2 1/2	2	17 1/2	9/16 × 1 5/16	15
	2 7/16	12CH2305	7 3/4	5	3/8	1/2	15 3/4	2 1/2	3	17 1/2		20
	3	12CH2306	7 3/4	5	3/8	1/2	15 3/4	2 1/2	3	17 1/2		25
14	2 7/16	14CH2305	9 1/4	5	1/2	1/2	17 3/4	2 1/2	3	19 1/2	9/16 × 1 5/16	24
	3	14CH2306	9 1/4	5	1/2	1/2	17 3/4	2 1/2	3	19 1/2		29
16	3	16CH2306	10 5/8	5	1/2	1/2	19 3/4	2 1/2	3	21 1/2	9/16 × 1 5/16	35
18	3	18CH2306	12 1/8	6	1/2	5/8	22 1/4	3 1/2	3	24 1/2	1 1/16 × 13/16	34
	3 7/16	18CH2307	12 1/8	6	1/2	5/8	22 1/4	3 1/2	4	24 1/2		47
20	3	20CH2306	13 1/2	6	1/2	5/8	24 1/4	3 1/2	3	26 1/2	1 1/16 × 13/16	40
	3 7/16	20CH2307	13 1/2	6	1/2	5/8	24 1/4	3 1/2	4	26 1/2		49
24	3 7/16	24CH2307	16 1/2	6	5/8	5/8	28 1/4	3 1/2	4	30 1/2	1 1/16 Holes	55

*Refer to Page H-99 for bearings. For hangers with oil pipe add –0 to part number

Style 316

No. 316 hangers are designed for heavy duty use in conveyors where abnormal heat requires unequal expansion between the screw and conveyor trough. Hard iron or bronze bearings are normally used; however, this hanger can be furnished with other bearings.
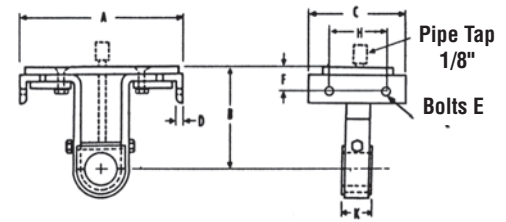
Style 326

No. 326 hangers are designed to permit minimum obstruction of material flow and are used in conveyors where abnormal heat requires unequal expansion between the screw and the conveyor trough. Hard iron or bronze bearings are normally used, but other type bearings are available.

Conveyor Diameter	Coupling Size	Part Number Style 316*	Part Number Style 326*	A	B	C	D	E	F	H	K
6	1 1/2	6CH3163	6CH3263	7	4 1/2	6	3/16	3/8	3/4	4 1/2	2
9	1 1/2	9CH3163	9CH3263	10	6 1/8	6	3/16	3/8	1	4 1/2	2
9	2	9CH3164	9CH3264	10	6 1/8	6	3/16	3/8	1	4 1/2	2
10	1 1/2	10CH3163	10CH3263	11	6 3/8	6	3/16	3/8	1	4 1/2	2
10	2	10CH3164	10CH3264	11	6 3/8	6	3/16	3/8	1	4 1/2	2
12	2	12CH3164	12CH3264	13	7 3/4	6 1/2	1/4	1/2	1 1/4	5	2
12	2 7/16	12CH3165	12CH3265	13	7 3/4	6 1/2	1/4	1/2	1 1/4	5	3
12	3	12CH3166	12CH3266	13	7 3/4	6 1/2	1/4	1/2	1 1/4	5	3
14	2 7/16	14CH3165	14CH3265	15	9 1/4	6 1/2	1/4	1/2	1 3/8	5	3
14	3	14CH3166	14CH3266	15	9 1/4	6 1/2	1/4	1/2	1 3/8	5	3
16	3	16CH3166	16CH3266	17	10 5/8	6 1/2	1/4	1/2	1 3/8	5	3
18	3	18CH3166	18CH3266	19	12 1/8	7	1/4	5/8	1 5/8	5 1/4	3
18	3 7/16	18CH3167	18CH3267	19	12 1/8	7	1/4	5/8	1 5/8	5 1/4	4
20	3	20CH3166	20CH3266	21	13 1/2	7	1/4	5/8	1 5/8	5 1/4	3
20	3 7/16	20CH3167	20CH3267	21	13 1/2	7	1/4	5/8	1 5/8	5 1/4	4
24	3 7/16	24CH3167	24CH3267	25	16 1/2	7	1/4	5/8	1 3/4	5 1/4	4

*Refer to Page H-99 for bearings. For hangers with oil pipe add –0 to part number

Air-Purged Hanger

Air purged hangers are recommended when handling dusty and abrasive materials which contribute to shut-downs and hanger bearing failures. They should not be used when handling hot materials (over 250°F) or wet sticky materials or when handling nonabrasive materials when an inexpensive hanger will do the job satisfactorily. Maximum trough loading should not exceed 15%. The air, at approximately 11/4 PSI, enters the housing at the top, passes over and around the bearing, and is dissipated around the coupling shaft on both sides of the housing. Only 3 to 7 cu. ft. of air per minute is required to keep each hanger bearing clean.
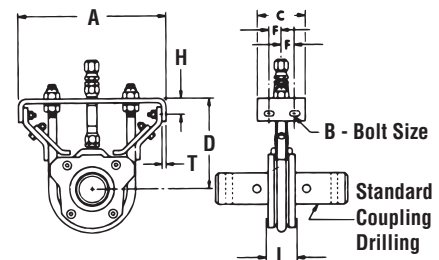
Conveyor Diameter	Part Number	Shaft Diameter	Weight (lb)	A	B	C	D	F	H	L	T
9	9CHAPH3	1 1/2	15	10	3/8	4 1/2	6 1/8	1 1/4	1	2	1/4
9	9CHAPH4	2	20								
12	12CHAPH4	2	30	13	1/2	5	7 3/4	1 1/4	1 1/4	2	1/4
12	12CHAPH5	2 7/16	52							3	
12	12CHAPH6	3	68							3	
14	14CHAPH5	2 7/16	60	15	1/2	5	9 1/4	1 1/4	1 3/8	3	3/8
14	14CHAPH6	3	74								
16	16CHAPH6	3	77	17	1/2	5	10 5/8	1 1/4	1 3/8	3	3/8
18	18CHAPH6	3	91	19	5/8	6	12 1/8	1 3/4	1 5/8	3	1/2
20	20CHAPH6	3	105	21	5/8	6	13 1/2	1 3/4	1 5/8	3	1/2
20	20CHAPH7	3 7/16	140							4	
24	24CHAPH7	3 7/16	155	25	5/8	6	16 1/2	1 3/4	1 5/8	4	1/2

Hangers

Style 30

No. 30 hangers are designed for side mounting within the conveyor trough on the non-carrying side and permit a minimum of obstruction of material flow. Available with friction type bearing.
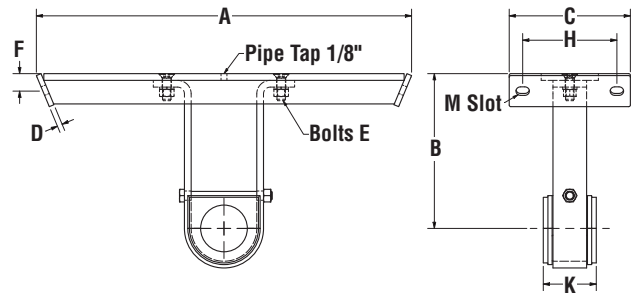
Conveyor Diameter	Coupling Size	Part Number*	A	B	C	D	E	F	G	H	Weight Each
6	1 1/2	6CH303	3 1/2	4 1/4	1 1/2	3/8	5/16	3 1/8	1/2	2	3
9	1 1/2	9CH303	5	5 7/8	1 1/2	3/8	3/8	4 1/4	1/2	2	6
	2	9CH304	5	5 7/8	1 1/2	1/2	3/8	4 1/4	1/2	2	8
10	1 1/2	10CH303	5 1/2	6 3/8	1 1/2	3/8	1/2	4 3/8	3/4	2	8
	2	10CH304	5 1/2	6 3/8	1 1/2	1/2	1/2	4 3/8	3/4	2	9
12	2	12CH304	6 1/2	7 1/2	1 1/2	1/2	1/2	5 1/2	3/4	2	12
	2 7/16	12CH305	6 1/2	7 1/2	2	1/2	1/2	5 1/2	3/4	3	18
	3	12CH306	6 1/2	7 1/2	2	5/8	1/2	5 1/2	3/4	3	20
14	2 7/16	14CH305	7 1/2	9	2	1/2	5/8	6 7/8	7/8	3	20
	3	14CH306	7 1/2	9	2	5/8	5/8	6 7/8	7/8	3	22
16	3	16CH306	8 1/2	10 3/8	2	5/8	5/8	8	1	3	32
18	3	18CH306	9 1/2	11 7/8	2	3/4	5/8	8	1 1/4	3	30
	3 7/16	18CH307	9 1/2	11 7/8	3	3/4	5/8	8	1 1/4	4	33
20	3	20CH306	10 1/2	13 1/4	2	3/4	5/8	10 1/4	1 1/4	3	32
	3 7/16	20CH307	10 1/2	13 1/4	3	3/4	5/8	10 1/4	1 1/4	4	38
24	3 7/16	24CH307	12 1/2	16 1/4	3	3/4	3/4	12 3/4	1 1/2	4	46

*Refer to Page H-99 for bearings. For hangers with oil pipe add −0 to part number

Style 216F

No. 216F hangers are designed for heavy duty applications and are mounted inside of flared trough. Hard iron or bronze bearings are normally furnished; however, other bearings are available.
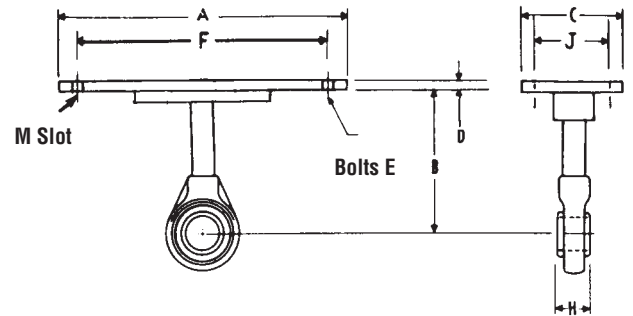
Conveyor Diameter	Coupling Size	Part Number*	A	B	C	D	E	F	H	K	Weight Each	M Slot
6	1 1/2	6CH216F3	14	7	7 1/2	1/4	3/8	7/8	6	2	9	7/16 × 3/4
9	1 1/2	9CH216F3	18	9	9	3/16	3/8	1	7	2	14	7/16 × 15/16
	2	9CH216F4									17	
12	2	12CH216F4	22	10	9	3/8	1/2	1 1/4	7	2	24	9/16 × 15/16
	2 7/16	12CH216F5								3	28	
	3	12CH216F6									32	
14	2 7/16	14CH216F5	24	11	9	3/8	1/2	1 1/8	7	3	31	9/16 × 15/16
	3	14CH216F6									34	
16	3	16CH216F6	28	11 1/2	9	1/2	5/8	1 1/4	7	3	38	11/16 × 1
18	3	18CH216F6	31	12 1/8	10	1/2	5/8	1 1/2	8	3	52	11/16 × 15/16
	3 7/16	18CH216F7								4	61	
20	3	20CH216F6	34	13 1/2	10	1/2	5/8	1 1/2	8	3	55	11/16 × 15/16
	3 7/16	20CH216F7								4	64	
24	3 7/16	24CH216F7	40	16 1/2	10	5/8	5/8	1 5/8	8	4	71	11/16 × 15/16

*Refer to Page H-99 for bearings. For hangers with oil pipe add −0 to part number

Style 60

No. 60 hangers are furnished with a heavy duty, permanently lubricated and sealed, self-aligning ball bearing which permits temperatures up to 245º F. and will allow for up to 4º shaft misalignment. This hanger is mounted on top of the trough flanges. Grease fitting can be furnished if specified.
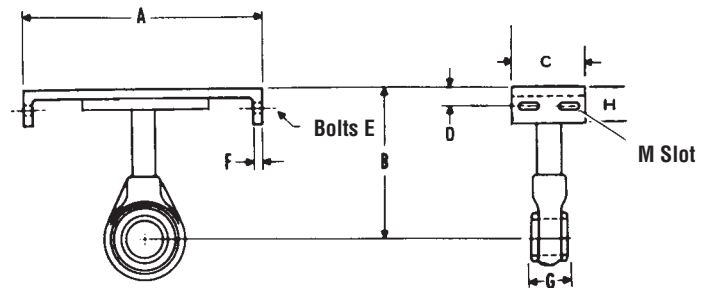
M Slot

Bolts E

Conveyor Diameter	Coupling Size	Part Number*	A	B	C	D	E	F	H	J	Weight Each	M Slot
6	1 1/2	6CH603	9 3/4	4 1/2	4 1/2	3/16	3/8	8 3/4	1 11/16	2	7	7/16 × 11/16
9	1 1/2	9CH603	13 1/2	6 1/8	4 1/2	1/4	3/8	12 1/4	1 11/16	2 1/2	8	7/16 × 11/16
	2	9CH604	13 1/2	6 1/8	4 1/2	1/4	3/8	12 1/4	1 3/4	2 1/2	9	7/16 × 11/16
10	1 1/2	10CH603	14 1/2	6 3/8	4 1/2	1/4	3/8	13 1/4	1 11/16	2 1/2	9	7/16 × 15/16
	2	10CH604	14 1/2	6 3/8	4 1/2	1/4	3/8	13 1/4	1 3/4	2 1/2	10	7/16 × 15/16
12	2	12CH604	17 1/2	7 3/4	5	3/8	1/2	15 3/4	1 3/4	2 1/2	12	9/16 × 15/16
	2 7/16	12CH605	17 1/2	7 3/4	5	3/8	1/2	15 3/4	1 63/64	2 1/2	20	9/16 × 15/16
	3	12CH606	17 1/2	7 3/4	5	3/8	1/2	15 3/4	2 11/16	2 1/2	30	9/16 × 15/16
14	2 7/16	14CH605	19 1/2	9 1/4	5	1/2	1/2	17 3/4	1 63/64	2 1/2	21	9/16 × 15/16
	3	14CH606	19 1/2	9 1/4	5	1/2	1/2	17 3/4	2 11/32	2 1/2	32	9/16 × 15/16
16	3	16CH606	21 1/2	10 5/8	5	1/2	1/2	19 3/4	2 11/32	2 1/2	35	9/16 × 15/16
18	3	18CH606	24 1/2	12 1/8	6	1/2	5/8	22 1/4	2 11/32	3 1/2	40	11/16 × 1 11/16
20	3	20CH606	26 1/2	13 1/2	6	1/2	5/8	24 1/4	2 11/32	3 1/2	45	11/16 × 1 11/16
24	3 7/16	24CH607	30 1/2	16 1/2	6	5/8	5/8	28 1/4	2 31/64	3 1/2	58	11/16 × 1 11/16

*For hangers with oil pipe add –0 to part number

Style 70

No. 70 hangers are furnished with a heavy duty, permanently lubricated and sealed, self aligning ball bearing which permits temperatures up to 245º F. and will allow for up to 4º shaft misalignment. This hanger is mounted inside the trough. Grease fitting can be furnished if specified.

Bolts E

M Slot

Conveyor Diameter	Coupling Size	Part Number*	A	B	C	D	E	F	G	H	Weight Each	M Slot
6	1 1/2	6CH703	7	4 1/2	4 1/2	3/4	3/8	3/16	1 11/16	1 1/2	7	7/16 × 11/16
9	1 1/2	9CH703	10	6 1/8	4 1/2	1	3/8	1/4	1 11/16	1 3/4	8	7/16 × 11/16
	2	9CH704	10	6 1/8	4 1/2	1	3/8	1/4	1 3/4	1 3/4	9	
10	1 1/2	10CH703	11	6 3/8	4 1/2	1	3/8	1/4	1 11/16	1 3/4	9	7/16 × 11/16
	2	10CH704	11	6 3/8	4 1/2	1	3/8	1/4	1 3/4	1 3/4	10	
12	2	12CH704	13	7 3/4	5	1 1/4	1/2	3/8	1 3/4	2 1/8	12	9/16 × 15/16
	2 7/16	12CH705	13	7 3/4	5	1 1/4	1/2	3/8	1 63/64	2 1/8	20	
	3	12CH706	13	7 3/4	5	1 1/4	1/2	3/8	2 11/32	2 1/8	30	
14	2 7/16	14CH705	15	9 1/4	5	1 3/8	1/2	1/2	1 63/64	2 1/4	21	9/16 × 15/16
	3	14CH706	15	9 1/4	5	1 3/8	1/2	1/2	2 11/32	2 1/4	32	
16	3	16CH706	17	10 5/8	5	1 3/8	1/2	1/2	2 11/32	2 1/4	35	9/16 × 15/16
18	3	18CH706	19	12 1/8	6	1 1/2	5/8	1/2	2 11/32	2 1/2	40	11/16 × 13/16
20	3	20CH706	21	13 1/2	6	1 1/2	5/8	1/2	2 11/32	2 1/2	45	11/16 × 13/16
24	3 7/16	24CH707	25	16 1/2	6	1 5/8	5/8	5/8	2 11/32	2 5/8	58	11/16 Holes

*For hangers with oil pipe add –0 to part number

Hangers

Style 19B

The No. 19-B Hanger is similar in construction to the No. 18-B except they are mounted on top of the trough angles. Built-in ledges provide supports for the ends of the cover. They are streamlined in design and permit free passage of the material.

Top half is furnished with bronze bearing. Bottom half can be supplied in oil impregnated wood, hard iron, or other special caps may be furnished on request.
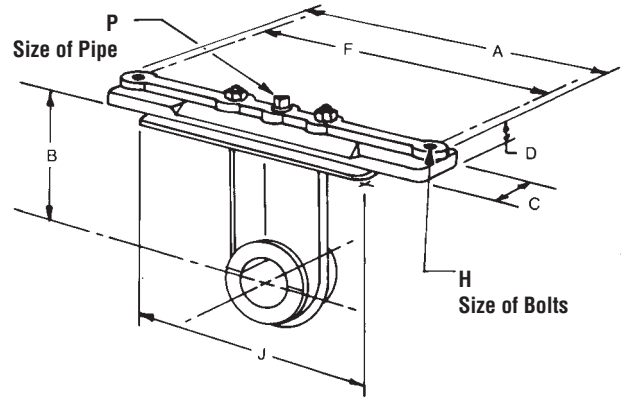
Conveyor Diameter	Coupling Size	Part Number	A	B	C	D	F	H	J	P	Weight
6	1 1/2	6CH19B3	9 7/8	4 1/2	1 7/8	7/8	8 3/4	9/16	6 1/2	1/8	8.5
9	1 1/2	9CH19B3	13 1/2	6 1/8	1 3/4	1	12 1/4	9/16	9 1/2	1/8	13.0
	2	9CH19B4	13 1/2	6 1/8	1 3/4	1	12 1/4	9/16	9 1/2	1/8	15.5
10	1 1/2	10CH19B3	14 1/2	6 3/8	1 3/4	1	13 1/4	9/16	10 1/2	1/8	14.0
	2	10CH19B4	14 1/2	6 3/8	1 3/4	1	13 1/4	9/16	10 1/2	1/8	14.0
12	2	12CH19B4	17	7 3/4	2	1 1/4	15 3/4	9/16	12 1/2	1/8	24.0
	2 7/16	12CH19B5	17	7 3/4	2 1/8	15/6	15 3/4	9/16	12 1/2	1/8	24.5
	3	12CH19B6	17	7 3/4	2 1/8	15/6	15 3/4	9/16	12 1/2	1/8	24.5
14	2 7/16	14CH19B5	19 1/4	9 1/4	3	1 1/2	17 3/4	9/16	14 1/2	1/8	37.0
	3	14CH19B6	19 1/4	9 1/4	3	1 1/2	17 3/4	9/16	14 1/4	1/8	37.0
16	3	16CH19B6	21 1/4	10 5/8	3	1 3/4	19 3/4	11/16	16 1/2	1/8	45.0
18	3	18CH19B6	23 3/4	12 1/8	3	1 5/8	22 1/4	11/16	18 1/2	1/8	48.5
20	3 7/16	20CH19B7	26 1/4	13 1/2	4	1 1/2	24 1/4	13/16	20	1/8	60.0
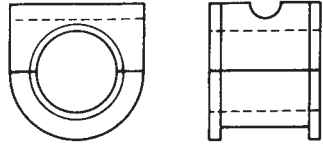
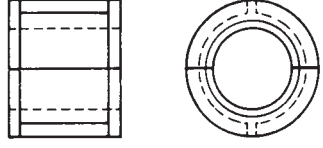| Bearing Material	Maximum Operating Temperature (°F)	Styles Available	Material FDA Complaint	Self Lube	Some Suggested Uses	Comments
WOOD	160°	220, 216, 19B	–	Yes	Grain, Feed, Fertilizer	Good general purpose.
UHMW	225°	220, 216	Yes	Yes	Food	Material USDA approved. Does not swell in water.
MARTIN HARD IRON	500°	220	–	Yes	Chemical, Cement, Aggregate	Requires Hardened Shaft
CAST HARD IRON	500°	220, 216, 19B	–	–	Lime, Cement, Salt, Gypsum	Requires hardened shaft. Can be noisy. Lubrication required in some applications.
CERAMIC[1]	1,000°	220, 216	Yes	–	Chemical, Cement, Food	Requires hardened shafts.
STELLITE	1000°	220, 216	–	–	Chemical, Cement, Aggregate	Requires Stellite insert in shaft.
FOOD GRADE ENGINEERED NYLON	300°	220	Yes	Yes	Food, Grain, Fertilizer	For dry application.
NYLATRON GS	250°	220, 19B	–	Yes	Chemical, Handling, Grain, Feed	Very low load capacity.
MARTIN BRONZE	850°	220	–	Yes	Grain, Feed, Processing	High quality bearings. High load capacity.
MARTIN HDPE	200°	220	Yes	Yes	Grain, Feed, Chemical Handling	Recommended for non-abrasive applications
MARTIN URETHANE	200°	220	–	Yes	Grain, Chemical, Fertilizer	Good general purpose.
MARTIN WHITE IRON	500°	220	–	–	Chemical, Cement, Aggregate	Requires hardened shaft. Can be noisy. Lubrication required in some applications.
GATKE	400°	220, 216	–	–	Chemical	Fiberglass fabric. Good for higher speeds.
ERTALYTE®	200°	220, 216	Yes	–	Food	Registered Trademark of Quadrant Engineering Products
BALL BEARING	180°	60, 70	–	–	Non-abrasive applications	General purpose use.

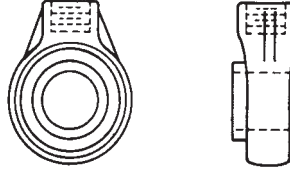[1] Higher temperature ceramics are available.

Hanger
Bearings

Martin

Hanger Types	Shaft Diameter	Part Number	Bearing
	1 1/2	CHB2163*	
216	2	CHB2164*	
230	2 7/16	CHB2165*	
316	3	CHB2166*	
	3 7/16	CHB2167*	

*H — Hard Iron   *W — Wood   *BR – Bronze   *U — UHMW   *G — Gatke   *ER – Ertalyte®   *C — Ceramic   * ST — Stellite   * UR - Urethane

*Oil hole is furnished on hard iron and bronze standard.

Hanger Types	Shaft Diameter	Part Number	Bearing
	1	CHB2202*	
220	1 1/2	CHB2203*	
226	2	CHB2204*	
326	2 7/16	CHB2205*	
30	3	CHB2206*	
	3 7/16	CHB2207*	

*H — Cast Hard Iron with oil hole   *W — Wood   *N — Nylatron   *P – HDPE   *G — Gatke   *ER – Ertalyte®

*MHI — Martin Hard iron (oil impregnated)   *MCB — Melamine (Furnished Less Flanges)   *C – Ceramic   *WN – White Nylon   *WI – White Iron

*MBR — Martin Bronze (oil impregnated)   *U — UHMW   *UR – Urethane

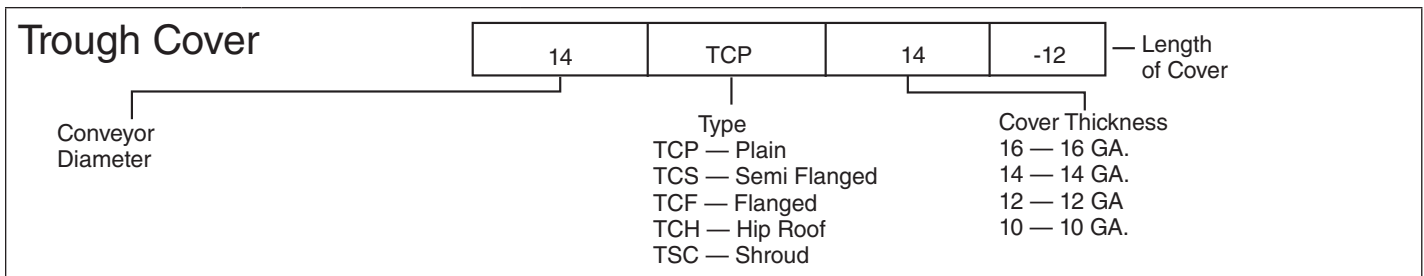| Hanger Types	Shaft Diameter	Part Number	Bearing
	1 1/2	CHB603	
	2	CHB604	
60 Ball Bearing	2 7/16	CHB605	
70 Ball Bearing	3	CHB606	
	3 7/16	CHB607	

Note: New style bearings are available with slinger shield one side.

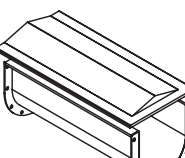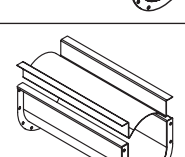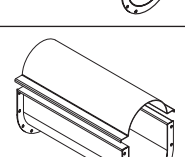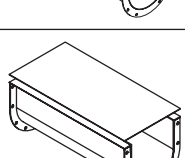| Hanger Types	Shaft Diameter	Part Number	Bearing
	1 1/2	CHB18B3*	
	2	CHB18B4*	
18B	2 7/16	CHB18B5*	
19B	3	CHB18B6*	
	3 7/16	CHB18B7*	
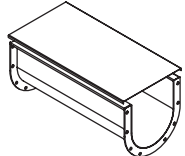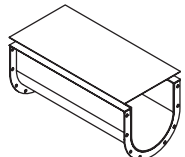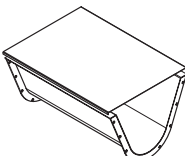
*W—Wood   *H—Hard Iron   *N—Nylatron   *G—Gatke

Note: Furnished as bottom cap only.

Ertalyte® is Registered Trademarks of Quadrant Engineered Plastic Products.

Trough Cover

| 14 | TCP | 14 | -12 | — Length of Cover |

Conveyor Diameter

Type
TCP — Plain
TCS — Semi Flanged
TCF — Flanged
TCH — Hip Roof
TSC — Shroud

Cover Thickness
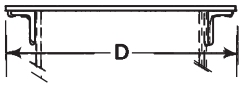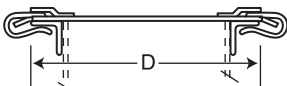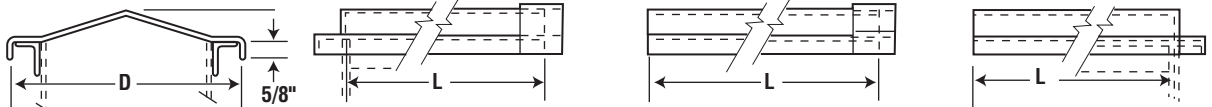16 — 16 GA.
14 — 14 GA.
12 — 12 GA
10 — 10 GA.

It is the responsibility of the contractor, installer, owner and user to install, maintain and operate the conveyor components and conveyor assemblies manufactured and supplied by Martin in such a manner as to comply with the Williams-Steiger Occupational Safety and Health Act and with all state and local laws and ordinances and the American National Standard Institute Safety Code.

FLANGED COVERS		Most commonly used. Can be supplied with gaskets and butt straps for dust tight applications. Semi-flanged must be furnished if spring clamps are used.
FLAT COVERS		Usually used only to cover conveyor for safety.
FLARED TROUGH COVERS		Usually flanged type and heavier gauges because of span.
HIP ROOF COVERS		Hip roof covers are similar to conventional flanged covers except they are peaked slightly to form a ridge along the center of the cover. A welded end plate closes the peaked section at each end of the trough while intermediate joints are usually buttstrap connected. Hip roof covers are usually recommended for outdoor installations to prevent accumulation of moisture. They are also often used in applications where a more rigid cover is required.
SHROUD COVERS		Used to approximate tubular cross section for inclined or feeder applications.
DOMED COVERS		Domed covers are half circle domes rolled to the same inside diameter as the trough bottom and are flanged for bolting to the trough top rails. They are used where venting of fumes or heat from the material being conveyed is required. End sections have a welded end plate and intermediate joints are buttstrap connected. Vent pipes or suction lines can be attached to the cover.
FEEDER SHROUDS		Shrouds are used in trough sections of screw feeders to decrease the clearance between the cover and feeder screw to obtain proper feed regulation. Lengths are sufficient to prevent flushing of the majority of materials being handled and gauges are proportioned to trough size and gauge.

Trough Covers

Plain Cover

Semi-flanged Cover

All conveyor troughs should have some type of cover not only to keep material inside the trough and to protect material in the trough from outside elements, **but trough definitely should be covered as a safety measure**, preventing injuries by keeping workers clear of the moving parts inside the conveyor trough. See H-122, Safety.

Flanged Cover

5/8"

Type 1   Type 2   Type 3

Hip Roof Cover

5/8"

End Trough Cover —Type 1   Intermediate Trough Cover —Type 2   End Trough Cover — Type 3

| Conveyor Diameter	Plain Cover				Plain Semi-Flanged Cover				Flanged Cover				Hip Roof Cover			
	Part Number	Thickness Ga.	Wt. per ft.	D	Part Number	Thickness Ga.	Wt. per ft.	D	Part Number	Thickness Ga.	Wt. per ft.	D	Part Number	Thickness Ga.	Wt. per ft.	D
4	4TCP16	16	1.5	8	4TCS16	□ 16	2.1	8 1/8	4TCF16	□ 16	1.9	8 3/8	4TCH16	□ 16	2	
*					4TCS14	14	2.6		4TCF14	14	2.4		4TCH14	14	2.5	8 3/8
6	6TCP16	16	2	9 3/4	6TCS16	□ 16	2.3	10 1/8	6TCF16	□ 16	2.1	10 3/8	6TCH16	□ 16	2.3	10 3/8
*					6TCS14	14	3.8		6TCF14	14	2.6		6TCH14	14	2.8	
9	9TCP14	14	3.5	13 3/8	9TCS14	□ 14	4.1	13 3/4	9TCF16	16	3.2	14	9TCH16	16	3.3	14
					9TCS12	12	5.7		9TCF14	□ 14	3.9		9TCH14	□ 14	4.1	
					9TCS10	10	7.3		9TCF12	12	5.5					
*									9TCF10	10	7.1					
10	10TCP14	14	3.8	14 3/8	10TCS14	□ 14	4.4	14 3/4	10TCF16	16	3.4	15	10TCH16	16	3.5	15
					10TCS12	12	6.1		10TCF14	□ 14	4.2		10TCH14	□ 14	4.3	
					10TCS10	10	7.8		10TCF12	12	5.9					
*									10TCF10	10	7.6					
12	12TCP14	14	4.6	17 1/2	12TCS14	□ 14	5.1	17 1/2	12TCF14	□ 14	4.9	18	12TCH14	□ 14	5	18
					12TCS12	12	7.1		12TCF12	12	6.9		12TCH12	12	7.1	
**					12TCS10	10	9		12TCF10	10	8.8					
14	14TCP14	14	5.1	19 1/2	14TCS14	□ 14	5.6	19 1/2	14TCF14	□ 14	5.4	19 7/8	14TCH14	□ 14	5.5	19 7/8
					14TCS12	12	7.8		14TCF12	12	7.6		14TCH12	12	7.7	
**					14TCS10	10	9.9		14TCF10	10	9.7					
16	16TCP14	14	5.6	21 1/2	16TCS14	□ 14	6.1	21 1/2	16TCF14	□ 14	5.9	21 7/8	16TCH14	□ 14	6.1	21 7/8
					16TCS12	12	8.5		16TCF12	12	8.3		16TCH12	12	8.5	
**					16TCS10	10	10.8		16TCF10	10	10.6					
18	18TCP12	12	8.9	24 1/2	18TCS12	□ 12	9.6	24 1/2	18TCF14	14	6.7	25	18TCH14	14	6.8	25
					18TCS10	10	12.3		18TCF12	□ 12	9.4		18TCH12	□ 12	9.5	
**									18TCF10	10	12.1					
20	20TCP12	12	9.7	26 1/2	20TCS12	□ 12	10.3	26 1/2	20TCF14	14	7.2	27	20TCH14	14	7.4	27
					20TCS10	10	13.3		20TCF12	□ 12	10.1		20TCH12	□ 12	10.4	
**									20TCF10	10	13.1					
24	24TCP12	12	11.1	30 1/2	24TCS12	□ 12	11.8	30 1/2	24TCF14	14	8.3	31	24TCH14	14	8.4	31
					24TCS10	10	15.1		24TCF12	□ 12	11.6		24TCH12	□ 12	11.8	
**									24TCF10	10	14.9					

For average applications where dust confinement is not a problem, 2'-0" centers or 10 fasteners per 10'-0" section are generally satisfactory. For commercially dust tight 1'-0" centers or 20 fasteners per 10'-0" section are suggested.

*L — Standard lengths are 5'-0" & 10'-0"   **L — Standard lengths are 5', 6', 10' & 12'-0"   □ — Standard gauge
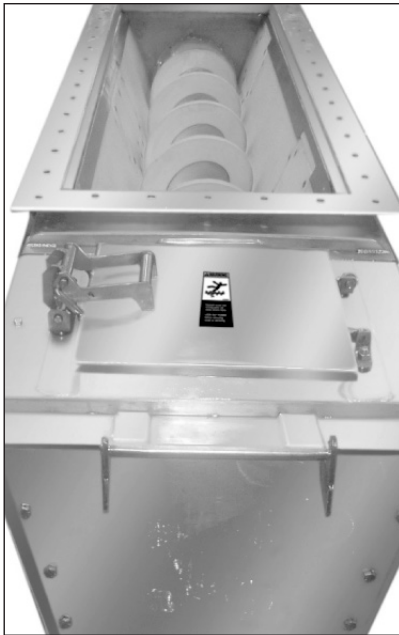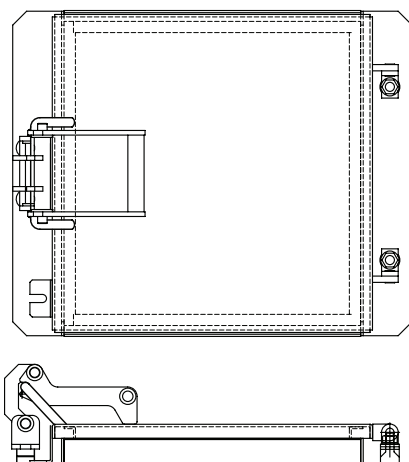
Martin

The Martin dust tight inspection door is ideal for visual inspection in dusty applications. Once installed, the Martin inspection door will give you years of trouble free service. It allows efficient access by authorized personnel while maintaining security with a latch that can be bolted or locked. The door comes with a poured black rubber door seal for chemical resistance and long life. The hinge and latch on all models are laser cut of 304 SS material for precision and corrosion resistance.

- Moisture and Dust Tight
- Heavy-Duty Construction
- Installs Easily on Existing Equipment
- Simple Operation
- Stocked in Carbon Steel and 304SS
- 316SS Available upon request
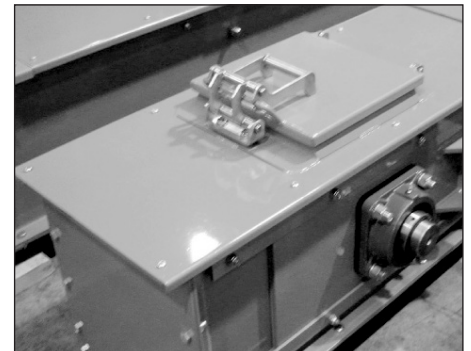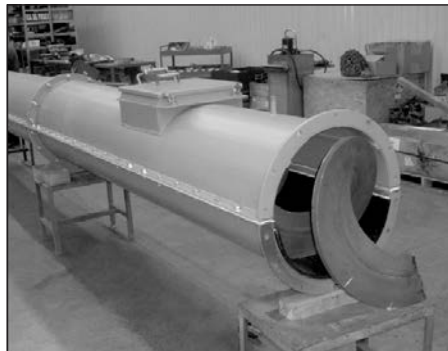
The Martin dust tight inspection door can be supplied with an expanded metal screen welded inside the opening to prevent physical access to moving parts. These doors are available from stock in many sizes. Custom sizes can be manufactured to fit your specific needs.

Call your local Martin Distributor for more information.

MDT® Martin Dust Tight Doors

Part Number		Size
Carbon Steel*	Stainless Steel	
0606PG-ID	0606PG-ID-SS	6" × 6"
0909PG-ID	0909PG-ID-SS	9" × 9"
1010PG-ID	1010PG-ID-SS	10" × 10"
1212PG-ID	1212PG-ID-SS	12" × 12"
1414PG-ID	1414PG-ID-SS	14" × 14"
1616PG-ID	1616PG-ID-SS	16" × 16"

*Carbon Steel construction with Stainless Steel Hinge.

Martin Dust Tight Doors are stocked in Carbon Steel and 304SS, 316SS is available upon request. Special sizes also available upon request.

Cover Accessories

Flanged Conveyor Inlets

The two styles of flanged conveyor inlets are designed for either bolting or welding to flat or flanged conveyor trough cover. The inlet size and bolt arrangement is the same as the standard conveyor discharge spout.

Fixed Typev

Detachable Type

L Bolts
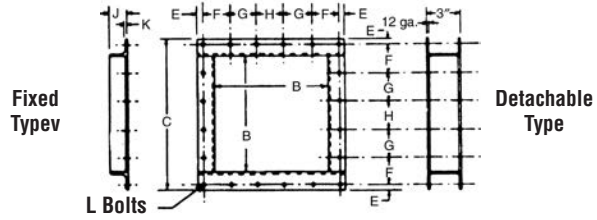
Conveyor Diameter	Part Number		Weight	B	C		E		F	G	H	J	K	L
	Fixed Inlet	Detachable Inlet			Fixed Inlet	Detachable Inlet	Fixed Inlet	Detachable Inlet						
4	4CIF	4CID	1.8	5	7 1/2	7 1/2	3/8	3/8	2 1/4	—	2 1/4	1 1/4	3/16	1/4
6	6CIF	6CID	5.0	7	10	10	11/16	11/16	2 13/16	—	3	1 1/2	3/16	3/8
9	9CIF	9CID	6.8	10	13	13	1/2	1/2	4	—	4	1 1/2	3/16	3/8
10	10CIF	10CID	7.4	11	14 1/4	14 1/4	5/8	5/8	4 5/16	—	4 3/8	1 1/2	3/16	3/8
12	12CIF	12CID	12.1	13	17 1/4	17 1/4	3/4	7/8	5 1/8	—	5 1/4	2 1/8	3/16	3/8
14	14CIF	14CID	13.7	15	19 1/4	19 1/4	3/4	7/8	3 1/2	3 1/2	3 1/2	2 1/8	3/16	3/8
16	16CIF	16CID	15.8	17	21 1/4	21 1/4	3/4	7/8	3 3/4	4	4	2 1/8	3/16	3/8
18	18CIF	18CID	29.0	19	24 1/4	24 1/4	1	1 1/8	4 7/16	4 3/8	4 3/8	2 1/2	3/16	1/2
20	20CIF	20CID	31.8	21	26 1/4	26 1/4	1	1 1/8	4 7/8	4 3/4	4 3/4	2 1/2	3/16	1/2
24	24CIF	24CID	37.2	25	30 1/4	30 1/4	1	1 1/8	5 5/8	5 5/8	5 1/2	2 1/2	3/16	1/2

Spring Clamps

Spring Clamps are used to attach plain and semi-flanged covers to trough. These clamps are normally riveted to the trough flange and will pivot to allow removal of cover.
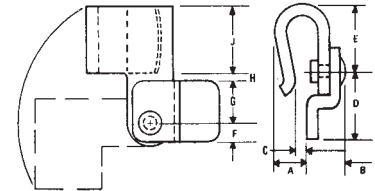
Clamp No.	A	B	C	D	E	F	G	H	J	Wt.
SPC-1	5/16	3/16	5/16	2	1 1/4	1 5/16	3	7/8	9/32	.38
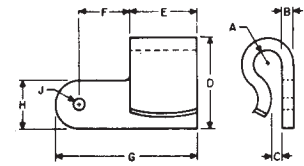
Spring Clamps with Cover Bracket

Spring Clamps with cover brackets are designed to attach to the top side of semi-flanged and plain covers.

Clamp No.	A	B	C	D	E	F	G	H	J	Wt.
SPCA-1	11/16	1/2	3/16	1 1/2	1 9/16	3/8	7/8	3/8	1 1/4	.50

Screw Clamps

Screw Clamps are a simple and effective means of attaching flanged or flat covers to trough. Screw Clamps available in mild steel, stainless steel and zinc plated.

Clamp No.	A	B	C	D	E	F	G	J	Wt.
CSC-2	2 1/4	1	1 3/16	1 7/16	5/16	3/8	1/2	.42	.50
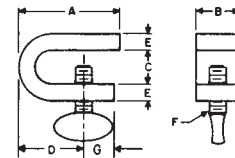
Cover Gaskets

Conveyor Diameter	Size		
	Red Rubber	Sponge Rubber	*White Rubber
4.6	RR125 1/8 × 1 1/4	SP125 1 1/8 × 1 1/4	WN125 1/8 × 1 1/4
9,10	RR150 1/8 × 1 1/2	SP150 1/8 × 1 1/2	WN150 1/8 × 1 1/2
12, 14, 16	RR200 1/8 × 2	SP200 1/8 × 2	WN200 1/8 × 2
18, 20, 24	RR250 1/8 × 2 1/2	SP250 1/8 × 2 1/2	WN250 1/8 × 2 1/2

*FDA Approved

H-104

Toggle Clamps

Quick acting toggle clamps are used to attach covers for quick accessibility. Normally this type clamp is attached by welding the front or top of clamp to the trough and can be adjusted to fit all sizes of trough, while allowing 90° to clear working area.
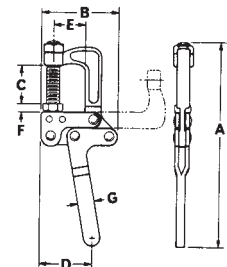
Conveyor	Part Number	No. Required per 10' Section	A	B	C	D	E	F	G
4 – 24	QTC	6 to 8	7 13/16	2 15/16	1 25/32	2	1 1/4	5/16	5/8

Feeder Shrouds

Shrouds are used in trough sections of screw feeders to decrease the clearance between the cover and feeder screw to obtain proper feed regulation. Lengths are sufficient to prevent flushing of the majority of materials being handled and gauges are proportioned to trough size and gauge.

Flared Trough

U-Trough
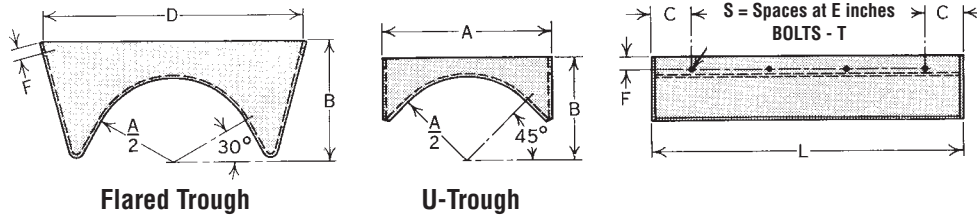
| Screw Diameter	Part Number		Shroud Thickness	A	B		C	D	E	F		L	T	S
	U	Flared			U	Flared				U	Flared			
4	4TFS14	4FFS14	14 Ga.	5	3 5/8	—	2	—	4	5/8	—	8	1/4	1
6	6TFS14	6FFS14	14 Ga.	7	4 1/2	7	3	14	6	3/4	3/4	12	5/16	1
	6TFS12	6FFS12	12 Ga.	7	4 1/2	7	3	14	6	3/4	3/4	12	5/16	1
9	9TFS14	9FFS14	14 Ga.	10	6 1/8	9	3	18	6	7/8	3/4	18	3/8	2
	9TFS7	9FFS7	3/16"	10	6 1/8	9	3	18	6	7/8	3/4	18	3/8	2
10	10TFS14	10FFS14	14 Ga.	11	6 3/8	—	2 1/2	—	5	7/8	—	20	3/8	3
	10TFS7	10FFS7	3/16"	11	6 3/8	—	2 1/2	—	5	7/8	—	20	3/8	3
12	12TFS12	12FFS12	12 Ga.	13	7 3/4	10	3	22	6	1 1/8	1	24	3/8	3
	12TFS7	12FFS7	3/16"	13	7 3/4	10	3	22	6	1 1/8	1	24	3/8	3
14	14TFS12	14FFS12	12 Ga.	15	9 1/4	11	3 1/2	24	7	1 1/8	1	28	3/8	3
	14TFS7	14FFS7	3/16"	15	9 1/4	11	3 1/2	24	7	1 1/8	1	28	3/8	3
16	16TFS12	16FFS12	12 Ga.	17	10 5/8	11 1/2	4	28	8	1 1/8	1	32	3/8	3
	16TFS7	16FFS7	3/16"	17	10 5/8	11 1/2	4	28	8	1 1/8	1	32	3/8	3
18	18TFS12	18FFS12	12 Ga.	19	12 1/8	12 1/8	4 1/2	31	9	1 3/8	1 3/8	36	3/8	3
	18TFS7	18FFS7	3/16"	19	12 1/8	12 1/8	4 1/2	31	9	1 3/8	1 1/8	36	3/8	3
20	20TFS10	20FFS10	10 Ga.	21	13 1/2	13 1/2	4	34	8	1 3/8	1 3/8	40	3/8	4
	20TFS7	20FFS7	3/16"	21	13 1/2	13 1/2	4	34	8	1 3/8	1 3/8	40	3/8	4
24	24TFS10	24FFS10	10 Ga.	25	16 1/2	16 1/2	4	40	8	1 3/8	1 3/8	48	3/8	5
	24TFS7	24FFS7	3/16"	25	16 1/2	16 1/2	4	40	8	1 3/8	1 3/8	48	3/8	5

Conveyor Shrouds

Conveyor shroud covers are used to form a tubular cross section within the conveyor trough. This arrangement gives the features of a tubular housing while allowing removal of the shroud for easy access and cleaning. Flat or flanged covers can be used over the shroud cover when it is objectionable for the recess in the shroud to be exposed to dust or weather. Various types of shrouds are furnished to fit various applications. These types are described below.
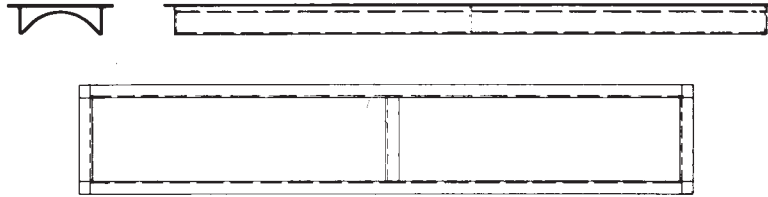
Type 1

Type 1 Shroud cover has flanged sides over top rail and flanged ends at both ends. This type is used when shroud is full length of trough or between hangers.
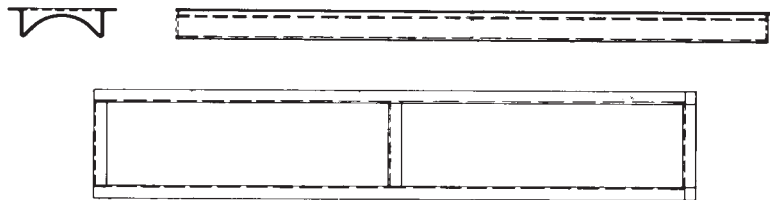
Type 2

Type 2 Shroud cover has flanged sides over top rails and flanged ends on one end over trough end; other end is plain. This type shroud is used at an inlet opening or next to a hanger at the plain end.
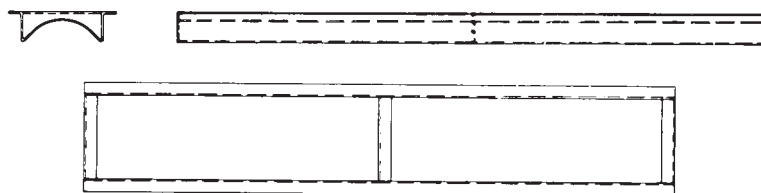
Type 3

Type 3 Shroud cover has flanged sides over top rail and both ends closed and no flanges over ends. This type shroud is used between hangers.
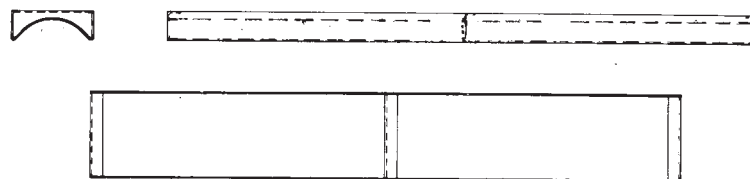
Type 4

Type 4 Shroud cover has no flanges at sides or ends. Bolt holes are provided along sides, for bolting through side of trough. This allows flush mounting with top of trough and a cover may be used over the shroud. This shroud is used mostly for short lengths when installed ahead of an inlet opening.

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SPECIAL FEATURES

Special Features

The information presented in this section gives descriptions and functions of the most commonly used special features available in the design of conveyor systems.

These special features will greatly broaden the range of uses for screw conveyor when added to the many standard features available. Standard features and components are always more desirable and practical in the design of a screw conveyor system; however, one or more of these special features may sometimes be required in special applications for a workable or more efficient system.

Covers

OVERFLOW COVER sections are used as a safety relief to handle overflow over the discharge in cases where the discharge may become plugged. It is a short section of flanged or flat cover hinged across the width to the adjoining cover. The cover is not attached to the trough in order that it can be raised by pressure from within the trough.

SHROUD COVERS are designed to fit inside a standard conveyor trough of a Screw Feeder or inclined conveyor, and create a tubular trough effect. This cover has an advantage over tubular trough in that ease of access is combined with the convenience of using standard hangers and accessories. An additional flat cover may be required over the shroud to prevent accumulation of dust or water in the recessed portion of the shroud cover.

EXPANDED METAL COVERS can be furnished where cover is required for safety but constant visual inspection is required.

STANDARD COVERS of any design can be furnished in heavier gauges, when needed to support weight.

DOME COVERS are half circle domes rolled to the same inside diameter as the trough bottom and are flanged for bolting to the trough top rails. They are used where venting of fumes or heat from the material being conveyed is required. End sections have a welded end plate and intermediate joints are buttstrap connected. Vent pipes or suction lines can be attached to the cover.

DUST SEAL COVERS are flanged down on all four sides to match channel sections fabricated on the sides, ends, and cross channels of special dust seal troughs. The length of the cover should not exceed one-half the length of the trough section.

HINGED COVERS may be constructed from conventional flat covers or most special covers. They are equipped with a hinge on one side for attaching to the trough and are bolted or clamped to the trough on the other side. Hinged covers are used in applications where it is not desirable to have a loose cover, such as in high areas above walkways where the cover might fall.

HIP ROOF COVERS are similar to conventional flanged covers except they are peaked slightly to form a ridge along the center of the cover. A welded end plate closes the peaked section at each end of the trough while intermediate joints are usually buttstrap connected. Hip roof covers are usually recommended for outdoor installations to prevent accumulation of moisture. They are also often used in applications where a more rigid cover is required.
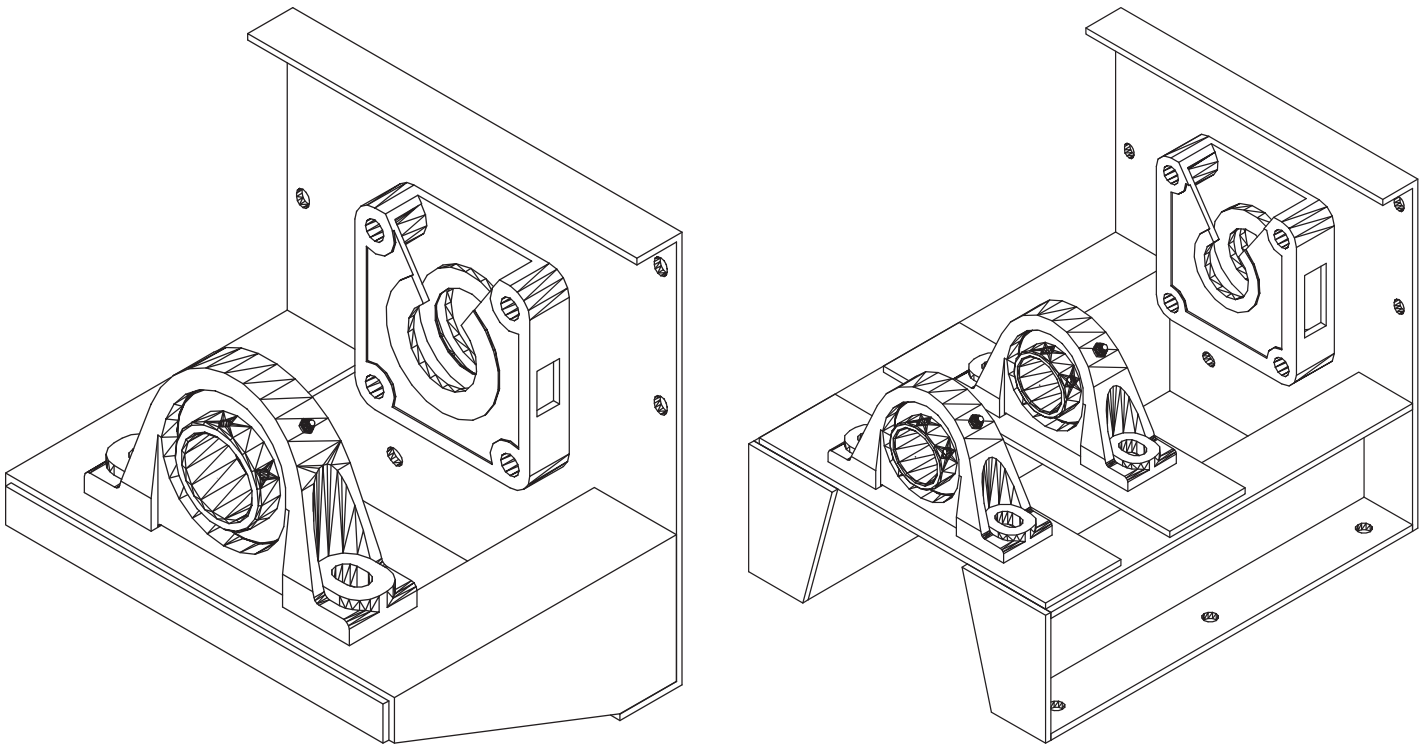
SHELF-TYPE TROUGH ENDS are furnished with outboard bearing pedestals for mounting pillow block bearings. The bearings are mounted away from the trough end plate allowing ample room to protect the bearing when handling abrasive or hot materials. This arrangement allows the use of most any type shaft seal desired. Either one or two bearings can be used.
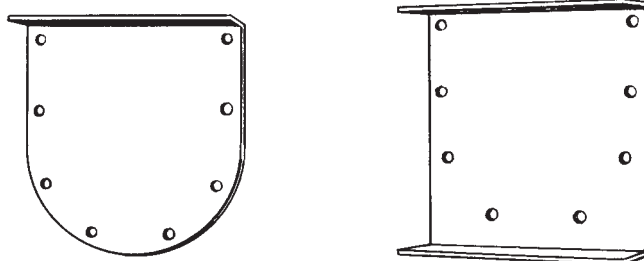
BLIND TROUGH ENDS are used on the tail end (normally the inlet end) of a conveyor, when sealing the end shaft is extremely difficult. A hanger is used inside the trough to support the tail shaft without the shaft projecting through the trough end.

A blind trough end plate can also be furnished with a dead shaft welded to the end plate. For this type the screw is bushed with an antifriction bearing to carry the radial load of the screw. When required, a grease fitting can be furnished through the dead shaft for lubricating the bearing.

Troughs

Martin
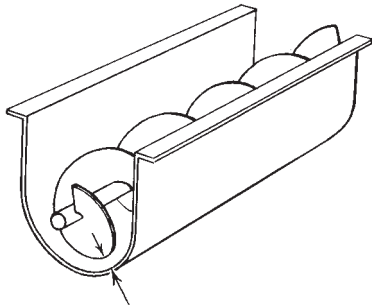
WIDE CLEARANCE TROUGH is of conventional construction except with a wider clearance between the outside of the conveyor screw and the inside of the trough. This type trough is used when it is desirable to form a layer of conveyed material in the trough. The material thus moves on itself, protecting the trough from undue wear. By using a wide clearance or oversize trough, a greater capacity than using a standard conveyor screw can be obtained for some materials that travel as a mass. When wide clearance trough is required, it is more economical to use a standard conveyor screw and the next larger size standard trough.
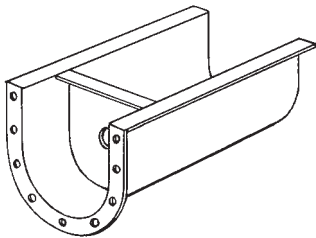
BULK HEAD is a plate or baffle shaped to the contour of the inside of the trough and is normally welded or bolted six to twelve inches from the trough end. The bulk head protects the end bearing and drive unit from heat while handling hot materials, when the pocket formed is filled with packing or insulation. The bulk head can be used in the same manner to prevent damage to seals and bearings when handling extremely abrasive materials.
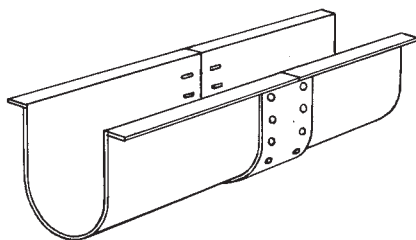
EXPANSION JOINT is a connection within a length of trough to allow for expansion caused by hot materials being conveyed. The expansion joint is constructed with bolts fastened in slots to allow for expansion or with a telescoping type slip joint. The number of joints and amount of expansion will depend on the application.
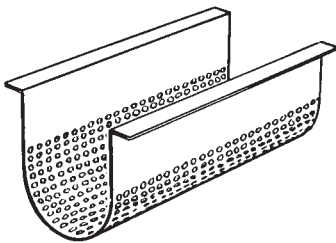
PERFORATED BOTTOM TROUGH is equipped with a perforated bottom, and is used as a screening operation or drain section when liquids are present in the conveyed material. The size of the perforations in the trough will vary depending on the material and application.
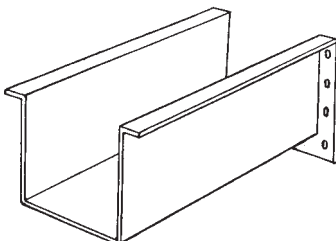
RECTANGULAR TROUGH is made with a flat bottom and can be formed from a single sheet or with sides and bottom of separate pieces. This type trough is frequently used in handling abrasive materials capable of forming a layer of material on the bottom of the trough. The material thus moves on itself, protecting the trough from undue wear. Also in handling hot materials, the material will form its own internal insulation with this type trough.
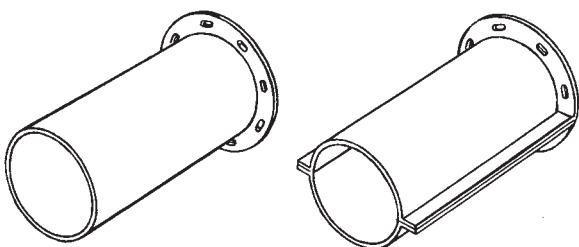
TUBULAR TROUGH is furnished in either solid tube construction or split tube construction with flanges for bolting or clamping the two halves together. This trough is a complete tube enclosure and is used for weather-tight applications, for loading to full cross sections, and for inclined or vertical applications where fall back necessitates the housing to operate at a full loading.

*Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

CLOSE CLEARANCE TROUGH is of conventional construction except with a closer clearance between the outside of the conveyor screw and the inside of the trough. This type trough leaves less material in the trough and is often used when a greater clean-out of conveyed material is required. This type trough also minimizes fall back of certain materials in an inclined conveyor.

Close

DROP BOTTOM TROUGH is equipped with either a bolted or clamped and completely removable drop bottom, or hinged on one side with bolts or clamps on the opposite side. This design offers ease in cleaning of the trough and screw conveyor, and is often used when handling food products where internal inspection and cleaning of the screw conveyor is necessary.

DUST SEAL TROUGH (Sometimes referred to as **SAND SEAL TROUGH**) has Z-bar top flanges and formed channel cross members making a continuous channel pocket around the top of the trough into which a special flanged cover is set. The channel is filled with sand or dust of the product being conveyed, thus creating an effective seal against the escape of dust from within the conveyor.

CHANNEL SIDE TROUGH is made with separate detachable trough bottoms, bolted or clamped to formed or rolled steel channels. The channels may be of any reasonable length to span widely spaced supports. This type of trough is occasionally used for easy replacement of trough bottoms, and to facilitate repairs when conveyor screw and hangers are not accessible from the top. The channel side trough can also be used without a bottom for filling bins and hoppers.

HIGH SIDE TROUGH is of conventional construction except that the trough sides extend higher than standard from the center line to the top of the trough. This type trough is frequently used in conveying materials which mat together and travel as a mass on top of the conveyor screw. High side trough will confine this type material in the trough, but still affords the necessary expansion room.

JACKETED TROUGH consists of a formed jacket continuously welded to the trough. This type trough is widely used for heating, drying or cooling of materials. Pipe connections are provided for supply and discharge of the heating or cooling media. Special construction must be provided for higher pressures.

*Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

Troughs

HOLD DOWN ANGLES are used to hold the conveyor screw in the trough when the conveyor is operated without intermediate hangers or when chunks of material may tend to ride under the conveyor screw and push it up. The angle is constructed of formed or regular angle iron and is attached to one side of the full length of trough far enough above the conveyor screw to allow approximately one-half inch clearance between the bottom angle and the conveyor screw.

INSULATED CONVEYOR TROUGH is used when handling hot or cold materials. There are many types of insulation materials and arrangements that can be used.

RIDER BARS are flat bars one to one and one-half inches in width running part of length or full length of the trough. Two or four bars are normally used and are spaced an equal distance apart along the curved bottom of the trough. The bars are used to support the conveyor screw to prevent wear on the trough when internal hanger bearings are not used. Rider bars are sometimes referred to as Rifling Bars when they are used to assist in conveying materials that tend to stick to the conveyor screw and rotate with it.

SADDLE TYPE WEAR PLATES are plates curved to the contour of the inside of the trough and of slightly less thickness than the clearance between the conveyor screw and trough. The plates are made in lengths of approximately one and one-half times the pitch of the conveyor screw and are normally spaced at intervals equal to the distance between hangers. They are used to support the conveyor screw to prevent damage to the trough when internal hanger bearings are not used.

STRIKE OFF PLATE (SHROUD BAFFLE) Is a single plate bolted vertically to the upper portion of the trough and is cut out to the contour of the screw. This plate is used to regulate the flow of material from an inlet by preventing flooding across the top of the conveyor screw.

*Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

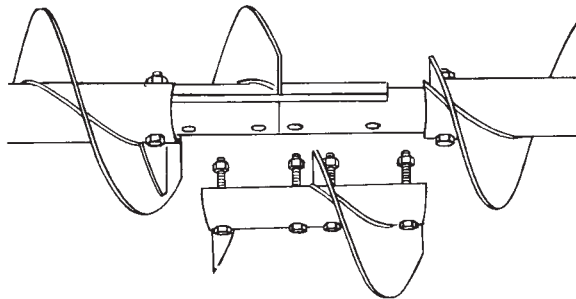**SPLIT FLIGHT COUPLINGS** permit installation or removal of individual sections of conveyor screw without disturbing adjoining sections. When they are installed on both sides of each hanger, sections of screw can be removed without disturbing the hangers. These must be furnished complete with matching shafts.
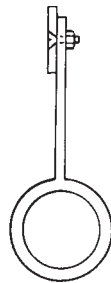
WEAR FLIGHTS, or wearing shoes, attached with countersunk bolts to the carrying side of conveyor screw flights are used for handling highly abrasive materials and are easily replaceable.
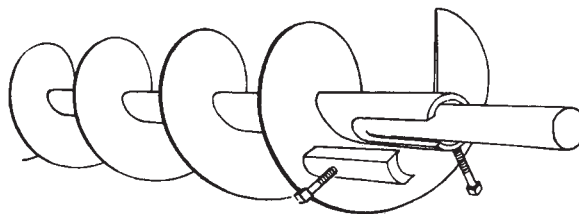
QUICK DETACHABLE KEY CONVEYOR SCREW is designed for easy removal from the conveyor trough. Each section of screw is provided with a removable key located at one end of the pipe. By removing this key, a conveyor screw section and coupling with a hanger can be quickly removed without disturbing other components.

Width of Application Chart

Screw Diameter	Standard Width of Application
6	1
9	1 1/2
12	2
14	2
16	2 1/2
18	2 1/2
20	3
24	3
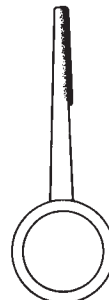
NOTE: Weld-on type normally 1/16" thick.

Helicoid   **Sectional**

HARD SURFACED FLIGHTS sometimes called abrasive resistant conveyors can be furnished using one of many hardsurfacing processes. The hard surfaced area is normally an outer portion of the face of the flight on the carrying side of the conveyor screw. This process is applied to the conveyor screw to resist wear when handling highly abrasive materials.

Conveyor
Screws
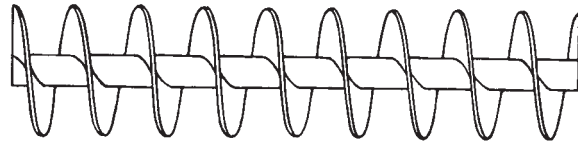
SHORT PITCH CONVEYOR SCREWS are of regular construction except that the pitch of the flights is reduced. They are recommended for use in inclined conveyors of 20 degrees slope and over, and are extensively used as feeder screws, and for controlling cross sectional loading in the balance of a conveyor when short pitch is used at the inlet opening.
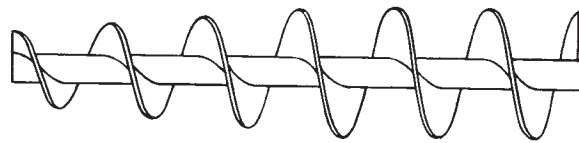
TAPERING FLIGHT CONVEYOR SCREWS are frequently used as feeder screws for handling friable lumpy material from bins or hoppers and also to draw the material uniformly from the entire length of the feed opening.
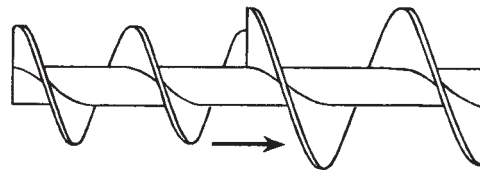
STEPPED DIAMETER CONVEYOR SCREWS consist of flights of different diameters, each with its regular pitch, mounted in tandem on one pipe or shaft. They are frequently used as feeder screws, with the smaller diameter located under bins or hoppers to regulate the flow of material.
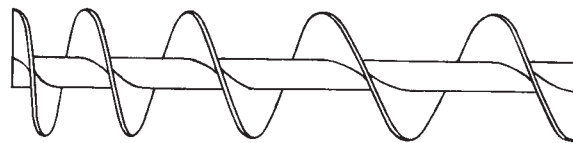
STEPPED PITCH CONVEYOR SCREWS are screws with succeeding single or groups of flights increasing in pitch and are used as feeder screws to draw free-flowing materials uniformly from the entire length of the feed opening.

CONE SCREW to withdraw material evenly from a hopper or bin. Constant pitch reduces bridging. Requires less start-up horsepower.
H-114
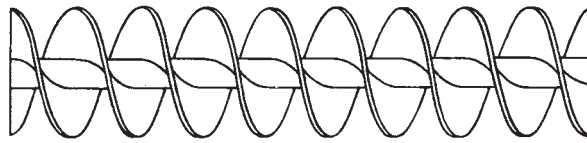
DOUBLE FLIGHT CONVEYOR SCREWS of regular pitch promote a smooth gentle flow and discharge of certain materials. Double flight can be used at hanger points only, for smooth flow past hangers.
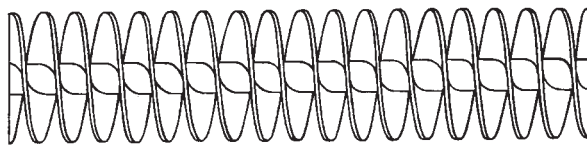
DOUBLE FLIGHT SHORT PITCH CONVEYOR SCREWS assure more accurate regulation of feed and flow in screw feeders and effectively deter flushing action of fluid materials.
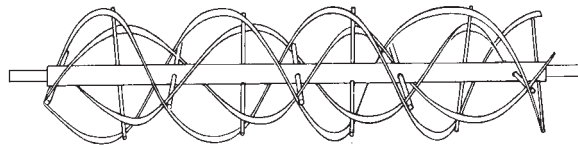
MULTIPLE RIBBON FLIGHT CONVEYOR SCREWS. This type of screw consists of two or more ribbon flights of different diameters and opposite hand, mounted one within the other on the same pipe or shaft by rigid supporting lugs. Material is moved forward by one flight and backward by the other, thereby inducing positive and thorough mixing. (Made per customer specifications.)
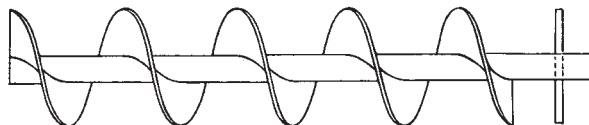
BREAKER PINS. The breaker pin is a rod approximately the same in length as the diameter of the conveyor screw and is inserted through the diameter of the pipe over the discharge to help break up lump materials.
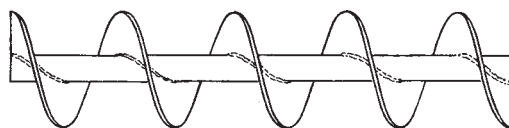
CONTINUOUS WELDING of the conveyor screw flight to the pipe can be furnished with welding one side or both sides. This welding is added to prevent stripping of flight from the pipe under extreme loads. The continuous welding can also be added to fill the slight crack between the flight and pipe for sanitary purposes.
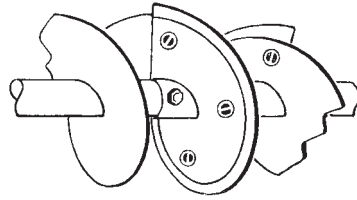
Conveyor
Screws

BEARING SHOES (Nylon, Teflon, Brass, and other bearing type materials.) Bearing shoes are used in place of internal bearings and are bolted to the conveyor screw. They are made from bearing type material, and when attached to the conveyor screw flight, the bearing shoe projects beyond the outer edge of flighting and rotates with the screw thereby preventing metal to metal contact between the conveyor screw and the trough. The bearing shoes extend around the helix slightly more than one pitch and are spaced along the screw at approximately the same intervals as internal bearings.
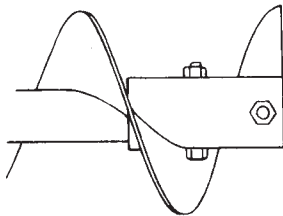
External Sleeves
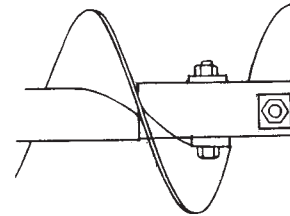
Bolt Pads

EXTERNAL SLEEVES OR BOLT PADS are added to the outside diameter of conveyor screw pipe at the end where the couplings are attached to reinforce the pipe at the bolt area.
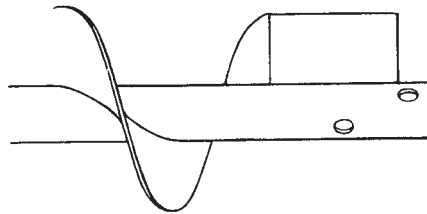
KICKER BARS are flat bars projecting from the conveyor screw pipe extending to the outside diameter of the screw over the discharge spout and are used to assist the discharge of materials.
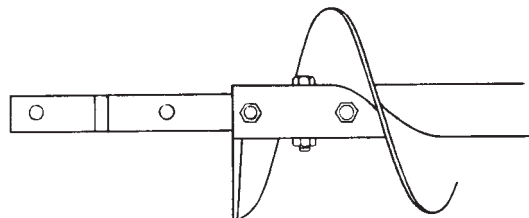
MULTIPLE HOLE DRILLING of the conveyor screw pipe and shafts will increase the torque rating of the bolted sections.
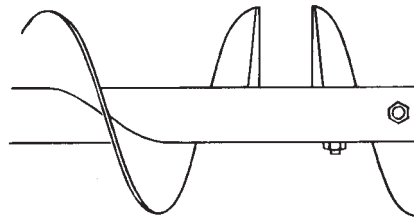
OPPOSITE HAND FLIGHTS are short sections (approximately one-half pitch) of flight added to the conveyor screw beyond the discharge point and are the opposite hand of the rest of the screw. This flight opposes the flow of material that tends to carry past the discharge spout and pack at the end plate and forces the material back to the spout for discharge.
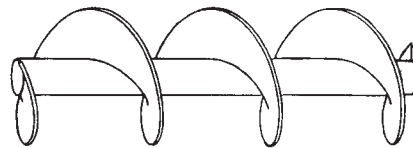
ODD DIAMETER CONVEYOR SCREW is of conventional construction except oversize or undersize in diameter. This type conveyor screw is used to provide a close clearance or wide clearance between the screw and trough and enable the use of standard component parts.
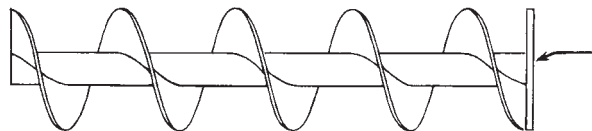
END DISC ON CONVEYOR SCREW. This disc is welded flush with the end of the conveyor screw pipe and is the same diameter as the screw. It rotates with the conveyor screw and assists in relieving the thrust of the conveyed material against the end plate shaft seal.
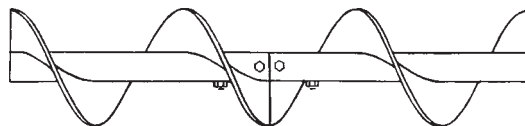
CLOSE COUPLED CONVEYOR SCREW. This type screw forms a continuous helix when two or more conveyor screws are close coupled by drilling the shaft of each to align the connecting flight.
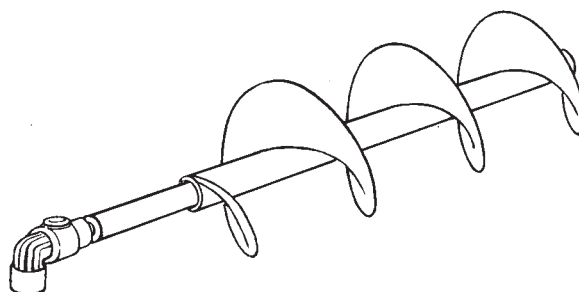
ROTARY JOINTS FOR COOLING AND HEATING are attached to one or both end shafts to provide a flow of heating or cooling media through the conveyor screw pipe.

Discharges
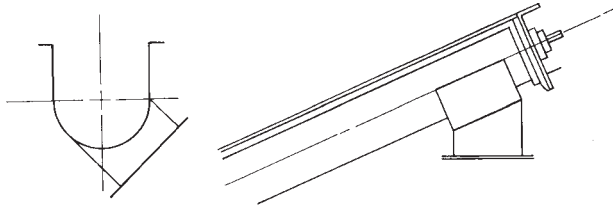
ANGULAR DISCHARGES can be furnished when necessary for certain applications. This type discharge is normally used on inclined conveyors when it is necessary that the discharge be parallel to ground level, or at other times when material must be discharged to one side.
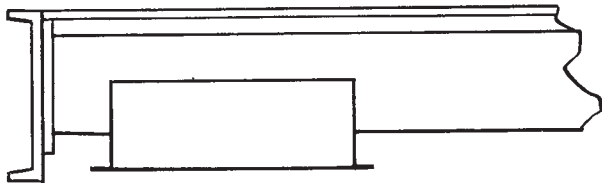
LONGER THAN STANDARD DISCHARGE SPOUTS are approximately one and one-half times the length of the standard discharge spouts. This discharge is used with materials hard to discharge due to the material trying to convey past the discharge opening. This discharge is also used when operating   conveyors.
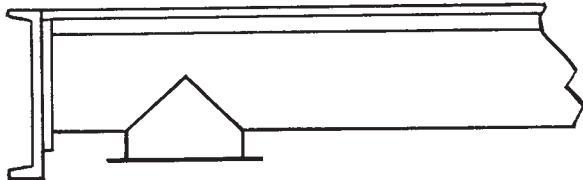
ROUND DISCHARGE SPOUTS are furnished where required for attaching tubular attachments, or when one conveyor discharges into another conveyor at an angle other than a right angle. By using a round discharge and round inlet the connection is easily made.
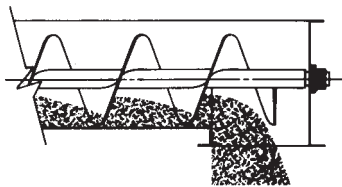
FLUSH END DISCHARGE SPOUTS are furnished with a special trough end plate constructed on trough end side of the spout. This type spout offers a complete discharge without a ledge at the end plate for material build up. It is used primarily in handling food products, where infestation may occur.
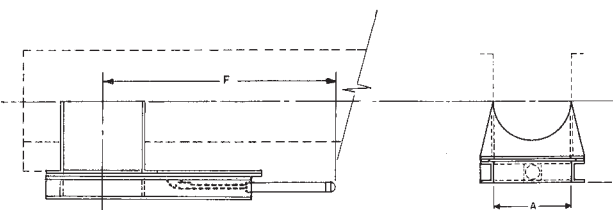
AIR OPERATED FLAT SLIDE GATES are similar in action and purpose to rack and pinion gates. The gate movement is accomplished by an air cylinder. These gates are usually employed when remote control and automatic operation is desired.
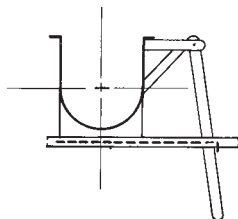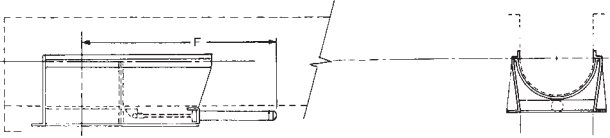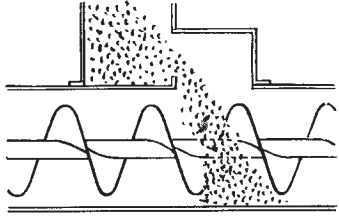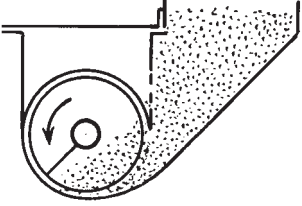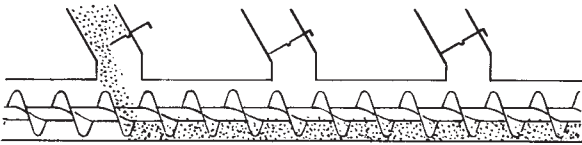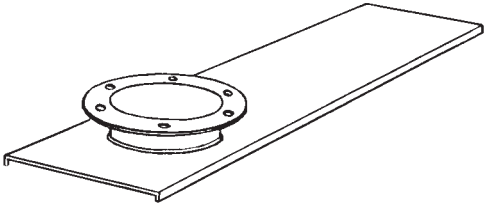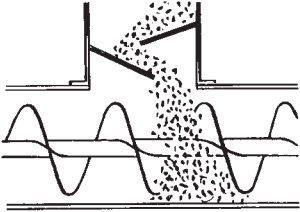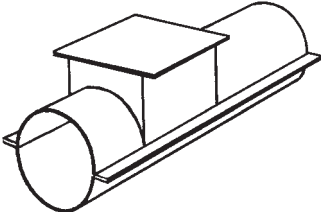
LEVER OPERATED GATES are a modification of standard slide discharges with a lever attached for opening and closing the gates. This attachment provides a leverage for ease of operation and a convenient means for quick opening and closing.
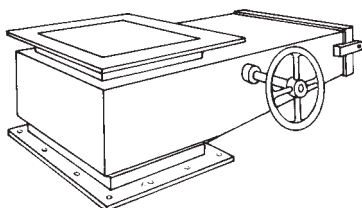
ENCLOSED DUST-TIGHT OR WEATHER-PROOF rack and pinion discharge spouts can be furnished in either flat or curved slide and are similar in construction to conventional rack and pinion slide gates except that the slide, rack, and pinion are fully enclosed in a housing.

AIR OPERATED CURVED SLIDE GATES are similar to standard rack and pinion gates except they are operated with an air cylinder. The air operated gate is usually used for remote control and automatic operation. These gates can also be furnished in dust-tight or weather-proof construction with the cylinder and gate fully enclosed in the housing.

CUSHION CHAMBER INLETS (DEAD BED INLETS) serve the same purpose as the deflector plate inlet, but are constructed with a ledge that forms a cushion for materials fed into the conveyor.

SIDE INLETS are equipped with a gate to furnish a means of regulating or stopping the inlet flow to relieve the conveyor screw from excessive material pressures. When using the side inlet, the screw rotation should be toward the inlet opening to assure a constant flow rate.

HAND SLIDE INLET GATES are normally used when multiple inlets are required. These inlets must be adjusted or closed manually to assure proper feed to the conveyor.

ROUND INLET SPOUTS are used for tubular attachments or when connecting the discharge of one conveyor to the inlet of another at other than a right angle. This type connection is easily made with round discharges and inlets.

DEFLECTOR PLATE INLETS are used when materials fall vertically into the inlet creating the possibility of impact damage or abrasion to the conveyor screw. The rectangular inlet is equipped with deflector plates, or baffles, that dampen the impact of the material in order to feed the conveyor more gently.

HANGER POCKETS are used with tubular trough, mounted on top of the tubular trough at hanger bearing points. The hanger pocket forms a U-shape section for a short length, allowing the use of standard conveyor hangers and providing easy access to the hanger.

Installation & Maintenance

Martin

General

All standard screw conveyor components are manufactured in conformity with Industry Standards. Special components are usually designed and manufactured to the particular job specifications.

Screw conveyors may be ordered either as complete units or by individual components. Complete units are normally shop assembled and then match marked and disassembled for shipment and field re-assembly. When components only are ordered, shipment is made as ordered, and these components must be sorted out and aligned in field assembly.

Because shop assembled screw conveyors are pre-aligned and match marked at the factory, they are easier to assemble in the field and require the minimum installation time. When individual components are ordered, more careful alignment and assembly are required. More time is required for field installation. Assembly bolts are not included with parts orders but are included with preassembled units.

> **Caution:** All Martin conveyors must be assembled and maintained in accordance with this section. Failure to follow these instructions may result in serious personal injury or property damage.

Installation

Receiving. Check all assemblies or parts with shipping papers and inspect for damage. Specifically check for dented or bent trough, bent flanges, bent flighting, bent pipe or hangers or damaged bearings. If any components are severely damaged in shipment, claims should be filed immediately with the carrier. NOTE: Handle Carefully! Fork lifts should have spreader bars to lift max. 24' lengths of assembled conveyors. Lift points should not exceed 10 - 12 feet.

Erection

For shop assembled conveyors, units are match marked and shipped in longest sections practical for shipment. Field assembly can be accomplished by connecting match marked joints, and in accordance with packing list, and/or drawing if applicable. In field erection, the mounting surfaces for supporting the conveyor must be level and true so there is no distortion in the conveyor. Shims or grout should be used when required. Check for straightness as assembly is made.

For conveyor assemblies purchased as parts or merchandise, assemble as follows: Place conveyor troughs in proper sequence with inlet and discharge spout properly located. Connect the trough flanges loosely. Do not tighten bolts. Align the trough bottom center-lines perfectly using piano wire (or equivalent) then tighten flange bolts. Tighten all anchor bolts.
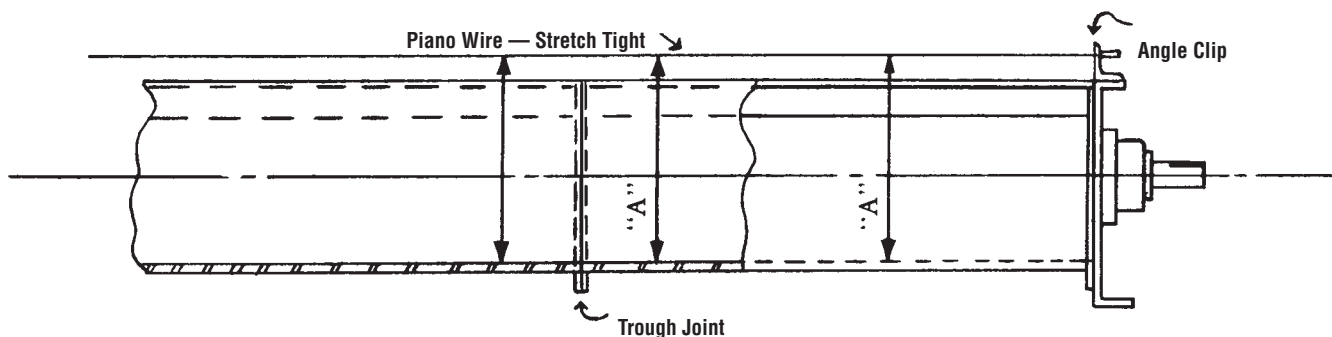
Assembly of conveyor screws should always begin at the thrust end. If the unit does not require a thrust unit, assembly should begin at the drive end. If a thrust end is designated, assemble trough end and thrust bearing. Insert the end, or drive shaft, in the end bearing. Do not tighten set screws until conveyor assembly is completed.

Place the first screw section in the trough, slipping the end, or drive shaft, into the pipe end. Secure tightly with coupling bolts. Install so that conveyor end lugs are opposite the carrying side of the flight.

Place a coupling shaft into the opposite end of conveyor pipe. Tighten coupling bolts.

Insert coupling shaft into hanger bearing and clamp hanger to trough.

Assemble alternately, conveyor screws, couplings and hangers until all screws are installed.

1) **With Hangers:** Assemble screw section so that flighting at each end is approximately 180° from ends of flighting of adjacent sections. Also, adjust conveyor screw and thrust unit so that hangers are equally spaced between adjacent screws.

2) **Without Hangers:** (close coupled) Assemble screws so that flighting at adjoining ends of screw sections align to produce a continuous helix surface. (Note coupling holes have been drilled in assembly to allow for flight alignment.)

Remove hanger clamps and bolt hanger to trough with the bearing centered between conveyor screws.

Install trough covers in proper sequence. Properly locate inlet openings. Handle covers with reasonable care to avoid warping or bending.

Attach covers to trough with fasteners provided.

Install drive at proper location and in accordance with separate instructions or drawing provided.

Check screw rotation for proper direction of material travel after electrical connections have been made but before attempting to handle material. Incorrect screw rotation can result in serious damage to the conveyor and to related conveying and drive equipment.

If necessary, reconnect electrical leads to reverse rotation of conveyor and direction of material flow.

Operation

Lubricate all bearings and drives per service instructions. Gear reducers are normally shipped without lubricant. Refer to service instructions for lubrication.

In start-up of the conveyor, operate several hours empty as a break in period. Observe for bearing heat up, unusual noises or drive misalignment. Should any of these occur, check the following and take necessary corrective steps. (Non-lubricated hanger bearings may cause some noise.)

1) When anti-friction bearings are used, check for proper lubrication. Insufficient or excess lubricant will cause high operating temperatures.

2) Misalignment of trough ends, screws, hangers and trough end can cause excessive maintenance and poor life expectancy.

3) Check assembly and mounting bolts; tighten if necessary.

Do not overload conveyor. Do not exceed conveyor speed, capacity, material density or rate of flow for which the conveyor and drive were designed.

If the conveyor is to be inoperative for a prolonged period of time, operate conveyor until cleared of all material. This is particularly important when the material conveyed tends to harden or become more viscous or sticky if allowed to stand for a period of time.

It may be necessary to recenter hanger bearings after running material in conveyor.

Maintenance

Practice good housekeeping. Keep the area around the conveyor and drive clean and free of obstacles to provide easy access and to avoid interference with the function of the conveyor and drive.

Establish routine periodic inspections of the entire conveyor to ensure continuous maximum operating performance.

To replace conveyor screw section, proceed as follows:

1) Removal of a section, or sections, usually must proceed from the end opposite the drive. Make sure drive and electrical power are disconnected before starting to disassemble.

2) Remove the trough end, sections of screws, coupling shafts and hangers until all sections have been removed or until the damaged or worn section is reached and removed.

3) To reassemble follow the above steps in reverse order.

4) Quick detachable conveyor screws can be removed at intermediate locations without first removing adjacent sections.

Replacement parts can be identified from a copy of the original packing list or invoice.

The coupling bolt contains a lock nut that may become damaged when removed. It is recommended practice to replace them rather than re-use them when changing conveyor screw sections.

Hazardous Operations

Screw conveyors are not normally manufactured or designed to operate handling hazardous materials or in a hazardous environment.

Hazardous materials can be those that are explosive, flammable, toxic or otherwise dangerous to personnel if they are not completely and thoroughly contained in the conveyor housing. Special construction of screw and conveyor housing with gaskets and special bolted covers can sometimes be used for handling this type of material.

Special conveyors are not made or designed to comply with local, state or federal codes for unfired pressure vessels.

Bucket Elevators

Introduction

Martin has been designing and manufacturing a multitude of bucket elevators for over 75 years with hundreds in service today. We offer a complete line of Industrial elevators to efficiently handle a wide range of dry free flowing materials in a relatively small space with minimum horsepower. These industrial elevators include centrifugal discharge and continuous discharge with chain or belt mounted buckets. Our elevators can be supplied with either boot or head take-ups. Martin additionally offers a line of industrial high-speed centrifugal grain elevators in both single leg and double leg designs.

Mill Duty-centrifugal discharge elevators are also available for your tough applications. The mill duty elevator is specifically designed and built for the severe service required by the cement, rock, fertilizer, lime, gypsum, coal and fine ore industries. The mill duty is offered with AC style buckets.

The Martin super capacity-continuous discharge elevator is designed around the use of "SC" bucket mounted between two strands of chain. These elevators are specifically used where higher capacities, severe duty and/or higher shaft centers are required.

Components such as sprockets, traction wheels, pulleys, buckets and most take-ups are manufactured by Martin.

Martin offers not only a complete line standard elevators but can design and manufacture MTO elevator specific for a customer's application.

The bucket elevator catalog may be used to assist in making a preliminary selection. Please contact one of martin's many service centers or distributors for a recommendation and quote.

Elevator Types

Martin designs and manufactures various types of industrial bucket elevators to efficiently handle most dry, free-flowing bulk materials. High design standards, quality manufacturing location throughout North America assures rapid manufacturing times and economical delivery. This catalog is designed as tool to help our customers make preliminary selections of bucket elevators manufactured by Martin. Martin also is able to fill your needs for a MTO bucket elevator to your specific requirements. Contact Martin to discuss your bucket elevator needs and to receive quotation.

Notes:

Various materials of construction and thicknesses are available.

Many types of drives are available and can be supplied. Bucket elevator styles 100, 200, 500, 700 and 800 are normally supplied with shaft mounted reducers having internal backstops. Other types of drives are available. Mill duty and super capacity elevators are quoted with a right angle reducer and chain drive with an external backstop.

Although the charts in this catalog are based on one type of bucket many other types are available. Nonmetallic buckets are also available in many types of buckets but offered as standard on our 500 series elevators.

Martin recommends a backstop be installed on all bucket elevators.
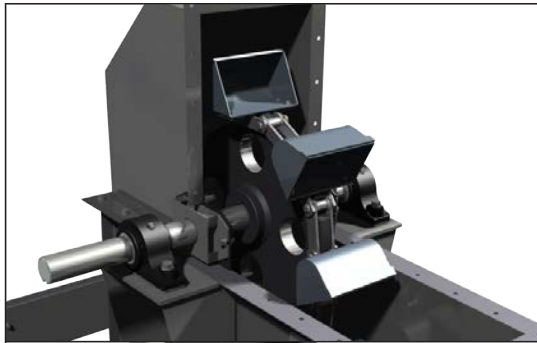
Elevator
Types

Centrifugal Discharge

Centrifugal discharge elevators are offered as: Series 100 (boot take-up) and Series 200 (head take-up). Both series are available with buckets mounted to a chain or belt. The centrifugal discharge elevators will handle free flowing materials with small to medium lump size. The Martin standard inlet chute and curved bottom plate help direct the material into the bucket, reducing the "digging" action of the bucket. The speed of the elevator is sufficient to discharge the material by centrifugal force.
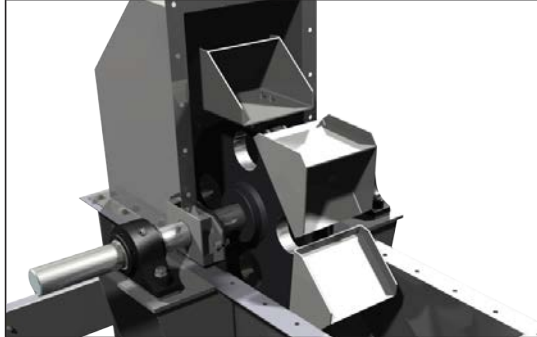
Continuous Discharge

Continuous discharge elevators are offered as: Series 700 (boot take-up) and Series 800 (head take-up). Either series is available with buckets continuous mounted on chain or belt to handle many bulk materials ranging from light to heavy and from fines to larger lumps. The buckets are loaded by direct feeding with the use of a loading leg. Spillage of material is minimizing by the close bucket spacing. As buckets discharge, material flows over the preceding buckets; projecting sides form a chute, assisting in proper discharge.
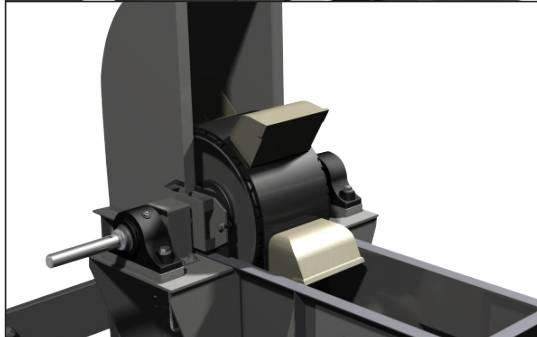
Centrifugal Discharge – High-Speed Grain

Series 500 (double leg) high-speed centrifugal discharge bucket elevators are specifically designed to economically handle grain and other free-flowing materials weighing less than 60 pounds a bushel. HSG elevators may be used in light duty frac sand applications.

Continuous Discharge – Super Capacity

Continuous Discharge Super Capacity elevators are offered as: Series SC with "SC" continuous discharge buckets mounted between two strands of heavy duty chain. These elevators are used where higher capacities, larger lumps, severe duty or higher shaft centers are required.

The feeding and discharge of material is similar to a standard continuous discharge elevator.

Centrifugal Discharge – Mill Duty

Centrifugal mill duty elevators are offered as: series MDC with AC buckets mounted on a chain, series MDC with buckets mounted on a chain and series mdb with AC buckets mounted on a belt. The mill duty elevators series MDC have a single medium duty or heavy duty rollerless elevator chain and a single row of AC type buckets. The series mdb belt type elevators may have a single or double row of AC buckets bolted to a heavy duty rubber covered belt. Product is centrifugally discharged as material passes over the head wheel or pulley. A head mounted traction wheel is utilized in chain type elevators, where practical. Lagged pulleys are standard on belt type mill duty elevators.
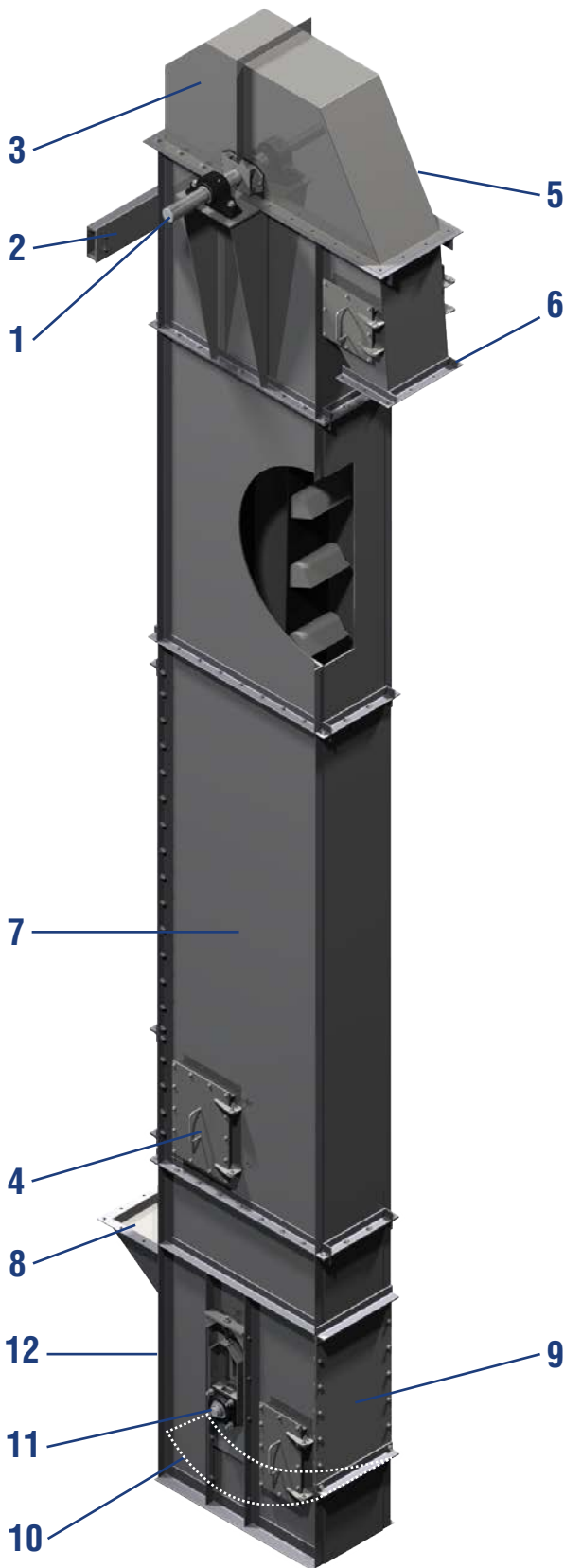
1. **Shaft Mount Type Drive** . . . . furnished as standard. Other types available. Backstops are required to prevent reverse rotation. Various types are available. (Not shown on diagram.)

2. **Torque arm bracket** . . . . box channel construction.

3. **Split hood** . . . . 14 gauge.

4. **Inspection door** . . . . near side.

5. **Head section** . . . . fabricated of 12 gauge steel with bearing pedestal structurally reinforced.

6. **Discharge spout** (style 1 shown) . . . . fabricated of 10 gauge plate steel with externally adjustable 4-ply belting throat lip (not shown). Style 2 (45°) available. Wear liners available.

7. **Intermediate section** . . . . fixture welded 12 gauge casing continuously welded for dust tight construction. Sides are cross crimped for additional stiffness. Vertical corner angles are full length.

8. **Inlet** . . . . fabricated of 3/16" thick plate steel.

9. **Clean out door** . . . . bolted for easy removal.

10. **Curved bottom plate** . . . . reduces build-up in boot

11. **Take-up ball bearing screw type** . . . . for positive take-up tension. Available with roller bearings. Internal gravity type also available.

12. **Boot** . . . . fabricated of 3/16" thick plate steel.

Elevator Number 100 thru 800 Series			
Example – B43-108			
Mounting	Bucket Size	Series	Head Wheel Diameter
I	I	I	I
B	**43**	**1**	**08**
I	I	I	I
B = Belt C = Chain	43 = 4 × 3 64 = 6 × 4 85 = 8 × 5 106 = 10 × 6 Etc.	1 = 100 2 = 200 5 = 500 7 = 700 8 = 800	08 = 8" dia.

B43-108 is a belt (B) elevator with 4" × 3" (43) buckets, centrifugal discharge type with boot take up (Series 100), Unit 39. Specifications may be found on pages H-131.

Standard Features of High-Speed Grain Elevator
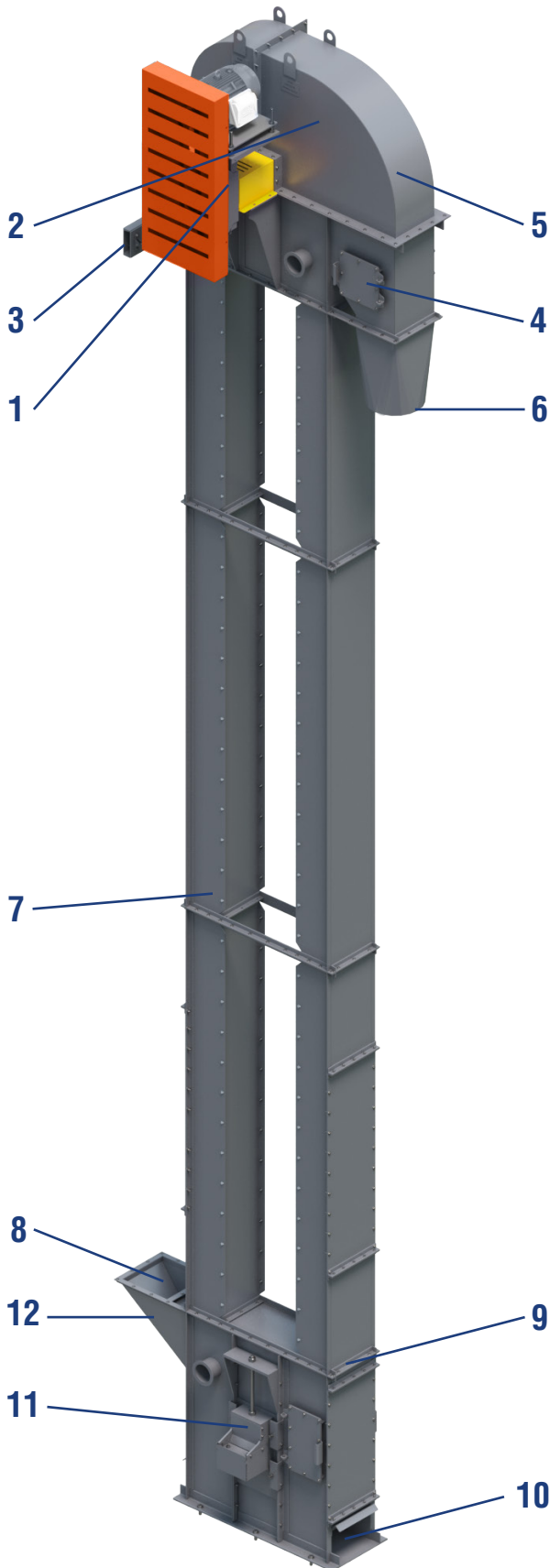
Martin

1. **Shaft mount type drive** . . . . furnished as standard. Other types available. Backstops are required to prevent reverse rotation.(Not shown on drawing.)

2. **High-speed type split hood**. . . . . 14 gauge.

3. **Torque arm bracket**. . . . . box channel construction.

4. **Inspection doors** . . . . one side.

5. **Head section** . . . . fabricated of 10 gauge steel minimum, with bearing pedestals structurally reinforced.

6. **Discharge spout** (style 1) . . . . fabricated of 10 gauge steel with externally adjustable 4-ply belting throat lip (not shown). Style 2 (45°) available as well as wear liners.

7. **Intermediate section**. . . . . fixture welded 12 gauge casing continuously welded for dust tight and weather tight constriction. Single casing intermediates are available. (Not shown on drawing.)

8. **Inlet**. . . . . fabricated of 3/16" thick steel plate and wear liners are available.

9. **Clean out door**. . . . . bolted for easy removal.

10. **Flat bottom with clean-out slides**. . . . . . reduces material build-up in boot.

11. **Screw type ball bearing take-up**. . . . . . . provides positive take-up tension and bell adjustment. Roller bearings are available as well as spring loaded style take-ups.

12. **Boot section** . . . . fabricated of 3/16" thick steel minimum.

13. **Sway bars** (inside). . . . . fabricated of structural angle and supplied on 30' intervals.
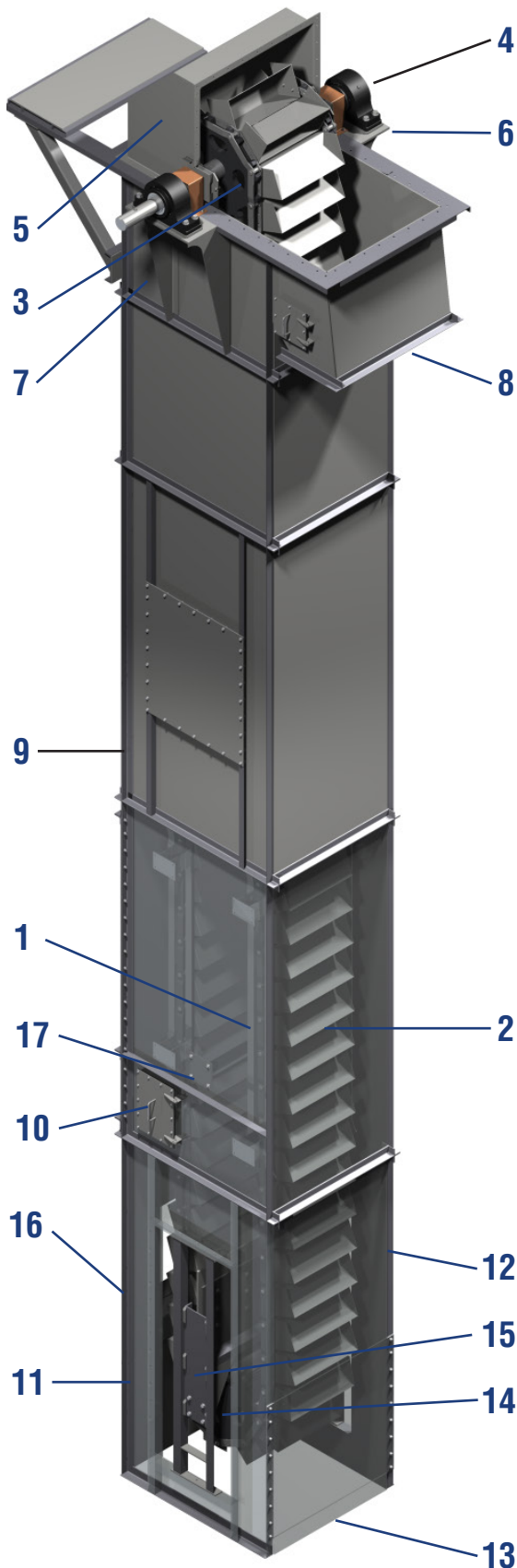
1. **Double chain** . . . . double strand of steel bushed "SC" chain.

2. **Buckets** . . . . fabricated steel "SC" continuous style buckets.

3. **Two segmented sprockets**. . . . . Solid body construction in hardened steel.

4. **Roller bearing pillow block.**

5. **Split removable hood** . . . . with lifting lugs and contoured to minimize packing of material.

6. **Heavy steel bearing support platform** . . . . designed to distribute the load to the head section.

7. **Head section**. . . . . minimum 1/4" steel plate.

8. **Discharge stub** . . . . with adjustable throat plate and access panel.

9. **Heavy-duty intermediates** . . . . of a dust-tight and weather tight construction. Internal angle rails guide the chain.

10. **Hinged inspection door.**

11. **Boot section** . . . . 1/4" steel plate construction minimum, supplied with an internal loading leg

12. **Bolted side & front access panels** . . . . allows access to take-up, bearings and tail sprocket /traction wheel. (Not shown on drawing.)

13. **Flat bottom plate** . . . . for better distribution of loads to the foundation.

14. **Hardened steel segmented sprocket or traction wheel with solid hub.**

15. **Internal gravity take-up** . . . . or optional heavy duty external take-up can be supplied.

16. **Flanged inlet**. . . . . allowing easy connection to loading chute.

17. **Take-up loading beam** . . . . for servicing the internal component**s.**

Super Capacity Elevator		
Example – SC35-2412		
Elevator Type	Head Wheel Diameter	Bucket Size
I	I	I
SC	**35**	**2412**
I	I	I
SC = Super Capacity Chain	35"	24" × 12"

H-127
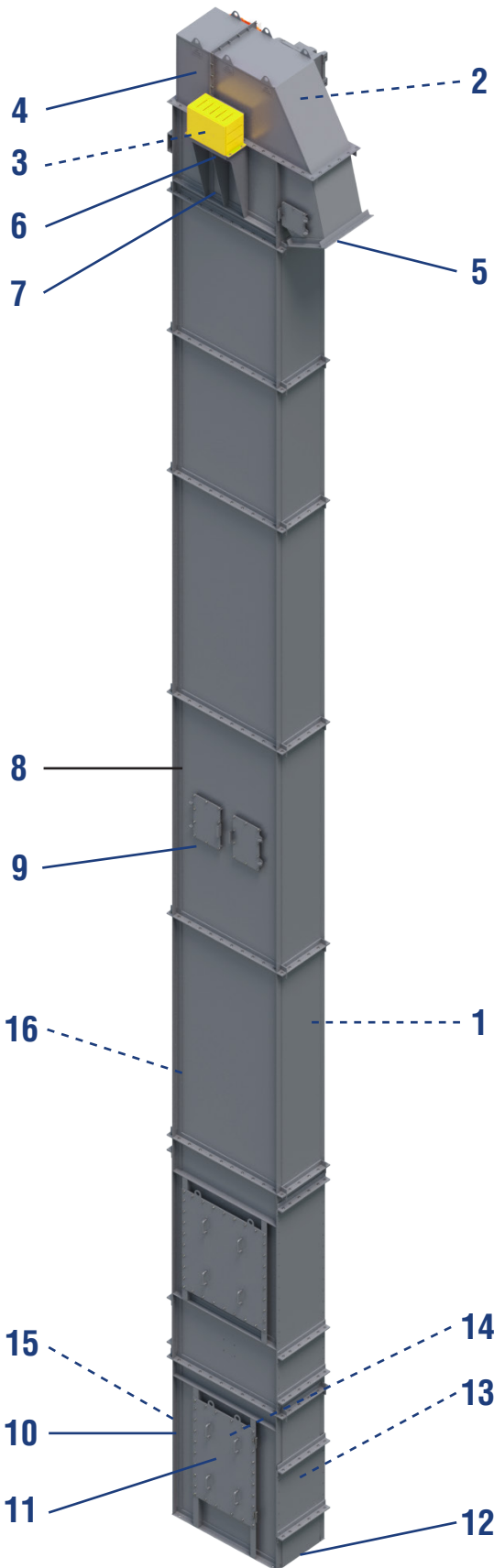
1. **Buckets (inside)** . . . . ac style hooded back and high front fabricated steel buckets.

2. **Traction wheel (inside)** . . . . with solid body and hardened steel segments is supplied on chain type and a heavy duty pulley is supplied with a belt style ac elevator.

3. **Roller bearing pillow blocks (inside)**

4. **Split steel hood** . . . . 12 gauge steel plate with lifting lugs and contoured to minimize packing of material.

5. **Discharge stub** . . . . with adjustable throat plate and access panel.

6. **Heavy steel bearing support platform** . . . . designed to distribute the load to the head section.

7. **Head section**. . . . . min. 1/4" Steel plate construction.

8. **Heavy-duty intermediates** . . . . of dust-tight and weather tight construction.

9. **Hinged inspection door**

10. **Boot section** . . . . min. 1/4" Steel plate construction.

11. **Bolted side and front access panels** . . . . allows access to take-up, bearings and tail sprocket or pulley (not shown on drawing.)

12. **Flat bottom plate for better distribution of loads to the foundation.**

13. **Hardened steel segmented sprocket or heavy-duty tail pulley (inside).**

14. **Internal gravity take-up (inside)** . . . . supplied standard on md elevators with chain and screw take-up on belt type. An optional external gravity take-up may be supplied.

15. **Flanged inlet (behind)** . . . . allowing easy connection to loading chute.

16. **Take-up loading beam (inside)** . . . . for servicing internal take-up and internal boot components.

Mill Duty Elevators			
Elevator Type	**Head Wheel Diameter**	**Bucket Size**	**Type of Spacing or # Rows**
Example – MDC26-2010A			
MDC	**26**	**2010**	**A**
MDC = Mill Duty Chain	26"	20" × 10"	
Example – MDC30-2714A-S			
MDC	**30**	**2714**	**A**
MDC = Mill Duty Chain	30"	27" × 14"	
Example – MDB30-1810DR			
MDC	**30**	**1810**	**DR**
MDB = Mill Duty Belt	30"	18" × 10"	DR = Double Row

General

To properly select a bucket elevator, the following factors must be determined:

1. **Volumetric Capacity** — All bucket elevators are volumetric devices with constant capacity ratings stated in cu.ft./hour, the capacity of any elevator in tons/hour varies with density. See Table 1-1 for conversions if necessary.
2. **Centers or Lift** — in feet.
3. **Lump Size and Lump Class** — Lump size is the largest particle dimension, and lump class is the percentage these lumps represent of the whole.
4. **Material Characteristics** — See Material Classification Code Chart.
5. **Operating Conditions** — Affecting operation include location (indoors, outdoors), number of hours per day operation, etc.

Procedure

The following steps should be followed to select an elevator:

1. **Determine proper elevator series** — See material table for recommendation.
2. **Select Elevator Number** — For the series selected, refer to the Capacity chart, and select an elevator number for which the capacity in cubic feet per hour listed equals or exceeds the required volumetric capacity. If the required volumetric capacity of centers exceed those listed, contact the Martin for a recommendation.
3. **Check Lump Size/Lump Class** — Check actual lump size/lump class against that listed for the elevator number selected. If the actual lump size/lump class is larger than that listed, choose a larger elevator where the actual is equal to or less than that listed.
4. **Determine Horsepower Requirements** — Consult Martin.
5. **List Specifications** — Refer to capacity, horsepower and dimension charts for the elevator number selected. List the specifications for the preliminary selection of the elevator.

Contact your local Martin Service Center or Martin, distributor for a recommendation.

To Convert	To Cubic Feet per Hour (CF of FT³/HR)	
Tons per hour (short) TPH	CFH =	$\dfrac{\text{TPH} \times 2000}{\text{Density (in pounds per cubic foot; PCF or LBS/FT}^3)}$
Pounds per hour Lbs/hour	CFH =	$\dfrac{\text{Pounds per hour}}{\text{Density (in pounds per cubic foot; PCF or LBS/FT}^3)}$
Bushels per hour BPH	CFH =	BPH × 1.24

Major Class	Material Characteristics Included		Code Designation
Density	Bulk Density, Loose		Actual lbs/PC
Size	Very Fine	No. 200 Sieve (.0029") and Under	A200
		No. 100 Sieve (.0059") and Under	A100
		No. 40 Sieve (.016") and Under	A40
	Fine	No. 6 Sieve (.132") and Under	B6
	Granular	1/2" And Under (6" Sieve to 1/2")	C1/2
		3" And Under (1/2" to 3")	D3
		7" And Under (3" to 7")	D7
	Lumpy	16" And Under (0" to 16")	D16
		Over 16" To Be Specified, X = Actual Maximum Size	DX
	Irregular	Irregular Stringy, Fibrous, Cylindrical, Slabs, Etc.	E
Flowability	Very Free Flowing		1
	Free Flowing		2
	Average Flowability		3
	Sluggish		4
Abrasiveness	Mildly Abrasive		5
	Moderately Abrasive		6
	Extremely Abrasive		7
Miscellaneous Properties or Hazards	Builds Up and Hardens		F
	Generates Static Electricity		G
	Decomposes — Deteriorates in Storage		H
	Flammability		J
	Becomes Plastic or Tends to Soften		K
	Very Dusty		L
	Aerates and Becomes a Fluid		M
	Explosiveness		N
	Stickiness — Adhesion		O
	Contaminable, Affecting Use		P
	Degradable, Affecting Use		Q
	Gives Off Harmful or Toxic Gas or Fumes		R
	Highly Corrosive		S
	Mildly Corrosive		T
	Hygroscopic		U
	Interlocks, Mats or Agglomerates		V
	Oils Present		W
	Packs Under Pressure		X
	Very Light and Fluffy — May Be Windswept		Y
	Elevated Temperature		Z

Material
Tables

Martin

Material	Density LBS/FT³	Material Code	Recommended Elevator Series ▲
Alfalfa Meal	14-22	B6-45WY	F, H
Almonds, Broken	27-30	C1/2-35Q	C, F, H
Almonds, Whole Shelled	28-30	C1/2-35Q	F
Alum, Fine	45-50	B6-35U	A, F
Alum, Lumpy	50-60	B6-25	A, F
Alumina	55-65	B6-27MY	G
Aluminum Chips, Dry	7-15	E-45V	F
Aluminum Oxide	60-120	A100-17M	F
Ashes, Coal, Dry — 3" •	35-40	D3-46T	C, J, K, L
Asphalt, Crushed — 1/2"	45	C1/2-45	A, C, F, J, K
Bakelite, Fine	30-45	B6-25	F
Baking Powder	40-55	A100-35	F
Bauxite, Crushed — 3"	75-85	D3-36	A, C, F, J, K
Beans, Castor, Whole Shelled	36	C1/2-15W	A, C, F, H
Beans, Navy, Dry	48	C1/2-15	A, C, F, H
Bentonite, Crude	34-40	D3-45X	A, C, I, J, K
Bentonite — 100 Mesh •	50-60	A100-25MXY	A, C, I, J, K, L
Boneblack	20-25	A100-25Y	F
Bonemeal	50-60	B6-35	A, C
Bones, Crushed	35-50	D3-45	A, C, F, H
Bones, Ground	50	B6-35	A, C, F, H
Borax, Fine	45-55	B6-25T	A, C, I, J, K
Bran, Rice-Rye-Wheat	16-20	B6-35NY	A, C
Brewer's Grain, spent, dry	14-30	C1/2-45	A, C
Brewer's Grain, spent, wet	55-60	C1/2-45T	A, C
Buckwheat	37-42	B6-25N	E
Calcium Oxide (See Lime, unslaked)	—	—	—
Cast Iron, Chips	130-200	C1/2-45	F
Cement, Clinker	75-95	D3-36	A, F, I, J, K
Cement, Portland •	94	A100-26M	A, F, I, J, K, L
Chalk, Crushed	75-95	D3-25	A, F, I, J, K
Chalk, Pulverized	67-75	A100-25MXY	A, F, I
Charcoal, Lumps	18-28	D3-45Q	F, I
Cinders, Coal	40	D3-36T	A, F, I, J, K
Clay, Brick, Dry, Fines	100-120	C1/2-36	B
Coal, Anthracite, Sized 1/2"	49-61	C1/2-25	A, F, I, J, K
Coal, Bituminous, Mined, Slack	43-50	C1/2-45T	A, F, I
Coffee, Green Bean	25-32	C1/2-25PQ	A, F
Coffee, Roasted Bean	20-30	C1/2-25PQ	A, F
Coke, Breeze	25-35	C1/2-37	B, D
Coke, Loose	23-35	D7-37	D
Coke, Petrol, Calcined	35-45	D7-37	D, I, J, K, L
Copra, Cake, Ground	40-45	B6-45HW	A, C, F, G
Copra, Cake, Lumpy	25-30	D3-35HW	A, C, F
Copra, Lumpy	22	E-35HW	A, C, F
Copra, Meal	40-45	B6-35HW	A, C, F, G
Cork, Granulated	12-15	C1/2-35JY	F, H
Corn, Cracked	40-50	B6-25P	F, H
Corn Germ	21	B6-35PY	A, C
Corn Grits	40-45	B6-35P	A, C
Cornmeal	32-40	B6-35P	A, C
Corn Shelled	45	C1/2-25	E
Corn Sugar	30-35	B6-35PU	A, C
Cottonseed, Cake, Lumpy	40-45	D7-45HW	A, C
Cottonseed, Dry, Delinted	22-40	C1/2-25X	B, D
Cottonseed, Dry, Not Delinted	18-25	C1/2-45XY	B, D
Cottonseed, Hulls	12	B6-35Y	F, G
Cottonseed, Meal, Extracted	35-40	B6-45HW	A, C
Cottonseed, Meats, Dry	40	B6-35HW	A, C
Distiller's Grain, Spent Dry	30	B6-35	A, C
Dolomite, Crushed	80-100	C1/2-36	A, F, I, J, K
Ebonite, Crushed	63-70	C1/2-35	F
Feldspar, Ground •	65-80	A100-37	A, C, F, I, J, K
Feldspar, Powder	100	A200-36	F, H
Flaxseed	43-45	B6-35X	E
Flaxseed Cake (Linseed Cake)	48-50	D7-45W	C
Flaxseed Meal (Linseed Meal)	25-45	B6-45W	A, C

Material	Density LBS/FT³	Material Code	Recommended Elevator Series ▲
Fuller's Earth, Dry, Raw	30-40	A40-25	B, D
Fuller's Earth, Oily, Spent	60-65	C1/2-450W	B, D
Glass, Batch	80-100	C1/2-37	B, D
Granite, Fine	80-90	C1/2-27	F, I, J, K
Gypsum, Calcined •	55-60	B6-35U	A, C, F, H, I, J, K
Gypsum, Calcined, Powdered •	60-80	A100-35U	A, F, I, J, K, L
Gypsum, Raw — 1"	70-80	D3-25	F, I, J, K
Hops, Spent, Dry	35	D3-35	A, C
Hops, Spent, Wet	50-55	D3-45V	A, C
Ice, Crushed	35-45	D3-35Q	A, F
Ilmenite Ore	140-160	D3-37	A, C, F, G, I, J, K
Lime, Ground, Unslaked	60-65	B6-35U	A, C, F, G, I, J, K
Lime, Hydrated	40	B6-35LM	F, I
Lime, Pebble	53-56	C1/2-25HU	A, F, I, J, K
Limestone, Agricultural •	68	B6-35	A, C, F, H, I, J, K
Limestone, Crushed	85-90	DX-36	F, H, I, J, K
Malt, Dry, Ground	20-30	B6-35NP	A, C
Malt, Meal	36-40	B6-25P	A, C
Malt, Dry Whole	20-30	C1/2-35N	A, C
Marble, Crushed	80-95	B6-37	F, I
Milk, Malted	27-30	A40-45PX	A
Oats	26	C1/2-25MN	E
Oats, Rolled	19-24	C1/2-35NY	A, C
Oxalic Acid Crystals – Ethane Diacid Crystals	60	B6-35QS	B, D
Phosphate Rock, Broken	75-85	DX-36	A, C, F, H, I, J, K
Phosphate Rock, Pulverized •	60	B6-36	A, C, F, H, I, J, K
Potash (Muriate) Dry	70	B6-37	A, C, F, I, J, K
Pumice — 1/8" •	42-48	B6-46	F, I, J, K
Rice, Bran	20	B6-35NY	E
Rice, Grits	42-45	B6-35P	A, C
Rice, Hulled	45-49	C1/2-25P	E
Rye	42-48	B6-15N	E
Salt Cake, Dry Coarse	85	B6-36TU	A, C, F, H, J, K, L
Salt, Dry Fine	70-80	B6-36TU	F, H, I, J, K, L
Sand Dry Bank (Damp)	110-130	B6-47	B, G
Sand Dry Bank (Dry)	90-110	B6-37	B, G
Sand Foundry (Shake Out)	90-100	D3-37Z	B, G
Shale, Crushed	85-90	C1/2-36	B, H, I, J, K
Slag, Blast Furnace, Crushed	130-180	D3-37Y	F, I, J, K
Slate, Crushed — 1/2"	80-90	C1/2-36	F, I, J, K
Soda Ash, Heavy •	55-65	B6-36	A, C, I, J, K
Soda Ash, Light	20-35	A40-36Y	F, H, I
Sodium Phosphate	50-60	A-35	A, F
Soybean, Cake	40-43	D3-35W	C
Soybean, Cracked	30-40	C1/2-36NW	A
Soybean, Flake, Raw	18-25	C1/2-35Y	A, C
Soybean, Flour	27-30	A40-35Mn	B, D
Soybean Meal, Cold	40	B6-35	A, C
Soybean Meal, Hot	40	B6-35T	A, C
Soybeans, Whole	45-50	C1/2-26NW	E
Sugar Beet, Pulp, Dry	12-15	C1/2-26	F, H
Sugar Beet, Pulp, Wet	25-45	C1/2-35X	F, H
Sugar, Raw	55-65	B6-35PX	A, C
Trisodium Phosphate, Granular	60	B6-36	A, F
Wheat	45-48	C1/2-25N	E
Wheat, Cracked	40-45	B6-25N	A, C
Wheat, Germ	18, 28	B6-25	A, C
Wood Chips, Screened	10-30	D3-45VY	B, D

• Buckets should be drilled on the bottom for air venting to assure rated capacity.

▲ **Elevator Series Designation**

A = Series 100 Chain	G = Series 700 Belt
B = Series 100 Belt	H = Series 800 Chain
C = Series 200 Chain	I = Series SC Double Chain
D = Series 200 Belt	J = Series MDC Chain
E = Series 500 Belt	L = Series MDB Belt
F = Series 700 Chain	

Series 100 Chain (Series 200 is for Head Take-up)

Centrifugal discharge chain type elevators handle a variety of relatively free-flowing dry materials with small to medium lump sizes that are mildly to moderately abrasive.

Buckets

Capacities and horsepower listed are for style "AA" buckets. Style "A", "AA-RB" and "Salem" can be furnished. Style "C" may also be used to handle wet or sticky materials. Consult the factory for a specific recommendation.

Chain

Centrifugal discharge chain type elevators are furnished with either combination chain for light to medium service or all steel (steel knuckle) chain for medium to severe service or when a higher chain working load is required.

Elevator	Capacity	Buckets				Chain			Lump Size		Nominal Casing Size		Head Sprocket			Boot Sprocket		
	Max CFH	Width	Proj.	Depth	Spacing	Number	Pitch	F.P.M.	100%	10%	Width	Depth	# Teeth	Pitch Dia.	RPM	# Teeth	Pitch Dia.	Shaft Dia.
C43-108	73	4	2.75	3	9.25	977	2.380	125	.5	1	8	18	10	7.50	63.7	10	7.5	1.500
C64-121	250	6	4	4.25	16	N102B	4.000	250	.5	3	11.75	39	16	20.50	39.4	14	18	1.500
C85-121	530	8	5	5.5	16	HSB102B	4.000	225	.75	3	11.75	39	16	20.50	41.9	10	13	1.500
C85-124	590	8	5	5.5	16	HSB102B	4.000	250	1	3.5	13.75	42	19	24.25	39.4	14	18	2.000
C106-124	1010	10	6	6.25	16	N102B	4.000	250	1.25	3.5	13.75	48	19	24.25	39.4	16	20.5	2.000
C127-125	1425	12	7	7.25	18	HSB110	6.000	250	1.25	4	15.75	48	13	25.00	38.2	9	17.5	2.438
C127-131	1765	12	7	7.25	16	N102B	4.000	275	1.25	4	17.75	54	24	30.50	34.4	19	24.25	2.438
C147-131	2135	14	7	7.25	16	N102B	4.000	275	1.25	4	19.75	54	24	30.50	34.4	19	24.25	2.438
C168-131	2800	16	8	8.5	18	HSB110	6.000	275	1.5	4.5	19.75	54	16	30.75	34.2	11	21.25	2.438
C188-131	3220	18	8	8.5	18	HSB110	6.000	275	1.5	4.5	24.75	54	16	30.75	34.2	11	21.25	2.438
C208-131	3460	20	8	8.5	18	HSB110	6.000	275	1.5	4.5	24.75	54	16	30.75	34.2	11	21.25	2.438
C248-131	4700	24	8	8.5	18	HSB833	6.000	275	1.5	4.5	30.75	54	16	30.75	34.2	11	21.25	3.000
C2410-131	6520	24	10	10.5	18	HSB833	6.000	275	2	4.5	30.75	54	16	30.75	34.2	11	21.25	3.000

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.
Other chain may be substituted based on chain pull requirements.

Centrifugal Discharge Belt
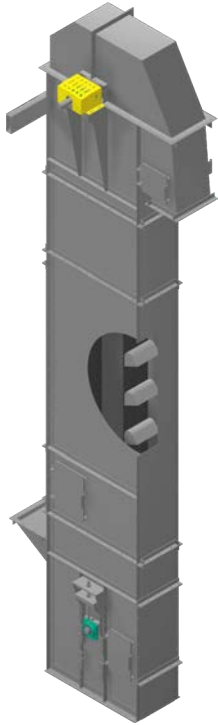
Series 100 Belt (Series 200 is for Head Take-up)

Centrifugal discharge belt type elevators handle a variety of relatively free-flowing dry materials with small to medium lump sizes that are mildly, moderately or extremely abrasive.

Buckets

Capacities listed are for style "AA" buckets. Style "A", "AA-RB" and "Salem" can be furnished. Style "C" may also be used to handle wet or sticky materials. Consult the factory for a specific recommendation.

Belt

Centrifugal discharge belt type elevators are typically furnished with 100% polyester carcass PVC belting or rubber covered ply belts specifically designed for elevator service. Many other types of belts and covers are available.

Elevator	Capacity	Buckets				Belt		Lump Size		Nominal Casing Size		Head Pulley		Boot Pulley	
	Max CFH	Width	Proj.	Depth	Spacing	Width	F.P.M.	100%	10%	Width	Depth	Pitch Dia.	RPM	Pitch Dia.	Shaft Dia.
B43-108	95	4	2.75	3	8	5	140	.25	1	8	18	8	62.9	8	1.500
B64-124	325	6	4	4.25	13	7	260	.5	2.5	11.75	39	24	40.5	24	1.500
B85-120	540	8	5	5.5	16	9	230	.75	2.5	11.75	39	20	42.9	20	1.500
B85-124	590	8	5	5.5	16	9	250	.75	3	13.75	42	24	39	24	2.000
B106-124	1010	10	6	6.25	16	11	250	1	3	15.75	48	24	39	24	2.000
B127-124	1425	12	7	7.25	18	13	250	1.25	4	17.75	48	24	39	24	2.438
B127-130	1600	12	7	7.25	18	13	280	1.25	4	17.75	54	30	35.1	30	2.438
B147-130	1930	14	7	7.25	18	15	280	1.25	4	19.75	54	30	35.1	30	2.438
B168-130	2860	16	8	8.5	18	17	280	1.5	4.5	22.75	54	30	35.1	30	2.438
B188-130	3280	18	8	8.5	18	19	280	1.5	4.5	24.75	54	30	35.1	30	2.438
B208-130	3530	20	8	8.5	18	21	280	1.5	4.5	26.75	54	30	35.1	30	2.438
B127-142S	4490	24	8	8.5	16	24	350	1.25	4	28	66	42	35.1	42	3.000
B2410-130	6640	24	10	10.5	18	25	280	1.5	4.5	30.75	60	30	35.1	30	3.000

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.

Series 700 Chain (Series 800 is for Head Take-up)

Continuous discharge chain type elevators will handle various free-flowing dry or sluggish materials which contain medium to large lumps and are mildly, moderately, or extremely abrasive.

Buckets

Capacities listed are for a medium-front, non-overlapping style fabricated steel bucket. High front style buckets are available. Consult the factory for a specific recommendation.

Chain

Continuous discharge chain type elevators are furnished with combination chain for mild to moderate service or all steel (steel knuckle) chain for moderate to severe service or when a higher chain working load is required.

Elevator	Capacity	Buckets				Chain			Lump Size		Nominal Casing Size		Head Sprocket			Boot Sprocket		
	Max CFH	Width	Proj.	Depth	Spacing	Number	Pitch	F.P.M.	100%	10%	Width	Depth	# Teeth	Pitch Dia.	RPM	# Teeth	Pitch Dia.	Shaft Dia.
C85-721	570	8	5	7.75	8	HSB102B	4.000	120	.75	2.5	11.75	39	16	20.5	22.4	11	20.5	1.50
C105-721	730	10	5	7.75	8	HSB102B	4.000	120	.75	2.5	13.75	39	16	20.5	22.4	11	20.5	2.000
C107-725	1010	10	7	11 5/8	12	HSB110	6.000	125	1	3	13.75	48	13	25	19.1	10	25	2.000
C127-725	1230	12	7	11 5/8	12	HSB110	6.000	125	1	3	15.75	48	13	25	19.1	10	25	2.438
C147-725	1425	14	7	11 5/8	12	HSB110	6.000	125	1	3	17.75	48	13	25	19.1	10	25	2.438
C128-725	1550	12	8	11 5/8	12	HSB110	6.000	125	1.25	4	15.75	48	13	25	19.1	9	25	2.438
C148-725	1828	14	8	11 5/8	12	HSB110	6.000	125	1.25	4	17.75	48	13	25	19.1	9	25	2.438
C168-725	2110	16	8	11 5/8	12	HSB110	6.000	125	1.5	4.5	19.75	48	13	25	19.1	9	25	2.438
C188-725	2365	18	8	11 5/8	12	HSB110	6.000	125	1.5	4.5	22.75	48	13	25	19.1	9	25	2.438
C208-725	2800	20	8	11 5/8	12	HSB833	6.000	125	1.5	4.5	24.75	48	13	25	19.1	9	25	2.438
C248-725	3400	24	8	11 5/8	12	HSB833	6.000	125	1.5	4.5	28.75	48	13	25	19.1	9	25	3.000
C2010-725	3900	20	10	11 5/8	12	HSB833	6.000	125	2	4.5	24.75	54	13	25	19.1	9	25	3.000
C2410-725	4670	24	10	11 5/8	12	HSB833	6.000	125	2	4.5	28.75	54	13	25	19.1	9	25	3.000

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.
Other chain may be substituted based on chain pull requirements.

Continuous Discharge Belt

Series 700 Belt (Series 800 is for Head Take-up)

Continuous discharge belt type elevators will handle various free-flowing dry or sluggish materials which contain medium to large lumps and are mildly, moderately, or extremely abrasive.

Buckets

Capacities listed are for a medium front, non-overlapping style fabricated steel bucket. High front style buckets are available. Consult the factory for a specific recommendation.

Belt

Continuous discharge belt type elevators are typically furnished with 100% polyester carcass PVC belting or rubber covered ply belts specifically designed for elevator service. Many other types of belt and covers are available.

Elevator	Capacity	Buckets				Belt		Lump Size		Nominal Casing Size		Head Pulley		Boot Pulley	
	Max CFH	Width	Proj.	Depth	Spacing	Width	F.P.M.	100%	10%	Width	Depth	Pitch Dia.	RPM	Pitch Dia.	Shaft Dia.
B85-720	760	8	5	7.75	8	8	160	.75	2.5	11.75	39	20.00	29.8	14	1.500
B105-720	975	10	5	7.75	8	11	160	.75	2.5	13.75	39	20.00	29.8	16	2.000
B107-724	1300	10	7	11.625	12	11	160	1	3	13.75	48	24.00	24.9	20	2.000
B127-724	1570	12	7	11.625	12	13	160	.75	3	15.75	48	24.00	24.9	20	2.438
B147-724	1825	14	7	11.625	12	15	160	1	3	17.75	48	24.00	24.9	20	2.438
B128-724	1980	12	8	11.625	12	13	160	1.25	4	15.75	48	24.00	24.9	20	2.438
B148-724	2340	14	8	11.625	12	15	160	1.25	4	17.75	48	24.00	24.9	20	2.438
B168-724	2700	16	8	11.625	12	17	160	1.25	4.5	19.75	48	24.00	24.9	20	2.438
B188-724	3025	18	8	11.625	12	19	160	1.5	4.5	22.75	48	24.00	24.9	20	2.438
B208-724	3560	20	8	11.625	12	21	160	1.5	4.5	24.75	48	24.00	24.9	20	2.438
B248-724	4320	24	8	11.625	12	25	160	1.5	4.5	26.75	48	24.00	24.9	20	3.000
B2010-724	4970	20	10	11.625	12	21	160	1.5	4.5	24.75	54	24.00	24.9	20	3.000
B2410-724	5975	24	10	11.625	12	25	160	1.5	4.5	28.75	60	24.00	24.9	20	3.000

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.
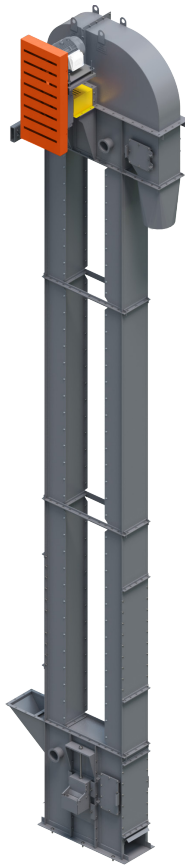
Series 500 Belt

The High-Speed centrifugal discharge type elevator is specifically designed to handle free flowing dry materials such as 48 lb. grains which have a small lump size and are mildly abrasive.

Buckets

Capacities and horsepower listed are for style "HD-MAX" buckets. Other style and materials of construction can be supplied. Consult factory for a specific recommendation.

Belt

Centrifugal discharge High-Speed Grain elevators are supplied with 100% polyester carcass PVC belting or rubber covered belts specially designed for elevator service. Many other types of belts and covers are available

Part Number	No. Bucket Rows	Capacity				Buckets Standard Duty Plastic				Belt Width	Pulley Width	Head Pulley Diam.	Boot Pulley Diam.
		C.F.H.		At Speed									
		@ "Y-Y +5 Deg." Max. Useable	@ "Y - Y" (W.L.)	Belt RPM	H.S. RPM	Typical Style	Width	Proj.	Spacing				
B64-508 *	1	782	697	265	119	HD-MAX	6.250	4.500	7	7	7	8	8
B65-512A	1	1,079	980	350	107	HD-MAX	6.250	5.625	10	7	8	12	12
B65-512B	1	1,541	1,400	350	107	HD-MAX	6.250	5.625	7	7	8	12	12
B95-518A	1	1,853	1,640	440	90	HD-MAX	9.375	5.625	12	10	11	18	18
B95-518B	1	2,470	2,187	440	90	HD-MAX	9.375	5.625	9	10	11	18	18
B95-518C	1	3,176	2,812	440	90	HD-MAX	9.375	5.625	7	10	11	18	18
B96-524	1	3,974	3,600	460	70	HD-MAX	9.375	6.625	8	10	11	24	24
B96-530	1	4,406	3,991	510	63	HD-MAX	9.375	6.625	8	10	11	30	30
B106-530	1	4,931	4,534	510	63	HD-MAX	10.375	6.625	8	11	12	30	30
B136-530	1	6,388	5,864	510	63	HD-MAX	13.375	6.625	8	14	15	30	30
B127-536	1	8,879	8,123	600	62	HD-MAX	12.500	7.750	9	13	15	36	36
B147-536	1	10,747	9,900	600	62	HD-MAX	14.500	7.750	9	15	16	36	36
B167-536	1	12,000	11,289	600	62	HD-MAX	16.500	7.750	9	17	19	36	36
B168-542	1	14,751	13,798	620	55	HD-MAX	16.500	8.750	10	17	19	42	42
B188-542	1	16,740	15,764	620	55	HD-MAX	18.500	8.750	10	20	22	42	42
B2108-548	2	20,648	19,164	700	55	HD-MAX	10.500	8.750	10	22	24	48	48
B2138-548	2	26,412	23,706	700	55	HD-MAX	13.500	8.750	10	28	30	48	48
B2168-548	2	33,314	31,681	700	55	HD-MAX	16.500	8.750	10	34	36	48	48
B2188-548	2	37,800	35,595	700	55	HD-MAX	18.500	8.750	10	38	40	48	48
B3168-548	3	49,971	47,521	700	55	HD-MAX	16.500	8.750	10	50	52	48	48
B4158-548	4	63,222	59,652	700	55	HD-MAX	15.500	8.750	10	62	64	48	48
B4188-548	4	75,600	71,190	700	55	HD-MAX	18.500	8.750	10	74	76	48	48

* Single Leg Intermediate Casing: 50' maximum height.
Head shaft diameter to be determined by customer's application and specifications.
Plastic buckets are available as Nylon, HDP or Urethane. Steel is available on special request.

Super Capacity
Continuous Discharge Chain

Martin
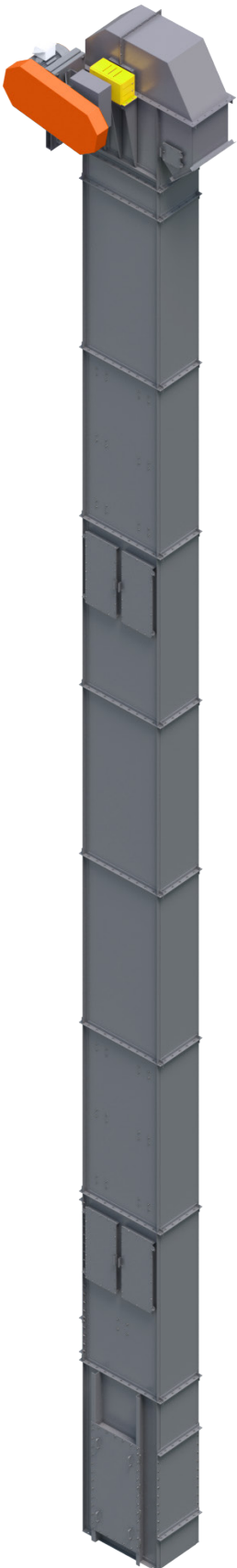
Series SC Chain Elevator

- Built to handle friable, heavy or abrasive materials typical of the aggregate and cement industries.
- Buckets are mounted between two strands of chain and project back towards the center of the elevator thus carry a much larger capacity and larger lump sizes because of their deeper design.
- The SC elevator's continuous discharge design allows for the operation of the elevator at much slow speeds greatly increasing chain and sprocket life.
- As a result of the increased life of wear components, maintenance costs are reduced.
- Higher shaft centers is also a benefit of the Martin SC elevator's double chain design.
- The Super-Capacity elevator is designed to handle Free-Flowing materials with particles ranging from fines up to heavy lumps.

Super Capacity Elevator w SC Buckets SC Series Double Chain

Elevator	Max CFH Capacity	Bucket	Spac-ing	Chain	Speed	Lump Size	Casing Size	Head Wheel	RPM	Boot Sprocket	Shaft Diam.
SC31-128	2250	12 × 8.75 × 11.625	12	6102 1/2	100	2 to 4	26 × 56	31.36	12.2	8T-31.36PD	2.438
SC31-148	2700	14 × 8.75 × 11.625	12	6102 1/2	100	2 to 4	28 × 56	31.36	12.2	8T-31.36PD	2.438
SC31-168	3150	16 × 8.75 × 11.625	12	6102 1/2	100	2.5 to 6	30 × 56	31.36	12.2	8T-31.36PD	3
SC31-188	3600	18 × 8.75 × 11.625	12	6102 1/2	100	2.5 to 6	32 × 56	31.36	12.2	8T-31.36PD	3
SC31-208	4050	20 × 8.75 × 11.625	12	6102 1/2	100	2.5 to 6	34 × 56	31.36	12.2	8T-31.36PD	3
SC35-1612	5625	16 × 12.75 × 17.625	18	9124	125	3.5 to 8	33 × 68	34.77	13.7	12T-34.77PD	3
SC35-2012	7125	20 × 12.75 × 17.625	18	9124	125	3.5 to 8	37 × 68	34.77	13.7	12T-34.77PD	3
SC35-2412	8250	24 × 12.75 × 17.625	18	9124	125	3.5 to 8	41 × 68	34.77	13.7	12T-34.77PD	3.438
SC35-3012	10500	30 × 12.75 × 17.625	18	9124	125	3.5 to 8	47 × 68	34.77	13.7	12T-34.77PD	3.438
SC35-3612	12375	36 × 12.75 × 17.625	18	9124	125	3.5 to 8	53 × 68	34.77	13.7	12T-34.77PD	3.438
SC35-4212	14450	42 × 12.75 × 17.625	18	9150	125	3.5 to 8	60 × 68	34.77	13.7	12T-34.77PD	3.438
SC35-4812	16500	48 × 12.75 × 17.625	18	9150	125	3.5 to 8	66 × 68	34.77	13.7	12T-34.77PD	3.438

Notes: 6102 1/2 Chain is 12 Pitch
           9124 Chain is 9 Pitch
           9150 Chain is 9 Pitch

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.
Other chain may be substituted based on chain pull requirements.

Series MDC Mill Duty Elevator with AC Buckets

- Built for the severe duty required of industries like cement, rock, lime, and gypsum.
- Buckets are mounted to a single chain in a continuous sequence.
- Material in fed directly into the bucket to minimize digging action, reducing wear and horsepower requirements.
- Centrifugal force causes discharge of buckets as they pass over head wheel.
- Designed to handle free-flowing material with particles ranging from fines up to 2" lumps.
- Most commonly supplied with a heavy duty steel rollerless chain.

Mill Duty with AC Buckets & Chain - MDC Series

Elevator	Max CFH Capacity	Bucket	Spac-ing	Chain	Speed	Lump Size	Casing Size	Head Wheel	RPM	Boot Sprocket	Shaft Diam.
MDC26-128	2230	12 × 8 × 8.5	18	ER-856	265	Fines to 2	20 × 56	26	36	13T-25.07PD	3
MDC26-148	2625	14 × 8 × 8.5	18	ER-856	265	Fines to 2	22 × 56	26	36	13T-25.07PD	3
MDC26-128	3340	12 × 8 × 8.5	12	ER-856	265	Fines to 2	20 × 56	26	36	13T-25.07PD	3
MDC26-148	3935	14 × 8 × 8.5	12	ER-856	265	Fines to 2	22 × 56	26	36	13T-25.07PD	3
MDC26-168	4530	16 × 8 × 8.5	12	ER-856	265	Fines to 2	24 × 56	26	36	13T-25.07PD	3
MDC26-1810A	4930	18 × 10 × 10.5	18	ER-856	265	Fines to 2	26 × 64	26	36	13T-25.07PD	3
MDC26-2010A	5470	20 × 10 × 10.5	18	ER-856	265	Fines to 2	28 × 64	26	36	13T-25.07PD	3
MDC26-2410A	6760	24 × 10 × 10.5	18	ER-856	265	Fines to 2	32 × 64	26	36	13T-25.07PD	3
MDC26-1810B	7400	18 × 10 × 10.5	12	ER-859	265	Fines to 2	26 × 64	26	36	13T-25.07PD	3
MDC26-2010B	8200	20 × 10 × 10.5	12	ER-859	265	Fines to 2	28 × 64	26	36	13T-25-07PD	3
MDC26-2410B	10136	24 × 10 × 10.5	12	ER-859	265	Fines to 2	32 × 64	26	36	13T-25-07PD	3.438

Notes: 6102 1/2 Chain is 12 Pitch
9124 Chain is 9 Pitch
9150 Chain is 9 Pitch

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.
Other chain may be substituted based on chain pull requirements.

Mill Duty
Centrifugal Discharge Belt

Martin

Series MDB Mill Duty Elevator with AC Buckets

- Built for the severe duty required of industries like cement, rock, lime, and gypsum.
- Buckets are mounted to a single belt in a continuous sequence.
- Material in fed directly into the bucket to minimize digging action, reducing wear and horsepower requirements.
- Centrifugal force causes discharge of buckets as they pass over head pulley.
- Designed to handle free-flowing material with particles ranging from fines up to 2" lumps.
- Most commonly supplied with a heavy belt or steel web core belt.

Mill Duty with AC Buckets & Belt - MDB Series

Elevator	Max CFH Capacity	Bucket	Spacing	Belt	Speed	Lump Size	Casing Size	Head Wheel	RPM	Boot Sprocket	Shaft Diam.
MDB30-128A	2520	12 × 8 × 8.5	18	14	300	1.5 to 4	22 × 58	30.00	37.6	24.00	3.000
MDB30-148A	2970	14 × 8 × 8.5	18	16	300	1.5 to 4	24 × 58	30.00	37.6	24.00	3.000
MDB30-168A	3420	16 × 8 × 8.5	18	18	300	1.5 to 4	26 × 58	30.00	37.6	24.00	3.000
MDB30-128B	3780	12 × 8 × 8.5	12	14	300	1.5 to 4	22 × 58	30.00	37.6	24.00	3.000
MDB30-148B	4455	14 × 8 × 8.5	12	16	300	1.5 to 4	24 × 58	30.00	37.6	24.00	3.000
MDB30-168B	5130	16 × 8 × 8.5	12	18	300	1.5 to 4	26 × 58	30.00	37.6	24.00	3.000
MDB30-1810A	5580	18 × 10 × 10.5	18	20	300	2 to 5	28 × 64	30.00	37.6	24.00	3.000
MDB30-2010A	6190	20 × 10 × 12.5	18	22	300	2 to 5	30 × 64	30.00	37.6	24.00	3.000
MDB30-2410A	7650	24 × 10 × 10.5	18	26	300	2 to 5	34 × 64	30.00	37.6	24.00	3.000
MDB30-1810B	8370	18 × 10 × 10.5	12	28	300	2 to 5	28 × 64	30.00	37.6	24.00	3.000
MDB30-2010B	9290	20 × 10 × 10.5	12	30	300	2 to 5	30 × 64	30.00	37.6	24.00	3.000
MDB30-2410B	11475	24 × 10 × 10.5	12	34	300	2 to 5	34 × 64	30.00	37.6	24.00	3.475
MDB30-1610DR	12500	16 × 10 × 10.5	12	34	275	1.5 to 4	42 × 64	30.00	34.4	30.00	3.475
MDB30-1810DR	15345	18 × 10 × 10.5	12	38	275	2 to 4.5	46 × 64	30.00	34.4	30.00	3.475
MDB30-2010DR	17030	20 × 10 × 10.5	12	42	275	2.5 to 4.75	50 × 64	30.00	34.4	30.00	3.475
MDB30-2410DR	21040	24 × 10 × 10.5	12	50	275	2.5 to 4.75	58 × 64	30.00	34.4	30.00	3.475

All Dimensions in inches.
Max. CFH capacity is at 75% bucket load.
Consult Martin for head shaft size and horsepower requirements.
Other chain may be substituted based on chain pull requirements.
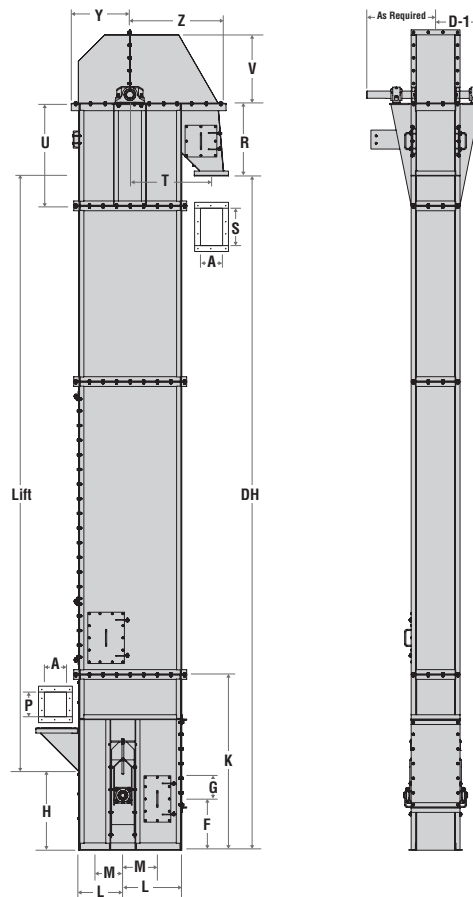
Standard Elevator - 100 & 200 Series

Elevator Number				Casing		Boot								Head								
Chain Series 100	Belt Series 700	Belt Series 100	Chain Series 700	A	B	F	G	H	J	K	L	M	N	P	R	S	T	U	V	Y	Z	D-1
C43-108	–	B43-108	–	8	18	9	6	27.25	36.75	42	9	6	10	6	15	8	17.5	36	14	9	20.25	13
C64-121	–	B64-124	–	11.75	39	14	9	26.5	43	72	19.5	16.5	15.5	13	31.5	10	30.5	42	21.5	19.5	32.5	14
C85-121	B85-720	–	C85-721	11.75	39	14	9	26.5	43	72	19.5	16.5	15.5	13	31.5	10	30.5	42	21.5	19.5	32.5	14
–	B105-720	B85-120	C105-721	13.75	39	14	9	26.5	43	72	19.5	16.5	17.5	13	31.5	10	30.5	42	21.5	19.5	32.5	15
C85-124	–	B85-124	–	13.75	42	16	9	32.5	50	72	21	18	17.5	13	32.5	10	33.25	42	24	21	36.25	15.5
C106-124	B107-724	–	C107-725	13.75	48	19	9	40.5	60	72	24	21	17.5	15	35.75	13	36.5	48	27.5	24	40.625	16
C127-125	B127-724 B128-724	B106-124	C127-725 C128-725	15.75	48	19	9	40.5	60	72	24	21	19.5	15	35.75	13	36.5	48	27.5	24	40.625	17
–	–	B127-124S	–	28	66	26	10	29.75	60.5	72	32	29	30.5	26.5	36	17	46.5	48	36.5	32	53	24
–	B147-724 B148-724	B127-130	C147-725 C148-725	17.75	48	19	10	40.5	60	72	24	21	21.5	15	35.75	13	36.5	48	27.5	24	40.625	18
C127-131	–	–	–	17.75	54	21	10	36	60.5	72	27	24	21.5	17	38.25	17	41.5	48	31	27	45	19.25
–	B168-724	–	C168-725	19.75	48	20	10	40.5	60	72	24	21	23.5	15	35.75	13	36.5	48	27.5	24	40.625	16
C147-131	–	B147-130	–	19.75	54	21	10	39	60.5	72	27	24	23.5	17	38.25	17	41.5	48	31	27	45	20
–	B188-724		C188-725	22.75	48	19	10	40.5	60	72	24	21	26.5	15	35.75	13	36.5	48	27.5	24	40.625	21
C168-131	–	B168-130	–	22.75	54	21	10	39	60.5	72	27	24	26.5	17	38.25	17	41.5	48	31	27	45	22
–	B208-724	–	C208-725	24.75	48	19	10	40.5	60	72	24	21	28.5	19	35.25	13	36.5	48	27.5	24	40.625	22
C188-131 C208-131	B2010-724	B188-130	C2010-725	24.75	54	21	10	40.5	60.5	72	27	24	28.5	19	38.25	17	41.5	48	31	27	45	23
–	B248-724	–	C248-725	28.75	48	19	10	39	60	72	24	21	32.5	22.5	35.25	13	36.5	48	27.5	24	40.625	24
C248-131	–	B208-130	C2410-725	28.75	54	21	10	40.5	60.5	72	27	24	32.5	22.5	38.25	17	41.5	48	31	27	45	25
C2410-131	B2410-724	B2410-130	–	30.75	60	23	10	38	60.5	72	29	27	34.5	22.5	40	21	46.5	60	31	30	52	26

All Dimensions in inches.
① NOT certified for construction.
② Normal maximum for largest head shaft listed.
For units not shown, contact Martin.

Dimensions of
High-Speed Grain Elevators

Martin
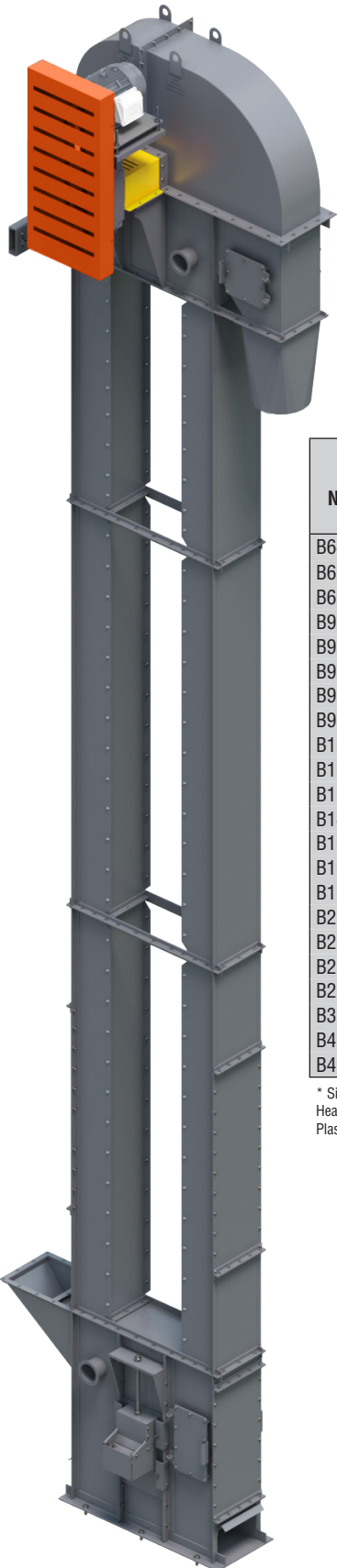
Part Number	Boot Shaft Diam.	External Casing Dimensions		Intermediate Casing Dimensions		Casing Thicknesses			Inlet Height Diam.
		Depth "C"	Width "A"	Depth "C"	Width "B"	Head	Boot	Int.	
B64-508 *	1.188	8	20	8	20*	12 ga.	12 ga.	12 ga.	30
B65-512A	1.438	9	27	9	8	12 ga.	12 ga.	12 ga.	32
B65-512B	1.438	9	27	9	8	12 ga.	12 ga.	12 ga.	32
B95-518A	1.438	12	34	12	9	12 ga.	10 ga.	12 ga.	39
B95-518B	1.438	12	34	12	9	12 ga.	10 ga.	12 ga.	39
B95-518C	1.438	12	34	12	9	12 ga.	10 ga.	12 ga.	39
B96-524	1.938	13	42	13	10	10 ga.	10 ga.	12 ga.	44
B96-530	1.938	15	48	15	10	10 ga.	3/16"	12 ga.	48
B106-530	1.938	15	48	15	10	10 ga.	3/16"	12 ga.	48
B136-530	1.938	18	48	18	10	10 ga.	3/16"	12 ga.	48
B127-536	2.438	18	56	18	11	10 ga.	3/16"	12 ga.	56
B147-536	2.438	21	56	21	11	10 ga.	3/16"	12 ga.	56
B167-536	2.438	21	56	21	11	10 ga.	3/16"	12 ga.	56
B168-542	2.438	23	68	23	14	3/16"	3/16"	12 ga.	72
B188-542	2.438	26	68	26	14	3/16"	3/16"	12 ga.	72
B2108-548	2.938	28	74	28	14	3/16"	1/4"	10 ga.	76
B2138-548	2.938	34	74	34	14	3/16"	1/4"	10 ga.	76
B2168-548	2.938	40	74	40	14	3/16"	1/4"	10 ga.	76
B2188-548	3.438	44	74	44	14	3/16"	1/4"	10 ga.	76
B3168-548	3.438	56	74	56	14	3/16"	1/4"	10 ga.	76
B4158-548	3.438	68	74	68	14	3/16"	1/4"	10 ga.	76
B4188-548	3.438	80	74	80	14	3/16"	1/4"	10 ga.	76

* Single Leg Intermediate Casing: 50' maximum height.
Head shaft diameter to be determined by customer's application and specifications.
Plastic buckets are available as Nylon, HDP or Urethane. Steel is available on special request.

Y

Y

2½"

E

S

F

H

5"

DH

Lift

Shaft
Centers

M

N

I

N

10' 0"

1' 0"
Take-Up

6½"   J   J   6½"

K   1½"
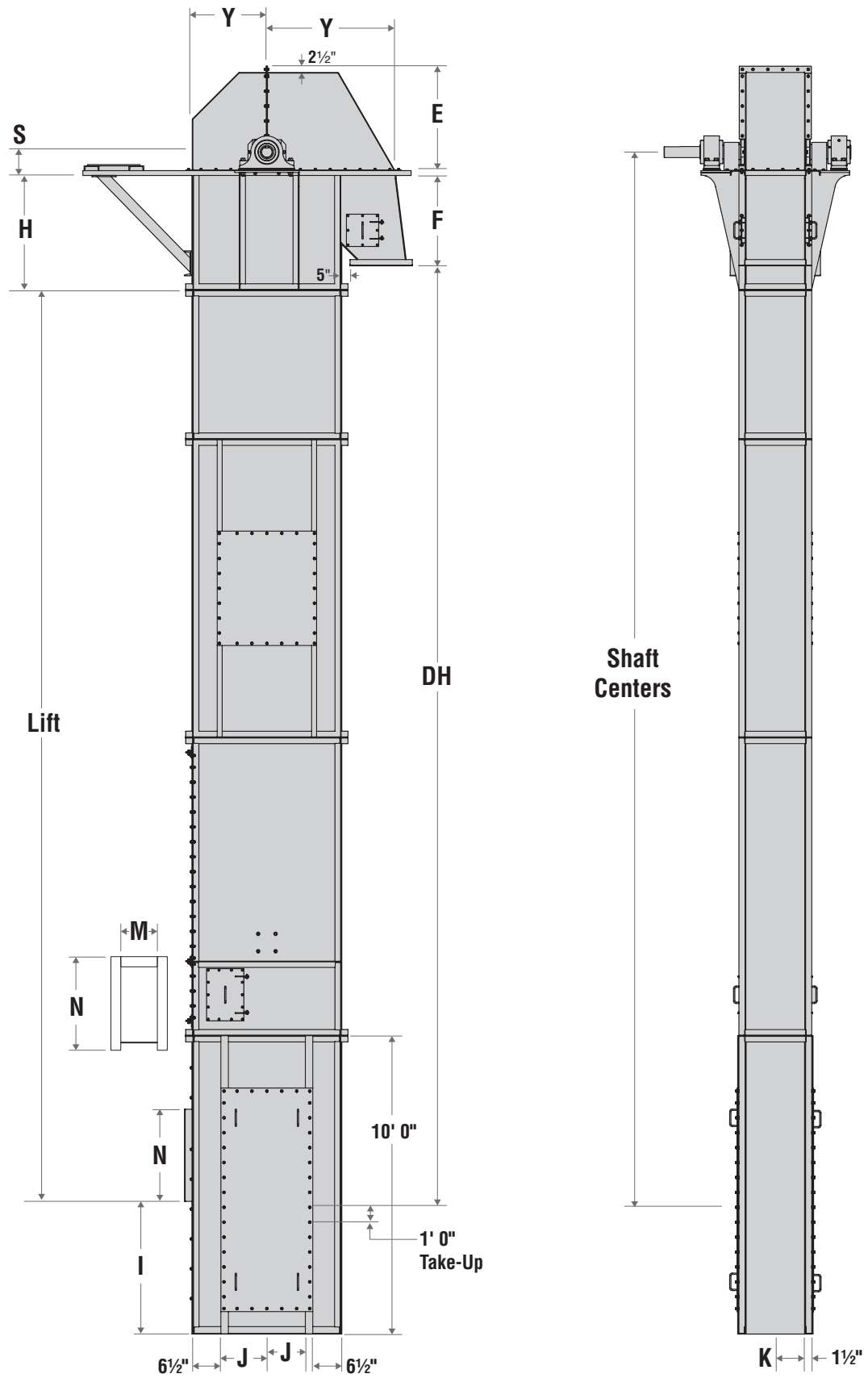
Dimensions of
Super Capacity & Mill Duty Elevator

Super Capacity Elevator with SC Buckets & Double Chain – SC Series

Elevator Number	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
SC31-128	26	56	28	48	34.5	47	44.25	60	56	25	14.750	17	8	20	23
SC31-148	28	56	28	48	34.5	47	44.25	60	56	25	15.750	17	10	20	24
SC31-168	30	56	28	48	34.5	47	44.25	60	56	25	16.750	17	11	20	25.625
SC31-188	32	56	28	48	34.5	47	44.25	60	56	25	17.750	17	8	20	26.625
SC31-208	34	56	28	48	34.5	47	44.25	60	56	25	18.750	17	10	20	27.625
SC35-1612	33	68	32	52	41.5	52	50.25	60	60	28	18.25	17	12	22	27.125
SC35-2012	37	68	32	52	41.5	52	50.25	60	60	28	20.25	17	13	22	29.125
SC35-2412	41	68	32	52	41.5	52	50.25	60	60	28	22.25	17	16	22	31.875
SC35-3012	47	68	32	52	41.5	52	50.25	60	60	28	25.25	17	12	22	34.875
SC35-3612	53	68	32	52	41.5	52	50.25	60	60	28	28.25	17	13	22	37.875
SC35-4212	60	68	32	52	41.5	52	50.25	60	60	28	31.750	17	16	22	41.375
SC35-4812	66	68	32	52	41.5	52	50.25	60	60	28	34.750	17	20	22	44.375

All Dimensions in inches.
Dimensions not certified for construction.
R & S dimensions dependent on head shaft size and reducer selection.
P will vary with shaft dimension.

Mill Duty Elevator with AC Buckets & Chain – MDC Series

Elevator Number	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
MDC26-128A	20	56	28	48	34.5	47	44.25	60	56	34.75	11.75	17	9	20	19
MDC26-148A	22	56	28	48	34.5	47	44.25	60	56	34.75	12.75	17	11	20	21
MDC26-128B	20	56	28	48	34.5	47	44.25	60	56	34.75	11.75	17	9	20	19
MDC26-148B	22	56	28	48	34.5	47	44.25	60	56	34.75	12.75	17	11	20	21
MDC12-168B	24	56	28	48	34.5	47	44.25	60	56	34.75	13.75	17	12	20	22
MDC26-1810A	26	64	32	52	41.5	52	48.25	60	60	38.75	14.75	17	14	20	23
MDC26-2010A	28	64	32	52	41.5	52	48.25	60	60	38.75	15.75	17	15	20	24
MDC26-2410A	32	64	32	52	41.5	52	48.25	60	60	38.75	17.75	17	18	20	26
MDC26-1810B	26	64	32	52	41.5	52	48.25	60	60	38.75	14.75	17	14	20	23
MDC26-2010B	28	64	32	52	41.5	52	48.25	60	60	38.75	15.75	17	15	20	24
MDC26-2410B	32	64	32	52	41.5	52	48.25	60	60	38.75	17.75	17	18	20	26

All Dimensions in inches.
Dimensions not certified for construction.
R & S dimensions dependent on head shaft size and reducer selection.
P will vary with shaft dimension.

Mill Duty Elevator with AC Buckets & Belt – MDB Series

Elevator Number	A	B	C	D	E	F	G	H	I	J	K	L	M	N	P
MDB30-128A	22	58	29	49	34.5	47	45.25	60	56	35.75	12.75	17	9	20	20
MDB30-148A	24	58	29	49	34.5	47	45.25	60	56	35.75	13.75	17	11	20	22
MDB30-168A	26	58	29	49	34.5	47	45.25	60	56	35.75	14.75	17	12	20	23
MDB30-128B	22	58	29	49	34.5	47	45.25	60	56	35.75	12.75	17	9	20	20
MDB30-148B	24	58	29	49	34.5	47	45.25	60	56	35.75	13.75	17	11	20	22
MDB30-168B	26	58	29	49	34.5	47	45.25	60	56	35.75	14.75	17	12	20	23
MDB30-1810A	28	64	32	52	41.5	52	48.25	60	60	38.75	15.75	17	14	20	24
MD30-2010A	30	64	32	52	41.5	52	48.25	60	60	38.75	16.75	17	15	20	26
MDB30-2410A	34	64	32	52	41.5	52	48.25	60	60	38.75	18.75	17	18	20	23
MDB30-1810B	28	64	32	52	41.5	52	48.25	60	60	38.75	15.75	17	14	20	24
MDB30-2010B	30	64	32	52	41.5	52	48.25	60	60	38.75	16.75	17	15	20	26
MDB30-2410B	34	64	32	52	41.5	52	48.25	60	60	38.75	18.75	17	18	20	27
MDB30-1610DR	42	64	32	52	41.5	52	48.25	60	60	38.75	22.75	17	18	20	32
MDB30-1810DR	46	64	32	52	41.5	52	48.25	60	60	38.75	24.75	17	21	20	34
MDB30-2010DR	50	64	32	52	41.5	52	48.25	60	60	38.75	26.75	17	22	20	36
MDB30-2410DR	58	64	32	52	41.5	52	48.25	60	60	38.75	30.75	17	26	20	40

All Dimensions in inches.
Dimensions not certified for construction.
R & S dimensions dependent on head shaft size and reducer selection.
P will vary with shaft dimension.

Head Platforms: Series 100 thru 800

Martin head section service platforms consist of:

- Heavy structural steel frames
- Square tube handrail
- Heavy non-skid grating
- Toe plates

The platform is entirely supported by the elevator casing. Drives should be mounted on an integral support or be of a shaft mounted type. **Drives should not be mounted on the service platform.**

Martin ladders / safety cages are designed to bolt to the elevator housing. They are constructed of heavy gauge steel and sized to provide easy access to platforms. Rest platforms are also available and required at 30' intervals.
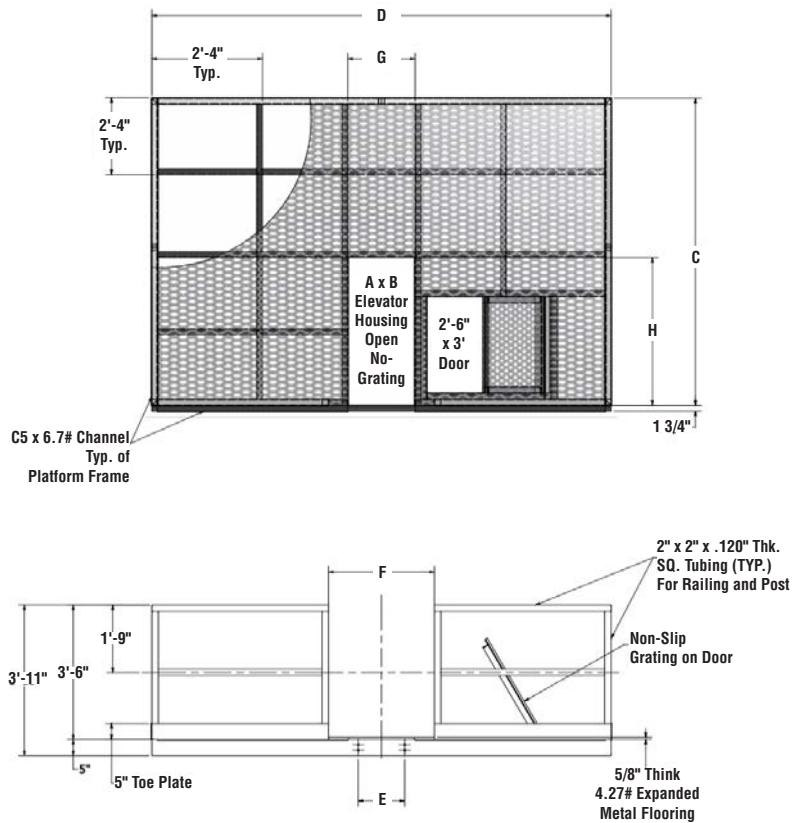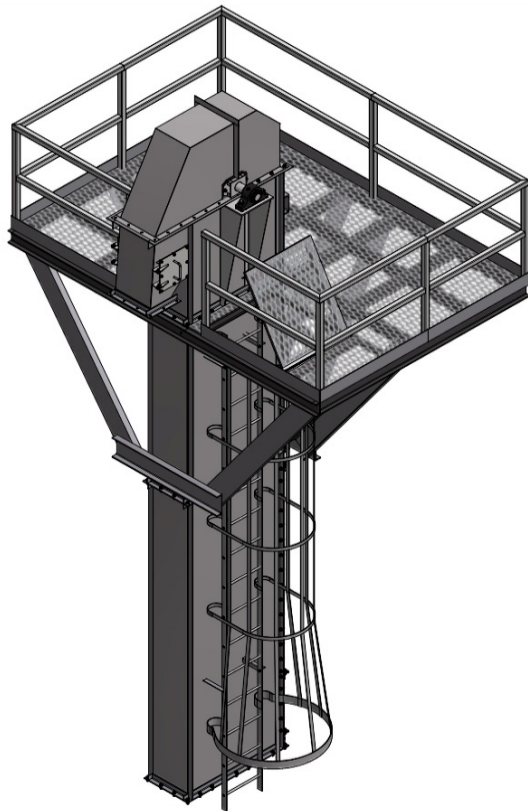
Casing Size		C	D	E	F	G	H
A	B						
11.75"	39"						
13.75"	39"	8' - 0"	11' - 9"				
13.75"	42"						
15.75"	48"						
17.75"	48"						
19.75"	48"	8' - 0"	11' - 9"				
22.75"	48"						
24.75"	48"			A + 2.5"	A + 12.75"	A + .5"	B + .5"
17.75"	54"						
19.75"	54"	10' - 0"	11' - 9"				
22.75"	54"						
24.75"	54"						
26.75"	54"						
28.75"	48"	10' - 0"	12' - 0"				
30.75"	54"						

Dimensions shown in the above table are for standard platforms only.
Platforms for elevators having large shafts, bearings, backstops or uselessly large drives will need to be designed and are made-to-order.
Note: Dimensions are subject to change and not for construction.
Casing Thickness: Casing thickness will vary with casing size and application.

Buckets

Martin

For more than 50 years, Martin has specialized in bucket elevators and other material handling solutions. Martin elevator buckets may be fabricated from many readily available materials such as mild steel or, stainless steel. They may also be cast in ductile iron or produced from a variety of non-metallic materials such as nylon, uhmw, polyurethane, or urethane. Whether you have a centrifugal elevator, continuous elevator, super capacity elevator, or a high speed grain elevator, we can provide the right bucket, at the right price, right when you need it.

 Martin builds replacement buckets for existing bucket elevator equipment:

Standard Buckets:

- Direct from our catalog

- Built to industry standards for a precise fit

- Custom or specialty buckets built to exact specification:

- Our knowledgeable sales engineers and specialists will assist you in finding the best custom solution for your specific application and help you navigate the many factors that may affect your final design and cost.

Reverse Engineered:

- Send us your bucket, our team of engineers, designers, and manufacturing experts will reverse engineer and build an exact duplicate for your application

Frequently Asked Questions:

Why a fabricated metallic bucket?

- They resist flexing and bending under load.
- They have much greater heat resistance.
- Resistant to damage from extremely sharp materials
- Fabricated metallic buckets are versatile, easy to modify for specific applications.
    - » A double thick front lip may be added for longer life when scooping or digging material.
    - » Available in wide range of long-lasting materials including abrasion resistant front plate and corrosion resistant alloys.
    - » Hard surfacing such as tungsten carbide or chromium carbide may be applied to wear faces and edges.
    - » Vent holes and mounting holes may be precut into the body before forming.
- Martin fabricated buckets are typically laser cut and continuously welded for precision, strength, and durability.
- Fabricated metallic buckets are lighter weight than cast ductile iron, which may allow use of less expensive drive units and lighter components, lowering overall cost.

Why a molded non-metallic bucket?

- Light weight
- Lower initial cost
- Flexible body, good for sticky products or material that may tend to pack.
- Abrasion and corrosion resistant varieties available.

Why use a cast iron elevator bucket?

- Good abrasion and impact resistance.
- Typically used as "digger buckets" to loosen material in the bottom of a bucket elevator.
- Digger buckets are frequently spaced at uniform intervals between standard buckets. They have larger overall dimensions than standard buckets and help loosen material in the boot section and clear the way for the standard buckets.
- Ductile iron has good general corrosion and rust resistance.

What items are commonly purchased with buckets?

- Belt installations:
    - » Saber-tooth norway bolts with fender washer and lock nut.
    - » Belt splice kit to bind the ends of the belt.
    - » Belt punch to produce holes for mounting the belt splices.
- Chain installations:
    - » Hex head assembly bolts with double flat washer and hex nut.

CENTRIFUGAL STYLE
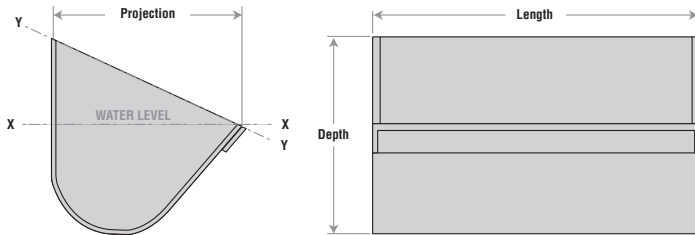
CONTINUOUS STYLE
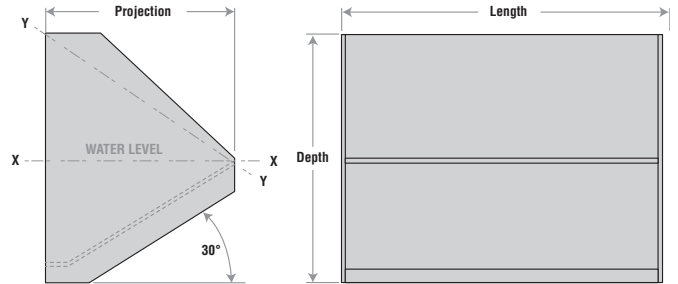
AA	–	8	5	5	–	10	–	B6	–	_____
Type		**Length**	**Projection**	**Depth**		**Thickness**		**Punching**		**Material**

Bucket Nomenclature definitions:

Bucket Type

- Centrifugal – **AA, AC, C**

- Continuous – **MF, HF, SC**

Dimensions – Whole numbers only, rounded down. Examples:

- 5.5" would be 5

- 7 5/8" would be **7**

Thickness – Only for metal buckets. Do not call out thickness on plastic buckets.

- Sheet metal gauge – **16, 14, 12, 10**

- Sheet metal plate

  » 3/16" = **7**

  » 1/4" = **3**

  » > 1/4" = thickness x 64 (Ex. 3/8 = **24**)

Punching

- Belt Punching* – **B1, B3, B4, B5, B6, B7, B8**

- Chain Punching – Chain and attachment (ex. **R110K2**)

  * *See Bucket Punching on page H-152*

Material – Carbon steel is the default. You do not have to designate carbon steel.

- Material other than carbon steel:

  SS = 304 Stainless

  S6 = 316 Stainless

  NY = Nylon

  UR = Urethane

  Poly = Polyurethane

  DI = Ductile Iron

Style AA
Centrifugal

Martin

What is the Martin AA Bucket?

AA Style Buckets are centrifugal style generally used for dry, moderately free-flowing material that is not easily damaged. The smooth, curved bottom and angled front face of the AA Style Bucket provides efficient product discharge. AA Buckets typically do some "digging" during operation and therefore have a reinforced front edge for longer life. AA Buckets often mount to a reinforced multi-ply elevator belt but may also mount to chain.

Some common materials of construction are mild steel, stainless steel, AR plate and molded plastic models.

Typical Applications:

- Sand
- Rock
- Aggregate
- Stone

- Fertilizer
- Clay
- Salt
- Coal

- Other Similar Granular Material

STANDARD BUCKET SIZE **	LENGTH (In)	PROJECTION (In)	DEPTH (In)	X-X (WATER LEVEL) CAPACITY ft³	Y-Y (100% FILL) CAPACITY ft³	EMPTY WT.* (lb)		
						10GA	3/16"	1/4"
4 X 3	4	2 3/4	3	.006	.01	1.50	1.95	-
6 X 4	6	4	4 1/4	.02	.03	3.02	3.96	5.27
8 X 5	8	5	5 1/2	.04	.07	5.33	7.06	9.39
10 X 6	10	6	6 1/4	.07	.12	7.37	9.79	13.02
12 X 7	12	7	7 1/4	.12	.19	10.42	13.93	18.53
14 X 8	14	8	8 1/2	.20	.32	13.90	18.64	24.80
16 X 7	16	7	7 1/4	.16	.26	13.03	17.47	23.24
16 X 8	16	8	8 1/2	.23	.34	15.41	20.67	27.49
18 X 8	18	8	8 1/2	.26	.40	16.92	22.70	30.19
18 X 10	18	10	10 1/2	.33	.63	21.48	28.88	38.41
20 X 10	20	10	10 1/2	.45	.70	22.19	30.35	40.20
24 X 10	24	10	10 1/2	.54	.84	25.67	35.10	46.52

** Contact Martin for sizes not listed
* Estimated weight based on welded steel.
Price is affected by material type and thickness.

AA Buckets are NOT continuous buckets.

What is the Martin AC Bucket?

AC or Added Capacity style buckets are centrifugal style used for dry, free flowing to moderately free flowing, material that is not easily damaged. AC style elevator buckets have a high front for increased capacity. The angled front face and hooded back allows for closer mounting. Optional vent holes can help efficiently fill and discharge material. AC buckets may perform some "digging" of product in the elevator boot during operation. They can mount to a reinforced multi-ply elevator belt, or to a chain

Some common materials of construction are mild steel, stainless steel and AR plate.

Typical Applications:

- Asphalt
- Aggregate
- Ore
- Shale
- Cement
- Clinker
- Coal
- Other Similar Material
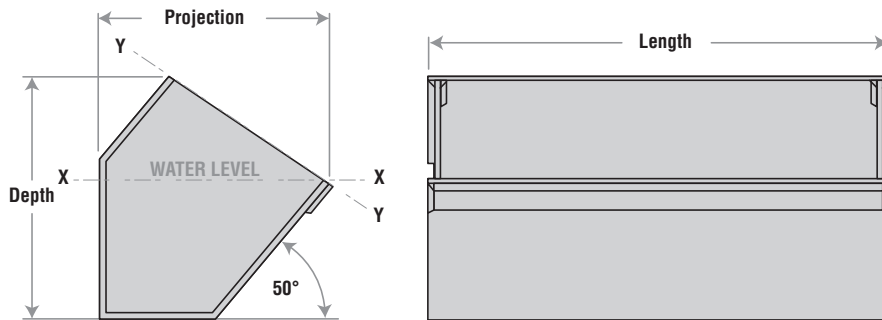
STANDARD BUCKET SIZE **	LENGTH (In)	PROJECTION (In)	DEPTH (In)	X-X (WATER LEVEL) CAPACITY ft³	Y-Y (100% FILL) CAPACITY ft³	EMPTY WT.* (lb)	
						3/16"	1/4"
12 X 8 X 8	12	8	8 1/2	.231	.303	18.25	24.30
14 X 8 X 8	14	8	8 1/2	.271	.356	20.30	27.00
16 X 8 X 8	16	8	8 1/2	.311	.408	22.48	29.98
18 X 10 X 10	18	10	10 1/2	.488	.691	31.15	38.95
20 X 10 X 10	20	10	10 1/2	.542	.768	33.68	42.10
24 X 10 X 10	24	10	10 1/2	.651	.921	39.67	52.69
27 X 12 X 12	27	12	12 1/2	1.072	1.474	53.84	71.46

** Contact Martin for sizes not listed
* Estimated weight based on welded steel.
Price is affected by material type and thickness.

AC Buckets are NOT continuous buckets.

Style C
Centrifugal

Martin

What is the Martin C Bucket?

C Style Elevator Buckets are a centrifugal style bucket. They typically handle wet or sticky products, finely pulverized material, or products that easily pack. The open front face and angled sides allow the discharge of materials trapped by other bucket designs. C Style Buckets are low profile, permitting more buckets per foot than some other styles.

C Style buckets commonly mount on a multi-ply elevator belt.

Some common materials of construction are mild steel, stainless steel and AR plate

Typical Applications:

- Sugar
- Salt
- Wet Grains
- Clay
- Powders
- Chemicals
- Similar Products
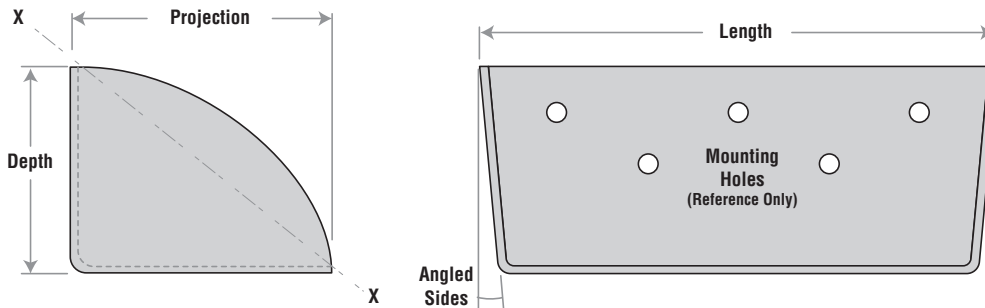
STANDARD BUCKET SIZE **	LENGTH (In)	PROJECTION (In)	DEPTH (in)	X-X CAPACITY ft³	EMPTY WT.* (lb)		
					12GA	10GA	3/16"
6 X 4 X 4	6	4 1/2	4	.026	2.00	2.63	3.58
8 X 4 X 4	8	4 1/2	4	.035	2.80	3.25	4.44
10 X 5 X 4	10	5	4	.052	3.23	4.10	5.67
12 X 5 X 4	12	5	4	.061	3.75	4.80	6.59
14 X 7 X 5	14	7	5 1/2	.138	6.38	8.14	11.21
16 X 7 X 5	16	7	5 1/2	.158	7.11	9.08	12.50

**   Contact Martin for sizes not listed
*   Estimated weight based on welded steel.
Price is affected by material type and thickness.

C Buckets are NOT continuous buckets.

What is the Martin MF Bucket?

MF Style Elevator Buckets are continuous style with a medium front for slow speed product discharge. They gently handle dry, fragile, powdery, dusty, or abrasive materials. The angled face aids in product discharge and extended side panel bottom edges create a chute to direct product pouring from the previous bucket into the discharge. Optional vent holes can help provide maximum fill and product discharge. MF Buckets are not designed to "dig" through material in the elevator boot (bottom) during operation. MF style buckets can mount to a reinforced multi-ply elevator belt, or to a chain.

Some common materials of construction are mild steel, stainless steel, AR plate and molded plastic models.

Typical Applications:

- Gypsum
- Cement
- Pellets
- Grain
- Salt
- Sand
- Aggregate
- Fertilizer
- Other Similar Granular Material

STANDARD BUCKET SIZE **	LENGTH (In)	PROJECTION (In)	DEPTH (In)	X-X (WATER LEVEL) CAPACITY ft³	Y-Y (100% FILL) CAPACITY ft³	EMPTY WT.* (lb)		
						10GA	3/16"	1/4"
8 X 5 X 7	8	5	7 3/4	.04	.07	6.30	8.70	-
10 X 5 X 7	10	5	7 3/4	.05	.09	7.40	10.20	-
10 X 7 X 11	10	7	11 5/8	.103	.180	11.90	16.50	-
12 X 7 X 11	12	7	11 5/8	.125	.218	13.40	18.60	24.80
12 X 8 X 11	12	8	11 5/8	.163	.275	14.40	20.00	26.10
14 X 7 X 11	14	7	11 5/8	.145	.253	14.90	20.70	27.60
14 X 8 X 11	14	8	11 5/8	.190	.325	16.00	22.20	29.10
16 X 8 X 11	16	8	11 5/8	.220	.375	17.60	24.50	32.00
18 X 8 X 11	18	8	11 5/8	.250	.420	19.20	26.70	35.00
20 X 8 X 11	20	8	11 5/8	.270	.470	20.80	29.00	38.00
24 X 10 X 11	24	10	11 5/8	.512	.850	27.40	38.20	50.00

** Contact Martin for sizes not listed
* Estimated weight based on welded steel.
Price is affected by material type and thickness.

MF Buckets are not centrifugal buckets.

Style HF
Centrifugal
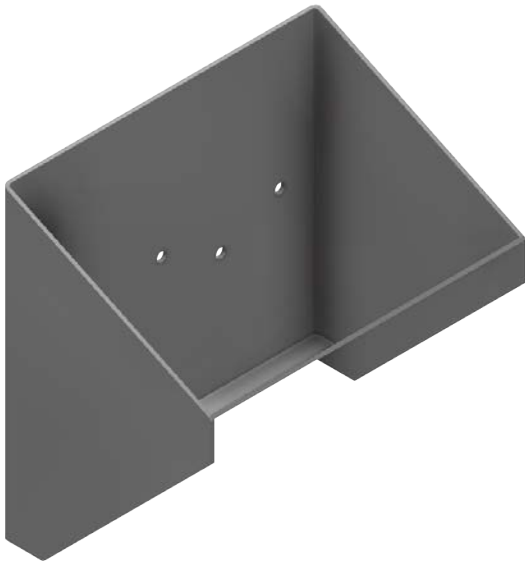
What is the Martin HF Bucket?

HF Style Elevator Buckets are continuous style with a high front place for greater capacity. Designed for slow speed product discharge, they gently handle dry, fragile, powdery, dusty, or abrasive materials. The angled front face aids in product discharge and extended side panel bottom edges create a chute to direct product pouring from the previous bucket into the discharge. Optional vent holes can provide maximum fill and product discharge. HF buckets do not "dig" material in the elevator boot (bottom) during operation. HF style buckets mount to a reinforced multi-ply elevator belt, or chain.

Some common materials of construction are mild steel, stainless steel and AR plate.

Typical Applications:

- Gypsum
- Cement
- Pellets
- Grain
- Salt
- Sand
- Aggregate
- Fertilizer
- Other Similar Granular Material

STANDARD BUCKET SIZE **	LENGTH (In)	PROJECTION (In)	DEPTH (in)	X-X (WATER LEVEL) CAPACITY ft³	Y-Y (100% FILL) CAPACITY ft³	EMPTY WT.* (lb)		
						10GA	3/16"	1/4"
8 X 5 X 7	8	5	7 3/4	.05	.08	6.20	8.50	-
10 X 5 X 7	10	5	7 3/4	.065	.100	7.30	10.00	-
10 X 7 X 11	10	7	11 5/8	.130	.190	11.60	16.00	20.90
12 X 7 X 11	12	7	11 5/8	.155	.240	13.20	18.20	23.90
12 X 8 X 11	12	8	11 5/8	.205	.295	14.30	20.00	26.00
14 X 7 X 11	14	7	11 5/8	.184	.280	14.80	20.40	26.70
14 X 8 X 11	14	8	11 5/8	.240	.350	16.00	22.40	28.10
16 X 8 X 11	16	8	11 5/8	.275	.395	17.70	24.70	32.20
18 X 8 X 11	18	8	11 5/8	.315	.453	19.20	26.28	34.67

** Contact Martin for sizes not listed
* Estimated weight based on welded steel.
Price is affected by material type and thickness.

HF Buckets are not centrifugal buckets.

What is the Martin SC Bucket?

SC style elevator buckets are continuous style for use with super capacity elevators and have increased capacity. They are designed for slow speed product discharge and very heavy materials. The angled front face aids in product discharge and extended side panels create a chute to direct product pouring from the previous bucket into the discharge. Optional vent holes can help provide maximum fill and product discharge. SC buckets do not "dig" material in the elevator boot during operation. SC style buckets mount between two strands of elevator chain.
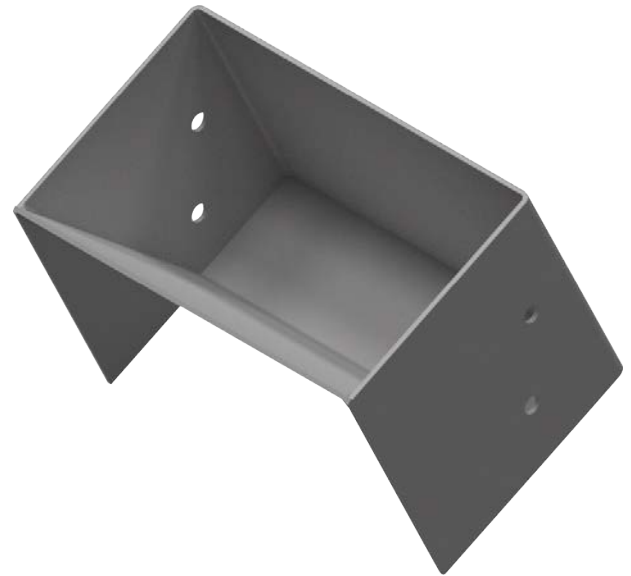
Typical Applications:

- Gypsum
- Cement
- Sand
- Fertilizers
- Clay
- Salt
- Coal
- Rocks
- Other Similar Material
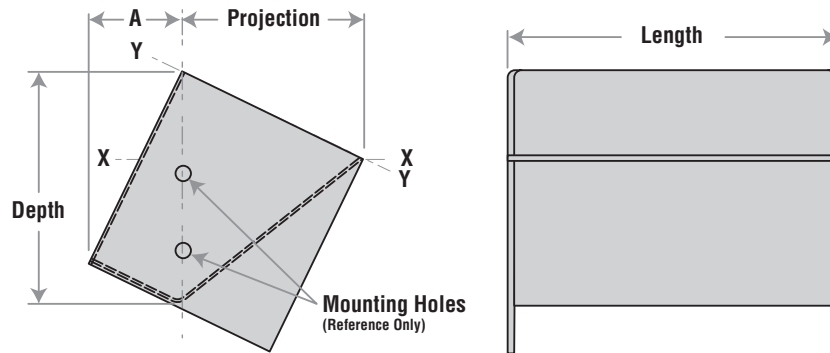
STANDARD BUCKET SIZE **	LENGTH (In)	PROJECTION (In)	BACK (A) PROJECTION (In)	DEPTH (in)	X-X (WATER LEVEL) CAPACITY ft³	Y-Y (100% FILL) CAPACITY ft³	EMPTY WT.* (lb)		
							10GA	3/16"	1/4"
12 X 8 X 11	12	8 3/4	4 9/16	11 5/8	.35	.54	22.00	29.00	39.00
14 X 8 X 11	14	8 3/4	4 9/16	11 5/8	.41	.63	23.00	31.00	41.00
16 X 8 X 11	16	8 3/4	4 9/16	11 5/8	.46	.72	25.00	34.00	45.00
16 X 12 X 17	16	12	6 1/2	17 5/8	1.11	1.55	43.00	58.00	76.00
18 X 8 X 11	18	8 3/4	4 9/16	11 5/8	.52	.81	27.00	36.00	48.00
20 X 8 X 11	20	8 3/4	4 9/16	11 5/8	.58	.90	29.00	39.00	52.00
20 X 12 X 17	20	12	4 9/16	17 5/8	1.40	1.94	49.00	67.00	88.00
24 X 12 X 17	24	12	4 9/16	17 5/8	1.68	2.33	55.00	75.00	104.00
30 X 12 X 17	30	12	6 1/2	17 5/8	2.11	2.91	65.00	88.00	117.00
36 X 12 X 17	36	12	6 1/2	17 5/8	2.53	3.49	73.00	99.00	132.00

** Contact Martin for sizes not listed
* Estimated weight based on welded steel.
Price is affected by material type and thickness.

SC Buckets are not centrifugal buckets.

Bucket Punching – Belt (CEMA Standard (Formerly P1 thru P9))
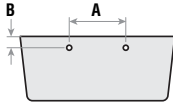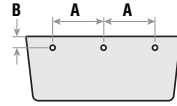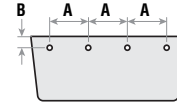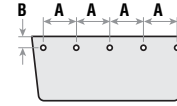
B1   B2   B3   B4
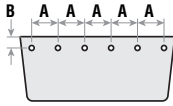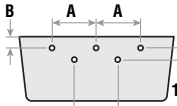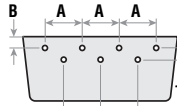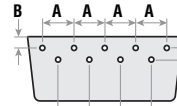
B5   B6   B7   B8

Bucket Length	Salem and Other Similar Light Buckets			
	Punch	A	B	Bolt Dia.
6	B-1	4 3/8	5/8	1/4
8	B-2	3 1/16	7/8	1/4 - 5/16
10	B-2	4 1/8	7/8	1/4 - 5/16
12	B-3	3 3/8	7/8	1/4 - 5/16
14	B-4	3	7/8	1/4 - 5/16
16	B-5	2 7/8	7/8	1/4 - 5/16
18	—	—	—	—

B7 Punching for 5⁄16" Bolts
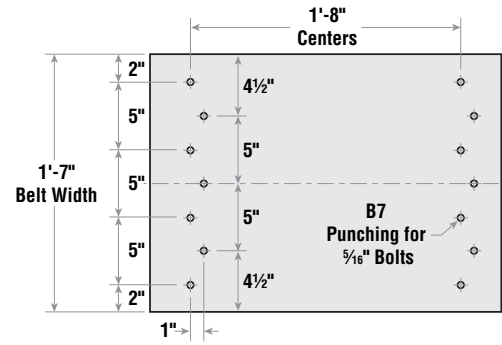
Centrifugal Bucket Belt Punching Patterns

Bucket Size	Style AA & C			
	Punch	A (In)	B (In)	** Bolts
4 X 3	B1	2 5/16	1	1/4
6 X 4	B1	4 3/8	1	1/4
8 X 4	B6	3	1	1/4
8 X 5	B6	3	1	1/4
10 X 5	B6	3 1/2	1	5/16
10 X 6	B6	3 1/2	1	5/16
12 X 5	B6	4 1/2	1	5/16
12 X 7	B6	4 1/2	1	5/16
14 X 7	B7	4	1	5/16
14 X 8	B7	4	1	5/16
16 X 7	B7	4 1/2	1	5/16
16 X 8	B7	4 1/2	1	5/16
18 X 8	B7	5	1	5/16
20 X 10	B8	4	1	5/16
24 X 10	B8	5	1	5/16

Continuous Bucket Belt Punching Patterns

Bucket Size	Style LF & MF			
	Punch	A (In)	B (In)	** Bolts
8 X 5 X 7	B6	3	3 3/8	1/4
8 X 5 X 8	B6	3	3 3/4	1/4
10 X 5 X 7	B6	3 1/2	3 3/8	5/16
10 X 7 X 11	B6	3 1/2	5 5/16	5/16
12 X 7 X 11	B6	4 1/2	5 5/16	5/16
12 X 8 X 11	B6	4 1/2	5 5/16	5/16
14 X 7 X 11	B7	4	5 5/16	5/16
14 X 8 X 11	B7	4	5 5/16	5/16
16 X 8 X 11	B7	4 1/2	5 5/16	5/16
18 X 8 X 11	B7	5	5 5/16	5/16
20 X 8 X 11	B8	4	5 5/16	5/16
24 X 10 X 11	B8	5	5 5/16	5/16

*   For bucket sizes or punching patterns not listed, contact Martin.
*   For belt punching drawings call out pattern and bolt size.
**   Bolt clearance hole diameter on metal fabricated buckets to be 1/16" larger than bolt size.

"P" to "B" Belt Punching Pattern Interchange Guide

"P" Callout	"B" Callout
P1	B1
P2	B2
P3	B3
P4	B4
P5	B5
P7	B6
P8	B7
P9	B8

Bucket Punching – Chain

E Bolt Dia.
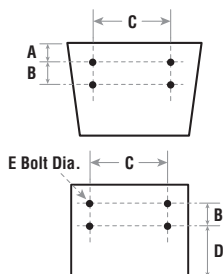
Bucket Size	High-Speed Grain			
	Punch	A	B	C
7 × 5	B2	2 11/16	1 3/4	1/4
9 × 5	B2	3 5/8	1 3/4	1/4
9 × 6	B2	3 5/8	2	1/4
11 × 6	B3	3	2	1/4
12 × 6	B3	3 3/8	2	1/4
14 × 7	B4	3	2	5/16

Consult Martin for AC and SC Bucket Punching.

Chain Number	Attachment Number	B	C	D	E
C-977	K-1	—	3	—	
C-188	K-2	1 1/4	4 3/16	2 3/4	
C-102B	K-2	1 3/4	5 5/16	2	
C-110	K-2	1 3/4	5 5/16	3 3/8	3/8
C-111	K-2	2 5/16	6 1/4	2 1/8	
SS-102B	K-2	1 3/4	5 5/16	2	
SS-110	K-2	1 3/4	5 5/16	3 3/8	

Engineering Class Steel Sprocket with C Hub

Rex Chain #	Jeffrey Chain #	Webster Chain #	# Teeth	Pitch Diameter	Chain Pitch	Hub Diameter	LTB	Max Bore	Face Width	Weight lbs.
		N102B	14	18	4	6.5	6	3.94	1.75	152
		N102B	16	20.5	4	6.5	6	3.94	1.75	190
S102B	6102R	HSB102B	10	13	4	6.5	6	3.94	1.75	92
S102B	6102R	HSB102B	14	18	4	6.5	6	3.94	1.75	152
S102B	6102R	HSB102B	16	20.5	4	6.5	6	3.94	1.75	190
S102B	6102R	HSB102B	19	24.25	4	6.5	6	3.94	1.75	260
S110	6110R	HSB110	10	19.1	6	7	6	4.44	1.75	171
			11	21.25	6	7	6	4.44	1.75	204
			13	25'	6	7	6	4.44	1.75	271
			16	30.75	6	7	6	4.44	1.75	397
ES833	6138R	HSB833	9	17.5	6	8	6	5	2.25	187
			11	21.25	6	8	6	5	2.25	260
			13	25	6	8	6	5	2.25	346
			16	30.75	6	8	6	5	2.25	507

Engineering Cast Sprocket with Hub

Rex Chain #	Jeffrey Chain #	Webster Chain #	# Teeth	Pitch Diameter	Chain Pitch	Hub Diameter	LTB	Max Bore	Weight lbs.
		N102B	14	17.98	4	7	5	4.56	110
		N102B	16	20.5	4	7	5	4.56	135
S102B	6102R	HSB102B	10	13	4	7	5	4.56	68
S102B	6102R	HSB102B	14	18	4	7	5	4.56	110
S102B	6102R	HSB102B	16	20.5	4	7	5	4.56	135
S102B	6102R	HSB102B	19	24.25	4	7	5	4.56	170
S110	6110R	HSB110	10	19.1	6	7.50	5	5	88
			11	21.25	6	7.50	5	5	121
			13	25''	6	7.50	5	5	152
			16	30.75	6	8	6	5	181

See page F-25 of Martin Catalog.

Segmented Traction Wheel Rims (Available Cast)

Rex Chain #	Jeffrey Chain #	Webster Chain #	Outside Diameter	Use Body #	Face Width	Weight
S102B	6102R	HSB102B	24	16	1.75	115
S110	6110R	HSB110	24	16	1.75	115
S111	6111M	HSB111	22	16	2.25	125
		HSB833	24	16	2.25	125
			26	20	2.25	140
ES856	6956PB	HSB956	22	16	2.75	115
ER857	6867R	HSB857A	26	20	2.75	155
			28	20	2.75	170
			30	20	2.75	185
ER859	6859R	HSB859B	24	16	3.50	165
			26	20	3.5	175
ER864	6864R	HSB864B	30	20	3.5	175
			36	20	3.5	175
ER984			42	35	3.5	235

Always specify chain number and manufacture when ordering traction wheels and sprockets
Fabricated steel rims are readily available for most chains.

Bodies (Without Bolts) – Solid – Steel

Body #	Outside Diameter	Bore Range	Length Thru Bore
MUS16	18.5	1.94 to 8.44	3.25 to 8
MUS20	22.5	1.94 to 9.94	5 to 9.5
MUS25	27.5	1.94 to 8.44	5.5 to 11
MUS35	38.0	1.94 to 8.44	5.50 to 11

Bodies (Without Bolts) – Split – Steel

Body #	Outside Diameter	Bore Range	Length Thru Bore
MUS16S	18.5	1.94 to 8.44	3.25 to 8
MUS20S	22.5	1.94 to 9.94	5 to 9.5
MUS25S	27.5	1.94 to 8.44	5.5 to 11
MUS35S	38.0	1.94 to 8.44	5.50 to 11

Bodies (Without Bolts) – Solid – Cast

Body #	Outside Diameter	Bore Range	Length Thru Bore
MUS16C	18.5	1.94 to 6.94	3.25 to 8
MUS20C	22.5	2.44 to 6.94	5 to 9.5

Bodies (Without Bolts) – Split – Cast

Body #	Outside Diameter	Bore Range	Length Thru Bore
MUS16CS	18.5	1.94 to 4.94	6.5 to 8.25
MUS20CS	22.5	1.94 to 7.44	4.375 to 11.12

Do not use traction wheels where ambient conditions are flammable

Complete Offering For Your Bucket Elevator Needs

Martin

CENTRIFUGAL DISCHARGE				CONTINUOUS DISCHARGE		
STANDARD		AC STYLE	HIGH-SPEED GRAIN	STANDARD		SUPER CAPACITY
CHAIN	BELT	BELT/CHAIN	BELT	CHAIN	BELT	CHAIN

COMPONENTS & ACCESSORIES

CONVEYOR PULLEYS	ENGINEERED CLASS SPROCKETS & TRACTION WHEELS

ELEVATOR BOLTS	ELEVATOR BELT SPLICE KITS	ASSEMBLY HARDWARE	CUSTOM SHAFTING

ELEVATOR BELTING	SHAFT SEALS	SHAFT BEARINGS	TAKE-UP FRAMES

How many Buckets do you need?
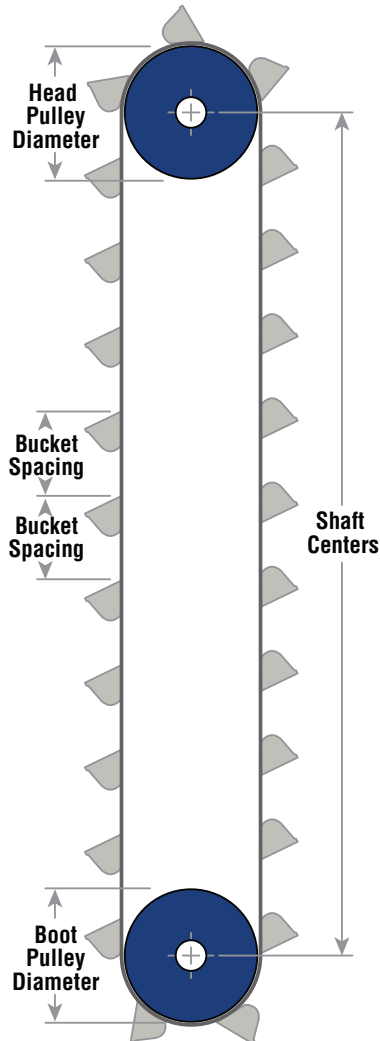
a) Calculate estimated **Vertical Length** using **Shaft Centers** distance.

Vertical Length = **Shaft Centers** x 2 = _____ **in**

b) Calculate estimated **Wrap** around pulleys/sprockets.

C_1 = **Head Pulley/Sprocket Diameter** x π = _____ **in**

C_2 = **Head Pulley/Sprocket Diameter** x π = _____ **in**

Wrap = $(C_1 + C_2) \div 2$ = _____ **in**

c) Determine the **Total Loop** of the belt/chain (in inches):

_____ **in**	+	_____ **in**	=	_____ **in**
Vertical length		**Wrap**		**Total Loop**

d) Divide the **Total Loop** of the belt/chain by the **Bucket Spacing**.

_____ **in**	÷	_____ **in**	=	_____
Total Loop		**Bucket Spacing**		**Buckets Needed**

CONVENIENT CONVERSIONS	
Cubic Inches to Cubic Feet	Divide By 1,728
Cubic Inches to Bushels	Divide By 2,150
Cubic Inches to Cubic Meters	Divide By 61,023.74
Pounds to Short Tons	Divide By 2,000
Pounds to Metric Tons	Divide By 2,204.62
π = 3.1416	

Head Pulley Diameter

Bucket Spacing

Bucket Spacing

Shaft Centers

Boot Pulley Diameter

Projection

Depth

Length
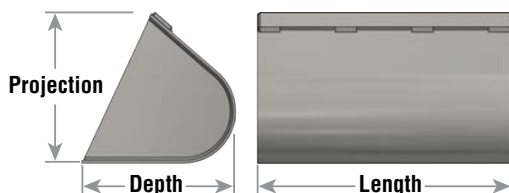
How to Measure a Bucket

See the specific bucket style page for bucket capacity. Lay the bucket on its back for easy measuring.
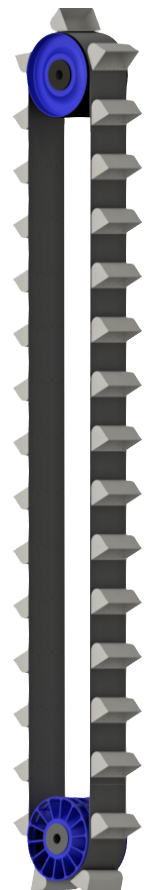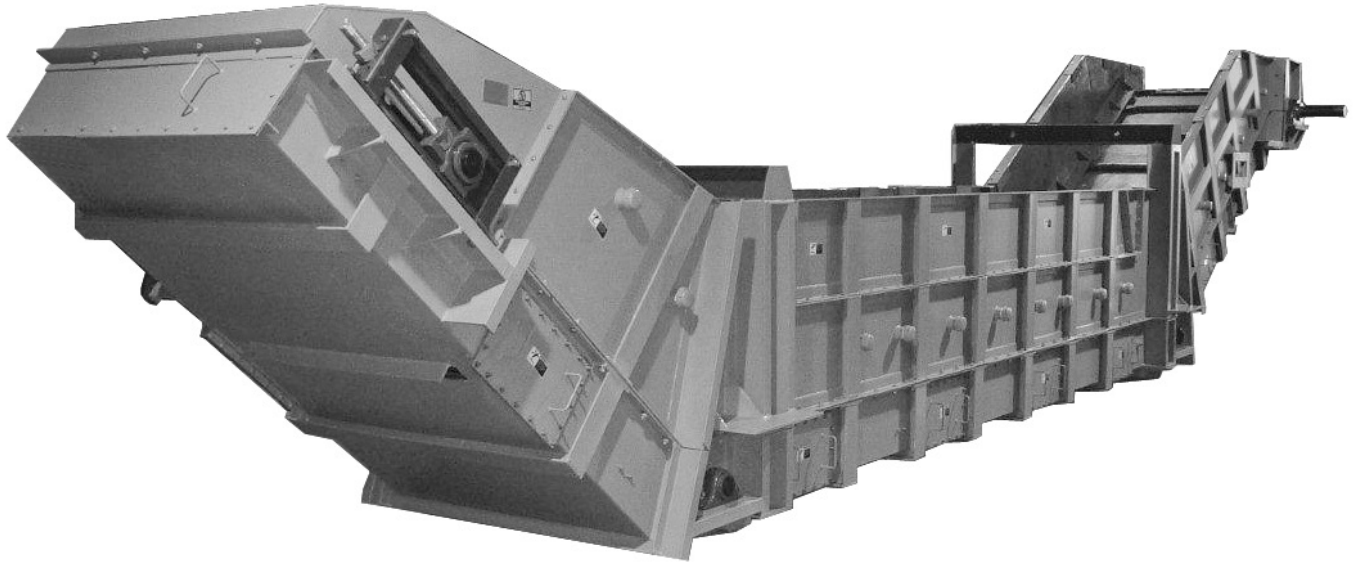
Drag
Conveyors

DRAG CONVEYORS

Martin has a long history of designing and manufacturing drag conveyors dating back more than 60 years to the Fort Worth Steel's "incline drag flight elevator".

Currently we offer a broad line of standard and made-to-order drag conveyors to meet our customer's conveying requirements, be it conveying grains or heavy abrasive materials. We have handled these materials in the horizontal, inclined and vertical planes. Martin is ready and willing to help design and manufacture the drag you need for your special application.

Martin offers flat bottom and round bottom drags for conveying relatively free flowing non- abrasive materials in a horizontal or slight incline.

Our mill duty drag conveyors were developed to handle abrasive and potentially hot materials by combining the features of our flat bottom and super duty drags with a very heavy duty construction. We have designed and manufactured submerged drags to handle ash from boilers and industrial incinerators.

Our I path line of drags was designed to handle materials at inclines greater than 20 degrees up to and including vertical. The L-path drag has also been redesigned using abrasive resistant steel liners and flights as well as a forged type chain to convey more abrasive products.

To assure the quality of our drags, Martin has invested in the latest cutting, forming and welding equipment, such as laser cutting equipment, high definition plasmas, CNC angle punches, CNC machining equipment as well as robotics. We also manufacture our own sprockets, our own take-ups and line of inspection doors.

To assure the best service and availability in the industry, Martin is able to manufacture our drag conveyors in nine locations throughout north America.

We are always driven to provide the highest quality service, products and value to our customer without compromising safety.

Easy Application Chart

Drag Type	Materials	Capacity Range	Length Range	Incline Range	Chain Type	Flight Type	Speeds Range
Martin Flat Bottom (MFB™)	Non Abrasive	2800 CFH to 32000 CFH	20' to 200'	0 to 10 degrees	Welded Steel	Non-metallic	100 to 200 FPM
Martin Mill Duty Flat Bottom (MMD™)	Abrasive	1422 CFH to 14063 CFH	20' to 250'	0 to 10 degrees	142, WD & WS	Metallic	25 to 100 FPM
Martin L/S – Flat Bottom (MLP™)	Non Abrasive	600 CFH to 15000 CFH	20' to 125'	20 to 90 degrees	WS & 142	Non-metallic	50 to 100 FPM
Martin Round Bottom (MRB™)	Non Abrasive	2000 CFH to 30000 CFH	20' to 200'	0 to 20 degrees	Welded Steel	Non-metallic	100 to 200 FPM

In all the above type drags the material should be relatively free flowing and not sticky.
Particle shape and particle size is also critical to a drags proper operation.
• The above recommendations are general in nature and specific to applications should be directed to Martin.

Flat Bottom
Drag Conveyor

2416 MFB Flat Bottom Drag

Standard Features

- Bolted replaceable bottom
- Bolted flanged cover
- UHMW flights
- Heat treated sprockets
- Rail return system
- Flow thru inlet
- Heavy-duty backing plate
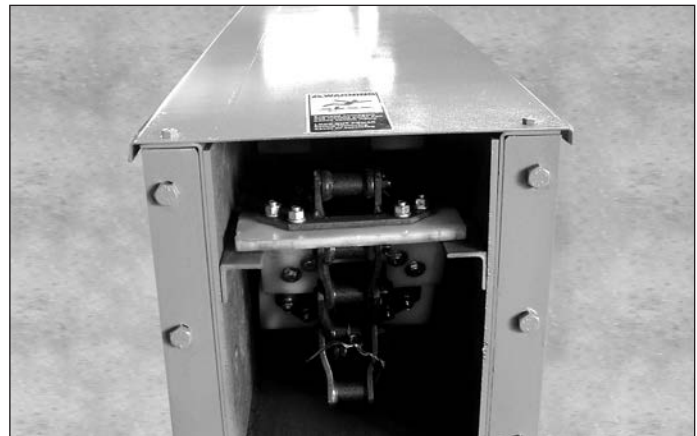
2412 MFB Intermediate
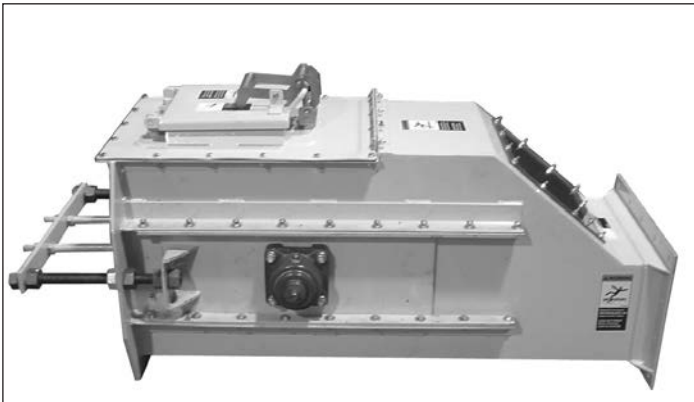
Self-Cleaning and Adjustable Tail Section

Popular Options

- Intermediate discharges
  (reduce bed depth to assure proper discharge.)
- Liners of metallic and non metallic materials
- Abrasive resistant steel bottom plates
- Feed control inlets
- Split sprockets
- Stainless steel construction
- Self-cleaning & adjustable tail sections

Capacity Chart for Standard Sizes

Series	1 FPM CFH	100 FPM CFH	100 FPM RPM	125 FPM CFH	125 FPM RPM	150 FPM CFH	150 FPM RPM	175 FPM CFH	175 FPM RPM	200 FPM CFH	200 FPM RPM
2409	54.38	5,438	27	6,798	34	8,157	40	9,517	47	10,876	54
2412	68.25	6,825	27	8,531	34	10,238	40	11,944	47	13,650	54
2414	78.75	7,875	27	9,844	34	11,813	40	13,781	47	15,750	54
2416	89.25	8,925	27	11,156	34	13,388	40	15,619	47	17,850	54
2418	96.19	9,619	27	12,024	34	14,429	40	16,833	47	19,238	54
3016	111.56	11,156	23	13,945	29	16,734	34	19,523	40	22,312	46
3018	121.13	12,113	23	15,141	29	18,170	34	21,198	40	24,226	46
3020	133.88	13,388	23	16,735	29	20,082	34	23,429	40	26,776	46
3024	159.38	15,938	23	19,923	29	23,907	34	27,892	40	31,876	46

1. Capacities based on 90% loading with a free-flowing material.
2. Selection of conveyors should be based upon the material's characteristic.
3. Capacities and speed will vary for other than free flowing materials.
Please Consult Martin if you have questions concerning your application.

Inlets

Flow Thru Inlet
Best suited for free flowing non- abrasive materials with a controlled feed rate to the drag.

Chains
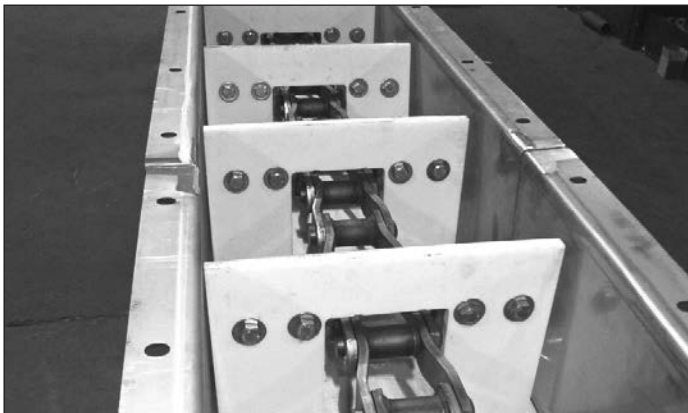
Welded Steel
Welded steel chain is our standard and can be quoted and supplied from a chain manufacture of your choice.

Bypass Inlet
Directs the flow of material to the carry strand of chain and flights.

142 Forged
Where abrasion or heat are an issue a 142 chains can be supplied. (Other chains are available.)
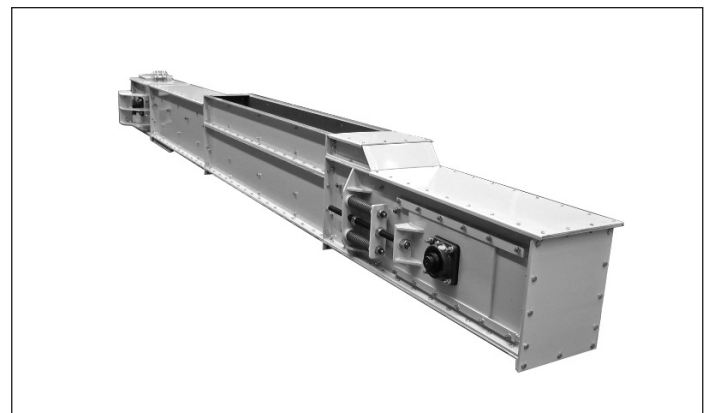
Feed Control Inlet
Allows the control of feed rates at the drag, limited to use with the flat, super duty and mill duty drags.

Mill Duty
Drag Conveyor
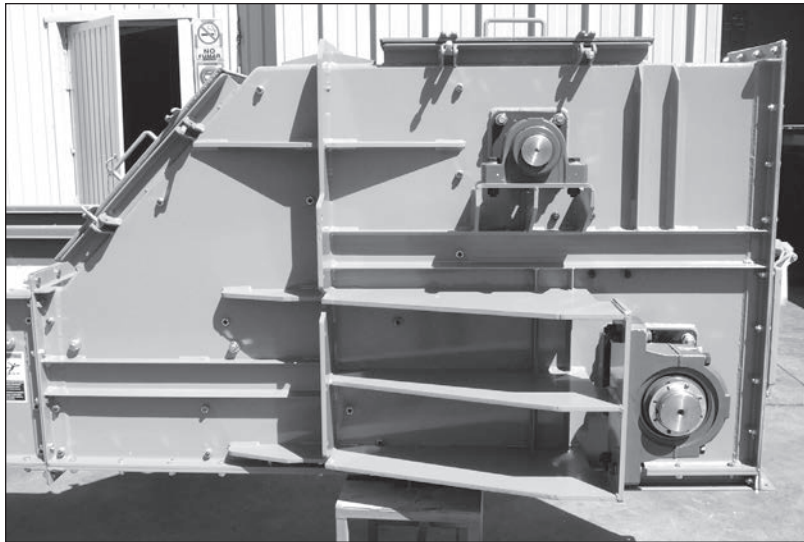
MMD Mill Duty Head with Martin Slack Side Tension Idler Sprocket

Standard Features

- Bolted replaceable bottom
- Bolted heavy flanged cover
- 142 Forged chain
- Heavy duty steel backing plates
- Non-metallic or abrasion resistant steel flights
- Heat treated split sprockets
- Center support rail return system with ar steel wear strips
- Replaceable side liners of various materials
- Flow thru inlet
- Special head section with pillow block bearings
- Heavy duty tails section with MHD take-ups and pillow block bearings
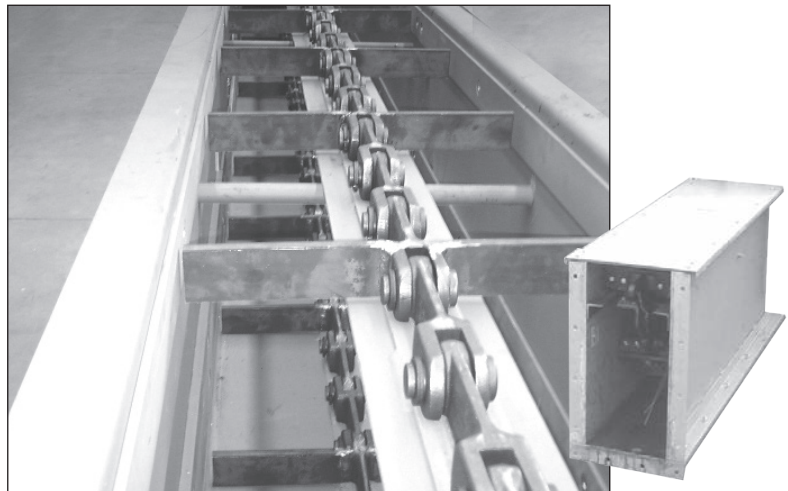
Center Support Rail Return System with AR steel Wear Strips for MMD Drag
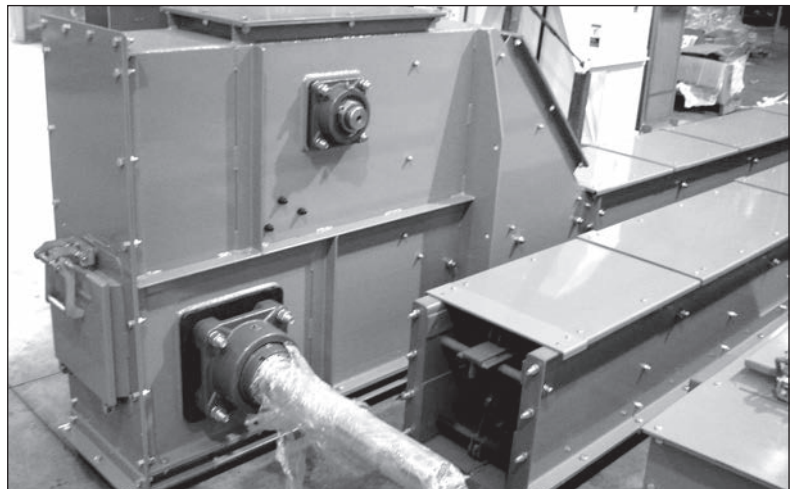
MMD Mill Duty Head and Intermediate

Mill Duty
Drag Conveyor

Mill Duty Drag

Series	FPM CFH	25 FPM CFH	50 FPM CFH	75 FPM CFH	100 FPM CFH
MD2412	57	1422	2844	4266	5688
MD2416	74	1859	3719	5578	7438
MD3020	118	2953	5906	8859	11813
MD3024	141	3516	7031	10547	14063

Popular Options

- Special chains like WDH welded steel
- Special heavy duty head section with Martin slack side tension idler sprocket assembly
- Spring loaded take-up
- Hydraulic take-up
- Stainless steel construction
- Liners of various materials both metallic and non-metallic
- Feed control inlet
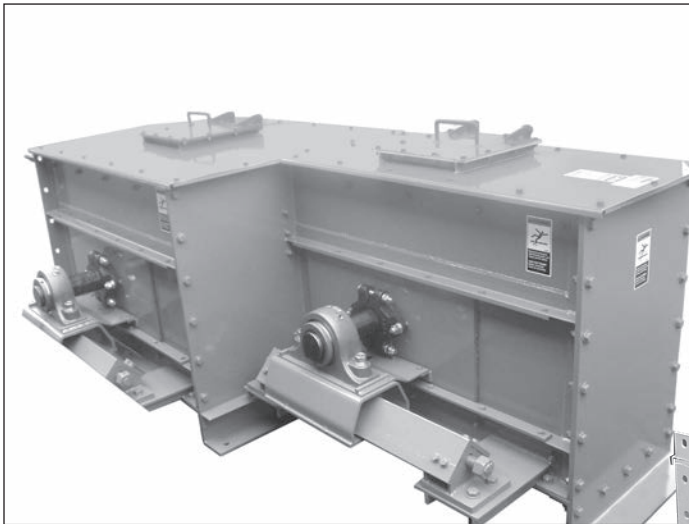
Feed Control Inlet and Spring Take-up on Martin MMD Drag
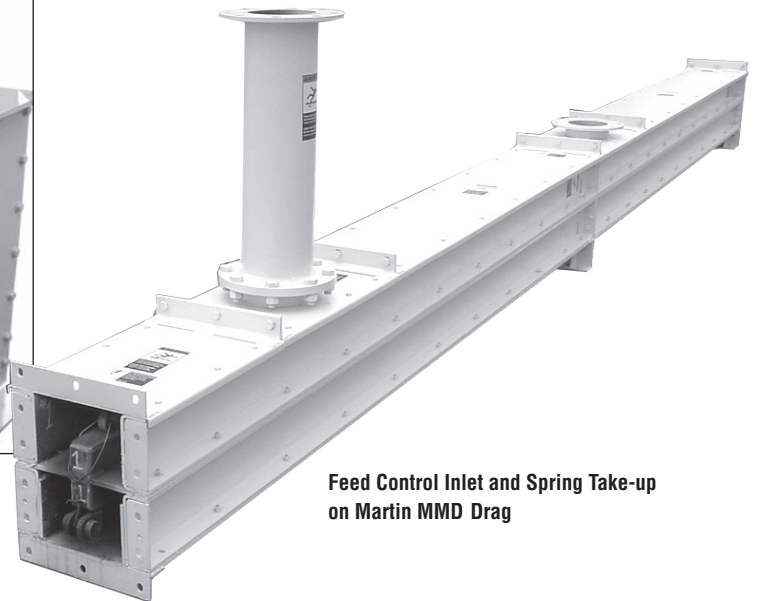
Feed Control Inlet and Spring Take-up on Martin MMD Drag
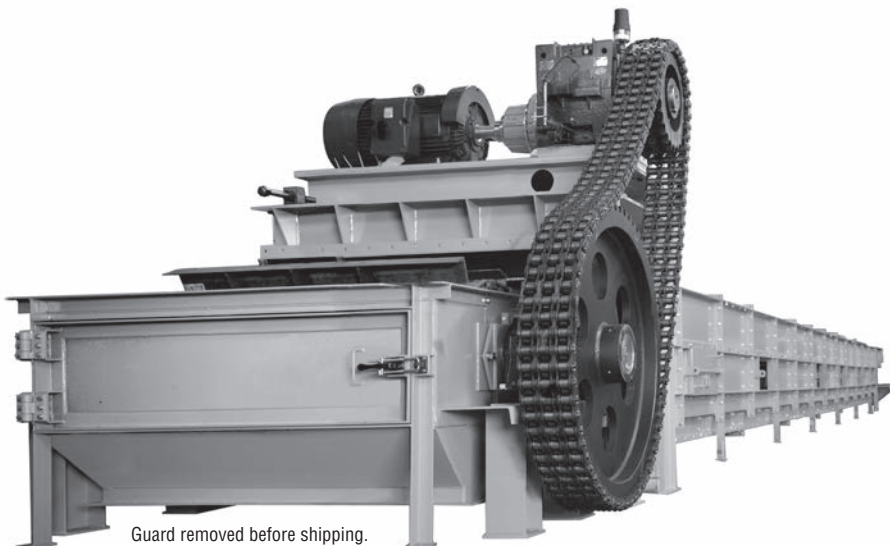
Guard removed before shipping.
Large Drag Conveyor
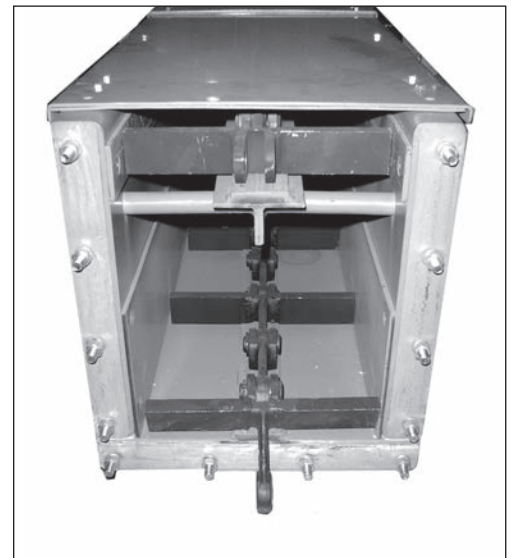
MMD Interior with 142 Chain

L-Path
Drag Conveyor
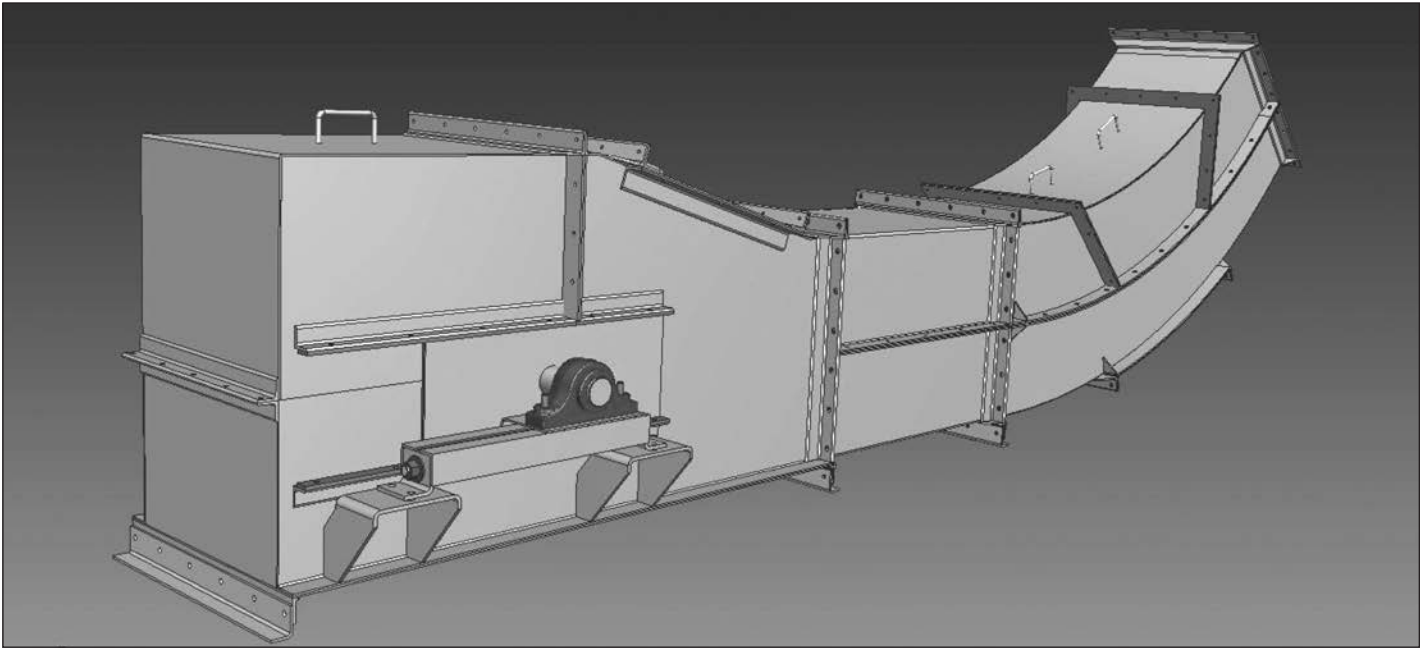
Standard Features

- Seven piece intermediate housing
- Welded steel chain
- Uhmw flights
- Martin ht and split sprockets
- Pillow block bearings
- Martin MHD take-ups
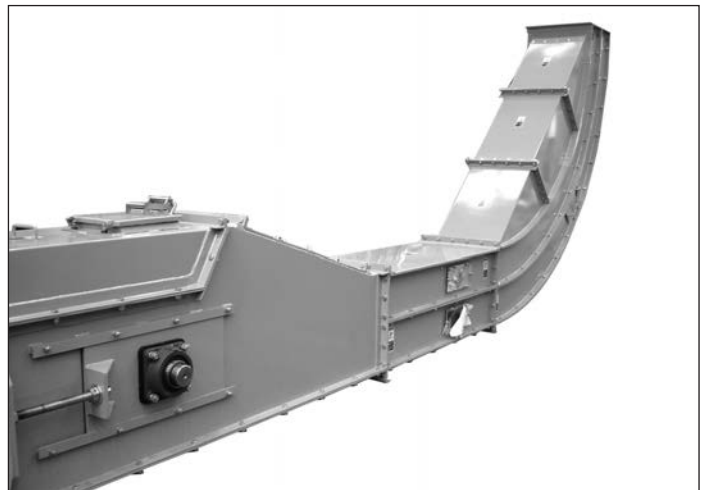
MMD Mill Duty Head and Intermediate

Popular Options

- 142 forged chain
- Mill duty type construction
- Abrasive resistant steel divider plates
- Special flight materials metallic and non-metallic
- Slack chain accommodating lower bend (45 to 90 degree)
- Upper bend section

MMD Mill Duty Head and Intermediate

L-Path Drag Capacity Chart

Series	1 FPM	50 FPM		75 FPM		100 FPM	
	CFH	CFH	RPM	CFH	RPM	CFH	RPM
MLP57	12	600	17	900	26	1200	35
MLP610	20	1000	11	1500	16 1/2	2000	22
MLP913	35	1750	8	2625	12	3500	16
MLP1020	58	2900	11	4350	16 1/2	5800	22
MLP1224	87	4350	11	6525	16 1/2	8700	22
MLP1236	129	6450	10	9675	15	12900	20
MLP1342	150	7500	10	11250	15	15000	20

Notes:
1. Capacities are based on the handling of non-abrasive materials such as –cotton seed hulls, cotton seed meal, delited cotton seed, whole grains and ground feeds.
2. CAUTION should be observed when handling fine granular materials such as- wheat flour, sugar, powdered lime, starch, carbon black and soda ash.
3. Abrasive material may be handled in the Mill Duty version of Martin's L-Path drag.

45º to 90º MLP Drag

0º to 45º MLP Drag
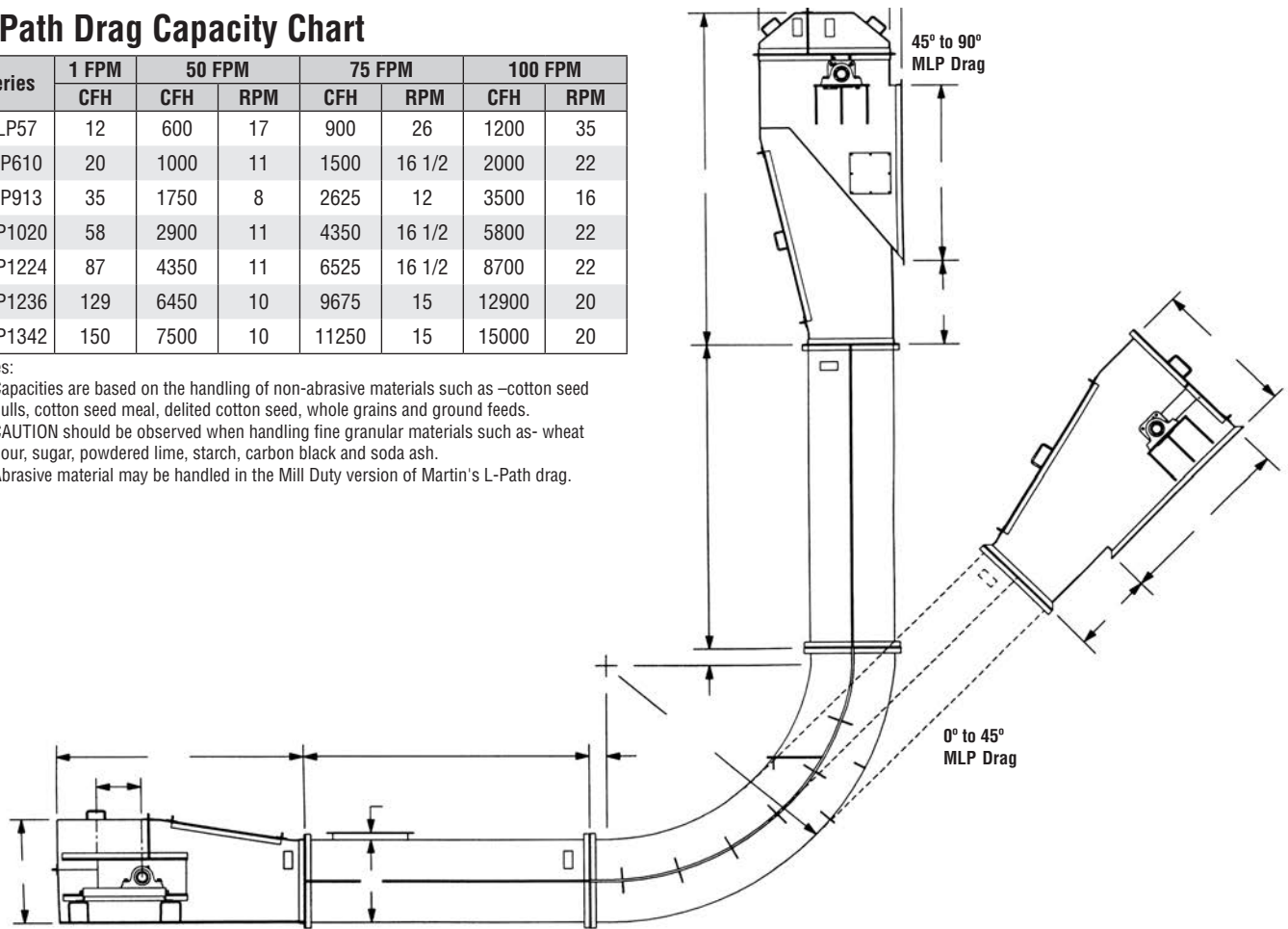
MLP Drag ready to ship

MMD Special L-Path Drag with Slack Accommodating Bend

Round Bottom
Drag Conveyor

Martin

Capacity FPM / RPM

Series	Size	100 FPM		125 FPM		150 FPM		175 FPM		200 FPM	
		CFH	RPM	CFH	RPM	CFH	RPM	CFH	RPM	CFH	RPM
900	9"	2040	33	2600	41	3050	50	3500	58	4080	66
1200	12"	3475	33	4300	41	5200	50	6075	58	6950	66
1400	14"	4750	33	5900	40	7100	50	8300	58	9500	66
1600	16"	6050	32	7600	40	9150	48	10600	56	12100	64
1800	18"	8100	32	10150	40	12300	48	14300	56	16200	64
2000	20"	10500	23	13000	29	15650	35	18200	40	21000	46
2400	24"	14800	23	18150	29	22000	35	25750	40	29600	46

1. 90% loading Capacities based on with a free-flowing material.
2. Selection of conveyors should be based upon the material's characteristic.
3. Capacities and speed will vary from other than free flowing and will be reduced if idler return is used.

Please consult Martin if you have questions concerning your application.

The Martin round bottom drag is designed with the user in mind. We have incorporated larger heat-treated sprockets into the design to reduce noise, vibration and chain chordal action while increasing chain and sprocket life. Our goal is to reduce maintenance and operating costs for the user.
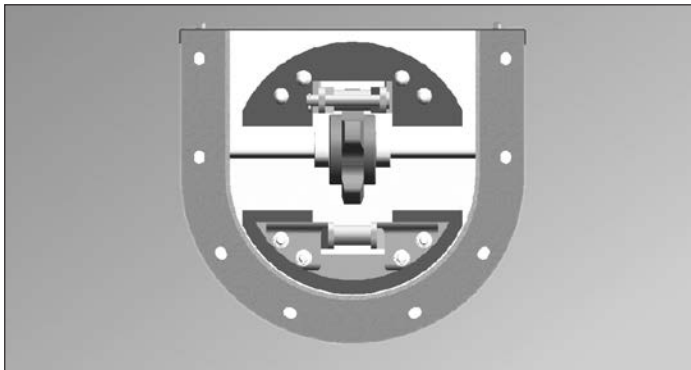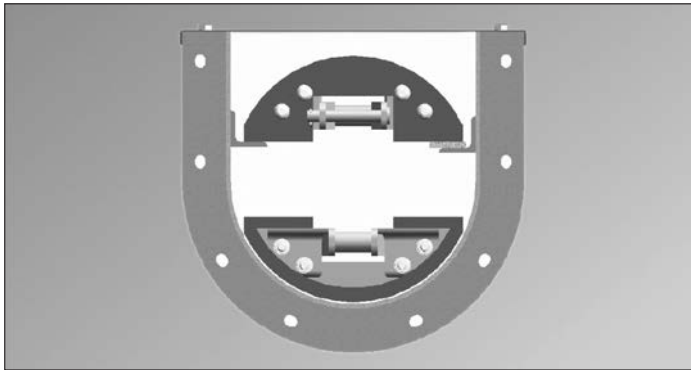
Standard Features

- Bolted flanged covers
- Welded steel chain
- Jig welded attachments
- UHMW flights with heavy duty backing plate
- Dust tight form flanged trough
- Heat treated sprockets
- Rail return system
- Flow thru inlet

Popular Options

- By-pass inlets
- Hip roof covers
- Self-cleaning tail
- Intermediate discharges
- Idler return system
- Abrasive resistant steel return wear strip
- Split sprockets
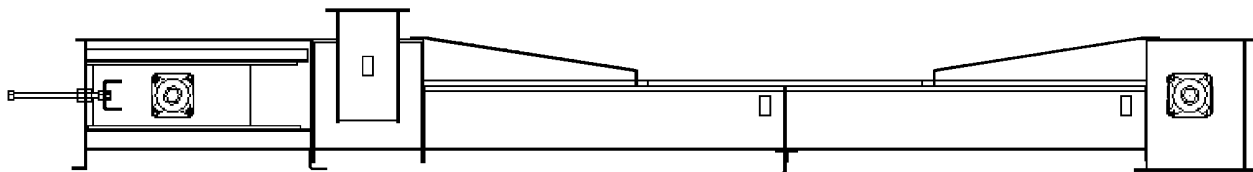
Martin Round Bottom Drag Conveyor (MRB)

Field assembly of Martin MFB™ Drag

Assembly

Return Rails

Assure all return rails are adjusted so they match up evenly at the joints; be sure to grind any burrs off the rail joints. The vertical alignment of the rails is most critical on drags having outboard return rails.

Tightening the Chain

Tightening the chain on initial startup may require the removal of several links of chain. On drags with welded steel chain there will be a 10' section of cottered chain marked at the factory by contrasting spray paint. Do not over tighten the chain; always remember that the take-up control's the chain tension on the return strand. The carrying strand is naturally in tension.

Chain tension is one of the most import aspects of maintaining your drag. Never over tighten the drag chain. The tension should be tightened till the chain is pulled or stripped from the head sprocket but no tighter. Slack side tension can be helped by the use of mechanical devices such as an slack side tension idler sprocket or stripper rail.

An under tightened chain will want to stay engaged with the head sprocket tooth and rap around the head sprocket. A catastrophic failure can be the result of an under tensioned chain. Regular chain inspection is important especially during the initial start-up period, make take-up adjustments as needed.

On **L-path drags** the best place to watch and adjust the tension is at the bottom bend section and at the tail sprocket. The slack accommodating lower bend is an especially convenient way to look at and determine the optimum tension. Adjust tension till the chain is several inches off the divider plate and moves up and down as it runs. The chain movement is a result of chordal action caused by the sprocket (much more noticeable with sprockets having less than 12 teeth). The chain should move freely but should not hit the divider plate. The chain should be snug but not tight at the tail. The chain should disengage smoothly from the head sprocket. Once the drag is running to your satisfaction, mark on the side of the sa bend near the inspection panel the

proper location of the chain so that future adjustments are easily determined. By looking through the inspection panel you can see if the chain needs adjusted or links removed. With an L-path drag of more than 30 degrees incline you control the tension from the tail to the lower bend with the take-up; gravity takes care of tension on the incline section.

On the **super duty drag** the take-up adjustment is made at the slack side tension idler sprocket in the head and at the tail. You adjust the take-ups till there is slight sag of the chain coming off the slack side tension idler sprocket, located in the head. The chain at the tail should be snug but not tight. The chain should be smoothly disengaging the head sprocket. Mark the location of the chain when it is properly tensioned on the side of the transition cover at the inspection panel near the head, making future adjustments easier.

The **flat bottom and round bottom drags** chain tension adjustment is done at the tail by tensioning the chain till it is snug but not tight, you should be able to lift the chain when the drag is not running. Observe proper lockout and tag out procedures when maintaining the drag conveyor. With the chain running confirm that the chain is disengaging the head sprocket smoothly.

The **mill duty drag**'s chain tension is either adjusted like a flat bottom drag or a super duty drag depending on the type of head section your drag is furnished with.

Sprocket Alignment

Assure that the sprocket is located in the center of the head and tail sections. Also check that all set screw or set collars are correctly tightened. Assure the sprockets are in alignment with each other, a laser is a useful tool to check sprocket alignment.

Lubrication

Assure that all bearings are properly lubricated with the manufacture's specified lubricant.

Assure all drives have the correct and adequate oil.

Drag Conveyor Maintenance Tips

Weld Steel Chain and MFB Tail™

Sprocket Wear

Common Operating Mistakes

Over Tightening the Chain

Over tightening the chain is the most common mistake and will cause accelerate chain and sprocket wear. Over tightening of the chain can also increase the wear of the drag flights, reduce bearings life and can cause damage to the shafts. It is better to slightly under tighten the chain than over tightening the chain.

Uneven Take-up Adjustment

Always adjust the take ups evenly and when the drag is not running. Uneven adjustment of the chain can cause accelerated chain, sprocket and flight wear. Uneven adjustment of the take ups may cause the chain to run to one side of the trough causing accelerated trough wear. It may be necessary to use the take up to get chain to run straight but should be minimized and can be an indication of an installation issue.

Not Checking Chain Wear

Set up and follow a preventative maintenance plan that includes regular inspection of the chain for stretch/wear. Chains tend to wear in during the initial operation of the chain so need to be inspected more often during the first 3 months of operation. Adjust the take-ups or remove chain links as needed to maintain proper tension.
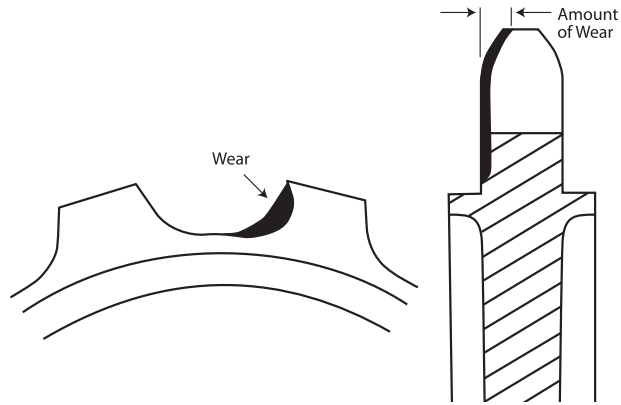
Maintenance Tips

Chain Wear

Conveyor chain stretch is commonly used to identify when a drag chain is worn out. It is usually described as a percent of stretch and a commonly used range is 4% to 6% but it is Martin's recommendation that the user contact the chain manufacturer for their recommendation.

When replacing the drag chain it is Martin's recommendation to also replace the sprockets.

Sprocket Wear

As sprockets are worn, the drag chain tends to "cling" to the sprockets or vibrate. The amount of allowable wear is dependent on the chain type and chain size. Wear of between .12" to .24" is a good sign that the existing sprocket needs replaced. The wear appears in the root of the sprocket tooth.

Wear on the side of the tooth is an indication that the alignment of the sprockets may be incorrect. The wear may be an indication that the take-ups are not evenly adjusted or that sprockets are not in alignment. The mis-alignment can be caused by the shaft walking in the bearing or the sprocket moving caused by the set screw being loose. It is also important to assure that the shafts are parallel to each other.

Flight Wear

Accelerated flight wear can have several causes but the most common is the high material temperature. Material temperatures are most critical when dealing with non-metallic flights. It is important to check flight wear whenever your process has changed. Chain speed is always a component of flight wear and slower is better when wear is an issue. The chain tension should be checked if flight wear becomes an issue.

Anytime your process or the material changes it may have an effect on flight wear, chain wear and sprocket wear.

Make sure you have and follow a regular preventative maintenance inspection plan that is based on your operating conditions.

Assure you have a Safety Program that includes a Lockout/ Tag out Program.
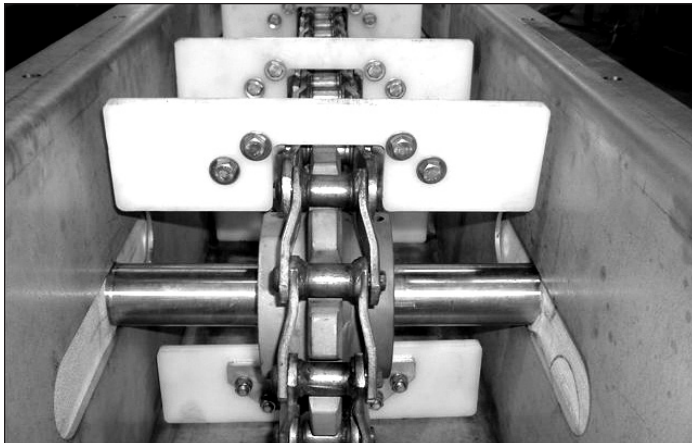
Welded Steel Chain and Sprocket

All welded steel sprockets are heat treated and most can be offered split or with segmented rim for easier replacement. All sprockets can be supplied with a shear pin hub where needed.
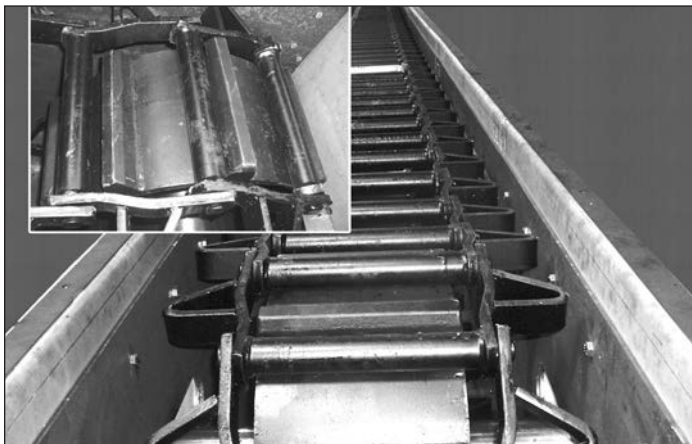
Wide Face Drag Sprockets

Wide face drag sprockets are available for chain numbers 102, 104, 120, 480, etc.

Wide face drag sprockets are available in QD, or MST style — induction heat treat available.

Stainless Steel Sprocket

Wide Face Sprocket with Forged Teeth

Cast Steel Sprocket

Segmented Rim Cast Sprockets

Cast Wide Face Traction Wheel

Cast Iron & Steel Sprockets

- Cast split sprockets
- Hunting tooth sprockets
- Rivetless chain sprocket
- Drag chain sprockets (plain & flanged)
- Traction wheels (plain & flanged)
- Plate body sprockets
- Chain saver rim sprockets
- Adjustable hub sprockets
- Chill rim sprockets

Vertical Screw Elevator

VERTICAL SCREW ELEVATOR   **PAGE**

Martin Screw Elevators

For over fifty years, Martin standard screw elevators have been successfully elevating a wide range of materials. In 1956, we added the heavier duty superscrew elevator, giving our customers the ability to elevate larger capacities to greater heights.

The Martin screw elevator is ideally suited to elevate a wide range of bulk materials in a relatively small space. If a material can be classified as very free flowing or free flowing, it can probably be elevated in a crew elevator.

We offer both our standard and superscrew elevators with several different drive arrangements to meet our customers' individual requirements. Martin has an experienced staff in over twenty locations throughout the u.S.A. And canada that can help you design the right screw elevator for your application. We have the capability of manufacturing our screw elevators in six locations in the U.S.A.

Contact your nearest Martin facility with your application information and we will design the right elevator for your needs.

Partial Material List

- Alfalfa Meal
- Barley, Malted
- Bone Meal
- Cement
- Coffee
- Corn Meal
- Cotton Seed
- Cryolite
- Flours
- Grains
- Hops
- Ice
- Kaolin Clay
- Lead Oxide
- Lime
- Malt
- Mica
- Milk, Dried
- Mixed Feeds
- Mustard Seed
- Oats
- Paper Pulp
- Peanuts
- Resin
- Rubber, Ground
- Salt
- Sawdust
- Screened Wood Chips
- Shellac, Powder
- Soda Ash
- Soybean Meal
- Sugar
- Sunflower Seeds
- Tobacco
- Wheat
- Wood Flour

**Type 4
Superscrew Elevator**

*Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

Martin Screw Elevators

To help better meet the needs of our customers, we offer both the Martin standard and superscrew elevators in sixteen different types. The different types allow us to vary the drive location, discharge location and feed arrangement. We are also able to drive the feeder or take-away conveyor by the screw elevator drive.

The Martin screw elevators are easy to install because they are factory assembled, match-marked and disassembled prior to shipment. All Martin screw elevators are of a sturdy self-supporting design and only need lateral support when installed.

The drives for the Martin standard and superscrew elevators are manufactured by Martin and are specifically designed for use with our screw elevators. We can also offer a screw conveyor drive arrangement for lighter duty applications.

Super Screw Elevator Types

Type 1	Type 2	Type 4	Type 5	Type 6	Type 8
Straight Inlet Top Drive, Pedestal Base	Offset Inlet Top Drive, Pedestal Base	Offset Inlet Top Drive, Bottom P.T.O. With Drive	Straight Inlet Bottom Drive, Thrust Head	Offset Inlet Bottom Drive, Thrust Head	Offset Inlet Bottom Drive, Thrust Head With Drive
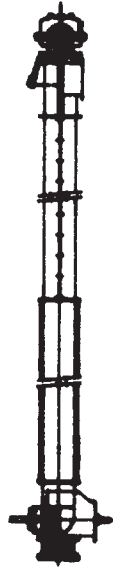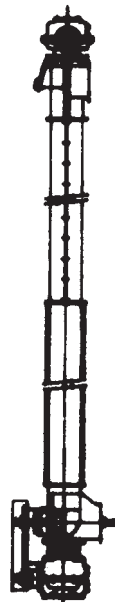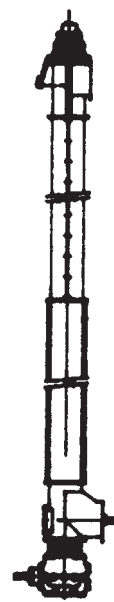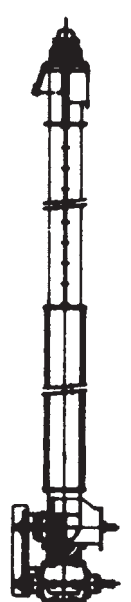
NOTE: All elevators are furnished less feeder and/or feeder drive unless otherwise specified.

CAUTION: Never operate without covers and guards. Always LOCKOUT/TAGOUT electrical power when working on equipment for inspection, cleaning, maintenance, or other purposes.

Screw
Elevator

Standard Screw Thrust Unit

**Stabilizer Bearing Used on
Standard Screw Elevator**
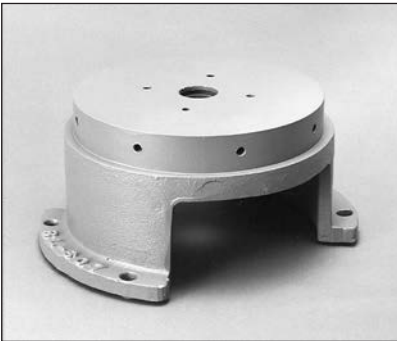
Standard Screw Pedestal Base

Standard Screw Thrust Head

All Martin screw elevators come with heavy duty helicoid or sectional screws which are checked for straightness and run-out to ensure a smooth running elevator. When handling free flowing material, we add stabilizers as needed, as the height of the elevator increases. The stabilizer bearings are available in a wide range of bearing materials to meet our customers' requirements, including wood, hard iron, bronze, uhmw, and others.

Both the Martin standard screw and superscrew elevators are supplied with split intermediate housing to allow easier maintenance.

Martin's specially engineered inlet/bottom section assures a smooth transfer to conveyed material from the horizontal to vertical with a minimum of back-up and product degradation.

The bottom inspection panel is bolted to minimize any product leakage. It also has a shroud to assure that the conveyed material is moving smoothly through the area.

The drives for both the standard screw and the superscrew elevator are manufactured by Martin to guarantee their quality and availability.

Clearance Between Screw and Housing

Size	Type of Housing	Clearance	Standard Screw Elevator			Superscrew Elevator		
			Intermediate	Top and Bottom Sections	Screw	Intermediate	Top and Bottom Sections	Screw
6	Standard Clearance	1/2	14	14	6H304	14	10	6H304
	Close Fitting Clearance	1/4	14	14	6.5S312*	14	10	6.5S312*
9	Standard Clearance	1/2	12	12	9H306	12	3/16	9H306
	Close Fitting Clearance	1/4	12	12	9.5S312*	12	3/16	9.5S312*
12	Standard Clearance	1/2	10	10	12H408	10	3/16	12H408
	Close Fitting Clearance	1/4	10	10	12.5S412*	10	3/16	12.5S412*
16	Standard Clearance	1/2	–	–	–	10	3/16	16H610
	Close Fitting Clearance	1/4	–	–	–	10	3/16	16.5S612*

* Close clearance sectional screws supplied as required.

The Martin standard screw elevator is designed to handle under normal conditions, capacities ranging from 360 cfh to 3600 cfh in 6" dia., 9" Dia., and 12" dia. Sizes. With complete information, Martin engineering staff can help you design the right screw elevator for your application.

Martin Standard Screw Elevator Speed / Capacity

Clearance Between Screw and Housing

Size	Vertical Shaft Diameter	Ratio Top Drive	Ratio Bottom Drive	▲ Recommended Minimum and Maximum Speeds			RPM Horizontal Feeder Screw 45 Percent Loading	Capacity Cubic Foot per Hour
				Vertical Screw	Input Top Drive	Input Bottom Drive		
6	1 1/2	2:1	1.4:1	200	400	280	165	360
				215	430	301	177	400
				275	550	385	226	500
9	1 1/2	2:1	1.4:1	170	340	238	139	1100
				200	400	280	163	1300
				230	460	322	187	1500
12	2	2:1	2:1	155	310	310	147	2700
				165	330	330	156	3000
				200	400	400	189	3600

▲ For speeds in excess or less than shown, consult Martin.

The standard screw elevator drive unit will function efficiently with the elevator erected at any angle of incline from horizontal to vertical. The input shaft can be driven in either direction, and the input shaft extension may be used to drive a horizontal feeder or discharge conveyor.

Both top and bottom drives are required when the elevator, feeder and discharge conveyor are all driven from one power source. A top drive and pedestal base are used when the elevator and discharge conveyor are driven from one source. A bottom drive and thrust unit are necessary if the elevator and feeder are driven from one power source. The drives are designed and constructed to withstand all radial and thrust loads and support the entire weight of a fully loaded elevator.

	Ratio			B																T Bolts		U	V
Size	Top Drive	Bottom Drive	A	Top Drive	Bottom Drive	C	E	F	G	H	J	L	M	N	P	Q	R	S	No. Rec'd	Size	B & BO	All Other Types	All Types
6*	2:1	1.4:1	1 1/2	2	1 1/2	5	13 1/2	14	15 1/4	7 5/8	4 15/16	7	4 1/4	4 1/2	11 11/32	3 3/8	3 13/16	13 1/4	4	3/8 - 16 NC	16 7/8	23 1/8	6 5/8
9	2:1	1.4:1	1 1/2	2	1 1/2	5	13 1/2	14	15 1/4	5	4 15/16	10	4 1/4	4 1/2	11 11/32	3 3/8	3 13/16	13 1/4	8	3/8 - 16 NC	21 1/2	27 3/4	8 3/4
12	2:1	2:1	2	2	2	5	13 1/2	14	15 1/4	4 7/8	4 15/16	13	5	5 9/16	14 7/16	3 7/8	4 9/16	13 1/4	8	1/2 - 13 NC	26	31 3/4	12 3/4

*2 5/8" lg. adapter for 6" head not illustrated.
Note: Dimensions not certified for construction.
Dimensions in Inches

CAUTION: Never operate without covers and guards. Always LOCKOUT/TAGOUT electrical power when working on equipment for inspection, cleaning, maintenance, or other purposes.

The Martin superscrew elevator is designed to handle capacities ranging from 360 CFH to 7000 CFH in 6" dia., 9" dia., 12" dia., and 16" dia. sizes.

Martin Superscrew Elevator Speed / Capacity

Size	Vertical Shaft Diameter	Ratio Top Drive	Ratio Bottom Drive	▲ Recommended Minimum and Maximum Speeds			RPM Horizontal Feeder Screw 45 Percent Loading	Capacity Cubic Foot per Hour
				Vertical Screw	Input Top Drive	Input Bottom Drive		
1	2	3	4	5	6	7	8	9
6	1 1/2	2:01	2:01	200	400	400	165	360
				215	430	430	177	400
				275	550	550	226	500
				330	660	660	272	600
				Up to 425	Up to 850	Up to 850	★	★
9	2	2:01	2:01	170	340	340	139	1100
				200	400	400	163	1300
				230	460	460	187	1500
				240	480	480	196	1600
				Up to 425	Up to 850	Up to 850	★	★
12	2 7/16	2:01	2:01	155	310	310	147	2800
				165	330	330	156	3000
				200	400	400	189	3600
				210	420	420	199	3800
				Up to 425	Up to 850	Up to 850	★	★
	2 7/16★ 3	2.06:1	2.06:1	155	319	319	151	2800
				165	340	340	161	3000
				200	412	412	195	3600
				210	433	433	205	3800
				Up to 425	Up to 876	Up to 876	★	★
16	3	2.06:1	2.06:1	138	284	284	132	6000
				150	309	309	144	6500
				161	332	332	155	7000
				Up to 425	Up to 876	Up to 876	★	★

★ Consult Martin.
▲ For speeds in excess or less than those shown, consult Martin.
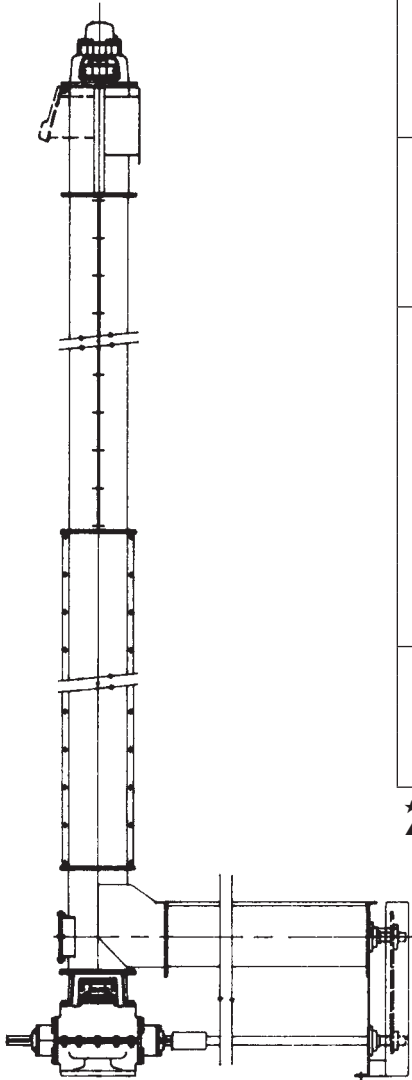
Type 7 Superscrew Elevator
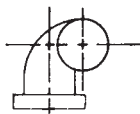
Elevator Offset to the Right of Inlet
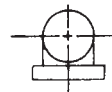
Straight Inlet
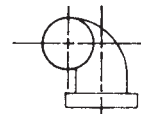
Elevator Offset to the Left of Inlet

CAUTION: Never operate without covers and guards. Always LOCKOUT/TAGOUT electrical power when working on equipment for inspection, cleaning, maintenance, or other purposes.

Superscrew Elevator

Superscrew Elevator D.S.D (Dry Shaft Drive)
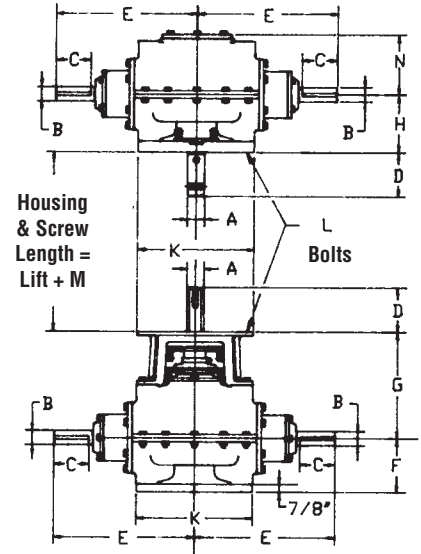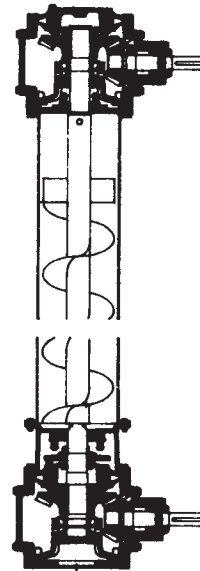
DSD (Dry Shaft Drive) is a completely new design and construction concept especially developed to enable the Superscrew Elevator to broaden the application of screw elevators.

The DSD unit is designed to meet special conditions encountered in vertical installations and may be installed in the range of 70° to 90° incline. If a smaller angle of incline is required, special units may be furnished.

A patented lubrication system precisely "meters" the proper amount of lubricant to those points where needed with no danger of damaging seals.

DSD units may be furnished at both the top and the bottom of the elevator. The top drive incorporates special design features to assure that no lubricant may pass into the elevator to contaminate the material being elevated. In the bottom drive unit other special features prevent entrance of foreign material into lubricant.

Housing & Screw Length = Lift + M

DSD units may also be furnished at the top only with a pedestal base or at the bottom only with a thrust head.

The compactness of the DSD requires a minimum of head room providing maximum lift with minimum overall elevator height.

DSD units are sturdily constructed to withstand all radial and thrust loads encountered and to support the entire weight of elevators and materials handled.

Size	Ratio	A	B	C	D Top	D Bottom	E	F	G	H	K	L No.	L Size	M
6	2:1	1 1/2	1 5/8	4	4 3/4	5	16	6 1/8	12	7 1/2	10 1/8	8	3/8	12 1/4
9	2:1	2	1 5/8	4	4 3/4	5	16	6 1/8	12	7 1/2	13 1/4	8	3/8	13 1/4
12	2:1	2 7/16	1 5/8	4	4 7/8	5	16	6 1/8	12	7 1/2	16 1/4	8	1/2	18 1/4
	2.06:1	2 7/16	1 5/8	4 1/4	4 7/8	5	18.1	6 7/8	12 5/8	7 1/4	17 1/4	8	1/2	18 1/4
	2.06:1	3	2 3/16	4 1/4	5	5	18.1	6 7/8	12 5/8	7 1/4	17 3/8	8	1/2	18 1/4
16	2.06:1	3	2 3/16	4 1/4	5	5	18.1	6 7/8	12 5/8	7 1/4	20 1/4	12	1/2	241 /4
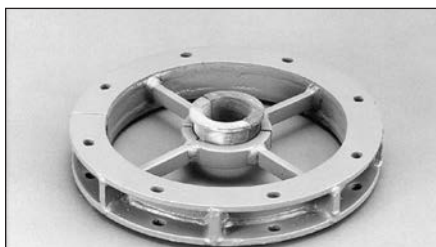
Spider Type Stabilizer Used on Superscrew

Superscrew Thrust Head

Superscrew Pedestal Base

H-173
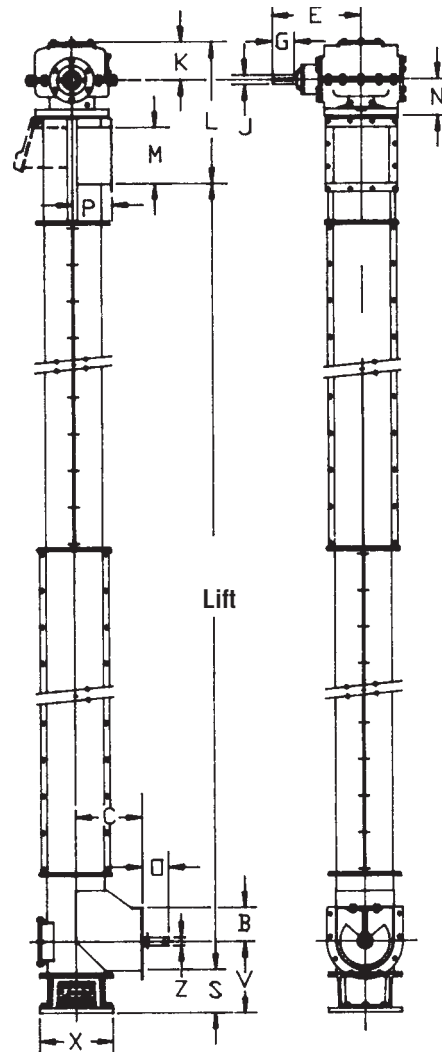
Type 1

Size of Elevator	Vertical Shaft Diameter	Ratio	B	C	E	G	J	K	L	M	N	O	P	S	V	X	Z ◇
6	1 1/2	2:1	4 1/2	10 1/2	16	4	1 5/8	6 3/4	26 3/4	7	6 1/2	4 3/4	5	8 3/8	11 7/8	13 1/4	1 1/2
9	2	2:1	6 1/8	12	16	4	1 5/8	6 3/4	28 1/4	10	6 1/2	4 3/4	7 1/8	7 7/8	12 7/8	13 1/4	1 1/2
12	2 7/16	2:1	7 3/4	15	16	4	1 5/8	6 3/4	32 1/4	13	6 1/2	4 3/4	8 7/8	8 7/8	15 3/8	13 1/4	2
	○2 7/16	2.06:1	7 3/4	15	18.1	4 1/4	2 3/16	7 15/16	34 3/8	13	7 1/4	4 3/4	8 7/8	9	15 1/2	17 3/8	2
	3	2.06:1	7 3/4	15	18.1	4 1/4	2 3/16	7 15/16	34 3/8	13	7 1/4	4 3/4	8 7/8	9	15 1/2	17 3/8	2
16	3	2.06:1	10 5/8	20	18.1	4 1/4	2 3/16	7 15/16	39 7/8	17	7 1/4	5	11 1/8	9 1/2	18	17 3/8	3

CAUTION: Never operate without covers and guards. Always LOCKOUT/TAGOUT electrical power when working on equipment for inspection, cleaning, maintenance, or other purposes.

Note: Dimensions not certified for construction.

Lift
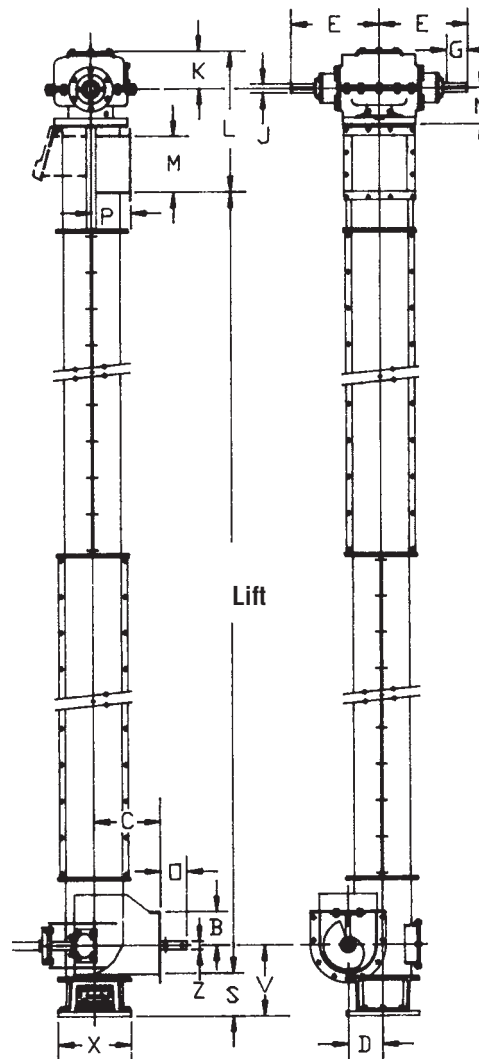
Normally Furnished Offset to the Left

Type 2

Size of Elevator	Vertical Shaft Diameter	Ratio	B	C	D	E	G	J	K	L	M	N	O	P	S	V	X	Z ◇
6	1 1/2	2:1	4 1/2	10 1/2	4 3/4	16	4	1 5/8	6 3/4	23 3/4	7	6 1/2	4 3/4	5	8 3/8	11 7/8	13 1/4	1 1/2
9	2	2:1	6 1/8	12	6 1/4	16	4	1 5/8	6 3/4	25 1/4	10	6 1/2	4 3/4	7 1/8	7 7/8	12 7/8	13 1/4	1 1/2
12	2 7/16	2:1	7 3/4	15	8	16	4	1 5/8	6 3/4	29 1/4	13	6 1/2	4 3/4	8 7/8	8 7/8	15 3/8	13 1/4	2
	○2 7/16	2.06:1	7 3/4	15	8	18.1	4 1/4	2 3/16	7 15/16	31 3/8	13	7 1/4	4 3/4	8 7/8	9	15 1/2	17 3/8	2
	3	2.06:1	7 3/4	15	8	18.1	4 1/4	2 3/16	7 15/16	31 3/8	13	7 1/4	4 3/4	8 7/8	9	15 1/2	17 3/8	2
16	3	2.06:1	10 5/8	20	10 1/2	18.1	4 1/4	2 3/16	7 15/16	36 3/4	17	7 1/4	5	11 1/8	9 1/2	18	17 3/8	3

Dimensions in Inches
◇ Horizontal coupling diameter may vary upon length of feeder.
○ Consult Martin before using.

CAUTION: Never operate without covers and guards. Always LOCKOUT/TAGOUT electrical power when working on equipment for inspection, cleaning, maintenance, or other purposes.

Note: Dimensions not certified for construction.

Modular
Plastic Screw

Another Martin Patented Innovation!
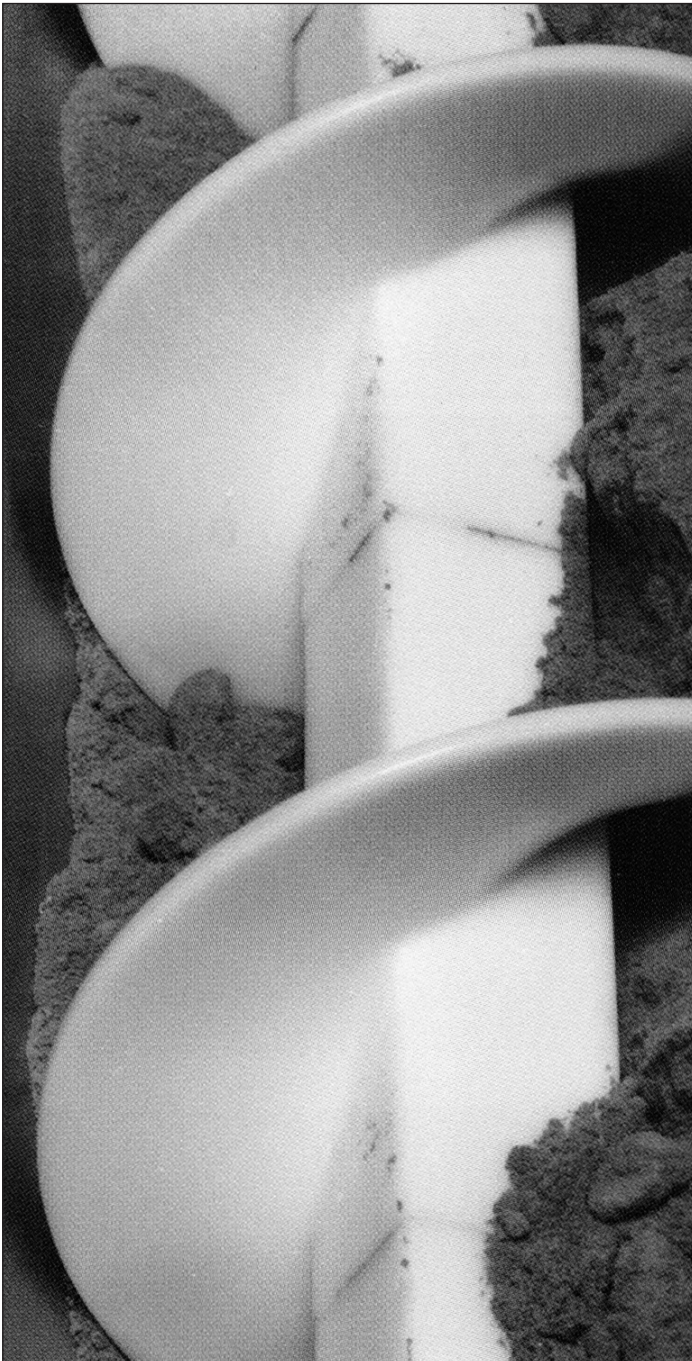
Popular Options

- Plastic modules consist of a helical flight spiraling once around a hollow square hub.

- Eliminates need to spot or continuously weld metal flights to shaft.

- Polyurethane - used where impact/abrasive wear is a problem. Lab tests show it up to 3 times more wear resistant than carbon or stainless steel in certain applications.

- All-plastic material does not corrode, is impervious to acids, caustics and other chemicals.

- Durable, lightweight injection-molded modules stack on square tube.

- Polypropylene - general purpose material for high temperature service.

- FDA approved for food contact.

- Highly resistant to corrosion.

- Modules are individually replaceable without welding or burning.

- Assembled conveyor is comparatively lightweight, easier to handle, and bearing life is prolonged.

- Polyethylene - general purpose material. FDA approved for food contact.

- Good abrasive and excellent corrosion resistance in a wide temperature range.

- Slick surface simplifies cleaning.

*Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

Martin Solutions to Screw Conveyor Problems

- Available in 6", 9" and 12" diameters, with right hand flights.

- Assembled conveyors compatible with CEMA standards; easily retrofitted.

- Flight modules available in polyethylene, polypropylene, and polyurethane, each with characteristics to fill specific needs (see technical data).

- Flights and hubs are integrally molded, resulting in consistent diameter, pitch and thickness with a uniform, smooth finish.

- Plastic modules eliminate metal contamination to food.

- Assembled conveyor is light in weight, is safe and easy to handle; bearing life is prolonged.

- Plastic flights may operate at close clearances, or when conveying many materials, directly on the trough without danger of metal contamination.

- Modules are individually replaceable.

- Balance is excellent allowing high speed operation.

A. All-plastic screw module
B. Square metal tube
C. Standard coupling tail and drive shaft
D. Retainer ring and washer
E. Recessed thrust pin
F. Close coupling shaft
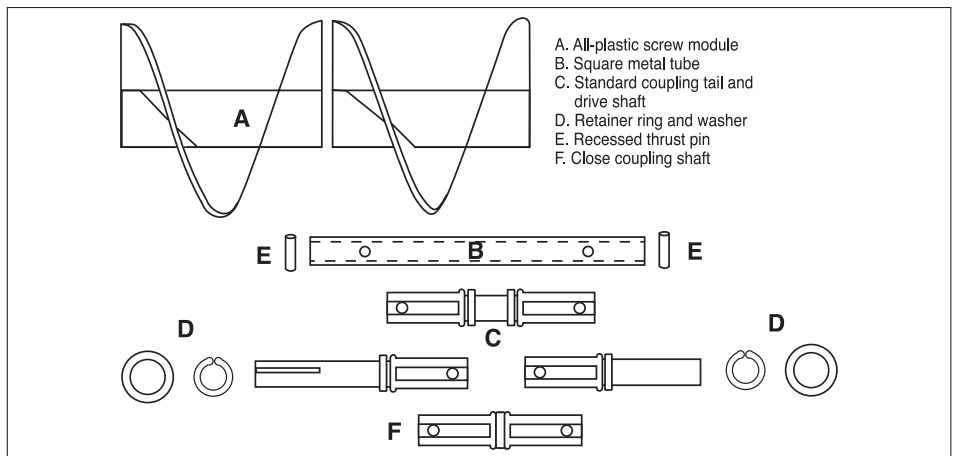
The Martin screw conveyor system consists of plastic modules stacked on a square metal tube. A shaft is inserted at each tube end and secured by a recessed pin. Modules are secured at tube ends by retainer rings and washers.
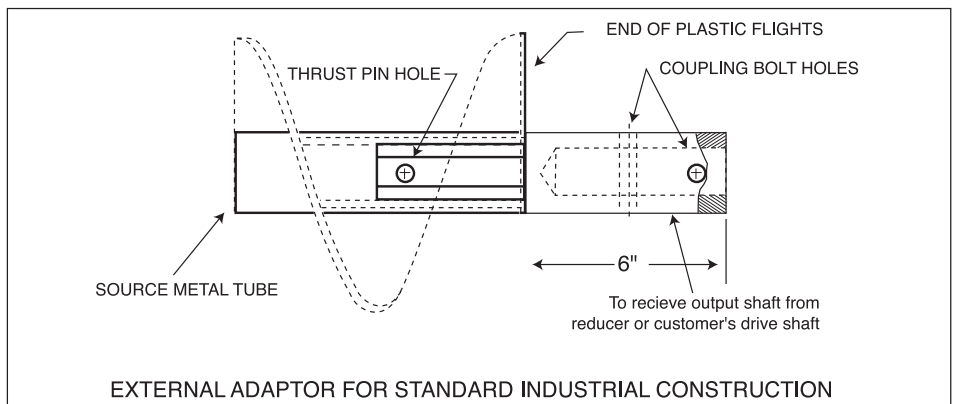
EXTERNAL ADAPTOR FOR STANDARD INDUSTRIAL CONSTRUCTION

DIAMETER	AVAILABLE SHAFTS	WEIGHT PER FOOT	
		FULL PITCH	SHORT PITCH
6"	1-1/2", 2"	4.1 lb	4.3 lb
9"	1-1/2", 2"	4.5 lb	5.2 lb
12"	2", 2-7/16"	8.0 lb	9.5 lb
14"	NOT CURRENTLY AVAILABLE		
16"	NOT CURRENTLY AVAILABLE		

Weights shown as for polyethylene or polypropylene on stainless steel tube, polyurethane approximately 10% heavier.

DIAMETER	FULL PITCH	SHORT PITCH	FLIGHT THICKNESS	OUTSIDE HUB	INSIDE HUB
6"	9.05"	4.53"	.25"	2.51"	2.03"
9"	9.05"	4.53"	.25"	2.51"	2.03"
12"	11.72"	5.86"	.34"	3.17"	2.53"
14"	NOT CURRENTLY AVAILABLE				
16"	NOT CURRENTLY AVAILABLE				

Technical & Design Data

Martin

Screw Conveyor Capacities

CUBIC FEET PER HOUR PER R.P.M. FULL PITCH HORIZONTAL				
DIAMETER	PITCH	CONVEYOR LOAD		
		FULL	45%	30%
6"	9"	5.72	2.57	1.72
9"	9"	16.73	7.53	5.02
12"	12"	39.27	17.67	11.78
14"	14"	NOT CURRENTLY AVAILABLE		
16"	16"	NOT CURRENTLY AVAILABLE		

Maximum Recommended Conveyor Speed / Horizontal Operation / R.P.M.

DIA.	SHAFT	TYPE OF INTERMEDIATE BEARING	
		WOOD, NYLATRON, BRONZE	CLOSE COUPLED*
6"	1 1/2"	165	90
9"	1 1/2"	165	80
9"	2"	150	80
12"	2"	145	70
12"	2 7/16"	140	70
14"	2 7/16"	NOT CURRENTLY AVAILABLE	
14"	3"	NOT CURRENTLY AVAILABLE	
16"	3"	NOT CURRENTLY AVAILABLE	

* Close coupled limitations apply to screw lengths over 12 ft. (for 6" and 9" dia.) or 15 ft. (for 12" dia). For longer lengths or units without intermediate bearing supports, locate end bearing no more than 3 1/8" (for 6" size); 4 5/8" (for 9" size); or 6 1/8" (for 12" size); centers above the inside bottom of the conveyor trough.

Horsepower Ratings

DIA.	SHAFT	RATINGS FOR CARBON STEEL SHAFT AND TUBE			
		50 R.P.M.	75 R.P.M.	100 R.P.M.	150 R.P.M.
6"-9"	1 1/2"	3.4	5.1	6.8	10.1
6"-9"	2"	5.6	8.4	11.2	16.8
12"	2"	8.0	12.0	16.0	24.0
12"	2 7/16"	9.1	13.6	18.2	27.3
14"	2 7/16"	NOT CURRENTLY AVAILABLE			
14"	3"	NOT CURRENTLY AVAILABLE			
16"	3	NOT CURRENTLY AVAILABLE			

NOTE: The above limitations are based on Martin modular plastic construction throughout. The use of coupling bolts, as required for an external adaptor, may reduce horsepower capacity.

Materials of Construction

	POLYETHYLENE	POLYPROPYLENE	POLYURETHANE
FDA Approved	Yes	Yes	No
Abrasive Resistance	Good	Fair	Excellent
Corrosive Resistance	Excellent	Excellent	Good
Impact Resistance	Good	Fair	Excellent
Temperature Limit	-60º to +150º F	+40º to +220º F	-20º to +150º
Release	Excellent	Good	Good

Note: Release pertains to the capability of conveying "sticky" products.

Design Data for Bonded Construction

Bonded construction is used in the handling of a finished food product or for the conveying of any product in which it is necessary to guard against material entering the internal clearances between the modules or into the inside of the square tube.

The hubs of the individual modules are heat fused together, the ends of the flights may be fused or may be cut to create a "clean out" gap, usually 1/8" to 1/4" wide.

The ends are capped and fitted with an "O" ring to seal around the shaft. The cap may be of alternate construction as detailed below.

Bonded construction has USDA acceptance for use as a component part of food processing equipment in federally inspected meat and poultry processing plants.
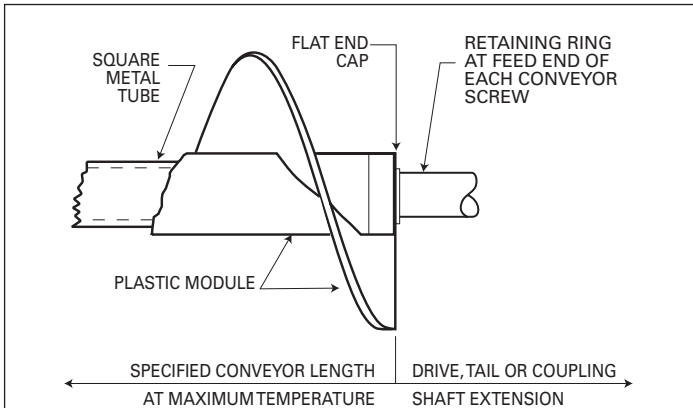
FLAT END CAPS

Flat end caps are the basic construction for conveying finished food products. Drive and tail end shafts are shipped factory installed. If used with coupling shafts, the thrust bearing must be at the feed end of the conveyor assembly. Retaining ring may be eliminated in some applications depending upon length and temperature involved.
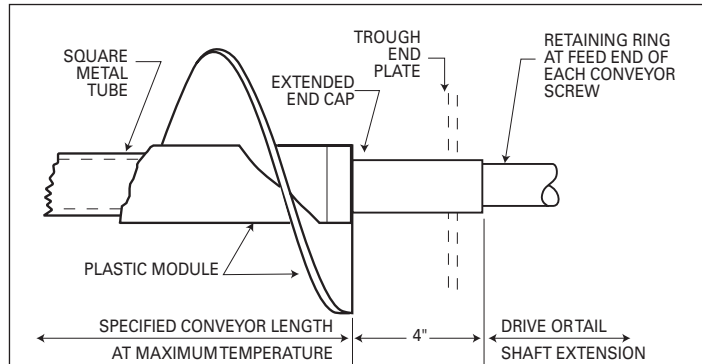
EXTENDED END CAPS

Extended end caps are used in the handling of products which require a total elimination of cracks and crevices on the conveyor screw. This precludes the use of coupling shafts and therefore limits the unit to one conveyor length, a maximum of 20 feet. Retainer rings and shafts are entirely outside the product area. Drive and tail end shafts are shipped factory installed.

SHAFTLESS SCREW CONVEYORS   PAGE

Martin Shaftless Screw Conveyors – The Problem Solver

Martin shaftless screw conveyors are the ideal solution for hard-to-transport materials ranging from irregularly shaped dry solids such as scrap wood and metals, to semi-liquid and sticky materials including pulp, compost, food-processing refuse, hospital waste, and wastewater products.

Martin shaftless conveyors' simple, pipeless design employs fewer parts than conventional shafted-screw conveyors, reducing lifetime maintenance costs. It enables higher trough loading and lower rpms, maximizing the volume of materials conveyed. Martin's shaftless screw eliminates jamming and buildup typical in shafted-screw conveyors for greater uptime, higher efficiency, and lower maintenance. It eliminates hanger bearings and end bearings to reduce maintenance and increase efficiency – enabling direct transfer to another conveyor.

Martin shaftless screw conveyors and components are manufactured and stocked at our branches strategically located near major industrial markets across North America. This ensures rapid shipping on new installations and next-day delivery on stock replacement parts.

Several test units, as well as video footage of actual applications, are available for demonstration of the unique capabilities of the shaftless screw. Discover the benefits Martin conveyors can bring to your business – call us today to arrange an on-site demo using your product.
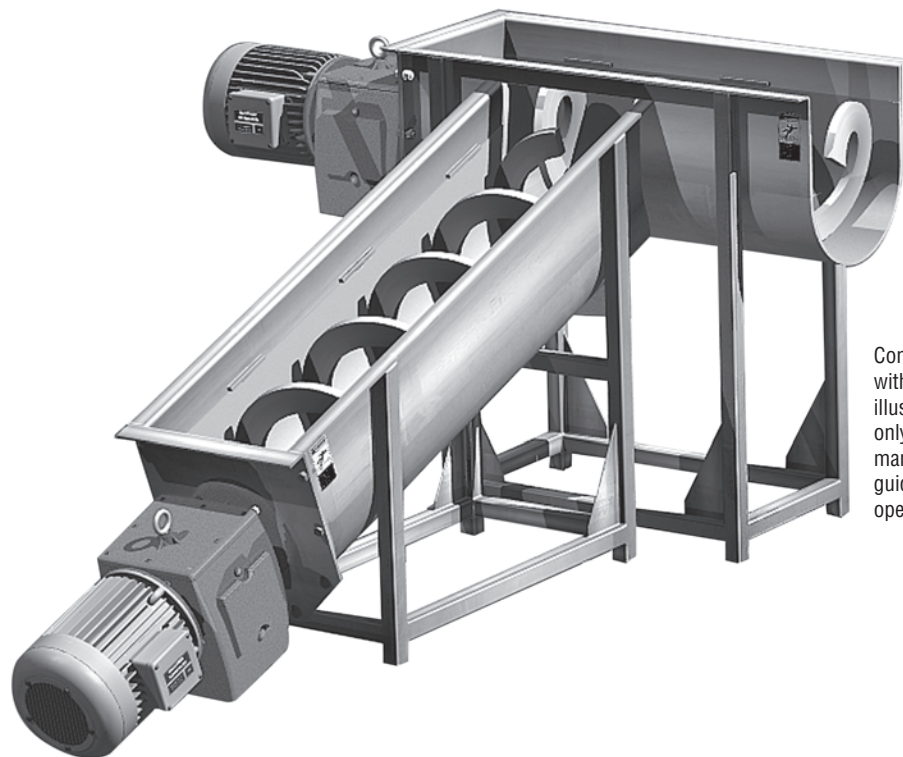
Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

Shaftless Screw Conveyors

Martin
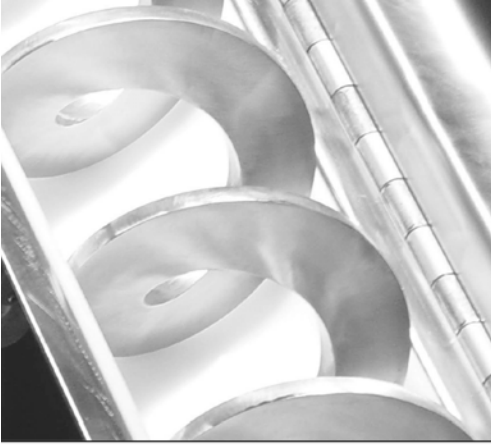
Typical Applications

- **Rendering**
  - **Poultry Processing**
    - Chicken Feathers
  - **Meat Processing**
    - Whole Carcasses
  - **Fish Processing**
    - Animal Waste
    - Fish/Animal Bones
- **Pulp & Paper, Gypsum Board, Particle Board**
  - Lime Mud
  - Pulp
  - Wood Chips
  - Fiber Sludge
  - Hogged Bark
  - Screenings
  - Shavings
- **Agriculture**
  - Fertilizer
  - Grain
  - Meal
  - Corn Gluten
  - Powder
  - Peat
  - Sugar Beets/Sugar Cane
  - Salt
  - Pellets
  - Chopped Hay
  - Flour
- **Hospital Waste Processing, Recycle Plants**
  - Shredded Cans
  - Heavy Reject
  - Bottles
  - Pulper Reject
  - Paper
  - Screenings
  - Medical Disposables
- **Wine & Beverage Industries**
  - Whole Berry
  - Stems
  - Pumice
  - Fruit Peels
- **Waste Water**
  - Solid Waste Treatment
  - Screenings
  - Sludge
  - Solids Removal
  - Grit
- **Chemical & Heavy Industrial**
  - Ash
  - Coal
  - Bauxite
  - Recycle Batteries
  - Metal Chip Handling
  - Iron Ore
  - Carbon Black
  - Bentonite
  - Limestone
  - Shredded Tires
  - Caustic Soda
  - Insulation

FEATURE	FUNCTION	BENEFIT
No center pipe required	Eliminate buildup on pipe	Able to convey large irregularly shaped and sticky product
Continuous flight	Hanger bearings not required	Eliminate costly hanger bearing maintenance
Higher trough loading	Can handle more product at lower rpms	Longer wear life
Can use blind endplate on tail end	No tail bearings or seals to maintain	Reduces maintenance and replacement costs
No end bearings needed	Direct transfer to another conveyor, incline, vertical or horizontal	Can be designed to fit within space limitations or plant layout
Side inlet feeding	No vertical transition necessary	Lower installation cost — reduces headroom
3/4" - 1" Thick flighting	Long lasting due to wear resistance	Increases uptime
Cold formed flight	High brinell	Longer life
Wide variety of liners	Offer proper liner for specific application	Reduced wear resulting in lower maintenance costs
Simple design	Fewer operating parts	Lower overall operating costs
Compact drive system	Doesn't require belts	Easy to maintain
Can be completely enclosed	Prevent material leakage — reduces dust	Eliminates environmental or product contamination
Manufactured in North America	Quality built — local stock	Fast delivery

CONFIGURATIONS / OPTIONS

Type of Steel	• Carbon steel • High brinell carbon steel • Stainless steel
Capacity	• Up to 17,000 cfh
Diameter	• 6" To 30" (and larger)
Pitches	• Full, 2/3, 1/2
Trough	• CEMA standards
Options	• Liners - UHMW - Xylethon - Tivar - AR • Rider bars • Inspection and overflow hatches • Various drive configurations • Available • Housings: cema standard • U-trough or split tubular housing
Configurations	• Single or inner/outer flight design • Twin screw • Multiple live bottom feeders • Inclined screw conveyors • Grit washers • Vertical

Shaftless Screw Live Bottom

*Conveyors shown without cover for illustration purposes only. Please follow manufacturing safety guidelines when operating conveyors.

50% Trough Loading*					
Nom. Dia.	A Dia.	B Inside	C Pitch	CFH @ 1 RPM	Max RPM
6	6	7	6	2.5	25
9	9	10	9	9.1	25
10	10	11	10	12.7	25
12	12	13	12	21.6	25
14	14	15	14	34.7	25
16	16	17	16	51.9	25
18	18	19	18	75.1	25
20	20	21	20	104	25
24	24	25	24	182	25
30	30	31	30	359	25

* Based on horizontal application only.

Client: _____ Date Quote: _____

Conveyor No.: _____ Inquiry No.: _____

Table 1-2

_____ Dia. × Length **L** = _____ Recommended % Trough Loading: _____

Material: _____ Material HP Factor: **F$_M$** = _____

Capacity: _____ Component Series: _____

Density: **W** = _____ lb/ft^3 Intermediate Hanger Bearing Series: _____

Lumps: Max. Size _____ in. Class (I) (II) (III) _____ Notes: _____

Required Capacity = **C** = _____ CFH (cubic feet per hour)

$$CFH = \frac{TPH \times 2000}{W}$$

$$CFH = \frac{Pounds\ per\ Hour}{W}$$

CFH = Bushels per Hour × 1.24

Tables 1-3, 1-4, 1-5

Equivalent Capacity = $\dfrac{Req'd\ Capacity}{\rule{2cm}{0.4pt}}$ × $\dfrac{CF_1}{\rule{1.5cm}{0.4pt}}$ × $\dfrac{CF_2}{\rule{1.5cm}{0.4pt}}$ × $\dfrac{CF_3}{\rule{1.5cm}{0.4pt}}$ = _____ CFH

Tables 1-6

Screw Diameter = _____ Select Diameter from "at max RPM" column where capacity listed equals or exceeds equivalent capacity

Screw RPM = **N** = _____ = $\dfrac{Equivalent\ Capacity}{Capacity\ "at\ one\ RPM"\ for\ diameter\ selected}$

Tables 1-7

Check lump size and lump class for diameter selected. If larger screw diameter recommended, recalculate RPM per instructions above for selected diameter.

Tables 1-12, 1-13, 1-14, 1-15, 1-16, 1-17

Values to be substituted in formula: _____ _____ _____ _____ _____

Fd **Fb** **Ff** **Fp** **e**

$$HPf = \frac{\overset{L}{()}\ \overset{N}{()}\ \overset{Fd}{()}\ \overset{Fb}{()}}{1{,}000{,}000} = \rule{3cm}{0.4pt}$$

$$HPf = \frac{\overset{C}{()}\ \overset{L}{()}\ \overset{W}{()}\ \overset{Ff}{()}\ \overset{Fm}{()}\ \overset{Fp}{()}}{1{,}000{,}000} = \rule{3cm}{0.4pt}$$

If HPf + HPm is less than 5.2, select overload factor F$_0$ = _____ (If HPf + HPm is greater than 5.2 F$_0$ = 1.0)

$$Total\ HP = \frac{(HPf + HPm)\ F_0}{e} = \rule{3cm}{0.4pt} = \rule{3cm}{0.4pt}$$

Drive: Use _____ HP motor with AGMA Class (I) (II) (III) Drive at _____ Screw RPM

Tables 1-18, 1-19

Torque = $\dfrac{Motor\ HP \times 63{,}025}{Screw\ RPM}$ = _____ in-lb

Tables 1-8, 1-9, 1-10, 1-11

Select Components:

Trough _____ Screw _____ Hanger Style _____ Hanger Bearing _____ Cover _____

Client: _____   Date Quote: _____

Conveyor No.: _____   Inquiry No.: _____

Table 1-2

_____ Dia. × Length **L** = _____   Recommended % Trough Loading: _____

Material: _____   Material HP Factor: F_M = _____

Capacity: _____   Component Series: _____

Density: **W** = _____ lb/ft³   Intermediate Hanger Bearing Series: _____

Lumps: Max. Size _____ in. Class (I) (II) (III) _____   Notes: _____

Required Capacity = **C** = _____ CFH (cubic feet per hour)

$$CFH = \frac{TPH \times 2000}{W}$$

$$CFH = \frac{Pounds\ per\ Hour}{W}$$

CFH = Bushels per Hour × 1.24

Tables 1-3, 1-4, 1-5

Equivalent Capacity = $\dfrac{Req'd\ Capacity}{\underline{\hspace{2cm}}}$ × $\dfrac{CF_1}{\underline{\hspace{1.5cm}}}$ × $\dfrac{CF_2}{\underline{\hspace{1.5cm}}}$ × $\dfrac{CF_3}{\underline{\hspace{1.5cm}}}$ = _____ CFH

Tables 1-6

Screw Diameter = _____ Select Diameter from "at max RPM" column where capacity listed equals or exceeds equivalent capacity

Screw RPM = **N** = $\dfrac{\underline{\hspace{3cm}}}{} = \dfrac{Equivalent\ Capacity}{Capacity\ "at\ one\ RPM"\ for\ diameter\ selected}$

Tables 1-7

Check lump size and lump class for diameter selected. If larger screw diameter recommended, recalculate RPM per instructions above for selected diameter.

Tables 1-12, 1-13, 1-14, 1-15, 1-16, 1-17

Values to be substituted in formula: _____ _____ _____ _____ _____

        Fd   **Fb**   **Ff**   **Fp**   **e**

$$HPf = \frac{\overset{L}{()}\ \overset{N}{()}\ \overset{Fd}{()}\ \overset{Fb}{()}}{1,000,000} = \underline{\hspace{3cm}}$$

$$HPf = \frac{\overset{C}{()}\ \overset{L}{()}\ \overset{W}{()}\ \overset{Ff}{()}\ \overset{Fm}{()}\ \overset{Fp}{()}}{1,000,000} = \underline{\hspace{3cm}}$$

If HPf + HPm is less than 5.2, select overload factor F_0 = _____ (If HPf + HPm is greater than 5.2 F_0 = 1.0)

$$Total\ HP = \frac{(HPf + HPm)\ F_0}{e} = \underline{\hspace{3cm}} = \underline{\hspace{3cm}}$$

Drive: Use _____ HP motor with AGMA Class (I) (II) (III) Drive at _____ Screw RPM

Tables 1-18, 1-19

$$Torque = \frac{Motor\ HP \times 63,025}{Screw\ RPM} = \underline{\hspace{3cm}} \ in\text{-}lb$$

Tables 1-8, 1-9, 1-10, 1-11

Select Components:

Trough _____ Screw _____ Hanger Style _____ Hanger Bearing _____ Cover _____

Vertical Screw Data Sheet

Martin

Customer: _____

Address: _____

Contact: _____

Vertical Screw: Lift: _____ Discharge Height: _____

_____

_____

Capacity: _____ (CFH)(lb/hr)(TPH)(MTPH)(BPH)

Material: _____ Density: _____ lb/ft³

Lumps: Max Size: _____ in   Lump Class: _____

Fed by: _____

Material of Construction: □ Mild Steel   □ T304   □ T316   □ H.D Galv.   □ Other

Installation: □ New   □ Replacement   □ Indoors   □ Outdoors

Drive: (Direct) (Screw Conveyor Drive) (Other): _____   □ V-Belt   □ Chain   □ Guard

Motor: □ TEFC   □ X-Proof   □ Other _____

Notes _____

Date Quote Due: _____

Phone #: _____

Inlet Configuration (Indicate One):

□	□	□
Elevator Offset to Left	**Straight Inlet**	**Elevator Offset to Right**

Temp: _____ °F   Moisture: _____ %

(Lump % of Total; I - 10%, II - 25%, III - 95%)

Discharges to: _____
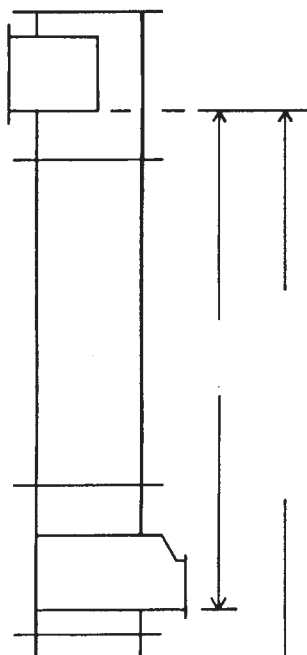
Notes _____

Trough: _____

Screw: _____

Shaft Diameter: _____

Hanger Style: _____

Hanger Bearing: _____

Bottom Bearing: _____

Bottom Seal: _____

Gaskets: _____

Trough: _____

Drive: _____ HP │ At _____ RPM

Reducer: _____

Paint: _____

Notes: _____

_____

_____

Page _____ of _____ Prepared by _____ Date _____

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Martin

Customer: _____ Date Quote Due: _____

Address: _____

Contact: _____ Phone #: _____

Screw Descri.: _____ Qty.: _____ Dia. × _____ Long (C Inlet to C Disch.)(Overall) □Horiz. □ Incl. _____° □ Decl. _____°

Capacity: _____ (CFH)(lb/hr)(TPH)(MTPH)(BPH)

Material: _____ Density: _____ lb/ft³ Temp: _____ °F Moisture: _____ %

Lumps: Max Size: _____ in Lump Class: _____ (Lump % of Total; I - 10%, II - 25%, III - 95%)

Material of Construction: □ Mild Steel   □ T304   □ T316   □ H.D Galv.   □ Other

Installation: □ New   □ Replacement □ Indoors   □ Outdoors

Is it?   □ Feeder   □ Conveyor   Is Feed?   □ Flood Load   □ Uniform

Fed by: _____ Inlet Size: _____ Discharges to: _____

Drive: (Direct) (Screw Conveyor Drive) (Other): _____ □ V-Belt   □ Chain   □ Guard

Notes _____

_____

Trough: Style: _____ Thk.: _____ Coupl. Bolts: _____

Discharge: Type: _____ Qty.: _____ Hanger: Style: _____

Gates: Type: _____ Qty.: _____ Hanger Brg.: Type: _____

Trough End Type: Tail: _____ Cover: Style: _____ Thk.: _____

Trough End Type: Head: _____ Cover Fasteners: Type: _____

Bearing Type: Tail _____ Head.: _____ Inlets: Style: _____ Qty.: _____

Seal Type: Tail: _____ Head.: _____ Gaskets: Type: _____ Thk.: _____

Screw: Dia.: _____ (RH)(LH) Pitch _____ Thk. _____ Drive: _____ HP At: _____ RPM

_____ Motor: _____ Motor Mount: _____

_____ Reducer: _____

_____ V-Belt/Chain: _____

Notes _____

_____
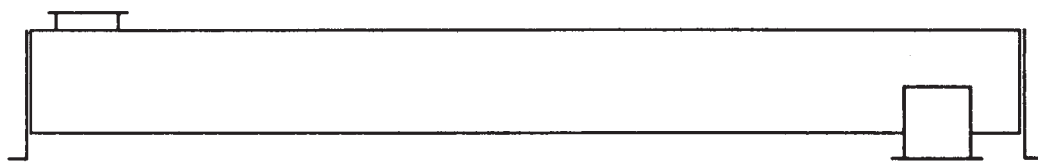
Sketch — (Show feeder inlet size and location, drive location, etc.)

Bucket Elevator
Data Sheet

Martin

Customer: _____ Date Quote Due: _____

Address: _____

Contact: _____ Phone #: _____

Bucket Elevator: (CTRS/Lift) _____ Descr.: _____

_____

Capacity: _____ (CFH)(lb/hr)(TPH)(MTPH)(BPH)

Material: _____ Density: _____ lb/ft^3 Temp: _____ °F Moisture: _____ %

Lumps: Max Size: _____ in Lump Class: _____ (Lump % of Total; I - 10%, II - 25%, III - 95%)

Fed by: _____ Discharges to: _____

Material of Construction: □ Mild Steel □ T304 □ T316 □ H.D Galv. □ Other

Installation: □ New □ Replacement □ Indoors □ Outdoors

Drive: (Shaft Mount)(Foot Mounted Gear Reducer)(Other): _____ □ V-Belt □ Chain □ Guard

_____ Motor: □ TEFC □ X-Proof □ Other _____ Backstop: □ Shaft □ Integral to Reducer □ Other

_____ Notes: _____

_____
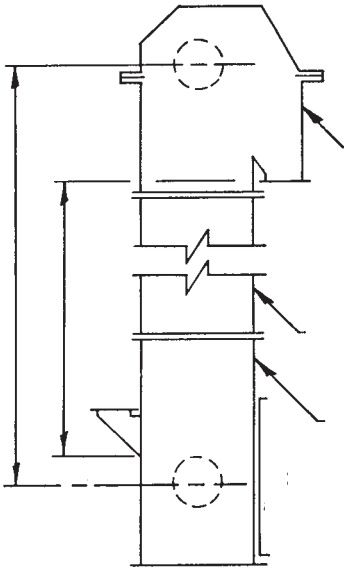
Type: □ Centrifugal □ Continuous □ Grain Type □ Other _____

□ Chain □ Belt Specs.: _____

Drive: _____ HP At: _____ RPM Reducer _____

Sprockets/Sheaves _____ Chain/V-Belts _____

_____ Backstop _____

Inlet: □ Standard □ Special _____

Discharge: □ Standard □ 45°

Cage: □ Yes □ No Ladder: Length _____

Head Platform: □ Standard Size □ Special _____

Int. Platform: □ Standard Size □ Special _____

Thickness: Head _____ Boot _____ Int. _____

Take-up: □ Head □ Boot □ Screw □ Gravity

Seals: □ Standard □ Special _____ Vents: Size _____ Qty. _____

Paint: _____

Page _____ of _____ Prepared by _____ Date _____

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Martin

Customer: _____   Date Proposal Due: _____

Address: _____

Contact: _____   Phone #: _____

Lenght: _____ (C Inlet to C Disch.)   ☐ Horiz. ☐ Incl. _____° ☐ Decl. _____°

Capacity: _____ (CFH)(lb/hr)(TPH)(MTPH)(BPH)

Material: _____   Density: _____ lb/ft³   Temp: _____ °F   Moisture: _____ %

Lumps: Max Size: _____ in   Lump Class: _____ (Lump % of Total; I - 10%, II - 25%, III - 95%)

Installation: ☐ New   ☐ Replacement ☐ Indoors   ☐ Outdoors

Material of Construction: ☐ Mild Steel   ☐ T304   ☐ T316   ☐ H.D. Galv.   ☐ Other

Is Feed?   ☐ Flood Load ☐ Uniform

Fed by: _____ Inlet Size: _____ Discharges to: _____

Drive: (Direct) (Screw Conveyor Drive) (Other): _____ ☐ V-Belt ☐ Chain ☐ Guard

Notes _____

_____

Type: ☐ Round Bottom ☐ Flat Bottom   ☐ L-Path   ☐ STD.   ☐ Mill Duty

Drive: _____ HP   At: _____ RPM   Horizontal C/L to C/L: _____ Discharge HT.: _____

Discharge: Type: _____   Qty.: _____

Gates: Type: _____   Qty.: _____   Hanger Brg.: Type: _____

Sprockets/Chain: ☐ Solid Style _____   ☐ Split _____   ☐ Sheave/V-Belts _____

Inlet: ☐ Standard   ☐ Bypass

Take-Up   ☐ Screw   ☐ Spring Loaded

Thickness: Head: _____

Boot: _____

Intermediates: _____

Covers: ☐ Flanged   ☐ Hip Roof

Paint: _____

Liners: ☐ UHMW   ☐ Mild Steel   ☐ AR Steel

Other Desired Options: _____

Page _____ of _____ Prepared by _____ Date _____
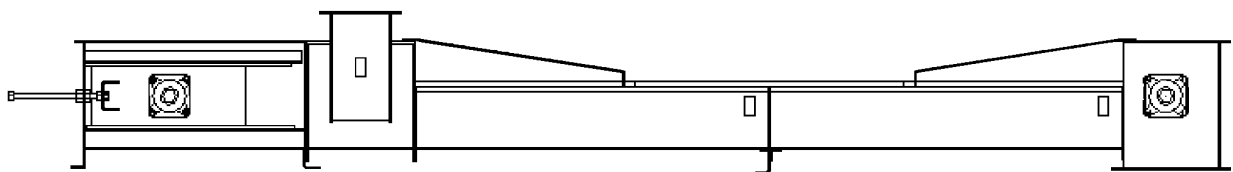
Notes

GENERAL ENGINEERING INFORMATION

Horsepower/Torque

Horsepower

One HP is the rate of work required to raise 33,000 pounds one foot in one minute.

ONE HORSEPOWER

ONE FOOT PER MINUTE

33,000 LB

$$HP = \frac{Force \times FPM}{33,000}$$

$$HP = \frac{Torque\ (in\ Pound\text{-}Inches) \times RPM}{63,025}$$

$$HP = \frac{Torque\ (in\ Pound\text{-}Feet) \times RPM}{5,252}$$

Torque: The twisting or turning effort around a shaft tending to cause rotation. Torque is determined by multiplying the applied force times the distance from the point where force is applied to the shaft center.

$$TQ = F\ (force) \times R\ (radius)$$

$$Torque\ (in\ pound\text{-}inches) = \frac{63,025 \times HP}{RPM}$$
$$= Force \times Lever\ Arm\ (in\ Inches)$$

$$Torque\ (in\ pound\text{-}feet) = \frac{5,252 \times HP}{RPM}$$
$$= Force \times Lever\ Arm\ (in\ Feet)$$

Force = Working loads in pounds
FPM = Feet per minute
RPM = Revolutions per minute
Lever Arm = Distance from the force to the center of rotation on inches or feet

Torque Calculation Example

20 HP at 100 RPM = 12,605 pound-inches Torque

2.0 HP at 10 RPM = 12,605 pound-inches Torque

Overhung Loads

An overhung load is a bending force imposed on a shaft due to the torque transmitted by v-drives, chain drives, and other power transmission devices, other than flexible couplings.

Most motor and reducer manufacturers list the maximum values allowable for overhung loads. It is desirable that these figures be compared with the load actually imposed by the connected drive.

Overhung loads may be calculated as follows:

$$O.H.L. = \frac{63,000 \times HP \times F}{N \times R}$$

Where: HP = Transmitted HP × Service Factor
            N = RPM of shaft
            R = Radius of sprocket, pulley, etc.
            F = Factor

Weights of the drive components are usually negligible. The formula is based on the assumption that the load is applied at a point equal to one shaft diameter from the bearing face. Factor F depends on the type of drive used:

F = {
1.00 for single chain drives
1.10 for timing belt drives
1.25 for spur or helical gear or double chain drives
1.50 for v-belt drives
2.50 for flat belt drives
}

Example: Find the overhung load imposed on a reducer by a double chain drive transmitting 7 HP @ 30 RPM. The pitch diameter of the sprocket is 10"; service factor is 1.3.

$$O.H.L. = \frac{(63,000)(7 \times 1.3)\ (1.25)}{(30) \times (5)} = 4,780\ lbs$$

Horsepower/Speed/Torque Relationships		
HP	Speed (RPM)	Torque
Constant	Increases	Decreases
Constant	Decreases	Increases
Increases	Constant	Increases
Decreases	Constant	Decreases
Increases	Increases	Constant
Decreases	Decreases	Constant

Torque for 1-50 HP @ 50-220 RPM

HP	Revolutions Per Minute																	
	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
1	1261	1050	900	788	700	630	573	525	485	450	420	394	371	350	332	315	300	286
2	2521	2101	1801	1576	1401	1260	1145	1050	969	900	840	787	741	700	663	630	600	572
3	3782	3151	2701	2363	2101	1890	1718	1575	1454	1350	1260	1181	1112	1050	995	945	900	859
4	5042	4202	3601	3151	2801	2521	2291	2100	1939	1800	1680	1575	1482	1400	1326	1260	1200	1145
5	6303	5252	4502	3939	3501	3151	2864	2626	2424	2250	2100	1969	1853	1750	1658	1575	1500	1432
6	7563	6303	5402	4727	4202	3781	3437	3151	2908	2701	2521	2363	2224	2100	1990	1890	1800	1718
7	8824	7353	6302	5515	4902	4411	4010	3676	3393	3151	2941	2757	2595	2450	2321	2205	2100	2005
8	10084	8403	7203	6303	5602	5042	4583	4201	3878	3601	3361	3151	2965	2801	2653	2521	2400	2291
9	11345	9454	8103	7090	6303	5672	5156	4726	4363	4051	3781	3545	3336	3151	2985	2836	2701	2578
10	12605	10504	9004	7878	7003	6302	5729	5252	4848	4501	4201	3939	3707	3501	3317	3151	3001	2864
11	13866	11555	9904	8666	7703	6932	6302	5777	5332	4951	4621	4332	4078	3851	3648	3466	3301	3151
12	15126	12605	10804	9454	8403	7563	6875	6302	5817	5402	5042	4726	4448	4201	3980	3781	3601	3437
13	16387	13655	11705	10242	9104	8193	7448	6827	6302	5852	5462	5120	4819	4551	4312	4096	3901	3724
14	17647	14706	12605	11029	9804	8823	8021	7352	6787	6302	5882	5514	5190	4901	4643	4411	4201	4010
15	18908	15756	13505	11817	10504	9453	8594	7878	7272	6752	6302	5908	5561	5252	4975	4726	4501	4297
16	20168	16807	14406	12605	11204	10084	9167	8403	7756	7202	6722	6302	5931	5602	5307	5042	4801	4583
17	21429	17857	15306	13393	11905	10714	9740	8928	8241	7653	7142	6696	6302	5952	5639	5357	5102	4870
18	22689	18908	16206	14181	12605	11344	10313	9453	8726	8103	7563	7090	6673	6302	5970	5672	5402	5156
19	23950	19958	17107	14968	13305	11974	10886	9979	9211	8553	7983	7484	7044	6652	6302	5987	5702	5443
20	25210	21008	18007	15756	14006	12605	11459	10504	9696	9003	8403	7878	7414	7002	6634	6302	6002	5729
21	26471	22059	18907	16544	14706	13235	12032	11029	10181	9453	8823	8272	7785	7352	6965	6617	6302	6016
22	27731	23109	19808	17332	15406	13865	12605	11554	10665	9903	9243	8665	8156	7703	7297	6932	6602	6302
23	28992	24160	20708	18120	16106	14495	13178	12079	11150	10354	9663	9059	8526	8053	7629	7247	6902	6588
24	30252	25210	21609	18908	16807	15126	13750	12605	11635	10804	10084	9453	8897	8403	7961	7563	7202	6875
25	31513	26260	22509	19695	17507	15756	14323	13130	12120	11254	10504	9847	9268	8753	8292	7878	7503	7161
26	32773	27311	23409	20483	18207	16386	14896	13655	12605	11704	10924	10241	9639	9103	8624	8193	7803	7448
27	34034	28361	24310	21271	18908	17016	15469	14180	13089	12154	11344	10635	10009	9453	8956	8508	8103	7734
28	35294	29412	25210	22059	19608	17647	16042	14705	13574	12605	11764	11029	10380	9803	9287	8823	8403	8021
29	36555	30462	26110	22847	20308	18277	16615	15231	14059	13055	12184	11423	10751	10154	9619	9138	8703	8307
30	37815	31513	27011	23634	21008	18907	17188	15756	14544	13505	12605	11817	11122	10504	9951	9453	9003	8594
31	39076	32563	27911	24422	21709	19537	17761	16281	15029	13955	13025	12211	11492	10854	10283	9768	9303	8880
32	40336	33613	28811	25210	22409	20168	18334	16806	15513	14405	13445	12605	11863	11204	10614	10084	9603	9167
33	41597	34664	29712	25998	23109	20798	18907	17331	15998	14855	13865	12998	12234	11554	10946	10399	9903	9453
34	42857	35714	30612	26786	23809	21428	19480	17857	16483	15306	14285	13392	12605	11904	11278	10714	10204	9740
35	44118	36767	31512	27573	24510	22058	20053	18382	16968	15756	14705	13786	12975	12254	11609	11029	10504	10026
36	45378	37815	32413	28361	25210	22689	20626	18907	17453	16206	15126	14180	13346	12605	11941	11344	10804	10313
37	46639	38865	33313	29149	25910	23319	21199	19432	17937	16656	15546	14574	13717	12955	12273	11659	11104	10599
38	47889	39916	34214	29937	26611	23949	21772	19958	18422	17106	15966	14968	14088	13305	12605	11974	11404	10886
39	49160	40996	35114	30725	27311	24579	22345	20483	18907	17557	16386	15362	14458	13655	12936	12289	11704	11172
40	50420	42017	36014	31513	28011	25210	22918	21008	19392	18007	16806	15756	14829	14005	13268	12605	12004	11459
41	51681	43067	36915	32300	28711	25840	23491	21533	19877	18457	17226	16150	15200	14355	13600	12920	12304	11745
42	52941	44118	37815	33088	29412	26470	24064	22058	20362	18907	17647	16544	15570	14705	13931	13235	12605	12032
43	54202	45168	38715	33876	30112	27100	24637	22584	20846	19357	18067	16938	15941	15056	14263	13550	12905	12318
44	55462	46218	39616	34664	30812	27731	25210	23109	21331	19807	18487	17331	16312	15406	14595	13865	13205	12605
45	56723	47269	40516	35452	31513	28361	25783	23634	21816	20258	18907	17725	16683	15756	14927	14180	13505	12891
46	57383	48319	41416	36239	32213	28991	26356	24159	22301	20708	19327	18119	17053	16106	15258	14495	13805	13177
47	59244	49370	42317	37027	32913	29621	26928	24684	22786	21158	19747	18513	17424	16456	15590	14810	14105	13464
48	60504	50420	43217	37815	33613	30252	27501	25210	23270	21608	20168	18907	17795	16806	14922	15126	14405	13750
49	61764	51470	44117	38603	34314	30882	28074	25735	23755	22058	20588	19301	18166	17156	16253	15441	14705	14037
50	63025	52521	45018	39319	35014	31512	28647	26260	24240	22509	21008	19695	18536	17507	16585	15756	15006	14323

Torque (in Pound-Inches) For Horsepower/RPM

Torque for 1-50 HP @ 230-1000 RPM

HP	Revolutions Per Minute																		
	230	240	250	260	270	280	290	300	350	400	450	500	550	600	650	700	800	900	1000
1	274	263	252	242	233	225	217	210	180	157	140	126	114	105	96	90	78	70	63
2	548	525	504	484	466	450	434	420	360	315	280	252	229	210	193	180	157	140	126
3	822	787	756	727	700	675	651	630	540	472	420	378	343	315	290	270	236	210	189
4	1096	1050	1008	969	933	900	869	840	720	630	560	504	458	420	387	360	315	280	252
5	1370	1313	1260	1212	1167	1125	1087	1050	900	787	700	630	572	525	484	450	393	350	315
6	1644	1575	1512	1454	1401	1350	1303	1260	1080	945	840	756	687	630	581	540	472	420	378
7	1918	1838	1764	1696	1633	1575	1521	1470	1260	1102	980	882	802	735	678	630	551	490	441
8	2192	2100	2016	1939	1867	1800	1738	1680	1440	1260	1120	1008	916	840	775	720	630	560	504
9	2466	2363	2268	2181	2100	2025	1955	1890	1620	1418	1260	1134	1031	945	872	810	709	630	567
10	2740	2626	2521	2424	2334	2250	2173	2100	1800	1575	1400	1260	1145	1050	969	900	787	700	630
11	3014	2888	2773	2666	2567	2475	2390	2310	1980	1733	1540	1386	1260	1155	1066	990	866	770	693
12	3288	3151	3025	2908	2801	2701	2607	2521	2160	1890	1680	1512	1375	1260	1163	1080	945	840	756
13	3562	3413	3277	3151	3034	2926	2825	2731	2340	2048	1820	1638	1489	1365	1260	1170	1024	910	819
14	3836	3676	3529	3393	3267	3151	3042	2941	2521	2205	1960	1764	1604	1470	1357	1260	1102	980	882
15	4110	3939	3781	3636	3501	3376	3259	3151	2701	2363	2100	1890	1718	1575	1454	1350	1181	1050	945
16	4384	4201	4033	3878	3734	3601	3477	3361	2881	2521	2240	2016	1833	1680	1551	1440	1260	1120	1008
17	4658	4464	4285	4120	3968	3826	3694	3571	3061	2678	2380	2142	1948	1785	1648	1530	1339	1190	1071
18	4932	4726	4537	4363	4201	4051	3911	3781	3241	2836	2521	2268	2062	1890	1745	1620	1418	1260	1134
19	5206	4989	4789	4605	4435	4276	4129	3991	3421	2993	2661	2394	2177	1995	1842	1710	1496	1330	1197
20	5480	5252	5042	4848	4668	4501	4346	4201	3601	3151	2801	2521	2291	2100	1939	1800	1575	1400	1260
21	5754	5514	5294	5090	4901	4726	4563	4411	3781	3308	2941	2647	2406	2205	2036	1890	1654	1470	1323
22	6028	5777	5546	5332	5135	4951	4781	4621	3961	3466	3081	2773	2521	2310	2133	1980	1733	1540	1386
23	6302	6039	5798	5575	5368	5177	4998	4831	4141	3623	3221	2899	2635	2415	2230	2070	1811	1610	1449
24	6576	6302	6050	5817	5602	5402	5215	5042	4321	3781	3361	3025	2750	2521	2327	2160	1890	1680	1512
25	6850	6565	6302	6060	5835	5627	5433	5252	4501	3939	3501	3151	2864	2626	2424	2250	1969	1750	1575
26	7124	6827	6554	6302	6069	5852	5650	5462	4681	4096	3641	3277	2979	2731	2521	2340	2048	1820	1638
27	7398	7090	6806	6544	6302	6077	5867	5672	4861	4254	3781	3403	3093	2836	2617	2430	2127	1890	1701
28	7672	7352	7058	6787	6535	6302	6085	5882	5042	4411	3921	3529	3208	2941	2714	2521	2205	1960	1764
29	7946	7615	7310	7029	6769	6527	6302	6092	5222	4569	4061	3655	3323	3046	2811	2611	2284	2030	1827
30	8220	7878	7563	7272	7002	6752	6519	6302	5402	4726	4201	3781	3437	3151	2908	2701	2363	2100	1890
31	8494	8140	7815	7514	7236	6977	6737	6512	5582	4884	4341	3907	3552	3256	3005	2791	2442	2170	1953
32	8768	8403	8067	7756	7469	7202	6954	6722	5762	5042	4481	4033	3666	3361	3102	2881	2520	2240	2016
33	9042	8665	8319	7999	7703	7427	7171	6932	5942	5199	4621	4159	3781	3466	3199	2971	2599	2310	2079
34	9316	8928	8571	8241	7936	7653	7389	7142	6122	5357	4761	4285	3896	3571	3296	3061	2678	2380	2142
35	9590	9191	8823	8484	8169	7878	7606	7352	6302	5514	4901	4411	4010	3676	3393	3151	2757	2450	2205
36	9864	9453	9075	8726	8403	8103	7823	7563	6482	5672	5042	4537	4125	3781	3490	3241	2836	2521	2268
37	10138	9716	9327	8968	8636	8328	8041	7773	6662	5829	5182	4663	4239	3886	3587	3331	2913	2591	2331
38	10412	9978	9579	9211	8870	8553	8258	7983	6842	5987	5322	4789	4354	3991	3684	3421	2993	2661	2394
39	10686	10241	9831	9453	9103	8778	8475	8193	7022	6144	5462	4915	4469	4096	3781	3511	3072	2731	2457
40	10960	10504	10084	9696	9337	9003	8693	8403	7202	6302	5602	5042	4583	4201	3878	3601	3151	2801	2521
41	11234	10766	10336	9938	9570	9228	8910	8613	7382	6460	5742	5168	4698	4306	3975	3691	3230	2871	2584
42	11508	11029	10588	10181	9803	9453	9127	8823	7563	6617	5882	5294	4812	4411	4072	3781	3308	2941	2647
43	11782	11292	10840	10423	10037	9678	9345	9033	7743	6775	6022	5420	4927	4516	4169	3871	3387	3011	2710
44	12057	11554	11092	10665	10270	9903	9562	9243	7923	6932	6162	5546	5042	4621	4266	3961	3466	3081	2773
45	12331	11817	11344	10908	10504	10129	9779	9453	8103	7090	6302	5672	5156	4726	4363	4051	3545	3151	2836
46	12605	12079	11596	11150	10737	10354	9997	9963	8283	7247	6442	5798	5271	4831	4460	4141	3623	3221	2899
47	12879	12342	11848	11393	10971	10579	10214	9873	8463	7405	6582	5924	5385	4936	4557	4231	3702	3291	2962
48	13153	12605	12100	11635	11204	10804	10431	10084	8643	7563	6722	6050	5500	5042	4654	4321	3781	3361	3025
49	13427	12867	12352	11877	11437	11029	10649	10294	8823	7720	6862	6176	5614	5147	4751	4411	3860	3431	3088
50	13701	13130	12605	12120	11671	11254	10866	10504	9003	7878	7002	6302	5729	5252	4848	4501	3939	3501	3151

Torque for 51-100 HP @ 50-220 RPM

HP	Revolutions Per Minute																	
	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220
51	64286	53571	45918	40178	35714	32142	29220	26785	24725	22959	21428	20089	18907	17857	16917	16071	15306	14610
52	65546	54622	46819	40966	36414	32773	29793	27310	25210	23409	21848	20483	19278	18207	17249	16386	15606	14896
53	66807	55672	47719	41754	37115	33403	30366	27836	25694	23859	22268	20877	19649	18557	17580	16701	15906	15183
54	68067	56723	48619	42542	37815	34033	30939	28361	26179	24309	22689	21271	20019	18907	17912	17016	16206	15469
55	69328	57773	49520	43330	38515	34663	31512	28886	26664	24760	23109	21664	20390	19257	18244	17331	16506	15756
56	70588	58823	50420	44118	39216	35294	32085	29411	27149	25210	23529	22058	20761	19607	18575	17647	16806	16042
57	71849	59874	51320	44905	39916	35924	32658	29937	27634	25660	23950	22452	21132	19957	18907	17962	17106	16329
58	73109	60924	52221	45693	40616	36554	33231	30462	28118	26110	24370	22846	21502	20308	19239	18277	17406	16615
59	74370	61975	53121	46481	41316	37184	33804	30987	28603	26560	24790	23240	21873	20658	19571	18592	17707	16902
60	75630	63025	54021	47269	42017	37815	34377	31512	29088	27010	25210	23634	22244	21008	19902	18907	18007	17188
61	76891	64075	54922	48057	42717	38445	34950	32037	29573	27461	25630	24028	22614	21358	20234	19222	18307	17475
62	78151	65126	55822	48844	43417	39075	35523	32563	30058	27911	26050	24422	22985	21708	20566	19537	18607	17761
63	79412	66176	56722	49632	44118	39705	36096	33088	30543	28361	26470	24816	23356	22058	20897	19852	18907	18048
64	80672	67227	57623	50420	44818	40336	36669	33613	31027	28811	26890	25210	23727	22408	21229	20168	19207	18334
65	81933	68277	58523	51208	45518	40966	37242	34138	31512	29261	27310	25604	24097	22759	21561	20483	19507	18621
66	83193	69328	59423	51996	46218	41596	37815	34663	31997	29711	27731	25997	24468	23109	21892	20798	19807	18907
67	84454	70378	60324	52783	46919	42226	38388	35189	32482	30162	28151	26391	24839	23459	22224	21113	20108	19194
68	85714	71428	61224	53571	47619	42857	38961	35714	32967	30612	28571	26785	25210	23809	22556	21428	20408	19480
69	86975	72479	72125	54359	48319	43487	39534	36239	33451	31062	28991	27179	25580	24159	22888	21743	20708	19766
70	88235	73529	63025	55147	49019	44117	40106	36764	33936	31512	29411	27573	25951	24509	23219	22058	21008	20053
71	89496	74580	63925	55935	49720	44747	40679	37289	34421	31962	29831	27967	26322	24859	23551	22373	21308	20339
72	90756	75630	64826	56723	50420	45378	41252	37815	34906	32413	30252	28361	26693	25210	23883	22689	21608	20626
73	92017	76680	65726	57510	51120	46008	41825	38340	35391	32863	30672	28755	27063	25560	24214	23004	21908	20912
74	93277	77731	66626	58298	51821	46638	42398	38865	35875	33313	31092	29149	27434	25910	24546	23319	22208	21199
75	94538	78781	67527	59086	52521	47268	42971	39390	36360	33763	31512	29543	27805	26260	24878	23634	22509	21485
76	95798	79832	68427	59874	53221	47899	43544	39916	36845	34213	31932	29937	28176	26610	25210	23949	22809	21772
77	97059	80882	69327	60662	53921	48529	44117	40441	37330	34663	32353	30330	28546	26960	25541	24264	23109	22058
78	98319	81933	70228	61449	54622	49159	44690	40966	37815	35114	32773	30724	28917	27310	25873	24579	23409	22345
79	99580	82983	71128	62237	55322	49789	45263	41491	38299	35564	33193	31118	29288	27661	26205	24894	23709	22631
80	100804	84033	72029	63024	56022	50420	45836	42016	38784	36014	33613	31512	29658	28011	26536	25210	24009	22918
81	102101	85084	72929	63813	56722	51050	46409	42542	39269	36464	34033	31906	30029	28361	26868	25525	24309	23204
82	103361	86134	73829	64601	57423	51680	46982	43067	39754	36914	34453	32300	30400	28711	27200	25840	24609	23491
83	104622	87185	74730	65388	58123	52310	47555	43592	40239	37365	34874	32694	30771	29061	27532	26155	24909	23777
84	105882	88235	75630	66176	58823	52941	44117	40724	37815	35294	33088	31141	29411	27863	26470	25210	24064	24064
85	107143	89285	76530	66964	59524	53571	48701	44642	41208	38265	35714	33482	31512	29761	28195	26785	25510	24350
86	108403	90336	77430	67752	60224	54201	49274	45168	41693	38715	36134	33876	31883	30112	28527	27100	25810	24637
87	109664	91386	78331	68540	60924	54831	49847	45693	42178	39165	36554	34269	32254	30462	28858	27415	26110	24923
88	110924	92437	79231	69328	61624	55462	50420	46218	42663	39615	36974	34663	32624	30812	29190	27731	26410	25210
89	112185	93487	80132	70115	62325	56092	50993	46743	43148	40066	37395	35057	32995	31163	29522	28046	26710	25496
90	113445	94538	81032	70903	63025	56722	51566	47268	43632	40516	37815	35451	33366	31512	29854	28361	27010	25783
91	114706	95588	81932	71691	63725	57352	52139	47794	44117	40966	38235	35845	33737	31862	30185	28676	27310	26069
92	115967	96638	82833	72479	64426	57983	52712	48319	44602	41416	38655	36239	34107	32212	30517	28991	27611	26355
93	117227	97689	83733	73267	65126	58613	53285	48844	45087	41866	39075	36633	34478	32563	30849	29306	27911	26642
94	118487	98739	84634	74054	65826	59243	53857	49369	45572	42317	39495	37027	34849	32913	31180	29621	28211	26928
95	119748	99790	85534	74842	66526	59873	54430	49895	46056	42767	39916	37421	35220	33263	31512	29936	28511	27215
96	121008	100840	86434	75630	67227	60504	55003	50420	46541	43217	40336	37815	35590	33613	31844	30252	28811	27501
97	122269	101890	87335	76418	67927	61134	55576	50945	47026	43667	40756	38209	35961	33963	32176	30567	29111	27788
98	123529	102941	88235	77206	68627	61764	56149	51470	47511	44117	41176	38602	36332	34313	32507	30882	29411	28074
99	124780	103991	89135	77993	69328	62394	56722	51995	47996	44567	41596	38996	36702	34663	32839	31197	29711	28361
100	126050	105042	90036	78781	70028	63025	57295	52521	48481	45018	42016	39390	37073	35014	33171	31512	30012	28647

Torque for 51-100 HP @ 230-1000 RPM

HP	Revolutions Per Minute																		
	230	240	250	260	270	280	290	300	350	400	450	500	550	600	650	700	800	900	1000
51	13975	13392	12857	12362	11904	11479	11083	10714	9183	8035	7141	6428	5844	5357	4945	4591	4017	3571	3314
52	14249	13655	13109	12605	12138	11704	11301	10924	9363	8193	7282	6554	5958	5462	5042	4681	4096	3641	3277
53	14523	13918	13361	12847	12371	11929	11518	11134	9543	8350	7422	6680	6073	5567	5138	4771	4175	3711	3340
54	14797	14180	13613	13089	12605	12154	11735	11344	9723	8508	7563	6806	6187	5672	5235	4861	4254	3781	3403
55	15071	14443	13865	13332	12838	12379	11953	11554	9903	8665	7703	6932	6302	5777	5332	4951	4332	3851	3466
56	15345	14705	14117	13574	13071	12605	12170	11764	10084	8823	7843	7058	6417	5882	5429	5042	4411	3921	3529
57	15619	14968	14369	13817	13305	12830	12387	11974	10264	8981	7983	7184	6531	5987	5526	5132	4490	3991	3592
58	15893	15231	14621	14059	13538	13055	12605	12184	10444	9138	8123	7310	6646	6092	5623	5222	4569	4061	3655
59	16167	15493	14873	14301	13772	13280	12822	12394	10624	9296	9263	7436	6760	6197	5720	5312	4648	4131	3718
60	16441	15756	15126	14544	14055	13505	13039	12605	10804	9453	8403	7563	6875	6302	5817	5402	4726	4201	3781
61	16715	16018	15378	14786	14239	13730	13257	12815	10984	9611	8543	7689	6990	6407	5914	5492	4805	4271	3844
62	16989	16281	15630	15029	14472	13955	13474	13025	11164	9768	8683	7815	7104	6512	6011	5582	4884	4341	3907
63	17263	16544	15882	15271	14705	14180	13691	13235	11344	9926	8823	7941	7219	6617	6108	5672	4963	4411	3970
64	17537	16806	16134	15513	14939	14405	13908	13445	11524	10084	8963	8067	7333	6722	6205	5762	5041	4481	4033
65	17811	17069	16386	15756	15172	14630	14126	13655	11704	10241	9103	8193	7448	6827	6302	5852	5120	4551	4096
66	18085	17331	16638	15998	15406	14855	14343	13865	11884	10399	9243	8319	7563	6932	6399	5942	5199	4621	4159
67	18359	17594	16890	16241	15639	15081	14560	14075	12064	10556	9383	8445	7677	7037	6496	6032	5278	4691	4222
68	18633	17857	17142	16483	15873	15306	14778	14285	12244	10714	9523	8571	7792	7142	6593	6122	5357	4761	4285
69	18907	18119	17394	16725	16106	15531	14995	14495	12424	10871	9663	8697	7906	7247	6690	6212	5435	4831	4348
70	19181	18382	17647	16968	16339	15756	15212	14705	12605	11029	9803	8823	8021	7352	6787	6302	5514	4901	4411
71	19455	18644	17899	17210	16573	15981	15430	14915	12785	11186	9943	8949	8135	7457	6884	6392	5593	4971	4474
72	19729	18907	18151	17453	16806	16206	15647	15126	12965	11344	10084	9075	8250	7563	6981	6482	5672	5042	4537
73	20003	19170	18403	17695	17040	16431	15864	15336	13145	11502	10224	9201	8365	7668	7078	6572	5751	5112	4600
74	20277	19432	18655	17937	17273	16656	16082	15546	13325	11659	10364	9327	8479	7773	7175	6662	5829	5182	4663
75	20551	19695	18907	18180	17507	16881	16299	15756	13505	11817	10504	9453	8594	7878	7272	6752	5908	5252	4726
76	20825	19957	19159	18422	17740	17106	16516	15966	13685	11974	10644	9579	8708	7983	7369	6842	5987	5322	4789
77	21099	20220	19411	18665	17973	17331	16734	16176	13865	12132	10784	9705	8823	8088	7466	6932	6066	5392	4852
78	21373	20483	19663	18907	18207	17557	16951	16386	14045	12289	10924	9831	8938	8193	7563	7022	6144	5462	4915
79	21647	20745	19915	19149	18440	17782	17168	16596	14225	12447	11064	9957	9052	8298	7659	7112	6223	5532	4978
80	21921	21008	20168	19392	18674	18007	17386	16806	14405	12605	11204	10084	9167	8403	7756	7202	6302	5602	5042
81	22195	21271	20420	19634	18907	18232	17603	17016	14585	12762	11344	10210	9281	8508	7853	7292	6381	5672	5105
82	22469	21533	20672	19877	19141	18457	17820	17226	14765	12920	11484	10336	9396	8613	7950	7382	6460	5742	5168
83	22743	21796	20924	20119	19374	18682	18038	17436	14945	13077	11624	10462	9511	8718	8047	7472	6538	5812	5231
84	23017	22058	21176	20362	19607	18907	18255	17647	15126	13235	11764	10588	9625	8823	8144	7563	6617	5882	5294
85	23291	22321	21428	20604	19841	19132	18472	17857	15306	13392	11904	10714	9740	8928	8241	7653	6696	5952	5357
86	23565	22584	21680	20846	20074	19357	18690	18067	15486	13550	12044	10840	9854	9033	8338	7743	6775	6022	5420
87	23840	22846	21932	21089	20308	19582	18907	18277	15666	13707	12184	10966	9969	9138	8435	7833	6853	6092	5483
88	24114	23109	22184	21331	20541	19807	19124	18487	15846	13865	12324	11092	10084	9243	8532	7923	6932	6162	5546
89	24388	23371	22436	21574	20775	20033	19342	18697	16026	14023	12464	11218	10198	9348	8629	8013	7011	6232	5609
90	24662	23634	22689	21816	21008	20258	19559	18907	16206	14180	12605	11344	10313	9453	8726	8103	7090	6302	5672
91	24936	23897	22941	22058	21241	20483	19776	19117	16386	14338	12745	11470	10427	9558	8823	8193	7169	6372	5735
92	25210	24159	23193	22301	21475	20708	19994	19327	16566	14495	12885	11596	10542	9663	8920	8283	7247	6442	5798
93	25484	24422	23445	22543	21708	20933	20211	19537	16746	14653	13025	11722	10656	9768	9017	8373	7326	6512	5861
94	25758	24684	23697	22786	21942	21158	20428	19747	16926	14810	13165	11848	10771	9873	9114	8463	7405	6582	5924
95	26032	24947	23949	23028	22175	21383	20646	19957	17106	14968	13305	11974	10886	9978	9211	8553	7484	6652	5987
96	26306	25210	24201	23270	22408	21608	20863	20168	17286	15126	13445	12100	11000	10084	9308	8643	7562	6722	6050
97	26580	25472	24453	23513	22642	21833	21080	20378	17466	15383	13585	12226	11115	10189	9405	8733	7641	6792	6113
98	26854	25735	24705	23755	22875	22058	21298	20588	17647	15441	13725	12352	11229	10294	9502	8823	7720	6862	6176
99	27128	25997	24957	23998	23109	22283	21515	20798	17827	15598	13865	12478	11344	10399	9599	8913	7799	6932	6239
100	27402	26260	25210	24240	23342	22509	21732	21008	18007	15756	14005	12605	11459	10504	9696	9003	7878	7002	6302

Electrical Formulas

To Find	Alternating Current		To Find	Alternating or Direct Current
	Single-Phase	Three-Phase		
Amperes when horsepower is known	$\dfrac{HP \times 746}{E \times Eff. \times pf}$	$\dfrac{HP \times 746}{1.73 \times E \times Eff. \times pf}$	Amperes when voltage and resistance is known	$\dfrac{E}{R}$
Amperes when kilowatts are known	$\dfrac{Kw \times 1000}{E \times pf}$	$\dfrac{Kw \times 1000}{1.73 \times E \times pf}$	Voltage when resistance and current are known	IR
Amperes when Kva are known	$\dfrac{Kva \times 1000}{E}$	$\dfrac{Kva \times 1000}{1.73 \times E}$	Resistance when voltage and current are known	$\dfrac{E}{I}$
Kilowatts	$\dfrac{I \times E \times pf}{1000}$	$\dfrac{1.73 \times I \times E \times pf}{1000}$		
Kva	$\dfrac{I \times E}{1000}$	$\dfrac{1.73 \times I \times E}{1000}$		
Horsepower = (output)	$\dfrac{I \times E \times Eff. \times pf}{746}$	$\dfrac{1.73 \times I \times E \times Eff. \times pf}{746}$		

I = Amperes; E = Volts; Eff. = Efficiency; pf = power factor;
Kva = Kilovolt amperes; Kw = Kilowatts; R = Ohms

General Information (Approximation)

All Values At 100% Load
{
At 1800 RPM, a motor develops 36 lb-in per hp
At 1200 RPM, a motor develops 54 lb-in per hp
At 575 volts, a 3-phase motor draws 1 amp per hp
At 460 volts, a 3-phase motor draws 1.25 amp per hp
At 230 volts, a 3-phase motor draws 2.5 amp per hp
At 230 volts, a single-phase motor draws 5 amp per hp
At 115 volts, a single-phase motor draws 10 amp per hp

Temperature Conversion:

Deg C = (Deg F - 32) × 5/9
Deg F = (Deg C × 9/5) + 32

Motor Amps @ Full Load †

HP	Alternating Current		DC	HP	Alternating Current		DC	HP	Alternating Current		DC	HP	Alternating Current		DC
	Single Phase	3-Phase			Single Phase	3-Phase			Single Phase	3-Phase			Single Phase	3-Phase	
1/2	4.9	2.0	2.7	5	28	14.4	20	25	....	60	92	75	....	180	268
1	8.0	3.4	4.8	7 1/2	40	21.0	29	30	....	75	110	100	....	240	355
1 1/2	10.0	4.8	6.6	10	50	26.0	38	40	....	100	146	125	....	300	443
2	12.0	6.2	8.5	15	....	38.0	56	50	....	120	180	150	....	360	534
3	17.0	8.6	12.5	20	....	50.0	74	60	....	150	215	200	....	480	712

† Values are for all speeds and frequencies @ 230 volts.
Amperage other than 230 volts can be figured:

$$V = \frac{230 \times \text{Amp from Table}}{\text{New Voltage}}$$

Example:

For 60 HP, 3 phase @ 550 volts: $\dfrac{(230 \times 150)}{550}$ = 62 amps.

Power Factor estimated @ 80% for most motors. Efficiency is usually 80-90%.

NEMA Electrical Enclosure Types

Type	Description
NEMA Type 1 (General Purpose)	For indoor use wherever oil, dust, or water is not a problem
NEMA Type 2 (Driptight)	Used indoors to exclude falling moisture and dirt
NEMA Type 3 (Weatherproof)	Provides protection against rain, sleet, and snow
NEMA Type 4 (Watertight)†	Needed when subject to great amounts of water from any angle — such as areas which are repeatedly hosed down

Type	Description
NEMA Type 5 Dust Tight (Non-Hazardous)	Used for excluding dust (All NEMA 12 and JIC enclosures are usually suitable for NEMA 5 use)
NEMA Type 9 Dust Tight (Hazardous)*	For locations where combustible dusts are present
NEMA Type 12 (Industrial Use)	Used for excluding oil, coolant, flying dust, lint, etc

NOTE: Joint Industry Conference (JIC) enclosures are similar in design to NEMA 12's.
For more complete details see NEMA or JIC Standards for enclosures.
† Not designed to be submerged.
* Class II Groups E, F, and G.

NEMA Frame Designation

Frame Assignments

HP	Motor Speed, RPM				HP	Motor Speed, RPM			
	3600	1800	1200	900		3600	1800	1200	900
1/8 - 1/3	—	48	—	—	15	215T, 256U	254T, 284U	284T, 324U	286T, 326U
1/8 - 1/2	48	—	56	—	20	254T, 284U	256T, 286U	286T, 326U	324T, 364U
1/6	—	—	48	—	25	256T, 286U	284T, 324U	324T, 364U	326T, 365U
1/3 - 1	—	56	—	—	30	284TS, 324S	286T, 326U	326T, 365U	364T, 404U
3/4 - 1	56	—	—	—	40	286TS, 326S	324T, 364U	364T, 404U	365T, 405U
1/2	—	—	—	143T	50	324TS, 364US	326T, 365U, 365US	365T, 405U	404T, 444U
3/4	—	—	143T	145T	60	326TS, 365US	364TS▲, 404U, 404US	404T, 444U	405T, 445U
1	—	143T	145T	182T	75	364TS, 404US	365TS▲, 405U, 405US	405T, 445U	444T
1 1/2	143T	145T	182T	184T	100	365TS, 405US	404TS▲, 444US	444T	445T
2	145T	145T	184T	213T	125	404TS, 444US	405TS▲, 445US	445T	—
3	145T	182T	213T	215T, 254U	150	405TS, 445US	444TS▲	—	—
5	182T	184T	215T, 254U	254T, 256U	200	444TS	445TS▲	—	—
7 1/2	184T	213T, 254U	254T, 256U	256T, 284U	250	445TS	—	—	—
10	213T, 254U	215T, 256U	256T, 284U	284T, 286U	—	—	—	—	—

Motor Frame Dimensions

Frame Size	D	E	2F	H Dia. (4) Holes	U Dia.	BA	V Min.	Key
48	3	2 1/8	2 3/4	11/32	1/2	2 1/2	...	3/64 FLAT
56	3 1/2	2 7/16	3	11/32	5/8	2 3/4	...	3/16 × 3/16 × 1 3/8
143T	3 1/2	2 3/4	4	11/32	7/8	2 1/4	2	3/16 × 3/16 × 1 3/8
145T	3 1/2	2 3/4	5	11/32	7/8	2 1/4	2	3/16 × 3/16 × 1 3/8
182T	4 1/2	3 3/4	4 1/2	13/32	1 1/8	2 3/4	2 1/2	1/4 × 1/4 × 1 3/4
184T	4 1/2	3 3/4	5 1/2	13/32	1 1/8	2 3/4	2 1/2	1/4 × 1/4 × 1 3/4
213T	5 1/4	4 1/4	5 1/2	13/32	1 3/8	3 1/2	3 1/8	5/16 × 5/16 × 2 3/8
215T	5 1/4	4 1/4	7	13/32	1 3/8	3 1/2	3 1/8	5/16 × 5/16 × 2 3/8
254U	6 1/4	5	8 1/4	17/32	1 3/8	4 1/4	3 1/2	5/16 × 5/16 × 2 3/4
254T	6 1/4	5	8 1/4	17/32	1 5/8	4 1/4	3 3/4	3/8 × 3/8 × 2 7/8
256U	6 1/4	5	10	17/32	1 3/8	4 1/4	3 1/2	5/16 × 5/16 × 2 3/4
256T	6 1/4	5	10	17/32	1 5/8	4 1/4	3 3/4	3/8 × 3/8 × 2 7/8
284U	7	5 1/2	9 1/2	17/32	1 5/8	4 3/4	4 5/8	3/8 × 3/8 × 3 3/4
284T	7	5 1/2	9 1/2	17/32	1 7/8	4 3/4	4 3/8	1/2 × 1/2 × 3 1/4
284TS	7	5 1/2	9 1/2	17/32	1 5/8	4 3/4	3	3/8 × 3/8 × 1 7/8
286U	7	5 1/2	11	17/32	1 5/8	4 3/4	4 5/8	3/8 × 3/8 × 3 3/4
286T	7	5 1/2	11	17/32	1 7/8	4 3/4	4 3/8	1/2 × 1/2 × 3 1/4
286TS	7	5 1/2	11	17/32	1 5/8	4 3/4	3	3/8 × 3/8 × 1 7/8
324U	8	6 1/4	10 1/2	21/32	1 7/8	5 1/4	5 3/8	1/2 × 1/2 × 4 1/4
324T	8	6 1/4	10 1/2	21/32	2 1/8	5 1/4	5	1/2 × 1/2 × 3 7/8
324TS	8	6 1/4	10 1/2	21/32	1 7/8	5 1/4	3 1/2	1/2 × 1/2 × 2
326U	8	6 1/4	12	21/32	1 7/8	5 1/4	5 3/8	1/2 × 1/2 × 4 1/4
326T	8	6 1/4	12	21/32	2 1/8	5 1/4	5	1/2 × 1/2 × 3 7/8
326TS	8	6 1/4	12	21/32	1 7/8	5 1/4	3 1/2	1/2 × 1/2 × 2
364U	9	7	11 1/4	21/32	2 1/8	5 7/8	6 1/8	1/2 × 1/2 × 5
364US	9	7	11 1/4	21/32	1 7/8	5 7/8	3 1/2	1/2 × 1/2 × 2
364T	9	7	11 1/4	21/32	2 3/8	5 7/8	5 5/8	5/8 × 5/8 × 4 1/4
364TS	9	7	11 1/4	21/32	1 7/8	5 7/8	3 1/2	1/2 × 1/2 × 2
365U	9	7	12 1/4	21/32	2 1/8	5 7/8	6 1/8	1/2 × 1/2 × 5
365US	9	7	12 1/4	21/32	1 7/8	5 7/8	3 1/2	1/2 × 1/2 × 2
365T	9	7	12 1/4	21/32	2 3/8	5 7/8	5 5/8	5/8 × 5/8 × 4 1/4
365TS	9	7	12 1/4	21/32	1 7/8	5 7/8	3 1/2	1/2 × 1/2 × 2
404U	10	8	12 1/4	13/16	2 3/8	6 5/8	6 7/8	5/8 × 5/8 × 5 1/2
404US	10	8	12 1/4	13/16	2 1/8	6 5/8	4	1/2 × 1/2 × 2 3/4
404T	10	8	12 1/4	13/16	2 7/8	6 5/8	7	3/4 × 3/4 × 5 5/8
404TS	10	8	12 1/4	13/16	2 1/8	6 5/8	4	1/2 × 1/2 × 2 3/4
405U	10	8	13 3/4	13/16	2 3/8	6 5/8	6 7/8	5/8 × 5/8 × 5 1/2
405US	10	8	13 3/4	13/16	2 1/8	6 5/8	4	1/2 × 1/2 × 2 3/4
405T	10	8	13 3/4	13/16	2 7/8	6 5/8	7	3/4 × 3/4 × 5 5/8
405TS	10	8	13 3/4	13/16	2 1/8	6 5/8	4	1/2 × 1/2 × 2 3/4
444U	11	9	14 1/2	13/16	2 7/8	7 1/2	8 3/8	3/4 × 3/4 × 7
444US	11	9	14 1/2	13/16	2 1/8	7 1/2	4	1/2 × 1/2 × 2 3/4
444T	11	9	14 1/2	13/16	3 3/8	7 1/2	8 1/4	7/8 × 7/8 × 6 7/8
444TS	11	9	14 1/2	13/16	2 3/8	7 1/2	4 1/2	5/8 × 5/8 × 3
445U	11	9	16 1/2	13/16	2 7/8	7 1/2	8 3/8	3/4 × 3/4 × 7
445US	11	9	16 1/2	13/16	2 1/8	7 1/2	4	1/2 × 1/2 × 2 3/4
445T	11	9	16 1/2	13/16	3 3/8	7 1/2	8 1/4	7/8 × 7/8 × 6 7/8
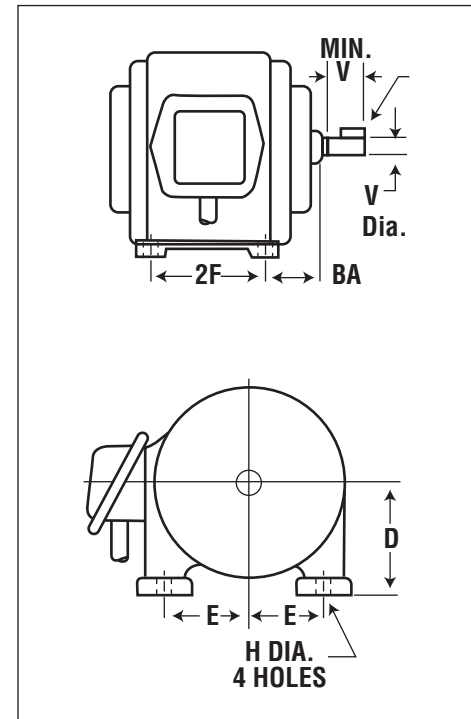
Shaded area indicates typical single phase standard squirreM-cage, open type, a-c motors. Balance of table same except three phase, design A and B.

▲ When these motors are used with v-belt or chain drives, the correct frame size is the one with the suffix "S" omitted — consult manufacturer.

Shaft Selection

Important factors to consider when calculating shaft size

(a) Shafting is subject to a **bending moment** and a **torsional moment.**

(b) Bending moment is that force which tends to **bend** a shaft.

(c) Torsional moment is that force which tends to **twist** a shaft.

(d) Shaft size is determined by the **combined action** of the bending and torsional moments.

Refer to Shaft Selection Charts 2 and 3 developed by the American Society of Mechanical Engineers to simplify selection. The charts should be used in conjunction with Service Factors (Table 1) to modify the selection for conditions under which the shaft will operate.

A = Shaft length from center of bearing to center of load

L = Unbalanced load in pounds

W = Suspended weight of elevator (chain, buckets, etc.) in pounds

R = Radius of wheel in inches

B = Bending moment

T = Torsional moment

$$B = A\,\frac{L + W}{2}\ \text{inch pounds}$$

$$T = R \times L\ \text{inch pounds}$$
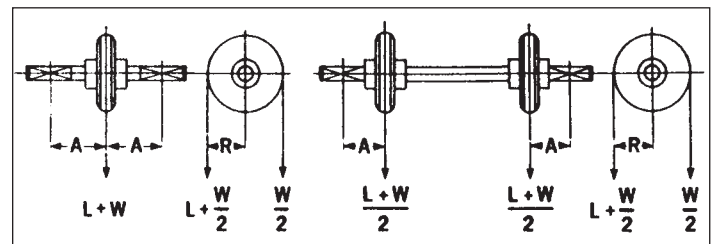
Selection Procedure

1. Compute the bending moment from the above formula.

2. Determine the service factor for bending that will suit conditions from table 1.

3. Compute the torsional moment from the above formula.

4. Determine the service factor for torsion that will suit conditions from table 1.

5. Draw a horizontal line across selection chart 2 or 3 on pages M-10 and M-11, from the point where the **torsional moment intersects** its selected service factor line.

6. Draw a vertical lineup selection chart 2 or 3 from the point where the **bending moment intersects** its selected factor line.

7. Intersection of above lines will give required shaft size.

8. For shafts not weakened by keyways, multiply the shaft size obtained by .91 For the corrected shaft size. See note at the bottom of Selection Chart 3.

Horsepower required may be computed directly from the righthand side of Selection Charts by correcting the figure in line with the horizontal torsional moment line by the speed in RPM.

Table 1 • Service Factors

Type of Loading	Service Factor	
	For Bending	For Torsion
Stationary Shafts –		
Gradually applied loads	1.0	1.0
Suddenly applied loads	1.5 to 2.0	1.5 to 2.0
Rotating Shafts –		
Gradually applied or steady loads	1.5	1.0
Suddenly applied loads –		
Minor shock only	1.5 to 2.0	1.0 to 1.5
Suddenly applied loads –		
Heavy shock	2.0 to 2.5	1.5 to 2.5

Selection Example:

Select shaft size for head shaft of chain conveyor subject to following requirements:

(a) Torsion (inch/lbs) — 20,500

(b) Bending moment (inch/lbs) — 13,300

(c) Service Factors:
    Torsion — 1.0
    Bending — 1.5

At the extreme left on Selection Chart 2, the torsion moment may be found for the Service Factor of 1.0. Draw a horizontal line to the right from the 20,500 point. The bending moment is given at the bottom of the chart. Find the 13,300 point; draw a line from this point to the right on the diagonal until it intersects the 1.5 Service Factor line, then project the line upward vertically until it intersects the horizontal line drawn from the 20,500 torsion point. At this intersection point, it is found that a shaft of approximately 2 13/16" diameter is required.

Select the nearest standard size shaft which is 2 15/16".

For a shaft subjected to the same conditions, but not weakened by keyways, the size of the shaft required would be (.91 × 2.8125) or 2.56 (29/16"). See note at the bottom of the charts.

On this same chart at the right, the horsepower ratings at 100 RPM are given based on the formula:

$$HP = \frac{TS}{63,000}$$

T = Torque in inch-pounds

S = Speed in RPM

The horsepower is directly proportional to the speed of the shaft in RPM.

Torsional Moment, in Thousands of Inch Pounds

DESIGN SHEAR STRESS	FACTOR
2000	1.4422
2500	1.3389
3000	1.2599
3500	1.1968
4000	1.1447
4500	1.1006
5000	1.0626
5500	1.0294
6000	1.0000
7000	0.9499
8000	0.9086
9000	0.8736
10000	0.8434
11000	0.8171
12000	0.7937

Selection charts are based on a **shear stress of 6000 PSI.** For a design shear stress other than 6000 PSI or heat-treated alloy shafting, diameter obtained from chart should be multiplied by the factors shown in the table above. When shafting does not contain keyways, size obtained from chart may be multiplied by a factor of **0.91**.

Horse Power Per 100 R.P.M.

SERVICE FACTORS

Bending Moment, in Thousands of Inch Pounds

Selection charts are based on a **shear stress of 6000 PSI**. For a design shear stress other than 6000 PSI or heat-treated alloy shafting, diameter obtained from chart should be multiplied by the factors shown in the table above. When shafting does not contain keyways, size obtained from chart may be multiplied by a factor of **0.91**.

DESIGN SHEAR STRESS	FACTOR
2000	1.4422
2500	1.3389
3000	1.2599
3500	1.1968
4000	1.1447
4500	1.1006
5000	1.0626
5500	1.0294
6000	1.0000
7000	0.9499
8000	0.9086
9000	0.8736
10000	0.8434
11000	0.8171
12000	0.7937

Torsional Moment, in Thousands of Inch Pounds

Horse Power Per 100 R.P.M.

SERVICE FACTORS

Bending Moment, in Thousands of Inch Pounds

Flywheel Formulas

Flywheels are occasionally used on a few machines, such as air compressors, to even out load pulsations. These formulas are useful in designing entire flywheel rims. It is also possible to use V-Belt sheaves as a flywheel thus eliminating the need for a separate flywheel in the system. Consult Martin with specific requirements.

Formulas for Entire Flywheel

W = weight (pounds)

R = radius of gyration (feet)

N = speed (RPM)

t = time to change from N1 to N2 (seconds)

F = face of rim (inches)

D = outside diameter of rim (inches)

d = inside diameter of rim (inches)

P = weight per cubic inch of material (pounds)

Kinetic energy of rotation of a flywheel (foot pounds) = $.0001705\ N^2(WR^2)$*.

Torque to accelerate or decelerate a flywheel uniformly (pound-inches) $= \dfrac{.03908(N_2 - N_1)(WR^2)\,*}{t}$

Where N_2 = final RPM and N_1 = initial RPM

Velocity at outside diameter (feet per minute) = 0.2618 ND

*WR^2 = flywheel effect (pounds × feet²). See table below for WR^2 of rims. Ordinarily the WR^2 of the rim only is considered. In unusual instances the relatively small WR^2 values of the hub and arms or web can be added directly to the $WR2^2$ of the rim if desired. To find the WR^2 of a hub or web use the WR^2 formula for rims, substituting the hub or web outside diameter, inside diameter, and width for D, d, and F respectively. When arms are used instead of a web an approximate WR^2 value of the arms is the total weight of the arms in pounds times the square of the radius in feet from the shaft center line to the mid-point of the arms between hub and rim.

Table 1 • Service Factors

Property	Cast Iron Rim (Based on .26 lb per cubic inch)	Steel Rim (Based on .283 lbs per cubic inch)	Rim of any Material (Weighing P Pounds per cubic inch)
Volume (Cubic Inches)	$.7854F(D^2 - d^2)$	$.7854F(D^2 - d^2)$	$.7854F(D^2 - d^2)$
W Weight (Pounds)	$.2042F(D^2 - d^2)$	$.2223F(D^2 - d^2)$	$.7854FP(D^2 - d^2)$
Radius of Gyration (Feet)	$\sqrt{\dfrac{.8681(D^2 + d^2)}{1000}}$	$\sqrt{\dfrac{.8681(D^2 + d^2)}{1000}}$	$\sqrt{\dfrac{.8681(D^2 + d^2)}{1000}}$
WR² Wt. × Sq. of Radius of Gyration (lb × Ft²)	$\dfrac{.1773F(D^4 - d^4)}{1000}$	$\dfrac{.1929F(D^4 - d^4)}{1000}$	$\dfrac{.6818FP(D^4 - d^4)}{1000}$
T▲ Tensile Load in Rim (lb)	$\dfrac{.3078FN^2(D^3 - d^3)}{1000}$	$\dfrac{.3350FN^2(D^3 - d^3)}{1000}$	$\dfrac{1.184PFN^2(D^3 - d^3)}{1000}$

▲ Centrifugal force causes this tensile load at each and every section of the rim. Thus on rims split into two or more sections, the fastening at each joint should be designed to take the full load as calculated from the formula below.

Electrical Formulas

R = Distance from the axis of rotation to the center of gravity of the body (feet)

N = Revolutions per minute (RPM)

v = Velocity of the center of gravity of the body (feet per second)

g = Acceleration due to gravity (32.16 commonly)

$$F = \dfrac{Wv^2}{gR} = \dfrac{WRN^2}{2933} = .000341\ WRN^2$$

F = Centrifugal force tending to move the body outward from the axis of rotation (pounds)

W = Weight of body (pounds)

NOTE: The steel weights in this section are nominal and are based on an approximate weight of 40.80 pounds per square foot, one inch thick. There may be differences between nominal weights and actual scale weights because of variation in manufacturing practices.

Hot Rolled and Cold Finished Steel Products Nominal Weight

Product	Thickness	Width	Length	Formulas	Product	Thickness	Diameter	Formulas
Plates, Strip and Flats	Inches	Inches	Inches	.2833 × T × W × L	Plate Circles	Inches	Inches	.2225 × T × D2
	Inches	Inches	Feet	3.4 × T × W × L		Inches	Feet	32.05 × T × D2
	Inches	Feet	Feet	40.8 × T × W × L	Sheet Circles	Inches	Inches	.228 × T × D2
	USS. Ga No.	Feet	Feet	Wt./Sq. Ft. × W × L		Inches	Feet	32.85 × T × D2
	Wt. per Sq. Ft.	Feet	Feet	Wt./Sq. Ft. × W × L	Bars { Square Round Hexagon Octagon	**Diameter**	**Length**	**Formulas**
Hot and C.R. Sheets	Inches	Inches	Inches	.2904 × T × W × L		Inches	Feet	3.4 × D2 × L
	Inches	Inches	Feet	3.485 × T × W × L		Inches	Feet	2.67 × D2 × L
	Inches	Feet	Feet	41.82 × T × W × L		Inches	Feet	2.945 × D2 × L
	USS. Ga No.	Feet	Feet	Wt./Sq. Ft. × W × L		Inches	Feet	2.817 × D2 × L
	Wt. per Sq. Ft.	Feet	Feet	Wt./Sq. Ft. × W × L	T = thickness L = length W = width D = diameter			

Steel Rounds

Size in Inches	Pounds Per Foot	Size in Inches	Pounds Per Foot
7/8	2.04	2 15/16	23.04
15/16	2.35	3	24.03
1	2.67	3 1/16	25.05
1 1/16	3.01	3 1/8	26.08
1 1/8	3.38	3 3/16	27.13
1 3/16	3.77	3 1/4	28.20
1 1/4	4.17	3 5/16	29.30
1 5/16	4.60	3 3/8	30.42
1 3/8	5.05	3 7/16	31.55
1 7/16	5.52	3 1/2	32.71
1 1/2	6.01	3 9/16	33.89
1 9/16	6.52	3 5/8	35.09
1 5/8	7.05	3 11/16	36.31
1 11/16	7.60	3 3/4	37.55
1 3/4	8.18	3 15/16	38.81
1 13/16	8.77	3 7/8	40.10
1 7/8	9.39	3 15/16	41.40
1 15/16	10.02	4	42.73
2	10.68	4 1/16	44.07
2 1/16	11.36	4 1/8	45.44
2 1/8	12.06	4 3/16	46.83
2 3/16	12.78	4 1/4	48.23
2 1/4	13.52	4 5/16	49.66
2 3/16	14.28	4 3/8	51.11
2 3/8	15.06	4 7/16	52.58
2 7/16	15.87	4 1/2	54.08
2 1/2	16.69	4 9/16	55.59
2 9/16	17.53	4 5/8	57.12
2 5/8	18.40	4 11/16	58.68
2 11/16	19.29	4 3/4	60.25
2 3/4	20.19	4 13/16	61.85
2 13/16	21.12	4 7/8	63.46
2 7/8	22.07	4 15/16	65.10

Standard Sheet Weights

Ga. Number	Thickness in Inches	Weight Per Square Foot in Pounds
Over 3/16" are plates		
7	.1793	7.500
8	.1644	6.875
9	.1494	6.250
10	.1345	5.625
11	.1196	5.000
12	.1046	4.375
13	.0897	3.750
14	.0747	3.125
15	.0673	2.812
16	.0598	2.500

Carbon Steel Plates

Size in Inches	Weight Per Square Foot in Pounds
3/16	7.76
1/4	10.20
5/16	12.75
3/8	15.30
7/16	17.85
1/2	20.40
9/16	22.95
5/8	25.50
3/4	30.60
13/16	33.15
7/8	35.70
1	40.80
1 1/8	45.90
1 1/4	51.00
1 3/8	56.10
1 1/2	61.20

Note: Stainless steel weighs approximately 10% more than carbon steel.

The information shown below is offered as a general guide to physical properties of steel in common use. Lower tensile properties are to be expected in large sections; the values of strength decrease as the size of the section increases. These values are not guaranteed and must **NOT** be used in specifying the raw materials or as a basis for acceptance or rejection of material. It must not be assumed that these properties will be obtained in all cases as they vary widely with permissible variations in analysis, size of section, rolling conditions, grain size, and methods of heat treatment. Dependable physical properties can only be obtained through carefully controlled analysis and heat treatment.

Average Properties of Standard Steel

AISI Number	SAE Number	Condition of Steel	Strength in 1000 PSI		% Elong. in 2"	% Red. of Area	Hardness		Machinability % of B1112 CD
			Tensile	Yield			Brinell	Rockwell	
B1112	1112	COLD DRAWN BESSEMER	75-90	60-70	12-16	40-50	170-185	80-95B	100
C1018	1018	NATURAL HOT ROLLED	55-70	40-50	25-35	50-65	120-140	-	55
		COLD DRAWN	70-85	50-70	18-25	45-55	160-180	80-90B	65
		1" RD. CARBURIZED AT 1700°F, COOLED IN BOX, REHEATED, QUENCHED – CORE PROPERTIES	90-100	60-80	10-22	35-50	200-230	93-98B	-
C1020	1020	NATURAL HOT ROLLED	60-80	40-50	25-35	50-65	120-145	60-98B	50
		COLD DRAWN	70-80	45-70	15-25	45-60	120-160	70-85B	60
C1117	1117	NATURAL HOT ROLLED	60-70	37-47	20-30	45-60	135-150	-	80
		COLD DRAWN	80-90	60-75	15-20	40-50	160-190	80-90B	90
		1" RD. CARBURIZED AT 1700°F, COOLED IN BOX, REHEATED, QUENCHED – CORE PROPERTIES	95-110	60-85	10-25	35-50	210-240	15-22C	-
C1035	1035	NATURAL HOT ROLLED	75-85	40-55	18-25	40-55	155-175	-	60
		COLD DRAWN	85-95	65-80	15-25	40-50	170-200	85-95B	65
		1" RD. QUENCHED, TEMPERED 1000°F	95-105	70-80	20-25	55-60	195-220	93-98B	55
C1040	1040	NATURAL HOT ROLLED	80-90	45-55	18-25	35-50	165-185	-	60
		COLD DRAWN	90-100	70-85	14-20	35-50	190-215	91-98B	62
		1" RD. QUENCHED, TEMPERED 1000°F	100-110	75-85	15-25	45-60	210-240	17-23C	52
C1042	1042	NATURAL HOT ROLLED	85-95	50-60	15-25	35-50	175-205	-	58
		COLD DRAWN	90-105	75-90	12-20	30-45	185-215	-	60
		1" RD. QUENCHED, TEMPERED 1000°F	105-120	80-90	15-25	40-60	215-250	-	-
C1045	1045	NATURAL HOT ROLLED	85-105	50-65	15-25	35-45	175-215	-	55
		COLD DRAWN	90-110	75-90	12-20	30-45	195-230	95-99B	58
		1" RD. QUENCHED, TEMPERED 1000°F	110-130	80-95	12-25	40-55	235-260	22-26C	47
C1141	1141	NATURAL HOT ROLLED	90-110	60-80	15-25	25-45	180-220	-	65
		COLD DRAWN	100-120	85-105	8-18	20-50	195-230	-	70
		1" RD. QUENCHED, TEMPERED 1000°F	120-145	100-130	10-20	35-50	270-310	-	-
C1144	1144	NATURAL HOT ROLLED	95-110	60-85	15-25	30-45	200-240	-	75
		COLD DRAWN	100-120	90-115	7-17	20-45	210-245	17-23C	85
		1" RD. QUENCHED, TEMPERED 1000°F	130-150	110-130	15	45	286-302	29-31C	-
C1050	1050	NATURAL HOT ROLLED	95-110	55-70	15-20	25-40	210-325	-	50
		1" RD. QUENCHED, TEMPERED 1000°F	115-135	85-100	10-22	35-50	240-265	23-27C	-
4140	4140	HOT ROLLED, ANNEALED	90-100	60-70	20-30	50-60	185-210	91-95B	55
		COLD DRAWN, ANNEALED	110-120	85-95	15-25	45-55	230-250	20-25C	65
		HEAT TREATED, COLD DRAWN.	140-155	125-140	12-20	45-55	270-300	26-30C	45
		1" RD. QUENCHED, TEMPERED 1000°F	150-160	130-140	15-20	50-60	320-350	34-37C	-
		2" RD. QUENCHED, TEMPERED 1000°F	145-155	125-135	15-20	50-60	320-345	33-36C	-
		3" RD. QUENCHED, TEMPERED 1000°F	130-145	115-125	15-20	55-65	280-310	28-32C	-
E52100	52100	HOT ROLLED, ANNEALED .	100-110	75-85	20-25	50-60	210-235	-	45
		1"" RD. QUENCHED, TEMPERED 1000°F	180-195	65-80	10-15	35-45	375-415	40-43C	-
8620	8620	NATURAL HOT ROLLED	90-95	55-65	18-25	45-60	160-200	85-95B	55
		COLD DRAWN	90-105	65-80	15-25	40-50	185-215	90-96B	60-70
		1" RD. CARBURIZED 1700°F., COOLED IN BOX, REHEATED, QUENCHED – CORE PROPERTIES	120-135	90-110	15-20	40-50	285-350	28-40C	-
8645	8645	NATURAL HOT ROLLED	105-125	55-75	15-25	35-50	220-270	20-28C	48-55
		HOT ROLLED, ANNEALED	100-110	50-60	20-25	40-55	210-230	17-21C	54
		2" RD. QUENCHED, TEMPERED 1000°F	140-150	110-125	15-20	45-55	300-320	30-34C	-
		3" RD. QUENCHED, TEMPERED 1000°F	130-140	105-115	15-20	50-60	285-310	29-32C	-
8742	8742	NATURAL HOT ROLLED	110-125	50-70	15-25	35-50	230-270	22-28C	45-50
		COLD DRAWN, ANNEALED	105-120	95-105	10-18	35-45	210-235	95-99B	60
		1" RD. QUENCHED, TEMPERED 1000°F	155-165	135-145	15-20	45-52	330-335	35-38C	-
		2" RD. QUENCHED, TEMPERED 1000°F	135-145	110-120	15-20	50-60	290-320	30-33C	-

Physical Properties of Various Metals

Metals and Alloys	Stress in Thousands of Pounds per Square Inch				Modulus of Elasticity 1,000,000 lb	Elongation %
	Tension Ultimate	Tension Yield Point	Compression Ultimate	Shea Ultimate		
ALUMINUM, TYPE 3003-0, ANNEALED	16	6	-	11	10	40
ALUMINUM, TYPE 3003-H18, HARD.	29	27	-	16	10	10
ALUMINUM, TYPE 5052-0, ANNEALED	28	13	-	18	10.2	30
ALUMINUM, TYPE 5052-H38, HARD.	42	37	-	24	10.2	8
ALUMINUM, TYPE 5056-0, ANNEALED	42	22	-	26	10.3	35
ALUMINUM, TYPE 2014-0, ANNEALED.	27	14	-	18	10.6	18
ALUMINUM, TYPE 2014-T4, HEAT TREATED	62	42	-	38	10.6	20
ALUMINUM, TYPE C4A, CASTING, SOLUTION HEAT TREAT	32	16	16▲	24	-	8.5
ALUMINUM, TYPE S5C, AS DIE CAST	30	16	16▲	19	-	9
BRASS, ALUMINUM, ANNEALED	60	27	-	-	16	55
BRASS, RED, 15% ZN, ANNEALED.	39	10	-	31	17	48
BRASS, RED, 15% ZN, HARD	70	57	-	42	17	5
BRASS, RED, LEADED, CAST, GRADE 4A	33-46	17-24	10-12▲	-	9.1-14.8	20-35
BRASS, RED, LEADED, CAST, GRADE 4B	30-38	12-17	11-12▲	-	-	15-27
BRASS, YELLOW, 35% ZN, ANNEALED	46	14	-	32	15	65
BRASS, YELLOW, 35% ZN, HARD.	74	60	-	43	15	8
BRONZE, ALUMINUM, AS CAST	67-95	27-45	-	-	15-18	5-35
BRONZE, COMMERCIAL, 10% ZN, ANNEALED.	37†	10†	-	28†	17	45†
BRONZE, MANGANESE, ANNEALED.	65†	30†	-	42†	15	33†
BRONZE, PHOSPHOR, ANNEALED	40-66	14-24	-	-	16-17	48-70
BRONZE, TIN, HIGH LEADED, CAST	23-38	11-22	12-16▲	-	8.5-13	7-20
BRONZE, TIN, LEADED, CAST	33-48	16-26	9-15▲	-	10.6-16	15-40
COPPER, BERYLLIUM, ANNEALED	60-80†	25-35†	-	50-60†	19	35-50†
INCONEL, CAST.	65-90	-	-	-	23	10-20
INCONEL, S, CAST	90-120	80-100	-	-	25	1-3
IRON, CAST, CLASS 30	30-34	-	115	44	15	-
IRON, CAST, CLASS 35	35-40	-	125	43	16	-
IRON, MALLEABLE, CLASS 32510	50	33	90	46	25	10-18
IRON, MALLEABLE, CLASS 35018	55	37	90	51	25	18-25
IRON, NODULAR (DUCTILE) CLASS 60-45-10.	60	45	120	-	22-25	10-25
IRON, NODULAR (DUCTILE) CLASS 80-60-3.	80	60	160	-	22-25	3-10
IRON, PEARLITIC, MALLEABLE	60-90	40-70	-	-	28	3-12
IRON, WROUGHT, HOT ROLLED	34-47	23-24	-	-	29	7-35
LEAD, HARD, ROLLED.	4.0-4.6	-	-	-	-	31-48
MONEL, CAST	65-90	32-45	-	-	23	20-50
MONEL, S, CAST	120-145	80-130	-	-	24.2	1-4
MONEL, SHAPES, PLATE, ETC., ANNEALED	70-85†	25-45†	-	-	26	35-50†
NICKEL, CAST	50-65	15-30	-	-	21.5	15-30
NICKEL, SILVER, ANNEALED	49-63†	18-30†	-	-	17-18	35-60†
STEEL, CAST CARBON, CLASS 70,000 NORMALIZED.	70	38	-	-	30	28
STEEL, CAST LOW ALLOY, CLASS 100,000, NORMALIZE & TEMPERED	100	68	-	-	29-30	20
STEEL, CAST LOW ALLOY, CLASS 120,000, QUENCHED AND TEMPERED	120	95	-	-	29-30	16
STEEL, CAST LOW ALLOY, CLASS 200,000, QUENCHED AND TEMPERED	200	170	-	-	29-30	5
STEEL, SHEETS	48	25	-	-	29-30	18-27
STEEL, STAINLESS, AUSTENITIC, TYPES 304, 316	85	35	-	-	28	55-60
STEEL, STAINLESS, MARTENSITIC, TYPE 416	75	40	-	-	29	30
STEEL, STRUCTURAL, BRIDGE AND BUILDING, ASTM A7	60-72	33	33▲	45-54	29-30	21
STEEL, STRUCTURAL, HIGH STRENGTH, LOW ALLOY, ASTM A242	63-72	42-50	42-50▲	47-53	29-30	18-24
ZINC, DIE CAST ALLOY, XXIII.	41	-	60▲	31	-	10

† When hardened, strength values are higher, elongation less.

▲ Compression yield point.

Hardness Conversion Chart

Martin

Brinell, Rockwell, and Scleroscope Hardness Numbers with Corresponding Tensile Strength

Brinell 10 MM Ball 3000 Kg	Rockwell "C" 120 Cone 150 Kg	Scleroscope Shore Model C	Tensile Strength 1000 Pound Per Square Inch
745	68	100	368
712	66	95	352
682	64	91	337
653	62	87	324
627	60	84	311
601	58	81	298
578	57	78	287
555	55	75	276
534	53	72	266
514	52	70	256
495	50	67	247
477	49	65	238
461	47	63	229
444	46	61	220
429	45	59	212
415	44	57	204
401	42	55	196
388	41	54	189
375	40	52	182
362	38	51	176
351	37	49	170
341	36	48	165
331	35	46	160
321	34	45	155
311	33	44	150
302	32	43	146
293	31	42	142
285	30	40	138
277	29	39	134
269	28	38	131
262	26	37	128
255	25	37	125
248	24	36	122
241	23	35	119
235	22	34	116
229	21	33	113
223	20	32	110
	Rockwell "B" 1/16" Ball 100 Kg.		
217	97	31	107
212	96	31	104
207	95	30	101
202	94	30	99
197	93	29	97
192	92	28	95
187	91	28	93
183	90	27	91
179	89	27	89
174	88	26	87

Decimal Equivalent Table

Decimal and Millimeter Equivalents of Fractions

Inches (Fractions)		Decimals	Millimeters	Inches (Fractions)		Decimals	Millimeters	Inches (Fractions)		Decimals	Millimeters
1/64	-------	0.015625	0.397	23/64	-------	0.359375	9.128	45/64	-------	0.703125	17.859
	1/32	0.03125	0.794		3/8	0.375	9.525		23/32	0.71875	18.256
3/64	-------	0.406875	1.191	25/64	-------	0.390625	9.922	47/64	-------	0.734375	18.653
	1/16	0.0625	1.588		13/32	0.40625	10.319		3/4	0.750	19.050
5/64	-------	0.078125	1.984	27/64	-------	0.421875	10.716	49/64	-------	0.765625	19.447
	3/32	0.09375	2.381		7/16	0.4375	11.113		25/32	0.78125	19.844
7/64	-------	0.109375	2.778	29/64	-------	0.453125	11.509	51/64	-------	0.796875	20.241
	1/8	0.125	3.175		15/32	0.46875	11.906		13/16	0.8125	20.638
9/64	-------	0.140625	3.572	31/64	-------	0.484375	12.303	53/64	-------	0.828125	21.034
	5/32	0.15625	3.969		1/2	0.500	12.700		27/32	0.84375	21.431
11/64	-------	0.171875	4.366	33/64	-------	0.515625	13.097	55/64	-------	0.859375	21.828
	3/16	0.1875	4.763		17/32	0.53125	13.494		7/8	0.875	22.225
13/64	-------	0.203125	5.159	35/64	-------	0.546875	13.891	57/64	-------	0.890625	22.622
	7/32	0.21875	5.556		9/16	0.5625	14.288		29/32	0.90625	23.019
15/64	-------	0.234375	5.953	37/64	-------	0.578125	14.684	59/64	-------	0.921875	23.416
	1/4	0.250	6.350		19/32	0.59375	15.081		15/16	0.9375	23.813
17/64	-------	0.265625	6.747	39/64	-------	0.609375	15.478	61/64	-------	0.953125	24.209
	9/32	0.28125	7.144		5/8	0.625	15.875		31/32	0.96875	24.606
19/64	-------	0.296875	7.541	41/64	-------	0.640625	16.272	63/64	-------	0.984375	25.003
	5/16	0.3125	7.938		21/32	0.65625	16.669		1	1.000	25.400
21/64	-------	0.328125	8.334	43/64	-------	0.671875	17.066				
	11/32	0.34375	8.731		11/16	0.6875	17.463				

Decimal Equivalents of Millimeters

MM	Inches	MM	Inches	MM	Inches	MM	Inches	MM	Inches	MM	Inches	MM	Inches	MM	Inches
0.1	.00394	9.5	0.37401	22.5	0.88582	35.5	1.39763	48.5	1.90944	61.5	2.42125	74.5	2.93306	87.5	3.44487
0.2	.00787	10.0	0.39370	23.0	0.90551	36.0	1.41732	49.0	1.92913	62.0	2.44094	75.0	2.95275	88.0	3.46456
0.3	.01181	10.5	0.41338	23.5	0.92519	36.5	1.43700	49.5	1.94881	62.5	2.46062	75.5	2.97243	88.5	3.48424
0.4	.01575	11.0	0.43307	24.0	0.94488	37.0	1.45669	50.0	1.96850	63.0	2.48031	76.0	2.99212	89.0	3.50393
0.5	.01968	11.5	0.45275	24.5	0.96456	37.5	1.47637	50.5	1.98818	63.5	2.49999	76.5	3.01180	89.5	3.52361
0.6	.02362	12.0	0.47244	25.0	0.98425	38.0	1.49606	51.0	2.00787	64.0	2.51968	77.0	3.03149	90.0	3.54330
0.7	.02756	12.5	0.49212	25.5	1.00393	38.5	1.51574	51.5	2.02755	64.5	2.53936	77.5	3.05117	90.5	3.56298
0.8	.03149	13.0	0.51181	26.0	1.02362	39.0	1.53543	52.0	2.04724	65.0	2.55905	78.0	3.07086	91.0	3.58267
0.9	.03543	13.5	0.53149	26.5	1.04330	39.5	1.55511	52.5	2.06692	65.5	2.57873	78.5	3.09054	91.5	3.60235
1.0	.03937	14.0	0.55118	27.0	1.06299	40.0	1.57480	53.0	2.08661	66.0	2.59842	79.0	3.11023	92.0	3.62204
1.5	.05905	14.5	0.57086	27.5	1.08267	40.5	1.59488	53.5	2.10629	66.5	2.61810	79.5	3.12991	92.5	3.64172
2.0	.07874	15.0	0.59055	28.0	1.10236	41.0	1.61417	54.0	2.12598	67.0	2.63779	80.0	3.14960	93.0	3.66141
2.5	.09842	15.5	0.61023	28.5	1.12204	41.5	1.63385	54.5	2.14566	67.5	2.65747	80.5	3.16928	93.5	3.68109
3.0	.11811	16.0	0.62992	29.0	1.14173	42.0	1.65354	55.0	2.16535	68.0	2.67716	81.0	3.18897	94.0	3.70078
3.5	.13779	16.5	0.64960	29.5	1.16141	42.5	1.67322	55.5	2.18503	68.5	2.69684	81.5	3.20865	94.5	3.72046
4.0	.15748	17.0	0.66929	30.0	1.18110	43.0	1.69291	56.0	2.20472	69.0	2.71653	82.0	3.22834	95.0	3.74015
4.5	.17716	17.5	0.68897	30.5	1.20078	43.5	1.71259	56.5	2.22440	69.5	2.73621	82.5	3.24802	95.5	3.75983
5.0	.19685	18.0	0.70866	31.0	1.22047	44.0	1.73228	57.0	2.24409	70.0	2.75590	83.0	3.26771	96.0	3.77952
5.5	.21653	18.5	0.72834	31.5	1.24015	44.5	1.75196	57.5	2.26377	70.5	2.77558	83.5	3.28739	96.5	3.79920
6.0	.23622	19.0	0.74803	32.0	1.25984	45.0	1.77165	58.0	2.28346	71.0	2.79527	84.0	3.30708	97.0	3.81889
6.5	.25590	19.5	0.76771	32.5	1.27952	45.5	1.79133	58.5	2.30314	71.5	2.81495	84.5	3.32676	97.5	3.83857
7.0	.27559	20.0	0.78740	33.0	1.29921	46.0	1.81102	59.0	2.32283	72.0	2.83464	85.0	3.34645	98.0	3.85826
7.5	.29527	20.5	0.80708	33.5	1.31889	46.5	1.83070	59.5	2.34251	72.5	2.85432	85.5	3.36613	98.5	3.87794
8.0	.31496	21.0	0.82677	34.0	1.33858	47.0	1.85039	60.0	2.36220	73.0	2.87401	86.0	3.38682	99.0	3.89763
8.5	.34464	21.5	0.84645	34.5	1.35826	47.5	1.87007	60.5	2.38188	73.5	2.89369	86.5	3.40550	99.5	3.91731
9.0	.35433	22.0	0.86614	35.0	1.37795	48.0	1.88976	61.0	2.40157	74.0	2.91338	87.0	3.42519	100.0	3.93700

English Metric System Equivalents

Martin

Decimal Equivalents of Millimeters

Unit	Millimeters	Centimeters	Inches	Feet	Yards	Meters
1 MILLIMETER =	1	.1	.03937	.003281	.001094	.001
1 CENTIMETER =	10	1	.3937	.032808	.010936	.01
1 INCH =	25.4001	2.54001	1	.083333	.027778	.025400
1 FOOT =	304.801	30.4801	12	1	.333333	.304801
1 YARD =	914.402	91.4402	36	3	1	.914402
1 METER =	1000	100	39.37	3.28083	1.09361	1

Unit	Feet	Yards	Meters	Rods	Furlongs	Miles (Statute)
1 ROD =	16.5	5.5	5.02921	1	.025 (1/40)	.003125 (1/320)
1 FURLONG =	660	220	201.168	40	1	.125 (1/8)
1 KILOMETER =	3280.8	1093.6	1000	199	4.971	.62137
1 MILE (STATUTE) =	5280	1760	1609.35	320	8	1

1 NAUTICAL MILE = 6080.2 FEET = 1.15155 STATUTE MILES = 1/3 LEAGUE.
1 LIGHT YEAR = 5.879 TRILLION MILES = 9.46 TRILLION KILOMETERS.

Weight Equivalents

Unit	Grains	Grams	Ounces (Troy)	Ounces (Avoir.)	Pounds (Troy)	Pounds (Avoir.)	Kilograms
1 MILLIMETER =	1	.064799	.002083	.002286	.000174	.000143	.000065
1 OUNCE (TROY) =	480	31.1035	1	1.09714	.083333	.068571	.031104
1 OUNCE (AVOIR.) =	437.5	28.3495	.911458	1	.075955	.0625	.028350
1 POUND (TROY) =	5760	373.242	12	13.1657	1	.822857	.373242
1 POUND (AVOIR.) =	7000	453.592	14.5833	16	1.21528	1	.453592
1 KILOGRAM =	15432.4	1000	32.1507	35.2740	2.67923	2.20462	1

Unit	Kilograms	Pounds (Troy)	Pounds (Avoir.)	Metric Tons	Net (Short) Tons	Gross (Long) Tons
1 METRIC TON =	1000	2679.23	2204.62	1	1.10231	.984206
1 NET (SHORT) TON =	907.185	2430.56	2000	.907185	1	.892857
1 GROSS (LONG) TON =	1016.05	2722.22	2240	1.01605	1.12	1

Volume and Capacity Equivalents

Unit	Cubic Centimeters	Cubic Inches	Liters	Quarts (Liquid)	Quarts (Dry)	Gallons (Liquid)	Gallons (Dry)	Cubic Feet
1 CU. CENTIMETER =	1	.06102	.001	.00106	.00091	.00026	.00023	.00004
1 CU. INCH =	16.387	1	.01639	.01732	.01488	.00433	.00372	.00058
1 GILL =	118.29	7.2188	.11829	.125	.10742	.03125	.02686	.00418
1 PINT (LIQUID) =	473.18	28.875	.47318	.5	.42968	.125	.10742	.01671
1 PINT (DRY) =	550.62	33.600	.55062	.58182	.5	.14546	.125	.01945
1 LITER =	1000	61.023	1	1.0567	.90808	.26417	.22702	.03531
1 QUART (LIQUID) =	946.36	57.75	.94636	1	.85937	.25	.21484	.03342
1 QUART (DRY) =	1101.2	67.201	1.1012	1.1637	1	.29091	.25	.03889
1 GALLON (LIQUID) =	3785.4	231	3.7854	4	3.4375	1	.85937	.13368
1 GALLON (DRY) =	4404.9	268.80	4.4049	4.6546	4	1.1636	1	.15556
1 PECK =	8809.8	537.61	8.8098	9.3092	8	2.3273	2	.31111
1 CU. FOOT =	28317.0	1728	28.317	29.922	25.714	7.4805	6.4285	1
1 BUSHEL =	35239.3	2150.4	35.239	37.237	32	9.3092	8	1.2445
1 BARREL =	119241.2	7276.5	119.24	126	108.28	31.5	27.070	4.2109
1 CU. YARD =	764559.4	46656	764.56	807.90	694.28	201.97	173.57	27
1 CU. METER =	1000000	61023.4	1000	1056.7	908.08	264.17	227.02	35.314

Area Equivalents

Unit	Cubic Centimeters	Cubic Inches	Liters	Quarts (Liquid)
1 SQUARE FOOT =	144	1	.1111	.09290
1 SQUARE YARD =	1296	9	1	.83613
1 SQUARE METER =	1550	10.7639	1.19599	1
1 SQUARE ROD =	39204	272.25	30.25	25.293
1 ARE =	155000	1076.39	119.599	100
1 ACRE =	6272640	43560	4840	4046.86
1 SQUARE MILE (640 ACRES) =	–	27878400	3097600	2589999
1 SQUARE KILOMETER =	–	10763867	1195985	1000000

Power Equivalents

Unit	BTU/Hour	Foot-Pound/Hour	Foot-Pound/Minute	HP	HP (Metric)	Watt	Kilowatt
1 BTU/HR. =	1	778.1688	12.96948	.000393	.000398	.293071	.000293
1 FT.LB./HR. =	.001285	1	–	5.05×10^{-7}	5.12×10^{-7}	.0003766	3.766×10^{-7}
1 FT.LB./MIN. =	.077104	–	1	3.0303×10^{-5}	3.072×10^{-7}	.022597	2.26×10^{-5}
1 HP =	2544.43	1980000	33000	1	1.01387	745.699	.7457
1 HP MET. =	2509.622	1952914	32548.56	.986320	1	735.499	.735499
1 WATT =	3.41214	2655.224	44.2537	.0013410	.0013596	1	.001

NOTE: Foot-Pounds indicates energy.
Pound-Feet indicates torque (Page M-2).

Metric System

Length

1 meter (m) = { 10 decimeters(dm)
100 centimeters(cm)
1,000 millimeters(mm)

1 dekameter (dkm) = 10 meters (m)
1 hectometer (hm) = 100 meters (m)
1 kilometer (km) = 1,000 meters (m)

Weight

1 gram (g) = { 10 decigrams (dg)
100 centigrams (cg)
1,000 milligrams (mg)

1 dekagram (dkg) = 10 grams (g)
1 hectogram (hg) = 100 grams (g)
1 kilogram (kg = 1000 grams (g)
1 metric ton = { 1000 kilograms (kg)
1,000,000 grams (g)

Volume & Capacity

1 liter (l) = { 1 cubic decimeter(dm³)
10 deciliters (dl)
100 centiliters(cl)
1,000 milliliters (ml)
1,000 cubic centimeters (cm³ or cc)

1 dekaliter (dkl) = 10 liters (l)
1 hectoliter (hl) = 100 liters (l)

1 kiloliter (kl) = { 1 cubic meter (m³)
1 stere (s)
1,000 liters (l)

Area

1 centare (ca) = { 1 square meter (m²)
100 square decimeters (dm²)
10,000 square centimeters (cm²)
1,000,000 square millimeters (mm²)

1 are (a) = { 1 square dekameter (dkm²)
100 square meters (m²)

1 hectare (ha) = { 100 ares (a)
10,000 square meters (m²)

1 square kilometer (km²) = 10 meters (m)

Other prefixes commonly used:

micro — one millionth
deca — 10 times (same as deka)
myria — 10,000 times
mega — 1,000,000 times

Engineering Formulas and Constants

Circle

Area = Square of Diameter × .7854
or square of Radius × 3.1416

Circumference = Diameter × 3.1416

Diameter = Circumference × .3183

Doubling diameter increases area four times; tripling diameter increases area nine times, etc.

Square

Area = Square of Side

Diagonal = Side × 1.4142

Side = Diagonal × .7071

Square Inscribed in Circle

Side of Square = Diameter of Circle × .7071
or Circumference of Circle × .2251

Diameter of Circle = Side of Square × 1.4142

Circumference of Circle = Side of Square × 4.4429

Square and Circle with Equal Area

Side of Square = Diameter of Circle × .8862

Diameter of Circle = Side of Square × 1.128

Circumference of Circle = Side of Square × 3.545

Rectangle

Area = Length × Width

Diagonal = Square root of sum of squares of width and length

Triangle

Area = Base × 1/2 of Perpendicular Height

Sphere

Area of Surface = Square of Diameter × 3.1416

Volume = Cube of Diameter × .5236

Cube

Area of Surface = Square of Side × 6

Volume = Cube of Side

Diagonal = Side × 1.732

Cylinder

Area of Curved Surface = Diameter × Length × 3.1416

Volume = Square of Diameter × Length × .7854

Cone

Area of Curved Surface = Diameter of Base × Slant Height × 1.5708

Volume = Diameter of Base Squared × Perpindicular Height × .2618 or Area of Base × 1/3 Perpendicular Height

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1 HP = 33,000 Foot-pounds of work per minute.

1 BTU = Heat required to raise 1 pound of water °F.

1 Kilowatt Hour = 3415 BTU

1 Radian = 57.296 degrees.

1 Register Ton = 100 cubic feet

1 U.S. Shipping Ton = 40 cubic feet

1 British Shipping Ton = 42 cubic feet

1 Cubic Foot/Minute = 471.9474 cubic cm/second

1 Cubic Foot/Minute = .1246753 gallons (U.S.)/second

1 Cubic Foot/Second = 2.2222 cubic yards/minute

1 Gallon (U.S.)/Minute = 8.020834 cubic feet/hour

1 Gallon (U.S.)/Minute = 3.785412 liter/minute

1 Liter/Minute = 2.118880 cubic feet/hour

1 Cubic Mitre/Minute = 264.1720 Gallons (U.S.)/Minute

1 Pound/Gallon (U.S.) = 7.480519 pound/cubic feet

1 Mile/Hour = 88 feet/minute

1 Foot/Minute = .01136364 miles/hour

1 Pound per Square Inch Pressure (PSI) = 144 pounds/square foot = 2.3095 feet fresh water at 62°F = 2.0355 inches mercury at 32°F = 2.0416 inches mercury at 62°F = .068 atmospheres.

Water Pressure (pounds per square inch) = .433 × height of water in feet (Fresh water at 62°F).

Weight of 1 cubic foot of fresh water = 62.355 pounds at 62°F = 59.76 pounds at 212°F.

Weight of 1 gallon (U.S.) water = 8.34 pounds

Weight of 1 cubic foot of Air at 14.7 lbs per square inch Pressure = .07608 pounds at 62°F = .08703 pounds at 32°F.

Watts = Amperes × Volts

1 Watt-Hour = 3.41214 BTU = 859.845 Calorie = 3600 Joule.

g = Acceleration due to gravity at Sea Level, Latitude 45° = 32.1726 Feet/Second squared.

1 pound-foot (torque) = 1.355818 Newton-Metre

Circumferences and Areas of Circles (1 — 31 7/8 Diameters)

Diameter	Circumference	Area	Diameter	Circumference	Area	Diameter	Circumference	Area	Diameter	Circumference	Area	Diameter	Circumference	Area
1	3.1416	0.7854	5 1/2	17.2788	23.758	14	43.9823	153.94	23	72.2566	415.48			
1 1/16	3.3379	0.8866	5 9/16	17.4751	24.301	14 1/8	44.3750	156.70	23 1/8	72.6493	420.00			
1 1/8	3.5343	0.9940	5 5/8	17.6715	24.850	14 1/4	44.7677	159.48	23 1/4	73.0420	424.56			
1 3/16	3.7306	1.1075	5 11/16	17.8678	25.406	14 3/8	45.1604	162.30	23 3/8	73.4347	429.13			
1 1/4	3.9270	1.2272	5 3/4	18.0642	25.967	14 1/2	45.5531	165.13	23 1/2	73.8274	433.74			
1 5/16	4.1233	1.3530	5 13/16	18.2605	26.535	14 5/8	45.9458	167.99	23 5/8	74.2201	438.36			
1 3/8	4.3197	1.4849	5 7/8	18.4569	27.100	14 3/4	46.3385	170.87	23 3/4	74.6128	443.01			
1 7/16	4.5160	1.6230	5 15/16	18.6532	27.688	14 7/8	46.7312	173.78	23 7/8	75.0055	447.69			
1 1/2	4.7124	1.7671	6	18.8496	28.274	15	47.1239	176.71	24	75.3982	452.39			
1 9/16	4.9087	1.9175	6 1/8	19.2423	29.465	15 1/8	47.5166	179.67	24 1/8	75.7909	457.11			
1 5/8	5.1051	2.0739	6 1/4	19.6350	30.680	15 1/4	47.9093	182.65	24 1/4	76.1836	461.86			
1 11/16	5.3014	2.2365	6 3/8	20.0277	31.919	15 3/8	48.3020	185.66	24 3/8	76.5763	466.64			
1 3/4	5.4978	2.4053	6 1/2	20.4204	33.183	15 1/2	48.6947	188.69	24 1/2	76.9690	471.44			
1 13/16	5.6941	2.5802	6 5/8	20.8131	34.472	15 5/8	49.0874	191.75	24 5/8	77.3617	476.26			
1 7/8	5.8905	2.7612	6 3/4	21.2058	35.785	15 3/4	49.4801	194.83	24 3/4	77.7544	481.11			
1 15/16	6.0868	2.9483	6 7/8	21.5984	37.122	15 7/8	49.8728	197.93	24 7/8	78.1471	485.98			
2	6.2832	3.1416	7	21.9911	38.485	16	50.2655	201.06	25	78.5398	490.87			
2 1/16	6.4795	3.3410	7 1/8	22.3838	39.871	16 1/8	50.6582	204.22	25 1/8	78.9325	495.79			
2 1/8	6.6759	3.5466	7 1/4	22.7765	41.282	16 1/4	51.0509	207.39	25 1/4	79.3252	500.74			
2 3/16	6.8722	3.7583	7 3/8	23.1692	42.718	16 3/8	51.4436	210.60	25 3/8	79.7179	505.71			
2 1/4	7.0686	3.9761	7 1/2	23.5619	44.179	16 1/2	51.8363	213.82	25 1/2	80.1106	510.71			
2 5/16	7.2649	4.2000	7 5/8	23.9546	45.664	16 5/8	52.2290	217.08	25 5/8	80.5033	515.72			
2 3/8	7.4613	4.4301	7 3/4	24.3473	47.173	16 3/4	52.6217	220.35	25 3/4	80.9060	520.77			
2 7/16	7.6576	4.6664	7 7/8	24.7400	48.707	16 7/8	53.0144	223.65	25 7/8	81.2887	525.84			
2 1/2	7.8540	4.9087	8	25.1327	50.265	17	53.4071	226.98	26	81.6814	530.93			
2 9/16	8.0503	5.1572	8 1/8	25.5254	51.849	17 1/8	53.7998	230.33	26 1/8	82.0741	536.05			
2 5/8	8.2467	5.4119	8 1/4	25.9181	53.456	17 1/4	54.1925	233.71	26 1/4	82.4668	541.19			
2 11/16	8.4430	5.6727	8 3/8	26.3108	55.088	17 3/8	54.5852	237.10	26 3/8	82.8595	546.35			
2 3/4	8.6394	5.9396	8 1/2	26.7035	56.745	17 1/2	54.9779	240.53	26 1/2	83.2522	551.55			
2 13/16	8.8357	6.2126	8 5/8	27.0962	58.426	17 5/8	55.3706	243.98	26 5/8	83.6449	556.76			
2 7/8	9.0321	6.4918	8 3/4	27.4889	60.132	17 3/4	55.7633	247.45	26 3/4	84.0376	562.00			
2 15/16	9.2284	6.7771	8 7/8	27.8816	61.862	17 7/8	56.1560	250.95	26 7/8	84.4303	567.27			
3	9.4248	7.0686	9	28.2743	63.617	18	56.5487	254.47	27	84.8230	572.56			
3 1/16	9.6211	7.3662	9 1/8	28.6670	65.397	18 1/8	56.9414	258.02	27 1/8	85.2157	577.87			
3 1/8	9.8175	7.6699	9 1/4	29.0597	67.201	18 1/4	57.3341	261.59	27 1/4	85.6084	583.21			
3 3/16	10.0138	7.9798	9 3/8	29.4524	69.029	18 3/8	57.7268	265.18	27 3/8	86.0011	588.57			
3 1/4	10.2102	8.2958	9 1/2	29.8451	70.882	18 1/2	58.1195	268.80	27 1/2	86.3938	593.96			
3 5/16	10.4065	8.6179	9 5/8	30.2378	72.760	18 5/8	58.5122	272.45	27 5/8	86.7865	599.37			
3 3/8	10.6029	8.9462	9 3/4	30.6305	74.662	18 3/4	58.9049	276.12	27 3/4	87.1792	604.81			
3 7/16	10.7992	9.2806	9 7/8	31.0232	76.589	18 7/8	59.2976	279.81	27 7/8	87.5719	610.27			
3 1/2	10.9956	9.6211	10	31.4159	78.540	19	59.6903	283.53	28	87.965	615.75			
3 9/16	11.1919	9.9678	10 1/8	31.8086	80.516	19 1/8	60.0830	287.27	28 1/8	88.357	621.26			
3 5/8	11.3883	10.321	10 1/4	32.2013	82.516	19 1/4	60.4757	291.04	28 1/4	88.750	626.80			
3 11/16	11.5846	10.680	10 3/8	32.5940	84.541	19 3/8	60.8684	294.83	28 3/8	89.143	632.36			
3 3/4	11.7810	11.045	10 1/2	32.9867	86.590	19 1/2	61.2611	298.65	28 1/2	89.535	637.94			
3 13/16	11.9773	11.416	10 5/8	33.3794	88.664	19 5/8	61.6538	302.49	28 5/8	89.928	643.55			
3 7/8	12.1737	11.793	10 3/4	33.7721	90.763	19 3/4	62.0465	306.35	28 3/4	90.321	649.18			
3 15/16	12.3700	12.177	10 7/8	34.1648	92.886	19 7/8	62.4392	310.24	28 7/8	90.713	654.84			
4	12.5664	12.566	11	34.5575	95.033	20	62.8319	314.16	29	91.106	660.52			
4 1/16	12.7627	12.962	11 1/8	34.9502	97.205	20 1/8	63.2246	318.10	29 1/8	91.499	666.23			
4 1/8	12.9591	13.364	11 1/4	35.3429	99.402	20 1/4	63.6173	322.06	29 1/4	91.892	671.96			
4 3/16	13.1554	13.772	11 3/8	35.7356	101.62	20 3/8	64.0100	326.05	29 3/8	92.284	677.71			
4 1/4	13.3518	14.185	11 1/2	36.1283	103.87	20 1/2	64.4026	330.06	29 1/2	92.677	683.49			
4 5/16	13.5481	14.607	11 5/8	36.5210	106.14	20 5/8	64.7953	334.10	29 5/8	93.070	689.30			
4 3/8	13.7445	15.033	11 3/4	36.9137	108.43	20 3/4	65.1880	338.16	29 3/4	93.462	695.13			
4 7/16	13.9408	15.466	11 7/8	37.3064	110.75	20 7/8	65.5807	342.25	29 7/8	93.855	700.98			
4 1/2	14.1372	15.904	12	37.6991	113.10	21	65.9734	346.36	30	94.248	706.86			
4 9/16	14.3335	16.349	12 1/8	38.0918	115.47	21 1/8	66.3661	350.50	30 1/8	94.640	712.70			
4 5/8	14.5299	16.800	12 1/4	38.4845	117.86	21 1/4	66.7588	354.66	30 1/4	95.033	718.69			
4 11/16	14.7262	17.257	12 3/8	38.8772	120.28	21 3/8	67.1515	358.84	30 3/8	95.426	724.64			
4 3/4	14.9226	17.721	12 1/2	39.2699	122.72	21 1/2	67.5442	363.05	30 1/2	95.819	730.62			
4 13/16	15.1189	18.190	12 5/8	39.6626	125.19	21 5/8	67.9369	367.28	30 5/8	96.211	736.62			
4 7/8	15.3153	18.665	12 3/4	40.0553	127.68	21 3/4	68.3296	371.54	30 3/4	96.604	742.64			
4 15/16	15.5116	19.147	12 7/8	40.4480	130.19	21 7/8	68.7223	375.83	30 7/8	96.997	748.69			
5	15.7080	19.635	13	40.8407	132.73	22	69.1150	380.13	31	97.389	754.77			
5 1/16	15.9043	20.129	13 1/8	41.2334	135.30	22 1/8	69.5077	384.46	311/8	97.782	760.87			
5 1/8	16.1007	20.629	13 1/4	41.6261	137.89	22 1/4	69.9004	388.82	311/4	98.175	766.99			
5 3/16	16.2970	21.135	13 3/8	42.0188	140.50	22 3/8	70.2931	393.20	313/8	98.567	773.14			
5 1/4	16.4934	21.648	13 1/2	42.4115	143.14	22 1/2	70.6858	397.61	311/2	98.960	779.31			
5 5/16	16.6897	22.166	13 5/8	42.8042	145.80	22 5/8	71.0785	402.04	315/8	99.353	785.51			
5 3/8	16.8861	22.691	13 3/4	43.1969	148.49	22 3/4	71.4712	406.49	313/4	99.746	791.73			
5 7/16	17.0824	23.221	13 7/8	43.5896	151.20	22 7/8	71.8639	410.97	317/8	100.138	797.98			

Trigonometric Functions

Martin

Right Angle Triangle
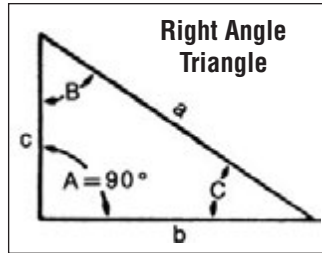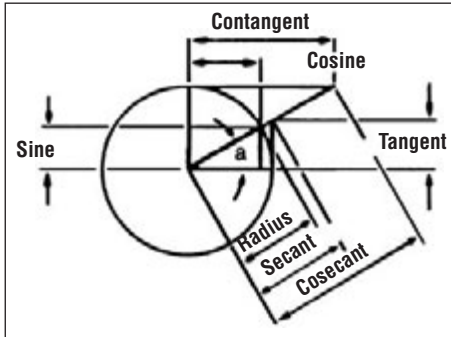
(See pages that follow for functions)

Formulas for Finding Functions of Angles

$$\frac{\text{Side Opposite}}{\text{Hypotenuse}} = \text{Sine}$$

$$\frac{\text{Side Adjacent}}{\text{Hypotenuse}} = \text{Cosine}$$

$$\frac{\text{Side Opposite}}{\text{Side Adjacent}} = \text{Tangent}$$

$$\frac{\text{Side Adjacent}}{\text{Side Opposite}} = \text{Cotangent}$$

$$\frac{\text{Hypotenuse}}{\text{Side Adjacent}} = \text{Secant}$$

$$\frac{\text{Hypotenuse}}{\text{Side Opposite}} = \text{Cosecant}$$

Formulas for Finding Sides of Right Angle Triangles with an Angle and Side Known

To Find:
Length of
side opposite
$=\begin{cases} \text{Hypotenuse} \times \text{Sine} \\ \text{Hypotenuse} \div \text{Cosecant} \\ \text{Side Adjacent} \times \text{Tangent} \\ \text{Side Adjacent} \div \text{Cotangent} \end{cases}$

To Find:
Length of
side adjacent
$=\begin{cases} \text{Hypotenuse} \times \text{Cosine} \\ \text{Hypotenuse} \div \text{Secant} \\ \text{Side Opposite} \times \text{Cotangent} \\ \text{Side Opposite} \div \text{Tangent} \end{cases}$

To Find:
Length of
hypotenuse
$=\begin{cases} \text{Side Opposite} \times \text{Cosecant} \\ \text{Side Opposite} \div \text{Sine} \\ \text{Side Adjacent} \times \text{Secant} \\ \text{Side Adjacent} \div \text{Cosine} \end{cases}$

Oblique Angle Triangle
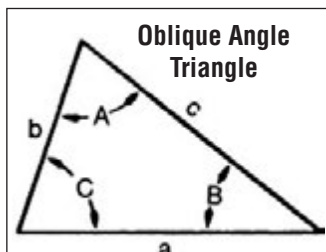
To Find Angles and Sides of Right Angle Triangles

To Find Angles		To Find Sides		
To Find:	Formulas	To Find:	Formulas	
C	$\frac{c}{a} = \sin C$	a	$\sqrt{b^2 + c^2}$	—
C	$\frac{b}{a} = \cos C$	a	$c \times \text{cosec } C$	$\frac{c}{\sin C}$
C	$\frac{c}{b} = \tan C$	a	$c \times \sec B$	$\frac{c}{\cos B}$
C	$\frac{b}{c} = \text{cotan } C$	a	$b \times \text{cosec } B$	$\frac{b}{\sin B}$
C	$\frac{a}{b} = \sec C$	a	$b \times \sec C$	$\frac{b}{\cos C}$
C	$\frac{a}{c} = \text{cosec } C$	b	$\sqrt{a^2 + c^2}$	—
B	$\frac{b}{a} = \cos B$	b	$a \times \sin B$	$\frac{a}{\text{cosec } B}$
B	$\frac{c}{a} = \cos B$	b	$c \times \cos C$	$\frac{a}{\sec C}$
B	$\frac{b}{c} = \tan B$	b	$c \times \tan B$	$\frac{c}{\text{cotan } B}$
B	$\frac{c}{b} = \text{cotan } B$	b	$c \times \cot C$	$\frac{c}{\tan C}$
B	$\frac{a}{c} = \sec B$	c	$\sqrt{a^2 + b^2}$	—
B	$\frac{a}{b} = \text{cosec } B$	c	$a \times \cos B$	$\frac{a}{\sec B}$
		c	$a \times \sin C$	$\frac{a}{\text{cosec } C}$
		c	$b \times \cot B$	$\frac{b}{\tan B}$
		c	$b \times \tan C$	$\frac{b}{\text{cotan } C}$

To Find Angles and Sides of Oblique Angle Triangles

To Find	Known	Formulas	To Find	Known	Formulas
C	A, B	$180° - (A + B)$	A	B, C	$180° - (B + C)$
b	a, B, A	$\frac{a \times \sin B}{\sin A}$	cos A	a, b, c	$\frac{b^2 + c^2 - a^2}{2bc}$
c	a, A, C	$\frac{a \times \sin C}{\sin A}$	sin C	c, A, a	$\frac{c \times \text{Sin. } A}{a}$
tan A	a, C, b	$\frac{a \times \sin C}{b - (a \times \cos C)}$	cot B	a, C, b	$\frac{a \times \text{cosec } C}{b} - \cot C$
B	A, C	$180° - (A + C)$	c	b, C, B	$b \times \sin C \times \text{cosec } B$
sin B	b, A, a	$\frac{b \times \text{cin } A}{a}$			

Trigonometric Tables

Trigonometric Functions

°	'	Sine	Tangent	Cotangent	Cosine	'	°	°	'	Sine	Tangent	Cotangent	Cosine	'	°
0	0	0.000000	0.000000	INFINITE	1.000000	0	90	11	0	0.190809	0.194380	5.1445540	0.981627	0	79
	10	0.002909	0.002909	343.77371	0.999996	50			10	0.913664	0.197401	5.0658352	0.981068	50	
	20	0.005818	0.005818	171.88540	0.999983	40			20	0.196517	0.200425	4.9894027	0.980500	40	
	30	0.008727	0.008727	114.58865	0.999962	30			30	0.199368	0.203452	4.9151570	0.979925	30	
	40	0.011635	0.011636	85.939791	0.999932	20			40	0.202218	0.206483	4.8430045	0.979341	20	
	50	0.014544	0.014545	68.750087	0.999894	10			50	0.205065	0.209518	4.7728568	0.978748	10	
1	0	0.017452	0.017455	57.289962	0.999848	0	89	12	0	0.207912	0.212557	4.7046301	0.978148	0	78
	10	0.020361	0.020365	49.103881	0.999793	50			10	0.210756	0.215599	4.6382457	0.977539	50	
	20	0.023269	0.023275	42.964077	0.999729	40			20	0.213599	0.218645	4.5736287	0.976921	40	
	30	0.026177	0.026186	38.188459	0.999657	30			30	0.216440	0.221695	4.5107085	0.976296	30	
	40	0.029085	0.029097	34.367771	0.999577	20			40	0.219279	0.224748	4.4494181	0.975662	20	
	50	0.031992	0.032009	31.241577	0.999488	10			50	0.222116	0.227806	4.3896940	0.975020	10	
2	0	0.034899	0.034921	28.636253	0.999391	0	88	13	0	0.224951	0.230868	4.3314759	0.974370	0	77
	10	0.037806	0.037834	26.431600	0.999285	50			10	0.227784	0.233934	4.2747066	0.973712	50	
	20	0.040713	0.040747	24.541758	0.999171	40			20	0.230616	0.237004	4.2193318	0.973045	40	
	30	0.043619	0.043661	22.903766	0.999048	30			30	0.233445	0.240079	4.1652998	0.927370	30	
	40	0.046525	0.046576	21.470401	0.998917	20			40	0.236273	0.243158	4.1125614	0.971687	20	
	50	0.049431	0.049491	20.205553	0.998778	10			50	0.239098	0.246241	4.0610700	0.970995	10	
3	0	0.052336	0.052408	19.081137	0.998630	0	87	14	0	0.241922	0.249328	4.0107809	0.970296	0	76
	10	0.055241	0.055325	18.074977	0.998473	50			10	0.244743	0.252420	3.9616518	0.969588	50	
	20	0.058145	0.058243	17.169337	0.998308	40			20	0.247563	0.255517	3.9136420	0.968872	40	
	30	0.061049	0.061163	16.349855	0.998135	30			30	0.250380	0.258618	3.8667131	0.968148	30	
	40	0.063952	0.064083	15.604784	0.997957	20			40	0.253195	0.261723	3.8208281	0.967415	20	
	50	0.066854	0.067004	14.924417	0.997763	10			50	0.256008	0.264834	3.7759519	0.966675	10	
4	0	0.069756	0.069927	14.300666	0.997564	0	86	15	0	0.258819	0.267949	3.7320508	0.965926	0	75
	10	0.072658	0.072851	13.726738	0.997357	50			10	0.261628	0.271069	3.6890927	0.965169	50	
	20	0.075559	0.075776	13.196888	0.997141	40			20	0.264434	0.274195	3.6470467	0.964404	40	
	30	0.078459	0.078702	12.706205	0.996917	30			30	0.267238	0.277325	3.6058835	0.963630	30	
	40	0.081359	0.081629	12.250505	0.996685	20			40	0.270040	0.280460	3.5655749	0.962849	20	
	50	0.084258	0.084558	11.826167	0.996444	10			50	0.272840	0.283600	3.5260938	0.962059	10	
5	0	0.087156	0.087489	11.430052	0.996195	0	85	16	0	0.275637	0.286745	3.4874144	0.961262	0	74
	10	0.090053	0.090421	11.059431	0.995937	50			10	0.278432	0.289896	3.4495120	0.960456	50	
	20	0.092950	0.093354	10.711913	0.995671	40			20	0.281225	0.293052	3.4123626	0.959642	40	
	30	0.095846	0.096289	10.385397	0.995396	30			30	0.284015	0.296214	3.3759434	0.958820	30	
	40	0.098741	0.099226	10.078031	0.995113	20			40	0.286803	0.299380	3.3402326	0.957990	20	
	50	0.101635	0.102164	9.7881732	0.994822	10			50	0.289589	0.302553	3.3052091	0.957151	10	
6	0	0.104528	0.105104	9.5143645	0.994522	0	84	17	0	0.292372	0.305731	3.2708526	0.956305	0	73
	10	0.107421	0.108046	9.2553035	0.994214	50			10	0.295152	0.308914	3.2371438	0.955450	50	
	20	0.110313	0.110990	9.0098261	0.993897	40			20	0.297930	0.312104	3.2040638	0.954588	40	
	30	0.113203	0.113936	8.7768874	0.993572	30			30	0.300706	0.315299	3.1715948	0.953717	30	
	40	0.116093	0.116883	8.5555468	0.993238	20			40	0.303479	0.318500	3.1397194	0.952838	20	
	50	0.118982	0.119833	8.3449558	0.922896	10			50	0.306249	0.321707	3.1084210	0.951951	10	
7	0	0.121869	0.122785	8.1443464	0.992546	0	83	18	0	0.309017	0.324920	3.0776835	0.951057	0	72
	10	0.124756	0.125738	7.9530224	0.992187	50			10	0.311782	0.328139	3.0474915	0.950154	50	
	20	0.127642	0.128694	7.7703506	0.991820	40			20	0.314545	0.331364	3.0178301	0.949243	40	
	30	0.130526	0.131653	7.5957541	0.991445	30			30	0.317305	0.334595	2.9886850	0.948324	30	
	40	0.133410	0.134613	7.4287064	0.991061	20			40	0.320062	0.337833	2.9600422	0.947397	20	
	50	0.136292	0.137576	7.2687255	0.990669	10			50	0.322816	0.341077	2.9318885	0.946462	10	
8	0	0.139173	0.140541	7.1153697	0.990268	0	82	19	0	0.325568	0.344328	2.9042109	0.945519	0	71
	10	0.142053	0.143508	6.9682335	0.989859	50			10	0.328317	0.347585	2.8769970	0.944568	50	
	20	0.144932	0.146478	6.8269437	0.989442	40			20	0.331063	0.350848	2.8502349	0.943609	40	
	30	0.147809	0.149451	6.6911562	0.959016	30			30	0.333807	0.354119	2.8239129	0.942641	30	
	40	0.150686	0.152426	6.5605538	0.988582	20			40	0.336547	0.357396	2.7980198	0.941666	20	
	50	0.153561	0.155404	6.4348428	0.988139	10			50	0.339285	0.360680	2.7725448	0.940684	10	
9	0	0.156434	0.158384	6.3137515	0.987688	0	81	20	0	0.342020	0.363970	2.7474774	0.939693	0	70
	10	0.159307	0.161368	6.1970279	0.987229	50			10	0.344752	0.367268	2.7228076	0.938694	50	
	20	0.162178	0.164354	6.0844381	0.986762	40			20	0.347481	0.370573	2.6985254	0.937687	40	
	30	0.165048	0.167343	5.9757644	0.986286	30			30	0.350207	0.373885	2.6746215	0.936672	30	
	40	0.167916	0.170334	5.8708042	0.985801	20			40	0.352931	0.377204	2.6510867	0.935650	20	
	50	0.170783	0.173329	5.7693688	0.985309	10			50	0.355651	0.380530	2.6279121	0.934619	10	
10	0	0.173648	0.176327	5.6712818	0.984808	0	80	21	0	0.358368	0.383864	2.6050891	0.933580	0	69
	10	0.176512	0.179328	5.5763786	0.984298	50			10	0.361082	0.387205	2.5826094	0.932534	50	
	20	0.179375	0.182332	5.4845052	0.983781	40			20	0.363793	0.390554	2.5604649	0.931480	40	
	30	0.182236	0.185339	5.3955172	0.983255	30			30	0.366501	0.393911	2.5386479	0.930418	30	
	40	0.185095	0.188359	5.3092793	0.982721	20			40	0.369206	0.397275	2.5171507	0.929348	20	
	50	0.187953	0.191363	5.2256647	0.982178	10	79		50	0.371908	0.400647	2.4959661	0.928270	10	68
°	'	Sine	Tangent	Cotangent	Cosine	'	°	°	'	Sine	Tangent	Cotangent	Cosine	'	°

NOTE: For functions from 45°-0' to 68° read from bottom of table upward.

Trigonometric Tables

Trigonometric Functions

°	'	Sine	Tangent	Cotangent	Cosine	'	°	°	'	Sine	Tangent	Cotangent	Cosine	'	°
22	0	0.374607	0.404026	2.4750869	0.927184	0	68	34	0	0.559193	0.674509	1.4825610	0.829038	0	56
	10	0.377302	0.407414	2.4545061	0.926090	50			10	0.561602	0.678749	1.4732983	0.827407	50	
	20	0.379994	0.410810	2.4342172	0.924980	40			20	0.564007	0.683007	1.4641147	0.825770	40	
	30	0.382683	0.414214	2.4142136	0.923880	30			30	0.566406	0.687281	1.4550090	0.824126	30	
	40	0.385369	0.417626	2.3944889	0.922762	20			40	0.568801	0.691573	1.4459801	0.822475	20	
	50	0.388052	0.421046	2.3750372	0.921638	10			50	0.571191	0.695881	1.4370268	0.820817	10	
23	0	0.390731	0.424475	2.3558524	0.920505	0	67	35	0	0.573576	0.700208	1.4281480	0.819152	0	55
	10	0.393407	0.427912	2.3369287	0.919364	50			10	0.575957	0.704552	1.4193427	0.817480	50	
	20	0.396080	0.431358	2.3182606	0.918216	40			20	0.578332	0.708913	1.4106098	0.815801	40	
	30	0.398749	0.434812	2.2998425	0.917060	30			30	0.580703	0.713293	1.4019483	0.814116	30	
	40	0.401415	0.438276	2.2816693	0.915896	20			40	0.583069	0.717691	1.3933571	0.812423	20	
	50	0.404078	0.441748	2.2637357	0.914725	10			50	0.585429	0.722108	1.3848355	0.810723	10	
24	0	0.406737	0.445229	2.2460368	0.913545	0	66	36	0	0.587785	0.726543	1.3763810	0.809017	0	54
	10	0.409392	0.448719	2.2285676	0.912358	50			10	0.590136	0.730996	1.3679959	0.807304	50	
	20	0.412045	0.452218	2.2113234	0.911164	40			20	0.592482	0.735469	1.3596764	0.805584	40	
	30	0.414693	0.455726	2.1942997	0.909961	30			30	0.594823	0.739961	1.3514224	0.803857	30	
	40	0.417338	0.459244	2.1774920	0.908751	20			40	0.597159	0.744472	1.3432331	0.802123	20	
	50	0.419980	0.462771	2.1608958	0.907533	10			50	0.599489	0.749003	1.3351075	0.800383	10	
25	0	0.422618	0.466308	2.1445069	0.906308	0	65	37	0	0.601815	0.753554	1.3270448	0.798636	0	53
	10	0.425253	0.469854	2.1283213	0.905075	50			10	0.604136	0.758125	1.3190441	0.796882	50	
	20	0.427884	0.473410	2.1123348	0.903834	40			20	0.606451	0.762716	1.3111046	0.795121	40	
	30	0.430511	0.476976	2.0965436	0.902585	30			30	0.608761	0.767327	1.3032254	0.793353	30	
	40	0.433125	0.480551	2.0809438	0.901329	20			40	0.611067	0.771959	1.2954057	0.791579	20	
	50	0.435755	0.484137	2.0655318	0.900065	10			50	0.613367	0.776612	1.2876447	0.789798	10	
26	0	0.438371	0.487733	2.0503038	0.898794	0	64	38	0	0.615661	0.781286	1.2799416	0.788011	0	52
	10	0.440984	0.491339	2.0352565	0.897515	50			10	0.617951	0.785981	1.2722957	0.786217	50	
	20	0.443593	0.494955	2.0203862	0.896229	40			20	0.620235	0.790698	1.2647062	0.784416	40	
	30	0.446197	0.498582	2.0056897	0.894934	30			30	0.622515	0.795436	1.2571723	0.782608	30	
	40	0.448799	0.502219	1.9911637	0.893633	20			40	0.624789	0.800196	1.2496933	0.780794	20	
	50	0.451397	0.505867	1.9768050	0.892323	10			50	0.627057	0.804980	1.2422685	0.778973	10	
27	0	0.453990	0.509525	1.9626105	0.891007	0	63	39	0	0.629320	0.809784	1.2348972	0.777146	0	51
	10	0.456580	0.513195	1.9485772	0.889682	50			10	0.631578	0.814612	1.2275786	0.775312	50	
	20	0.459166	0.516876	1.9347020	0.888350	40			20	0.633831	0.819463	1.2203121	0.773472	40	
	30	0.461749	0.520567	1.9209821	0.887011	30			30	0.636078	0.824336	1.2130970	0.771625	30	
	40	0.464327	0.524270	1.9074147	0.885664	20			40	0.638320	0.829234	1.2059327	0.769771	20	
	50	0.466901	0.527984	1.8939971	0.884309	10			50	0.640557	0.834155	1.1988184	0.767911	10	
28	0	0.469472	0.531709	1.8807265	0.882948	0	62	40	0	0.642788	0.839100	1.1917536	0.766044	0	50
	10	0.472038	0.535547	1.8676003	0.881578	50			10	0.645013	0.844069	1.1847376	0.764171	50	
	20	0.474600	0.539195	1.8546159	0.880201	40			20	0.647233	0.849062	1.1777698	0.762292	40	
	30	0.477149	0.542956	1.8417709	0.878817	30			30	0.649448	0.854081	1.1708496	0.760406	30	
	40	0.479713	0.546728	1.8290628	0.877425	20			40	0.651657	0.859124	1.1639763	0.758514	20	
	50	0.482263	0.550515	1.8164892	0.876026	10			50	0.653861	0.864193	1.1571495	0.756615	10	
29	0	0.484810	0.554309	1.8040478	0.874620	0	61	41	0	0.656059	0.869287	1.1503684	0.754710	0	49
	10	0.487352	0.558118	1.7917362	0.873206	50			10	0.658252	0.874407	1.1436326	0.752798	50	
	20	0.489890	0.561939	1.7795524	0.871784	40			20	0.660439	0.879553	1.1369414	0.750880	40	
	30	0.492424	0.565773	1.7674940	0.870356	30			30	0.662620	0.884725	1.1302944	0.748956	30	
	40	0.494953	0.569619	1.7555590	0.868920	20			40	0.664796	0.889924	1.1236909	0.747025	20	
	50	0.497479	0.573478	1.7437453	0.867476	10			50	0.666966	0.895151	1.1171305	0.745088	10	
30	0	0.500000	0.577350	1.7320508	0.866025	0	60	42	0	0.669131	0.900404	1.1106125	0.743145	0	48
	10	0.502517	0.581235	1.7204736	0.864567	50			10	0.671289	0.905685	1.1041365	0.741195	50	
	20	0.505030	0.585134	1.7090116	0.863102	40			20	0.673443	0.910994	1.0977020	0.739239	40	
	30	0.507538	0.589045	1.6976631	0.861629	30			30	0.675590	0.916331	1.0913085	0.737277	30	
	40	0.510043	0.592970	1.6864261	0.860149	20			40	0.677732	0.921697	1.0849554	0.735309	20	
	50	0.512543	0.596908	1.6752988	0.858662	10			50	0.679868	0.927021	1.0786423	0.733335	10	
31	0	0.515038	0.600861	1.6642795	0.857167	0	59	43	0	0.681998	0.932515	1.0723687	0.731354	0	47
	10	0.517529	0.604827	1.6533663	0.855665	50			10	0.684123	0.937968	1.0661341	0.729367	50	
	20	0.520016	0.608807	1.6425576	0.854156	40			20	0.686242	0.943451	1.0599381	0.727374	40	
	30	0.522499	0.612801	1.6318517	0.852640	30			30	0.688355	0.948965	1.0537801	0.725374	30	
	40	0.524977	0.616809	1.6212469	0.851117	20			40	0.690462	0.954508	1.0476598	0.723369	20	
	50	0.527450	0.620832	1.6107417	0.849586	10			50	0.692563	0.960083	1.0415767	0.721357	10	
32	0	0.529919	0.624869	1.6003345	0.848048	0	58	44	0	0.694658	0.965689	1.0355303	0.719340	0	46
	10	0.532384	0.628921	1.5900238	0.846503	50			10	0.696748	0.971326	1.0295203	0.717316	50	
	20	0.534844	0.632988	1.5798079	0.844951	40			20	0.698832	0.976996	1.0235461	0.715286	40	
	30	0.537300	0.637079	1.5696856	0.843391	30			30	0.700909	0.982697	1.0176074	0.713251	30	
	40	0.539751	0.641167	1.5596552	0.841825	20			40	0.702981	0.988432	1.0117088	0.711209	20	
	50	0.542197	0.645280	1.5497155	0.840251	10			50	0.705047	0.994199	1.0058348	0.709161	10	
33	0	0.544639	0.649408	1.5398650	0.838671	0	57	45	0	0.707107	1.000000	1.0000000	0.707107	0	45
	10	0.547076	0.653551	1.5301025	0.837083	50			—	—	—	—	—	—	—
	20	0.549509	0.657710	1.5204261	0.835488	40			—	—	—	—	—	—	—
	30	0.551937	0.661886	1.5108352	0.833886	30			—	—	—	—	—	—	—
	40	0.554360	0.666077	1.5013282	0.832277	20			—	—	—	—	—	—	—
	50	0.556769	0.670285	1.4919039	0.830661	10	56	—	—	—	—	—	—	—	—
°	'	Sine	Tangent	Cotangent	Cosine	'	°	°	'	Sine	Tangent	Cotangent	Cosine	'	°

NOTE: For functions from 45°-0' to 68° read from bottom of table upward.

Given	Multiply	By
ABAMPERE	10	AMPERE
ACRES	0.4046856	HECTARE
ACRES	43560	SQUARE FEET
ACRES	4046.8564	SQUARE METERS
ACRES	1.562×10^{-3}	SQUARE MILES
ARE	1076.391	SQUARE FEET
ATMOSPHERES	76	CMS. OF MERCURY
ATMOSPHERES	33.89854	FEET OF WATER
ATMOSPHERES	29.92	INCHES OF MERCURY
ATMOSPHERES	14.69595	POUNDS/SQUARE INCH
BAGS - CEMENT	94	POUNDS - CEMENT
BARRELS - OIL	5.614583	CUBIC FOOT
BARRELS - OIL	158.9873	LITER
BARRELS - OIL	42	GALLONS - OIL
BARRELS (US DRY)	3.281219	BUSHELS (US)
BARRELS (US DRY)	4.083333	CUBIC FEET
BARRELS (US DRY)	115.6271	LITER
BARRELS (US LIQ.)	4.2109375	CUBIC FEET
BARRELS (US LIQ.)	0.1192405	CUBIC METERS
BARRELS (US LIQ.)	26.22925	GALLONS (BRIT.)
BARRELS (US LIQ.)	31.5	GALLONS (US)
BARRELS – CEMENT	376	POUNDS – CEMENT
BTU	251.996	CALORIE
BTU	778.169	FOOT – POUNDS – FORCE
BTU	3.9302×10^{-4}	HORSEPOWER – HOURS
BTU	0.252	KILOGRAM – CALORIES
BTU	107.586	KILOGRAM - METERS
BTU	2.9307×10^{-4}	KILOWATT - HOURS
BTU	1055.056	JOULE
BTU/MIN.	12.96	FOOT - POUNDS/SEC.
BTU/MIN.	0.0235809	HORSEPOWER
BTU/MIN.	0.0175843	KILOWATTS
BTU/MIN.	17.5796	WATTS
BUSHELS (BRIT.)	1.032057	BUSHELS (US)
BUSHELS (BRIT.)	8	GALLONS (BRIT.)
BUSHELS (US)	0.3047647	BARRELS (US DRY)
BUSHELS (US)	1.244456	CUBIC FEET
BUSHELS (US)	9.309177	GALLONS (US LIQ.)
CALORIE	4.1868	JOULE
CALORIE	3.96832×10^{-3}	BTU
CALORIE	3.08803	FOOT - POUND - FORCE
CENTARES (CENTIARES)	1	SQUARE METERS
CENTIMETERS	0.3937008	INCHES
CENTIMETERS	0.3937008	INCH
CENTIMETERS	0.01	METERS
CENTIMETERS	10	MILLIMETERS
CENTIMTRS. OF MERCURY	0.01316	ATMOSPHERES
CENTIMTRS. OF MERCURY	0.4461	FEET OF WATER
CENTIMTRS. OF MERCURY	136	KGS./SQUARE METER
CENTIMTRS. OF MERCURY	27.85	POUNDS/SQUARE FT.
CENTIMTRS. OF MERCURY	0.1934	POUNDS/SQUARE INCH
CENTIPOISE	0.001	PASCAL - SECOND
CHAIN (RAMSDEN'S)	100	FEET
CHAIN (GUNTER'S)	66	FEET
CORD	128	CUBIC FEET
CORD	3.624	STERE
COULOMB	1	AMPERE - SECOND
CUBIC CENTIMETER	0.06102	CUBIC INCHES
CUBIC CENTIMETER	0.001	LITER
CUBIC CENTIMETER	1	MILLILETER
CUBIC DECIMETER	0.0353	CUBIC FEET
CUBIC FEET	12	BOARD FEET
CUBIC FEET	0.803564	BUSHELS (US)
CUBIC FEET	1728	CUBIC INCHES
CUBIC FEET	0.0283168	CUBIC METERS
CUBIC FEET	28.317	CUBIC DECIMETERS
CUBIC FEET	0.037037	CUBIC YARD
CUBIC FEET	6.228835	GALLONS (BRIT.)
CUBIC FEET	7.480519	GALLONS (US)
CUBIC FEET	28.316847	LITERS
CUBIC FEET	25.71405	QUARTS (US DRY)
CUBIC FEET/HOUR	7.865791	CUBIC CM./SEC.
CUBIC FEET/HOUR	0.4719474	LITER/MIN.
CUBIC FEET/MIN.	0.1246753	GALLONS (US)/SEC.
CUBIC FEET/POUND	0.0624279	CUBIC METER/KILOGRAM
CUBIC METER	8.64849	BARREL (US DRY)
CUBIC METER	8.386414	BARREL (US LIQ.)
CUBIC METER	35.31467	CUBIC FEET
CUBIC METER	1.307951	CUBIC YARDS
CUBIC METER	264.1721	GALLONS (US)
CUBIC METER	1000	LITER
CUBIC YARDS	27	CUBIC FEET

Given	Multiply	By
CUBIC YARDS	0.7645548	CUBIC METER
CUBIC YARDS	201.974	GALLONS (US)
CUBIC YARDS/MIN.	0.45	CUBIC FEET/SEC.
CUBIC YARDS/MIN.	3.366234	GALLONS (US)/SEC.
CUBIT	18	INCH
CUP	236.588	MILLILITER
CUP (METRIC)	200	MILLILITER
DEGREE	0.017453	RADIAN
DEGREE/SEC.	0.166667	REVOLUTION/MIN.
DENIER	0.11111(1/9)	TEX
DRACHM (BRIT. FLUID)	0.9607599	DRAM (U.S. FLUID)
DRAM (APOTH)	60	GRAINS
DRAM (AVOIR)	27.34375	GRAINS
DRAM (U.S. FLUID)	0.2255859	CUBIC INCHES
ELL	45	INCH
ERG	1×10^{-7}	JOULE
FATHOM	6	FEET
FEET OF WATER	0.0295	ATMOSPHERES
FEET OF WATER	0.8826	INCHES OF MERCURY
FEET OF WATER	304.8	KGS./SQUARE METER
FEET OF WATER	62.43	POUNDS/SQUARE FT.
FEET OF WATER	0.4335	POUNDS/SQUARE INCH
FEET/MIN.	0.508	CENTIMETERS/SEC.
FEET/MIN.	0.01667	FEET/SEC.
FEET/MIN.	0.01829	KILOMETERS/HOUR
FEET/MIN.	0.3048	METERS/MIN
FEET/MIN.	0.01136	MILES/HOUR
FEET/SEC.	30.48	CENTIMETERS/SEC.
FEET/SEC.	1.097	KILOMETERS/HOUR
FEET/SEC.	0.5921	KNOTS
FEET/SEC.	18.29	METERS/MIN.
FEET/SEC.	0.6818	MILES/HOUR
FEET/SEC.	0.01136	MILES/MIN.
FERKIN (US)	9	GALLONS (US) DRY
FOOT	30.48	CENTIMETER
FOOT	12	INCH
FOOT/MINUTE	0.3048	METER
FOOT/MINUTE	0.018288	KILOMETER/HOUR
FOOT/SECOND	0.01136364	MILE/HOUR
FOOT/SECOND	0.3048	METER/SECOND
FOOT - POUNDS - FORCE	0.6818182	MILE/HOUR
FOOT - POUNDS - FORCE	5.050×10^{-7}	HORSEPOWER - HOURS
FOOT - POUNDS - FORCE	1.35582	JOULES
FOOT - POUNDS - FORCE	3.241×10^{-4}	KILOGRAM - CALORIES
FOOT - POUNDS - FORCE	0.1383	KILOGRAM - METERS
FOOT - POUNDS - FORCE	$.766\times10^{-5}$	KILOWATT - HOURS
FOOT - POUNDS - FORCE	1.286×10^{-3}	BTU
FOOT - POUNDS/MIN.	1.286×10^{-3}	BTU/MIN.
FOOT - POUNDS/MIN.	0.01667	FOOT - POUNDS/SEC.
FOOT - POUNDS/MIN.	3.030×10^{-4}	HORSEPOWER
FOOT - POUNDS/MIN.	3.241×10^{-4}	KG. - CALORIES/MIN.
FOOT - POUNDS/MIN.	2.260×10^{-5}	KILOWATTS
FOOT - POUNDS/SEC.	7.717×10-2	BTU/MIN.
FOOT - POUNDS/SEC.	1.818×10^{-3}	HORSEPOWER
FOOT - POUNDS/SEC.	1.945×10-2	KG. - CALORIES/MIN.
FOOT - POUNDS/SEC.	1.355818	WATTS
FURLONG	660	FEET
FURLONG	10	CHAIN
GALLON (BRIT.)	9.632619	CUBIC FT./HOUR
GALLON (BRIT.)	0.2727654	CUBIC METER/HOUR
GALLONS (US)/MIN.	8.020834	CUBIC FEET/HOUR
GALLONS (US)/MIN.	0.2271247	CUBIC METER/HOUR
GALLON (DRY)	268.8025	CUBIC INCH
GALLONS (LIQ.)	3785.412	CUBIC CENTIMETERS
GALLONS (LIQ.)	0.1336805	CUBIC FEET
GALLONS (LIQ.)	231	CUBIC INCHES
GALLONS (LIQ.)	3.785×10^{-3}	CUBIC METERS
GALLONS (LIQ.)	4.951×10^{-3}	CUBIC YARDS
GALLONS (LIQ.)	0.8326742	GALLONS (BRIT.)
GALLONS (LIQ.)	3.785412	LITERS
GALLONS (LIQ.)	8	PINTS (LIQ.)
GALLONS (LIQ.)	4	QUARTS (LIQ.)
GALLONS WATER	8.3453	POUNDS OF WATER
GALLONS WATER/MIN.	6.0086	TONS WATER/24 HOURS
GALLONS - IMPERIAL	1.20095	U.S. GALLONS
GALLONS - U.S.	0.83267	IMPERIAL GALLONS
GALLONS (US)/MIN.	2.228×10^{-3}	CUBIC FEET/SEC.
GALLONS (US)/MIN.	8.020834	CUBIC FEET/HOUR
GALLONS (US)/MIN.	0.06308	Litros/SEC.
GILL	7.21875	CUBIC INCHES
GILL	4	OUNCE (U.S.)
GILL (BRIT.)	1.20095	GILL (U.S.)

Given	Multiply	By
GRAINS (TROY)	0.0648	GRAMS
GRAINS/U.S. GAL.	17.118	PARTS/MILLION
GRAINS/U.S. GAL.	142.86	POUNDS/MILLION GAL.
GRAINS/U.S. GAL.	14.254	PARTS/MILLION
GRAMS	980.7	DYNES
GRAMS	15.432358	GRAINS
GRAMS	10^{-3}	KILOGRAMS
GRAMS	10^3	MILLIGRAMS
GRAMS	0.0352739	OUNCES
GRAMS	0.03215	OUNCES (TROY)
GRAMS	2.205×10^{-3}	POUNDS
GRAMS	0.7716179	SCRUPLE
GRAMS (TROY)	2.0833×10^{-3}	OUNCES (TROY)
GRAMS/CM.	5.600×10^{-3}	POUNDS/INCH
GRAMS/CU. CM.	62.43	POUNDS/CUBIC FOOT
GRAMS/CU. CM.	0.03613	POUNDS/CUBIC INCH
GRAMS/LITER	58.417	GRAINS/GAL.
GRAMS/LITER	8.345	POUNDS/1000 GALS.
GRAMS/LITER	0.062427	POUNDS/CUBIC FOOT
GRAMS/LITER	1000	PARTS/MILLION
GROSS	12	DOZEN
HAND	4	INCH
HECTARE	2.471054	ACRE
HECTARE	107639.1	SQUARE FT.
HOGSHEAD	63	GALLONS
HORSEPOWER	42.4072	BTU/MIN.
HORSEPOWER	33000	FOOT – POUNDS/MIN.
HORSEPOWER	550	FOOT – POUNDS/SEC.
HORSEPOWER	1.014	HORSEPOWER (METRIC)
HORSEPOWER	10.7	KG. – CALORIES/MIN.
HORSEPOWER	0.7457	KILOWATTS
HORSEPOWER	745.7	WATTS
HORSEPOWER (BOILER)	33479	BTU/HOUR
HORSEPOWER (BOILER)	9.8095	KILOWATT
HORSEPOWER – HOURS	2547	BTU
HORSEPOWER – HOURS	1.98×10^6	FOOT – POUNDS
HORSEPOWER – HOURS	641.7	KILOGRAM – CALORIES
HORSEPOWER – HOURS	2.737×10^5	KILOGRAM – METERS
HORSEPOWER – HOURS	0.7457	KILOWATT – HOURS
INCH	1000	MILS
INCH	25.4	MILLIMETERS
INCHES OF MERCURY	0.03342	ATMOSPHERES
INCHES OF MERCURY	1.133	FEET OF WATER
INCHES OF MERCURY	345.3	KGS./SQUARE METER
INCHES OF MERCURY	70.73	LBS./SQUARE FT.
INCHES OF MERCURY	0.4912	LBS./SQUARE INCH
INCHES OF WATER	0.002458	ATMOSPHERES
INCHES OF WATER	0.07355	INCHES OF MERCURY
INCHES OF WATER	25.4	KGS./SQUARE METER
INCHES OF WATER	0.5781	OUNCES/SQUARE INCH
INCHES OF WATER	5.202	POUNDS/SQUARE FOOT
INCHES OF WATER	0.03613	POUNDS/SQUARE INCH
JOULE	0.000948	BTU
JOULE	0.238846	CALORIE
KILOGRAMS	980665	DYNES
KILOGRAMS	2.2046226	POUNDS
KILOGRAMS	1.102×10^{-3}	TONS (SHORT)
KILOGRAMS	10^3	GRAMS
KILOGRAMS – CALORIES	3.968	BTU
KILOGRAMS – CALORIES	3086	FOOT – POUNDS
KILOGRAMS – CALORIES	1.558×10^{-3}	HORSEPOWER – HOURS
KILOGRAMS – CALORIES	1.162×10^{-3}	KILOWATT – HOURS
KILOMETERS	10^5	CENTIMETERS
KILOMETERS	3280.84	FEET
KILOMETERS	10^3	METERS
KILOMETERS	0.6213712	MILES
KILOMETROS	1094	YARDS
KILOMETERS/HOUR	27.78	CENTIMETERS/SEC.
KILOMETERS/HOUR	54.68	FEET/MIN.
KILOMETERS/HOUR	0.9113	FEET/SEC.
KILOMETERS/HOUR	0.5396	KNOTS
KILOMETERS/HOUR	16.67	METERS/MIN.
KILOMETROS/HOUR	0.6214	MILES/HOUR
KILOWATT – HOURS	3415	BTU
KILOWATT – HOURS	2.655×10^6	FOOT – POUNDS
KILOWATT – HOURS	1.341	HORSEPOWER – HOURS
KILOWATT – HOURS	3.6×10^6	JOULE
KILOWATT – HOURS	860.5	KILOGRAM – CALORIES
KILOWATT – HOURS	3.671×10^5	KILOGRAM – METERS
KILOWATTS	56.869	BTU/MIN.
KILOWATTS	44253.7	FOOT – POUNDS/MIN.
KILOWATTS	737.6	FOOT – POUNDS/SEC.

Given	Multiply	By
KILOWATTS	1.34102	HORSEPOWER
KILOWATTS	14.3308	KG. – CALORIES/MIN.
KILOWATTS	10^{-3}	WATTS
KNOTS	1.150779	MILES (STATUTE)/HOUR
LEAGUE (STATUTE)	3	MILES (STATUTE)
LIGHT YEAR	5.8785×10^{12}	MILES
LINK	0.01	CHAIN
LINK	7.92	INCHES
LITERS	103	CUBIC CENTIMETERS
LITERS	0.03531	CUBIC FEET
LITERS	61.02	CUBIC INCHES
LITERS	10^{-3}	CUBIC METERS
LITERS	1.308×10^{-3}	CUBIC YARDS
LITERS	0.2642	GALLONS
LITERS	2.113	PINTS (LIQ.)
LITERS	0.908	QUARTS (DRY)
LITERS	1.0567	QUARTS (LIQ.)
LITERS/MIN.	5.886×10^{-4}	CUBIC FT./SEC.
LITERS/MIN.	13.19815	GALLON (BRIT.)/HOUR
LITERS/MIN.	4.403×10^{-3}	GALLONS/SEC.
LITERS/SEC.	2.11888	CUBIC FT./MIN.
METERS	100	CENTIMETERS
METERS	3.2808399	FEET
METERS	39.37	INCHES
METERS	10^{-3}	KILOMETROS
METERS	10^3	MILLIMETERS
METERS	1.093613	YARDS
METERS/MIN.	1.667	CENTIMETERS/SEC.
METERS/MIN.	3.281	FEET/MIN.
METERS/MIN.	0.05468	FEET/SEC.
METERS/MIN.	0.06	KILOMETROS/HOUR
METERS/MIN.	0.03728	MILES/HOUR
METERS/SEC.	196.8	FEET/MIN.
METERS/SEC.	3.281	FEET/SEC.
METERS/SEC.	3.6	KILOMETER/HOUR
METERS/SEC.	0.06	KILOMETROS/MIN.
METERS/SEC.	2.236936	MILES/HOUR
METERS/SEC.	0.03728	MILES/MIN.
MIL	0.001	INCH
MIL	0.0254	MILLIMETER
MILES	320	ROD
MILES	1.609×10^5	CENTIMETERS
MILES	5280	FEET
MILES	1.609	KILOMETROS
MILES	1760	YARDS
MILES/HOUR	44.7	CENTIMETERS/SEC.
MILES/HOUR	88	FEET/MIN.
MILES/HOUR	1.467	FEET/SEC.
MILES/HOUR	1.609	KILOMETROS/HOUR
MILES/HOUR	0.8684	KNOTS
MILES/HOUR	26.82	Metros/MIN.
MILES/HOUR	1.609344	KILOMETROS/HOUR
MILES/HOUR	0.8689762	KNOTS
MILES/MIN.	2682	CENTIMETERS/SEC.
MILES/MIN.	88	FEET/SEC.
MILES/MIN.	1.609	KILOMETROS/MIN.
MILES/MIN.	60	MILES/HOUR
MILLIGRAMS	10^{-3}	GRAMS
MILLIGRAMS/LITER	1	PARTS/MILLION
MILLILITERS	0.0610237	CUBIC INCH
MILLILITERS	0.0338142	FLUID OUNCES
MILLILITERS	10^{-3}	LITERS
MILLIMETERS	0.1	CENTIMETERS
MILLIMETERS	0.03937	INCHES
MILLION GALS./DAY	1.54723	CUBIC FT./SEC.
MINER'S INCHES	1.5	CUBIC FT./MIN.
MINUTES (ANGLE)	2.909×10^{-4}	RADIANS
NEWTON – METER	0.737562	FOOT – POUNDS – FORCE
OUNCES	16	DRAMS
OUNCES	437.5	GRAINS
OUNCES	0.0625	POUNDS
OUNCES	28.349527	GRAMS
OUNCES	0.9115	OUNCES (TROY)
OUNCES	2.790×10^{-5}	TONS (LONG)
OUNCES	2.835×10^{-5}	TONS (METRIC)
OUNCES (FLUID)	1.805	CUBIC INCHES
OUNCES (FLUID)	0.02957	LITERS
OUNCES (FLUID)	30	MILLILITERS
OUNCES (FLUID)	1.040843	OUNCES (BRIT. FLUID)
OUNCES (TROY)	480	GRAINS
OUNCES (TROY)	20	PENNYWEIGHTS (TROY)
OUNCES (TROY)	0.08333	POUNDS (TROY)

Given	Multiply	By
OUNCES (TROY)	31.103481	GRAMS
OUNCES (TROY)	1.09714	OUNCES (AVOIR.)
OUNCES/SQUARE INCH	0.0625	POUNDS/SQUARE INCH
PACE	2.5	FEET
PALM	3	INCH
PARTS/MILLION	0.0584	GRAINS/U.S. GAL.
PARTS/MILLION	0.07016	GRAINS/IMP. GAL.
PARTS/MILLION	8.345	POUNDS/MILLION GAL.
PASCAL	0.0208854	POUNDS – FORCE/SQ. FT.
PECK (BRIT.)	2	GALLON (BRIT)
PECKS (US)	8	QUARTS (US DRY)
PENNYWEIGHTS (TROY)	24	GRAINS
PENNYWEIGHTS (TROY)	1.55517	GRAMS
PENNYWEIGHTS (TROY)	0.05	OUNCES (TROY)
PENNYWEIGHTS (TROY)	4.1667×10^{-3}	POUNDS (TROY)
PERCH (MASONRY)	24.75	CUBIC FEET
POINT (U.S.-PRINT)	0.013837	INCH
POLE (BRIT.)	16.5	FEET
POTTLE (BRIT.)	.5	GALLONS
POUNDS	16	OUNCES
POUNDS	256	DRAMS
POUNDS	7000	GRAINS
POUNDS	0.0005	TONS (SHORT)
POUNDS	453.5924	GRAMS
POUNDS	1.21528	POUNDS (TROY)
POUNDS	14.5833	OUNCES (TROY)
POUNDS OF WATER	0.01602	CUBIC FEET
POUNDS OF WATER	27.68	CUBIC INCHES
POUNDS OF WATER	0.1198	GALLONS
POUNDS OF WATER/MIN.	2.670×10^{-4}	CUBIC FT./SEC.
POUNDS (TROY)	5760	GRAINS
POUNDS (TROY)	140	PENNYWEIGHTS (TROY)
POUNDS (TROY)	12	OUNCES (TROY)
POUNDS (TROY)	373.24177	GRAMS
POUNDS (TROY)	0.822857	POUNDS (AVOIR.)
POUNDS (TROY)	13.1657	OUNCES (AVOIR.)
POUNDS (TROY)	3.6735×10^{-4}	TONS (LONG)
POUNDS (TROY)	4.1143×10^{-4}	TONS (SHORT)
POUNDS (TROY)	4.1667×10^{-3}	TONS (METRIC)
POUNDS/CUBIC FOOT	0.01602	GRAMS/CUBIC CM.
POUNDS/CUBIC FOOT	16.02	KGS./CUBIC METERS
POUNDS/CUBIC FOOT	5.787×10^{-4}	POUNDS/CUBIC INCH
POUNDS/CUBIC INCH	27.68	GRAMS/CUBIC CM.
POUNDS/CUBIC INCH	2.768×10^4	KGS./CUBIC METER
POUNDS/CUBIC INCH	1728	POUNDS/CUBIC FOOT
POUNDS/FOOT	1.488	KGS./METER
POUNDS/INCH	178.6	GRAMS/CM.
POUNDS/SQUARE FOOT	0.01602	FEET OF WATER
POUNDS/SQUARE FOOT	4.883	KGS./SQUARE METER
POUNDS/SQUARE FOOT	6.945×10^{-3}	POUNDS/SQUARE INCH
POUNDS/SQUARE INCH	0.068046	ATMOSPHERES
POUNDS/SQUARE INCH	2.307	FEET OF WATER
POUNDS/SQUARE INCH	2.03602	INCHES OF MERCURY
POUNDS/SQUARE INCH	703.1	KGS./SQUARE METER
PSI	1	POUND – FORCE/SQ. IN.
PUNCHEON	84	GALLONS
PUNCHEON (BRIT.)	70	GALLON (BRIT.)
QUARTS (DRY)	0.03125	BUSHEL
QUARTS (DRY)	67.200625	CUBIC INCHES
QUARTS (DRY)	1.101	LITERS
QUARTS (LIQ)	57.75	CUBIC INCHES
QUARTS (LIQ)	0.9463	LITER
QUARTS (LIQ)	0.8326742	QUART (BRIT.)
QUARTS (LIQ)	0.859367	QUART (DRY)
QUINTAL, ARGENTINE	101.28	POUNDS
QUINTAL, BRAZIL	129.54	POUNDS
QUINTAL, CASTILE, PERU	101.43	POUNDS
QUINTAL, CHILE	101.41	POUNDS
QUINTAL, METRIC	220.46	POUNDS
QUINTAL, MEXICO	101.47	POUNDS
RADIANS	57.29578	DEGREES
RADIANS	3437.747	MINUTES
RADIANS	0.63662	QUADRANTS
RADIANS/SEC.	57.3	DEGREES/SEC.
RADIANS/SEC.	0.1592	REVOLUTIONS/SEC.
RADIANS/SEC.	9.549297	REVOLUTIONS/MIN.
REAMS	500	SHEETS
REVOLUTIONS	360	DEGREES
REVOLUTIONS	4	QUADRANTS
REVOLUTIONS	6.283	RADIANS
REVOLUTIONS/MIN.	6	DEGREES/SEC.
REVOLUTIONS/MIN.	0.1047	RADIANS/SEC.

Given	Multiply	By
REVOLUTIONS/MIN.	0.01667	REVOLUTIONS/SEC.
REVOLUTIONS/SEC.	360	DEGREES/SEC.
REVOLUTIONS/SEC.	6.283	RADIANS/SEC.
REVOLUTIONS/SEC.	60	REVOLUTIONS/MIN.
RODS	16.5	FEET
ROPE	20	FEET
SCRUPLE	20	GRAINS
SEAM (BRIT.)	64	GALLON (BRIT.)
SLUG	14.5939	KILOGRAMS
SPAN	9	INCHES
SQUARE CM.	10^{-4}	SQUARE METERS
SQUARE CM.	100	SQUARE MILLIMETERS
SQUARE FEET	2.296×10^{-5}	ACRES
SQUARE FEET	929	SQUARE CENTIMETERS
SQUARE FEET	144	SQUARE INCHES
SQUARE FEET	0.0929	SQUARE METERS
SQUARE FEET	3.587×10^{-3}	SQUARE MILES
SQUARE FEET	1/9	SQUARE YARDS
SQUARE INCHES	6.452	SQUARE CENTIMETERS
SQUARE INCHES	6.944×10^{-3}	SQUARE FEET
SQUARE INCHES	645.2	SQUARE MILLIMETERS
SQUARE KILOMETERS	247.1	ACRES
SQUARE KILOMETERS	10.76×10^6	SQUARE FEET
SQUARE KILOMETERS	10^6	SQUARE METERS
SQUARE KILOMETERS	0.3861	SQUARE MILES
SQUARE KILOMETERS	1.196×10^6	SQUARE YARDS
SQUARE METERS	2.471×10^{-4}	ACRES
SQUARE METERS	10.76	SQUARE FEET
SQUARE METERS	3.861×10^{-7}	SQUARE MILES
SQUARE METERS	1.196	SQUARE YARDS
SQUARE MILES	640	ACRES
SQUARE MILES	27.88×10^6	SQUARE FEET
SQUARE MILES	2.59	SQUARE KILOMETERS
SQUARE MILES	3.098×10^6	SQUARE YARDS
SQUARE MILLIMETERS	0.01	SQUARE CENTIMETERS
SQUARE MILLIMETERS	1.550×10^{-3}	SQUARE INCHES
SQUARE YARDS	2.066×10^{-4}	ACRES
SQUARE YARDS	9	SQUARE FEET
SQUARE YARDS	0.8361	SQUARE METERS
SQUARE YARDS	3.228×10^{-7}	SQUARE MILES
STERE	1	CUBIC METER
STERE	0.2759	CORD
STONE	14	POUNDS
TABLESPOON	14.79	MILLILITERS
TEASPOON	5	MILLILITERS
TEMP.(°C.)+17.78	1.8	TEMP.(°F.)
TEMP.(°F)-32	.555	TEMP.(°C.)
THERM	100,000	BTU
TONS OF WATER/24 HRS.	83.333	POUNDS WATER/HOUR
TONS OF WATER/24 HRS.	0.16643	GALLONS/MIN.
TONS OF WATER/24 HRS.	1.3349	CUBIC FT./HOUR
TONS (LONG)	1016.0469	KILOGRAMS
TONS (LONG)	1.016047	TONS (METRIC)
TONS (LONG)	2240	POUNDS
TONS (LONG)	1.12	TONS (SHORT)
TONS (METRIC)	103	KILOGRAMS
TONS (METRIC)	2205	POUNDS
TONS (SHORT)	2000	POUNDS
TONS (SHORT)	32000	OUNCES
TONS (SHORT)	907.18486	KILOGRAMS
TONS (SHORT)	2430.56	POUNDS (TROY)
TONS (SHORT)	0.89287	TONS (LONG)
TONS (SHORT)	29166	OUNCES (TROY)
TONS (SHORT)	0.90718	TONS (METRIC)
WATT – HOUR	3600	JOULE
WATTS	0.05692	BTU/MIN.
WATTS	44.26	FOOT – POUNDS/MIN.
WATTS	0.7376	FOOT – POUNDS/SEC.
WATTS	1.341×10^{-3}	HORSEPOWER
WATTS	0.01434	KG. – CALORIES/MIN.
WATTS	10^{-3}	KILOWATTS
WATTS – HOURS	3.41214	BTU
WATTS – HOURS	2655	FOOT – POUNDS – FORCE
WATTS – HOURS	1.341×10^{-3}	HORSEPOWER – HOURS
WATTS – HOURS	3600	JOULES
WATTS – HOURS	0.8605	KILOGRAM – CALORIES
WATTS – HOURS	367.1	KILOGRAM – METROS
WATTS – HOURS	10^{-3}	KILOWATT – HOURS
YARDS	91.44	CENTIMETERS
YARDS	36	INCHES
YARDS	0.9144	METROS

NOTES

NOTES

Limited Warranty and Additional Terms & Conditions

LIMITED WARRANTY
Revised September 16, 2021

Subject to the limitation expressed in subsequent paragraphs, Martin Sprocket & Gear, Inc. and Martin Sprocket & Gear Canada Inc., and Martin Sprocket & Gear de Mexico, S.A. de C.V., make the following warranties: We warrant that each of our products of manufacture will be free from defects in material and workmanship under normal use, and service and stored, installed and maintained properly for twelve months from the date of delivery to the original user. We will correct any such defects in material or workmanship by repair or replacement of the product F.O.B. our plant. Tools will carry the following lifetime warranty: If a Martin tool fails to satisfactorily perform its designated use, it may be returned to the Martin distributor from which such tool was purchased and will be repaired or replaced without cost.

THE FOREGOING WARRANTIES ARE EXPRESSLY IN LIEU OF ANY AND ALL REPRESENTATIONS, WARRANTIES AND CONDITIONS EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHETHER ARISING FROM STATUTE, COMMON LAW, CUSTOM, OR OTHERWISE. THE REMEDY OF REPAIR OR REPLACEMENT OF THE DEFECTIVE PRODUCT OR TOOL SET FORTH IN THE FOREGOING WARRANTIES SHALL BE THE EXCLUSIVE REMEDY AVAILABLE TO ANY PERSON.

Charges for correcting defects will not be allowed, nor can we accept goods returned to us for repair or replacement, unless we are previously notified of the defect in writing and the return or correction is authorized by us in writing. All warranty claims alleging defects of materials or workmanship must be submitted in writing within thirty days of the discovery of a defect or such claim shall be considered waived. (This paragraph is subject to the provisions of the Consumer Protection laws of Mexico.)

The foregoing warranties shall not apply to any products or tools which have been subjected to misuse, neglect or accident, or have been altered or tampered with, or have been used beyond their normal useful or expected life, or which have had corrective work done thereon without our written consent. WE SHALL NOT BE LIABLE FOR ANY LOSS, INJURY, EXPENSE, OR DAMAGE, WHETHER DIRECT, CONSEQUENTIAL, INCIDENTAL, OR OTHERWISE, RESULTING FROM THE USE OF OUR PRODUCTS OR TOOLS OR CAUSED BY ANY DEFECT, FAILURE, OR MALFUNCTION OF ANY PRODUCT OR TOOL, WHETHER A CLAIM FOR SUCH DAMAGES IS BASED UPON WARRANTY, CONTRACT, NEGLIGENCE, OR OTHERWISE. Equipment manufactured by others, and included in our proposal, is not warranted in any way by us but carries only the manufacturer's warranty, if any. No person has the authority to bind us to any representation or warranty other than the foregoing limited warranties as disclaimed.

Sale of Martin products and tools shall be governed by the laws of the State of Texas and of the United States of America. The provisions of the United Nations Convention on Contracts for the International Sale of Goods or any local statute declaring it to have the force of law in the jurisdiction of one of the parties shall not apply to products or tools supplied hereunder.

"YOU ARE HEREBY NOTIFIED THAT ANY ADDITIONAL OR DIFFERENT TERMS FROM THOSE CONTAINED IN THIS LIMITED WARRANTY ARE OBJECTIONABLE. NO ADDITIONS OR CHANGES ARE BINDING ON MARTIN UNLESS THEY ARE IN WRITING AND SIGNED BY AN AUTHORIZED OFFICER."

NOTE: All past due invoices shall be payable to Martin Sprocket & Gear, Inc., at P.O. Box 91588, Arlington, Tarrant County, Texas 76015-0088. All past due invoices of Martin Sprocket & Gear Canada Inc., shall be payable at 896 Meyerside Drive, Mississauga, Ontario, Canada L5T 1R9. All past due Invoices of Martin Sprocket & Gear de Mexico, S.A. de C.V., shall be payable at Km. 52 Carretera, Naucalpan-Toluca, Calle 3 Mz.7 Lt. 11, Parque Industrial, Toluca 2000, Toluca, Edo. de Mexico, C.P. 50200. Reasonable attorneys' fees will be added if collection is forced.

ADDITIONAL TERMS & CONDITIONS
APPLICABLE TO ORDERS OF MARTIN STOCK PARTS

TAXES: Any sales, use, consumption, or other similar tax applicable to the sale, purchase, or use of any Product is not included in quoted price and shall be paid by the Purchaser.
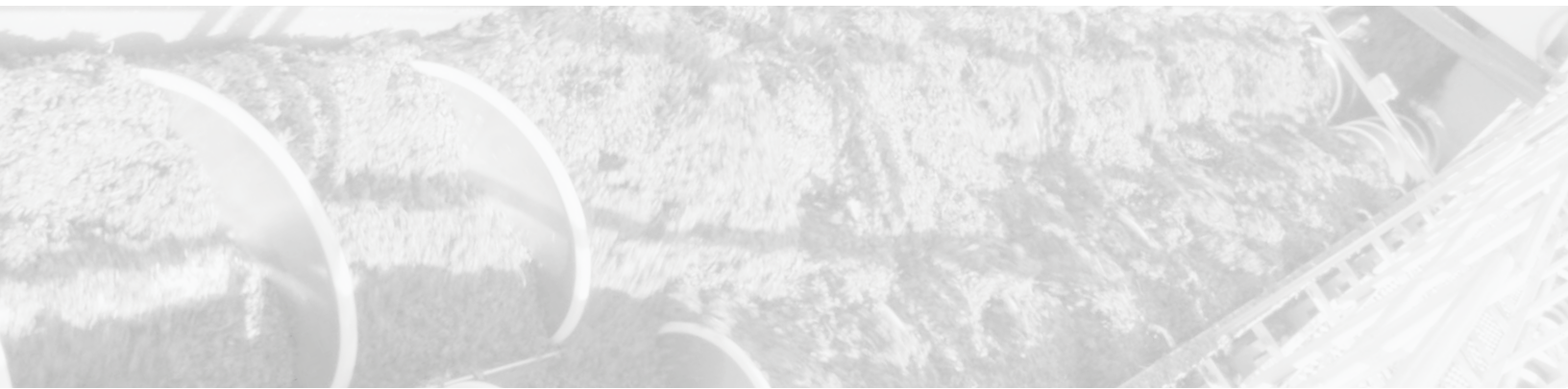
RETURNED PRODUCT: When it is desired to return Product for credit or exchange, it is necessary that permission in writing first be obtained from the nearest Martin Sprocket & Gear sales office.

SHIPMENTS: If Seller is not able to meet Purchaser's shipment requirements and/or expected dates of shipment, Seller will not accept liability for delays beyond Seller's control, nor will Seller accept cancellations unless a settlement has been agreed upon between all parties.

FREIGHT ALLOWANCE: Freight allowances are shown on the different product discount sheets. In cases where a Purchaser's specified routing of any Order is more costly than the routing selected by Seller, the excess charges will be added to the net amount of the invoice. Weights shown in supplier's publications are approximate, and may not be used to determine qualifications for freight allowance.

CASH DISCOUNT: Unless modified in the Order or Invoice, payment shall be: A 1% cash discount will be allowed on invoices paid net 15 days. All invoices are due in 30 days. Cash discount does not apply to other charges such as freight, postage, or delivery charges.

PUBLISHED DIMENSIONAL DATA: Due to changes in engineering and manufacturing processes and procedures, it becomes necessary, from time to time, to make alterations to products. Such alterations may not be reflected in supplier's publications. Therefore, if dimensions, specifications or appearances represented by pictures or drawings or tables are critical in their applications, please consult the factory for clarification or certified drawings.

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