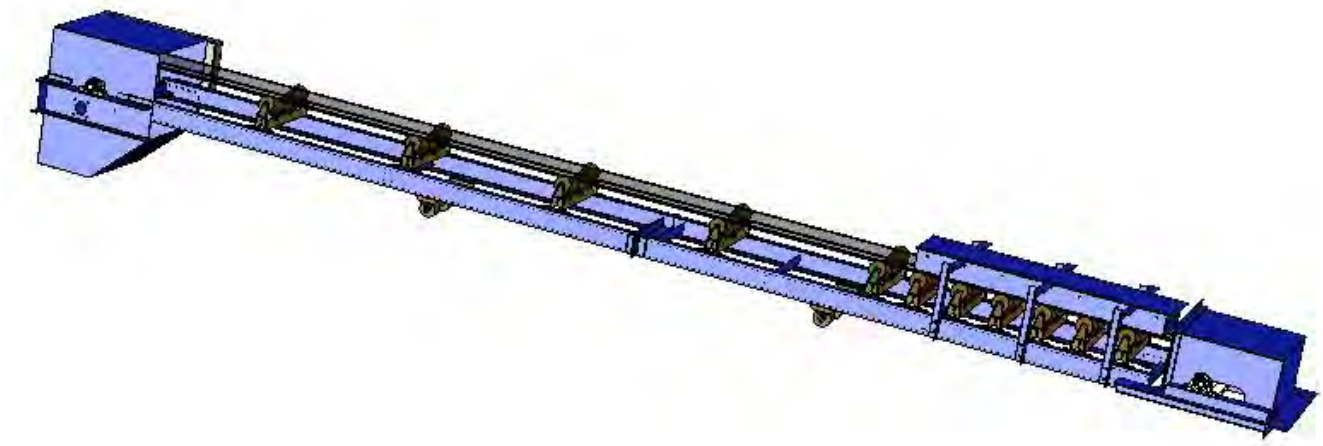
Orthman
CONVEYING SYSTEMS

Belt Conveyor Catalog



PTDA Member

MEMBER CEMA CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION

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

APPROVED FOR DISTRIBUTION BY THE SCREW CONVEYOR 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 Williams-Steiger 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.

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.

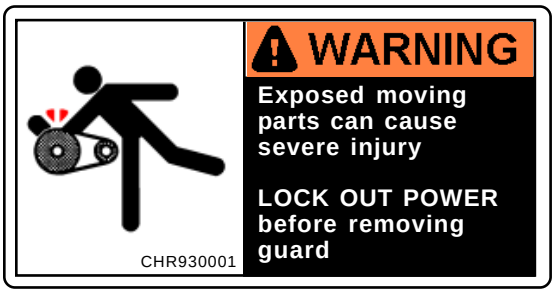
One or more warning labels should be visible on conveyor housings, conveyor covers and elevator housings. If the labels attached to the equipment become illegible, please order replacement warning labels from the OEM or CEMA.

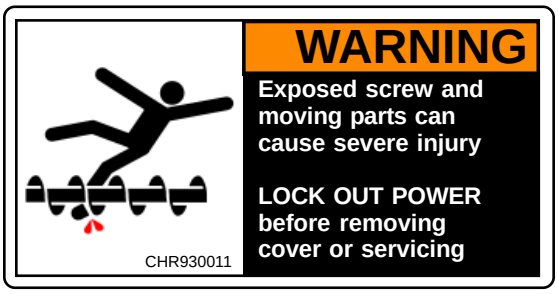
The Conveyor Equipment Manufacturers Association (CEMA) has produced an audio-visual presentation entitled “Safe Operation of Screw Conveyors, Drag Conveyors, and Bucket Elevators.” CEMA encourages acquisition and use of this source of safety information to supplement your safety program.

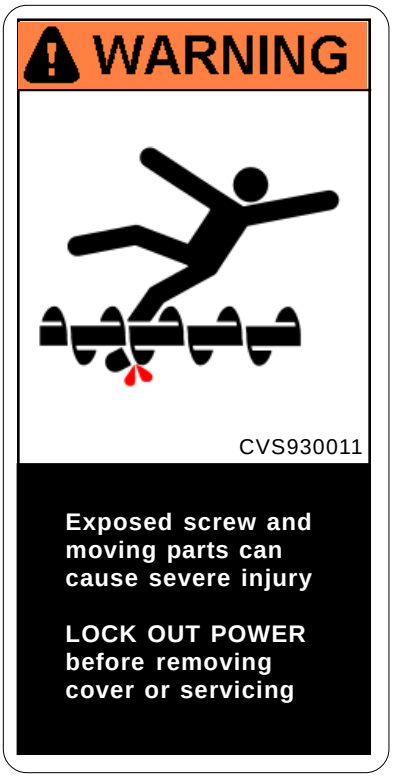
SEE OTHER SIDE FOR SAFETY LABELS

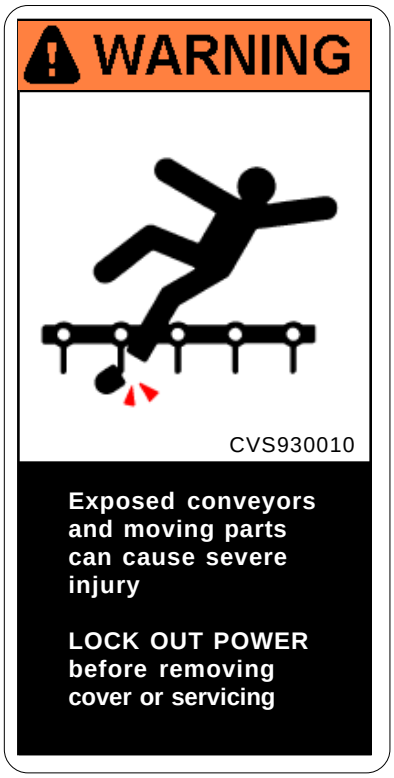
CEMA Safety Labels

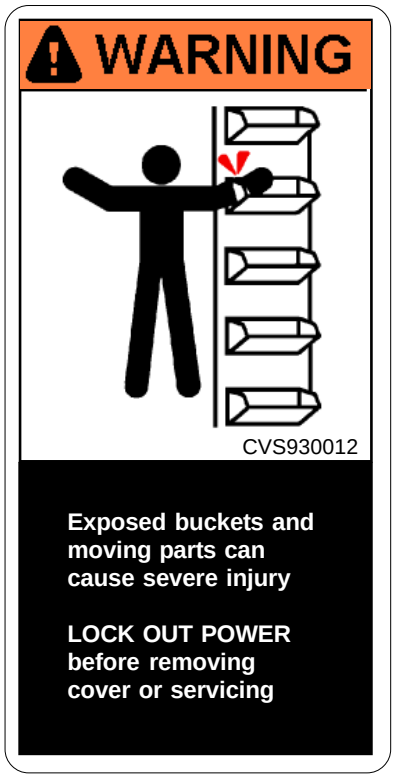
The CEMA safety labels shown below should be used on screw conveyors, drag conveyors, and bucket elevators. Safety labels should be placed on inlets, discharges, troughs, covers, inspection doors & drive guards. See CEMA Safety Label Placement Guidelines on CEMA Web Site: http://www.cemanet.org/safety/guidelines.html











PROMINENTLY DISPLAY THESE SAFETY LABELS ON INSTALLED EQUIPMENT

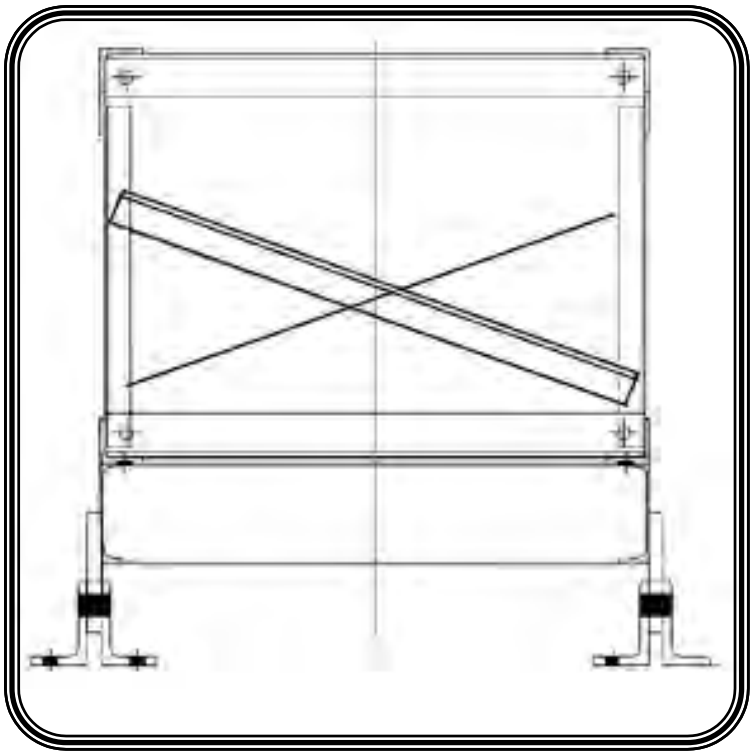
SEE OTHER SIDE FOR SAFETY REMINDERS

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

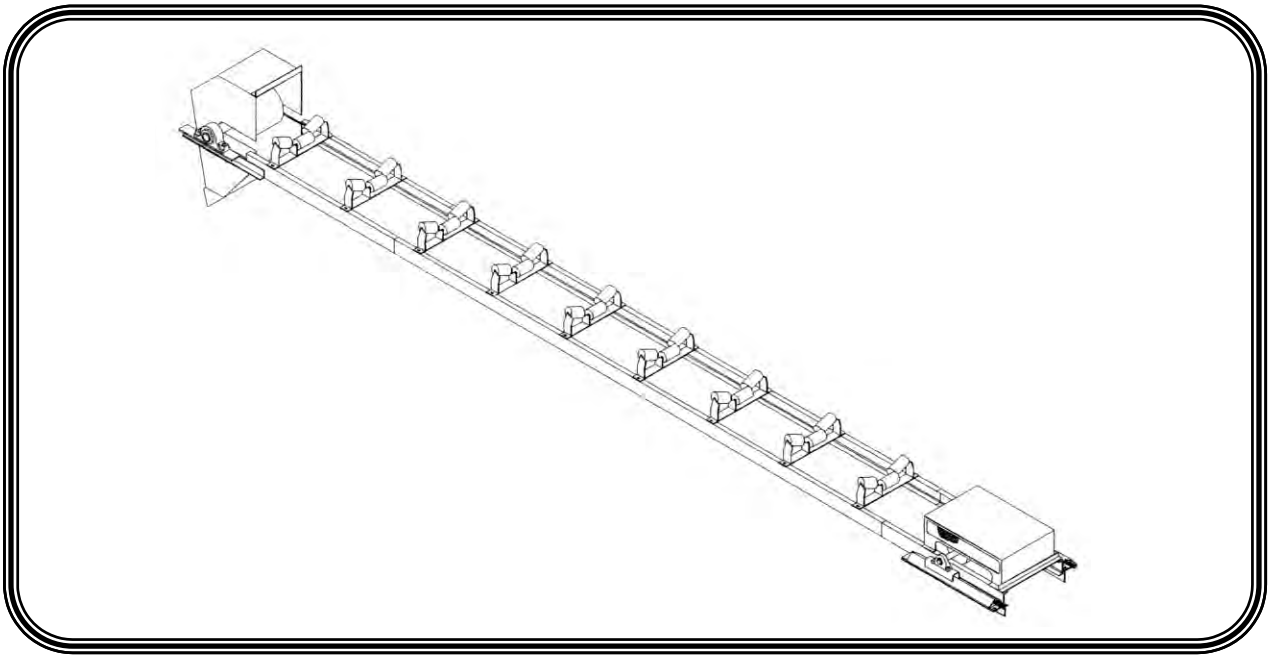
CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION
6724 Lone Oak Blvd., Naples, Florida 34109
239-514-3441

This catalog is a partial representation of the different styles, designs and options of **ORTHMAN** belt conveyors and the accessories that accompany them. **ORTHMAN** will design and manufacture complete systems using either standard or special parts to meet the customer's exact needs.



ORTHMAN'S experience in handling products such as sand, gravel, grain, coffee, minerals, etc. will insure a properly sized conveyor for handling any bulk material. We specialize in heavy duty construction as a standard to reduce maintenance and extend the life of all equipment.

ORTHMAN puts a very strong emphasis on application engineering. Studied attention to detail during this phase eliminates costly installation and operation errors. Meeting our client's performance expectations with quality machinery is our number one goal.



DESIGN CONSIDERATIONS:

Belt Widths:	18”, 24”, 30”, 36”, 48”
Belt Speeds:	18” B. W. 400 FPM max. 24” B. W. 500 FPM max. 30” B. W. 600 FPM max. 36” B. W. 650 FPM max. 48” B. W. 700 FPM max.
Carrying Idlers:	CEMA B, CEMA C, flat steel, 20 degree troughing, 35 degree troughing, impact and training
Idler Spacing:	Carrying: 5’ – 0” Return: 10’ – 0”
Drives:	Standard drives include: 1750 rpm, TEFC, NEMA B motor with a 1.15 S.F. Class II shaft mounted gear reducer “V” type sheaves and belts Motor Mount Belt Guard Integral Backstop (if required)

BASIC DESIGN

STEP 1: Compile the Basic Design Information Required
Length of Conveyor:
Measured in feet from center to center of pulleys, parallel to belt line.

Inclination of conveyor:
Measured in degrees off the horizontal, consult the CEMA Belt Conveyor Manual or **ORTHMAN CONVEYING** Engineering Department to determine the maximum angle at which the particular material may be conveyed.

Maximum and Minimum Material Density:
Measured in pounds per cubic foot (PCF), the maximum density is used for power calculations while the minimum density is used in the conveyor calculations.

Peak Capacity:
Measured in tons per hour (TPH), the capacity used should be the peak capacity at which the conveyor is expected to perform, not a lesser average capacity.

STEP 2: Determine Belt Width

Using Table 1 (pg. 3), determine the conveyor belt width required in inches.

TABLE 1

BELT WIDTH INCHES	*Capacity in Tons per Hour at 100 FPM Belt Speed*			*Lump Size Inches*		*Maximum Recommended Belt Speed, FPM**	
	Weight of Material, Pounds per cu. ft (PCF)			Sized	Unsized	50% Max. Size Lumps	100% Max. Size Lumps
	50	75	100				
18	27	41	54	3	5	400	300
24	50	75	100	4 ½	8	500	400
30	81	122	162	7	10	600	450
36	117	176	235	8	12	650	500

*Certain materials should not be handled at maximum belt speeds.
Consult the CEMA Belt conveyor manual or Orthman Engineering Department.

STEP 3: Determine Operating Speed

Using Table 2 (below), determine the conveyor operating speed in feet per minute (FPM)

TABLE 2

Material Density PCF	BELT WIDTH, INCHES	*Capacity, Tons per Hour (TPH)* / *Belt Speed, Feet per minute (FPM)*											
		100	150	200	250	300	350	400	450	500	550	600	650
50	18	27	41	54	68	81	95	108					
	24	50	75	100	125	150	175	200	225	250			
	30	81	122	162	203	243	284	324	365	405	446	486	
	36	118	176	235	294	353	411	470	529	588	646	705	764
75	18	41	61	81	101	122	142	162					
	24	75	113	150	188	225	263	300	338	375			
	30	122	182	243	304	365	425	486	547	608	668	729	
	36	176	264	353	441	529	617	705	793	881	969	1058	1146
100	18	54	81	108	135	162	189	216					
	24	100	150	200	250	300	350	400	450	500			
	30	162	243	324	405	486	567	648	729	810	891	972	
	36	235	352	470	587	705	822	940	1057	1175	1292	1410	1527

STEP 4: Calculate the Horsepower Required

Using Table 3, determine the horsepower required to drive the empty conveyor per each 100 FPM of belt speed, HP_o. then, HP_e= (Belt Speed/100) X HP_o.

TABLE 3

BELT WIDTH, INCHES	*Horsepower to drive empty conveyor for each 100 FPM of belt speed* / *Conveyor centers, feet*											
	50	100	150	200	300	400	500	600	700	800	900	1000
18	0.20	0.37	0.45	0.52	0.67	0.82	1.00	1.20	1.40	1.50	1.60	1.70
24	0.30	0.47	0.57	0.66	0.88	1.10	1.20	1.40	1.60	1.80	2.00	2.20
30	0.40	0.60	0.75	0.90	1.20	1.40	1.70	2.00	2.30	2.60	2.80	3.00
36	0.65	0.80	0.95	1.10	1.50	1.80	2.10	2.40	2.70	3.00	3.40	3.80

Using Table 4 (pg.4) determine the horsepower required to convey the material horizontally, HP_m.

TABLE 4												
Tons Per Hour (TPH)	Horsepower to convey material horizontally*											
	Conveyor Centers, feet											
	50	100	150	200	300	400	500	600	700	800	900	1000
50	0.3	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.3	1.4	1.6	1.7
100	0.6	0.8	0.9	1.1	1.4	1.7	2.0	2.3	2.6	2.9	3.2	3.5
150	0.9	1.1	1.4	1.6	2.0	2.5	3.0	3.4	3.9	4.3	4.8	5.2
200	1.2	1.5	1.8	2.1	2.7	3.3	3.9	4.5	5.2	5.8	6.4	7.0
300	1.8	2.3	2.7	3.2	4.1	5.0	5.9	6.8	7.7	8.6	9.6	10.5
400	2.4	3.0	3.6	4.2	5.5	6.7	7.9	9.1	10.3	11.5	12.7	13.9
500	3.0	3.8	4.5	5.3	6.8	8.3	9.8	11.4	12.9	14.4	15.9	17.4
600	3.6	4.5	5.5	6.4	8.2	10.0	11.8	3.6	15.5	17.3	18.7	21.0
700	4.2	5.3	6.4	7.4	9.5	11.7	13.8	15.9	18.0	20.0	22.0	24.0
800	4.8	6.1	7.3	8.5	10.9	13.3	15.8	18.2	21.0	23.0	25.5	28.0
900	5.5	6.8	8.2	9.5	12.3	15.0	17.7	20.0	23.0	26.0	28.5	31.0
1000	6.1	7.6	9.1	10.6	13.6	16.7	19.7	23.0	25.0	29.0	32.0	35.0
1100	6.7	8.3	10.0	11.7	15.0	18.3	22.0	25.0	27.0	32.0	35.0	38.0
1200	7.3	9.1	10.9	12.7	16.4	20.0	24.0	27.0	31.0	35.0	38.5	

*For any speed and any material

Using Table 5, determine the horsepower required to elevate the material, HP_j.

TABLE 5										
Tons Per Hour (TPH)	Horsepower to elevate the material									
	Conveyor lift, feet									
	10	20	30	40	50	60	70	80	90	100
50	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.6	5.1
100	1.0	2.0	3.0	4.0	5.1	6.1	7.1	8.1	9.1	10.1
150	1.5	3.0	4.5	6.1	7.6	9.1	10.6	12.1	13.7	15.2
200	2.0	4.0	6.1	8.1	10.1	12.1	14.2	16.2	18.1	20.0
300	3.0	6.1	9.1	12.1	15.2	18.2	21.2	24.0	27.0	30.0
400	4.0	8.1	12.1	16.2	20.0	24.0	28.0	32.0	36.0	40.0
500	5.1	10.1	15.2	20.0	25.0	30.0	35.0	40.0		
600	6.1	12.1	18.2	24.0	30.0	36.0				
700	7.1	14.1	21.0	28.0	35.0					
800	8.1	16.2	24.0	32.0	40.0					
900	9.1	18.2	27.0	36.0						
1000	10.1	20.0	30.0	40.0						
1100	11.1	22.0	33.0							
1200	12.1	24.0	36.0							

To calculate the Horsepower required, use the following equation:

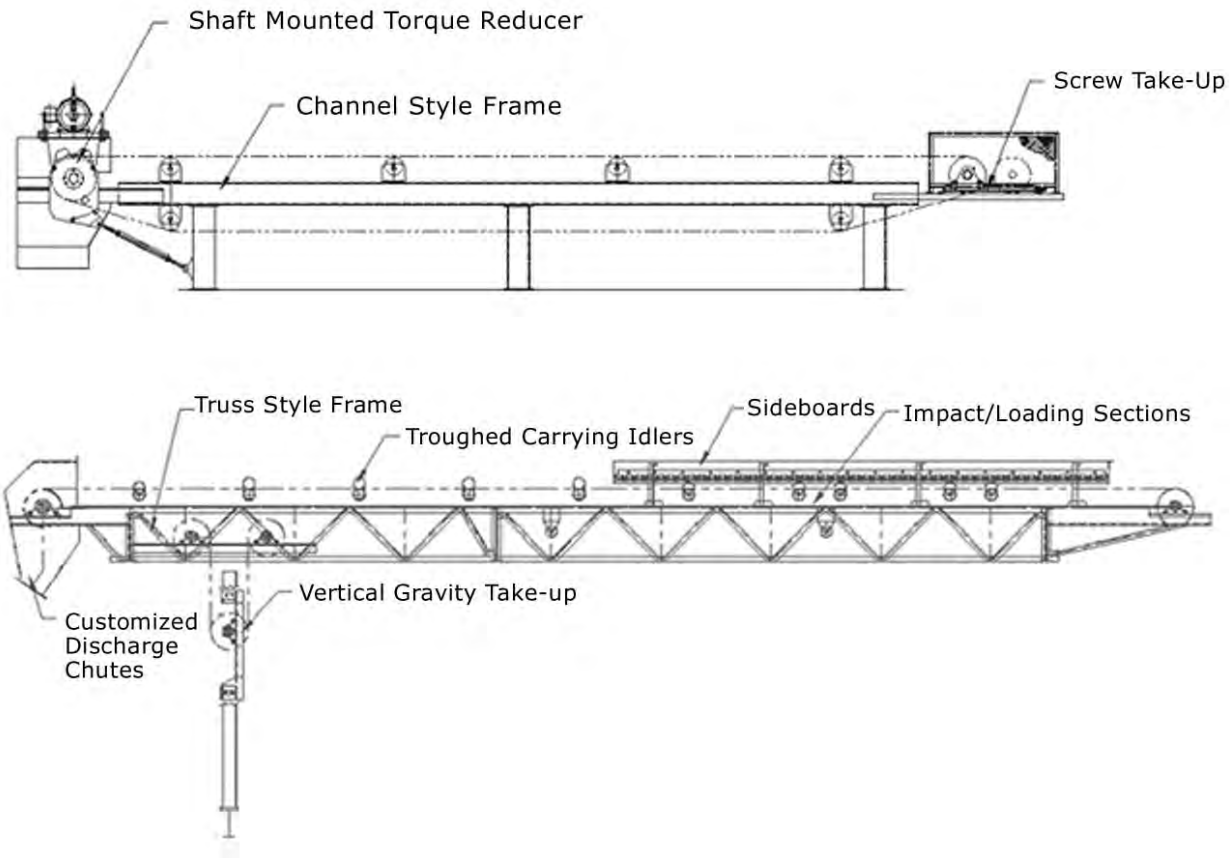
$HP_{req}=HP_e+HP_m+HP_j$.

STEP 5: Determine the Motor Horsepower
Motor HP_{min} = HP_{req}/Drive Efficiency
Motor HP = next standard Motor HP greater than Motor HP_{min}

STEP 6: Identify the Conveyor Layout
Identify the conveyor layout. See following sections to determine channel or truss construction, gravity or screw take-up, sideboards, covers, etc.

STEP 7: Complete the Request for Quotation form included in this catalog.

CONVEYOR OPTIONS



CHANNEL STRINGER CONVEYORS

Conveyors designed with channel stringers are available in 10’ 0”, and 20’ 0” standard sections. Depending on the required conveyor length, an additional, nonstandard length section will be supplied. A bolted splice plate connection joins and stiffens each joint. Channel stringer sections can be joined to truss sections by special lateral frames for spanning distances that require a truss section, while still enabling channel stringers to be used where the spanned distance does not require a truss. Channel stringers range in size from C4x5.4 to C10x20, depending on load, capacity and span requirements. Schedule 40 pipe or carbon steel angles are used for cross-members, supplying added strength and rigidity. Steel channel or fabricated bents are used for supports. The channel frame design is especially suited to any application where overhead clearance is limited.

TRUSS FRAME CONVEYORS

Truss frame conveyors are available in 24” deep and 42” deep sections. The 24” deep sections are available in lengths of 6’– 0”, 15’– 0”, 18’– 0”, and 20’– 0”. The 42” deep sections are available in 16’– 0”, 20’– 0”, and 24’– 0” lengths. As with the channel frame conveyors, a non-standard section may be required to meet the customers’ required conveyor length. The truss frame conveyors are used in applications where a channel frame conveyor cannot span an unsupported distance required by the customer.

Please refer to the following chart for permissible spans:

MAXIMUM TRUSS SECTION SPANS – FEET			
Truss Depth, Inches	Belt Width, Inches	Allowable Span w/o walkway, Feet	Allowable Span w/ walkway, Feet
24	18	48	33
24	24	44	31
24	30	40	29
24	36	36	27
42	18	55	46
42	24	52	43
42	30	49	40
42	36	49	37

OTHER CONVEYOR OPTIONS

Slider Bed Conveyors:

14 to 10 ga. Plate is used for conveyor decking depending on conveyor loads. Heavy, conservative design insures long life while also minimizing the number of intermediate supports needed for industries whose light bulk material densities allow their use. Conveyors requiring moderate incline (23 degrees or less) may be supplied with special cleated belts.

U-Trough Slider Conveyors:

Used to provide better material containment on the carrying run. Minimizes fallback and increases efficiency in inclined applications when used with wood chips to provide more inter-meshing of material.

Flat Slide Conveyors

Used when weighing of the material is necessary, when the belt serves as a feeder, or when limited overhead clearance requires a flat slide design.

Totally Enclosed Conveyors

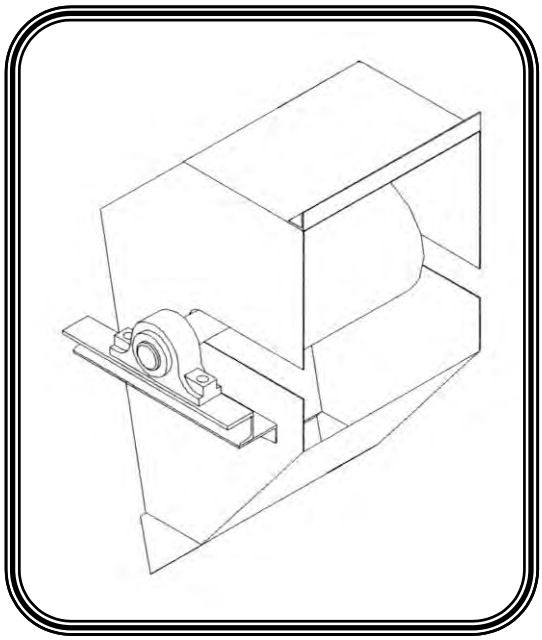
Sealed covers and drip pans allow for virtually dust-free material conveyance. Corrugated or non-corrugated covers are available. Drip pans are constructed of 14 ga. steels, standard.

Custom Engineered Conveyors

If none of the standard conveyor designs fits the customer's needs, **ORTHMAN** will be pleased to design a custom conveyor application. By supplying **ORTHMAN** with specifications and/or drawings illustrating the particular application, the engineering department will be able to produce general arrangement drawings for the customer's approval.

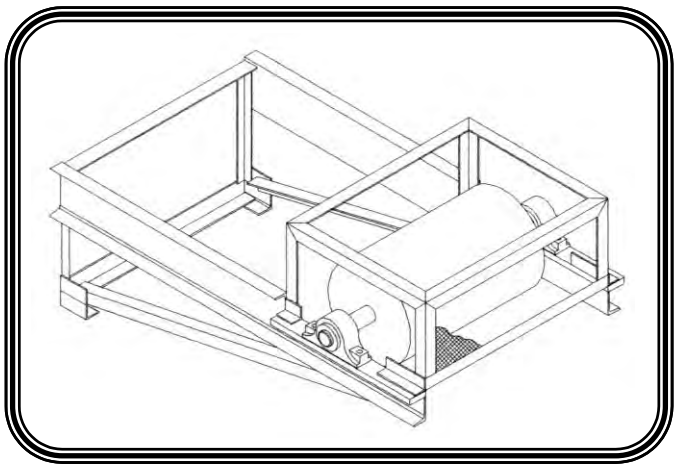
ORTHMAN CONVEYING DISCHARGE CHUTES

The standard **ORTHMAN** Discharge Chutes are constructed of 14 ga. to ¼" plate, depending on application. Chutes may be constructed of a range of materials depending on usage, including: stainless steel, aluminum, and carbon steel (standard). Chute options also include abrasion resistant or UHMW liners. Access panels may also be added to facilitate pulley maintenance. Clip angles allow for easy removal of Discharge Chute.



These chutes may be fitted with the standard **ORTHMAN** belt cleaner or with several commercially available belt cleaners, including brush type belt cleaners. Customer should specify what type of belt cleaner, if any, is applicable to their requirements.

Custom chute extensions or flange connections may be specified by the customer. Standard discharge angle is 60 degrees, but customer may specify required discharge angle. Please note that some materials require a steeper discharge angle than others to prevent material from sticking to inside of chute. Consult **ORTHMAN CONVEYOR SYSTEMS** to determine the optimum angle for the material to be conveyed.

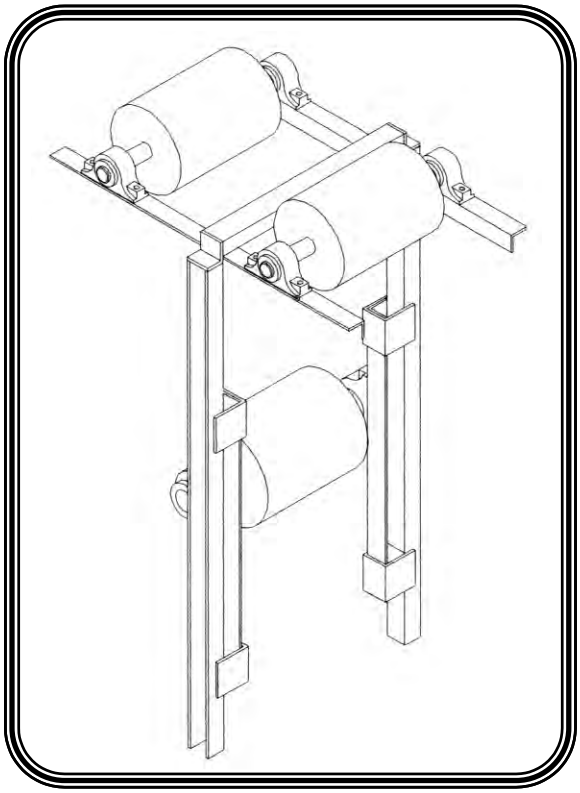


FIXED TAIL TERMINALS

This style is used when the conveyor has a gravity take-up arrangement. The unit consists of a fabricated steel frame, ball or roller type pillow block bearings, a wing-type tail pulley (unless otherwise specified), and a fabricated expanded metal tail pulley guard. For a totally enclosed conveyor, the tail pulley guard is made with solid sheet metal. The unit can also be welded to the last stringer section for easy maintenance. The tail terminal shown is designed to bolt to a truss section. Terminals for channel stringers are also available.

TAIL SECTIONS – FIXED PULLEY				
Belt Width, in	Pulley Dia., in	Shaft Dia., in	Frame Ht., in	Weight, lbs
18	14	1 *15/16*	24	190
18	14	2 *7/16*	24	195
18	14	2 *15/16*	24	210
18	14	1 *15/16*	42	220
18	14	2 *7/16*	42	225
18	14	2 *15/16*	42	240
24	14	1 *15/16*	24	205
24	14	2 *7/16*	24	210
24	14	2 *15/16*	24	225
24	14	1 *15/16*	42	230
24	14	2 *7/16*	42	235
24	14	2 *15/16*	42	250
30	16	1 *15/16*	24	220
30	16	2 *7/16*	24	225
30	16	2 *15/16*	24	240
30	16	3 *7/16*	24	255
30	16	1 *15/16*	42	250
30	16	2 *7/16*	42	255
30	16	2 *15/16*	42	270
36	16	3 *7/16*	42	285
36	16	2 *7/16*	24	245
36	16	2 *15/16*	24	260
36	16	3 *7/16*	24	275
36	16	2 *7/16*	42	270
36	16	2 *15/16*	42	285
36	16	3 *7/16*	42	300

Notes: 1. Weight values are frame-weights only; tail pulley guard weight is not included.
2. Pulley and shaft diameters will change with excessive loads and/or capacities.



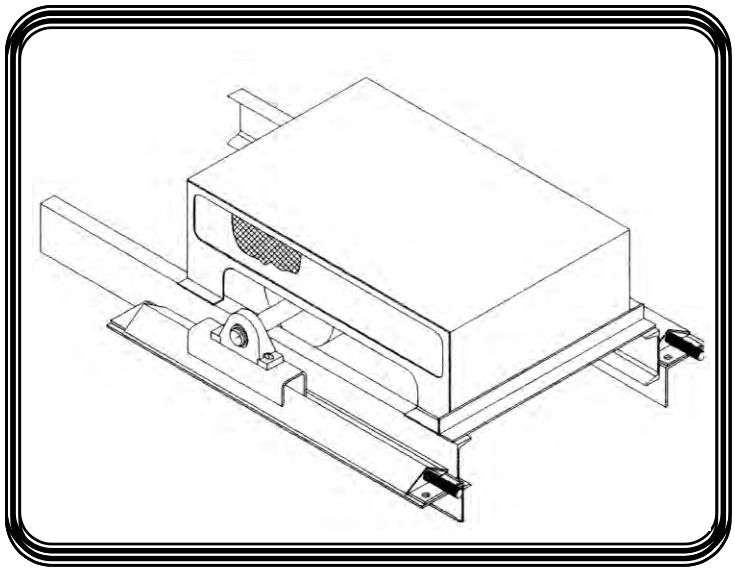
GRAVITY TAKE-UP

This illustration shows a standard gravity take-up. Depending on the specific conveyor requirements, design changes may be made to accommodate them. The standard gravity take-up includes two drum bend pulleys with ¼" plain lagging and one wing-type take-up pulley. The bearings are ball or roller type pillow blocks. The frame is fabricated carbon steel that is designed to either weld or bolt to the conveyor structure, depending on customer requirements. There is also a counterweight box, not shown for clarity. A take-up guard may be required for certain conveyors. Gravity take-ups have a travel of 18", 24" and 30" depending on conveyor length. Longer travel lengths may be designed if required. The chart shows values for standard gravity take-ups. Pulley diameters, shaft diameters and weights may change if there are excessive loads and/or capacities.

GRAVITY TAKE-UP SPECIFICATION – STANDARD			
Belt Width, in	**Pulley Diameter, in**	**Shaft Diameter, in**	**Weight, lbs**
18	16	1 *15/16*	285
18	16	2 *7/16*	365
18	16	2 *15/16*	395
18	16	3 *7/16*	440
24	16	1 *15/16*	325
24	16	2 *7/16*	380
24	16	2 *15/16*	455
24	16	3 *7/16*	515
30	16	2 *7/16*	410
30	16	2 *15/16*	515
30	16	3 *7/16*	605
36	16	2 *7/16*	500
36	16	2 *15/16*	550
36	16	3 *7/16*	690
36	16	3 *15/16*	740

SCREW TAKE-UP TAIL TERMINALS

These terminals are also made of fabricated steel construction. These include screw-type take-up frames, ball or roller type pillow block bearings, wing-type tail pulleys, and expanded metal tail guards. Take-up lengths can be 12", 18", 24", or 36". Standard units are designed to be welded to the last stringer section, but a bolted connection can also be supplied.



The terminal shown is designed to be welded to a channel type stringer.

TAIL SECTIONS – SCREW TAKE-UPS					
Belt Width, in	Pulley Diam, in	Shaft Dia, in	Frame Ht, in	T-U Travel, in	Weight, lbs
18	14	1 *15/16*	24	12-30	190-260
18	14	2 *7/16*	24	12-30	195-280
18	14	2 *15/16*	24	12-30	210-310
18	14	1 *15/16*	42	12-30	220-290
18	14	2 *7/16*	42	12-30	225-310
18	14	2 *15/16*	42	12-30	240-340
24	14	1 *15/16*	24	12-30	205-275
24	14	2 *7/16*	24	12-30	210-295
24	14	2 *15/16*	24	12-30	225-325
24	14	1 *15/16*	42	12-30	230-305
24	14	2 *7/16*	42	12-30	235-325
24	14	2 *15/16*	42	12-30	250-355
30	16	1 *15/16*	24	12-36	220-295
30	16	2 *7/16*	24	12-36	225-315
30	16	2 *15/16*	24	12-36	240-345
30	16	3 *7/16*	24	12-36	255-365
30	16	1 *15/16*	42	12-36	250-315
30	16	2 *7/16*	42	12-36	255-335
30	16	2 *15/16*	42	12-36	270-365
30	16	3 *7/16*	42	12-36	285-385
36	16	2 *7/16*	24	12-36	245-310
36	16	2 *15/16*	24	12-36	260-330
36	16	3 *7/16*	24	12-36	275-350
36	16	2 *7/16*	42	12-36	270-340
36	16	2 *15/16*	42	12-36	285-360
36	16	3 *7/17*	42	12-36	300-380

Notes: 1. Weight Values are frame-weights only; tail pulley guard weight is not included.
2. Pulley and shaft diameters will change with excessive loads and/or capacities.
3. The amount of take-up required is dependant on the length of the conveyor.

Please consult the ORTHMAN **Engineering Department** to determine your specific take-up needs.

CONVEYOR ACCESSORIES

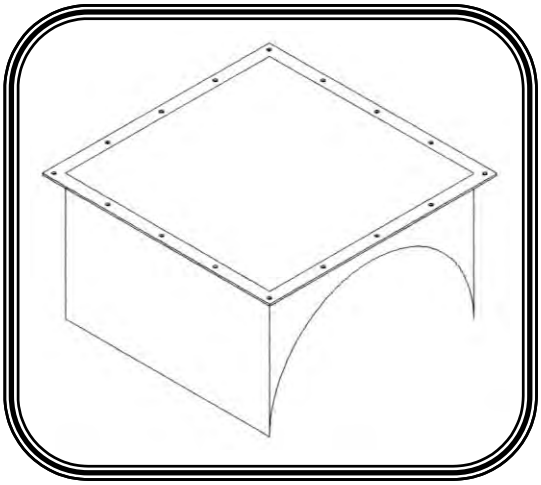
BELT CLEANERS

ORTHMAN has several different styles of industrial and food grade belt cleaners. The most standard design is a spring-loaded belt cleaner with either a rubber or UHMW scraper blade. This type cleaner is the most often used and will provide adequate cleaning in most applications. Motor driven brush type cleaners are also available for applications where the scraper type cleaner does not remove enough material. Please consult the Engineering Staff at ORTHMAN to determine what type of belt cleaner best suits your application.

The chart below shows the most standard belt cleaners available:

SCRAPER-TYPE BELT CLEANERS, STANDARD		
Belt Width, In	Blade Material	Weight, lbs
18	Standard Rubber	25
24	Standard Rubber	30
30	Standard Rubber	35
36	Standard Rubber	40
18	UHMW	25
24	UHMW	30
30	UHMW	35
36	UHMW	40

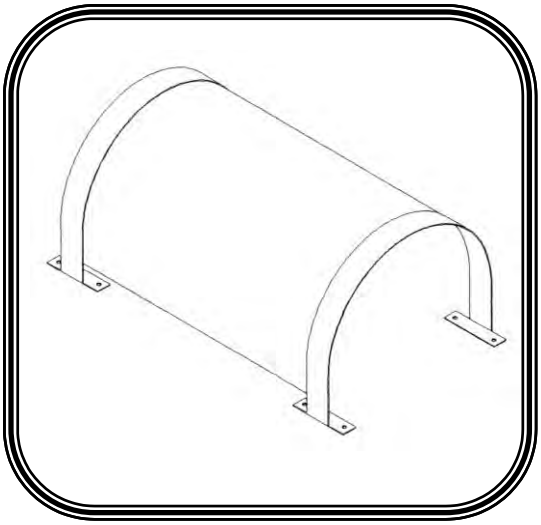
These inlets provide a guide for incoming flow for covered conveyors. The flange may be the ORTHMAN standard or specified by the customer to attach to already existing chuting. The inlet chute itself is made of 14 ga. steel metal, standard. The chute is designed to be welded to a standard ORTHMANS curved cover. This same type of cover may be adapted for a box-type cover. UHMW or abrasion-resistant lining may be added if required. For applications where conveyors must be dust-proof, a gasket will be supplied with the flange.



FLANGED INLETS LOAD HOPPERS (FOR COVERED CONVEYORS)

Load hoppers are available for non-enclosed conveyors. A load hopper is able to guide the incoming flow of material properly onto the belt. The unit consists of structural steel chute walls, adjustable rubber or UHMW skirt seals and an optional downstream cover. The load hopper bolts directly to the top of any of ORTHMAN'S conveyor structures. If needed, impact idlers or a load section is located under the hopper's discharge point. The chute sides may be inclined or vertical to suit customers' applications.

STANDARD CONVEYOR COVERS



ORTHMAN offers a variety of standard conveyor covers. These covers are designed to protect the belt, material and idlers from the weather and other contaminants. Conveyor covers also protect the belt from being sun dried and damaged, and offers protection from wind and rain. Shown here is a non-hinged, smooth curved cover. This standard cover consists of steel, galvanized steel or aluminum cover sections supported on bands of heavier gauge steel or aluminum. The support bands bolt directly to the foot brackets which are subsequently bolted to the top chord of truss frames or to the top of channel stringers.

The chart below gives some specifications on the curved covers:

STANDARD CONVEYOR COVERS – WEIGHTS			
Belt Width, inches	*Weight per 4' – 0" Section, Lbs*		
	Full, galvanized	*Full, aluminum*	*¾, galvanized*
18"	52	22	42
24"	58	25	47
30"	65	28	52
36"	71	30	55
48"	84	36	72
60"	97	41	84
72"	109	47	93

CONVEYOR DECK PLATES

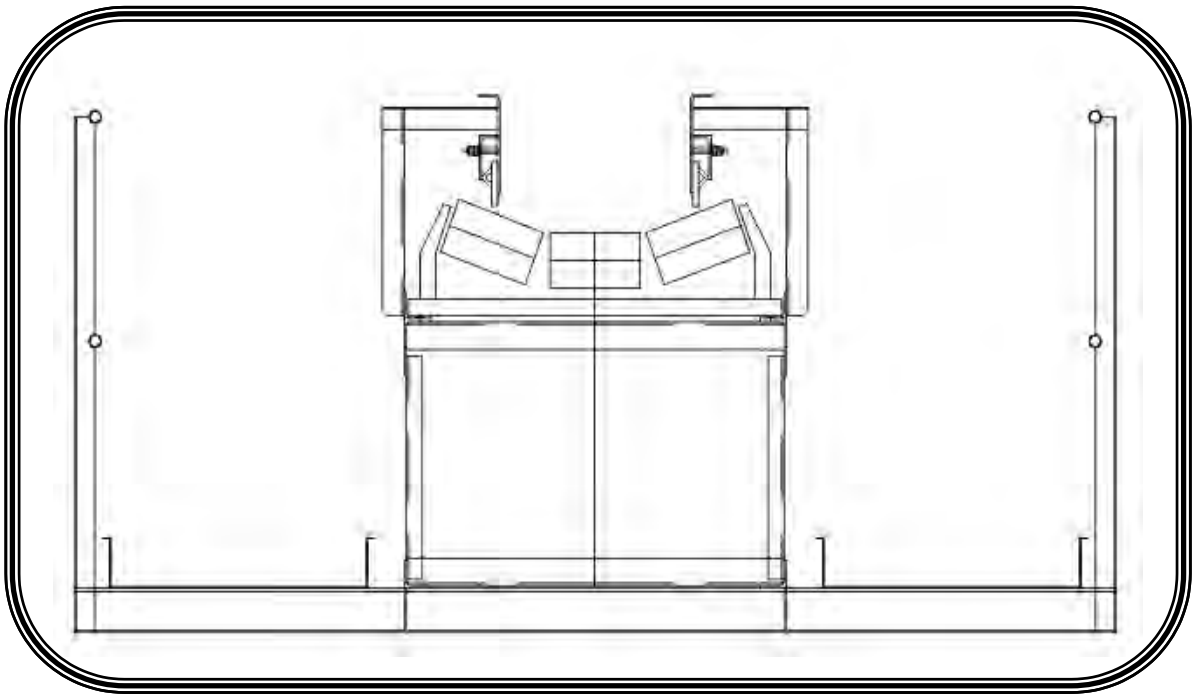
Deck plates for the conveyors are an optional feature used to deflect any material from the carrying run of the belting from falling on the return run of the belting. Typically, 16 ga. material is used, although the customer may specify thicker material if it is needed. Inclined conveyor decking is designed to shed water and debris, while still protecting the belt and return idlers.

DRIP PANS

Essential for conveyors running in areas where delicate machinery or people may be underneath the conveyors, the fabricated drip pans are designed to keep any material on the carrying and return runs from falling below the conveyors. The drip pans are made of 14 ga. carbon steel and are joined together with bolted splice sections. For totally enclosed conveyors, gaskets will be provided to ensure the drip pans are dust-proof.

WALKWAYS AND HANDRAILS

ORTHMAN offers walkways and handrails for one or both sides of their conveyors to provide maintenance access to the full length of the conveyor. Standard walkways are either 36” or 48” wide. Walkways are designed to bolt to the conveyor supports of channel frame conveyors, or directly to the lower cord angles of truss sections. The handrails may either be welded directly to the walkway support frame, or may be designed to bolt together at the job site, depending on shipping and installation needs. Standard walkway flooring is 1 ¼” X $^{3}/_{16}$” bar grating, and standard handrails are 1 ¼” Sch 40 pipe. Walkway sections are available in 10’-0” or 20’-0” lengths. Galvanized walkway is non-standard, but is available in 10’-0” sections. Ladders and cages are also available if needed. In addition, **ORTHMAN** can provide the customer with service platforms and support steel needed at critical maintenance areas, such as the head and tail sections.



This picture shows a conveyor installation by **ORTHMAN** already in the field. The walkways, handrails, platforms, ladders and/or steps are tailored to the individual customer’s application. Please note that a safety stop switch is recommended on conveyors where workers will be near a running conveyor.

Some welding and/or assembly may be required in the field for installation of walkways and handrails. **ORTHMAN** will supply any installation instructions that are needed.

OTHER ORTHMAN PRODUCTS

BUCKET ELEVATORS

Designed to move flowing powders or bulk solids vertically. Series of buckets mounted on chain or belt operating over a sprocket or pulley is the typical elevator configuration. Take-ups are provided as a means to compensate for variation in conditions, or belt or chain wear. A steel casing encloses the bucket line. Boot sections can be designed for various angles and heights of inlet material. Discharge hoods can be designed to accommodate specific customer applications. Please contact the ORTHMAN CONVEYOR SYSTEMS Sales Department for a complete catalog of standard bucket elevators.

SCREW CONVEYORS

Industrial and food grade screw conveyors are available for conveying a variety of different materials. ORTHMAN offers a wide range of standard screw conveyors and options shown in our Screw Conveyor catalog. This catalog is also available through contacting the Sales Department at our home office or through your local sales representative. ORTHMAN provides a full line of screw conveyors and related components from water-jacketed heat-transferring models to multiple-screw “live bottom” type feeder units.

GATES

ORTHMAN offers gates of virtually any configuration. Electric-actuated, air-operated, and manual Y flop gates, flat slide gates, as well as made-to-order gates of the customers’ design are available. Our general catalog shows many types of gates already in use in the field. A wide range of materials is available for fabrication of the gates including steel, stainless steel, and aluminum. Gates lined with abrasion resistant steel or UHMW are available to suit customer requirements.

DRAG CONVEYORS

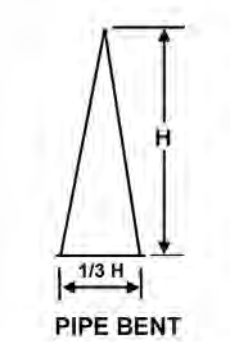
Drag conveyors are typically a chain-driven series of solid or perforated flights. This type of conveyor is used for material retrieval where there is little overhead room, such as under a casting line. They are also used for material retrieval in an oil or water pit after a wash procedure. These conveyors are designed per customer requirements and are tailored to fit customer needs. Because these conveyors are usually installed in areas where maintainance access is usually difficult, they are built ruggedly. As with all ORTHMAN products, these conveyors are built with the highest level of quality to avoid frequent maintainance.

CUSTOM FABRICATION

From support steel structures to custom conveyors and mass flow hoppers, ORTHMAN’S fabrication, welding and machine departments are able to supply just about any type of fabricated steel structure, designed to suit customer requirements.

BELT CONVEYOR BENT SUPPORTS

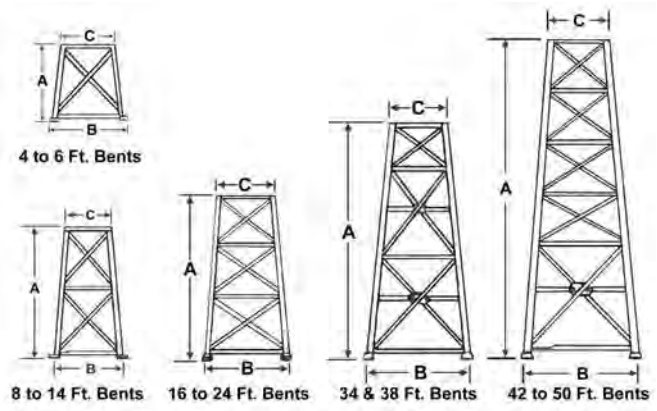
HEIGHT	PIPE BENTS		BRACED BENTS	
H	STEEL WT/LB	WT/FT	STEEL WT/LB	WT/FT
10	800	80	800	80
20	1600	80	1700	85
30	3800	127	2500	83
40	5000	125	3200	80
50	6500	130	4700	94
60	8000	133	7000	117
70	12000	171	11000	157
80	16000	200	15000	225
90	20000	222	20000	222
100	23000	230	22000	220
110	26000	236	27000	245
120	29000	242	32000	266
130	36000	277	37000	284
140	39000	278	41000	292
150	42000	280	47000	313
160	45000	281	53000	331
170	47000	276	59000	347



*Bents designed for 40° wind sheer and 90° DL & LL (per col.)

GENERAL DIMENSIONS – *FOR CONVEYORS 12" THROUGH 42" IN WIDTH*

BENT HEIGHT	CONVEYOR WIDTHS 18" AND 24"		
A	B	C	WT/LBS
4	4' 3 ½"	3' 6"	159
6	4' 8 ½"	3' 6"	190
8	5' 1"	3' 6"	281
10	5' 6"	3' 6"	324
12	5" 11"	3' 6"	459
14	6" 3 ½"	3' 6"	516
16	6' 8 ½"	3' 6"	634
18	7' 1"	3' 6"	671
20	7' 6"	3' 6"	723
22	7' 11"	3' 6"	774
24	8' 3 ½"	3' 6"	858
26	8' 8 ½"	3' 6"	1177
28	9" 1"	3' 6"	1232
30	9' 6"	3' 6"	1225
32	9' 11"	3' 6"	1384
34	10' 4"	3' 6"	1656
36	10' 5 ½"	3' 6"	1759
38	11' 1"	3' 6"	1998
40	11' 6"	3' 6"	2064
42	11' 11"	3' 6"	2507
44	12' 4"	3' 6"	2593
46	12' 8 ½"	3' 6"	2677
48	13' 1"	3' 6"	3722
50	13' 6"	3' 6"	3844



BENT HT	CONVEYOR WIDTHS 30", 36" AND 42"			BENT HT	CONVEYOR WIDTHS 30", 36" AND 42"		
A	B	C	WT/LBS	A	B	C	WT/LBS
4	5' 3 ½"	4' 6"	178	28	10' 1"	4' 6"	1282
6	5' 8 ½"	4' 6"	219	30	10' 6"	4' 6"	1354
8	6' 1"	4' 6"	312	32	10' 11"	4' 6"	1435
10	6' 6"	4' 6"	351	34	11' 4"	4' 6"	1732
12	6' 11"	4' 6"	486	36	11' 8 ½"	4' 6"	1806
14	7' 3 ½"	4' 6"	543	38	12' 1"	4' 6"	2053
16	7' 8 ½"	4' 6"	863	40	12' 6"	4' 6"	2129
18	8' 1"	4' 6"	7-5	42	12' 11"	4' 6"	2618
20	8" 6"	4' 6"	775	44	13' 4"	4' 6"	2673
22	8' 11"	4' 6"	798	46	13' 8 ½"	4' 6"	2781
24	9' 3 ½"	4' 6"	870	48	14' 1"	4' 6"	3783
26	9' 8 ½"	4' 6"	1222	50	14' 8"	4' 6"	3907

REQUEST FOR QUOTATION

ORTHMAN CONVEYOR SYSTEMS BELT CONVEYORS

MINIMUM DESIGN INFORMATION TO QUOTE

CUSTOMER INFORMATION

Customer Name:

Conveyor Name or #:

Customer Location/Fax #:

Quantity Required:

MATERIAL HANDLED

Material Type:

Minimum Density, PCF:

Maximum Density, PCF:

Maximum Lump Size, in.:

% Lumps at Max. Size:

Capacity Required, TPH:

CONVEYOR PROFILE & LAYOUT

Conveyor Length, feet:

Conveyor Lift, feet:

Support Span, feet:

Cover Requirement:

Walkway Requirement:

Additional Design Information Required (If Applicable)

Load Hopper Requirement:

Load Section Length:

Material Height at Load:

Number of Scrapers Req'd:

Number of Plows Req'd:

Optional Design Information (Only Required if Specified)

Belt Width, in.:

Belt Speed, FPM:

Discharge Hood Req'd

Motor Specification

Motor HP

Motor Manufacturer:

Paint Specification:

Drive Type:

Drive Model:

Belt/Chain Drive:

Belt Specification:

Belt Fastener:

Idler CEMA Class:

Idler Diameter:

Additional Features:

Pulleys & Bearings

Head Pulley Diameter, in.:

Head Pulley Lagging:

Bearing Manufacturer:

Bearing Model:

Snub Pulley Diameter, in.:

Snub Pulley Lagging:

Snub Bearing Diameter, in.:

Tail Pulley Diameter, in.:

Tail Pulley Lagging:

Take-up Pulley Diameter, in.:

Take-up Pulley Lagging:

Take-up Pulley Bearing Diameter, in.:

Bend Pulley Diameter, in.:

Bend Pulley Lagging:

Bend Bearing Diameter:

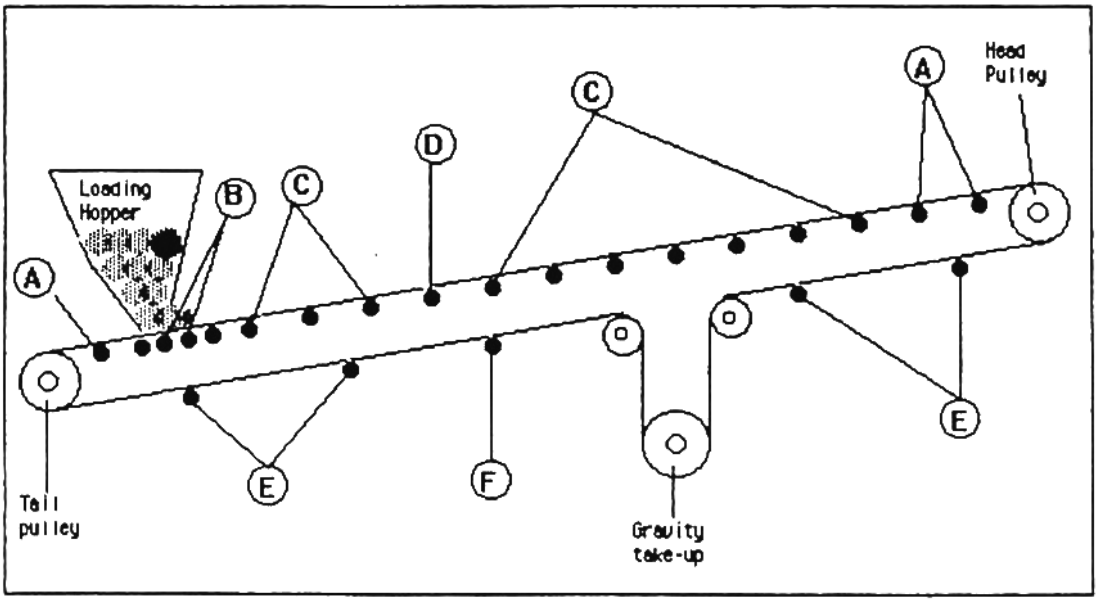
Take-up Type:

Take-up Travel:

IDLER SURVEY SHEET

Customer Name:_____ Customer Location:_____
Contact Name:_____ Phone Number:_____
CONVEYOR_____

Length:_____ Capacity (STPH):_____
Speed:_____ Material Lump Size & Wt:_____
Width:_____ CEMA Series (Used):_____
CEMA Recommended:_____



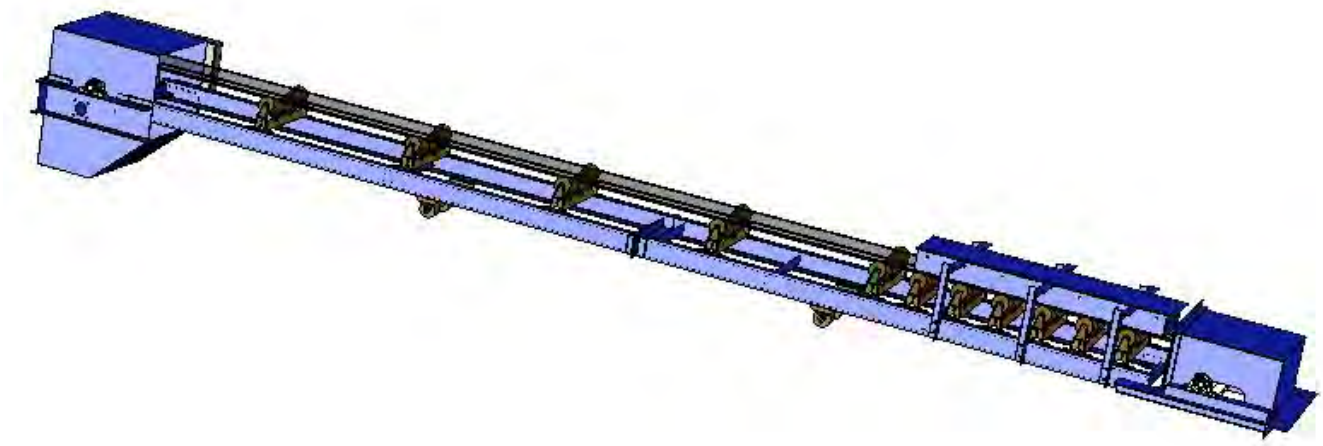
LOCATION	DESCRIPTION	QUANTITY	ROLL DIAMETER	DEGREE	PART #	CATALOG PAGE #
A	Transition Idlers					
B	Load Area Idlers					
C	Carrying Idlers					
D	Carrying Belt Training Idlers					
E	Return Idlers					
F	Return Belt Training Idlers					

NOTES: _____

Orthman
CONVEYING SYSTEMS

Belt Conveyor

INSTALLATION, & OPERATIONAL MAINTENANCE MANUAL



PTDA Member

MEMBER
CEMA
CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION

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

APPROVED FOR DISTRIBUTION BY THE SCREW CONVEYOR 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 Williams-Steiger 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.

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.

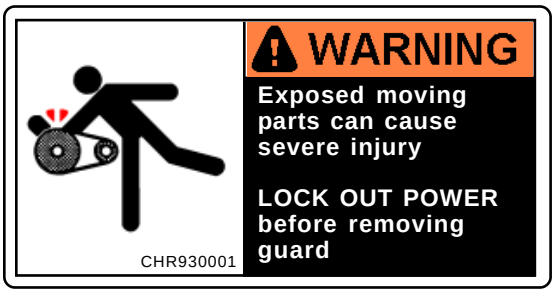
One or more warning labels should be visible on conveyor housings, conveyor covers and elevator housings. If the labels attached to the equipment become illegible, please order replacement warning labels from the OEM or CEMA.

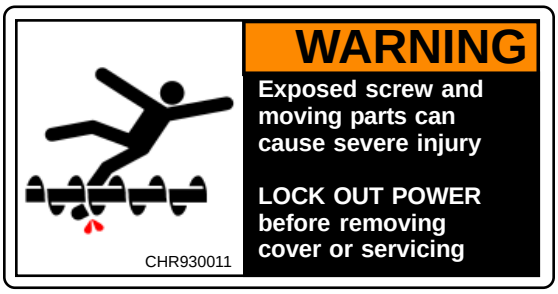
The Conveyor Equipment Manufacturers Association (CEMA) has produced an audio-visual presentation entitled “Safe Operation of Screw Conveyors, Drag Conveyors, and Bucket Elevators.” CEMA encourages acquisition and use of this source of safety information to supplement your safety program.

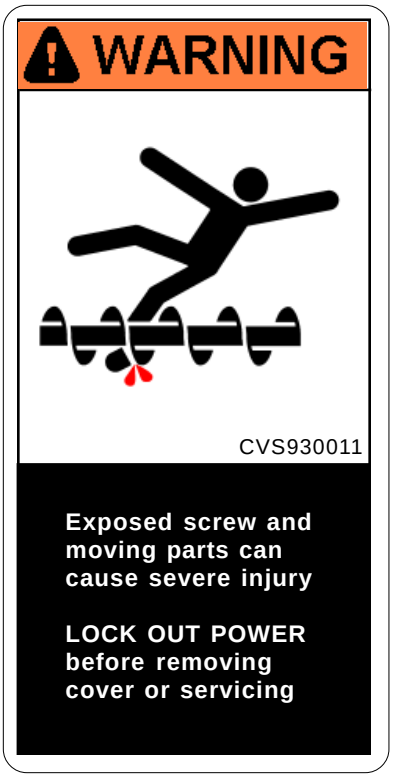
SEE OTHER SIDE FOR SAFETY LABELS

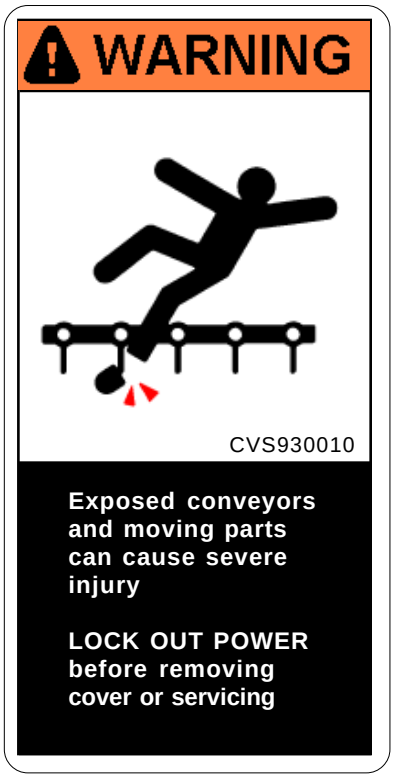
CEMA Safety Labels

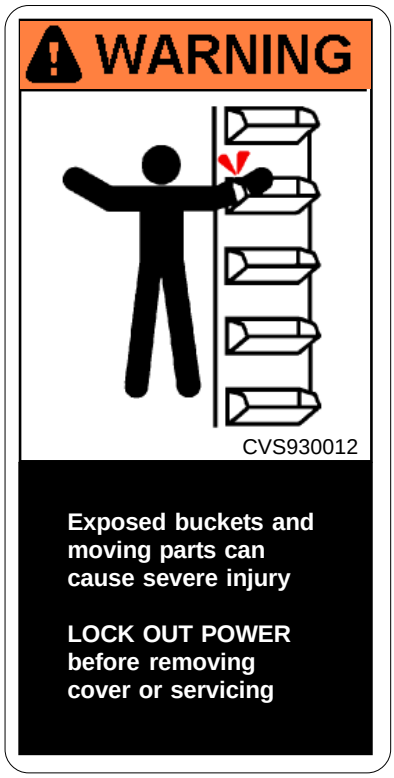
The CEMA safety labels shown below should be used on screw conveyors, drag conveyors, and bucket elevators. Safety labels should be placed on inlets, discharges, troughs, covers, inspection doors & drive guards. See CEMA Safety Label Placement Guidelines on CEMA Web Site: http://www.cemanet.org/safety/guidelines.html











PROMINENTLY DISPLAY THESE SAFETY LABELS ON INSTALLED EQUIPMENT

SEE OTHER SIDE 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
6724 Lone Oak Blvd., Naples, Florida 34109
239-514-3441

BELT CONVEYOR MAINTENANCE AND TROUBLE SHOOTING

TABLE OF CONTENTS

BELT CONVEYOR MAINTENANCE AND TROUBLE SHOOTING

INTRODUCTION

There are keys to successful preventive maintenance that can be summed up in two words, “Good Housekeeping”. Good belt conveyor and idler maintenance begins with “Good Housekeeping”, the master key to getting the highest return on your conveyor dollar.

We have found the following procedures play a prominent part at almost every installation where high standards of maintenance are achieved. They provide excellent guidelines for any operator.

1. INSPECTION – The key is timing and who does it. It should be done daily and ideally performed by the Maintenance Superintendent or the Foreman.

2. PROMPT REPAIRS – Repairs should be made as soon as possible after reported – daily if possible.

3. CONVEYOR RECORDS – keep a brief outline history of each conveyor noting such things as the original idler and belt specifications, tonnage records and major repairs or changes. This information is invaluable when reordering components. Problem areas can be readily identified and equipment manufacturers can be consulted about desirable changes in specifications when replacements are needed.

In addition to the general tips provided above, we will treat the major areas of conveyor idler maintenance in detail.

IDLER LUBRICATION

Idler seals retain an ample supply of grease at the bearings for long periods of operation, but provision is made in the idlers for relubrication when required. Under ideal operating conditions – little dust and protected from weather – relubrication is generally required only once every 8,000 operating hours or one every two years to insure longest possible life.

Frequency of relubrication must be tempered by food judgment. When severe conditions exist, such as at loading or transfer points or where very dusty materials are present, more frequent lubrication usually becomes necessary, in some cases as often as every two or three months.

Where doubt exists as to the proper interval, disassembly of a few representative idlers and an inspection of the amount of grease remaining in the bearings and the condition of bearings and seal will usually establish whether the lubrication frequency is correct. This procedure can also establish the relubrication cycles considerably longer than 4,000 hours can be obtained.

IMPORTANT – For maximum lubrication effectiveness, as well as for safety reasons, idlers must not be lubricated while the conveyor is running. Power must be locked out to the equipment.

PRESSURE LUBRICATION

Certain high pressure – high volume grease guns and lubrication systems are not suited for idler lubrication. The high pressure and high volume of grease can cause internal damage; therefore, input pressures at the idler of more than 60-70 psi should be avoided.

Avoid over-lubrication. The old adage “Too much grease can be as bad as too little” is particularly true in this case. It does not improve operation, but does encourage leakage that may cause contact of grease with costly conveyor belts. If there is excessive grease purging from the idler rolls, chances are they are being relubricated too frequently. The idlers are equipped with a lubrication fitting on one end of the idler and a pressure relief fitting on the other, except in the case of all 100 series, mine- type returns and all return idlers which have a lube fitting on each end.

IMPORTANT – It should be noted that the lubrication fittings are special because they *do not incorporate a ball check and spring*. Therefore, **do not substitute standard fittings for the ones installed.**

SELECTION OF PROPER GREASE

As a result of many tests conducted under controlled conditions, certain greases are approved for idler use. It is not implied that these are the only lubricants available that would be suitable, but that these particular ones are among those, which have been tested and have been found to be satisfactory. It is important, therefore, to use one of the greases approved by ORTHMAN. This information is available from Operating and Installation Manuals, Idler Catalogs or from any ORTHMAN representative.

IDLER GREASE SEEPAGE

Generally, a small percentage of all the idlers we ship will generate some grease seepage or oil separation. The average is probably less than 15 percent.

The degree of purging will also vary from a film of oil or a small collar of grease to a "star burst" of grease continuing to the O.D. of the roll. The "star burst" is usually a very small percentage of the total.

There are multitudes of reasons why new idlers will purge at start up and at each subsequent re-greasing.

1. Displacement of Grease During Start Up – When greased, the pressure relief lubrication system insures that every bearing cavity is adequately lubricated. When the idler starts up, the bearing rolls displace grease that must go somewhere. Sometimes, when a cavity is absolutely full, there is no alternative but that a small portion will purge out through the seals.

2. Internal Pressure – This same pressure relief also retains a small internal pressure, which will only relieve itself fully when the idler rolls rotate freely and the seals break in. This can be affected appreciably by temperature.

3. Oil Separation – In any large container of grease, there will be areas where some oil separation exists. When this grease is put into the idlers, the less viscous lubricant can readily seep through the seals. We do our best to avoid this, but it can happen. It is also important to note that oil separation is not peculiar to idlers. It can occur with any grease in any piece of machinery during storage. Most grease seepage occurs immediately after a new conveyor is installed and the belt is run, the airborne dust always present around a conveyor will solidify this grease and keep any more from getting on the belt.

To minimize the potential damage to belts resulting from the grease seepage at start up, we recommend that the following procedures should be followed:

a. Do not relubricate new idlers prior to or immediately after start up as they are adequately lubricated at the factory. ORTHMAN recommends that the first field re-lubrication should be done 4,000 hours after initial start up.

b. Use only idler lubricants approved by ORTHMAN.

c. Do not lubricate idlers when rotating.

General guidelines for clean up idler lubricant on belts are as follows:

For shorter belts where mechanical clean up is feasible:

Scrape surface deposits of grease from the belt. After all scrapable residue is removed; the belt surface should be wiped clean with a suitable solvent. The cheapest and most commonly available solvent for this purpose is chlorothene. Chlorothene is fast drying, is a good grease solvent and is nonflammable.

For longer belts where manual scraping and wiping are impractical:

Remove all excess grease using a suitable mechanical belt scraper. This operation should be conducted under constant surveillance, to protect against damage to the belt cover. After scraping, the belt surface should be wiped clean as in the manual operation, using a suitable solvent. A rag or felt pad saturated with chlorothene mounted on a scraper carriage can be used for this purpose.

The preceding instructions should be considered general guidelines on the cleaning of belts. We recommend that customers consult with the belt manufacturer for more detailed specific instructions.

Please remember that the majority of idlers run without any grease seepage, but it will happen occasionally.

BELT TRAINING

Conveyor belting represents about 40 – 50 percent of the cost of a new installation, but more important it can involve about 75 percent of the cost of maintenance. Probably the most important single factor in belt life is training.

We could never hope to cover all of the possible causes of detraining but we will discuss the most common ones and the appropriate corrective measures.

If belt detraining is to be reduced to a minimum, the source of the detraining must be identified. Too often, training devices are added to a conveyor to alleviate a specific detraining condition. If the detraining force or cause is one that is detrimental to belt life it still exists – and will still reduce belt life.

Belt training can only be a result of one of two things:

1. Poor initial installation.

2. Shortcomings in operations and/or maintenance or unusual surrounding conditions.

We will cover each separately.

Initial Installation

Conveyor Structure Alignment – There is no substitute for proper initial alignment of the conveyor frame. Everything must be installed in accurate lines both longitudinally and laterally and in a fashion to prevent shifting at a later date.

Conveyor Machinery Alignment – Misalignment is probably the most common cause of the problem. It is often treated very lightly, but it can and has created serious problems. As an example, let's take a look at a typical case of pulley alignment. Assume we have a belt conveyor with a 24" diameter pulley running a 500 fpm – an average situation. An insignificant lateral misalignment in the pulley of only 0 – 1' (one minute) will actually cause the belt to run off 2" for every minute of operation.

Another typical case is idler alignment. We know from experience that training idlers generate a positive training effect in a belt with as little as ½ degree of skew. Similarly, a ½ degree misalignment of an idler can cause noticeable detraining.

Belt Splicing – Care must be taken to insure belt spices are square. If it is not, not only does it generate training problems, but also it exerts unequal tension across the belt that can lead to premature failure.

Temperature Gradients – Recently, we have become aware of a case where the sun shining on one side of a long overland belt created severe misalignment through differential in expansion. A similar condition can occur where the prevailing wind can detrain a relatively long belt.

About the only corrective measure is to provide covers or shields. These are some of the more common causes of detraining as a result of improper initial installation.

Operating Problems of Belt Training

Off Center Belt Loading – We have found that this is the most common case of detraining. If the load is put on the belt off center, the only sure cure is to revise the feed chute or loading hopper. Sometimes, with an angular transfer, the load may be centered, but the force of the trajectory is in line with the belt travel. This may be difficult at times due to headroom restrictions, and the only alternative may be to revise the trajectory to a vertical drop, thus, eliminating all lateral of horizontal thrust load. Even this might be detrimental to belt life if belt speeds are over 300 fpm or if the material is coarse and sharp.

Material Build Up – Build up can occur in many places.

On Conveyor Decking – This is generally the result of poor loading conditions, and can cause stoppage of idler rotation, thereby creating excessive wear on idlers and belt, and detraining. Material build up should never be allowed to reach the idler rolls.

Return Idler Build Up – This is very common in applications where fines and moisture exist – which seem to be practically everywhere. The corrections are numerous.

1. Use an effective belt cleaner
2. Use rubber disc idlers, which are probably the most common means for compensating for this.
3. Use a Spiral Cantenary Type Idler – This is probably the most effective means of all of them. Not only does the Spiral tend to remove material through the broken surface and screwing action, but it actually reverse bends the belts to generate a separation of material from the belt. This reverse bend can also help keep the return strand centered.

Pulley Build Up – Can be serious not only for detraining but can also result in a loss of friction for driving the belt. A good lagging, preferably of the grooved herringbone type, will go a long way to alleviating this. Another is the use of a belt plow on the return strand – just ahead of the tail pulley.

Of course, we have all heard the old axiom that if a belt conveyor is installed and operated properly, self-aligning idlers would be necessary. Perhaps true in theory, but it seldom works.

Practically every conveyor requires some trainers, but since they really are nothing more than a necessary evil, their application would be limited to absolute necessity through the proper evaluation of the ideas we have just covered.

Over the last few years, there has been a rapid evolution in conveyor design such as speed up to 1200 fpm, steel cable belts, and long, single flights up to 15,000-foot centers or more. Hewitt-Robins has been pioneering new developments in the area of training these belts.

One is the V-type return idler that is ideally suited for wide, long and fairly high-tension belts. It incorporates two rolls sloped at 10 degrees. If the belt tends to wander, the change in the center of gravity of the belt will tend to return it to the proper location.

While these are more expensive than simple flat return idlers, the overall cost of the system may be a standoff with conventional idlers and trainers in that they can usually be spaced at approximately twice the centers and can eliminate the need for return trainers.

There are, of course, a multitude of other items that could be covered in respect to belt training but the foregoing covers the most common and probably 90 percent of the cases.

TRANSITIONS

Traditionally, conveyor designers have incorporated transition type troughing idlers adjacent to the head and tail pulleys on belts supported on 35 degrees and 45 degrees troughing idlers. Special idlers are available with adjustable end brackets that will permit the slope of the end rolls to be varied in increments of 2 degrees. Some people use one 20 degree idler at each end of a 35 degree conveyor, and 20 degree and 35 degree idlers on each end of a 45 degree conveyor. The object of this approach is to have the rolls sloped to suit the belt contour between the last regular or impact idler and the adjacent pulley.

In recent years, due to the design and development of lighter, thinner and higher tensile belts, all belt manufacturers have experienced premature belt failures from creasing and rupturing at the junction of troughing idler rolls. Although it has occurred on 25 degree, 35 degree, and 45-degree idlers, deep trough idlers have been the chief culprits. We now recognize that changing the slope of the end rolls in the transition area is far from the ideal solution.

Tests have shown that the slope of the edge of the belt remains at the same slope as the troughing idlers all the way from the idler to the flat pulley. What does change is the width of flat (horizontal) and the width of the sloped portion. The horizontal section varies from the full width of the belt at the pulley to the center roll of the idler at the first regular idler. Theoretically, the ideal situation would exist if the transition idlers had end rolls that were at a constant slope of 25 degrees, 35 degrees, or 45 degrees, and were adjustable horizontally to support the edge of the belt, as it contoured itself naturally at the point the idler is installed.

Studies are presently underway to develop hardware consistent with this theory and it is hoped that soon the problems associated with this troublesome area of a conveyor can be eliminated completely.

LOADING POINT SPILLAGE

The initial design of successful loading chutes and skirtboards require considerable care. Much has been written in conveyor design textbooks and manuals about the proper design of skirtboards and their application. Consult ORTHMAN if a particular problem arises on your conveyor. Much of the spillage at loading and transfer points can be attributed to worn or improperly adjusted skirtboards. Other things to consider include hanging a confining curtain (such as an old belt) at the transfer point and incorporating a stone box effect in the chute to reduce material velocity.

There is another solution to a spillage problem in the loading area that is worthy of further investigation. If your basic conveyor utilizes 20 degree troughing idlers, and headroom permits, install 35 degree impact or troughing idlers in the loading area. The additional slope generally eliminated spillage and gives the added bonus of better centering the load on the belt. There is no reason why this cannot be done even after a conveyor is in operation if the loading chute and skirtboard design permit easy modification. The same can be accomplished by using 45 degree idlers on a 35 degree conveyor.

ORTHMAN has developed what we call a “hanging impact idler” that has the effect of eliminating the structure below the idler. The conveyor deck is completely exposed and accessible for simple clean up.

SKIRTBOARDS

Skirtboards, when necessary, are used to confine material to the center of the belt at the loading point. These can be made of wood or steel, but the skirtboards themselves should not come closer than two or three inches to the belt. Fastening skirtboard rubber to the skirtboards and allowing the rubber to extend onto the belt should bridge the remaining gap to the belt. Do not use old conveyor belting for skirtboard rubber, since the carcass provides too much rigidity and will wear grooves in the main belt.

In addition, fines will become trapped in the carcass and act as an abrasive. Instead, skirtboard rubber designed for the purpose should be utilized.

The design of the skirtboards should be such that they taper inward and lift slightly off the belt in the direction of belt travel.

MAINTENANCE HINTS

BELT CONVEYOR – TROUBLES, CAUSES AND CORRECTIONS

TROUBLE	CAUSE	CORRECTION
A. Conveyor belt runs to one side at a particular pint on the conveyor.	One or more idlers not at right angles to longitudinal centerline of belt. Conveyor frame not lined up properly; or idler stand, or stands, not centered on belt. Sticking idlers. Structure not level and belt tends to shift to low side Build up of material on idlers.	Advance the end of idler to which the belt has shifted in the direction of belt travel. Stretch line along edge to determine how much out of line and correct. Replace or free idler Level Structure. Improve maintenance. Install scrapers.
B. One section of belting runs off to one side all along the conveyor.	Splices not square. Crooked belt caused by storage of telescoped rolls or one edge close to damp ground or wall.	Resplice, cutting end square. If bow is in new belt, it may correct itself when belt becomes broken in; otherwise replace it with a new section.
C. Conveyor belt runs to one side for some distance along conveyor line.	Improper loading of belt.	Make changes in loading station and loading conditions so that it is centered properly.

Belt Conveyor – Troubles, Causes, and Corrections (cont.)

TROUBLE	CAUSE	CORRECTION
D. Belt has erratic action, following not particular pattern.	Belt too stiff.	May be due to newness. If so, allow proper break-in time. It will shorten break-in time if belt is left loaded on off shift. Tilt troughing idler forward a maximum of 2 degrees if conveyor is never reversed in direction. Use self-aligning idlers. Use more troughable belt.
E. Belt running off at head pulley.	Head pulley or troughing idlers approaching head pulley out of alignment.	Check alignment of pulley and adjacent troughing idlers.
F. Belt running off at tail pulley.	Build up of material on return idlers.	Remove material; provide better housekeeping.
	Return rollers out of line.	Adjust at right angle to frame.
	Unequal loading.	Adjust loading chute to properly center the load.
G. Excessive wear on bottom side of belt.	Slippage between belt and drive pulley or pulleys.	Increase tension or belt take-up device.

Belt Conveyor – Troubles, Causes, and Corrections (cont.)

TROUBLE	CAUSE	CORRECTION
G. Excessive wear on bottom side of belt.	Slippage between belt and drive pulley or pulleys. (Cont.)	Lag drive pulleys, renew worn-out lagging.
		Increase arc of contact drive pulley with snub pulley or use tandem drive.
	Sticking troughing idlers.	Replace or free.
	Material ground between pulley and belt.	Install scrapers in front of tail pulley or return belt.
H. Excessive wear on carrying side of belt.	Dirt, frozen or misaligned return idlers.	Install belt-cleaning plows at head end and tail end.
		Clean, repair and align return idlers.
	Excessive sag between troughing idlers causing load to move and shift on belt as it passes over idlers.	Increase belt tension if too low.
		Reduce idler spacing.
	Abrasive skirtboards.	Use rubber skirt material. Avoid use of old belting.
	Poor loading.	Feed load on belt in same direction at same speed.

Belt Conveyor – Troubles, Causes, and Corrections (cont.)

TROUBLE	CAUSE	CORRECTION
I. Belt requires too much tension resulting in excessive stretch in belt.	Improper maintenance of troughing and return idlers.	Reduce friction by placing frozen or worn-out idlers. Provide better maintenance. Decrease tension by improving drive. 1. Lagging on drive pulleys. 2. Increase arc of contact of drive pulley; provide tandem drive. Increase speed, if possible, keeping shift tonnage the same. Reduce tonnage at slower speed. Tighten screw take-up just enough to keep belt from slipping. On a gravity take-up reduce counterweight to minimum amount sufficient to keep belt from slipping.

Belt Conveyor – Troubles, Causes, and Corrections (cont.)

TROUBLE	CAUSE	CORRECTION
J. Fasteners pull out of belt.	Tension too high.	See Paragraph 1.
	Mildew.	Use mildew inhibitor on belt.
	Wrong type of fasteners or fasteners not tight.	Replace belt with proper fasteners that have the required strength.
		Use vulcanized splices if feasible.
	Improper starting.	Use more acceleration steps in starting.
K. Short breaks in carcass of belt parallel to edge and star breaks in carcass.	Impact of lumps falling on belt at loading station.	Use impact idlers.
	Material trapped between belt and pulley.	Install plows or scrapers ahead of pulley.
L. Excessive noise or squealing in tandem drive.	Unequal diameters of drive pulley.	Difference of ¼ inch diameters will cause noise.
M. Thumping noise in tandem drive.	One or both pulleys loose on shaft.	Tighten pulleys.
	Gear out of mesh, improperly machined or worn out.	Change gears.

BELT CONVEYOR DAILY MAINTENANCE CHECK LIST

Belts:

1. Watch out for spillage of material onto the return strand, where it can get between the belt and pulleys.

2. See that the belt is properly trained and does not contact steel structure.
   This is especially important on the return strand that is generally not as easy to see.

3. Mark breaks, damaged and worn spots and report them for early repair.

4. Keep large lumps of material off belts. If they do get on, remove them carefully.

Idlers and Pulleys:

1. Note and mark “frozen” or damaged idlers for repair or replacement.

2. Check troughing and return training idlers for proper operation.

3. Check scrapers and plows for proper operation.

4. Watch for material to build up on decking or floor under idlers or pulleys. This is especially important at training idlers.

5. Watch for and eliminate material built up on idlers and pulleys.

Chutes and Hoppers:

1. Note and correct clogged or “bridged” material.

2. Prevent large lumps from dropping onto unprotected belt.

3. Check to see that the material is centered on the belt and that the belt is not overloaded.

CEMA IDLER STANDARDS

CEMA CLASS	TYPE BEARINGS	ROLL DIAMETER	SHAFT DIAMETER	LOAD CAPACITY	H-R SERIES
B4	BALL	4" – 5"	$^{5}/_{8}$"		1000
B5	BALL	4" – 5"	¾"		
C4, C5	ROLLER	4" – 5"	¾"	900	2000
C6	ROLLER	6"	¾"	900	2000
	ROLLER	6"	1"	1500	3000
D6	ROLLER	6"	1 $^{3}/_{16}$" *OR* 1 ¼"	1800	4600
D7	ROLLER	7"	1 $^{3}/_{16}$" *OR* 1 ¼"	1800	4700

IDLERS – BASIC DESIGN FEATURES

Everyone is aware of the fact that conveyor idlers are designed to support and to train the conveyor belt. We also realize that they are to offer a minimum of resistance to the belt passage regardless of speed, and they must be designed and spaced to support a load of material as well as to support the belt. Impact damage from heavy lumps must be resisted. Frequently, idlers must be specially designed to resist severe abrasion, corrosion, oxidation or material build up on rolls.

The belt idlers manufactured today are equipped with anti-friction bearings and they provide for relubrication from one side to minimize relubrication time. Roll ends are welded to the idler rolls eliminating reduced tube thickness at the roll ends, thus preventing the necessity of early idler replacement due to holes abraded through the idler roll ends. For the protection against belt pinching, gaps between idler rolls are kept at a minimum. Slotted holes are used for bolt connections to supporting steel so that idlers may be aligned for training purposes.

One-shot lubrication system provides a means of greasing all six bearings of the idlers by the application of a grease gun to one grease fitting, which can be located on either end of the idler. A single axial grease passage services all bearings. No need to reach dangerously beneath the belt to lubricate through other grease fittings. Plus, only one walkway required for servicing.

An important feature of this one-shot lubrication system is the use of an open-grease fitting and pressure relief valve that equalizes internal grease pressure. This permits a build up of pressure sufficient to force fresh grease to enter bearing chambers through drilled holes behind each bearing. This grease flowing through the bearing forces the air ahead of it until it all escapes around the cork seal elements. When the grease contacts the cork rings, they act as check valves, closing the exit, and prevent further travel of grease in the bearing chamber. All other grease chambers are successively filled with fresh grease in the same manner. Grease coming through the pressure relief valve visually alerts maintenance men that the lubrication is complete. Grease escapes at a point where it cannot come in contact with the belt.

Drop-In Roll construction used on all new series utilizes very simple steel keepers to hold the rolls in place. No special tools are required. A special feature of this arrangement is that all steel rolls and impact rolls of the same series fit into the same frame. Distributors can now modify stock idlers by simply changing rolls to enable them to offer more styles from stock with less investment. Although we lose the extra load carrying capacity available in the previous rigid Truss Designs, these new lines meet or exceed all CEMA standards.

Additional belt protection is assured by rounding off all roll ends.

Fast Belt Alignment is accomplished by utilizing slotted belt holes on one and two-bolt connections on each side. For one-bolt connection, located at each end of the baseboard, installation time is cut by 50%.

SPECIAL AND ACCESSORY IDLERS

Training Idlers – are useful when used within the guidelines given in our idler selection procedure. They are of limited or no value on steel cable belts and high-tension fabric belts where the training force that can be obtained is far less than the forces in the belt causing detraining. In such cases, v-return idlers and trainers should be considered. We know that a "skewed" idler exerts a force on the belt that causes it to tend to move laterally. It is this force on the belt that causes it to tend to move laterally. It is this force that we take advantage of when we use a training idler. On troughing training idlers, there is a guide roll located on the outside of the end rolls. When a belt detrains and contacts this roll, it is pushed out, rotating around a pivot. At the opposite end of the guide roll bracket (under the end roll) there is a brake pad. When the guide roll is pushed far enough, the brake pad comes in contact with the end roll causing it to stop rotating. This causes a drag between the belt and the roll, which, in turn, causes the frame holding the three rolls to pivot around a center pivot. The idler is thus skewed and a force is applied to the belt to move it back to the center. Other designs, such as our current reversible return trainer, use a skid bar in place of a guide roll. The drag occurs from the belt skidding over the stationary skid surface.

Impact Idlers – are currently being made in 3000 and 4000 Series only. Since there is very little cost difference between a 2000 and 3000 Series trainer, it was decided to make 3000 Series only to facilitate inventory. Dimensionally, they are the same. Impacts should be applied as described in the idler selection procedure. There are many applications we have encountered where no conventional impact will do the job. In these cases, we usually recommend 5 roll impacts. We have also used spirals successfully where conventional impacts have failed. The trick here is the swivel bracket where the roll is held in the heavy steel cable and the "hammock" effect where the energy of the impact is partially dissipated through idler movement and deformation.

Troughing and Return Idlers – are available with different types of rolls to suit severe operating conditions, such as highly abrasive coke, sinter, etc. Cast iron rolls are available on 2000 and 3000 Series and are generally used in highly abrasive applications, such as coke and sinter. Coated rolls are also an excellent solution to the abrasion problem. We can also supply idlers with 6" diameter rolls and ¼" thick roll sheets. When material tends to stick to the rolls, Spiral Cantenary Idlers are excellent choices.

Rubber Disc Returns – are used when material handled is damp, sticky or corrosive, or when material tends to freeze in the belt.

Feeder and Picking and Feeder and Picking Impact – idlers are used primarily on belt feeders as they spread the load in a wide, thin layer for picking, sorting and inspection. They are made in 3000 (except impact) and 4000 Series only.