

Installation, Operation and Maintenance Instructions



SUSPENDED PERMANENT MAGNETS

ERIEZ MAGNETICS HEADQUARTERS: 2200 ASBURY ROAD, ERIE, PA 16506-1402 U.S.A.
WORLD AUTHORITY IN ADVANCED TECHNOLOGY FOR MAGNETIC, VIBRATORY and INSPECTION APPLICATIONS

Introduction

This manual applies to the two basic styles of Eriez Magnetics suspended permanent magnets. The slight differences in installation and maintenance procedures for these magnets are detailed in the text.

A careful reading of these Installation, Operation and Maintenance Instructions will assure your magnet's most efficient and dependable performance.

If there are any questions or comments about the manual, please call Eriez Manufacturing at 814/835-6000 for assistance.



CAUTION - STRONG MAGNET

This equipment includes one or more extremely powerful magnetic circuits. The magnetic field may be much stronger than the Earth's background field at a distance several times the largest dimension of the equipment.

- **If you use a heart pacemaker or similar device you must never approach the equipment because your device may malfunction in the magnetic field, with consequences up to and including death.**
- **To avoid serious pinch-type injuries caused by objects attracted to the magnet, keep all steel and iron objects well away from the equipment. Do not allow hands, fingers, and other body parts to be caught between the equipment and "workpiece" being lifted.**
- **Keep credit cards, computer disks, and other magnetic storage devices away from the equipment because magnetically stored information may be corrupted by the magnetic field.**
- **Keep electronic devices, such as computers or monitors, away from the equipment because exposure to the magnetic field may result in malfunction or permanent damage to such devices.**

Contact Eriez if you have a question regarding these precautions.



CAUTION

Safety labels must be affixed to this product. Should the safety label(s) be damaged, dislodged or removed, contact Eriez for replacement.

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ERIEZ SUSPENDED PERMANENT MAGNETS

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Warning

Suspended magnets with self-cleaning belts are normally suspended above conveyor belts away from personnel working areas. Eriez has no control over this location or adjacent areas.

Under certain conditions it may be necessary for the user to install additional safety devices to protect operating personnel.

Suspended magnets with self-cleaning belts have pinch points where the belt goes over the pulleys. When the belt is running this is a hazardous area. Workers should be instructed not to perform duties on this equipment unless it is shut down and the electric supply source is locked out.

Warning plates on the magnet must not be removed. The warnings must always be observed.

Description

Suspended permanent magnets are heavy duty separators designed for use over a moving bed of material from which iron is to be removed. Basically, they are box-shaped units with Erium 25 (oriented barium ferrite) permanent magnet material inside to produce a powerful magnetic field.

There are two basic styles available: Manual-Cleaning or Self-Cleaning units (see illustrations to the right). Either style can be installed in-line or across the belt.

Each style has two types, one specifically designed for in-line use and other for cross-belt use. These types are not interchangeable. Manual-Cleaning models are available with or without optional mechanical tramp iron strippers.

Manual-Cleaning magnets are designed for use where small amounts of tramp iron are suspected. They are furnished with an adjustable cable sling designed for a one-point suspension. With Manual-Cleaning magnets it is necessary to periodically remove the accumulated tramp iron. Models with strippers are cleaned by pulling on the stripper handles as if opening a drawer. To clean a model without a stripper, it is necessary to pick each piece of iron from the face of the magnet. Manual-Cleaning units may be installed over the head pulley or over the conveyor.

Self-Cleaning magnets consist of a Manual-Cleaning unit with a short belt conveyor built around it to provide automatic discharge of tramp iron. These magnets, furnished with turnbuckles for four-point suspension, can also be used over the head pulley or over the conveyor.

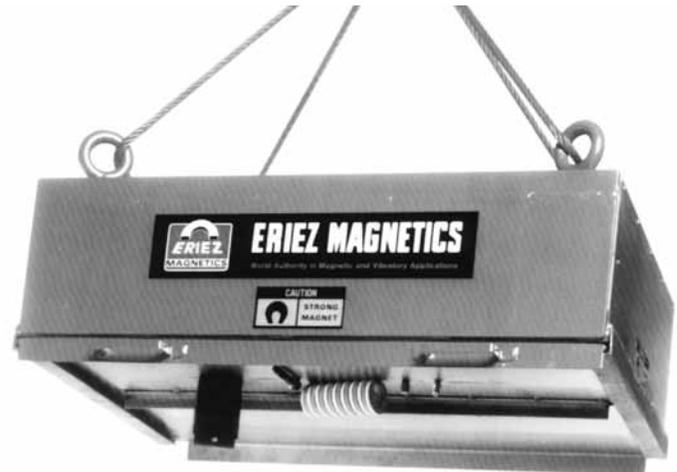


FIGURE 1

Typical manual-cleaning suspended permanent magnet with optional drawer type mechanical stripper

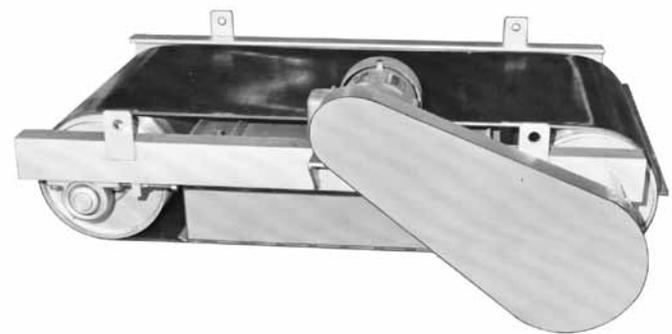


FIGURE 2

Typical self-cleaning suspended permanent magnet

Installation

General

Use care in uncrating to avoid damage to the equipment.

IMPORTANT: Check the area upstream, downstream, on the sides and underneath the magnet for carbon steel or other ferrous metals. Specifically look for carbon steel conveyor belt idlers, slider beds, side frames or any other metals in the area. All carbon steel or ferrous metals within the magnetic field of the magnet (up to 3-feet or possibly more for larger size magnets) will become induced or “magnetized” and will reduce the separation efficiency of the suspended magnet.

For the best magnetic separation efficiency, replace all carbon steel or other ferrous metals with 304 or 316 stainless steel, aluminum, plastic, wood or other nonmagnetic materials in the area of the magnet.

For All Models: Be sure the magnet is oriented properly. In all installations, the heavy steel end poles must be at right angles to the direction of material flow (See Figure 3).

Magnet Positions

Position 1 (In-Line)

The preferred installation of a suspended magnet is over the trajectory of material discharged from the belt conveyor. This is referred to as Position 1 (See Figures 3 and 4).

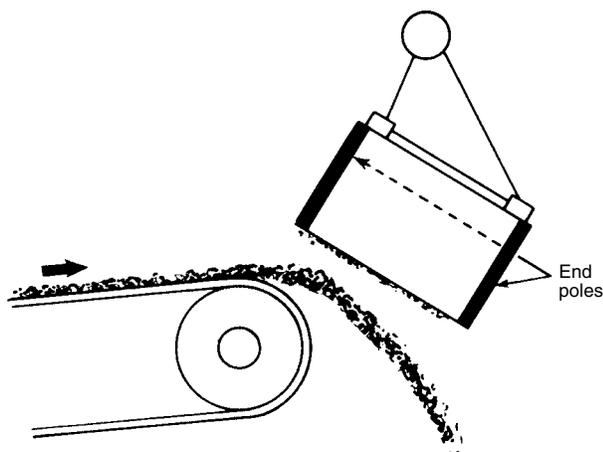


FIGURE 3
Manual-cleaning position 1

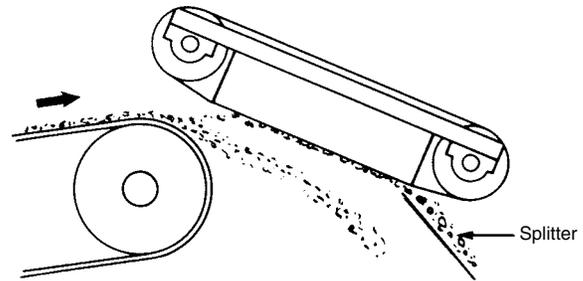


FIGURE 4
Self-cleaning position 1

For optimum separation in Position 1 installations, provision must be made to locate the magnet to suit the trajectory of the material. Determine where the highest point of the material trajectory occurs and position the magnet so that the face is 2" (51 mm) (3" (76 mm) if unit is self-cleaning type above material and the magnet center line passes through the high point of the trajectory. See Figure 3.

In cases where belt speeds are slower (usually 350 fpm) (107 mpm) or less) the material trajectory will not rise higher than the top of the pulley but, rather, will follow around the periphery of the pulley and “fall off” the downstream side. For this condition, the magnet centerline should pass through the center of the pulley. A head pulley of non-magnetic material (series 300 stainless steel) may be required to avoid magnetic inducement that would be present with a mild steel pulley. A mild steel pulley will adversely affect the performance of the magnet.

If a Self-Cleaning unit is being installed, examine the area to make sure that the self-cleaning belt around the separator has adequate room to run properly and that provisions have been made to collect the discharged tramp iron. A hinged non-magnetic splitter, adjustable in length, will be required to prevent extracted tramp iron from re-entering the product stream.

Position the magnet approximately as illustrated in Figure 4.

Position 2 (Cross-Belt)

Installation of the separator over the moving bed of material at right angles to the conveyor is referred to as Position 2 (see Figures 5 and 6). This location normally presents a more difficult separation problem than Position 1 and usually requires a stronger magnet. Position 2 mounting is generally not recommended where belt speed is in excess of 350 fpm (107 m/min).

Installation (cont.)

For Position 2 installations, steel conveyor idlers cannot be used in the length of the conveyor beneath the separator. Any conveyor idlers in the area of the magnet separator must be made of rubber, wood, or some other non-magnetic material.

Both the Manual-Cleaning and the Self-Cleaning units should be installed on the center-line of the material conveyor with the face (bottom) parallel to the slope of the conveyor.

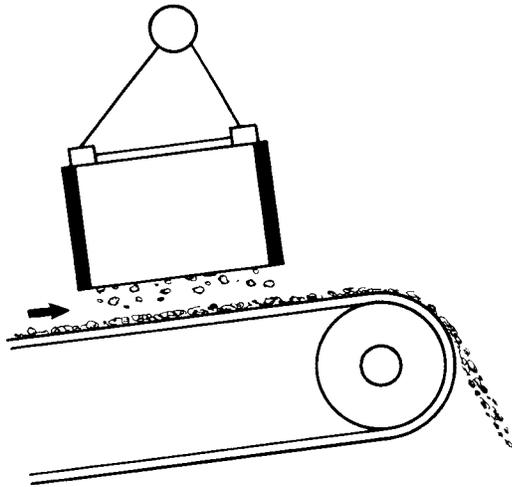


FIGURE 5
Manual-cleaning position 2

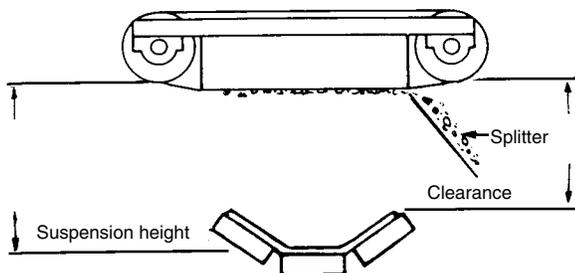


FIGURE 6
Self-cleaning position 2

When a self-cleaning magnet is installed over a troughed conveyor belt, the magnet must be high enough so that a piece of iron on the magnet belt will clear the edge of the conveyor belt. However, caution must be exercised so that the rated suspension height of the magnet is not exceeded. See Figure 6.

Suspension Height

Each size magnet is designed for a specific suspension height. This height should be considered a maximum and the magnet should be lowered as close to the actual burden as possible. When lowering the magnet to the burden, be sure that plowing does not occur. If the unit is a Self-Cleaning magnet, make sure that the separator belt has room to operate and discharge tramp iron properly.

A clearance of 3" (76 mm) between the magnet and the top of the burden is typical and should be maintained for Self-Cleaning units; this clearance can be reduced to 2" (51 mm) for Manual-Cleaning units.

Burden Depth

The best separator performance is achieved by controlling the burden depth. A plow or leveler positioned above the conveyor and before the magnet will help level high spots or surges in Position 2 installations. For Position 1 installations, the recommended installation location is calculated on expected tonnage. Any variation from this rate to the working surface of the magnet may result in poor separation.

Operation

Start-Up Of Self-Cleaning Units

1. Be sure the frame is visibly square and has not been damaged or twisted.
2. After installation, momentarily close the AC switch to the belt drive to determine if the belt is running in the right direction or if it tends to wander and, if so, in which direction.
3. Belt Adjustment

At the bottom of the magnet the belt must move toward the drive pulley; if it does not, reverse the motor rotation.

The Self-Cleaning suspended magnets utilize a two-pulley design. The tail pulley has approximately 6" (152 mm) of take-up available for both belt stretch and tracking purposes. To track the belt, the tail pulley should be moved in a direction to tighten the belt on the side to which the belt wanders.

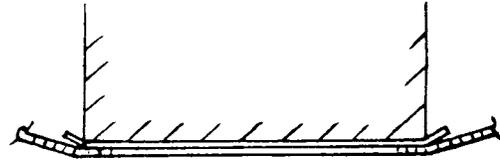
NOTE: Never start the belt drive and allow it to run continuously until the belt is properly trained.

Repair & Alteration

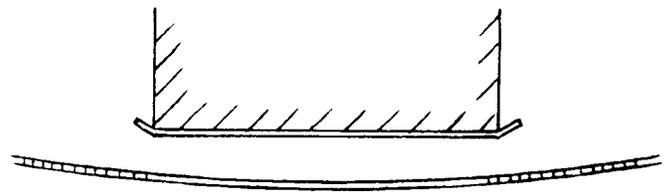
No maintenance is required for Manual-Cleaning units except for the removal of accumulated tramp iron.

For Self-Cleaning Models:

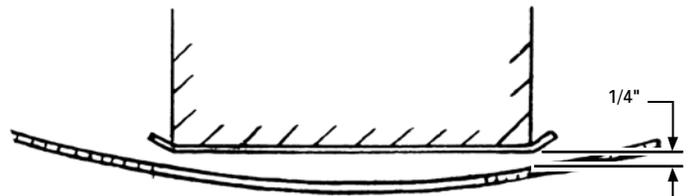
1. Belt tracking should be checked frequently and adjusted as necessary. Tighten the side of the belt opposite the side to which you want the belt to move.
2. Lubricate bearings on a schedule consistent with other equipment in use with your product and environment. An NGL1 No. 2 lithium-base grease is recommended.
3. Check V-belt tension frequently. Adjust by tightening the reducer torque arm as required.
4. For motor and reducer maintenance, refer to the manufacturer's instruction sheets packed with the shipment.
5. If the separator is to be installed inside a fabricated enclosure, provisions must be made to maintain and adjust moving parts as required.
6. Once the belt has been tracked, further adjustment may be required to achieve proper tension. Excess tension applied in an effort to keep the belt flat against the face of the magnet can lead to pulley, shaft or bearing failure. It is normal for the belt to sag due to its own weight and this becomes more prevalent on the larger units. Efficient operation can be achieved without applying excess tension so the belt should be tightened only enough to prevent slipping on the pulleys when it is conveying iron off the face of the magnet. Usually a sag of up to 1" (25 mm) is not detrimental unless it interferes with material flow. See Figure 7.
7. After initial run in, check all fasteners for proper tightness. Refer to Table 1 on page 8.
8. After 250 hours of running check pulley hubs and tighten set screws to 17 lb. ft. (23 Nm) torque.



Belt is too tight



Belt is too loose



Belt should have a 1/4" gap at magnetic corners

FIGURE 7

Troubleshooting

MANUAL-CLEANING UNITS

| PROBLEM | PROBABLE CAUSE | SOLUTION |
|-------------------------------|---|--|
| Magnet will not attract iron. | a. Magnet face is overloaded. b. Magnet set too far from burden. c. Magnet set too close to burden. d. Steel in close proximity to the magnet. | a. Examine face of magnet for with already extracted iron build-up of excessive quantities of extracted tramp iron. Discharge more frequently as required. b. Check for proper clearance between the magnet and burden. Adjust for proper gap. c. Check for proper clearance between the magnet and burden. If too close, material surges can occur and the surge may act as a wiper. d. Replace steel pulley, idlers, or trough with non-magnetic equivalents. |

SELF-CLEANING UNITS

| PROBLEM | PROBABLE CAUSE | SOLUTION |
|-------------------------------------|--|---|
| Tramp iron re-entering the product. | a. Not enough clearance for the iron to be discharged from the magnet. b. Splitter improperly positioned. | a. For self-cleaning units in Position 2, check to see that enough clearance has been allowed between bottom of magnet and edge of conveyor belt for maximum sizes to be discharged. Adjust as necessary. b. For self-cleaning units in Position 1, check splitter for proper location and clearance with respect to the magnet. Adjust splitter angle and length as required. |

| BOLT SIZE | PLAIN | | PLATED | |
|-----------|---------|--------------|---------|--------------|
| | Lb.-Ft. | Newton Meter | Lb.-Ft. | Newton Meter |
| 1/4 - 20 | 8 | 11 | 6 | 8 |
| 5/16 - 18 | 17 | 23 | 13 | 18 |
| 3/8 - 16 | 31 | 42 | 23 | 31 |
| 1/2 - 13 | 76 | 103 | 57 | 77 |
| 5/8 - 11 | 150 | 203 | 112 | 152 |
| 3/4 - 10 | 266 | 361 | 200 | 271 |
| 7/8 - 9 | 430 | 583 | 322 | 437 |
| 1 - 8 | 644 | 873 | 483 | 655 |

These values apply to unlubricated Grade 5 bolts with flat or no washers under the head.

TABLE 1
Bolt torque

Note: Some safety warning labels or guarding may have been removed before photographing this equipment.

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