SB-324

Model SER
Large Rectangular Suspended Electromagnets

Wide Conveyor and Apron Feeder Applications in Hard Rock and Coal Mining

Model SER
Large Rectangular Magnets
for conveyor widths of 84 to 150-inches

Eriez' SER series of large rectangular core suspended Electromagnets are specifically engineered for 84 to 150-inch wide conveyor belts and feeders used to remove large, unwanted tramp metal objects in hard rock and coal mining applications. These magnets use similar technology found in the very successful 7000 Series of suspended electromagnets designed for use over 12 to 72-inch belt widths.

The two most critical factors in sizing a suspended electromagnet are the width of the conveyor and the burden depth of the material being conveyed. The magnetic field must penetrate the burden depth as well as provide complete coverage across the width of the conveyor. The SER series rectangular electromagnetic circuit provides cross-belt coverage of up to 150-inches while generating A powerful magnetic field capable of penetrating deep burdens on fast moving conveyor commonly found in today's most productive mines.

Advanced Magnetic Circuit Design

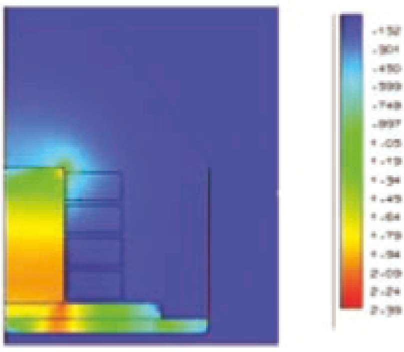
Eriez uses advanced, multi dimensional finite element analysis to model each magnetic circuit. Guided by these sophisticated models, Eriez' engineers design each SER Magnet with the appropriate magnetic field configuration to ensure optimum performance for its unique application.

These large SER magnets employ an electromagnetic coil with a rectangular steel core submerged in transformer oil to create the magnetic circuit. The coils, or series of individual coils, are wound from round aluminium or copper conductor and placed on the core with spacers to aid cooling. The size of the conductor is designed for exact amperage draw And magnetic field projection. Once powered, the coil magnetically induces the steel core, in turn projecting the Magnetic field that attracts and collects tramp metal.

The strength of all electromagnetic circuits is defined by amp-turns (the number of turns) in the coil multiplied by the ampere draw. Eriez' coil turns are designed to minimize the power draw. This technique ensures cooler operating temperatures extending the life of the conductor insulation and subsequently the life of the magnet.

Magnetic Field Tests

Finite element analysis and modelling of a suspended electromagnet. The model details the electromagnetic coil and steel core. Contour plot details magnetic field intensity and magnetic field gradient. Note the magnetic flux density concentrated in the steel core and bottom plate.



Effective Removal of Tramp Metal

Model SER suspended magnets produce a deep Magnetic field capable of collecting large pieces of tramp metal from high-speed conveyors with deep material burdens. The image to the left shows debris removed by a large suspended magnet.

Manual or Self-Cleaning Styles

A manual clean SE is mounted over a conveyor belt.

A self-cleaning magnet mounted over a wide conveyor belt.

Suspended electromagnets are available in manual cleaning or self-cleaning styles. Manual cleaning magnets are best suited where only small amounts or occasional pieces of tramp metal are encountered. This style magnet must be periodically turned off in order to remove the tramp iron accumulation from the magnet face.

Self-cleaning magnets employ a cross-belt running under the magnet face providing continuous removal of tramp iron objects. As tramp metal is pulled to the magnet's face, the cross-belt intercepts it and discharges it to the side clear of the mined material being conveyed. Self-cleaning magnets are best suited where a high of tramp irons or large pieces Of tramp iron are anticipated.

Conveyor Belt Applications

High power SER series of magnets are specifically designed for belts conveying high tonnages of ore or coal. Belts in these applications are typically very wide ranging from 96 to 120-inches. The belts operate at high speeds ranging up to 1100 feet/minute and carry a deep burden often-reaching 30+ inches material. These factors counteract the magnetic force applied by a suspended magnet.

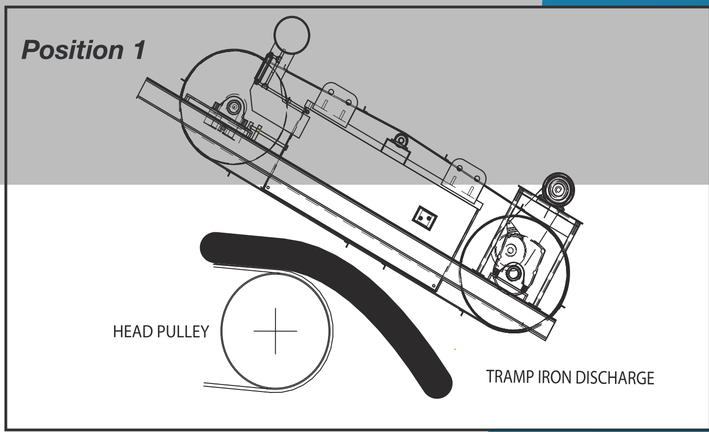
Positioning Suspended Magnets

In most applications, electromagnets are suspended 3 to 4 inches over the top of the material burden and are mounted in one of two positions.

Magnet over material leaving the head pulley *(Position 1)*

This position utilizes the full potential of the magnet as it reacts with the material in suspended trajectory. Tramp metal is easily pulled through the suspended burden. Further, the flow of material is directed toward the magnet face. Collection of the tramp metal from the material flow does not necessitate a change in direction.

At conveyor belt speeds of less than 350 fpm or for apron feeder applications, the suspended trajectory of the material is minimal and becomes near vertical. In these cases, the magnet must be positioned over the material burden as it free falls.

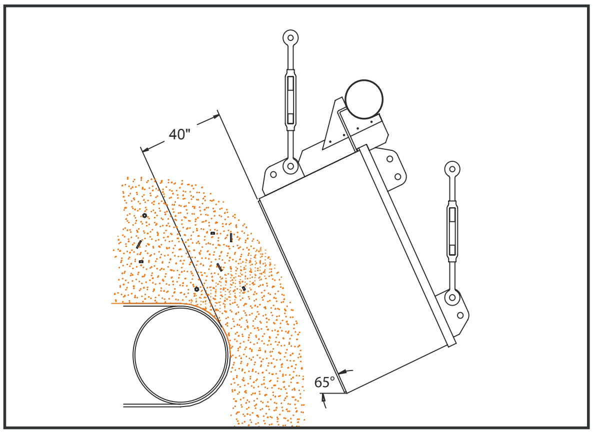


Magnet over the conveyor belt prior to the head pulley *(Position 2)*

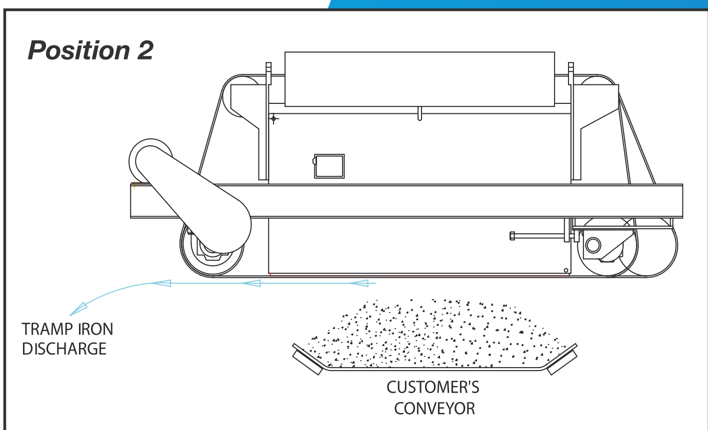
Magnets positioned directly over the conveyor belt require A higher magnetic field strength to remove unwanted and dangerous metal objects. Here, the magnet must reach and attract the tramp metal, shift the direction of momentum, and pull it through the bed of material.

Apron Feeder Applications

Apron feeders are typically slow moving conveyors carrying high tonnage with burden depths reaching 60-inches plus. In all cases, the magnet must be suspended at the discharge of the feeder where the material is approaching free fall, accelerating and the burden depth is decreasing.



A manual clean magnet mounted over the discharge of a 120-inch apron feeder.



Magnet Selection and Sizing

The following are considerations in sizing and selection of suspended magnets:

- **Width of the conveyor belt**
- **Burden depth of the material (magnet suspension height)**
- **Belt speed**
- **Magnet positioning**

Model SER Series Magnet Options

- **High altitude circuit designs**
- **Self-cleaning conveyor belts**
- **Static conducting belts (self-cleaning option)**
- **Zero speed switch on self-cleaning conveyor belts**
- **Explosion proof motors and high fire point coolant**
- **Pulley guards, dust enclosures and suspension hardware**
- **Remote operation of power supply**
- **Power supply ammeter and voltmeter**
- **Under-current relay**
- **NEMA selection for the magnet junction box and power supply cabinet**
- **Force cooled designs for higher magnetic field strength or compact magnet dimensions**

General Features of Selected SER Suspended Electromagnets

90	90	72 - 84	26	18,000	47,000	52,000
96	90	84 - 90	28	21,000	50,300	55,600
102	96	90 - 96	30	23,900	56,800	62,800
108	96	96 - 102	32	25,300	60,200	66,600
114	96	96 - 108	34	26,700	63,500	70,400
120	96	108	36	28,100	66,800	74,200
132	102	120	38	32,800	78,000	86,600
150	112	120 -150	40	41,100	118,000	131,000

All values subject to change.

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

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