INDUSTRIAL MAGNETICS
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## IMI / WALKER HEAVY LIFT MAGNETS

# GENERAL SAFETY AND MAINTENANCE MANUAL

P.O. #: Order #: Part #:

## MAGNET SPECIFICATIONS

Please contact IMI for individual magnet specifications.

Input voltage (VDC/VAC): Nominal ohms (@ 20°C)

Nominal amps (@20°C): Magnet weight: Duty Cycle: (see page 11)

Lift Capacity (Working Load Limit and Application):

## INTRODUCTION

This manual presents Safety & Maintenance direction for IMI / Walker magnetic systems for Lifting and Material Handling. IMI products have proven to be among the best designed and safest in the industry. This is dependent on correct installation and application training. It is essential that anyone who uses the lifting magnet be trained on how to use it correctly.

**READ THIS MANUAL CAREFULLY TO LEARN HOW TO OPERATE AND MAINTAIN THE MAGNET. FAILURE TO DO SO COULD REUSLT IN SERIOUS INJURY TO THE OPERATOR AND BYSTANDERS.**
**THIS MANUAL SHOULD BE CONSIDERED A PERMANENT PART OF THE MAGNET AND SHOULD ALWAYS BE AVAILABLE TO ALL OPERATORS AND REMAIN WITH THE MAGNET.**

## APPLICABLE MAGNETS: LIFT and MATERIAL HANDLING MAGNETS (see illustrations p.2)

**Bi-Polar Model 271** The 271 series concentrates the magnetic field, reducing the attraction of adjacent material and making it suitable for handling bundles of pipe, tubing, rebar, and bar stock.

**Bi-Polar Model 272** The 272 series has a wide range of applications in the production and handling of plate, structural shapes, castings, forgings, coiled strips, individual/bundled lengths of pipe, tubing, rebar, and bar stock.

**Rectangular Lift Magnets** Rectangular lifting systems are designed to lift plate, slabs, and billets. These magnets can be used individually or in multiples with different types of suspension systems.

**Electro-permanent Lift Magnets** These permanent magnets only require a momentary pulse of electricity from the controller to energize or de-energize. Once energized, the magnets are "ON" and their lifting ability will not be affected by electrical power failure or cut cables.

# IMI / WALKER HEAVY LIFT MAGNETS
# GENERAL SAFETY AND MAINTENANCE MANUAL

## CONTENTS

# HEALTH AND SAFETY WARNINGS

Do not attempt to operate any magnet until you read and understand the Operator's Manual.

## MOTOR DRIVEN ROTATING EQUIPMENT

Rotating shafts, gears, sprockets, and other components can present hazards when running, keep hands and feet clear; equipment should only be serviced by trained service personnel.

Electric shock hazard - observe all local plant Lockout/Tagout procedures before removing any guards or initiating service or cleaning activity.
Never disconnect an electromagnet from its energy source while it is energized. Electrical arcing will occur and presents a hazard that may cause serious injury.

## GENERAL

Please be advised that in and around the application of magnetic equipment, there are potential safety concerns that can arise with sensitive medical devices:

- Pacemaker behavior can be affected when they are near strong magnetic fields.
- Medical implants and external fixation systems can be influenced by magnetic fields.
- Hearing aid behavior may be affected when exposed to strong magnetic fields.

Any individual that carries the above equipment or other sensitive medical devices should use caution when they are around or handling magnets. For more specific information the wearer should contact their physician.

Beware of pinch points from sudden attraction and unexpected movement between magnets and ferrous metal equipment components or tools.

## OVERHEAD LIFT EQUIPMENT

- Always stay clear of the load.
- Never lift a load over people or in close proximity to people; inform others that a lift is to begin.
- Never use this magnet to lift, support or to transport people.
- Never leave any lifted load unattended.
- Never lift more than one workpiece at a time with this magnet, unless the device is specifically designed to lift multiple pieces
- Make sure that the supporting structure and load attaching devices (i.e. crane, chains, and hook) are rated to support the weight of the magnet and load.
- Keep feet and other extremities out from beneath a lifted load; never stand under a load being lifted.
- Beware of pinch points at the pivot, lift hook, and handle when adjusting Lift System positions.
- Entrapment hazard: keep extremities clear of hoist, taut wire rope, or strap & hook when operating the magnet or lift system.

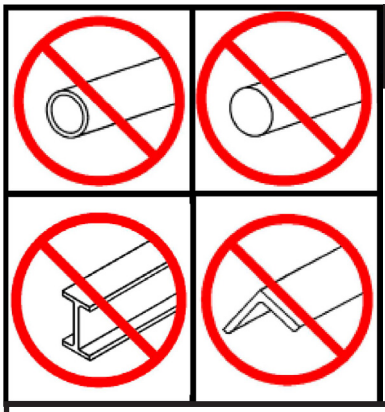
## RECOGNIZE SAFETY INFORMATION

This is the safety alert symbol. This symbol on the magnet or in this manual is an alert to the potential for personal injury. Follow recommended precautions and safe operating practices at all times.

| | |
|---|---|
| **DANGER** Red Background, White Letters | DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
| **WARNING** Orange Background, Black Letters | WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
| **CAUTION** Yellow Background, Black Letters | CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. |

**These Hazard Signal Words Deserve your Full Attention**

## UNSAFE LIFTING APPLICATIONS FOR MAGNETS

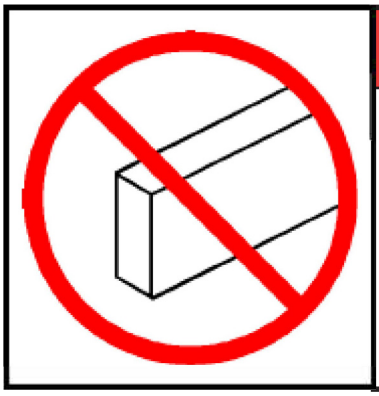


**DANGER**

- **Never** lift any pipe, solid round or structural shapes with this magnet unless it is configured for the shape.
- **Never** lift any castings that do not have a machined flat lifting surface for the magnet. The location of the lifting surface should be such to permit the load to remain level when lifted.

IMI can provide other type magnets for these applications.

For specific model magnets see lifting guidelines for structural shapes.



**DANGER**

**Never** lift a load by its narrowest dimension.

**WARNING**

If there is any difficulty lifting a load, DON'T LIFT IT!
Call IMI for advice at 1-800-662-4638

## WAYS TO AVOID A REDUCTION OF LIFTING CAPACITY

### ⚠ DANGER

**To Avoid any Reduction of Lifting Capacity:**

- The lifting surfaces of the magnet and the area of the load where the magnet will be located must be clean, smooth, flat, and free of nicks and burrs.
- The full area of the magnet's lifting surface must be in contact with the load.
- The load must be at least as thick as half the radius of the center pole for a round manet, or the thickness of the side pole on a rectangular magnet.
- The load must be low carbon steel such as SAE 1020.
- The magnet's lifting surface must stay level and the contacting surface of the load remain flat.
- The temperature of the magnet and/or the load must not be greater than 110° F (43°C) unless specified and designed for high temperature applications.
- Control actuator must be in the "on" or "lift" position.
- Do not exceed the maximum duty cycle.
- Repair of this magnet should only be performed by Industrial Magnetics, Inc. or a Designated Person*.
- If there is any difficulty lifting a load, DON'T LIFT IT! Call IMI for advice at 1-800-662-4638.

## ADDITIONAL WARNINGS and SAFETY INSTRUCTIONS

### ⚠ WARNING

- Never operate a magnet with a direct electrical short to the magnet case. Any person making contact with such a magnet could receive a severe electric shock.
- Always use safety latches on all crane and hoist hooks.
- Never operate damaged or malfuctioning magnets.
- Never remove or damage operating and warning labels.
- Persons using pacemakers or any other medical device should not use magnets until they have consulted with their physician.
- Never connect or disconnect a magnet when power is on.

### ⚠ WARNING

- Disassembly or repair of this magnet can result in reduced holding power and/or cause an unsafe condition. Anytime a magnet system is disassembled beyond the parts list shown in the manual, the magnet must be re-tested for breakaway force in accordance with ASME B30.20.
- Electrical power interruption to electromagnets will cause the load to drop with a risk of injury to anyone in close proximity.
  - **NOTE:** ElectroPerm magnets are not affected by electrical power interruptions once they have been turned on and fully charged.
- Modification of any operating mechanism or structure of a magnet can reduce the magnet's effectiveness and/or cause unsafe conditions.

## SAFETY PERSON

IMI recommends that a person be assigned to review all magnetic handling applications for these magnets to ensure that safe practices and procedures are being followed.

*IMI replacement parts may be installed by a ****Designated Person.**

**** Designated Person** - A person selected or assigned by the employer as being competent to replace specific replacement parts listed in this manual and is able to verify the proper functioning of the specific replacement parts and the entire product after the completion of the installation.

# ADDITIONAL SAFETY INFORMATION

## ASME B30.20 "Below the Hook Lifting Devices" Safety Standard

IMI Lift Magnets are designed and manufactured in accordance with the ASME B30.20 standard and the associated ASME BTH-1 Design Standard. These American National Standards cover the design, construction, testing, installation, operation, and maintenance of Close Proximity Operated Lifting Magnets and Remotely Operated Lifting Magnets.

## Close Proximity Operated Lifting Device

A magnetic lifter is considered a close proximity lifting device if:

It is used in such a fashion that the operator manually positions the lifting magnet on the load, and manually guides the lifting magnet and the load during the lift.

## Remotely Operated Lifting Device

A magnetic lifter is considered a remotely operated lifting magnet if:

The magnet does not require the operator or other personnel to be in close proximity to the lifting magnet or its load while the lifting magnet is in use.

# INSTALLATION INSTRUCTIONS

### BEFORE INSTALLING THE LIFTING MAGNET and/or MAGNET SYSTEM

1. Unpack the lifting magnet and/or magnet system and check that all components have been included and are undamaged after shipment.
2. Observe all instructions and warnings in this manual and on the magnetic lifter.
3. If everything in this manual is not understood, contact IMI for assistance before using the magnetic lifter.
4. Check that the load rating of the hoisting equipment exceeds the total weight of the load plus the weight of the magnetic lifter.
5. If the magnetic lifter is to be installed on an existing crane, hoist, or other type hoisting equipment, move it to a location where it will cause the least interference with other equipment and operations in the area.
6. Place all power controllers in the **"OFF"** position.

**Only qualified personnel should install this lifting magnet and/or magnet system.**

**⚠ WARNING**

- All electrical wiring should be installed by a qualified electrician and must conform to national, state / province, and local electrical codes.
- Prior to beginning installation, check that all sources of power are disconnected, locked out, and tagged "out of service".
- Determine the voltage and current rating of the magnetic lifter. This information is marked on the magnet or system's nameplate.

## INSTALLATION INSTRUCTIONS (continued)

# CONNECTING ELECTRICAL POWER DISCONNECTS

(In accordance with the ASME B30.20 safety standards)

- A separate Magnet circuit disconnect switch, independent of the hoisting equipment's disconnect switch, shall be provided. The Magnet circuit disconnect switch must be of the enclosed type with provision for locking, flagging, or tagging in the open (off) position and have means for discharging the inductive energy of the magnet. The Magnet circuit disconnect switch must be connected on the line side (power supply side) of the hoisting equipment disconnect switch.
- Power supplied to magnets from DC Generators can be disconnected by disabling the external powered source connected to the DC generator, or by providing a circuit switch that disconnects excitation power to the generator and removes all power to the magnet.
- Disconnects are not required on externally powered electromagnets operating from a 120 V AC single phase power source.

# ELECTRICAL GROUNDING

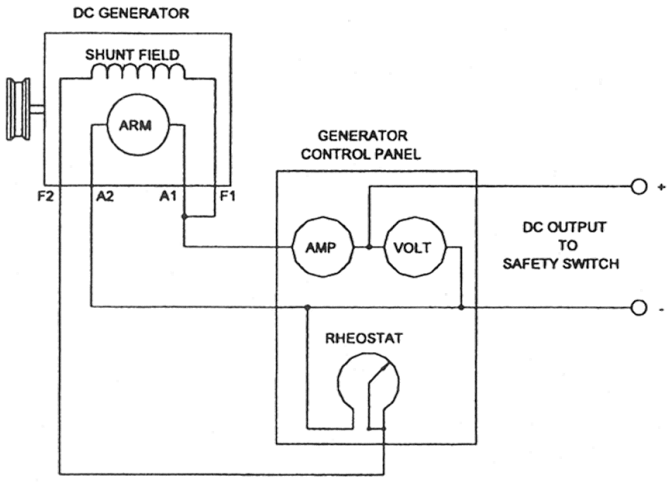
All IMI electromagnetic lifting magnets are provided with provisions to ground the electrically conductive body of the magnet in order to facilitate compliance with the governing electric codes.

## ⚠ WARNING

- Each magnet is supplied with a safety ground wire or a grounding lug for attachment of a safety ground wire. The green or green with yellow stripe safety ground wire provided with most magnets is attached to the body of the magnet.
- It is the responsibility of the electrical installer to verify that the magnet is electrically wired and grounded properly and in accordance with the local and national electric code for the intended application.
- In the US, the governing national standard is the National Electric Code NFPA 70. Article 250 contained in this code is devoted to the grounding requirements for various types of installations.
- Prior to energizing the electromagnetic device, check all the electrical connections and confirm that the metal body of the electromagnetic device is electrically grounded.

# INSTALLATION INSTRUCTIONS (continued)

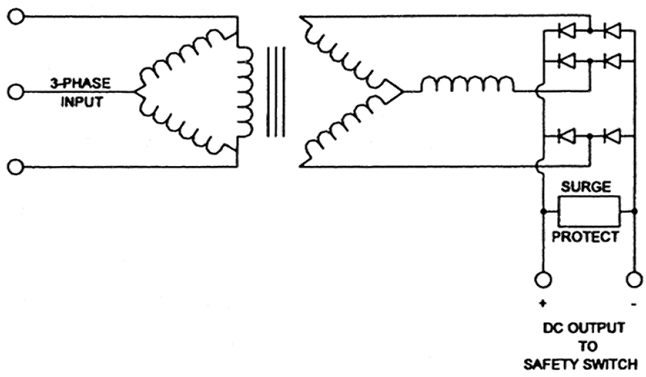
## TYPICAL GENERATOR SCHEMATIC




**Connections on generator shown for C.C.W. rotation facing commutator end. Interchange field connections for clockwise rotation.**

**Eliminate control panel by connecting F2 to A2. Voltage will then be controlled by generator RPM only.**

## TYPICAL RECTIFIER SCHEMATIC




**Rectifier must be rated for magnet service and be equipped with surge protection.**

**Rectifier may have options such as: AC circuit breaker, AC line contactor, DC metering, Indicator lights, fuses or circuit breakers, which are not shown above.**

# MAGNET SUPPRESSION

When energized, an electromagnet creates a large magnetic field and the magnet coil contains large amounts of energy. Capacitive discharging occurs when a magnet coil dissipates its energy internally.

When the current producing source is removed from an inductive device, such as the coil of a magnet, the energy stored in the inductor produces work in order to bring the system into equilibrium.

In the case of a magnet coil, when the source of power is removed, the voltage potential between one end of the coil and the other increases rapidly, and if a suitable median exists, the electrons flow from one end to the other through the median. In other words, the movement of electrons, from one end of the coil to the other, over or through the conductor, is the work produced by the stored energy.

The energy stored in a magnet coil is normally controlled through external circuitry, usually located in the electrical magnet controller.
IMI controls employ a suppressor/resistor network across the magnet to accomplish this.
If a control other than an IMI control is to be used, ensure that the controller provides adequate suppression. Adequate suppression is defined as any circuit which provides a continuous current path.

For technical assistance, contact your IMI representative.

## INSTALLATION INSTRUCTIONS (continued)

### SAFETY HOOK LATCH

**⚠ WARNING**

Always use a safety hook latch on the crane hook to hold the magnet.

### CABLE TAKE UP REEL

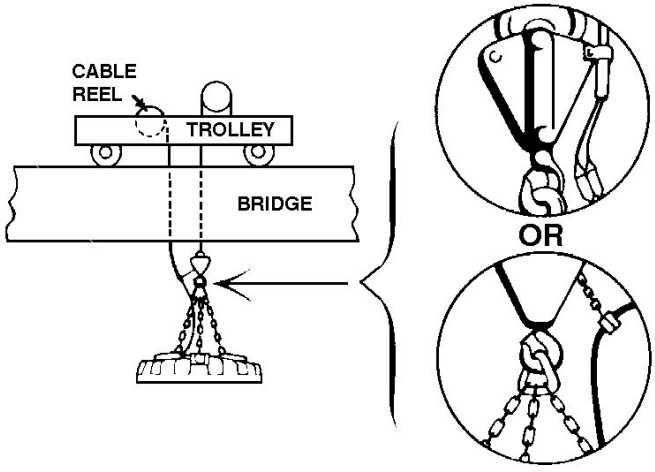
A cable take-up reel is recommended on boom type and overhead type cranes to control the cables in the air between the crane and magnet. Cable take-up reels are not normally required on hydraulic type cranes.

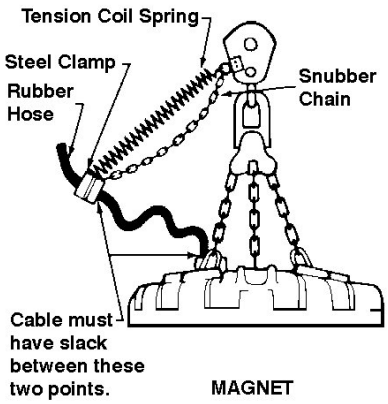
### CABLE STRAIN RELIEF

With electrical power off, connect power supply cable to the line side terminals of connectors. Power supply cable should be supported in a vertical position to prevent cable damage. Recommended installations for overhead and mobile cranes are illustrated below. A cable strain relief assembly is available from IMI and is recommended for all applications to eliminate strain on the terminal connections.

### ESTABLISHING TEST VALUES

To obtain accurate values, the Coil Resistance Test, Megger Test, and AC Current Test should be performed on a magnet immediately upon receipt from the manufacturer. The values obtained from these tests should be recorded and compared with subsequent tests results.



# OPERATING INSTRUCTIONS

## IMPORTANT FACTS FOR THE OPERATION OF LIFT MAGNETS

### LOAD CHARACTERISTICS OTHER THAN WEIGHT MUST BE CONSIDERED TO DETERMINE THE LOAD THAT ANY MAGNET CAN LIFT.

This statement is true for all lifting magnets because they all operate using the same fundamental laws of physics. Magnetic power is often pictured as lines of magnetic force flowing from north pole to south pole. Anything that limits the flow of these magnetic lines of force reduces the magnet's lifting capacity. There are many important factors which limit the flow of these lines of force.

1. **LOAD THICKNESS**

   The greater the number of lines of magnetic force that can flow from a magnet into the load, the greater the effectiveness of the magnet. The thicker the load, the more lines of magnetic force that are able to flow, up to the thickness where the load capacity excedes the lift capability of the magnet.

   The maximum thickness of load required to reach full lifting capacity is approximately half the radius of the center pole for a round magnet or the thickness of the side pole on a rectangular magnet.

   The shape and density of a load and the amount of the load in direct contact with the pole faces of the magnet all affect the final lifting capacity.

   Thin material (load) means less iron available and thus fewer lines of magnetic force flow from the magnet into the load. As a result, the lifting capacity of the magnet is reduced. In some cases, the magnet will attract more than one thin plate of material when set on a stack of thin plates.

**Use caution in applications that are intended for the lift of multiple sheets**

2. **SURFACE CONDITIONS**

   Magnetic lines of force do not flow easily through air, however, they do flow very easily through iron. As a result, anything that creates a space or an air gap between a magnet and the load will limit the flow of magnetic lines of force, thus, reducing the lifting capacity of the magnet.

» **Magnet's Lifting Surface Condition** - The lifting surfaces of a magnet must be clean, smooth, flat, and free of nicks and burrs in order to minimize the air gap between a magnet and the load. These magnets have been designed with soft, low carbon steel lifting surfaces in order to maximize the lifting capacity. This requires that special care be taken to protect these surfaces. Follow the Inspection Instructions in this manual. Attaching or welding other materials to the lifting surfaces of the magnet in order to reduce wear is not recommended as it will reduce the lifting capacity.

» **Load Surface Condition** - Paper, dirt, rags, rust, paint, and scale present air gaps between the magnet and load. A rough surface finish on the load also creates an air gap. Any of these conditions will reduce the magnet's lifting capacity.

# IMPORTANT FACTS FOR THE OPERATION OF LIFT MAGNETS (continued)

**3. LOAD ALLOY**

Low carbon steels, such as SAE 1020 steel, are nearly as good conductors of magnetic lines of force as pure iron. Many alloys contain non-magnetic materials which reduce the ability of magnetic lines of force to flow into the load. An alloy such as SAE 300 series stainless steel is almost as poor a conductor of magnetic lines of force as air.

Type 416 stainless steel is considered magnetic but contains enough chromium so that a magnet can develop only one-half as much force on a type 416 stainless steel load when compared to SAE 1020 steel. In cast iron, the carbon content reduces the force developed to less than one-half of that developed on SAE 1020 steel. (Chilled cast iron further reduces the force to less than one-quarter.)

**4. LOAD LENGTH OR WIDTH**

As the length or width of a load increases, it will cease to remain flat when lifted as the edges will begin to sag. This sagging of the load can create an air gap between the load and the magnet, especially at the ends of the magnet. This is referred to as peel. If this occurs, the lifting capacity of the magnet is greatly reduced.

For plate lifting, where sag often occurs, rectangular shaped magnets must be positioned so that the length of the magnet is parallel to the width of the load.

**5. POSITION OF MAGNET'S LIFTING SURFACE**

Position the magnet (s) on the load so that it will remain level when lifted.
As the slope of the magnet's lifting surface changes from horizontal to vertical, the lifting capacity of the magnet decreases. When the magnet's lifting surfaces are vertical, the lifting capacity of the magnet is minimum and dependent upon the coefficient of friction between the magnet's lifting surface and the load.

**6. PORTION OF MAGNET SURFACE IN CONTACT WITH LOAD**

The full surface of the magnet must contact the load if the magnet is to achieve its rated lift capacity.

**7. LOAD TEMPERATURE**

The temperature of the load can cause damage to the magnet and if high enough, can even change the magnetic characteristics of the load. For Standard Lift Magnets, IMI should be consulted if the load or air temperature exceeds 110° F (43° C).

## DUTY CYCLE

**DO NOT EXCEED THE DUTY CYCLE RATING OF THE MAGNET.**

Exceeding the duty cycle will result in reduced lifting capacity due to the excessive heat that will build up in the magnet.

Duty cycle rating (D.C.%) is defined as: (Time On x 100)/(Time Off + Time On) = D.C.% and is expressed as a percent, with a maximum of 10 minutes Time On to avoid overheating the magnet.

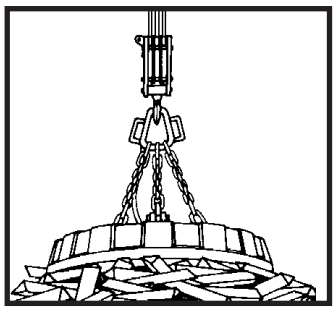
To maximize the effectiveness of the magnet(s), keep power off when the magnet(s) are not in use.

**EXAMPLES:** 3 minutes on, 1 minute off equals: (3 x 100)/(3 + 1) = 75%
5 minutes on, 5 minutes off equals: (5 x 100)/(5 + 5) = 50%

The duty cycle rating of the magnet(s) is marked on the magnet nameplate.

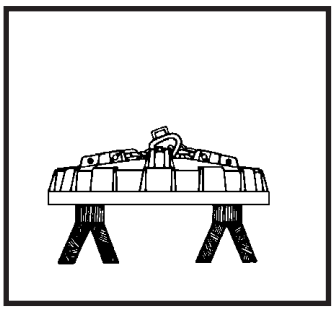
# RECOMMENDED LIFTING PROCEDURES

## LIFTING PROCEDURES Do's & Don'ts



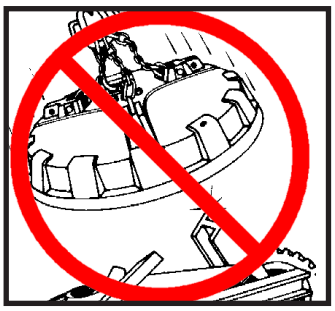
### TURN ON POWER - WAIT A FEW SECONDS - THEN LIFT

This lets magnetism build to a peak level and provides maximum load to the lift. A bigger payload can be moved faster.



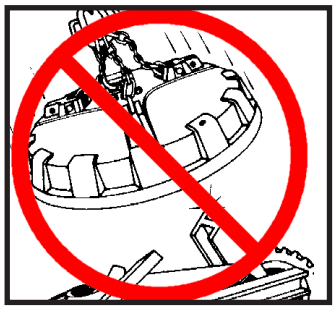
### KEEP MAGNET DRY

Always store magnet off of the ground. Never cool the magnet with water. Store in dry area - moisture can cause short circuits thereby crippling lifting capacity.



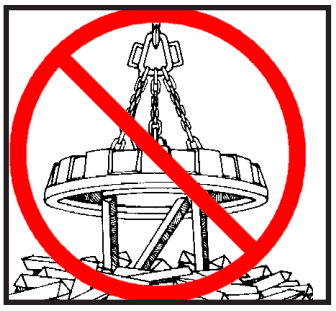
### KEEP TERMINAL BOX CLOSED

This keeps moisture away from the terminals and out of the magnet coil.



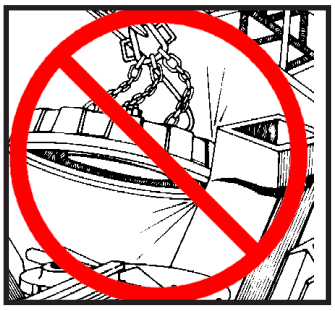
### ALWAYS SET A MAGNET DOWN EASY

Ease the magnet down onto the material. Repairs are costly and time-consuming.



### KEEP POWER OFF UNTIL THE MAGNET SETTLES ON THE LOAD

Lift the load 2 to 3 inches then jar the load to ensure that adequate holding power is available.



### DON'T USE ANY MAGNET AS A BATTERING RAM

Improper use, such as dropping a magnet to break up heavy pieces for scrap will cause damage to the pole shoe, terminal box, or the coil. Use the magnet only for lifting.

**Lift and move the load SMOOTHLY - avoid swinging the load.**

**Never let the load come into contact with any obstruction.**

**Always stay clear of the load. If the load must be guided, push or pull the edges of the load. DO NOT guide the load by pushing or pulling the magnet or chains/slings.**

**Release:**

- **Carefully set the load down and de-energize the magnet(s).**
- **Apply reverse current as required for a clean release.**
- **Raise the magnet(s) slightly to be sure the load has been released.**

# INSPECTION and MAINTENANCE INSTRUCTIONS

## FREQUENT INSPECTION (Daily to Weekly) depending on severity of service

1. **TURN OFF ELECTRIC POWER.**
2. All chain links should be checked for wear. Any chain in which the minimum diameter of the worn portion of any link is less than 87% of the actual new stock diameter or thickness must be replaced. Never attempt to repair links by welding or hardfacing worn areas.
3. Inspect all chain pins. Any pin in which the minimum diameter of the worn portion is less than 90% of the new stock diameter must be replaced. Be sure that cotter pins, plates, washers, etc. are in place and in good condition.
4. Check the entire magnet case for any cracks. Repair cracks immediately.
5. Check chain pin lugs and tagline lugs for wear and other damage. Make necessary repairs immediately.
6. Inspect the physical condition of all electrical cables and leads. Look for cuts, abrasion, and strain damage. Replace any suspect cable or lead. Magnet leads are sometimes protected by thick hoses, steel pipes, or fabricated cable channels. Check that these items have not been cut, bent or crushed, and hiding a damaged cable or lead.
7. Check the terminal box for any damage or missing components. Replace any missing covers and plugs to prevent the entry of moisture. Clean away any build-up of dirt or foreign materials in the area of the box since these materials retain moisture and can accidentally enter the box during repairs.
8. Inspect the non-magnetic bottom plate for cracks, dents, and the integrity of the weld between it and the magnet case.
9. If the magnet has a center pole shoe, inspect for excessive wear, cracks, and fit to the center pole. An air gap between the shoe and pole will result in reduced lifting capacity.
10. If the magnet is used for plate lifting, care should be taken to keep the unpainted magnetic pole surfaces on the bottom of the magnet flat and free from rust, nicks, and burrs, which reduce the lifting capacity. Burrs may be removed by filing, deep nicks may require grinding of the pole faces.

## PERIODIC INSPECTION (Monthly to Yearly) depending on severity of service

1. **TURN OFF ELECTRIC POWER.**
2. Completely inspect and **record** the condition of the magnet and its suspension system and maintain this record. Test and record the magnet's coil resistance, case to coil resistance, and AC current test reading. This will provide a health status of the magnet's internal insulation when compared with values taken when the magnet was put in service.

# PERIODIC INSPECTION RECORD FORM

**Record date and initials; note condition of each item. Make additional forms as needed.**

| Date and Initials for each inspection | Condition | Date | Initials | Date | Initials |
|---|---|---|---|---|---|
| Structural & Weld Condition | | | | | |
| Chains | | | | | |
| Lift Bail | | | | | |
| Lift Pin | | | | | |
| Lift Lugs | | | | | |
| Fasteners | | | | | |
| Magnet Face | | | | | |
| Coil Shield | | | | | |
| All electrical components incl. Meters, indicators, or alarms shall be tested for proper operation. | | | | | |
| Labels & Safety Instructions | | | | | |
| | | | | | |
| **Magnet Electrical Tests** | **Values** | **Date** | **Initials** | **Date** | **Initials** |
| Coil Resistance (ohms) | | | | | |
| Case to Coil Res. (meg ohms) | | | | | |
| AC Current Test (amps) | | | | | |

# MAGNET INSPECTION (Out of Service Magnet)

**Any magnet that has been out of service more than 30 days MUST be thoroughly inspected before being placed back into service.**

# YEARLY MAGNET INSPECTION

**IMI recommends that any Close Proximity Lifting Magnet be re-tested for breakaway force annually.**
Contact IMI for test instructions or recertification.

# TROUBLE SHOOTING

In many cases of poor magnet performance, the difficulty can be traced to the power supply, controller, or cable reel assembly. If these elements are found to be in good working order, the magnet can be checked with the following simple tests.

If a lifting magnet is suspected to be faulty, preliminary electrical tests can be made from the external leads.

1. Disconnect power to the magnet before making any electrical tests on your magnet.
2. Make electrical tests at outside leads. If tests indicate an open coil, ground, or low case to coil resistance, disconnect cable and connector and make further tests at coil leads. On some magnets, this will require removal of the terminal box cover. If these tests are satisfactory, trouble is then in the outside leads, connectors, controller, or power supply.

**⚠ DANGER**

**Use extreme care when opening a magnet's terminal box. Contents may be under extreme pressure. Allow magnet to cool to ambient temperature before opening terminal box.**

# MAGNET TEST PROCEDURES

These tests should be performed when the magnet temperature is close to ambient temperature (70º F) and has not been operated for at least 10 hours.

## COIL RESISTANCE TEST

1. Use a Wheatstone Bridge, Kelvin, or other accurate ohmmeter (e.g., Fluke 115 or 179).
2. Connect meter leads to terminal junction. If the resistance is lower than that shown on the magnet's nametag or by calculating the coil resistance by dividing 230 volts by the amps on the nametag, shorted turns are indicated. If the resistance is less than 75% of this resistance, DO NOT operate magnet, as it is likely to cause extreme overheating and may cause serious damage to the coil material.

## GROUND INSULATION TEST "MEGGER TEST" (Case to Coil Resistance)

1. Use a 500-volt Megger (e.g., Fluke 1503 or 1507).
2. Connect one Megger lead to terminal junction and the other to a clean surface of the magnet casing. If the reading is between 20 Megohms and infinity, it is typical of a brand new Walker magnet. If the reading is between 10 & 20 Megohms, the insulation is sound. If the insulation is between 1 and 10 Megohms, the insulation is still acceptable. However, the insulation has degraded and the magnet should be closely monitored for further deterioration. If the reading is less than 1 Megohm, it should be returned to the factory for further inspection. Zero Megohms indicates a dead short.

## WHAT CAN AFFECT THE GROUND INSULATION TEST (Case to Coil Resistance)

1. The most common difficulty is moisture.
2. The most likely entry point is the terminal box because the box has not been properly maintained and sealed.
3. The second most likely entry point is the bottom plate area because the bottom plate has been damaged and the welds have fractured.

Once the moisture enters the coil cavity, the coil insulation degrades and permits the current to arc or trace through the moisture to the case.

## AC CURRENT TEST

A more accurate test for shorted turns can be made by checking the current that will flow through the magnet with a 220 volt 60 cycle power supply connected to the magnet leads. A good quality ammeter should be used to perform this test. To establish a value, which can be used in a comparison with future readings, this test should be performed on the magnet upon receipt from the manufacturer. If provided with the serial number of the magnet, IMI can supply the results of the pre-shipment AC Current Test. Future test readings, which are higher than the initial test value, indicate that additional shortened turns are present.

**If all tests meet the magnet specifications, the problem can be**:

1. Low Voltage
2. Controller Trouble
3. Cable Reel - Ground or Shorts
4. Worn or Broken Cable

## RETURN and REPAIR INTRUCTIONS

For warranty and non-warranty repairs on any part of the magnet system, contact IMI TOLL-FREE at 1-800-582-0821.

- A return authorization number will be issued along with any applicable packaging and shipping instructions.
- After receipt of the components to be repaired, IMI will perform an inspection and provide an estimate of the repair costs.
- Authorization from the customer must be obtained by IMI before repairs are initiated.
- Transportation charges, both to and from the factory, are the sole responsibility of the customer unless otherwise agreed upon.

For technical assistance contact IMI.

## MAGNET DEGRADATION

The force of a permanent and electromagnets can degrade over time and when subjected to external influences. It is recommended that magnetic devices are audited annually.

IMI can provide a Magnet Audit and Plant Survey to evaluate magnetic equipment performance and assist with compliance to global industry standards; Pull Test Kits are available for self-auditing plant activity.

## COMMENTS OR CONCERNS?

We believe Industrial Magnetics, Inc. offers the finest Lift Magnets available today. Great pride has gone into the design and manufacture of these units. Any comments or concerns should be directed to our Customer Service Department at 1-888-582-0821.

**We appreciate the opportunity to serve you!**