CHOOSING AND USING THE CORRECT...

LIFT MAGNET
Introduction To Lift Magnets

Our magnetic material meets Magnetic Materials Producers Association (MMPA) standards for physical quality and magnetic properties.

There are three types of lift magnet to choose from:

- Permanent
- Electromagnet
- Permanent / Electromagnet Combination

Which one to select is based on many factors ranging from power accessibility, cost and how close you can get to the magnet. Consult with your magnet supplier to select the best product for the application instead of just picking a magnet like the other one you may already have. Magnets and magnetics are changing rapidly, getting the best magnet for the application can get you a magnet that is stronger, lighter, contains “smart” technology and/or is less expensive than a lifter that you currently use.

**Ceramic magnets** are made of Strontium Ferrite (SrFe) in a sintering process. Ceramic magnets are staples in the electronic, automotive, medical, mining, industrial, oil industries and more. Ceramic magnets are medium strength magnet material with a high resistance to demagnetization, long time stability (loses 0.5% of its magnetic strength in 100 years), brittle material that has to be cut with diamond tipped blades. Maximum temperature 480°F (249°C).

**Rare Earth Neodymium-Iron-Boron (NdFeB) magnets** are made in sintered as well as bonded forms. Commonly referred to as Neo, this magnet material provides the highest magnetic strength of any magnet material, very high resistance to demagnetization and is ideal for applications requiring maximum strength in a limited area. Because of its high iron content, Neo is usually coated or plated to prevent oxidization, therefore avoid grinding. Maximum temperature 180°F (82°C).
Permanent Lift Magnets

Permanent lift magnets come in two styles: One is “Always On” and the other is “On/Off”.

ALWAYS ON

“Always On” lift magnets utilize some kind of mechanical method to separate the magnet from the steel you are lifting. This mechanical method usually is a roller cam, solid round cam, jack screw or breaker bar. Other than the roller cam, these mechanical release methods could mar or scratch metal surfaces. Typically, this type of magnet has multi-poles meaning strips of steel with alternating polarity (N,S,N,S). These magnets are used on flat steel and have shallower magnetic penetrations that make them better suited for thinner metal.

ON/OFF

“On/Off” permanent magnets have the safety of an Always On permanent magnet and the controlled On/Off of an electromagnet. These magnets often use Rare Earth magnetic material in two separate fields. When both fields are lined up, North to North and South to South, the magnetic field goes down into the steel. When one field is reversed, caused by rotating the On/Off handle, the field stays within the magnet, no longer holding the steel. On/Off magnets generally have two parallel poles which give this magnet a deep penetrating magnetic field for rougher, flat surfaces and work well on round pipe or shaft material. When this type of permanent magnet is “Off” all collected “fuzz” iron falls away. In most sizes, the On/Off magnet must be on steel to rotate the handle to the “On” position. This is a safety feature that prevents pre-energizing of the magnet prior to being placed on steel, reducing the chance of injury or equipment damage.
CHOOSING AND USING THE CORRECT LIFT MAGNET

Electromagnet Lifts

Electromagnets use electrical power to generate a magnetic field. This power must be in the form of Direct Current (DC) power. The DC power comes from the conversion of AC to DC by a power supply or can be provided from a battery. Electromagnets provide controlled “On” & “Off” from remote locations. They do however require constant electrical current or the magnet will release the load. Battery backup power supplies can provide constant power when a power interruption occurs.

ELECTROMAGNETS

Electromagnets with a “cord” coming from a power source provide concentrated holding power and a deep reaching magnetic field to lift thick, non-flexing ferrous items. Some models have pendant controls or on-board switch for “On, Off and Release” functions.

BATTERY LIFT

Battery lift magnets operate from a self-contained, automotive-type battery, which results in maximum convenience, portability and versatility. This type of magnet is ideal for remote locations. Built-in chargers and a visible power gauge provide ease of operation. However, this type of lift magnet requires a consistent charging schedule to make sure the batteries are charged and ready to use.

Permanent/Electromagnet Combination Lifts

Perm/Electro (Permatrol®) combination lifts provide the best of both worlds. Safety of a permanent magnet for the entire lift cycle and only uses a momentary pulse of electricity to redirect the magnetic field inward to release the load.

These Perm/Electro designs use virtually no energy, do not require battery backup and can be controlled remotely. Ideal for lifting applications that require fast cycle times, however surface conditions must be flat and clean.

Pictured: Permatrol® PME0404
Lifting ferrous items using a magnet requires a good look at the length, width and thickness of the item. Thin metals do not absorb as many of the magnetic flux lines (magnetic energy) as thicker metals. Thin metals also flex, causing the steel to peel-off the magnet. Equally important is the physical size, flatness, surface conditions and type of steel. The charts below illustrate how surface finish and Carbon content effect lifting value.

### Percentage Of Stated Lifting Power By Surface Finish

<table>
<thead>
<tr>
<th>SURFACE FINISH</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Surface</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Machined</td>
<td>100%</td>
</tr>
<tr>
<td>Foundry Finish</td>
<td>85%</td>
</tr>
<tr>
<td>Rough Cast</td>
<td>65%</td>
</tr>
</tbody>
</table>

### Percentage Of Stated Lifting Power By Material

<table>
<thead>
<tr>
<th>CARBON CONTENT</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Carbon 0.05 - 0.29%</td>
<td>100%</td>
</tr>
<tr>
<td>Moderate Carbon 0.30 - 0.59%</td>
<td>85%</td>
</tr>
<tr>
<td>High Carbon 0.60 - 0.99%</td>
<td>75%</td>
</tr>
<tr>
<td>Higher Carbon = Higher Residual*</td>
<td></td>
</tr>
</tbody>
</table>

* High Carbon steel (Tool Steel) will absorb magnetism and may magnetically stick to steel surface, such as the magnet or attract ferrous particles.

### Design Factor – What is it?

**Design factor is the relation of the magnet’s labeled lifting value compared to the magnets maximum lifting value under ideal conditions.** Ideal conditions are when a magnet is new and pulled off a newly machined, thick, low carbon steel plate. The pounds of pull it takes to break the magnet away from the steel surface is the “maximum” lifting value. Design factor (de-rating) values are then determined by taking this maximum lifting value and dividing it by the manufacturers design factor. Design factors are minimum 2:1 and most cases 3:1. This means a magnet with a 3:1 design factor and labeled to lift 1,000 lbs will have a break-away force of approximately 3,000 lbs. The labeled lifting value is stated for the benefit and safety of the user, due to the fact that ideal conditions rarely exist in the field. The steel that you are lifting may have scale, rust, dirt, or coatings on its surface; or the surface of the magnet itself may be worn. Any of these conditions will cause lower lifting values. Pick a lift magnet that has a lifting value slightly higher than the weight of your part.

**DO NOT ADD** additional weight to your lifting requirements. If you have a 1,000 lb part and you buy a higher stated 2,000 lb lift magnet, it will result in a magnet that is much heavier, harder to handle and cost more than needed since the 2,000 lb magnet should have a Design Factor of 2:1 or 3:1. **Under no circumstances should you lift ferrous objects that weigh more than the stated lift magnet value.**
Lifting Angle relation to Lifting Force

Maximum lift force achieved by a magnet is when the direction of force is perpendicular (90°) to the metal surface. If a load is tipped at an angle, shear forces, slide forces, friction, peeling forces associated with movement or impact forces from bumping the load as it is conveyed can cause the lift to fail.

- Check magnet/load balance by raising the load off the ground by 2”-3” only.
- Reposition the magnet until the load is level.
- Never lift a load at an angle in excess of 5° from horizontal.

Loss of Magnetism

Under normal use conditions, a permanent magnet can experience a decrease in its original holding value. The most common factors which can cause a loss of strength include:

- Every day wear and tear on the magnet face such as: fine metal buildup on or between the magnet’s poles, nicks or gouges in the magnet’s poles, rust buildup, etc.
- Exposure to extreme temperatures: Ceramic lifts lower than -76°F (-60°C) and higher than 300°F (148°C). Neodymium-Iron-Boron Rare Earth lifts lower than -10°F (-22°C) and higher than 180°F (82°C). Electromagnet & Battery Lifts higher than 140°F (60°C).
- Severe blow or shock to the magnet. Do not use a blunt instrument to position the magnet on the load.
- Exposure to electrical currents. Never place magnet next to a large motor or generator. Never use the magnet as part of a welding ground circuit.
- Exposure to vibration.
DETERMINING MAGNET LAYOUT

In a perfect world all steel would come in thick, smooth, non-flexing material that would be either 4’x4’ or 5’x5’ or 6’x6’ square, then one magnet in the center would work just fine. In the real world, we deal with, steel sheets, containers, tubing, I-beams, well drilling pipe and more that can be just about any length, width and thickness. Sometimes the part needs to be rotated 90° or 180°. What all this means is more than one magnet attached to a spreader system may be needed to move your part. See examples below.

The lift magnet may require custom magnetic pole shoes to adequately lift the part if your part is not a sheet or plate and it has peaks, valleys, ridges, etc. Customizing the face of the magnet to conform to the surface condition of the part ensures good contact between the two and most, if not all, magnetic strength will flow into the part to be lifted.

Magnet Maintenance and Care

A lift magnet, like any other tool, needs to be kept in good working order. Maintaining your lift magnet can only assist in a safe lift condition.

- Occasionally check the mechanical operation of the magnet release handle, spring, grip, as well as the lift lug for damage or fatigue.
- Keep the surface (magnetic face) of the lift free of chips, slag, weld beads, dirt, rust, etc. This can be done by wiping the surface of the magnet off frequently with a wire brush, shop rag or gloved hand.
- Apply oil or grease to magnetic face pole surfaces if magnet is to be stored for long periods of time.
- After a period of time the magnet face poles may become somewhat rounded, nicked or gouged, reducing the magnet’s effectiveness. Magnetic pole faces can be machined or ground to bring the magnet back to a consistent flat surface. Calibration tests can determine current magnetic strength of the lifter.
- Do not weld on, hammer, throw or drop the magnet.
- Do not strike, slam, ram or forcefully impact the magnet against other objects.
- Lift magnets are designed to be used in dry applications. Never use magnet under water without consulting the manufacturer.
- Always store the magnet in a non-conductive, dry environment.
Magnet Calibration

An annual calibration test is recommended to ensure that your lift magnet is performing to its optimal level. Calibration of a lift magnet is a test, performed by an approved testing facility that determines the current lift capacity of the magnet, at the time of the test.

Under an “Ideal Condition” environment, a series of break-a-way tests will determine the current “de-rated” holding value of your magnet. This holding value must meet or exceed the value stated on your lift magnet. If the stated holding value is met, the magnet can be returned to use and scheduled for another calibration test in one year. The outcome of the test allows the operator/owner of the lift to know that the magnet meets the lift standards as designed by the manufacturer.

If the stated holding value is not met, the lift magnet can possibly be machined to bring all magnet face poles back to a smooth, level condition. If that does not bring the magnet back to the manufactured lifting value, the magnet should be removed from operation and replaced with another magnet.

A CERTIFICATE OF CALIBRATION, given at the conclusion of the testing, gives the operator/owner documentation of the magnet’s performance.

SHIPPING INSTRUCTIONS FOR MAGNET CALIBRATION:

Note: Customer is responsible for shipping to and from Industrial Magnetics, Inc., and any authorized repairs to the Lift Magnet.

Please contact our customer service department at (888) 582-0822 to obtain your Customer Supplied Material (CSM) number.

At this time, you will be required to supply a P.O.# for the test procedure described under “Magnet Calibration”. Current fees for this procedure can be obtained by contacting the number listed above. Please include your contact information and shipping address with your Lift Magnet and send to:

Industrial Magnetics, Inc.
1385 South M-75
Boyne City, MI 49712
CSM#______, Attn: Quality Assurance, Calibration
ASME B30.20 Lifting Standards

The American Society of Mechanical Engineers has established standards for Below-the-Hook Lifting Devices. This standard applies to the marking, construction, installation, inspection, testing, maintenance, and operation of all lifting magnets when used for single or multiple steel piece handling operations in which the operator of the lifting magnet is required to manually position the lifting magnet on the load and manually guide the load during its movement, or in close proximity to people.

What that means is... the manufacturer has to follow design and marking standards and the operator has to follow safe lifting operations and procedures.

ALWAYS ASK FOR A MAGNET THAT MEETS OR EXCEEDS ASME B30.20 STANDARDS.

ASME Below-The-Hook Design Standards

This standard provides minimum structural and mechanical design and electrical component selection criteria for ASME B30.20 below-the-hook lifting devices.

The provisions in this Standard apply to the design or modification of below-the-hook lifting devices. Compliance with requirements and criteria that may be unique to specialized industries and environments is outside of the scope of this Standard.

Lifting devices designed to this Standard shall comply with ASME B30.20, Below-the-Hook Lifting Devices. ASME B30.20 includes provisions that apply to the marking, construction, installation, inspection, testing, maintenance, and operation of below-the-hook lifting devices.
CHOOSING AND USING THE CORRECT LIFT MAGNET

Safety Measures

READ THE PRODUCT MANUAL PRIOR TO OPERATION!

ALWAYS use the entire lift pole surface.
ALWAYS keep contact pole areas perfectly flat and parallel on the surface of the load.
ALWAYS keep contact pole areas and surface of the load clean and free of debris.
ALWAYS protect pole surfaces from rust after use by treating with some oil.
ALWAYS store magnet in a dry environment.
ALWAYS check the magnetic poles to make sure they are flat and not damaged from use.

DO NOT attempt to engage the magnetic lift before resting it on the steel to be lifted. If you have an “Always On” lift magnet use, the release handle in the release position while lowering the magnet onto the load to prevent sudden attraction of the lift magnet and the steel material.

DO NOT hoist the load before locking the handle in the “ON” position (if applicable) or making sure the release handle is not interfering with the load.

DO NOT hoist a load weighing more than the lift's stated capacity.
DO NOT hoist a load if it is flexing and/or unbalanced. Magnet peel-off may occur and the load may fall.
DO NOT hoist a load before ensuring perfect magnetic contact. First make a TEST lift of 2” or 3” (5-7.5 cm).
DO NOT disengage the lift magnet before firmly setting down the load on the floor or support and making sure the load is steadied.
DO NOT weld in close proximity to the lift magnet or use the lift magnet as a part of the ground circuit during a welding operation.
DO NOT place the lift magnet directly onto a grounded floor. Use a non-conductive spacer.
DO NOT lift people or loads with people on them.
DO NOT leave suspended loads unattended.
DO NOT operate a lift magnet that is missing parts, damaged or malfunctioning.
DO NOT remove or obscure product labeling.
DO NOT lift loads higher than necessary or over people.
DO NOT center the lift magnet by pounding on the sides of the lift with a hammer or other blunt instrument.
Installation and start-up are very simple and safe provided that the load limits and the applicable standards of the lift magnet are observed for handling suspended loads. Read more product specific operational instructions further in this manual.

1. Remove lifter from packaging and set on a non-ferrous floor or support structure. This operation is to be done with a bridge or other crane of appropriate capacity. Check magnet for missing parts, loose bolts or damage. Tighten where necessary or contact the manufacturer.

2. Clean the area where the magnet will touch. With a crane of appropriate size, lift the magnet and position it on the center of the load to be moved. Be careful to make sure that the load to be lifted is within the prescribed range of the lift magnet’s lifting capabilities.

3. Make sure the magnetic lifter’s poles are in full contact with the load.

4. Read product specific operational instructions on how to operate your lift further in this manual to turn the magnet on or introduce the magnet to the load.

5. Move the load observing all applicable standards for safely handling any suspended load. **NO ONE SHOULD BE IN THE OPERATING AREA. NEVER STAND UNDER A LOAD BEING LIFTED OR LIFT A LOAD OVER ANY PEOPLE. ALWAYS USE EXTRA CAUTION. ONLY USE ON MATERIAL THAT DOES NOT FLEX OR BEND.**

6. Set the load on the floor, machine or other support structure before dis-engaging the lift magnet. Be careful that the load is perfectly settled on the support structure and that the support structure is adequate for the load.

7. Read product specific operational instructions on how to operate your lift further in this manual to turn the lift magnet off.

*Note: The above operations must be performed while applying the applicable shop standards and other standards for suspended load handling.*
Questions?

Feel free to contact us to speak to a specialist that can answer your questions regarding choosing and using the correct lift magnet. We appreciate the opportunity to assist you.