MAGLOGIX®

Operation Manual

Maglogix® MagnaHoist MXL-440

Shear Lifting Adapter and Strap
Available Separately

Dear customer,

Thank you for purchasing a Maglogix® product. Please read these operating instructions closely before using your device for the first time and keep them along with the enclosed Product Control Card for later reference.

Safety Instructions

Serious accidents with fatal physical injuries can occur when using extremely strong magnetic clamps if they are improperly used and/or maintained. Please observe all safety instructions in this operation manual and contact the manufacturer if you have any questions.

Always...

- activate the Lifting Magnet completely ON until activation lever springs into the locking notch
- activate the Lifting Magnet on metallic, ferromagnetic materials
- use the entire magnetic surface for lifting
- lift on plane surfaces
- check the magnetic holding force by lifting the load slightly by about 10 cm
- clean the magnetic contact area and keep it clear of dirt, chips and welding spatter
- set the lifting magnet down gently to prevent damage to the magnetic contact area
- check the hazard area before pivoting the load
- respect the stated maximum load before pivoting
- inspect the magnetic surface and the entire Lifting Magnet for damage
- use suitable lifting gear
- follow the instructions in these operating instructions
- instruct new operators in the safe use of lifting magnets
- respect local, country-specific guidelines on handling magnetic tools
- keep and use in a dry environment

Never...

- lift round or arched objects
- exceed the stated maximum load
- lift loads over people
- lift more than one work piece at a time
- switch the Lifting Magnet off before setting down the load safely
- allow the load to sway or bring to a sharp and immediate stop
- lift loads exceeding the recommended dimensions
- lift loads with cavities, cut-out openings or drilled holes
- lift unbalanced loads
- modify the Lifting Magnet or remove operating labels
- use the Lifting Magnet if damaged or missing parts
- strain the underside of the magnet through heavy impact or blows
- position yourself beneath the lifted load
- lift loads while people are within the hazard area
- leave the load hanging unattended
- use the Lifting Magnet without having been properly instructed
- use if you have not read and understood these operating instructions completely
- use the Lifting Magnet to support, lift or transport persons
- operate the Lifting Magnet in temperatures higher than 140°F (60°C)
- expose to corrosive substances

People using pacemakers or other medical devices should not use this lifting magnet until they have consulted with their physician.

Proper Use

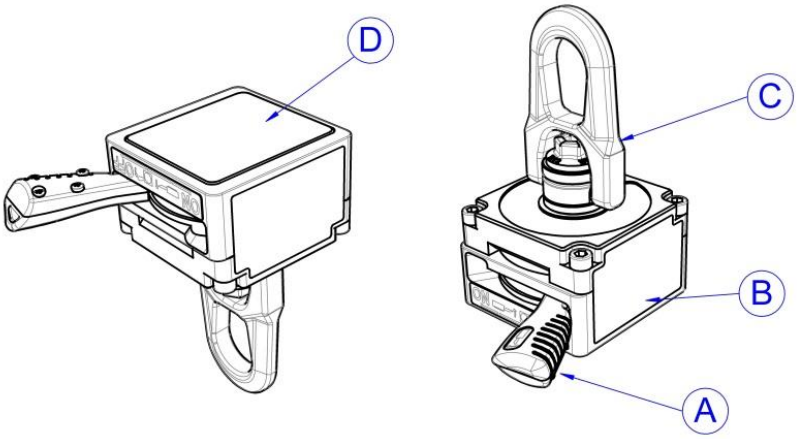
The Maglogix® Lifting Magnet (MXL-440) is a switchable magnetic lifting magnet equipped with permanent magnets and is designed for attachment to and lifting ferromagnetic, metallic workpieces with its rotatable and pivotable load swivel. The MXL-440 may only be used according to its technical data and determination. Proper use includes adherence to the start-up, operating, environment and maintenance conditions specified by the manufacturer. The user bears sole responsibility for understanding this operating manual as well as for the proper use and maintenance of this magnetic lifting magnet. Please contact the manufacturer if you have any questions prior to using this device.

Device Description

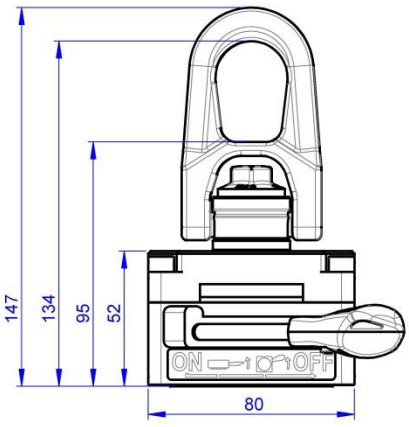
The MXL-440 Lifting Magnet is based upon the special design of the MX-1500 magnetic clamp (B). The MX-1500 magnetic clamp has a tightly compacted (shallow-profile) magnetic field that develops an incredible attractive force especially on thin ferromagnetic materials of less than 10 mm. The MX-1500 magnetic clamp is switchable (ON/OFF) by means of a 60° manual activation lever (A). When switched and locked into the ON position, internal permanent magnets generate a powerful magnetic field into the magnetic contact area (D) and hold a ferromagnetic, metallic workpiece with incredible force. To deactivate the magnetic clamp, first lift the activation lever at its far end upwards to disengage the lever from its latching notch and return by 60° into the OFF position.

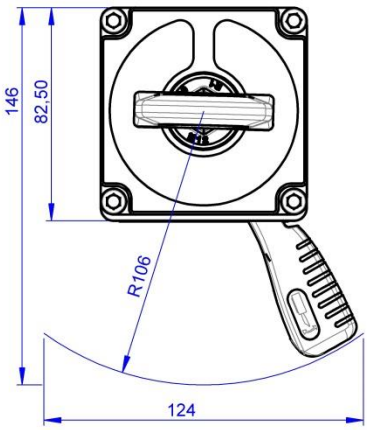
> Note: Care must be taken because the activation lever can quickly/strongly spring back to the OFF position when working on thin materials.

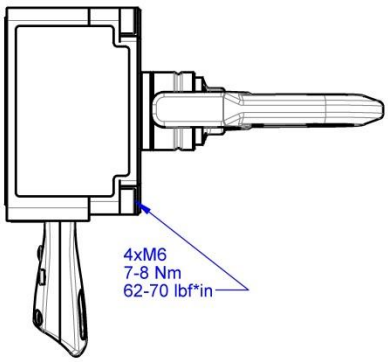
A rotatable and pivotable load swivel (C) is situated on the top of the lifting magnet. This load swivel can be used with a soft eye to attach the lifting magnet to the hook of a crane. The load-bearing capacity of the lifting magnet is equivalent to 1/3 of the maximum pull-off strength of the magnet and thus complies with the standard safety factor of 3:1. Please refer to the following ***Technical Data***.



A) Activation lever
B) MX-1500 Magnetic Clamp
C) Rotatable load swivel
D) Magnetic contact area







Note:
All dimensions shown in millimeters.

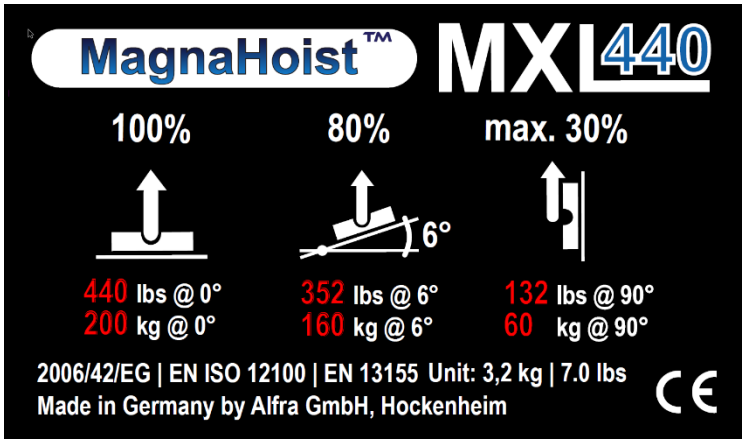
Be sure to read the operation instructions completely before using this magnet for the first time!

Technical Data

Product-Number:	**MXL-440**	
Designation:	Lifting Magnet	
Breakaway force:	>1500 lbs. from 0.375“ A36	>680 kg from 10mm
Max. load-bearing capacity: (on flat material with safety factor 3:1)	440 lbs. from 0.375“	200 kg from 10mm S235
Max. load-bearing capacity: (at 6° inclination acc. to EN 13155 with safety factor 3:1)	400 lbs. from 0,375“	180 kg from 10mm S235
Max. load-bearing capacity: (at 90° inclination of the load with safety factor 3:1)	133 lbs. from 0,375“	60 kg from 10mm S235
Dead weight of the unit:	7.4 lbs.	3.4 kg
Storage temperature:	-22°F to +140°F	-30°C to +60°C
Operating temperature:	-22°F to +140°F	-30°C to +60°C

Markings on the Lifting Magnet

Detailed descriptions for the safe handling and proper operating conditions of the MXL-440 can be found on the upper and both sides of the lifting magnet. If any of these labels have been modified, damaged, or removed the manufacturer cannot be held responsible for any personal injuries, property damage or accidents resulting from this fact. To meet full compliance, the entire Lifting Magnet must be returned to the manufacture for calibration and relabeling.



Start-up

You have received a completely assembled Maglogix® MXL-440 Lifting Magnet and a detailed operating manual. Please check the condition of all items upon receipt for any damage incurred during transport, and make sure the delivery is complete. If you find any problems, please contact the manufacturer immediately.

1. Follow all safety instructions. Clean the workpiece in the area of attachment and the magnetic contact area of the magnetic clamp (see ***Surface Quality***).

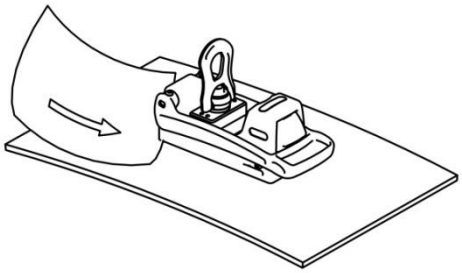
2. Place the Lifting Magnet as close to the center of gravity of the workpiece as possible.

   Note: Although the magnetic clamp of the Lifting Magnet is in the OFF position, it still has a slight magnetic pre-tensioning in order to avoid inadvertent slippage or dropping of the Lifting Magnet, and/or the workpiece. This pre-tension also allows for ease of positioning the Lifting Magnet to the workpiece.

3. Rotate the magnetic clamp activation lever by 60° into the ON position. Always check to make sure the lever springs into the locking notch.

4. Perform a test lift. Move the load hook to the required position with the rotatable load swivel and lift the load by about 3/8" to check the material deformation and the magnetic holding force.

   Caution: Watch for any deformation of the workpiece to the magnetic contact area when activating the magnetic clamp and anytime during the test lift. If a small distance (air gap) forms between the magnetic contact area and the workpiece, the magnetic clamp will not reach the stated holding force and could detach itself. Please check for any air gap developing at the edges of the TiN-coated magnetic contact area. This air gap can be tested by slipping a sheet of 20 lbs. (80g/m^2) paper into the gap. If the paper slips into the gap:



Immediately stop the lift!

The maximum dimensions of the loads to be lifted depend to a large extent on the geometry and flexural stiffness of the workpieces. This is due to the fact that, in the case of bending, an air gap forms under the magnetic contact area and the workpiece resulting in a significant decrease of the load-bearing capacity. Never exceed the dimensions and/or the load-bearing capacity of the values given in ***Detailed Performance Data,*** **Table 2.**

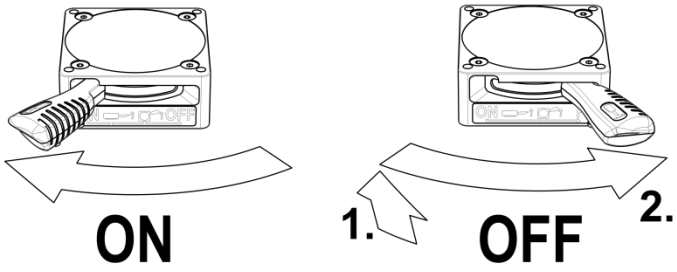
5. You can try deactivating the Lifting Magnet (see Step 8), reposition and repeat Steps 4, and 5. Otherwise, if the air gap check does not pass, DO NOT LIFT!

6. If/When the test lift passes the air gap check, move the load slowly and smoothly. Avoid any swinging or jarring to the load throughout the entire lift. Quick, abrupt movements could cause the load to instantly detach, so always stay clear of the hazard area.

   IMPORTANT: If your lift includes ***Pivoting or vertical lifting of loads***, please see the following page for safe lifting procedures and calculations.

7. After the load has been set down safely and all tension removed from the rotatable load swivel, only then deactivate the Lifting Magnet and remove from the workpiece, especially if the application might exceed the ***Maximum Operating Temperature*** of the magnet clamp. To deactivate the magnetic clamp, first lift the activation lever at its far end upwards to disengage the lever from its latching notch (**1**) and return by 60°

into the OFF position (**2**). Care must be taken because the activation lever can quickly/strongly spring back to the OFF position when working on thin materials.



Pivoting or vertical lifting of loads

The special design of the MX-1500magnetic clamp along with the rotatable load swivel allows the user to turn and pivot the load freely. The suspended load can be turned around at 360° and pivoted at up to 90°.

1. Be sure to use a flexible soft eye to avoid jamming the Lifting Magnet into the hook of the crane. Otherwise this leads to extremely unfavorable load conditions and the lifting capacity can no longer be assured. In addition, this will protect the Lifting Magnet from damage and extend its lifetime by using a soft eye.

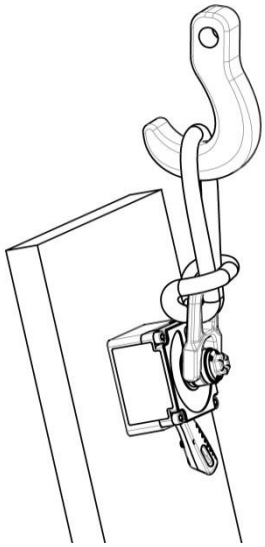


Figure 1

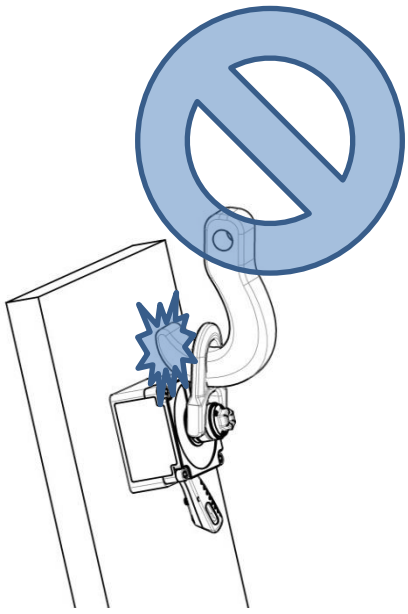
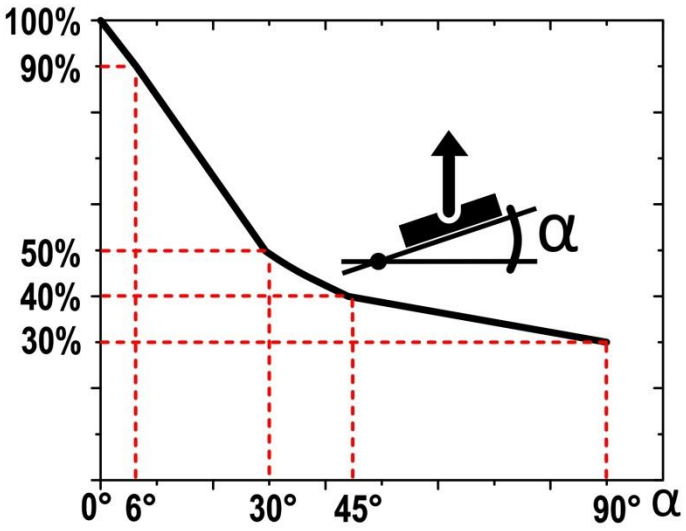


Figure 2

2. If the load is attached horizontally to the Lifting Magnet, the entire pull-off strength of the Lifting Magnet is acting on the load, so you can use 100% of the lifting capacity as stated in ***Detailed Performance Data,*** Table 1. However, if load and magnetic contact area tilt at an angle other than 0° to horizontal, the load-bearing capacity decreases due to the new alignment of the magnetic contact area to the gravity of Earth. As soon as the load is suspended vertically (i.e. at an angle of 90°), friction will be the only effect exerted by the magnetic contact area which is not more than 10% to 35% of the maximum load-bearing capacity, depending on the material being lifted.

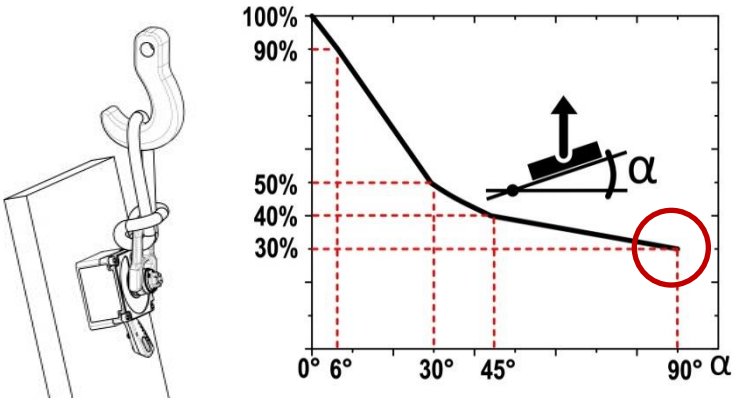


Load-figures corresponding to the direction for the MXL-440

You can calculate the maximum load-bearing capacity of the Lifting Magnet, including the 3:1 safety factor, on the basis of the load-figure that corresponds to the direction.

Example: You would like to lift a plate of A36 steel which is 3/8" thick. The plate stands vertically in your shelf (i.e. at an angle of 90°) and your Lifting Magnet is ideally positioned, as shown above in figure 1.

Material thickness:	3/8" → max. load-bearing capacity at 0° = 440 Lbs. (see Table 1)
Material:	A36 → holding force, subject to material = 100 % (see Table 2)
Alignment of the load:	90° tilted; load swivel facing upwards
	→Load-figure corresponding to direction = 30 %



Maximum load weight with 3:1 safety factor = 440 Lbs. x 100 % x 30 % = 132 Lbs.

Detailed Performance Data for the MXL-440 Lifting Magnet

Values shown for load capacity of the MXL-440 Lifting Magnet are based on material A36 for the maximum, vertical tractive force with 0° deviation from the load axis and additionally under a 6° inclined load in accordance with EN13155, in each case with a 3:1 safety factor. This manual does not contain any instructions for use on round material. The MXL-440 is designed for lifting flat materials only. Round materials or arched objects may not be lifted.

Table 1

	Load capacity in lbs.					
Thickness of material	Clean, flat, ground surface		Rusty, slightly scratched surface		Irregular, rusty or rough surface	
	Air gap <0.004 inches		Air gap = 0.01 inches		Air gap = 0.02 inches	
Inches	**0°**	**6°**	**0°**	**6°**	**0°**	**6°**
0.08	83	25	73	22	59	18
1/8	133	40	110	33	99	30
0.16	233	70	209	63	161	48
0.20	297	89	268	80	205	62
¼	355	107	319	96	242	73
5/16	425	131	367	110	249	75
>3/8	440	132	370	111	257	77

	Load capacity in kg					
Thickness of material	Clean, flat, ground surface		Rusty, slightly scratched surface		Irregular, rusty or rough surface	
	Air gap <0.1 mm		Air gap = 0.25 mm		Air gap = 0.5 mm	
mm	**0°**	**6°**	**0°**	**6°**	**0°**	**6°**
2	38	11	33	10	27	8
3	61	18	50	15	45	13
4	106	32	95	28	73	22
5	135	40	122	37	93	28
6	161	48	145	43	110	33
8	193	60	167	50	113	34
>10	200	60	168	50	117	35

Basic Information Concerning the Maximum Holding Force of the MX-1500

The magnetic contact area is located on the underside of the magnet incorporating multiple magnetic poles which generate the magnetic holding force when activated. The maximum holding force that can be achieved depends upon different factors which are explained below:

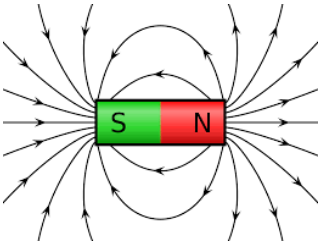
Material

Every material reacts in different ways to the penetration of magnetic field lines. The breakaway force of the magnetic contact area is determined by using common (low carbon) A36 steel. The given load-bearing capacity of the magnet should be De-Rated based on **Table 2**. It is up to the user to determine adequate magnetic holding force for alloys not shown in this table.

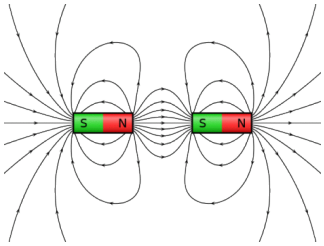
Table 2

Material	**Magnetic force in %**
Non-alloyed steel (0.1-0.3% C content, includes A36)	100
Non-alloyed steel (0.3-0.5% C content)	90-95
Cast steel	90
Grey castiron	45
Nickel	11
Stainlesssteel, aluminium, brass	0

Material thickness
The magnetic flux (north to south field lines) of the permanent magnet requires a minimum material thickness to flow completely into and across the material below the magnetic contact area. Beyond this minimum material thickness, the maximum holding force continues to decrease (see ***Detailed Performance Data,*** Table 1).



Conventional (singular) switchable permanent magnet



Maglogix® (multi-field) switchable permanent magnet

Conventional switchable permanent magnets have a deep penetrating singular (north to south) magnetic field. The way conventional switchable permanent magnets hold onto steel would be similar to stapling paper together using one large heavy staple in the center of the page, and not bending the legs together.
The compact multi-field magnetic array of the Maglogix® switchable permanent magnets would be similar to stapling paper together in a circular pattern with many small lightweight staples close together, and bending the legs together to achieve an even greater holding force. An infinite number of small magnetic field arrays are the principle behind the Maglogix® patented switchable magnetic clamps.

Surface quality
The maximum holding force of a permanent magnet can be achieved in case of a closed magnetic circuit in which the magnetic field lines can connect up freely between the poles, thus creating a high magnetic flux. In contrast to iron, for example, air has very high resistance to magnetic flux. If an “air gap” (i.e. a space) is formed between the workpiece and the magnet contact area, the holding force will be reduced. In the same way, paint, rust, scale, surface coatings, grease or similar substances all constitute a space between the workpiece and magnetic contact area. Furthermore, an increase in surface roughness or unevenness has an adverse effect on the magnetic holding force. Reference values for your MXL-440 can also be found in **Table 1**.

Load dimensions
When working with large workpieces such as girders or plates, the load can partly become deformed during the lift. A large steel plate would bend downwards at the outer edges and create a curved surface which no longer has full contact with the magnetic contact area. The resulting air gap reduces the maximum load-bearing capacity of the Lifting Magnet. Hollow objects or those smaller than the magnetic contact area of the magnet will also result in less holding power being available.

Load alignment
During load movement care must be taken that the Lifting Magnet stays located at the workpiece center of gravity and that the Lifting Magnet’s magnetic contact area respectively, stays balanced horizontally. In this scenario, the magnetic force of the Lifting Magnet’s magnetic contact area and workpiece stay perpendicular to gravity, thus providing the maximum rated load-bearing capacity, resulting in a standard 3:1 safety factor.

> **Danger**: if by accident the workpiece and Lifting Magnet shift or change from a horizontal to a vertical position. The Lifting Magnet is now transitioning into shear mode and the workpiece can slip away to the edge or even detach. In shear mode, the load-bearing capacity decreases dependent upon the coefficient of friction between the two materials.

Maximum operating temperature
The high-power permanent magnets installed in the magnetic clamp will maintain their load-bearing capacity up to a maximum operating temperature of 176°F (80°C). Exceeding this maximum operational temperature may cause irreversible damage.

Maintenance and Inspection of the Lifting Magnet

Regular maintenance and inspections are necessary to ensure the safe use and operation of the Lifting Magnet. Furthermore, country-specific standards and regulations must be observed depending upon user application (e.g. ASME B30.20B, DGUV-Information 209-013; AMVO).

The below maintenance intervals are classified according to the recommended schedule.

Before every use...

- visually inspect the Lifting Magnet for damage
- clean the magnetic contact area of any contamination (i.e. rust, metal chips) that would cause unevenness of attachment or an air gap between the workpiece

Weekly...

- make sure the activation lever is not bent or the plastic of the activation lever is not cracked
- make sure the activation lever springs into the locking notch when in the ON position
- inspect the magnetic contact area for any protruding scratches, pressure point deformations, and/or cracks into the magnetic contact area. Have the Lifting Magnet repaired by the manufacturer if any unevenness of the magnetic contact areas is identified.
- inspect the load swivel for damage, deformation, cracks or wear and have it replaced if necessary

Monthly...

- check the markings and labeling on the Lifting Magnet for legibility, damage, modification, or removal. To meet full compliance, the entire Lifting Magnet must be returned to the manufacture for calibration and relabeling.

Annually...

- have the load-bearing capacity of the magnet checked by the supplier or an authorized workshop, should the application so require.

An annual inspection is recommended for the triple safety system of this lifting magnet. We will be glad to assume this inspection for you first-hand. Please send us an email to:

MX-Test@maglogix.com

You will then promptly receive an offer and have the assurance that the Lifting Magnet will be inspected in a process-reliable manner where it was actually produced.

Unauthorized repairs or modification to the Lifting Magnet are not permitted.
If you have any questions, please contact the manufacturer.

EC Declaration of Conformity as defined by the Machinery Directive 2006/42/EC

We,

Alfra GmbH
2. Industriestr. 10
68766 Hockenheim/Germany

hereby declare that the switchable permanent magnet-type lifting magnet

MXL-440 with mounted MX-1500
from serial number 1583F0256 onwards

complies with the following standards:

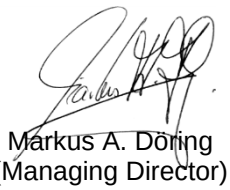
EN ISO 12100:2010
EN 13155:2003+A2:2009

This certificate is no longer valid if the product is modified without the manufacturer's consent. Furthermore, this certificate is no longer valid if the product is not used properly in accordance with the use cases documented in the user manual or if regular maintenance is not carried out in accordance with this manual or country-specific regulations.

Person authorized to compile the documents:

Alfra GmbH
2. Industriestr. 10
68766 Hockenheim/Germany

Hockenheim/Germany, 03.04.2017



Markus A. Döring
(Managing Director)