



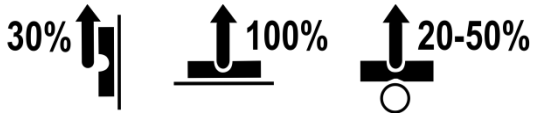
MAGLOGIX[®]

Operation Manual


MagnaJig[™] MX-1500R

EN Switchable Magnetic Clamp

ES Imán adherente conmutable



Contents / Índice

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Dear customer,

Thank you for purchasing a Maglogix® product. Read these operating instructions closely before using your device for the first time and keep them 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. Observe all safety instructions in this operation manual and contact the manufacturer if you have any questions.



Important:

- arched surfaces are very unstable and do not provide safe holding of workpieces
- use the Magnetic Clamp's magnetic contact area preferably on cleaned, flat plane surfaces or round pipes
- full load rated performance is only reached when using the entire magnetic contact area
- cavities or drilled holes under the magnetic contact area will reduce the magnetic holding force
- stacking several workpieces on/under the magnetic contact area will significantly decrease the holding force
- the activation lever can spring back quickly/strongly when deactivated from thin materials



Always...

- activate the Magnetic Clamp completely ON until activation lever springs into the locking notch
- activate the Magnetic Clamp on metallic, ferromagnetic materials
- clean the magnetic contact area and keep it clear of dirt, chips and welding spatter
- set the Magnetic Clamp down gently to prevent damage to the magnetic contact area
- respect the stated maximum breakaway force
- ensure that the pipe is positioned correctly in the groove of the lifting magnet
- inspect the magnetic contact area and the entire Magnetic Clamp for damage
- follow the instructions in this operating manual
- instruct new operators in the safe use of switchable magnetic clamps
- respect local and country-specific guidelines on handling magnetic tools
- keep and use in a dry environment



Never...

- exceed the stated maximum load
- allow other ferromagnetic materials within 2 inches of any exposed ACTIVATED magnetic contact area. Serious injury could occur from instantaneous magnetic attraction!
- place fingers or any other body part between the magnetic contact area and workpiece because there is severe risk of painful injury
- use the Magnetic Clamp to position objects above people or walking paths
- use the Magnetic Clamp to lift or transport loads unless the
- use the Magnetic Clamp to support, lift or transport persons
- switch the Magnetic Clamp off before setting down the workpiece in a safe position
- modify the Magnetic Clamp or remove any operating labels
- use the Magnetic Clamp if damaged or missing parts
- subject the magnetic contact area of the Magnetic Clamp to heavy impact or blows
- use the Magnetic Clamp without having been properly instructed
- use if you have not read and understood these operating instructions completely
- operate in temperatures higher than 140°F (60°C)
- expose the Magnetic Clamp to corrosive substances



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

Proper Use

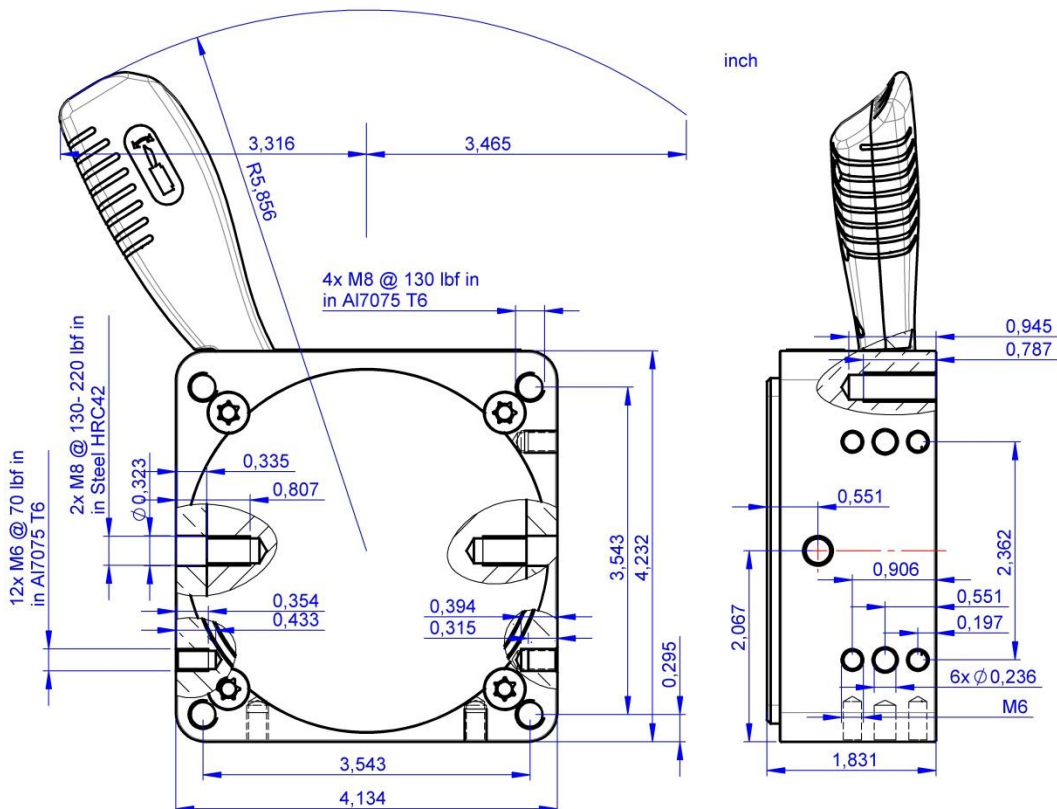
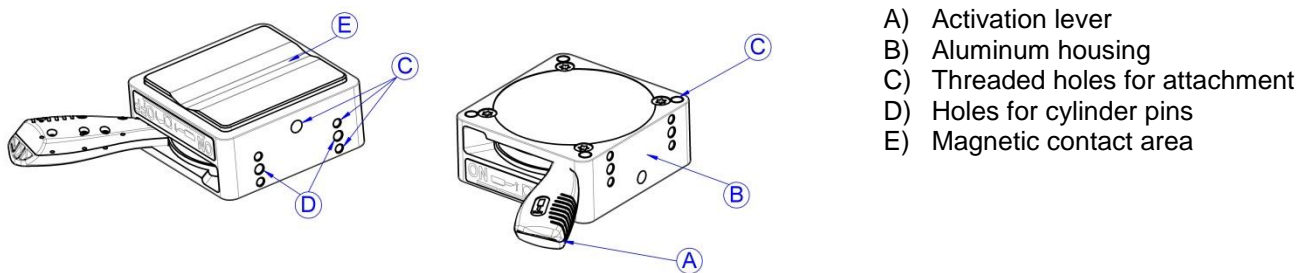
The MagnaJig™ Magnetic Clamp (MX-1500R) is a switchable magnetic clamp equipped with permanent magnets and is designed for attachment to ferromagnetic, metallic workpieces. The MX-1500R may only be used according to its technical data and determination. Proper use includes adherence to the start-up, 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 clamp. Please contact the manufacturer if you have any questions prior to using this device.

Device Description

Surrounded by an aluminum housing (B), the MX-1500R Magnetic Clamp's special design 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-1500R 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 (E) 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.

Multiple threaded holes (C) and precise round holes (D) for **Special, Modified Mounting Applications** are located on three sides of the magnetic clamp. A groove in the magnetic contact area (I) allows also for the holding of round pipes.



Be sure to read the operation instructions completely before using the Magnetic Clamp for the first time!

Technical Data

Product-Number:	41200.R.MX-1500	
Designation:	MagnaJig™ MX-1500R Magnetic Clamp	
Breakaway force: (at 0° inclination to the load)	>1320 lbs. on 3/8" AISI CRS 1020	>600 kg on 10 mm S235
Max. load-bearing capacity: (at 90° inclination of the load)	30% of the breakaway force	30% of the breakaway force
Max. load-bearing capacity: (at 90° inclination of the load)	440 lbs. on 3/8" AISI CRS 1020	200 kg on 10 mm S235
Max. load-bearing capacity: (on round pipes at 0° inclination)	20 - 50% of the load-bearing capacity for flat material	20 - 50% of the load-bearing capacity for flat material
Admissible diameter of round pipes:	50 - 300 mm	1" - 12"
Dead weight of the unit:	6 lbs.	2.73 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 Magnetic Clamp

Detailed descriptions for the safe handling and proper operating conditions of the MX-1500R can be found on the upper side of the Magnetic Clamp. If this label has 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 Magnetic Clamp must be returned to the manufacture for calibration and relabeling.

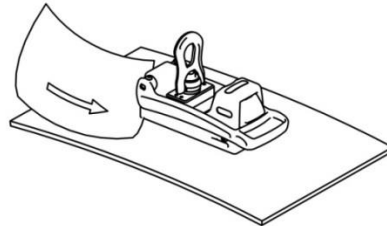


Start-up

You have received a completely assembled MagnaJig™ MX-1500R Magnetic Clamp 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**).

Caution: At the beginning of the application, watch for any deformation of the workpiece to the magnetic contact area when activating the Magnetic Clamp. 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/m²) paper into the gap. If the paper slips into the gap:



Immediately stop the application!

Never exceed the dimensions and/or the load-bearing capacity of the values given in **Detailed Performance Data, Table 2**.

2. Place the Magnetic Clamp into the desired position on the workpiece, or place the workpiece onto the Magnetic Clamp contact area.

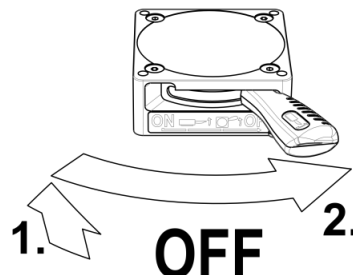
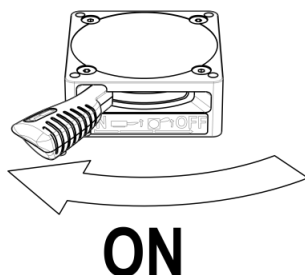
Note: Although the Magnetic Clamp is in the OFF position, it still has a slight magnetic pre-tensioning in order to avoid inadvertent slippage or dropping of the Magnetic Clamp, and/or the workpiece (e.g. when used in a vertical or other forced position). This pre-tension also allows for ease of positioning the Magnetic Clamp to the workpiece.

3. Align the workpiece and the Magnetic Clamp according to the desired application.
4. Rotate the Magnetic Clamp activation lever by 60° into the ON position. Always check to make sure the lever springs into the locking notch.
5. Check both for a secure and strong hold of the magnetic contact area to the workpieces and that no excessive air gap exists.

Important

DO NOT allow other ferromagnetic materials within 2 inches of any exposed ACTIVATED magnetic contact area. Serious injury could occur from instantaneous magnetic attraction!

6. When the application is complete, deactivate the magnetic clamp and remove from the workpiece, especially if the application might exceed the **Maximum Operating Temperature** of the Magnetic 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.

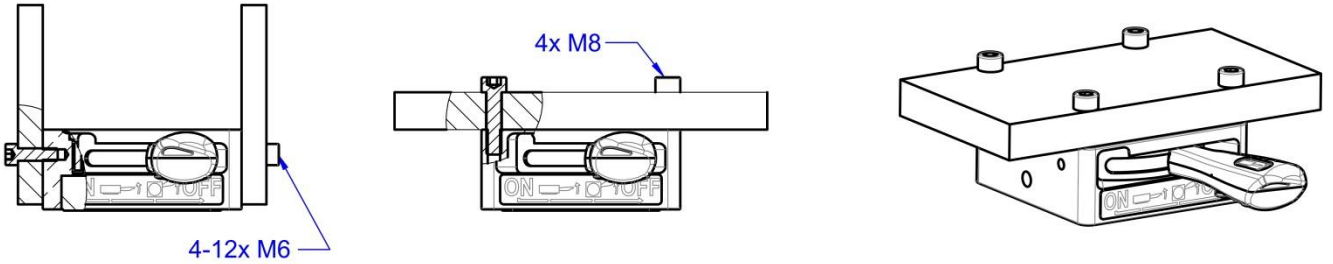


Special, Modified Mounting Applications of the MX-1500R

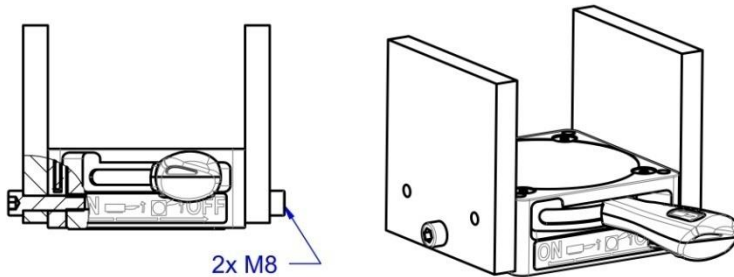
The switchable Magnetic Clamp MX-1500R is of modular design and thus can be used for special requirements and load situations. Individual mounting techniques must be designed, calculated and tested for each case depending on requirement and application. Ultimately the design must be in accordance with the local and country-specific standards (e.g. EN 13155, ASME). An accredited testing institute must approve individual installations accordingly if necessary.

Details and data for mounting of the MX-1500R Magnetic Clamp:

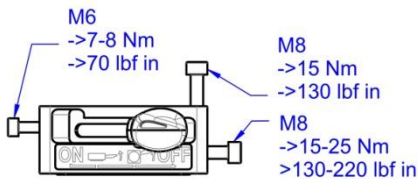
1. Mounting on the aluminum housing (Al 7075 T651 with Rm >50.5 ksi) requires at least 4 screws at any time.



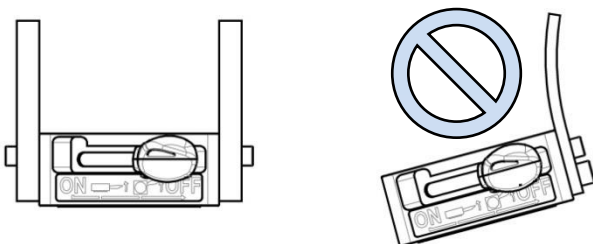
Mounting through the aluminum housing into the hardened steel (HRC 42) magnetic bottom plate requires at least two screws at any time. Additional fastening points into the aluminum housing should be used for anti-rotation.



2. Be sure to use the stated torque when fastening the screws. Depending upon application, screws should be fixed with thread locking fluid.



3. Ensure an equal load introduction and distribution to avoid mechanical failure of the Magnetic Clamp or the mounting materials.



4. Always use sufficiently stable mounting materials.

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

The magnetic contact area is located on the underside of the Magnetic Clamp 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

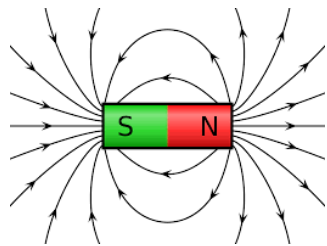
Every material reacts in different ways to the penetration of magnetic field lines. The breakaway force of the magnetic contact area is determined by using common (low carbon) A36 steel. The given load-bearing capacity of the magnet should be De-Rated based on **Table 1**. It is up to the user to determine adequate magnetic holding force for alloys not shown in this table.

Table 1

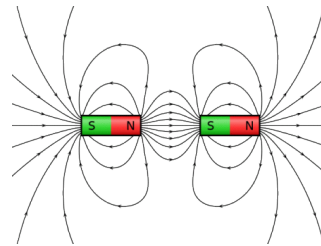
Material	Magnetic force in %
Non-alloyed steel (0.1-0.3% C content, includes A36)	100
Non-alloyed steel (0.3-0.5% C content)	90-95
Cast steel	90
Grey cast iron	45
Nickel	11
Most stainless steels, aluminum, brass	0

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 2).



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 MX-1500R can also be found in **Table 2**.

Load dimensions

When working with large workpieces such as girders or plates, the load can deform during the application. 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 Magnetic Clamp. Hollow objects or those smaller than the magnetic contact area of the Magnetic Clamp will also result in less holding power being available.

Load alignment

During lateral (‘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.

Detailed Performance Data for Use on Flat Material

Values shown for the performance of the MX-1500R Magnetic Clamp are based on material A36 for the maximum, vertical tractive force with 0° deviation from the load axis and additionally under a 90° inclined load in accordance with EN13155. These values do not include any safety factor. The Magnetic Clamp will detach itself abruptly when the load exceeds values given in Table 2.

Table 2: Flat material



Thickness of material	Breakaway force in lbs					
	Clean, flat, ground surface		Rusty, slightly scratched surface		Irregular, rusty or rough surface	
	Air gap < 0.004 inch		Air gap = 0.01 inch		Air gap = 0.024 inch	
inch	0°	90°	0°	90°	0°	90°
0,08	250	75	220	66	176	53
1/8	400	120	330	99	297	89
0,16	700	210	627	188	484	145
0,20	890	267	803	241	616	185
1/4	1065	320	957	287	726	218
5/16	1275	383	1100	330	748	224
>3/8	1320	396	1111	333	770	231

Thickness of material	Breakaway force in kg					
	Clean, flat, ground surface		Rusty, slightly scratched surface		Irregular, rusty or rough surface	
	Air gap < 0.1 mm		Air gap = 0.20 mm		Air gap = 0.6 mm	
mm	0°	90°	0°	90°	0°	90°
2	115	35	100	30	80	24
3	180	55	150	45	135	41
4	320	95	285	86	220	66
5	405	120	365	110	280	84
6	485	145	435	131	330	99
8	580	174	500	150	340	102
>10	600	180	505	152	350	105

Detailed Performance Data for Use on Round Pipes

Values shown for load capacity of the MX-1500R are based on material A36 for the maximum, vertical tractive force with 0° deviation from the load axis and a correct position of the pipe inside the groove of the magnetic contact area. These values include a 3:1 safety factor as defined by EN13155.

Table 3: Round pipes

inch	Breakaway force in lbs					
	2"	3"	4"	8"	12"	
	1/8	308	385	352	385	-
	0.16	385	484	440	484	-
	0.2	462	583	539	583	-
	5/16	506	638	572	638	-
	>3/8	528	660	605	660	



mm	Breakaway force in kg					
	50	75	100	200	300	
	3	140	175	160	175	-
	4	175	220	200	220	-
	5	210	265	245	265	-
	8	230	290	260	290	-
	>10	240	300	275	300	

Table 4: Air gap on round pipes

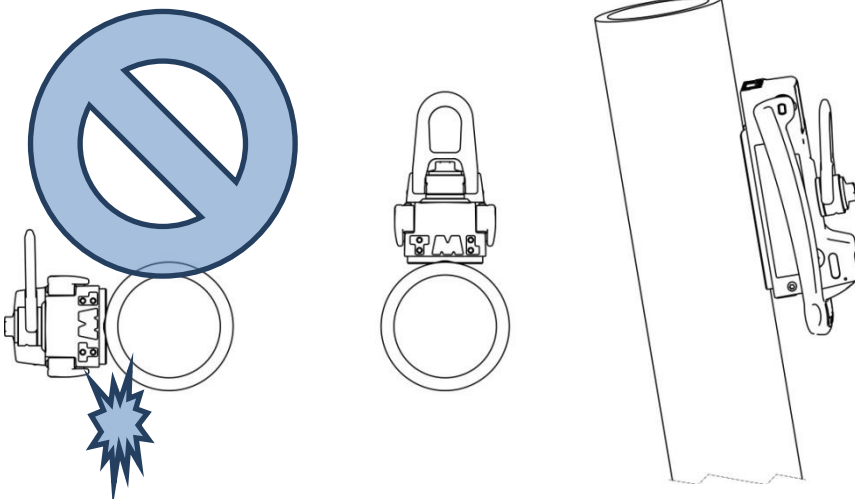
Air gap in mm	0	0,2	0,4	0,6	1,0	1,5
Air gap in inch	0	0,0078	0,0157	0,0236	0,0393	0,0590
Remaining load capacity in %	100%	85%	70%	55%	35%	22%



Quick and abrupt rotations of the magnet can cause round objects to disengage from the magnet's groove. This will reduce the load-bearing capacity immediately.



Never perform lateral lifts of round pipes or exceed the load-bearing capacity given in table 3 & 4.



Maintenance and inspection of the Magnetic Clamp

Regular maintenance and inspections are necessary to ensure the safe use and operation of the Magnetic Clamp. Furthermore, country-specific standards and regulations must be observed depending upon user application.

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

Before every use...

- visually inspect the Magnetic Clamp for any 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 Magnetic Clamp repaired by the manufacturer if any unevenness of the magnetic contact area is identified.

Monthly...

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

Annually...

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



**Unauthorized repairs or modification to the Magnetic Clamp are not permitted.
If you have any questions, please contact the manufacturer.**

