ALFRA TML 400R

Passion for Tools

DE LASTHEBEMAGNET
EN LIFTING MAGNET
FR AIMANT DE LEVAGE

ALFRA TML 400R #41400.R

BEDIENUNGSANLEITUNG | OPERATION MANUAL | MODE D'EMPLOI

EN

Dear customer,
Thank you for purchasing an ALFRA product. Read these operation 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

Dangers can occur when transporting loads by lifting devices due to improper handling and/or poor maintenance, which may cause serious accidents with fatal physical injuries. Read these operation instructions closely and observe all safety instructions mentioned therein. Contact the manufacturer if you have any questions.

Always...

- activate the lifting magnet completely
- activate the lifting magnet on metallic, ferromagnetic materials
- use the entire magnetic surface for lifting
- lift on plane surfaces
- lift round pipes with the admissible diameter
- ensure that the pipe is positioned correctly in the groove of the lifting magnet
- check the magnetic holding force by lifting the load slightly by about 10 cm
- clean the magnetic surface and keep it clear of dirt, chips and welding sputter
- set the lifting magnet down gently to prevent damage to the magnetic surface
- 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 to the safe use of lifting magnets
- respect local, country-specific guidelines
- use and store in a dry place

Never...

- exceed the stated maximum load
- lift arched objects or objects with free form surfaces
- lift round pipes of a too big or too small diameter
- lift loads over people
- perform lateral lifts of round pipes
- 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 60°C (140°F)
- expose to corrosive substances

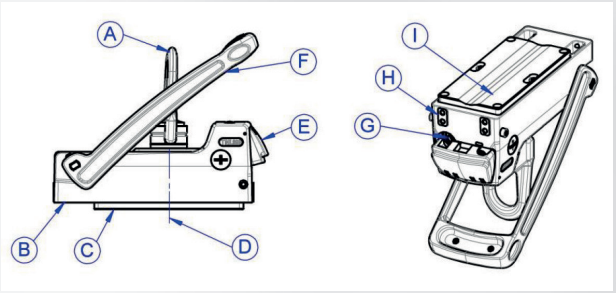
People using pacemakers or other medical devices should not use this lifting magnet until they have consulted with their physician.

PROPER USE

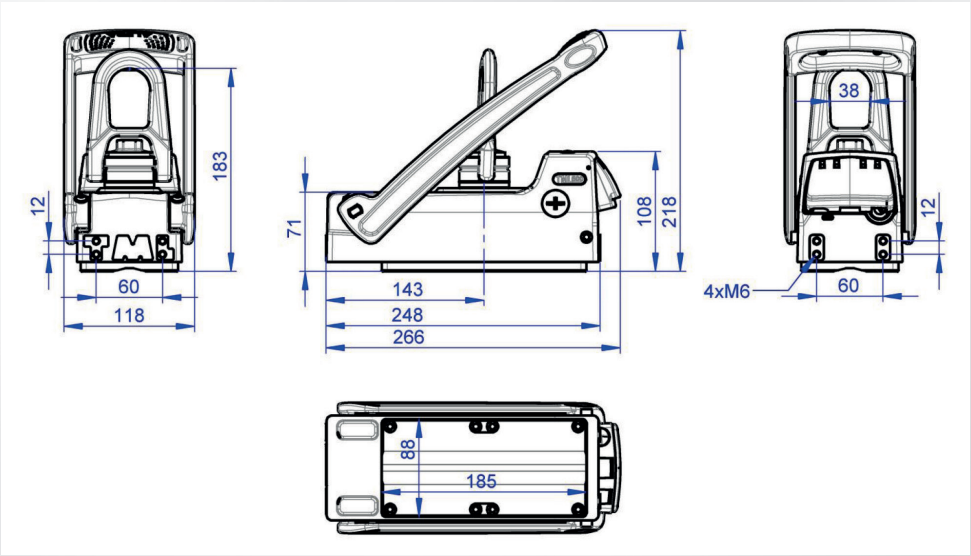
The permanent lifting magnet TML 400R is designed to lift ferromagnetic, metallic loads and may only be used according to its technical data and determination. Proper use includes adherence to the start-up, operating, environment and maintenance conditions specified by the manufacturer. The user bears sole responsibility for understanding the operating manual as well as for proper use and maintenance of the lifting magnet.

DEVICE DESCRIPTION

The TML 400R (Thin Material Lifter) is a switchable lifting magnet with manual actuation for the lifting, transporting and lowering of ferromagnetic materials. By pressing the lever (F) down, the magnetic field generated by the permanent magnet can be activated in the lower magnetic plate (C) area.
Thanks to the special design, a very compact magnetic field is generated which develops excellent adhesive force, especially on thin materials (less than 10 mm). The magnet can be deactivated by first pressing the safety tab (E) with the heel of the hand and then moving the lever upwards. An adjustable oil damper is incorporated underneath the safety tab in order to absorb the recoil energy of the lever, especially during use on thin materials. Additional threads for mounting are located on either front side of the magnet which, if desired, can be used as holding device. An eyelet is situated on the top of the lifting magnet for attachment to a crane. The load-bearing capacity of the lifting magnet is equivalent to 1/3 of the maximum breakaway force of the magnet and thus is equivalent to the standard safety factor 3:1. A groove in the magnetic contact area (I) allows also for the lifting of round pipes.



A) Load hook
B) Basic body
C) Magnetic contact area
D) Magnetic center of the magnet
E) Safety tab
F) Lever for activation / deactivation
G) Shock absorber for lever
H) Additional threads for mounting
I) Groove for round pipes

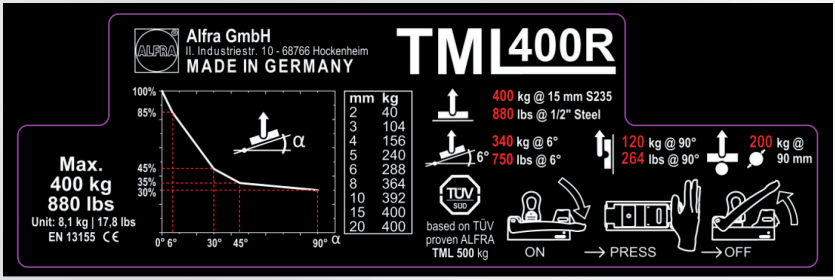


TECHNICAL DATA

Prod.-No.	**41400.R**	
Designation	TML 400R Lifting Magnet	
Breakaway force	›1200 kg from 15 mm S235	›2640 lbs from 1/2" AISI CRS 1020
Max. load-bearing capacity: (on flat material with safety factor 3:1)	400 kg from15 mm S235	880 lbs from 1/2" AISI CRS 1020
Max. load-bearing capacity: (at 6° inclination acc. to EN 13155 with safety factor 3:1)	340 kg from15 mm S235	750 lbs from 1/2" AISI CRS 1020
Max. load-bearing capacity: (at 90° inclination of the load with safety factor 3:1)	120 kg from15 mm S235	264 lbs from 1/2" AISI CRS 1020
Dead weight of the unit	8.2 kg	18 lbs
Admissible diameter of round 50 - 400 mm 2"- 16" pipes	50 - 400 mm	2"- 16"
Max. load-bearing capacity: (on round pipes at 0° inclination)	20 - 50% of the load-bearing capacity for flat material	20 - 50% der Tragfähigkeit für Flachmaterial
Storage temperature	-30°C to +60°C	-22°F to +140°F
Operating temperature	-10°C to +60°C	+14°F to +140°F

MARKINGS ON THE LIFTING MAGNET

Additional detailed descriptions for handling and operating conditions can be found on both sides of the lifting magnet. This labeling must not be modified, damaged or removed, as otherwise the manufacturer cannot be held responsible for any personal injuries, property damage or accidents resulting from this fact. New labels must be ordered from the manufacturer if necessary.



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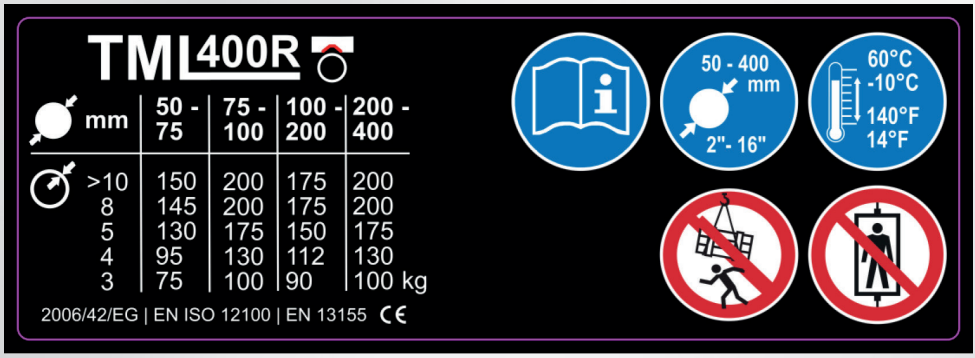


(Prod.-No. 189414178.R)

START-UP

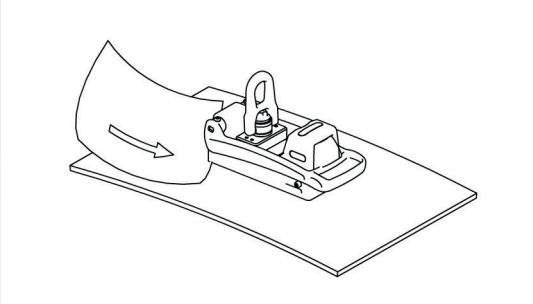
You have received a completely assembled lifting magnet and detailed operating manual. Please check the condition of the goods upon receipt for any damage incurred during transport, and make sure the delivery is complete. If you have any problems, please contact the authorized reseller or manufacturer immediately.

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

1. Follow the safety instructions. Clean the work piece and the lower magnetic plate of the lifting magnet

   Note:
   Although the activation lever of the TML-Magnet is facing upwards (OFF position), the magnet still has a slight magnetic pre-tensioning. This pre-tension does not only allow for ease of positioning the lifting magnet to the workpiece, it also avoids inadvertent slippage or dropping of the lifting magnet or the workpiece (e.g. when used in a vertical or other forced position).

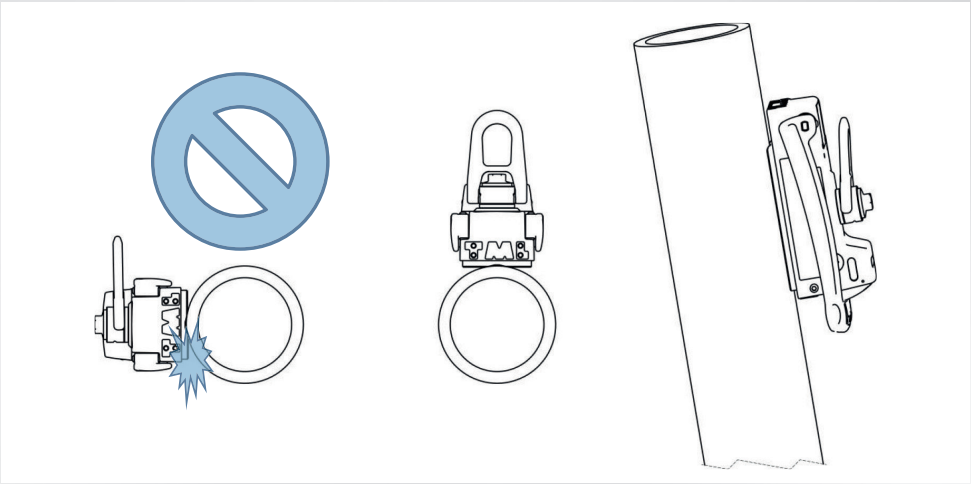
2. Position the lifting magnet at the center of gravity of the load.
3. Ensure that the workpiece is positioned correctly inside the groove of the magnetic contact area when using the TML 400R on round material. Otherwise the magnet's load-bearing capacity is not ensured.
4. Align the lifting magnet ideally according to the desired application.
5. Press the activation lever down until it is fully engaged in the ON position.
   Make sure that it is securely locked underneath the safety tab.
6. Perform a test lift: Move the load hook to the required position and lift the load by about 10 mm to check its deformation and the magnetic holding force of the TML-Magnet.
7. Check for any air gap developing at the edges of the magnetic surface contact area, for instance by means of a sheet of paper (80g/m2). If a small distance (air gap) forms between magnet and workpiece, the load- bearing capacity of the lifting magnet will be reduced significantly.



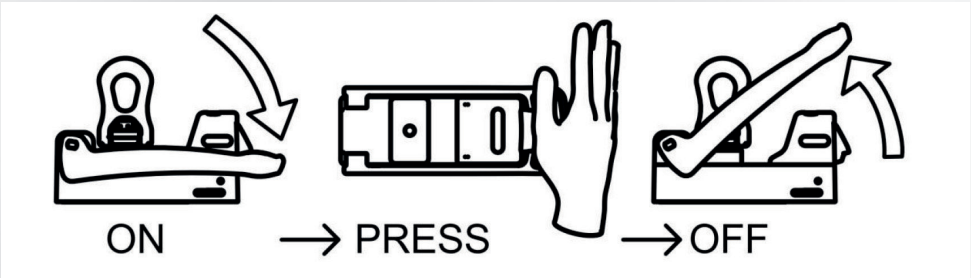
Immediately stop the lift if there is any excessive deformation of the work piece or an air gap.

Use spreader bars with additional magnets to safely lift large or flexible loads.

Never lift round pipes laterally. The workpiece could slip abruptly off the groove and disengage itself from the lifting magnet. Danger of injury!



8. If the magnetic adhesion is sufficient and there is no deformation, you can continue the lift.
9. Be sure to move your load slowly and smoothly. Avoid swinging, jarring or quick and abrupt rotations. Especially round workpieces could disengage from the groove and immediately reduce the load-bearing capacity.
10. After the load has been set down completely and safely, you can deactivate the lifting magnet. To do this, press the safety tab using the heel of your hand and move the lever upwards into the OFF position.



PIVOTING OR VERTICAL LIFTING OF LOADS

The special design of the TML 400R lifting magnet allows the user to turn and pivot the load freely. The suspended load can be turned around at 360° and pivoted at 90° in most cases.

1. Be sure to use a flexible soft eye to avoid jamming the lifting magnet into the hook of the crane since this would lead to extremely unfavorable load conditions and the lifting capacity would no longer be assured. In addition, this will protect your magnet from damage and extend its lifetime.

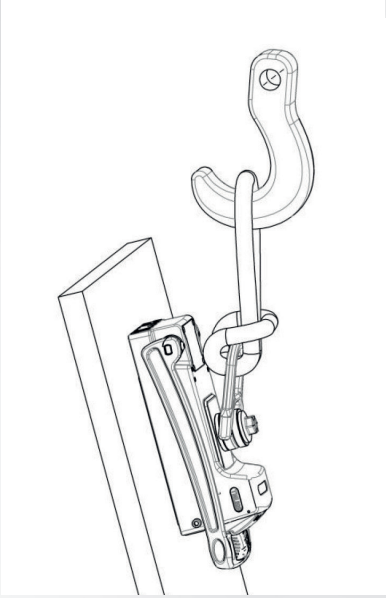


Figure 1

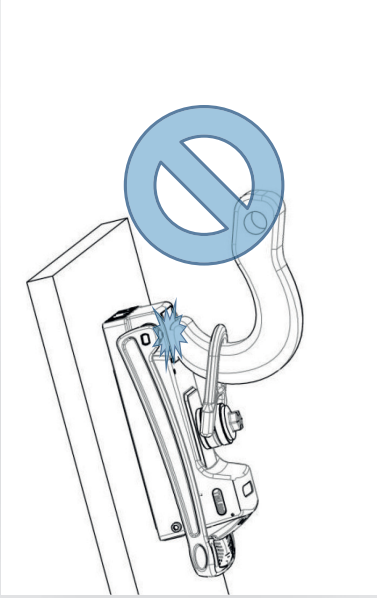
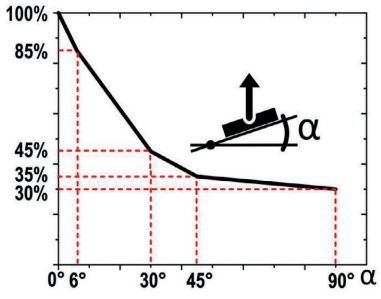


Figure 2

2. If the load is attached horizontally to the magnet, the entire breakaway force of the lifting magnet is acting on the load, so you can use 100 % of the lifting capacity as stated in table 2. However, if the load and the magnet surface tilt at an angle other than 0° to horizontal, the load-bearing capacity decreases due to the new alignment of the magnet 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 magnet which is not more than 10-35 % of the maximum load-bearing capacity, depending on material being lifted.



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

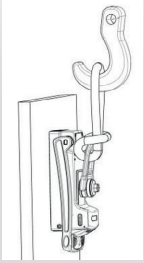
Load-figures corresponding to the direction of the TML 400R

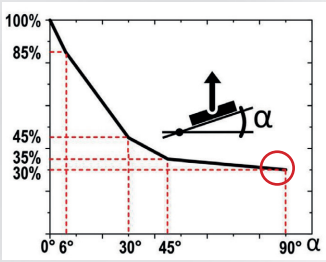
Example mm:
You would like to lift a plate which is 6 mm thick and made of S235. The plate stands vertically, i.e. at an angle of 90°, in your shelf rack and your magnet is ideally positioned, as shown in figure 1.

Material thickness: 6 mm ➔ max. load-bearing capacity at 0° = 288 kg (see table 2)
Material: S235 ➔ holding force, subject to material = 100% (see table 1)
Alignment of the load: 90° tilted; load hook facing upwards
➔ Load-figure corresponding to direction = 30%

Example INCH:
You would like to lift a plateof mild Cold Rolled Steel (CRS) which is 1/4 inch thick. The plate stands vertically, i.e. at an angle of 90°, in your shelf rack and your magnet is ideally positioned, as shown in figure 1.

Material thickness: 1/4 inch ➔ max. load-bearing capacity at 0° = 640 lbs (see table 2)
Material: mild steel ➔ holding force, subject to material = 100% (see table 1)
Alignment of the load: 90° tilted; load hook facing upwards
➔ load-figure corresponding to direction = 30%

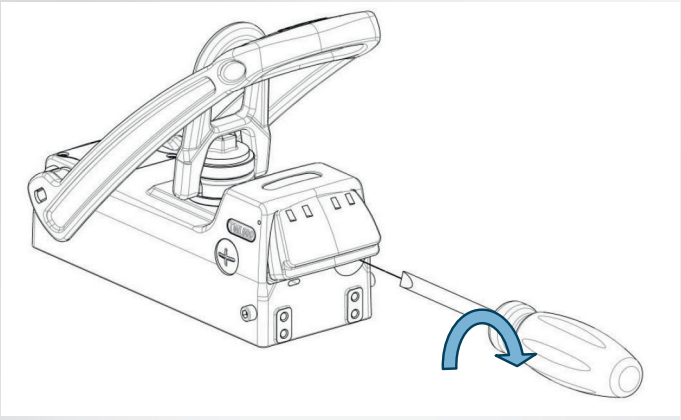




Maximum load weight with 3:1 safety factor = 320 kg x 100% x 30% = 86.4 kg
Maximum load weight with 3:1 safety factor = 700 lbs x 100% x 30% = 192 lbs

ADJUSTABLE SHOCK ABSORBER

An oil filled shock absorber is incorporated on the backside of the magnet in order to absorb any recoil energy of the lever. The thinner the material to be lifted the higher the recoil energy to be absorbed. The set screw on the backside of the magnet makes it possible to adjust the shock absorber variably, so that the upward movement of the lever is controlled and operates smoothly. This adjustment should be made by using a flat-blade screwdriver.



BASIC INFORMATION ON THE LOAD-BEARING CAPACITY OF THE LIFTING MAGNET

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

Material thickness

The magnetic flux of the lifting magnet requires a minimum material thickness to flow completely into the load. Below this minimum thickness of material, the maximum holding force is reduced subject to material thickness. Conventional switchable permanent magnets have a deep penetrating magnetic field similar to tree tap roots, and require a large material thickness to achieve maximum holding force. The compact magnetic field of the TML magnets is similar to a shallow root and achieves maximum holding force even when used on thin materials (see table 2 & 3, chapter “Detailed Performance Data“).

Material

Every material reacts in a different way to penetration of the magnetic field lines. The load-bearing capacity of the lifting magnets is determined using allow carbon material. Steels with high carbon content or whose structure has been changed by heat treatment have a lower holding force. Foamed or porous cast components also have a lower holding force, so that the given load-bearing capacity of the lifting magnet can be downgraded on the basis of the following table1.

Table 1

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

Surface quality

The maximum holding force of a lifting 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 a kind of “air gap” is formed between the lifting magnet and the work piece, the holding force will be reduced. In the same way, paint, rust, scale, surface coatings, grease or similar substances all constitute a space, or an air gap, between work piece and lifting magnet. An increase in surface roughness or unevenness also has an adverse effect on the magnetic holding force. Reference values can be found in the performance table of your lifting magnet.

Load dimensions

When working with large workpieces such as girders or plates, the load can deform 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 bottom of the magnet. The resulting air gap reduces the maximum load-bearing capacity of the lifting magnet. Hollow objects or those smaller than the magnetic surface will also result in less holding power being available.

Load alignment

During load transport, care must be taken that the lifting magnet is always at the center of gravity of the work piece and that load, or lifting magnet respectively, is always aligned horizontally. In this case, the magnetic force of the lifter acts with its breakaway force perpendicular in relation to the surface, and the maximum rated load-bearing capacity is achieved with the 3:1 standard safety factor.

If the position of work piece and lifting magnet changes from horizontal to vertical, the lifting magnet is operated in shear mode and the work piece can slip away to the side. In shear mode, the load-bearing capacity decreases dependent upon the coefficient of friction between the two materials.

Temperature

The high-power permanent magnets installed in the lifting magnet will begin to lose their magnetic properties irreversibly from a temperature of more than 80°C (180°F), so that the full load-bearing capacity is never reached again even after the magnet has cooled down. Please note the specifications on your product or in the operating manual.

MAINTENANCE AND INSPECTION

The user is obliged to maintain and service the lifting magnet in compliance with the specifications in the operating manual and according to the country-specific standards and regulations (e.g. ASME B30.20B, DGUV-Information 209-013; AMVO).

The maintenance intervals are classified according to the recommended schedule.

Before every use...
- visually inspect the lifting magnet for damage
- clean the surface of the workpiece and the underside of the magnet
- free the underside of the magnet of rust, chips or unevenness
- verify the lock function of the safety tab on the lever

Weekly...
- inspect the lifting magnet and load hook for deformation, cracks or other defects
- make sure that the operating lever and safety tab are working properly
- inspect the load hook for damage or wear and have it replaced if necessary
- inspect the bottom of the magnet for scratches, pressure points or cracks and have the magnet repaired by the manufacturer if necessary

Monthly...
- check the markings and labelling on the lifting magnet for legibility and damage and replace them if necessary

Annually...
- have the load-bearing capacity of the lifting magnet checked by the supplier or an authorized workshop

An annual inspection is recommended for the safe use of this lifting magnet.
We will be glad to perform this inspection for you in-house.
Please send us an email to:

TML-Test@alfra.de

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 contact the manufacturer.

DETAILED PERFORMANCE DATA FOR USE ON FLAT MATERIAL

Values shown for the TML 400R's load capacity are based on material S235 JR (comparable to AISI 1020 Cold Rolled Steel) with the maximum, vertical breakaway force at 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.

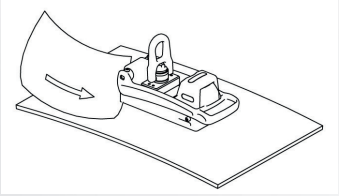
Table 2: Flat material

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 = 0.5mm	
mm	**0°**	**6°**	**0°**	**6°**	**0°**	**6°**
2	40	35,2	36	31,2	32	28
3	104	88	92	80	68	57,6
4	156	136	128	112	108	92
5	240	208	192	164	152	132
6	288	252	216	188	176	152
8	364	316	248	216	192	164
10	392	344	288	248	200	172
15	400	352	292	252	200	176
›20	400	352	296	256	208	180

Load capacity in lbs						
Thickness of material	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 = 0.02 inch	
inches	**0°**	**6°**	**0°**	**6°**	**0°**	**6°**
0.08	88	72	80	68	72	60
0.12	228	196	204	176	148	128
0.16	344	296	284	244	236	204
0.20	528	460	420	364	332	288
0.25	640	460	476	408	384	332
0.30	800	696	548	472	420	364
0.40	872	752	628	544	432	376
0.50	880	760	640	552	436	380
›1	880	776	652	564	444	384

The maximum dimensions of the loads to be lifted depend to a large extent on the geometry and flexural stiffness of the work pieces. If the material bends, an air gap will form under the magnetic surface which will decrease the load-bearing capacity significantly.

During each lift, watch for any deformation of the work piece that might occur and check for any air gap developing at the edges of the magnetic surface contact area. You can use for instance a sheet of paper (80g/m2) to check this. Spreader bars with additional magnets may be required to safely lift large or flexible loads.



Immediately stop the lift if there is any excessive deformation of the work piece or an air gap.

Never exceed load-bearing capacity given in the table 2.

DETAILED PERFORMANCE DATA FOR USE ON ROUND PIPES

Values shown for load capacity of the TML 400R are based on material S235 JR 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. The safety factor corresponds to at least 3:1 in all cases.

Table 3: Round pipes

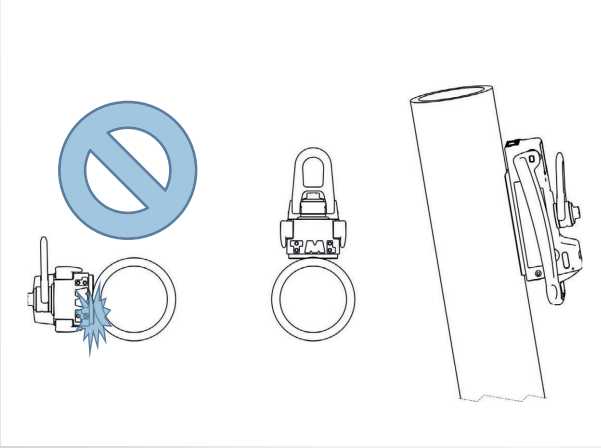
mm	Load capacity in kg					
	50	75	100	200	400	
>10	150	200	175	200	-	
8	145	200	175	200	-	
5	130	175	150	175	-	
4	95	130	112	130	-	
3	75	100	90	100		

inches	Load capacity in lbs					
	2"	3"	4"	8"	16"	
>3/8	330	440	385	440	-	
5/16	319	440	385	440	-	
0,20	286	385	330	385	-	
0,16	209	286	246	286	-	
1/8	165	220	198	220		

Rust, paint or any other surface coating may cause an air gap that will reduce the load-bearing capacity according to the following table.

Tabelle 4: Tragfähigkeit bei Luftspalt

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**	**89**	**75**	**65**	**45**	**30**



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

Never lift round pipes laterally or exceed the load-bearing capacity given in table 3 & 4.

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 **TML 400R**
from serial number 16H2669 onwards 16H2669

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, 08.06.2017

Markus A. Döring
(Managing Director)