



FiberMax[®]

CRANE PADS

AVAILABLE IN
**3D Lift
Plan!**



Owner's Manual
FM9x7x10

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Congratulations on your purchase of a set of DICA FiberMax Crane Pads. The following information will provide the technical specifications needed for using the pads and generating lift plans.

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Please contact our team with any questions.

Sales

Phone: 1-800-610-3422

E-mail: sales@dicausa.com



What to Expect

When Using FiberMax Crane Pads

Pads can make noise

The textured wear surface on top of the FiberMax Crane Pads may adhere to the steel frame as part of the manufacturing process. When setting up on your new FiberMax Crane Pads, the textured wear surface may separate from the steel frame. As a result, a crackling or popping sound may be heard. This is normal and is part of the break-in process. Wear surface separation from the steel channel does not affect the integrity or performance of the pads.

Wear surface cracks

The top wear surface is a hard, rigid and durable surface. As load is exerted on the pads, the wear surface may show some surface cracks. This is normal, as the coating does not supply any structural support and does not affect the integrity or performance of the pad.

Cracks between the wear surface and steel frame

The purpose of the steel frame is to protect the pad from side impact and to provide placement points for lifting and handling of the pads. Any separation of the wear surface from the steel channel is normal and does not affect the integrity or performance of the pads.

Inspection Guidelines:

- 1.** DICA FiberMax Crane Pads should always be placed on a surface that is level, smooth and without voids. When operating on concrete or other high ground support locations make sure the surface is smooth and free of rocks or other hard objects greater than ½" diameter. Failure to comply may result in object penetration of the mat surface.
- 2.** Prior to use, inspect the top and bottom surfaces for penetration damage. Small indentions less than 1 in² should be patched to prevent water penetration. If larger indentions are present, the pad should be removed from service and repaired.
- 3.** Prior to use, inspect the bottom of the pad for cracks. Cracks between the fiberglass edge and steel frame are normal and do not require repair. The purpose of the steel frame is to protect the pad from side impacts and handling damage. Small cracks in the wear surface are normal and do not require repairs. If cracks are large and penetrate through the wear surface and into the top fiberglass plate, the pad should be removed from service and repaired.
- 4.** Prior to use, inspect the top and bottom of the pad for depressed areas. If the surface of the pad is depressed, the pad should be removed from service. In that event, send pictures to DICA with a straight edge across the pad and a tape measure in picture to indicate the depth of the depression.
- 5.** Prior to use, inspect all welds and lifting points. If cracks are present, the pad should be repaired.

If there are any concerns about the performance or condition of the mats, please contact DICA.

Usage Guidelines

Under no circumstances does DICA or its suppliers assume any liability for the use of the products outside the designed and recommended usage. It is the responsibility of the owner to make all personnel aware of the recommended use of these products and any other rules and codes set forth by the jurisdictions in the areas of use.

- Slow down, always use common sense.
- Follow the Original Equipment Manufacturers Guidelines for all equipment that will be set up on FiberMax pads.
- FiberMax crane pads are an insulator. Follow original equipment manufacturers suggestions for proper equipment grounding.
- Assess your ground conditions. Make sure you have the right size pad for the job you are performing.
- Pads must be placed on a smooth level surface that is free of raised and lowered areas. Failure to do so could result in pad punctures or the spanning of voids, which will increase the pressure on surrounding areas.
- Pads are to be lifted and moved using the different lifting points originally included with the pad.
- If excessive deflection is visible during lifting operations that may cause the crane to lose level, stop operations immediately.
- On hard surfaces consider using .75" – 1" thick neoprene sheet or other highly compactable materials such as sand, chips or soil under the pad. These materials will allow the pad to deflect which increases load distribution and reduces ground bearing pressures.
- DICA does not recommend the placement of outrigger floats outside the designated target area. Doing so, increases the ground bearing pressure which must be accounted for. Placing the outrigger float in the center of the FiberMax Crane Pad allows for equalized loading that results in more even ground bearing pressure under the pad.
- It is the responsibility of the crane owner, operator, site owner and all parties on site to ensure that the ground under a FiberMax Crane Pad is of sufficient strength to support the loads exerted through it. If the Soil Bearing Capacity is not sufficient you will see the ground begin to displace, and the pad will begin depressing into the ground. If this condition develops, **stop operations immediately**; Improve the ground, add more matting or both before re-starting operations. The principal addressed above is consistent for all materials that would be used in this application and under these conditions.

Anyone considering the use of these products should thoroughly test or evaluate them to ensure that they satisfy their specific needs. Manufacturer and/or Distributor cannot guarantee performance of these products because usage or application of buyers cannot be controlled by either the Manufacturer and/or Distributor. Proper Use requires the selection of the proper products for the equipment and the specific application. Manufacturer and/or distributor expressly disclaim any and all warranties not set forth herein, including any warrant of fitness for a particular purpose and/or any warranty of merchantability, which might otherwise be applicable. In the event of a manufacturing defect, buyer's remedy shall be strictly limited to a refund of the purchased price or replacement of the product. Buyers specifically acknowledges waivers of any claim against either manufacturer or any distributor regarding consequential damages to person or property, damages for loss of use, lost time, loss of profit, lost income or other incidental or consequential damage. All prices, designs and/or specifications are subject to change without notice.

Technical Specifications

FiberMax® FM9x7x10 Mega Duty Crane Pad

Design Analysis Basis

The load distribution into the ground and maximum outrigger load capacity of the FiberMax Crane Pad is highly dependent on the characteristics of the soil below the pad.

To properly analyze the performance of the FiberMax Crane Pad, there must be an understanding of the soil characteristics of a job site. The most important design property of the soil is the Modulus of Subgrade Reaction (MSR) of the soil. MSR is a measure of the soil stiffness (can be thought of as a spring constant) and directly affects the load distribution of the FiberMax Crane Pad and the maximum outrigger load the pad can handle.

For this design analysis there are three MSR values that are analyzed: 20,000 lbf/ft²/in; 40,000 lbf/ft²/in; and 80,000 lbf/ft²/in. These selected values are designed to represent a range of typical site set-up soil conditions. In basic terms, an 80,000 lbf/ft²/in MSR means that 80,000 lbf loaded on one square foot will compress the soil one inch.

Table 1 below shows examples of typical soil MSR or “k” values:

Table 1 - Typical Modulus of Subgrade Reaction Values (k_s)

Type of Soil	k _s (lbf/ft ² /in)
Dense sandy gravel	115,200 - 201,600
Medium dense coarse sand	86,400 - 172,800
Medium sand	57,600 - 144,000
Fine to silty fine sand	41,760 - 100,800
Medium clay	21,600 - 72,000
Soft clay	864 - 21,600

To simplify this and to correlate to industry standards, DICA has converted these to soil bearing capacities. Table 2 details the correlation between MSR and soil bearing capacity:

Table 2 - Modulus of Subgrade Reaction and Soil Bearing Capacity Correlation

Soil Bearing Capacity (lbf/ft ²)	Soil Compression at Soil Bearing Capacity (in)	Modulus of Subgrade Reaction (lbf/ft ² /in)
2,500	1/8	20,000
5,000	1/8	40,000
10,000	1/8	80,000

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Design Analysis Methodology

Finite Element Analysis (FEA) Outputs

To properly analyze the interaction of the FiberMax Crane Pads with various soil conditions, an FEA is used to determine the following outputs:

- Maximum Ground Pressure
- Maximum Displacement

Finite Element Analysis (FEA) Inputs

An FEA requires each sub component of the FiberMax Crane Pad be modeled.

The specific details of the internal construction of the FiberMax Crane Pad are proprietary. In general, the construction of the FiberMax Crane Pad consists of fiberglass skins and an internal structure of a bi-directional grid of fiberglass webs. The FEA inputs required to complete this analysis consists of the following inputs for the fiberglass construction of the FiberMax Crane Pad:

- Tensile Strength
- Compression Strength
- Compression/Tensile Average Modulus
- Shear Strength
- Shear Modulus
- Poisson's Ratio
- Density

For the purpose of this analysis, the MSR values are broken down into the series of springs. The spring constant applied to these springs is consistent with the MSR for the various soil conditions. This is a simplification of the reality of soil mechanics.

To fully analyze a specific soil, knowledge of additional properties is required, such as: mass density; Poisson's ratio; cohesion; angle of friction; soil modulus and others. Determining these properties for every crane set-up is not practical given the transient nature of crane usage.

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Float Size

The float size is an important aspect of the FEA and usage as it affects the shear loading in the pads. The FEA was conducted using a 24"x24" square float.

Floats with a large footprint will provide better safety factors. Smaller floats will reduce the safety factor. In the field, it is recommended smaller floats utilize a DR36-2 SafetyTech® Outrigger Pad or a FMR36.75 Heavy Duty FiberMax® Outrigger Pad between the float and the Mega Duty Crane Pad.

Crush Rating

The allowable amount of pressure that a crane pad is rated for. It is the users responsibility to ensure that the crush rating is not exceeded. To reduce the pressure applied to a FiberMax Crane Pad use a transition pad (a 2" or thicker SafetyTech Outrigger Pad) that is larger than the outrigger float and is placed between the outrigger float and the FiberMax pad.



Large outrigger floats provide better safety factors.

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FEA Results for the FiberMax FM9x7x10 Mega Duty Crane Pad

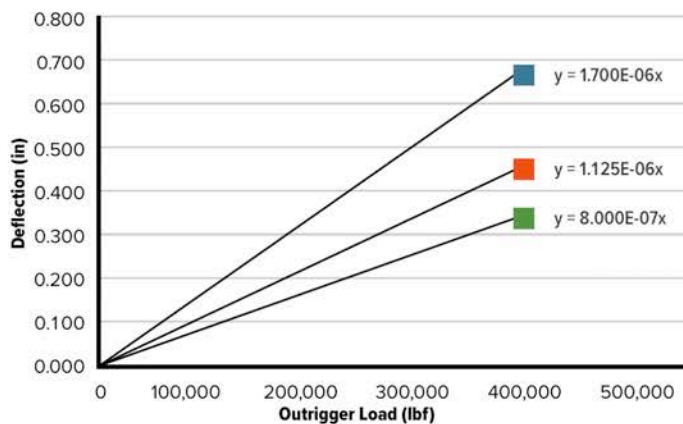
Table 3 details the maximum allowable load and deflection with respect to soil bearing capacity:

Table 3 - Maximum Allowable Load

Soil Bearing Capacity (lb/ft²)	Crush Rating (psi)	Maximum Rated Capacity (lbs)
2,500	1,000	325,000

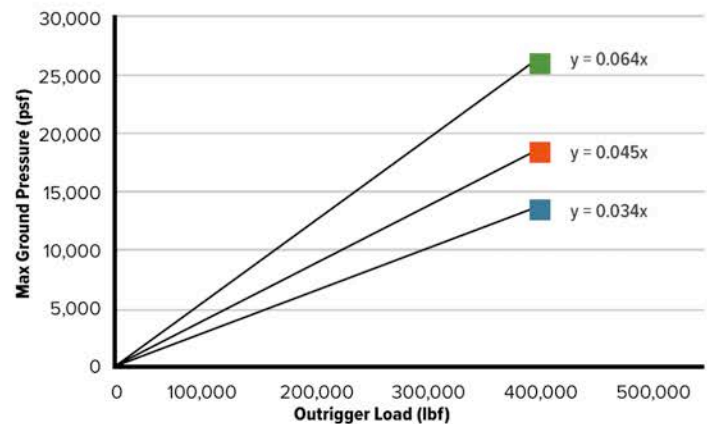
The two charts below show the two FEA outputs discussed earlier, with respect to soil conditions:

Outrigger Load vs. Deflection



- 2,500 psf Soil
- 5,000 psf Soil
- 10,000 psf Soil

Outrigger Load vs. Max Ground Pressure



- 2,500 psf Soil
- 5,000 psf Soil
- 10,000 psf Soil

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Testing Correlation

The FEA detailed above has been correlated to full-scale test articles. This testing was completed at an independent laboratory. Tests were performed on full-scale articles for bending (with four-sided support) and pure crushing on a solid foundation.



Figure 1 – Typical Full-Scale Bending Test

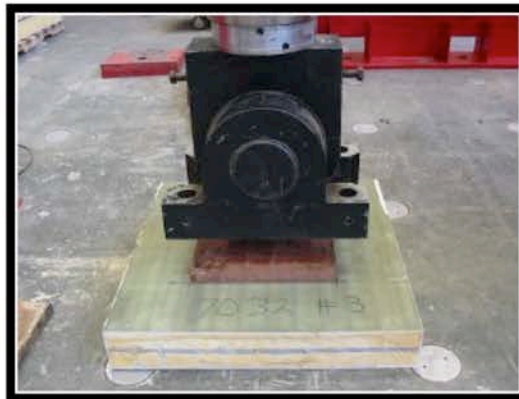


Figure 2 - Typical Crushing Test

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Field Testing

To understand the ground conditions at a specific site there are a couple of ways to determine this:

1. Typically, larger cranes (>100 ton) are designed to have about 9,000 lbf/ft² of tire pressure while driving. This is within DOT standards for maximum tire pressure.

A simple way to get a rough idea of the MSR is to measure the amount the tire compresses the soil. For example:

- a. If the tire compresses the soil ¼", the MSR is 9,000 psf/ft²/0.25 in, which equates to 36,000 psf/ft²/in. This would be equivalent to 4,500 psf soil capacity.
2. There is another field method for determining the MSR. In this example, a simple hydraulic cylinder is used to push on plates that are set on the ground. The concept is similar to the tire example above. Below are pictures of the typical test set-up:

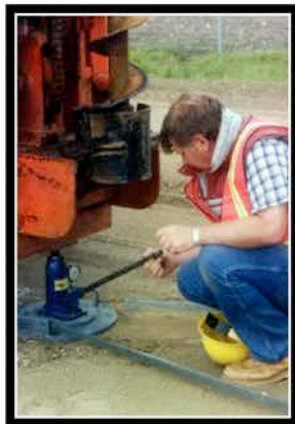


Figure 3 – Plate Load Test with Jack

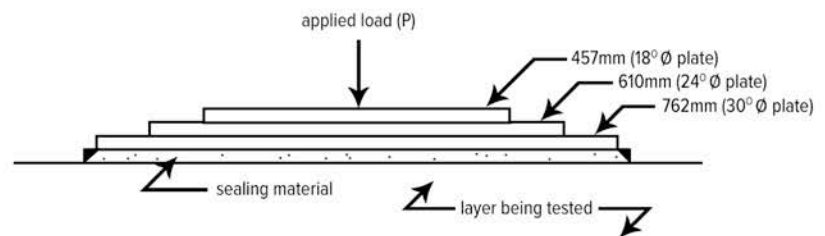


Figure 4 – Plate Load Test Diagram

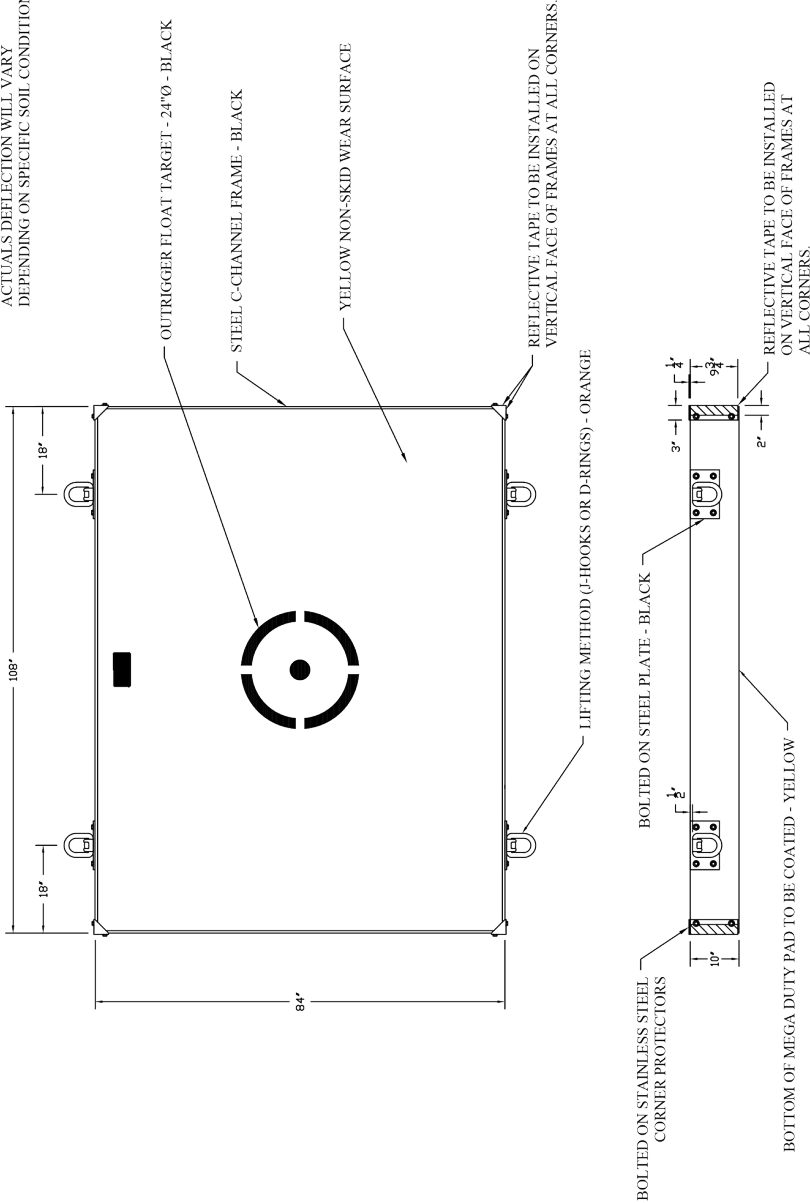
3. The outrigger float itself can be used to perform this test as well, assuming there are load indicators on the outrigger floats. Simply push the float onto the ground with a small amount of pressure (~10,000 psf), measure the soil compression and correlate the results.



FM9X7X10

	MAXIMUM OUTRIGGER LOAD	DEFLECTION AT MAXIMUM OUTRIGGER LOAD
SBC 2,500 PSF	325,000 LBS	0.52"

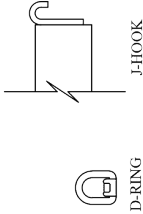
DEFLECTION IS BASED ON CALCULATION. ACTUALS DEFLECTION WILL VARY DEPENDING ON SPECIFIC SOIL CONDITIONS.



SCALE 1/2" = 12"

LIFTING APPARATUS OPTIONS	
D-RINGS	1" ø RING
J-HOOKS	1" ø

*ALL COATINGS (OTHER THAN NON SKID WEAR SURFACING) TO BE ACRYLIC ALIPHATIC POLYURETHANE .



TECHNICAL INFORMATION

WEIGHT - 1,900 LBS.
MAXIMUM FLOAT PRESSURE - 1,000 PSI
FLOAT PRESSURE IS THE MAXIMUM AMOUNT OF PRESSURE THAT IS APPLIED BY THE CRANE FLOAT.

SBC - SOIL BEARING CAPACITY IS DEFINED AS THE AMOUNT OF PRESSURE REQUIRED TO COMPRESS THE SOIL 1/8".

- NOTES:
- THE MAT DESIGN AND FUNCTIONALITY IS BASED ON THE OUTRIGGER FLOAT BEING CENTERED ON THE TARGET AREA.
 - IT IS THE USERS RESPONSIBILITY TO ENSURE THAT THERE IS ADEQUATE GROUND SUPPORT UNDER THE MEGA DUTY OUTRIGGER PADS.
 - THE ALLOWABLE SOIL BEARING CAPACITY SHALL BE DETERMINED BY THE USER.
 - MAT MUST BE FULLY SUPPORTED BY THE GROUND. IF SHIMMING IS REQUIRED TO LEVEL THE OUTRIGGER PAD, THEN SHIMS NEED TO BE CONTINUOUS UNDER THE MAT AND BE ABLE TO SUPPORT THE LOAD APPLIED BY THE CRANE.
 - DO NOT USE THE MEGA DUTY OUTRIGGER PAD IF THERE IS ANY VISIBLE DAMAGE TO THE MAT.

THE OVERALL STRUCTURAL CONFIGURATION OF FIBERMAX MEGA DUTY MATS IS A SANDWICH CONSTRUCTION CONSISTING OF TOP AND BOTTOM LAYERS THAT ARE MOLDED WITH AN INTERNAL CORE. THE FIBERGLASS FABRIC REINFORCEMENT IN THE TOP AND BOTTOM SURFACES ARE E-GLASS FIBERGLASS FABRICS. THESE ARE AVAILABLE IN A NUMBER OF FORMS WITH DIFFERENT COMBINATIONS OF FIBERS RUNNING IN DIFFERENT DIRECTIONS. FIBERMAX MEGA DUTY MATS ARE MADE WITH FIBERGLASS FABRICS. THESE FABRICS ARE ARRANGED TO ENGINEER THE STRUCTURAL PROPERTIES TO MOST EFFICIENTLY HANDLE THE APPLIED LOADS.

THE POLYMER THAT SELDS THE FIBERGLASS TOGETHER AS A COMPOSITE MATERIAL IS VINYL ESTER RESIN. VINYL ESTER RESINS PROVIDE MAXIMUM CORROSION AND MOISTURE RESISTANCE WITH GOOD STRUCTURAL PROPERTIES, EXCELLENT MOLDING PROPERTIES, EXCELLENT DURABILITY, AND HAS A CLASS 2 FIRE RETARDANT RATING PER THE FLAME SPREAD INDEX OF ASTM E-84.

A KEY COMPONENT OF DICA FIBERMAX MEGA DUTY MATS IS THE FIBER REINFORCED CORE. THESE FIBERS ARE INFUSED WITH RESIN AND SURROUNDED BY CLOSED CELL FOAM, WHICH FORM VERY STRONG AND STIFF SHEAR WEBS FOR THE SANDWICH CROSS-SECTION. THE CLOSELY SPACED FIBERS IN THE CORE PROVIDE GOOD CRUSHING RESISTANCE TO CONCENTRATED LOADS. IN ADDITION, THERE IS NO LOCAL SKIN DEFLECTION ON THE SURFACE OF THE MAT SINCE THE SKINS ARE SO WELL SUPPORTED BY THE WEBS. THE REDUNDANCY OF THE MULTIPLE WEBS PROVIDES IMPROVED DAMAGE TOLERANCE: OVER THICK, WIDER-SPACED WEBS, THE FOAM DOES NOT ABSORB WATER, AND ELIMINATES ANY OPEN AREAS INSIDE THE DECKING WHERE WATER MIGHT ACCUMULATE.

Warranty

Quality Assurance

FiberMax® Crane Pads have been full-scale performance tested, and are deemed to exceed all stated crush, and maximum allowable load ratings. This attention to quality and performance is what has made DICA the top brand in outrigger pads and crane pads.

1 Year Limited Defective Material & Workmanship Warranty

DICA will warranty all FiberMax® Crane Pads manufactured by DICA to be free of any defects in material or workmanship. Subject to the limitations and exclusions described in this warranty, DICA will remedy defects in materials or workmanship by repairing or replacing, at its option, a defective product without charge for parts or labor. In addition, DICA may elect, at its option, not to repair or replace a defective product but rather issue to a purchaser a refund equal to the purchase price paid for the product or a credit to be used toward the purchase of a new DICA product. This warranty covers only manufacturing defects and does not cover any damage caused by misuse (such as exceeding the crush and allowable load limits), neglect, accidents, abrasion, normal wear and tear or transport damage. While non-warranty maintenance or repairs on your Product can be performed by any company, DICA requires that you use only an approved DICA technicians ("Service Center"), or approved representatives for warranty repairs. Improper or incorrectly performed maintenance or repairs void this warranty. Incidental and consequential damages are expressly disclaimed. Labor charges and damages attributable to work performed by anyone other than a Service Center are not covered by this warranty. To the extent permitted by applicable law, any implied warranties are hereby excluded. The warranty provided herein is limited to the value of the Product. Manufacturing specifications are subject to change without notice. Inspect your Product immediately after each use. No warranty is given for defects caused by normal wear and tear, misuse, scratches, accidents, or unapproved field modifications. No warranty is given for defects resulting from conditions beyond DICA's control including, but not limited to, misuse, including the spanning of voids, overloading or actions in contradiction with DICA's published usage guidelines.

10 Year Limited Cracking & Crushing Warranty

DICA will warranty all FiberMax® Crane Pads manufactured by DICA against any surface cracking or crushing. Subject to the limitations and exclusions described in this warranty, DICA will remedy any cracking or crushing damage by repairing or replacing, at its option, a defective product without charge for parts or labor. In addition, DICA may elect, at its option, not to repair or replace a defective product but rather issue to a purchaser a refund equal to the purchase price paid for the product or a credit to be used toward the purchase of a new DICA product. Said warranty is void if the posted crush rating, or allowable load rating is exceeded at any time after the initial purchase of the product. This warranty applies only to typical use conditions. Incidental and consequential damages are expressly disclaimed. This warranty covers only crushing or cracking of the product under normal use, and does not cover any damage caused by misuse (such as exceeding the crush and allowable load limits), neglect, accidents, abrasion, normal wear and tear or transport damage. While non-warranty maintenance or repairs on your Product can be performed by any company, DICA requires that you use only an approved DICA technicians ("Service Center"), or approved representatives for warranty repairs. Improper or incorrectly performed maintenance or repairs void this warranty. No warranty is given for defects caused by normal wear and tear, misuse, scratches, accidents, or unapproved field modifications. No warranty is given for defects resulting from conditions beyond DICA's control including, but not limited to, misuse, including the spanning of voids, overloading or actions in contradiction with DICA's published usage guidelines. In the event that a product is defective, the purchaser should contact DICA in writing or by phone.

DICA
4101 120th St.
Urbandale, IA 50323
USA
PH: 800.610.3422
www.dicausa.com

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