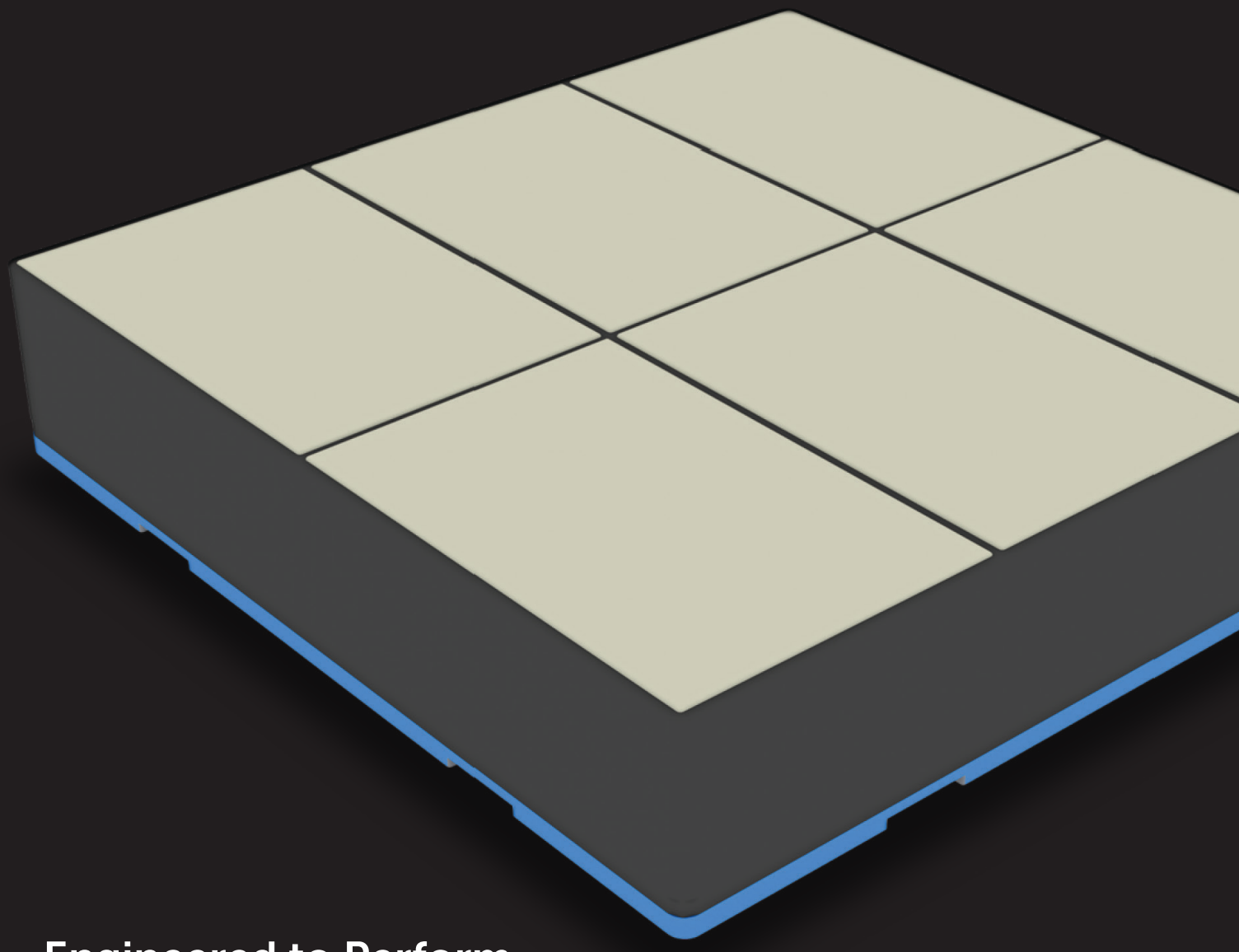
magnefast™ | TSGlobal
Conveyor & Polyurethane Specialists

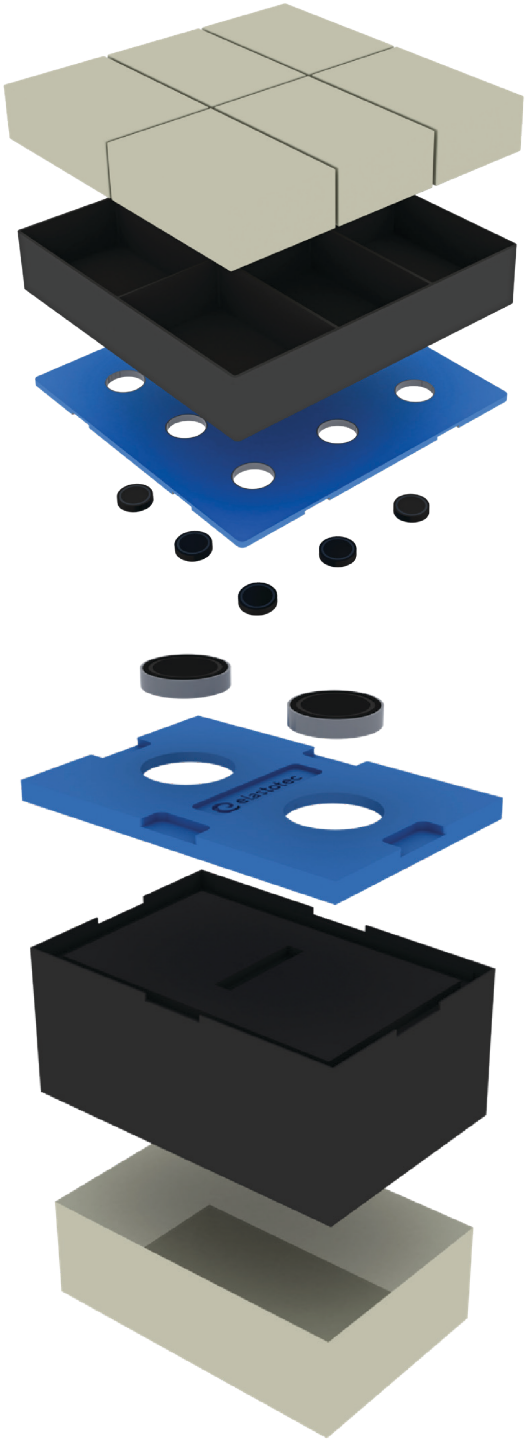
# Magnefast Wear Panel

**Elastotec** has developed MAGNEFAST™, a unique single sided magnetic attachment system that has several features and benefits.



## Engineered to Perform

# Magnetic attachment system



## No holes required in ceramic tiles for single sided attachment.

Eliminates potential points of weakness and cracking in the ceramic blocks.

## No need for gap between panels to aid fitment panels can be butted up to one another using a rubber hammer so there are NO GAPS.

No gaps between wear panels eliminates the possibility of accelerated edge wear due to tracking of material along gaps / recesses.

## Multiple magnet fixing locations.

Magnet location and number can be varied to suit cut panel shape and size.

## Magnets available in a range of champing forces.

Wear panel clamping force can be adjusted to suit different applications.

## Engineered polymer backing plates.

No corrosion. Light weight.

# Key Features & Benefits - Productivity

Reduce time for installation and replacement.

Quick and easy rotation of wear position.

No nuts/ bolts to seize or corrode making removal difficult.

Simple tools for installation and removal of wear panels (rubber hammer, pinch bar).

Stable rubber hardness with age.

Resists tile cracking and pull out.

Easy to install.

Reduced number of operators and hours for install / replacement with reduced logistics (accommodation, flights etc.).

No need to access outside of chute with potential working at height and safety issue.

Estimate the risk of damage to wear panels in good condition that can prevent them from being reused. This problem can occur when routable chutes are being reconditioned.

Reduced time and cost to fabricate new chutes. Can be used in above and below ground applications.

# Key Features & Benefits - OH&S

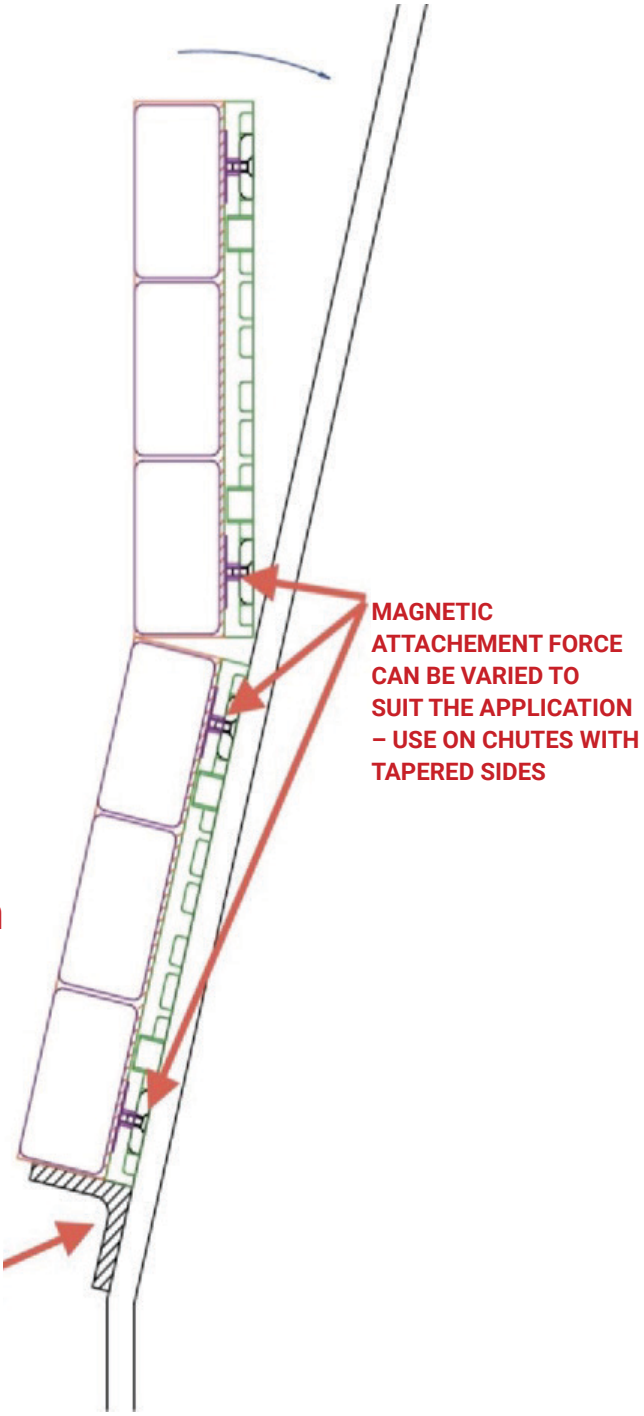
## Magnetic attachment system

No nuts and washers to be used / removed eliminates the risk of DROPPED OBJECTS FROM HEIGHT.

Eliminates the need to cut, grind or use a nut splitter to remove seized nuts.

Eliminates HIGH RISK activities in underground coal mines or areas with flammability or explosion risk.

Eliminates the need to access the outside of the chute and associated working at height safety risk.




## Simple tools for installation and removal.

No requirement for use of electric power tools hydraulics or compressed air.

# Magnets

Elastotec Neodymium Rare Earth Magnets are among the most powerful permanent magnets available and are sometimes called super magnets. These magnets have a powerful magnetics field along with a great strength and coercivity. They are designed to provide excellent strength to size ratio and good temperature stability.

## Key Features

### Magnetic attachment system

- Based on Neodymium, iron and boron composite.
- High magnetic force to size ratio.
- High resistance to demagnetisation.
- Surface plating and stainless-steel housing to provide corrosion resistance.
- Stainless steel housing with external thread for ease of installation and removal.
- Magnetic attachment eliminates the need for mechanical fasteners.
- Magnetic attachment eliminates the need for mounting holes in the substrate.
- Low-cost method of attachment.
- Magnets operating temperatures up to 120°C (248°F)
- Magnets available with holding forces of 40Kg(88lbf)/magnet to 100Kg(220lbf)/magnet.

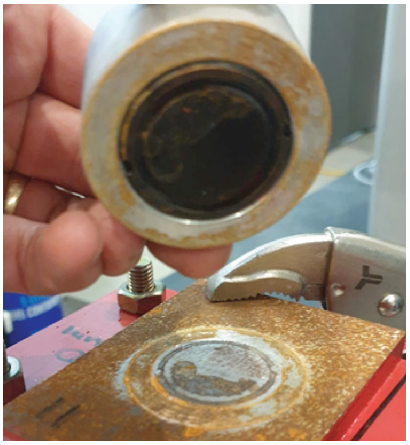
| SURFACE TREATMENTS | |
|---|---|
| **TYPE** | **INFORMATION** |
| Metallic | Zinc, Nickel, Nickel + Nickel, Nickel + Tin, Nickel, Gold |
| Organic | Epoxy, Nickel + Epoxy coating |
| Temporary | Surface Passivation |

The Magnefast magnets are designed to provide consistent holding force over extended periods when operating outdoors exposed to heat, cold, rain, dust etc. These magnets have been engineered to operate over a wide temperature range from -50°C(-58°F) to +100°C(+212°F) in both wet and dry conditions. Extensive testing of the magnetic holding force has been carried out with the results detailed below.

## Outdoor Ageing Performance of Magnefast Magnets

| Day Zero 5-03-2021 | | | Day 54 28-04-2021 | | | Day 84 28-05-2021 | | | Day 180 21-09-2021 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average Peak Force (kgf) | (lbf) | | Average Peak Force (kgf) | (lbf) | | Average Peak Force (kgf) | (lbf) | | Average Peak Force (kgf) | (lbf) |
| Magnet#1 | 50.7 | 112 | Magnet#1 | 51.7 | 113.8 | Magnet#1 | 50.8 | 112 | Magnet#1 | 50.3 | 110.9 |
| Magnet#2 | 51.7 | 113.8 | Magnet#2 | 53.3 | 117.5 | Magnet#2 | 50.8 | 112 | Magnet#2 | 52.9 | 116.6 |
| Magnet#3 | 51.8 | 114.2 | Magnet#3 | 54.4 | 119.9 | Magnet#3 | 50.3 | 110.9 | Magnet#3 | 51.6 | 113.8 |
| Magnet#4 | 51.4 | 113.3 | Magnet#4 | 53.5 | 118 | Magnet#4 | 50.7 | 111.8 | Magnet#4 | 50.6 | 111.6 |
| Magnet#5 | 52.8 | 116.4 | Magnet#5 | 54.8 | 120.8 | Magnet#5 | 53.0 | 116.8 | Magnet#5 | 52.1 | 114.9 |
| Magnet#6 | 52.0 | 114.6 | Magnet#6 | 51.4 | 113.3 | Magnet#6 | 52.6 | 116 | Magnet#6 | 56.0 | 123.5 |
| Magnet#7 | 50.1 | 110.5 | Magnet#7 | 51.8 | 114.2 | Magnet#7 | 51.5 | 113.5 | Magnet#7 | 50.0 | 110.2 |
| Magnet#8 | 50.5 | 111.3 | Magnet#8 | 51.8 | 114.2 | Magnet#8 | 50.7 | 111.8 | Magnet#8 | 50.0 | 110.2 |
| Magnet#9 | 50.5 | 111.3 | Magnet#9 | 57.0 | 125.7 | Magnet#9 | 54.2 | 119.5 | Magnet#9 | 55.1 | 121.5 |
| **Average of all magnets** | **51.7** | **111.3** | **Average of all magnets** | **53.2** | **117.3** | **Average of all magnets** | **51.6** | **113.8** | **Average of all magnets** | **52.1** | **114.9** |

Photos below show the magnet samples used for the outdoor ageing test to determine the effect on magnet holding force.



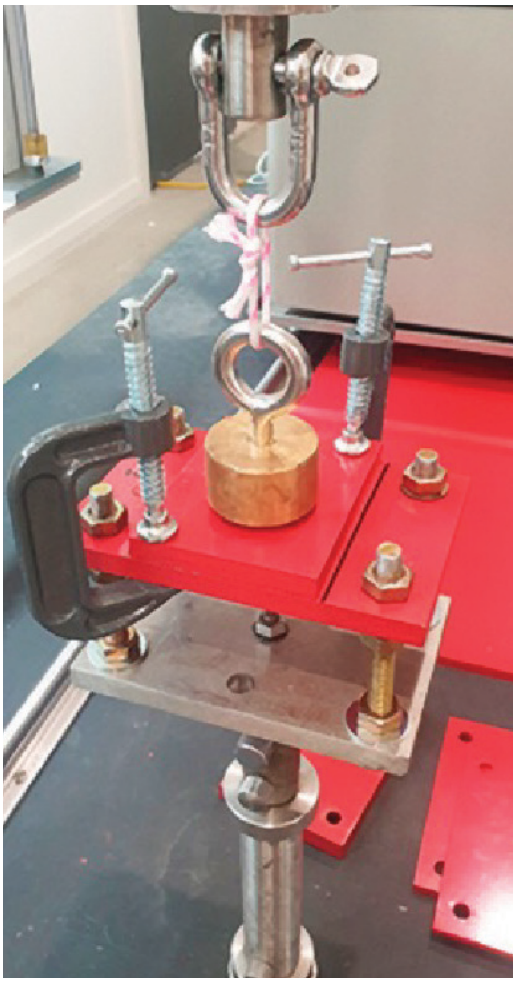
**RESULTS TO DATE - NO REDUCTION IN MAGNET HOLDING FORCE AFTER SIX MONTHS OUTDOOR EXPOSURE**

## Effect of Temperature on the Performance of Magnefast Magnet

Magnefast holding force has been tested at a range of temperatures including -40°C, +25°C, +50°C & +100°C

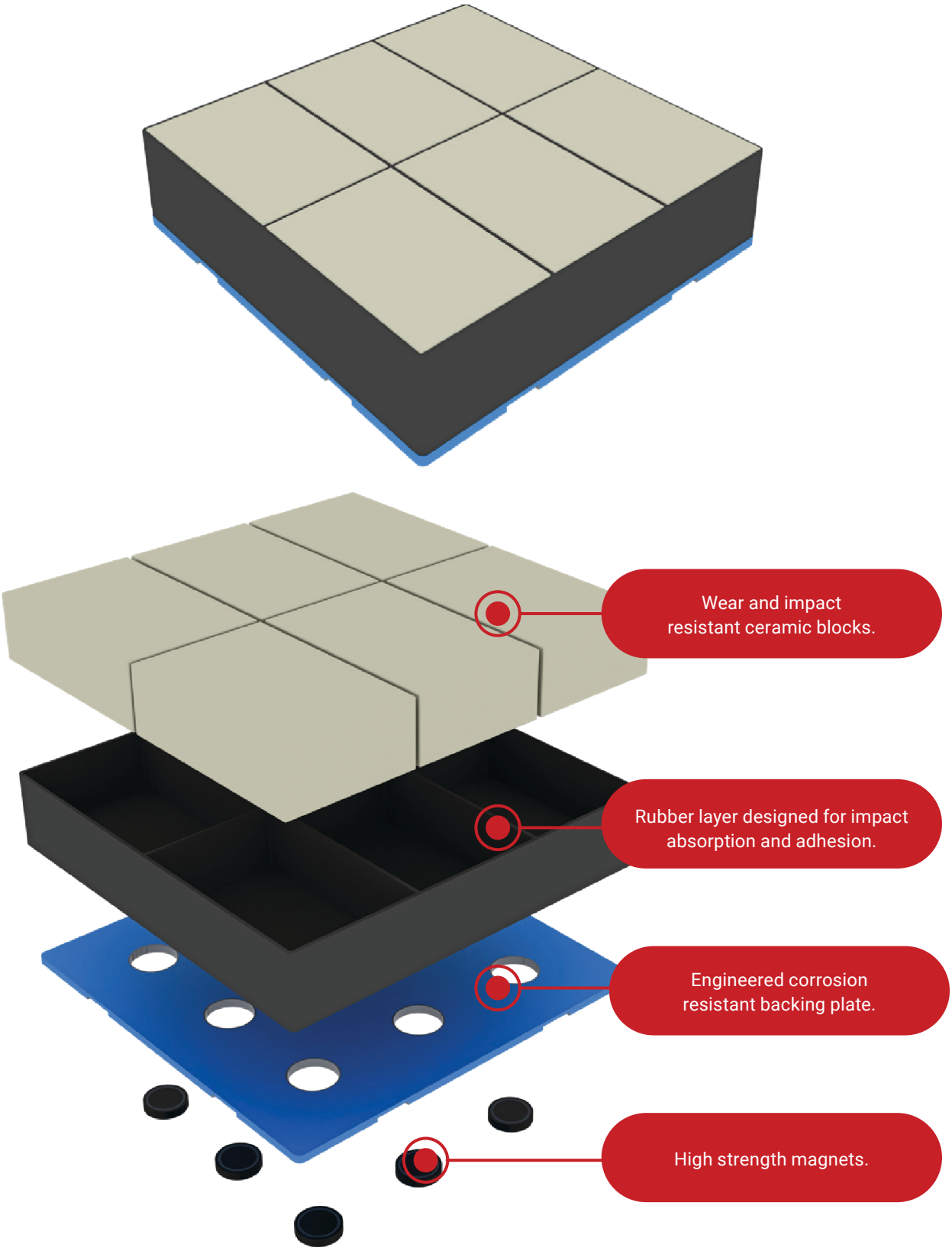
| TEMPERATURE | | MAGNET FORCE | |
|---|---|---|---|
| | | (kgf) | (lbf) |
| - 40°C | - 40°F | 53.5 | 118 |
| + 25°C | + 77°F | 53 | 116.8 |
| + 50°C | + 122°F | 52.3 | 115.3 |
| + 100°C | + 212°F | 51.7 | 114 |

Results are the average of five tests on multiple magnets at each temperature. The same magnets have been tested at each temperature.



# Single Sided Attachment - Ceramic Liners

Ceramic wear panels 100% rubber tear bond backing plate.



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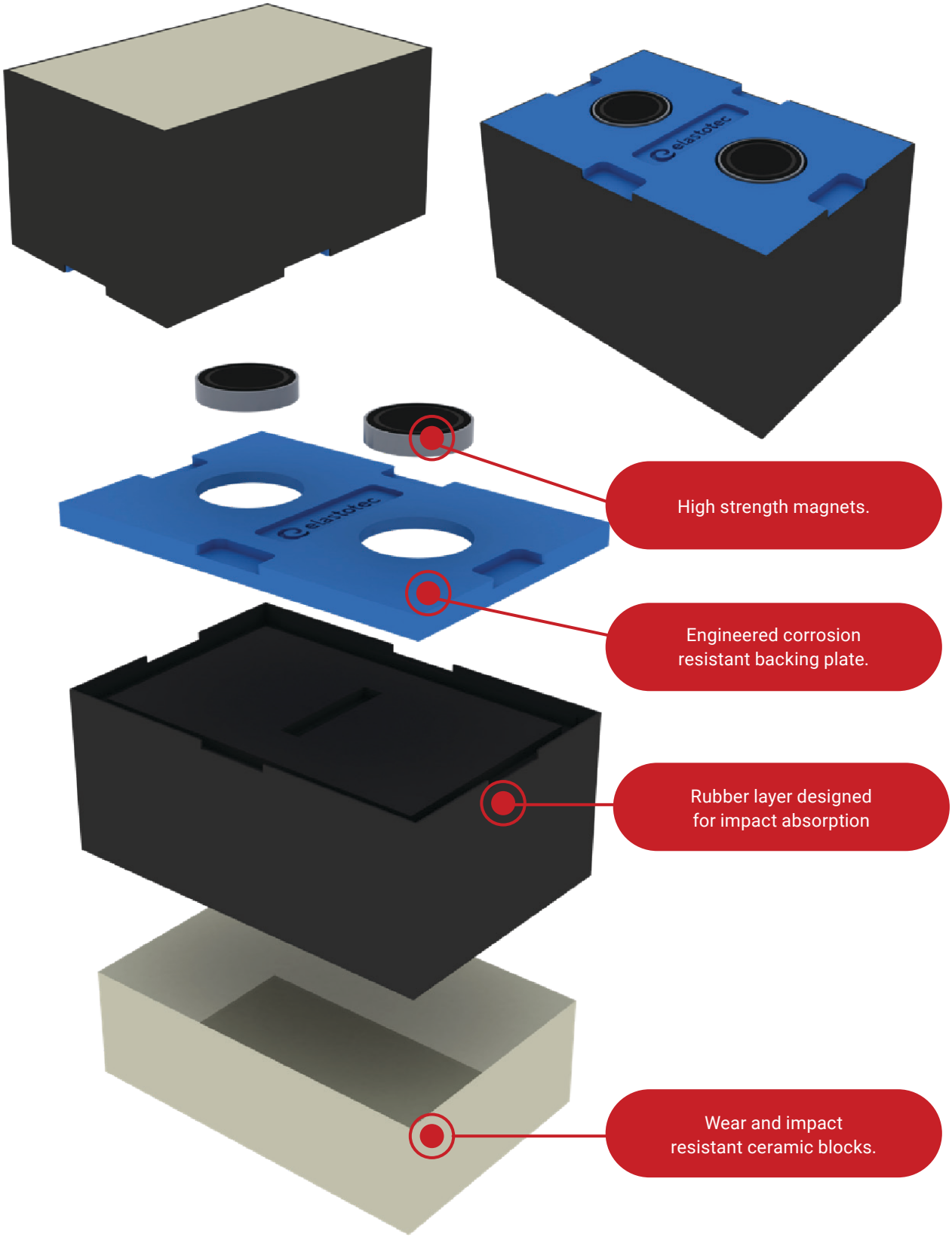
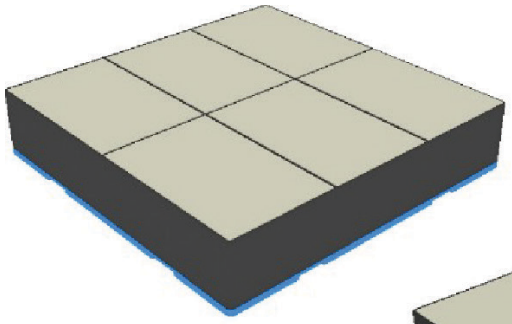


# Design

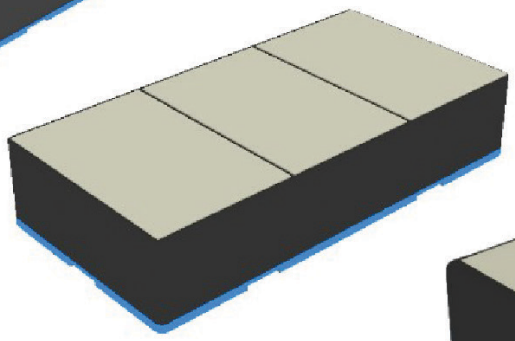
## Elastotec has a developed a range of high performance ceramic wear panels for use in the mining industry.

Based on composites of state-of-the-art ceramics, high strength, high resilience elastomer and mild steel and engineering thermoplastic (ETP) backing plates the Elastotec wear panels are precision vacuum moulded. This ensures a rubber tear bond is obtained between the rubber and the ceramic tiles and the rubber and the polymer backing plates. The 100% rubber tear bonding ensures that the ceramic tiles are retained in the panel even under the most arduous operating conditions.

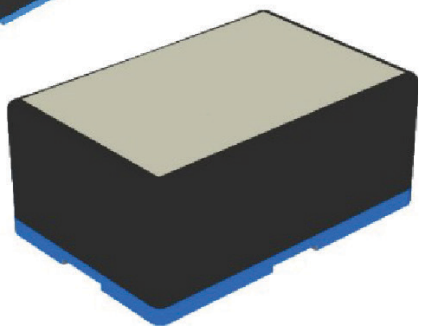
**300 x 300 mm.**
**12”x 12”**



**300 x 150 mm.**
**12” x 6”**



**150 x 100 mm.**
**6” x 4”**



| Overall panel thickness (mm) | (in) | Ceramic thickness (mm) | (in) | Rubber thickness (mm) | (in) | ETP backing plate thickness (mm) | (in) |
|---|---|---|---|---|---|---|---|
| **25** | **1** | 12 | 1/2 | 5 | 1/5 | 8 | 5/16 |
| **38** | **11/2** | 25 | 1 | 5 | 1/5 | 8 | 5/16 |
| **63** | **21/2** | 50 | 2 | 5 | 1/5 | 8 | 5/16 |

# Ceramics

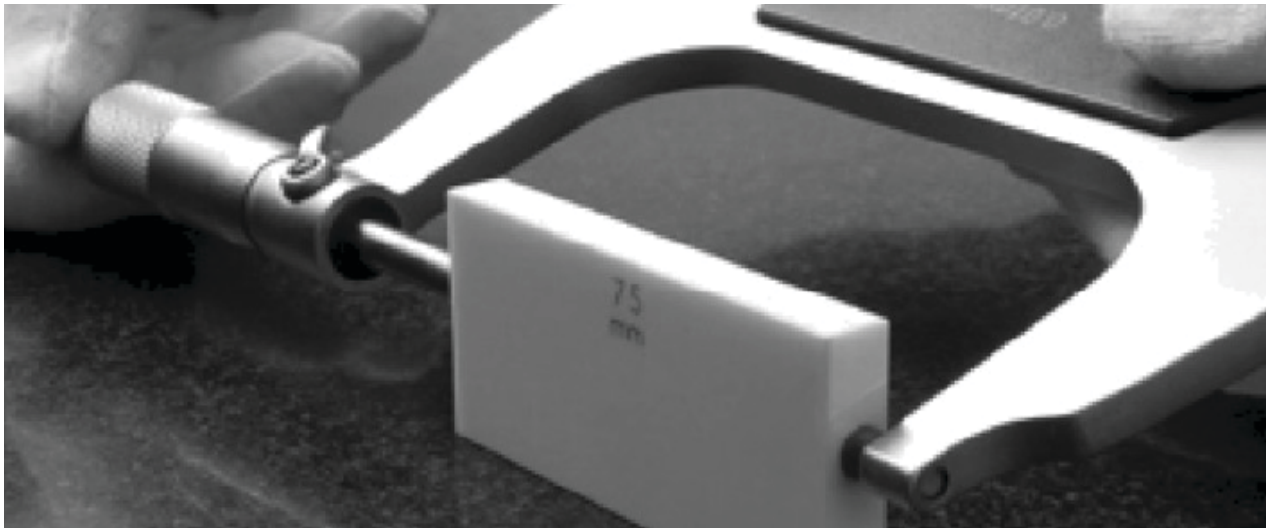
Elastotec has formulated a range of wear resistant ceramics. In house ability to test key ceramic properties including Vickers Hardness, Flex Crack Toughness and Wear Resistance has enabled Elastotec to optimise the ceramic performance and confirm these properties on each production batch. Elastotec wear panels can be made in a range of ceramic materials to suit a variety of end use applications.

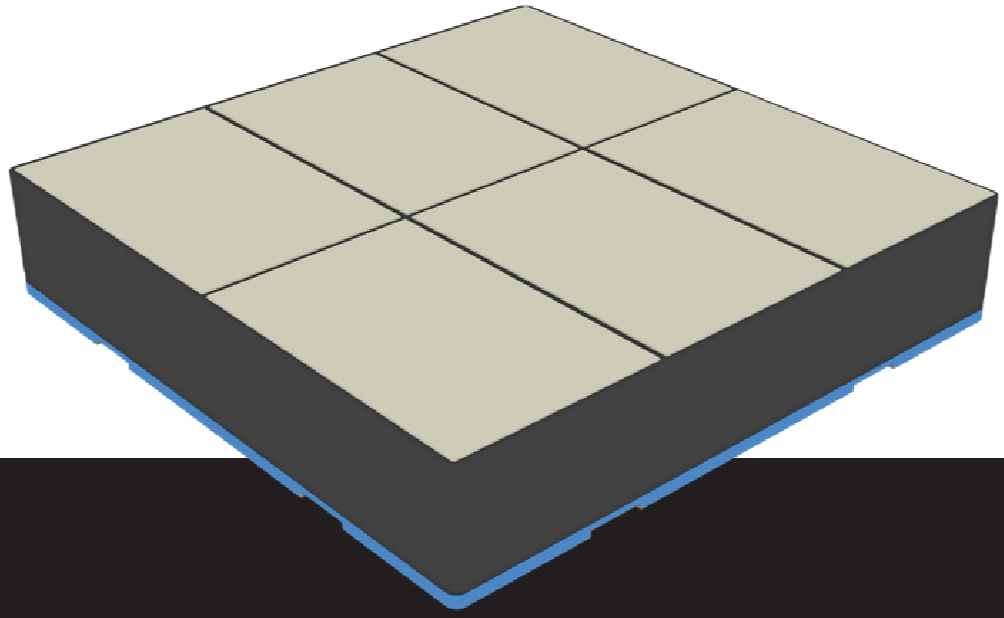
| | | |
|---|---|---|
| **Aluminium oxide Al203** | 92% | Economic cost with reasonable wear resistance. |
| **Aluminium oxide Al203** | 96% | Improved wear resistance. |
| **Aluminium oxide Al203** | 99% | Highest hardness, highest wear resistance grade of aluminium oxide. |
| **Toughened aluminium oxide** | ZTA | Aluminium oxide with improved fexural crack resistance - used in applications that require some impact resistance and exceptional wear resistance. |
| **Zoncronium oxide ceramic** | YTZ | Combines very good abrasion resistance with exceptional flex crack toughness. |

# Ceramic Oxide Properties

Typical values

| Material | AL2O3 92% | | AL2O3 95-97% | | AL2O3 99% | | ZTA Toughened Aluminia Oxide | | ZIR | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Density (g/cc3) (lb/ft3)** | **3.60** | 225 | 3.77 | 235 | 3.83 | 239 | 4.10 | 256 | 4.10 | 256 |
| **Flexural strength (Mpa) (psi)** | **220** | 31,908 | 300 | 43,511 | 330 | 47,860 | 400 | 58,000 | 400 | 58,000 |
| **Impact resistance (Mpa m1/2)** | **3.70** | 50 | 4.10 | 5 | 4.20 | | 4.50 | | 7.50 | |
| **Vickers hardness (Hv20)** | **950** | | 1150 | | 1200 | | 1350 | | 1350 | |
| **Wear resistance (cm3)** | **0.25** | | 0.16 | | 0.10 | | 0.05 | | 0.05 | |





# Rubber

Elastotec has a strong background and knowledge of elastomers. The elastomer is the lowest cost raw material in a ceramic wear panel but provides critical functions of retention of the ceramic tiles and cushioning from impact. Elastotec has developed a high strength ( >20 Mpa Tensile Strength), high resilience ( >60% resilience) elastomer with in built adhesion promoters. As with the ceramics Elastotec has in house testing capability for all these elastomer physical properties and can guarantee 100% rubber tear bonds between the ceramic and the polymer backing plate for each and every panel.

## Typical Elastomer Properties

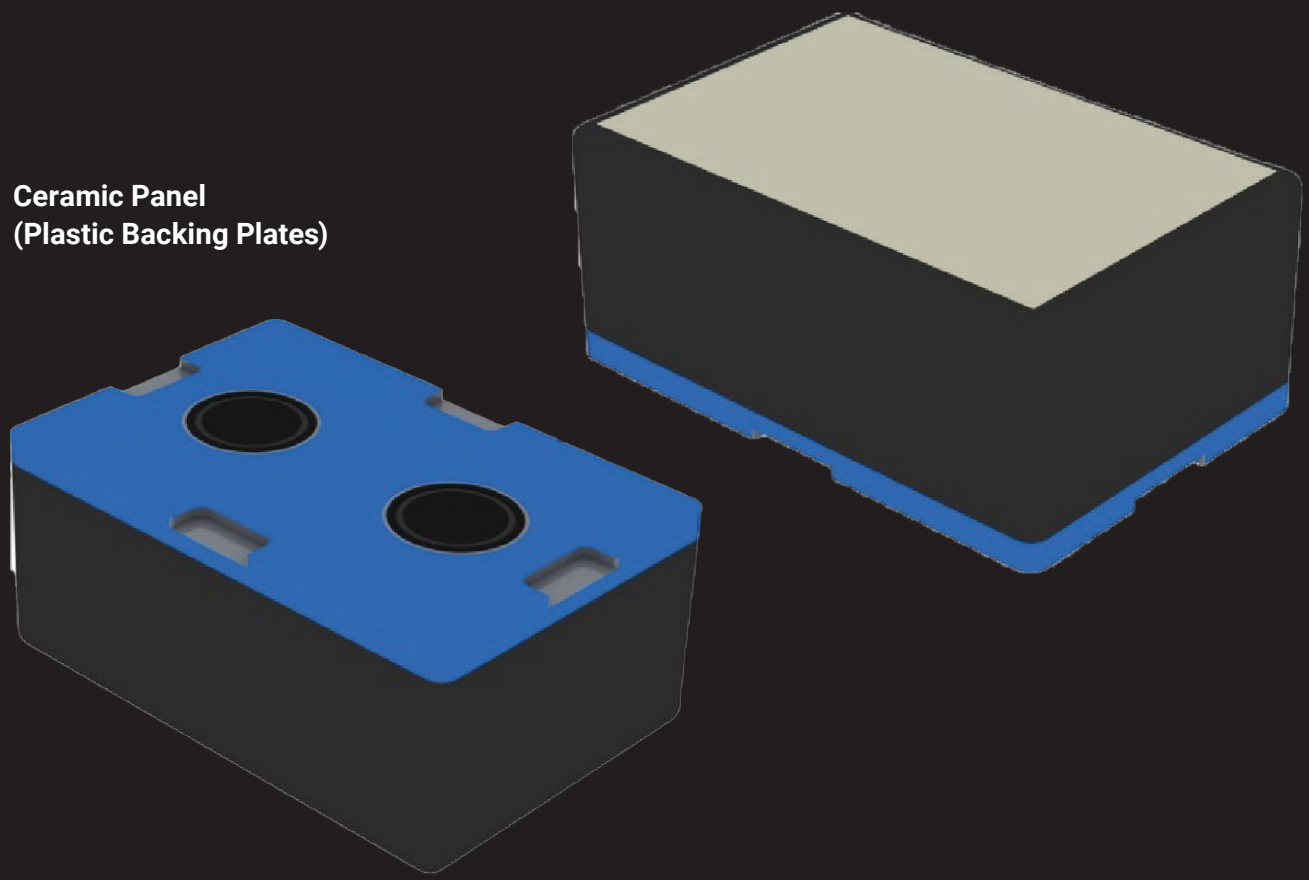
Typical values

| | | |
|---|---|---|
| **Tensile strength** | **20 Mpa** | **2900 psi** |
| **% Elongation** | 550% | |
| **Hardness** | 55+/-5 | |
| **Resilience** | 60% | |
| **Abrasion loss DIN53516** | 100 mm3 | 0.006 in3 volume loss |

# Backing Plates

Elastotec has backing plates available in mild steel and also engineering thermoplastic (ETP). The ETP offers a number ofunique features - reduced weight, corrosion resistance, increased impact resistance and reduced cost. For many years the automotive and appliance industries have been using engineering thermoplastics as metal replacements to reduce cost and increase performance. Elastotec is applying this technology to the wear panels it manufactures to provide the same benefits to the mining industry.

**Ceramic Panel**
**(Plastic Backing Plates)**



# Single Sided Attachment - Steel Liners

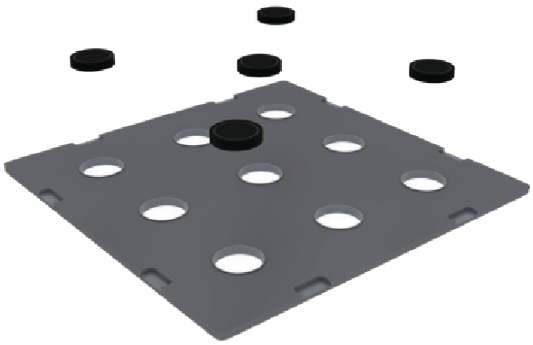
Steel wear panels attached to steel backing plate via plug welding. Any type of steel wear liner can be used with Magnefast:

- Quench & Tempered plate
- Chrome Carbide overlay plate.
- Domite
- Ni-Hard
- Creusabro

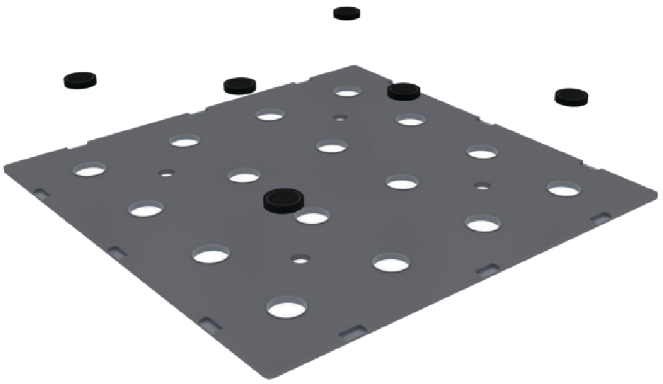
**150 x 100 x 8 mm**
**6” x 4” x 5/16”**

**150 x 300 x 8 mm.**
**6”x12” x 5/16”**

**300 x 300 x 8 mm.**
**12” x 12” x 5/16”**



**500 x 500 x 8 mm**
**20”x20”x 5/16”**



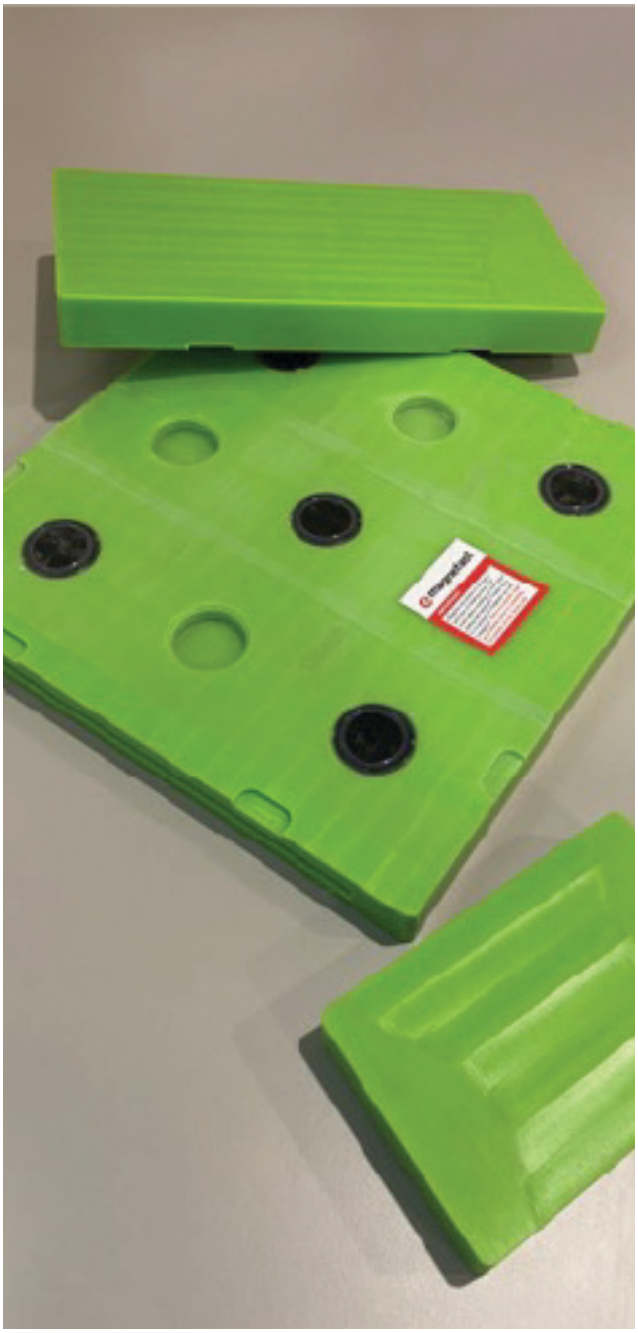
# Single Sided Attachment - UHMWPE Liners

Elastotec has a developed a range of high-performance UHMWPE wear panels for use in bulk materials handling.

Based on WearPro Plus UHMWPE polymer that combines extreme low co-efficient of friction, abrasion resistance and excellent physical properties. Magnefast UHMWPE Wear panels are machined from a solid sheet and have the high strength magnets mounted directly into the back of each panel. Recessed lugs on each edge enable easy panel removal using a mini pry bar.

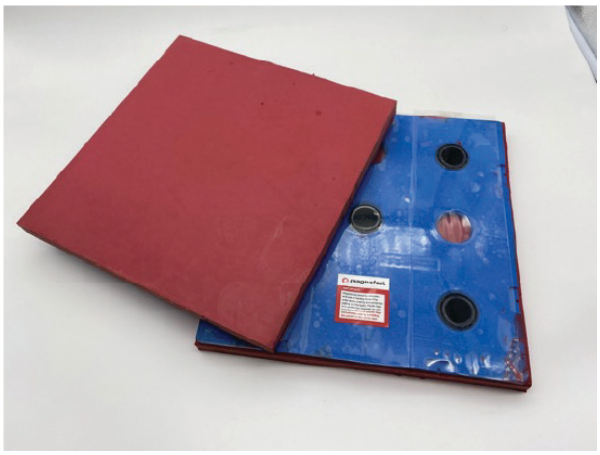
Magnefast UHMWPE wear liners are ideal for handling sticky materials. The extreme low friction UHMWPE surface resists sticking and/or build up better than any other material.

| | |
|---|---|
| **Tensile strength** | >24.0 |
| **% Elongation** | >280% |
| **Impact Strength (KJ/m2)** | > 70 |
| **Co-efficient of Friction** | 0.12 |
| **Abrasion loss DIN53516 (mm3 vol loss)** | < 20 |

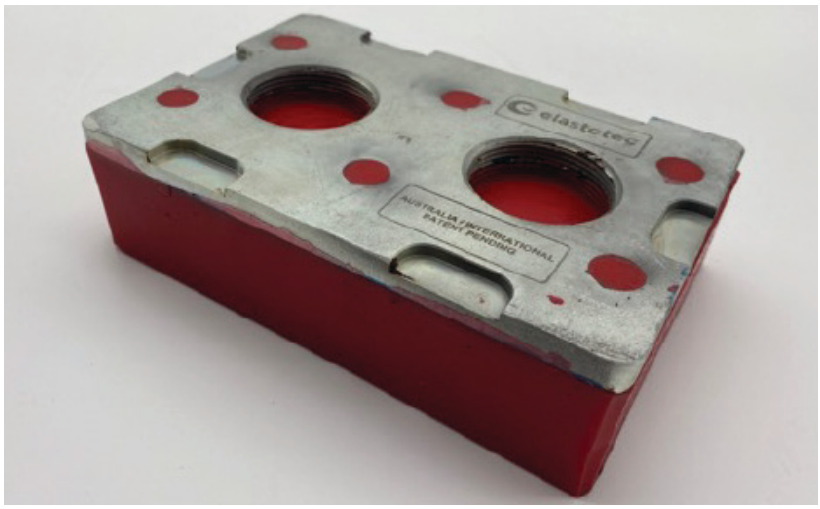


## Single Sided Attachment - Rubber Liners

Rubber wear liners in any type of rubber (Linatex, Linard) can be prepared by cold bonding the rubber material to the Magnefast ETP (Engineering Thermoplastic) backing plate. The ETP backing plate is light weight, corrosion resistant and is suitable for operating conditions from -50C to +110 C. Magnets can then be added to the required locations in the backing plate. The ETP backing plates have moulded recesses for ease of liner removal with a small pry bar.



## Single Side Attachment - Polyurethane (PU) Liners



PU wear liners can be prepared using hot cast PU and a Magnefast steel backing plate. Strong bonds between the hot cast PU and the steel backing plate can be achieved and panels are suitable for operating conditions ranging from -50 C to +110 C. Physical properties for the PU are shown in the table:

Magnets can be added to the required locations in the backing plate. The steel backing plates have moulded recesses for ease of liner removal with a small pry bar.

| | |
|---|---|
| **Tensile strength** | >30.0 |
| **% Elongation** | >200% |
| **Tear Strength (N/mm)** | > 30 |
| **Hardness (Shore A)** | 85-90 |
| **Abrasion loss ISO4649 (mm3 vol loss)** | < 30 |
| **Adhesion PU- Steel (N/mm)** | >15 |

## Studded Wear Panels

Elastotec can also manufacture wear panels with a studded attachment option, providing a reliable solution for applications where mechanical fastening is required. This option ensures secure installation in high-impact or high-vibration environments.

# The Next Generation in Wear Panel Solutions

magnefast™
An elastotec™ brand

TSGlobal
Conveyor & Polyurethane Specialists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