Impact Resistant Polyurethane Plates

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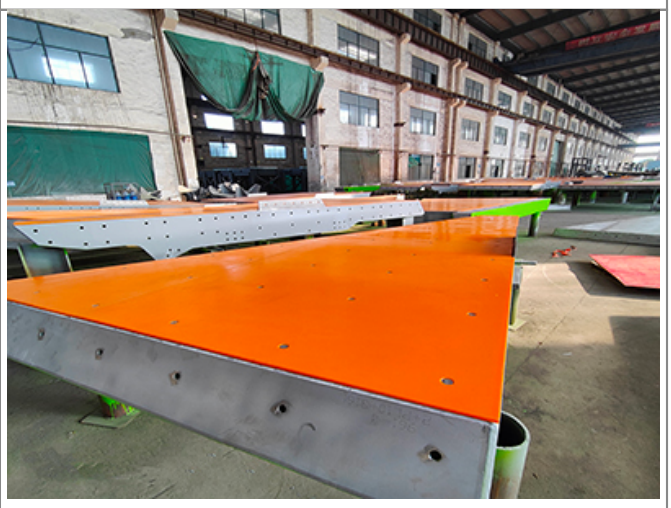
Thumb	
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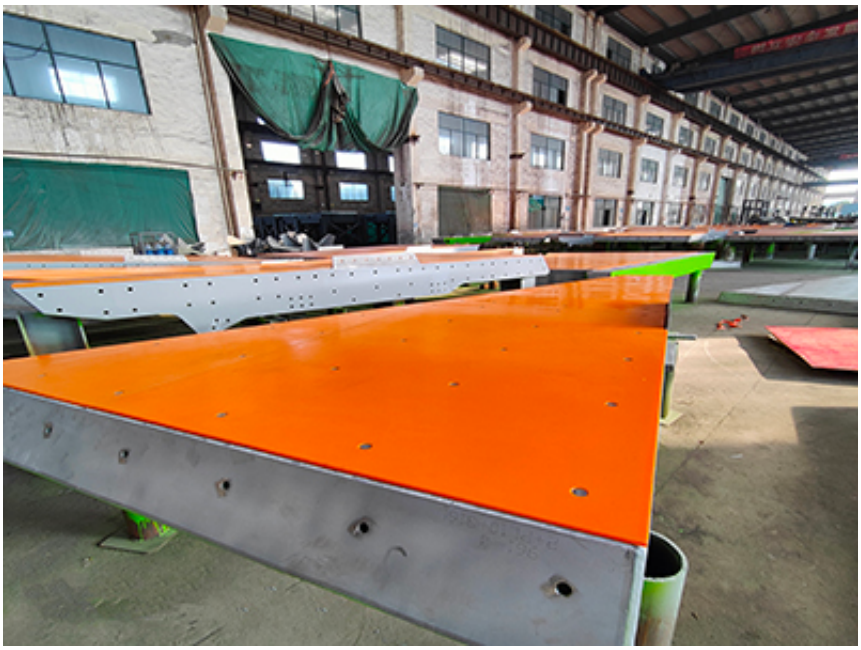
Description

Anti-Collision Plates are engineered from high-performance polyurethane elastomers using specialized precision casting technology. This advanced material seamlessly integrates extreme mechanical protection (high rebound, exceptional wear resistance, high shock-absorption capacity) with superior physical barrier properties (high closed-cell waterproofing, ultra-low thermal conductivity, and self-extinguishing flame retardancy). Breaking through the limitations of traditional single-function protective materials, it serves as an indispensable multi-functional solution for modern heavy-duty logistics, extreme marine engineering, rail transit, and high-standard structural architectures.



Core Physical & Chemical Features

1. Heavy-Duty Anti-Collision & Instant High Rebound: Featuring a unique microphase-separated molecular structure, the plates instantaneously absorb and dissipate high-impact energy from heavy forklifts or marine vessels. Upon unloading, the exceptional elastic deformation recovery rate ensures a rapid return to its original shape without permanent plastic deformation during long-term service.

2. Industrial-Grade Wear & Tear Resistance: The abrasion resistance of polyurethane elastomers ranks at the top of synthetic materials. Boasting an extremely low Akron abrasion loss and superior resistance to mechanical tearing and gouging, it maintains a flawless surface even under high-frequency friction and sharp scrapes.

3. Closed-Cell Thermal Insulation: The internal micro-structure consists of highly dense, uniform closed cells, yielding an ultra-low thermal conductivity between $0.018 sim 0.023 text{ W/(m·K)}$. This allows the thickness of the protective layer to be significantly reduced while achieving identical insulation performance, optimizing space utilization.

4. Hydrophobic "Lotus Effect" Moisture-Proofing: With a closed-cell rate exceeding 90%, the material exhibits native water-repelling traits. The surface mimics the hydrophobic "lotus effect," causing liquid water to bead and slide off instantly. It maintains peak mechanical and insulation performance even under prolonged high-humidity or submerged conditions.

5. Flame Retardancy & Intumescent Carbonization: By incorporating high-efficiency, eco-

friendly flame retardants into the polymer matrix, the material achieves a softening point exceeding 250°C. Upon exposure to open flames, a dense, inert carbonized layer forms instantly on the surface, cutting off oxygen and heat transfer to isolate the core, ensuring self-extinguishing safety without generating toxic dense smoke.

6. Lightweight, High-Strength & Vibration Damping: With a density only approximately 1/8 of traditional steel components, it substantially reduces the dead load on substrate structures. Concurrently, its polymeric elastomeric network provides excellent acoustic impedance matching, effectively absorbing and dampening low-to-medium frequency solid-borne sounds and mechanical vibrations.

Technical Datasheet

Test Item
Hardness (Shore)
Thermal Conductivity
Closed-cell Rate
Compressive Strength (@ 10% deflection)
Tensile Strength
Akron Abrasion Volume Loss

Test Item
Max. Safe Service Temperature
Chemical Resistance

Core Application Scenarios

1. Heavy-Duty Logistics Warehousing & Smart Automated Storage (AS/RS)

Key Pain Points: High-frequency forklift impacts warping rack columns; temperature leakage in cold-chain storage; frequent failure of conventional rubber bumpers.

Solution: Custom-fitted onto heavy-duty rack column bases, aisle intersections, and loading dock edges. The ultra-high rebound capability withstands aggressive impacts, preventing structural deformation of steel racking. In cold-chain logistics, its dense closed-cell matrix eliminates thermal bridging when deployed as integrated anti-collision insulation panels for cold-room doors and transition zones, utilizing a lightweight setup at 1/8 the weight of steel.

2. Modern Multi-Functional Buildings & High-End Industrial Facilities

Key Pain Points: Water absorption ruining roof insulation; vulnerability of exterior walls to impacts; poor fire-retardant safety in traditional insulations.

Solution: Functions as an integrated "4-in-1" board providing roofing/exterior wall insulation, waterproofing, impact protection, and flame retardancy. By replacing tedious multi-layered traditional steps (insulation + waterproof membranes + protection layer), it reduces overall installation schedules by nearly 50%. Its high softening point (>250°C) and surface carbonization provide a strict safety barrier, ensuring stable thermal performance even in perpetual dampness.

3. Urban Rail Transit & Subway Tunnel Engineering

Key Pain Points: High-frequency solid-borne vibrations in underground spaces; noise pollution in neighboring zones; strict, zero-compromise fire safety regulations.

Solution: Anchored to rail track beds, sensitive tunnel sidewalls, and pump station foundations. The high acoustic impedance and damping traits of the polyurethane network rapidly suppress vibration energy during train passages, significantly diminishing solid-borne noise. Its premium flame-retardant properties fully satisfy strict confined-space fire safety codes for underground transit systems.

4. Extreme Marine Engineering & Offshore Drilling Platforms

Key Pain Points: Persistent high-salinity seawater corrosion; high-energy vessel berthing impacts; exorbitant replacement and maintenance costs.

Solution: Applied as heavy-duty fender liners or protective subsea armor modules on offshore jacket structures, berthing zones, and marine pipeline interfaces. This material possesses native resistance to salt spray, marine bio-degradation, and UV aging, eliminating the need for periodic repainting. During heavy vessel berthing under rough sea states, it absorbs immense impact energy to protect both the platform structure and the hull, yielding a service life that far outlasts traditional rubber or nylon.