



Concrete Mattress Load Capacity

Concrete mattress systems are designed to provide erosion protection, stabilization, and load distribution over varying soil conditions. While the system offers excellent compressive strength, it is not intended to support concentrated loads from heavy machinery, such as skid steers, excavators, or other tracked or wheeled equipment.

Load Analysis Example

As a reference, a typical skid steer weighing approximately **3 tons ($\approx 6,600$ lb)** with an estimated **wheel contact area of 0.5 m^2 ($\approx 775 \text{ in}^2$)** exerts a concentrated pressure of roughly **0.06 MPa ($\approx 8.5 \text{ psi}$)**. Even in an **unreinforced configuration**, the concrete mattress can withstand this **direct compressive pressure** without structural failure.

Primary Consideration: Subgrade Support

The **critical factor** in determining the system's performance under heavy equipment is the **bearing capacity of the underlying soil**.

- If the subgrade is **stiff and well-compacted**, the load is effectively distributed, minimizing risk of deformation.
- If the subgrade is **soft, weak, or poorly compacted**, **localized punching or settlement** may occur. In such cases, damage may result even if the concrete itself remains intact.

The overall stability and durability of the system therefore depend on both the **concrete strength** and the **support provided by the soil** beneath it.

Recommendations

- Evaluate **subgrade bearing capacity** prior to allowing equipment traffic.
- Consider **temporary load distribution measures** (e.g., mats or plates) if heavy equipment must traverse the surface.
- For long-term or repetitive loading, conduct a **project-specific engineering assessment** to confirm system suitability.

Conclusion

While the concrete mattress can resist compressive loads typical of light to moderate equipment, **its performance under heavy machinery depends primarily on subgrade conditions**. Proper evaluation of both the concrete and the supporting soil is essential to ensure safe and reliable performance.