



Spartan Mat STRUXURE® Heavy Duty SR Mats With Steel Flitch-Plate Reinforcement and Matlok® Hardware Systems

Spartan's STRUXURE® SR Heavy Duty Mats made from our structural polymer composites (SPC), when combined with reinforced ¼" or ½" steel flitch plates, and MatLok® hardware systems. These predictable pre-engineered mats are lighter, stronger, longer lasting and do not lose strength in wet conditions. STRUXURE® SR Heavy Duty Mats can support more load than traditional 12" hardwood lumber mats for use under heavy equipment in wet or challenging or environmentally sensitive project site conditions.

Product Comparison	Weight (lbs)	Fc Perp Compression Perp. Grain (psi)	E Elastic Modulus (psi)	Fb Allowable Stress (psi)	E*I (kip*in^2) Full Section Timbers
12"x4'x20' & 24' Select Structural Red Oak Wet Use Reductions Applied ⁽¹⁾ , Limited Availability	20'/4,000 24'/4,800	550	1,100,000	1,150	7,600,000
12"x4'x20' & 24' No. 2 Beech-Birch-Hickory Wet Use Reductions Applied ⁽¹⁾ , Mixed HW in market	20'/4,000 24'/4,800	480	1,100,000	765	7,600,000
7"x46"x20' STRUXURE® Heavy Duty Mat (5) pcs SPC, (4) ¼" Flitch Plates, (8) Matlok® Sets	2,700	4,500 ⁽²⁾	Mixed ⁽³⁾	3,000	4,500,000 ⁽⁴⁾
9"x51"x24' STRUXURE® Heavy Duty Mat (7) pcs SPC, (4) ½" Flitch Plates, (9) Matlok® Sets	4,820	6,000 ⁽²⁾	Mixed ⁽³⁾	4,500	8,000,000 ⁽⁴⁾

1. Hardwood Lumber Information Source – American Wood Council NDS Supplement 2015 Edition for 5"x5" and larger timbers. Wet Use Adjustment Factors applied – Fb @ .85, Fc perp @ .67, E @ .90. Weight and performance varies with moisture content and rate of deterioration
2. Design values shown are calculated for SPC members only as steel plates are isotropic and have no grain. Figures shown assuming standard load distribution between SPC (Perp. Compression = 1,200 psi, Allowable Stress=1100 psi) and steel plates.
3. Composite material using both SPC (E=350,000 psi) planks and steel flitch plates (E=29,000,000 psi)
4. Calculated E values based on composite action between mat components (SPC, plates, reinforced MATLOK bars)

The above comparison demonstrates the structural properties advantages comparing a STRUXURE® steel reinforced recycled structural composite mat versus a 12" select structural red oak and 12" mixed hardwood mat. The 12" mixed hardwood mat is comprised assuming a published scenario between beech, birch, hickory or other available timber hardwood species. When compared side by side, the additional weight from the flitch plate in a Spartan composite mat is offset by dramatically higher compressive capacity and flexural resistance with added stiffness, increasing their load carrying capacity and performance in both soft and uneven soils.

The reinforced SPC mat is a composite structure combining the rigidity and tensile strength of A36 steel plates and high performance MatLok® hardware with the toughness, environmental stability, compressive strength and lateral buckling stability from the thermoplastic STRUXURE® beams. 7" SR SPC mats with ¼" plates perform similarly to thicker 12" timber mats with full soil support 3/17/173/17/17, and weigh up to 25% less!, offering lower transportation costs. 9" SR SPC mats with ½" steel plates exceed 12" timber mats capacity in all applications! In field use, these reinforced mats can be expected to perform as follows (calculated using the soil bearing capacity method):

Minimum Allowable Soiling Bearing Capacity, STRUXURE® SR Heavy Duty Mat 7"x46"x20' (1/4" x 4) & MatLok® Hardware

Load (lb)	Width Tire or Tread on Mat (in)						
	6"	12"	18"	24"	30"	36"	45"
100,000	2100 PSF	2000 PSF	1750 PSF	1600 PSF	1400 PSF	1200 PSF	1100 PSF
140,000	3700 PSF	3400 PSF	3000 PSF	2650 PSF	2500 PSF	2350 PSF	2200 PSF
200,000	5800 PSF	5600 PSF	5400 PSF	5200 PSF	5100 PSF	4900 PSF	4800 PSF

Minimum Allowable Soiling Bearing Capacity, STRUXURE® SR Heavy Duty Mat 9"x51"x20' & 24' (1/2" x 4) & MatLok® Hardware

Load (lb)	Width Tire or Tread on Mat (in)						
	6"	12"	18"	24"	30"	36"	48"
100,000	1700 PSF	1550 PSF	1350 PSF	1175 PSF	1000 PSF	900 PSF	800 PSF
140,000	3250 PSF	2900 PSF	2550 PSF	2150 SF	2000 SF	1800 SF	1600 SF
200,000	5300 PSF	4900 PSF	4400 PSF	3900 SF	3600 SF	3450 SF	3100 SF

Steel reinforced Spartan STRUXURE® Heavy Duty composite mats are stronger and lighter than hardwood mats and do not lose structural integrity when wet. At 12" thick when dry, a standard heavy construction wooden mat is around 40% heavier than a 7" STRUXURE mat with the flitch plate. When comparing load carrying capacity, the picture becomes even more impressive for STRUXURE® reinforced mats:

Minimum Allowable Soiling Bearing Capacity, 12" Select Structural Red Oak Mat

Load (lb)	Width Tire or Tread on Mat (in)						
	6"	12"	18"	24"	30"	36"	48"
100,000	2250 PSF	2100 PSF	1950 PSF	1850 PSF	1750 PSF	1650 PSF	1500 PSF
140,000	4200 PSF	3800 PSF	3500 PSF	3300 PSF	3000 PSF	2800 PSF	2500 PSF
200,000	7700 PSF	7100 PSF	6500 PSF	5800 PSF	5300 PSF	4900 PSF	4400 PSF

A 12" thick dry use select structural red oak mat (E=1,200,000 psi, Fb=1350 psi, Fc perp=820 psi) performs very similarly to a 7" mat with steel reinforcing plates with full soil support at a significantly lighter weight per foot! This scenario is with a best case scenario, as it assumes a dry, select structural red oak if graded properly.

Note that the wood charts above assume the lumber at 12% moisture content, or dry conditions. If the lumber used in a mat is green, or used for a prolonged period in a saturated environment, the boards will either contain or absorb excess water. It is important to remember that as wood absorbs moisture up and until its saturation point, it will LOSE allowable stress (Fb) as well as stiffness (E) by as much as 67% from maximum values. This is direct contrast to structural thermoplastic such as STRUXURE® products that will never change structural properties due to the environment. Finally, wood products can be treated with and contain toxic preservative materials such as creosote, chromated copper arsenate (CCA), ammoniacal copper zinc arsenate (ACZA) and ammoniacal copper arsenate (ACA) that can leach out of the lumber and into the environment in direct contrast to STRUXURE® thermoplastics which remain inert and unchanged by the environment they occupy.

The 12" timber mats most commonly found in the market today are made from mixed hardwoods. The strength of these mats in dry use is estimated at (E=1,200,000 psi, Fb=725 psi, Fc perp=715 psi), but the structural properties of mats being produced today should be confirmed by the manufacturer as various types, grades and section sizes of hardwood lumber are being used in 12" mats.

Minimum Allowable Soiling Bearing Capacity, 12" No. 2 Beech-Birch-Hickory Mixed Hardwood Mat

Load (lb)	Width Tire or Tread on Mat (in)						
	6"	12"	18"	24"	30"	36"	48"
100,000	2600 PSF	2500 PSF	2300 PSF	2150 PSF	2000 PSF	1800 PSF	1700 PSF
140,000	4800 PSF	4500 PSF	4100 PSF	3900 PSF	3500 PSF	3100 PSF	2800 PSF
200,000	9100 PSF	8500 PSF	7300 PSF	6600 PSF	6000 PSF	5500 PSF	4700 PSF

Advantages of STRUXURE® Steel Reinforced Heavy Duty Mats

- Engineered product made from recycled plastic waste, steel plates and high performance Matlok® hardware
- No loss of structural integrity or rot when wet!
- Weighs less than timber mats resulting in more square footage of ground cover per shipment and lower freight costs per mat
- Estimated 5x or greater the service life of mixed hardwood lumber mats
- Resistant to salt and most chemicals
- Does not absorb, retain or release chemicals or liquids – can be washed repeatedly with no effect!
- Can be recycled again at the end of their useful life
- Local prompt shipment inventory available for purchase or rental