



# TIRES

Tires are crucial for enabling users to propel independently and efficiently. Understanding the wheelchair user's lifestyle, environment, and goals aids in selecting the best option. Paying close attention to features like material, tread, and maintenance requirements will help identify the ideal selection.

## TIRE OPTIONS

### SOLID/URETHANE

Solid tires perform well on indoor flat surfaces and require little maintenance. However, there is limited shock or vibration absorption, and traction. This can lead to bumpy and potentially uncomfortable rides outdoors. Solid tires, in general are heavier than pneumatics and have been found to have increased rolling resistance.

### PNEUMATIC WITH AIRLESS INSERTS

This option is a polyurethane insert inside a standard pneumatic tire. This reportedly allows for a softer ride than a solid tire, without the maintenance of an air tire. This option will have the most rolling resistance and will be the heaviest.

### PNEUMATIC/AIR

Air tires are the optimal choice for propulsion efficiency, traction and comfort. Clinically, the smoother ride can help with pain control, spasm management etc. While air tires require some maintenance, the benefits typically outweigh this effort. Tires should be checked weekly. Tire inflation is needed 1-2x per month.

# TIRE FEATURES

**WIDTH:** With proper inflation, wider tires will naturally have lower pressure, have a larger contact patch, and good traction and control. Narrow tires will have higher tire pressure and less rolling resistance but will have a smaller contact area on the surface, which could pose traction issues depending on the environment.

## PRO TIP:

With all else equal, high-pressure pneumatic tires have less rolling resistance. Typically, high pressure tires are 1" in width, which may not be suitable for all environments. Above all else, matching the tire to the environment has the greatest impact on performance.



**TREAD:** A smooth tire is best for speed and maneuverability indoors. Low or medium treads have ridges or deeper channels and are more diverse allowing for transition between smooth and uneven surfaces. A larger tread with a more intricate pattern will be better for traction on outdoor and wet surfaces.

## PRO TIP:

Some tires have directional treads. There is limited research to say if this has a significant impact on efficiency. The general opinion is that a directional pattern may clear debris and water away better and is overall visually pleasing.



**WEIGHT:** The rear wheel is required to move and will therefore directly affect overall efficiency. A lighter rear tire will aid in decreasing overall rear wheel weight, therefore reducing energy expenditure during daily activities.

## PRO TIP:

When considering tire weight, it's essential to include the wheel and handrim weight as well. Being mindful of the cumulative impact helps in making informed choices for an optimal balance between weight and performance.



## PRO TIP:

The evidence is clear: air-filled tires are the most efficient. Even at 40% of recommended inflation, an air-filled tire rolls with less resistance than airless inert tires.<sup>1</sup>

Some users may choose to purchase a second set of tires and wheels to allow for better access to multiple terrains.




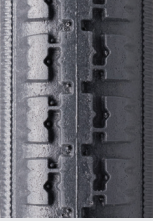

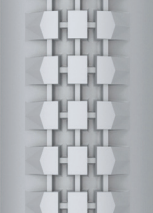
## PRO TIP:

If ordering as a second set of tires, it may benefit to order a size down in order to limit changes in rear seat to floor height and wheel locks

## Reference

<sup>1</sup> Joseph Ott, Holly Wilson-Jene, Alicia Koontz & Jonathan Pearlman (2022) Evaluation of rolling resistance in manual wheelchair wheels and casters using drum-based testing, Disability and Rehabilitation: Assistive Technology, 17:6, 719-730, DOI: 10.1080/17483107.2020.1815088.

## TIRE SPECIFICATIONS WITH IMAGES

TIRE OPTIONS	WIDTH	TREAD	WEIGHT <i>SINGLE 24" TIRE</i>	COLOR	CLINICAL JUSTIFICATION
<b>SOLID (see above rationale to include in justification for this option)</b>					
SOFT URETHANE LOW TREAD 	1 3/8"	Low Tread	1.5 lbs.	Black	<ul style="list-style-type: none"> <li>• Designed to be fully puncture proof and low maintenance.</li> <li>• Wears at a slower rate compared to pneumatics.</li> <li>• Higher tensile strength allowing it to carry heavier loads.</li> <li>• No maintenance requirements.</li> </ul>
SOFT URETHANE MEDIUM TREAD 	1 3/8"	Medium Tread	1.48 lbs.	Black	<ul style="list-style-type: none"> <li>• Designed to be fully puncture proof and low maintenance.</li> <li>• Will have increased traction on outdoor terrain compared to std. urethane.</li> <li>• No maintenance requirements.</li> </ul>
SOFT URETHANE – SHOX 	1"	No Tread, herringbone pattern	1.34 lbs.	Black	<ul style="list-style-type: none"> <li>• Designed to be fully puncture proof and low maintenance.</li> <li>• Performs best on hard indoor surfaces.</li> <li>• No maintenance requirements</li> </ul>
<b>PNEUMATIC (see above rationale to include in justification for this option)</b>					
PNEUMATIC WITH AIRLESS INSERTS 	1 3/8"	Medium Tread	2.64 lbs.	Black/Grey (dependent on sizing)	<ul style="list-style-type: none"> <li>• Designed to be fully puncture proof and low maintenance.</li> <li>• Heaviest tire option due to polyurethane insert.</li> <li>• Increased traction compared to solid tires.</li> <li>• Softer ride than solid tires due to air tire.</li> <li>• No maintenance requirements.</li> </ul>

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PNEUMATIC 	1 3/8"	Medium Tread	1.14 lbs.	Black/Grey (dependent on sizing)	<ul style="list-style-type: none"> <li>• Lower rolling resistance than solid tires.</li> <li>• The right amount of tire pressure can offer a softer ride over bumpy surfaces and provide that tactile grip for wet surfaces.</li> </ul>
PNEUMATIC HIGH PRESSURE, SPEEDLITE 	1"	Low Tread	0.62 lbs.	Black	<ul style="list-style-type: none"> <li>• Dual layer for extremely high puncture resistance.</li> <li>• High pressure achieves the least rolling resistance.</li> </ul>
PNEUMATIC HIGH PRESSURE, TRAILBLAZER 	1"	Medium Tread, directional	1.06 lbs.	Black	<ul style="list-style-type: none"> <li>• Dual layer for extremely high puncture resistance.</li> <li>• High pressure achieves the least rolling resistance.</li> <li>• Increased traction compared to low tread option.</li> </ul>
PNEUMATIC, LARGE TREAD 	2,1"	Large Tread	2.07 lbs.	Black	<ul style="list-style-type: none"> <li>• Puncture protection</li> <li>• Large tread increases traction on a variety of terrains</li> <li>• Provides versatility and grip without sacrificing ride comfort</li> </ul>

This is what is offered on Motion Composites order forms, principles can be applied to other market options.

SCAN HERE FOR OPTIONS AND ACCESSORIES GUIDE.



## TIRE SPECIFICATIONS WITHOUT IMAGES

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PNEUMATIC	1 3/8"	Medium Tread	1.14 lbs.	Black/Grey (dependent on sizing)	<ul style="list-style-type: none"> <li>• Lower rolling resistance than solid tires.</li> <li>• The right amount of tire pressure can offer a softer ride over bumpy surfaces and provide that tactile grip for wet surfaces.</li> </ul>
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