

## Whitepaper

# Electric Scissor Lifts: Why understanding floor loads and how they are measured is important

**Corey Connolly,**  
Skyjack Senior Product Manager

## Introduction

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Electric scissor lifts are used in a variety of applications and in a variety of environments. While they are designed to be used on firm hard surfaces, the type of surfaces they are used on can vary – concrete, asphalt, brick/stone, ceramic/porcelain tile, wood, and raised/access . Low level access, and the so called “micro” machine, is a growing sub-section within the electric scissor lift segment that has been reinforced by health and safety legislation, and work at height regulations - increasing the need to replace ladders and scaffold with safer, productive, compact, mobile access. Most of this need comes from indoor work requiring lightweight machines that can be transported within multi-level buildings (via standard elevator), operated in confined spaces and on weight sensitive floors.

Working on weight sensitive floors and being able to transport machines accordingly necessitates the need to understand the gross vehicle weight (GVW) and floor loading to recognize weight bearing limitations. Since a lot of the work is related to maintenance as opposed to initial construction there is also a need to protect finished, often decorative flooring. For these reasons it is important to understand how the floor loads are being measured.



# How is Floor Loading Measured?

When speaking to floor load measurements (all of which can be measured with or without a rated load in the scissor lift's platform) it is important to understand what is being referenced:

## WHEEL LOADS

- The weight that can be experienced on one wheel of the scissor lift
  - More than 25% of the machine weight due to weight distribution of the machine and weight in the platform
- Typically expressed in pounds (lbs) or kilograms (kgs)

## LOCAL FLOOR LOADING PRESSURES

- Local Concentrated Pressure (LCP) – The absolute area of the tire tread directly contacting the ground is identified and the measurement of how hard the scissor lift presses on that direct contact area is calculated
  - Typically expressed in pounds per square inch (psi) or kilopascals (kPa)
- Ground Bearing Pressure (GBP) – The area is calculated using the width and the length of the of the tire contact area, and the measurement of how hard the scissor lift presses on that contact area is calculated. This area assumes some compressibility of the ground surface and the tire into it.
  - Typically expressed in pounds per square inch (psi) or kilopascals (kPa)

## OVERALL FLOOR LOADING

- Overall Floor Load (OFL) Pressure – A measure of the average load the scissor lift imparts on the whole surface directly underneath the chassis. This is calculated by dividing the scissor lift weight by the overall floor area occupied by the scissor lift (on wheels)
  - Typically expressed in pounds per square foot (psf), kilopascal (kPa) or kilograms per square meter (kg/m<sup>2</sup>)

Comparing LCP and GBP values there is a noticeable difference between the two. The GBP is assuming some compressibility of the ground surface and direct contact with the tire area including all regions of the tread, thus providing a larger surface area and lower measurement value. The LCP measurement assumes no compressibility in the ground surface, ignores the deeper zones within the tire tread, and provides a smaller surface area with higher measurement value.

Figure 1 illustrates how this may be represented, when looking at a real example of a tire imprint area.

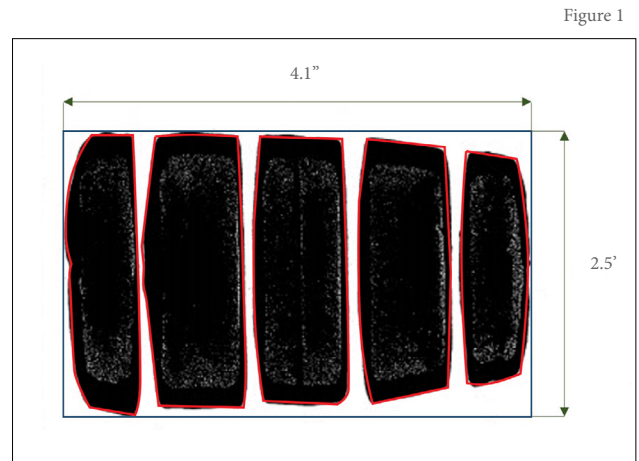


Figure 1

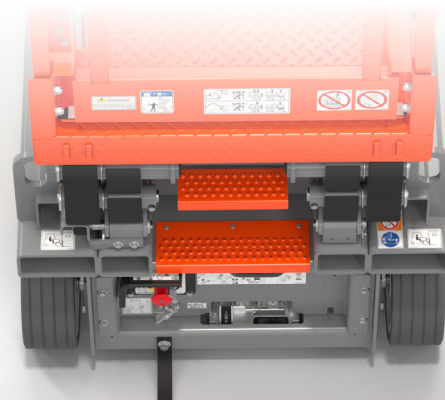
Machine tire imprint with rated load showing the actual contact area vs the approximate compressible contact area. As such; the tire area that exerts LCP is 8.68 in<sup>2</sup> (red boxes area) the tire area that exerts GBP is 10.25 in<sup>2</sup> (blue box area)

Figure 2 illustrates the difference these tire areas can have using a real world example for Skyjack's micro scissor lifts with rated load:

	Locally Concentrated Pressure (LCP)	Ground Bearing Pressure (GBP)
SJ3213 micro	152 psi (1,047 kPa)	103 psi (710 kPa)
SJ3219 micro	175 psi (1,207 kPa)	117 psi (807 kPa)

Figure 2

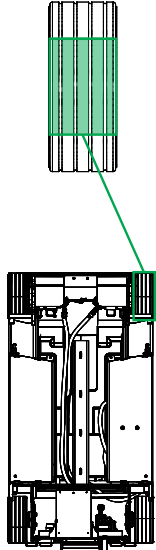
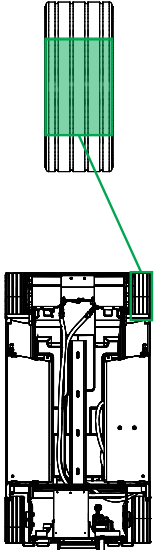
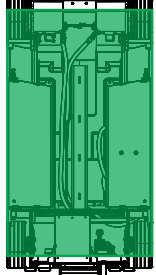
When selecting the correct MEWP for the job, it is really important to understand the difference in these values, the origin of their calculation and the impact they could have on making the right choice.



In order to assist customers, Skyjack will be using the three values in Figure 3 to enable customers to choose the right value for their needs, and enable effective comparisons with other models on the market place.

Starting with the SJ3213 micro and SJ3219 micro, Skyjack will publish ground bearing pressure and overall floor loads in their marketing literature, while all three values will be published in their manuals.

Figure 3

	Local Concentrated Pressure	Ground Bearing Pressure	Overall Floor Load
Area over which the force is exerted			
Force Used	Force exerted by "Max Weight per Wheel"		Force exerted by "Total MEWP Weight"

