

Ergonomics approved quality label

Matador wheelbarrow 2.0 for brick transport



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1 Introduction

This report contains the assessment for a vhp ergonomics approved quality label for the Matador wheelbarrow 2.0 for brick transport. During the assessment of the vhp ergonomics approved quality label, the functional and usage aspects of the product are assessed in terms of compliance with the guidelines for physical load from the Dutch Physical Workload Handbook. The ergonomics approved quality label is not a safety test.

2 Product: wheelbarrow for transporting bricks

The Matador wheelbarrow for transporting bricks 2.0 is specially constructed to wheel bricks. The wheelbarrow is suitable for 56 standard type of bricks. Normally these bricks vary in weight between 1.5 and 2.5 kg each (masonry brick = 1.6 kg, concrete brick = 2.25 kg). The wheelbarrow has a steel design and is equipped with 2 wheels. The handles are placed at 65 cm height. A product video can be seen via YouTube: <https://www.youtube.com/watch?v=itrpSUKomnl>

3 Features Matador wheelbarrow for transporting bricks

The Matador wheelbarrow for brick transport has the following ergonomic features:

- The position of the load is distributed in such a way as to provide sufficient stability but also a maximum of 24 KG handload when transporting 126 KG (56 bricks averaging 2.25 KG each). This provides a 43% gain related to a traditional brick wheelbarrow (42 KG weight on the handles while transporting the same load).
- When transporting the load over a horizontal, relatively flat surface, the weight load on the hands is 14.7 kg (see Appendix 1). This is a 60% reduction compared to the traditional brick wheelbarrow (load of about 36.5 KG on the handles at an equal load).
- The higher placed handles ensure that less deep bending is required while lifting the load. The load/compression force on the lower back is 2455 N. When pushing the bricks over a horizontal surface, the load on the lower back is 521 N (a load of less than 3400 N on the lower back, for a single lifting operation, results in a 'green' , acceptable, score, in this case the risk of physical overloading is minimal).
- The wheelbarrow is designed to load no more than 56 bricks.
- The placement of an additional wheel provides better stability. The user does not have to hold the wheelbarrow steady, with possibly a large portion of the load resting on one hand. The load is distributed over two wheels, so the weight of the load is distributed over both wheels and both hands. It is expected that two-wheeled wheelbarrows are safer, with less risk of the load falling over.
- The bracket at the front of the wheelbarrow is placed so that the load can rest stably on it when tilted forward.

4 Vhp ergonomics approved quality label

The Matador wheelbarrow for transporting bricks 2.0 is provided with the vhp ergonomics approved quality label.

The Matador wheelbarrow for transporting bricks shows a significant improvement over the traditional brick wheelbarrow. To limit the handload to < 25 KG when lifting and < 15 KG when pushing and/or pulling, bricks up to a maximum weight of 126 KG (maximum load of 56 concrete bricks of 2.25 KG) can be moved during transport horizontally on a flat surface.

The Dutch Government Gazette specifies a maximum loading weight of 60 kg. Compared to the traditional stone wheelbarrow (minimum 23.3 KG on handles at 60 kg load), there is an improvement possible of 58% (9.30 KG on the handles at 60 KG load) and still comply with the government standard.

It is recommended to use lighter bricks (e.g. masonry bricks < 2 kg) or not to fully load the Matador brick wheelbarrow with the heavier concrete bricks when moving it over slopes or uneven ground. In addition to lifting, the force due to pushing with the whole body will increase on slopes.



Version 2.0 is more stable compared to version 1.0 because the centre of mass of the load is moved to the rear. Thus, the wheelbarrow tilts forward less easily. The bracket on the front is an and ensures that when the wheelbarrow is tilted forward, the load is tilted slightly so it bricks do not fall off easily.

5 Appropriate Standards

Appropriate standards

NEN-EN 1005-1:2001+A1:2008 en	Safety of machinery - Human physical performance - Part 1: Terms and definitions
NEN-EN 1005-2:2003+A1:2008 en	Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery
NEN-EN 1005-3:2002+A1:2008 en	Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation
NEN-EN 1005-4:2005+A1:2008 en	Safety of machinery - Human physical performance - Part 4: Evaluation of working postures and movements in relation to machinery
Mital , A. et al: 1997	A Guide to Manual Materials Handling, Taylor & Francis, London.
Dutch official Government Gazette	<p>The Government Gazette of February 25, 2012 states: A fine will be imposed by the Inspectorate SZW in cases where one handles a wheelbarrow heavier than 25 kilograms.</p> <p>The Government Gazette of May 14, 2012 states the standard that the load plus the own weight of the wheelbarrow should not exceed 60 kilograms.</p>

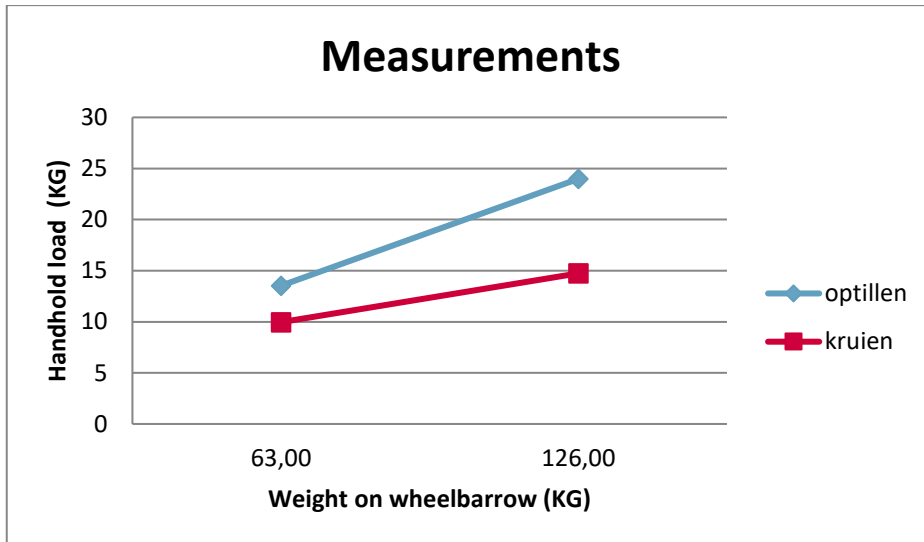
Biomechanical analysis 3D SSPP of low back compression force (N)

3D SSPP	Matador stenenkruiwagen 2.0
<p>Lifting</p> <p>Average Dutch male (182 cm, 83 KG) Lifting = 65 cm handhold height Weight: 126 KG</p>	 <p>2455 N (low back compression force)</p>
<p>Walking with the wheelbarrow</p> <p>Average Dutch male (182 cm, 83 KG) Lifting = 85 cm handhold height Weight: 126 KG</p>	 <p>521 N (low back compression force)</p>

Values up to 3400 N are acceptable in terms of Dutch health regulations.

“Optillen” means: Lifting

“Kruien” means: barrowing with loaded wheelbarrow



Measured values when barrowing bricks with the Matador brick barrow (average values over 3 measurements).