

**XV<sup>th</sup> European Transport Congress**  
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# **The abrasive effect of various vehicle classes on concrete pavement**

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# 1. Introduction

- Surface types
  - combed – yuta – exposed
- Behavior
  - abrasion – freeze thaw scaling
- Attribution
  - strength – w/c ratio

# Rolling resistance factors for trucks on different pavement types

<b>Pavement type</b>	<b>Minimal</b>	<b>Maximal</b>
	rolling resistance factor	
<b>Asphalt Concrete (AC)</b>	0,006	0,01
<b>Cement Concrete (CC)</b>	0,010	0,02

Schmidt et al., 2003

## 2. The units

for geometrical design

vehicle unit

[e-UT 02.01.21]

for load scaling

100 kN axle unit

[e-UT 06.03.13.]

# Vehicle factors as required by the Hungarian regulations

Vehicle classes		Unit	
		Vehicle in rural area	Axle
Passanger car		1	0
Medium truck		2,5	0,5
Single	truck	2,5	1
Trailer		2,5	2,5
Semi-trailer		2,5	2,6
Single	bus	2,5	1,3
Articulated		2,5	1,3

# 3. Vehicle classes

**Axle**

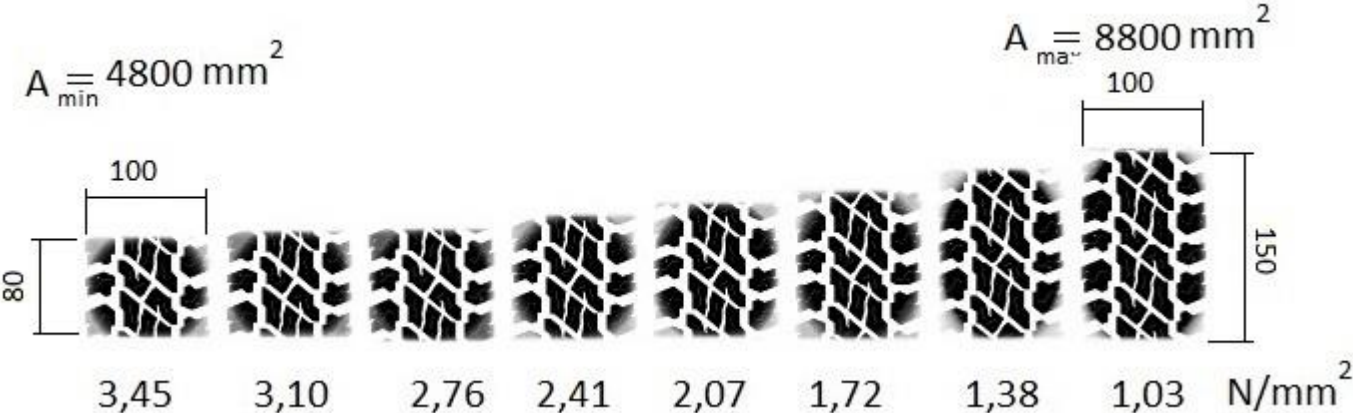
<b>Pcar</b>	<b>Truck</b>	<b>Bus</b>		<b>Truck</b>				
		Single	Articulated	Medium	Heavy	Trailer	Semi-trailer	Special
<b>2</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>4</b>

# The pressure of tyre on the surface with ideal support

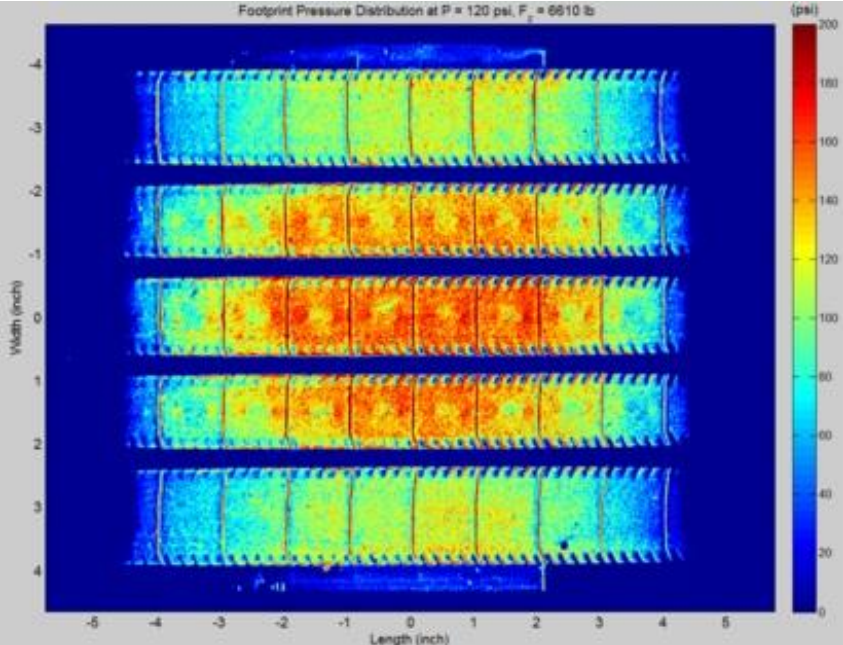
Classes		Tyre types			Maximum load on axle[kg]				
		steered	driven	on trailer	1.	2.	3.	4.	5.
Passanger car		175/65 R14	175/65 R14		800	800			
Medium truck		265/35 R20	265/35 R20		6000	6000			
Single	truck	295/80 R 22,5	295/80 R 22,5		7500	11500			
Trailer		285/70 R 19,5	295/70 R 22,5	285/70 R 19,5	7500	11500	6300	6300	
Semi-trailer		385/65 R 22,5	315/70 R 22,5	385/65 R 22,5	7500	11500	7000	7000	7000
Single	bus	275/70 R 22,5	275/70 R 22,5		7500	11500	11500		
Articulated		295/80 R 22,5	295/80 R 22,5	295/80 R 22,5	7500	11500	11500		



# Pressure in tyre



[Yap, 1989]



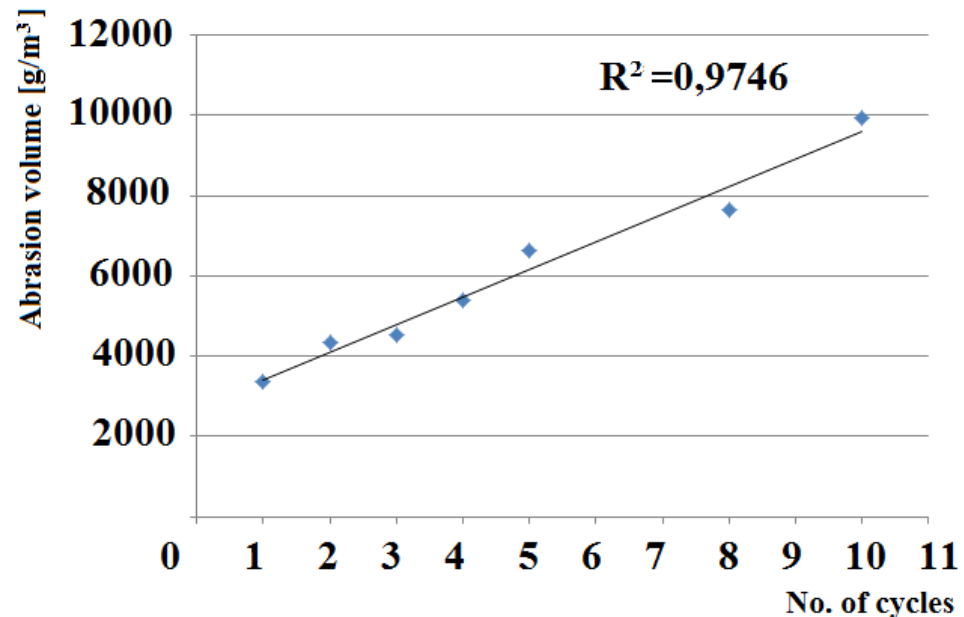
[Smithers, 2016] 9

# Tyre and abrasion

for passanger cars: Shore „A” 65,

for trucks and busses: Shore „D” 50

CP 4/2,7



# 4. The abrasive effect of various vehicle classes on concrete pavement

Classes		Summ. pressure	Load ratio $T_e$	Abra- sion ratio $T_o$	Shore ratio	Summ. Abrasion ratio $(T_e * T_o)^{Sh}$
		[N/mm <sup>2</sup> ]				
Passanger car		0,256	1,00	1,00	1,00	1
Medium truck		1,111	4,33	1,73	1,48	20
Single	Truck	1,215	4,74	1,73	1,48	23
Trailer		2,119	8,27	2,38	1,48	82
Semi-trailer		2,113	8,24	2,37	1,48	81
Single	Bus	1,356	5,29	2,01	1,48	33
Articulated		1,950	7,61	2,25	1,48	67

Thank you for your kind  
attention!