

THE PRESENT EUROPEAN TYRE DESASTER

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ABSTRACT:

Following items will be discussed:

- 1. The demands of the European Union to cancel all prescriptions of tyres for road vehicles and their consequences*
- 2. Not suitable tyre characteristics and their negative influence on the dynamic performance of vehicles*
- 3. Problems with the new EU-tyre label*
- 4. Demands from the results of the tests gained: the to do's.*

KEYWORDS:

Tyre Characteristics, ISO-Test Procedures, Vehicle Stability and Braking Ability, Legal Demands of EU, The New EU-Tyre Label

1 INTRODUCTION

Before the year 2000 vehicle manufacturers always had decided and stipulated after long lasting tests, which tyres were suitable for their vehicles – always seen from a safety standpoint.

A complaint filed by the European Commission against Germany prohibited the prescription of tyres, because of „unnecessary trade obstructions in the market“. This decision allowed legally to use tyres with significantly different side force- and braking force characteristics in the same vehicle within the European Union.

Since the year 2003 the vehicle manufacturer – but also EVU and other European safety institutions – have warned intensively the Traffic Committee of the European Parliament and the EU-Traffic Commission because of the fatal consequences of this decision.

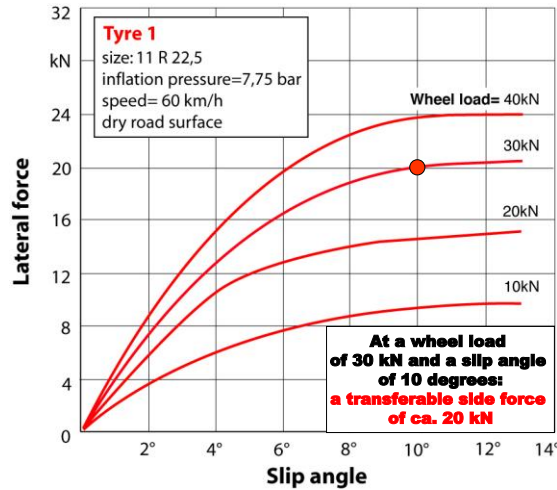
Meanwhile both EU-Institutions have acknowledged the problems of this decision. They have pointed out, that the new tyre regulations (tyre label) – valid from November 2012 – will correct the disadvantages of the decision made in the year 2000.

2 TYRE PROBLEMS ALREADY EXISTING SINCE 2000

The performance levels of today's tyres are – seen from the same tyre size – significantly different among each other, because of the variation of internal production parameters of the single manufacturers.

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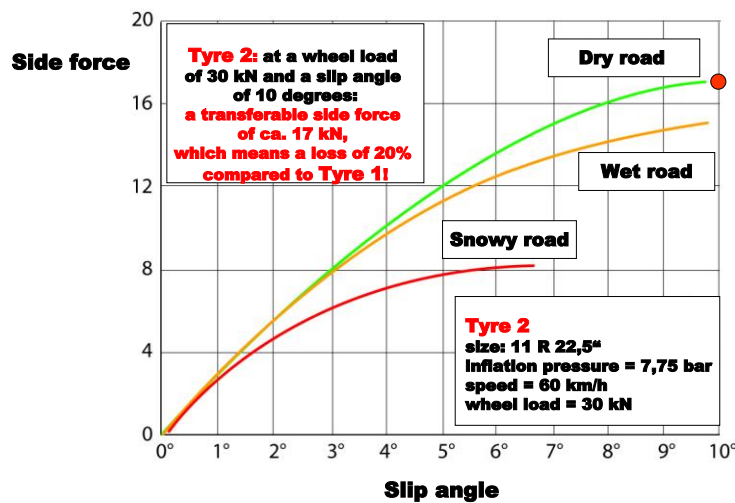
Fig. 1: Different Side Force/Slip Angle – Characteristics of Commercial Vehicle Premium Tyres



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Fig. 2: Different Side Force/Slip Angle – Characteristics of Commercial Vehicle Budget Tyres

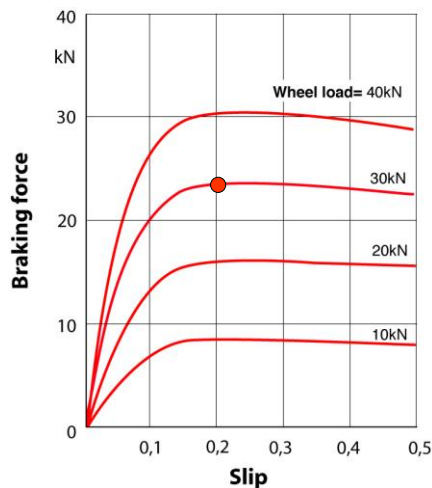


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Many of imported tyres show big performance differences (compare the side forces in figures 1 and 2 as well as the braking forces in figures 3 and 4 for heavy commercial vehicles tyres, see figure 5 for light commercial vehicles tyres and figure 6 for van and passenger car tyres).

Fig. 3: Different Braking Force/Slip - Characteristics of Commercial Vehicle Premium Tyres



Tyre 1
 size: 11 R 22,5
 inflation pressure= 7,75 bar
 speed= 60 km/h
 dry road surface

At a wheel load of 30 kN and a slip of 20%:

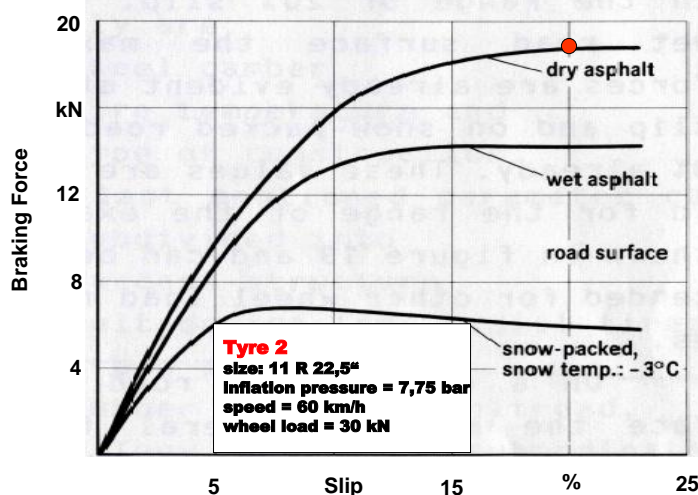
a transferable braking force of ca. 23 kN



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Fig. 4: Different Braking Force/Slip - Characteristics of Commercial Vehicle Budget Tyres



Tyre 2
 size: 11 R 22,5"
 Inflation pressure = 7,75 bar
 speed = 60 km/h
 wheel load = 30 kN

At a wheel load of 30 kN and a slip of 20%:

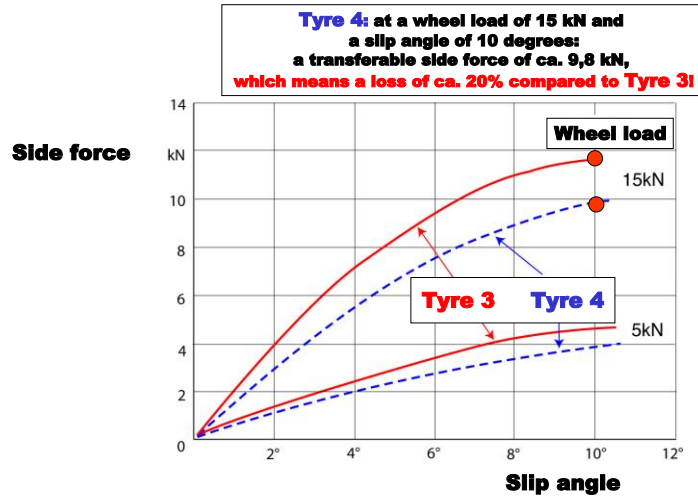
a transferable braking force of ca. 17 kN, which means a loss of 20% compared to Tyre 1!



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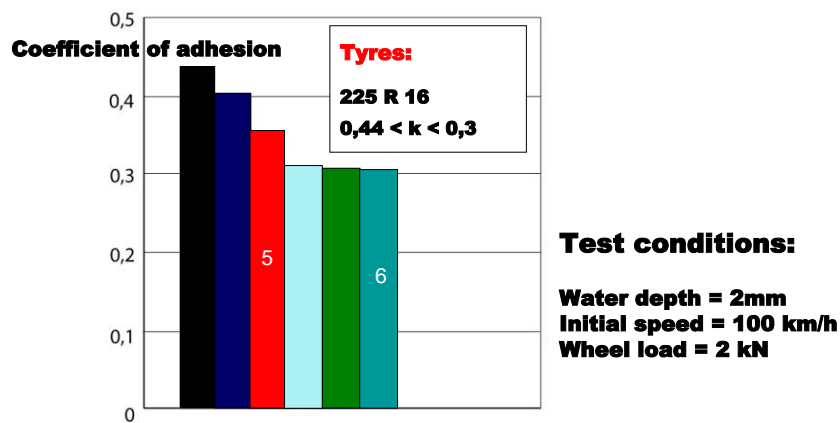
Fig. 5: Different Side Force/Slip Angle - Characteristics of Tyres for the same 7,5t-Truck



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Fig. 6: Coefficient of Adhesion on Wet Roads of Van-/Passenger Car Tyres of Different Manufacturers



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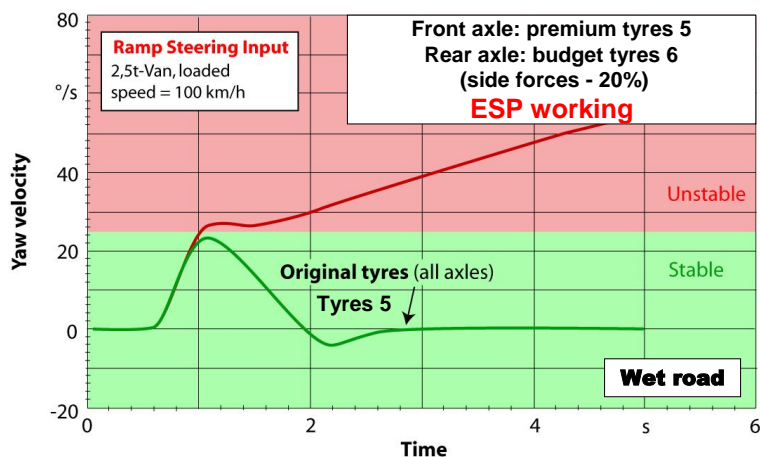


Tyres with significantly different performance levels adapted on the same vehicle can dramatically change the braking- and steering performance of road vehicles.

This fact is valid especially for critical driving manoeuvres like rapid lane changing, braking and accelerating in a turn, braking on split-adhesion roads, etc.

Tests made by European automobile institutions showed problems with vehicle stability (see figure 7) and very long braking distances (see figure 8).

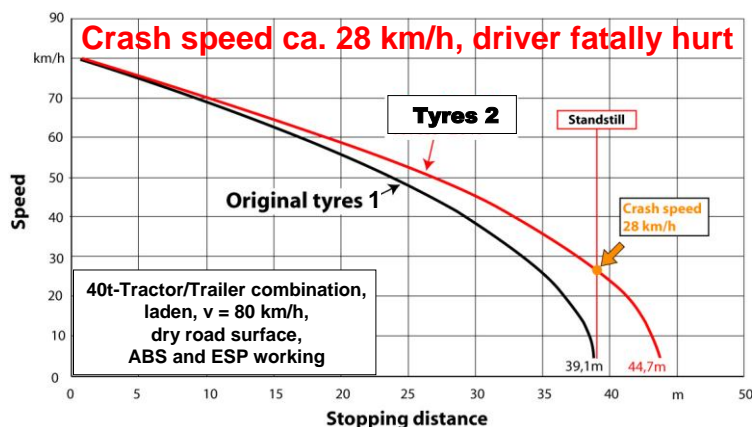
Fig. 7: Test Procedure: „Rapid Lane Changing“ Van with Different Tyre Characteristics



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Fig. 8: Test Procedure „Braking Straight Ahead“ Tractor/Trailer with Different Tyre Characteristics



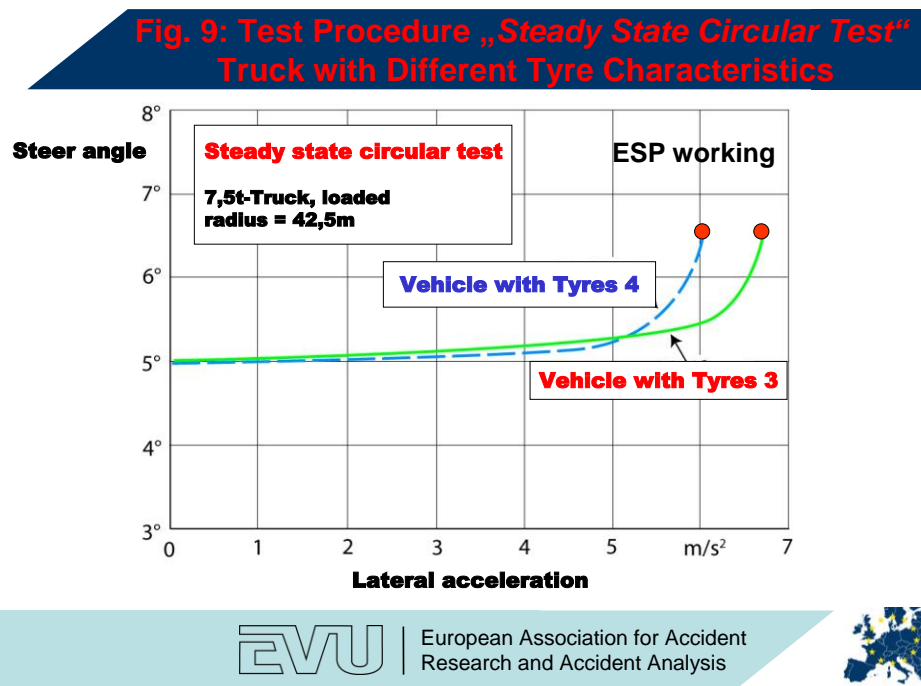
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Changing to worse tyres destroys the driving dynamic concept of the vehicle, which has been developed during long lasting tests by the vehicle manufacturer.

An originally good-natured and stable braking and steering behaviour of a vehicle can be changed abruptly into instability by using tyres with lower performance levels on rear axle.

Tyre characteristics with lower performance levels in comparison to original (premium) tyres influence negatively the efficiency of electronic driver assistance systems (e.g. ABS, Traction Control ASR, Emergency Braking System AEBS, Vehicle Stability Control ESP, etc., see figure 9).



Matter of fact:

The decision of the European Union from the year 2000 to cancel the relation of tyres to the vehicle was and is contra-productive to their own demand in the EU-safety charters 2001-2010 and 2011-2020 to halve the numbers of fatalities on our roads.

3 PROBLEMS WITH THE NEW TYRE LABEL

The new tyre label is – no doubt – a good step forward compared to the last 12 years without any legal demands on the braking- and side force performance of tyres.

Nevertheless, **amendments of the new tyre label are urgently necessary.**

The new tyre label contains only information on rolling resistance, rolling noise and braking ability on wet roads.

It contains no information on other important influencing factors like side force capability (stability), aquaplaning, braking- and traction ability on dry or wintry roads, duration of life, etc. Therefore, the new tyre label is not yet suitable for the average consumer/driver (see figure 10).

Fig.10: New EU-Tyre Label for Passenger Cars

Similar to the classification of fridges:

A is the best!

(seen from an environmental standpoint)



C is **not** the best!

(seen from a safety standpoint)

High environmental values can influence negatively the safety on our roads!



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If the rolling resistance is decreased with today's tyres, then the braking ability on wet roads is also decreased - and vice versa (see figure 11).

Fig. 11: New EU-Tyre Label

Facts:

- The step from A to B on the side of the rolling resistance leads to an additional fuel consumption of 1 litre/1000 km.
- The step from A to B on the side of the braking ability on a wet road leads to an increase of the braking distance of 3 to 6 meters, the step from A to C to an increase of 6 to 12 meters!



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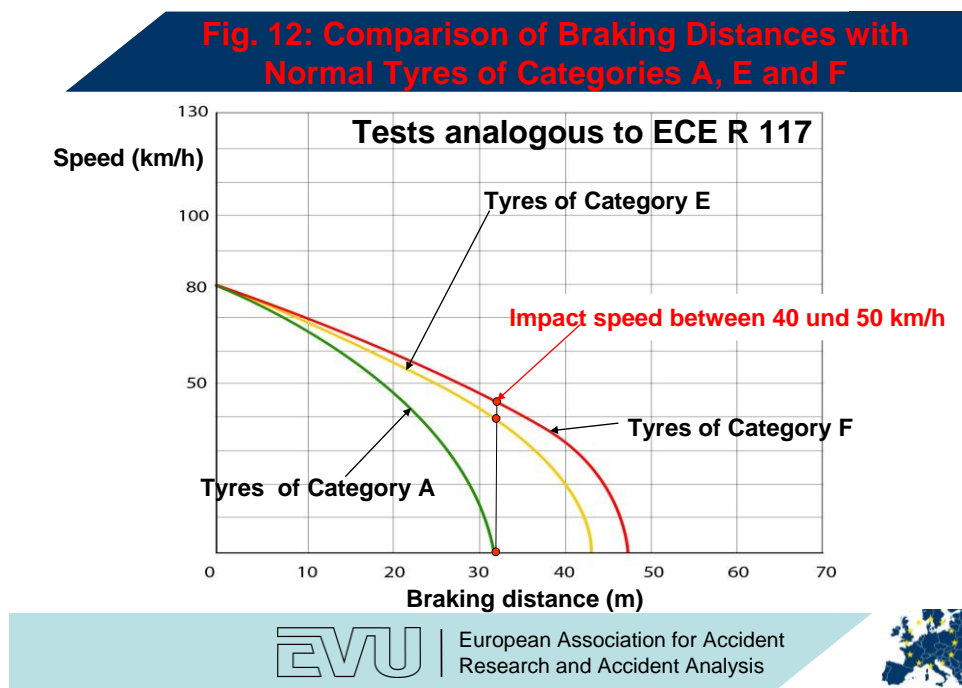
If one improves from tyre category B to A on the side of the rolling resistance, then it is possible to reduce the fuel consumption by 0,1 litre per 100 km.

If the braking ability on wet roads decreases from category A to B, then the braking distance increases 3 to 6 meters.

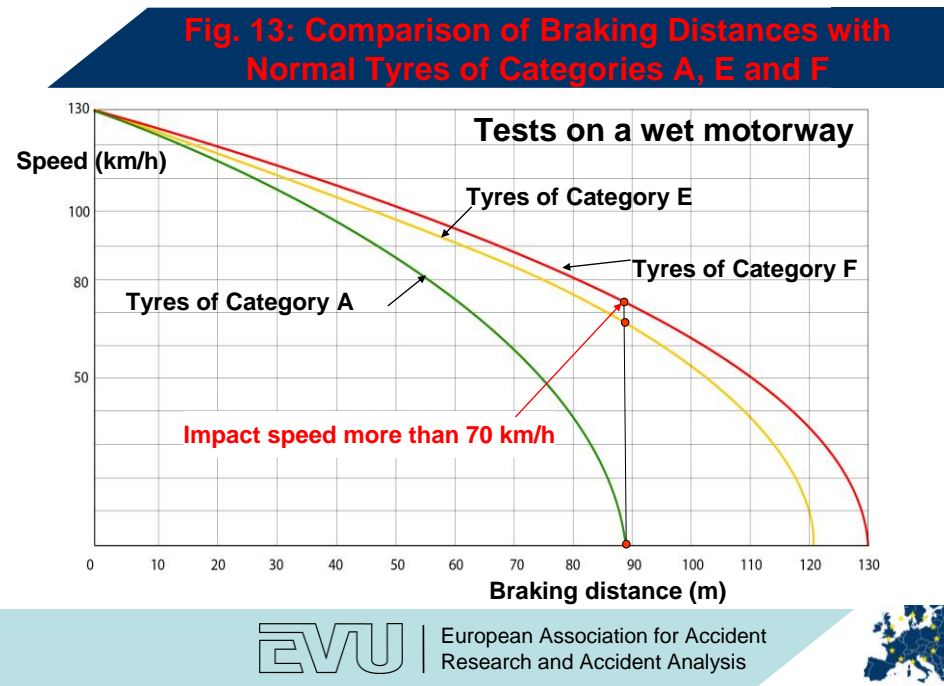
The misleading colour code of the label (used like with frigidaires!) gives the impression, that the reduction of the rolling resistance is more important than the safety while braking on wet roads.

Many safety institutions in Europe fear, that the customer will buy fuel saving tyres because of cost reasons and will ignore the lacking braking ability on wet roads, because the customers does not know this fact.

Important: the new tyre label allows legally differences in braking distances of more than 18 meters between category A and category F, when braking from 80 km/h. In this situation a vehicle equipped with budget tyres of category F moves into an already standing vehicle equipped with premium tyres of category A (or into a pedestrian, cyclist, etc.) with ca. 40 km/h (see **figure 12**).



Contemplating the usual speed of 130 km/h on European motorways, the aforementioned difference in braking distance is more than 40 meters, which means, that the vehicle with budget tyres of category F crashes into the already standing vehicle with premium tyres of category A with more than 70 km/h (see **figure 13**).



3 CONCLUSION

The results of our examinations are the reason for the demand of EVU and many other European accident research and accident analysis institutions to forbid the use of today's normal tyres of categories E and F, because they are a safety risk, when braking on wet roads.

The Working Group "Tyres" of the German Traffic Safety Council (DVR) is developing proposals for the optimisation of the tyre label, as the EU plans amendments of the tyre label in the year 2016.