Informal document No. GRB-40-8
(40th GRB, 23-24 September 2004,
agenda item 1.2.1.)

Request for better clarification of the background statistics, principal choices and foundation of the D/ISO proposal for draft amendment of R51

Transmitted by the Netherlands

1. Introduction

The D/ISO proposal for draft amendment of R51, which was originally launched as the "ACEA proposal" in February 2000, has been discussed intensively over the past four years in GRB, in the GRB informal group and in ISO WG42.

Despite this intensive discussion, there has never been a report on the background statistics and the justification of the starting points of the method, apart from the introduction in informal documents no 4 and 9 in GRB 32 (Feb 2000).

The Netherlands has frequently expressed concerns about the data analysis as presented in these informal documents. Unfortunately this has never resulted in a written clarification of the controversial points.

The Netherlands now request OICA that such a report will be made available to GRB on short notice.

Until this report has been presented to the satisfaction of GRB, the Netherlands believes that the analysis of the background statistics is incomplete and leads to incorrect operation conditions on the test track.

2. Most important Questions

The most important points of clarification with respect to informal document 4 and 9 of GRB 32 are:

1. the choice for a vehicle speed of 50 km/h (ref: GRB 32; inf doc 4 statistical background information page 8)
2. the choice for normal driving behavior on main streets (ref: GRB 32; inf doc 9 page 3)
3. The amount of driving in 2nd and 3rd gear in urban traffic. (ref: GRB 32; inf doc 9 page 6 and inf doc 4 statistical background information page 5)

3. Background data

3.1. Background data on vehicle speed

In GRB 32 informal document 9 (page 8) ACEA states that the 50 percentile of vehicle speed is used to ensure the correct choice of driven gear. For the foundation of a test speed of 50 km/h the graph is used which is copied in fig1 below.

Figs 2 to 5 give examples of other sources of data. All of these data lead to the conclusion that the average urban speed is significantly lower than the test speed of 50 km/h.

Arguments against the use of fig 1:

- Fig 1 is the only analysis which is based on a distribution in % of distance. All other analysis are based on distribution in % of time or % of events.
- Analysis in the distance domain will lead to an over emphasis of high speeds compared to time domain analysis.
- Mixing different units in one analysis may lead to erroneous results.
- Noise is mostly measured in the time domain, seldom in the event domain, but never in the distance domain.

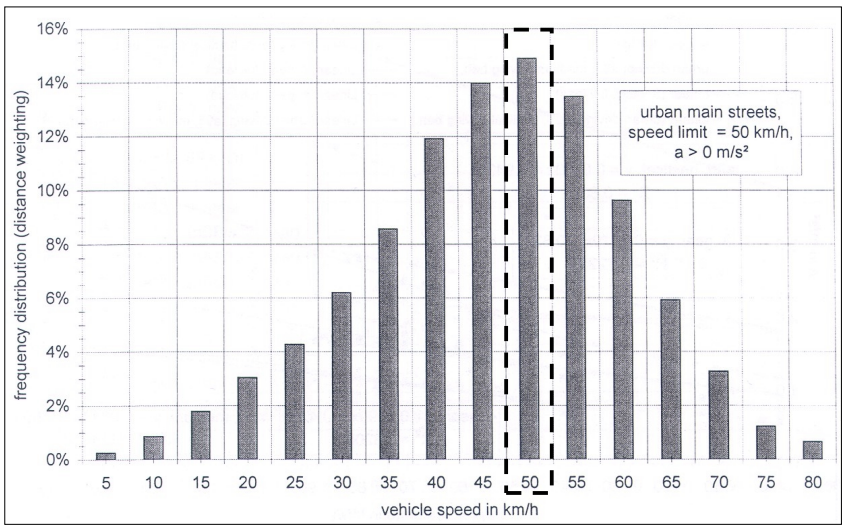

Table 1

fig 1: Speed distribution in urban traffic as presented by ACEA in GRB 32 informal doc no 4

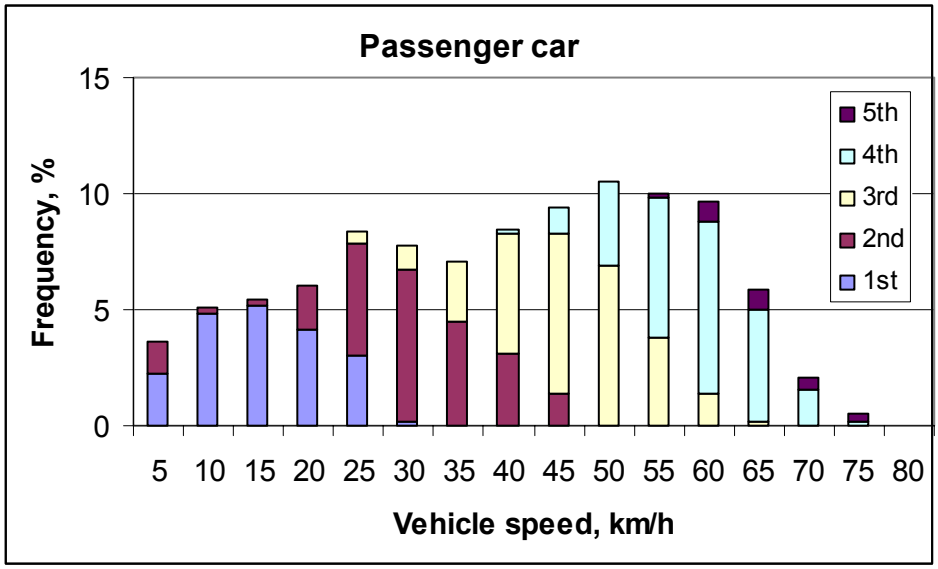

Fig 2 Speed distribution in urban traffic (source JAMA [4])

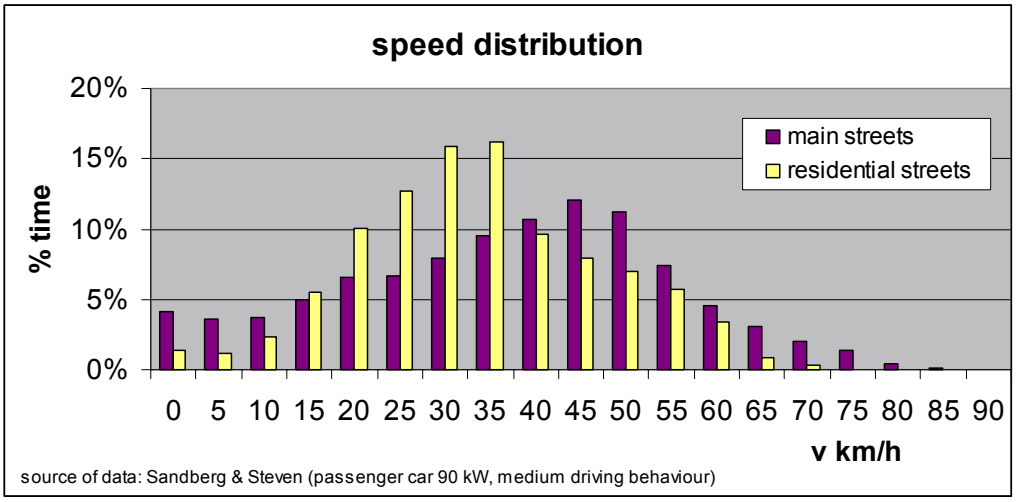

Fig 3 Speed distribution in urban traffic (a 2D simplification by De Graaff & Van Blokland [7] based on two 3D graphs from Sandberg & Steven [5])

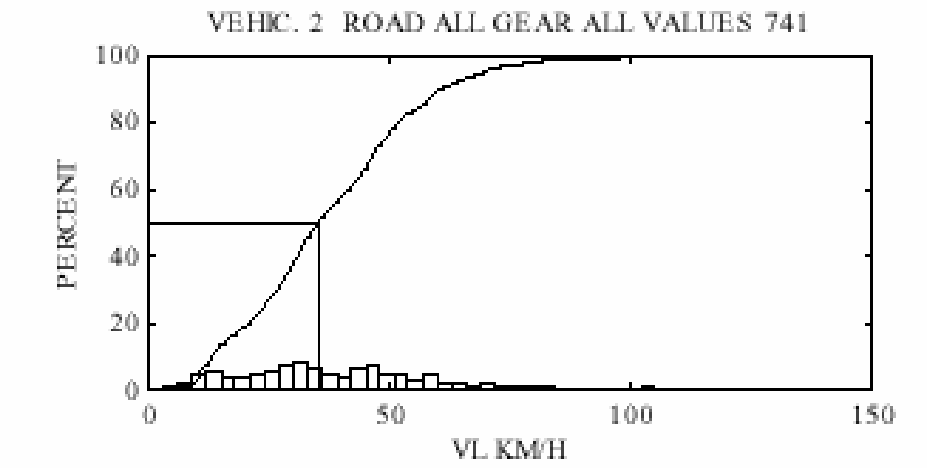

Fig 4 Speed distribution in urban traffic (Le Salver[3])

3.2. Background data on driving behavior and main streets

In GRB 32; inf doc 9 (page 3) ACEA states that the study on urban driving behavior focuses on urban main streets. Residential streets where not incorporated in this study. Furthermore it was clarified that the drivers of the vehicles have adopted a driving behavior "like most of the others".

Table 1 gives a classification of drivers in terms of driving behavior. A significant amount of drivers can by stipulated as "faster than most of the others". Fig 5 shows data for the classification of the total urban network in the Netherlands. It can be seen that urban main streets cover only a minor fraction of the total urban network length. The majority of the urban network consists of residential streets. In fig 3 it can be seen that the speed in residential streets is significantly lower than in main streets.

These data lead to the conclusion that a significant amount of urban driving is not included in the targeted test conditions, because

- a significant amount of urban driving occurs at speeds lower than 50 km/h
- a significant amount of urban driving exceeds "normal driving behavior"

Table 1. Typology of car drivers in France (van Dongen [6])

Quiet, disciplined and fuel saving drivers	26%
Rather quiet and slightly fuel saving drivers	23%
Fast and anticipating drivers	23%
Sportive and no fuel saving drivers	15%
Aggressive and obtrusive drivers	8%
Others	5%

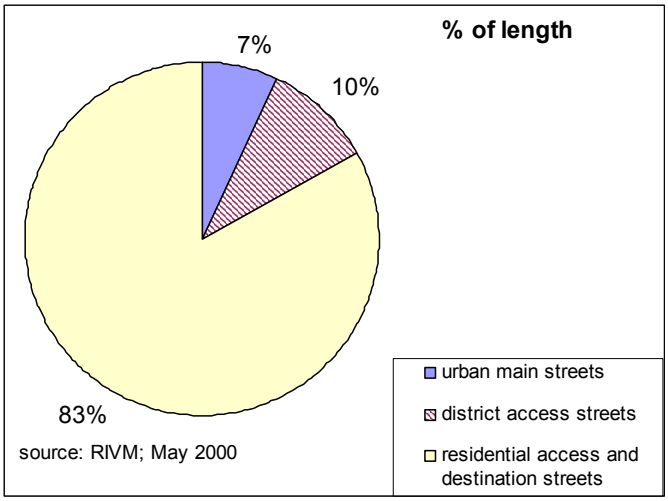

Fig 5 Categorisation of the total urban road network in the Netherlands; in terms of network length

3.3. Background data on gear use

In GRB 32; inf doc 9 (page 6) and inf doc 4 (page 5) ACEA shows examples of their analysis of urban driving. Similar examples are given by Le Salver in an Internoise paper [3]. From these data examples the gear use during the urban drive cycle can be extracted. Table 2 gives the percentages. It can be seen that 2nd and 3rd gear are most frequently used in urban traffic. A similar conclusion can be drawn from fig 2.

The first try outs of the new test protocol however lead to the conclusion that most vehicles are tested in significant higher gears than 2nd and 3rd. The tested gear use is mostly between 3rd and 4th; on average close to 4th.

This leads to the conclusion that the gear use in the test cycle does not comply with the gear use as found in urban traffic.

Table 2. gear use in urban traffic (extracted from ACEA papers [2], [3])

	1st	2nd	3rd	4th
ACEA [3]	15%	37%	35%	12%
ACEA [2]	6%	39%	33%	19%

4. REFERENCES

[1] OICA; background information on the ACEA-proposal; GRB Feb. 2000; informal doc. 9
[2] OICA; Statistical background for the ACEA-proposal; GRB Feb. 2000; informal doc. 4
[3] R. le Salver; ACEA proposal for a new method to measure the noise emitted by a car in urban driving conditions; internoise 2001
[4] JAMA; Study on pass-by noise testing methods incorporating urban driving conditions; ISO/TC43/SC1/WG42/D134B also presented in GRB Sep 2000 inf.doc. 2
[5] U. Sandberg & H. Steven; An improved procedure for measurement of vehicle noise emission – background and outline; ISO/TC43/SC1/WG42/D172, also presented in GRB Feb 2002
[6] J.E.F. van Dongen; Prevalence of acceleration at low speed and driving at constant low speed and the influence on community annoyance; TNO-PG; GRB Feb 2001 informal document 8
[7] D.F. de Graaff & GJ van Blokland; Position paper on part 2 of ISO 362; GRB IG WP4