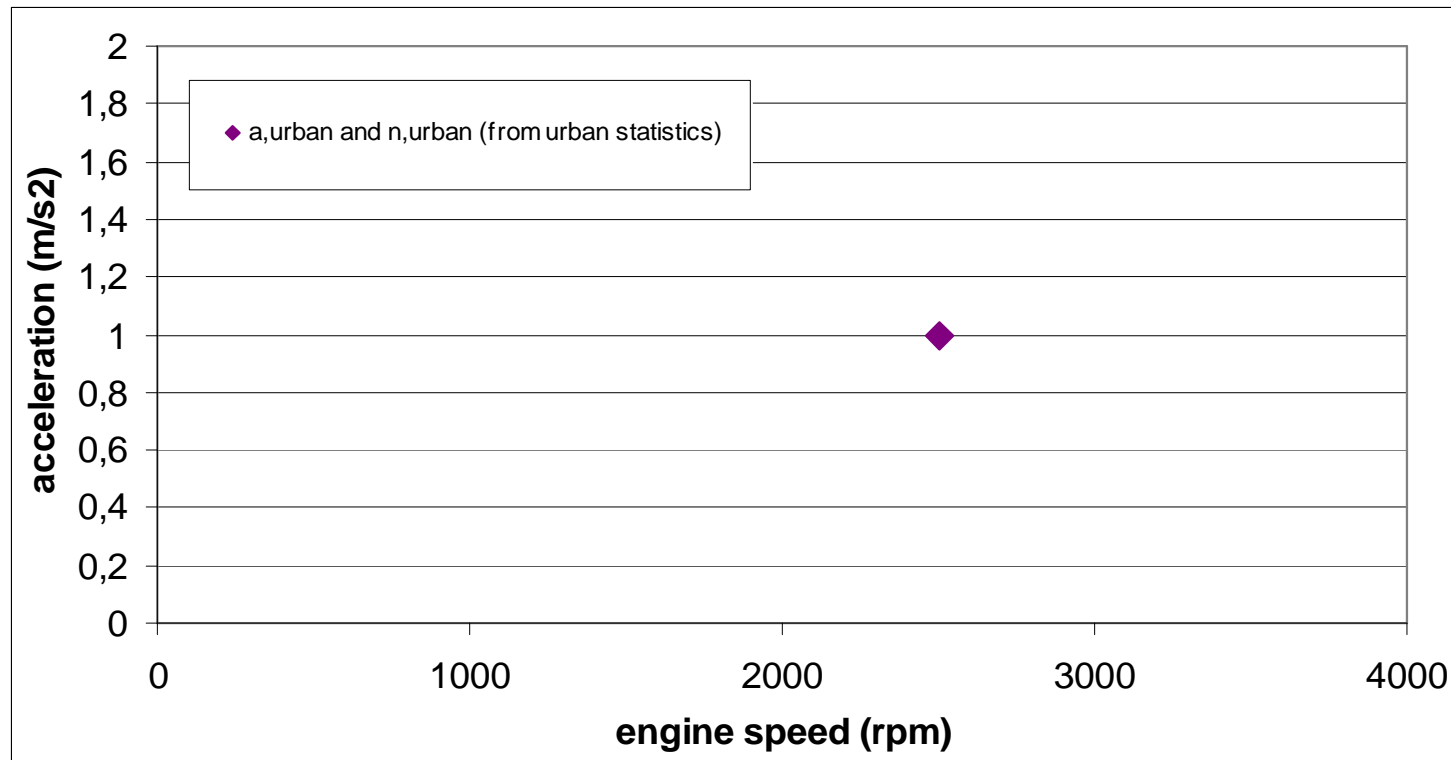


# Anchor points in ASEP

the shifting in the various proposals  
as the chairman has understood it

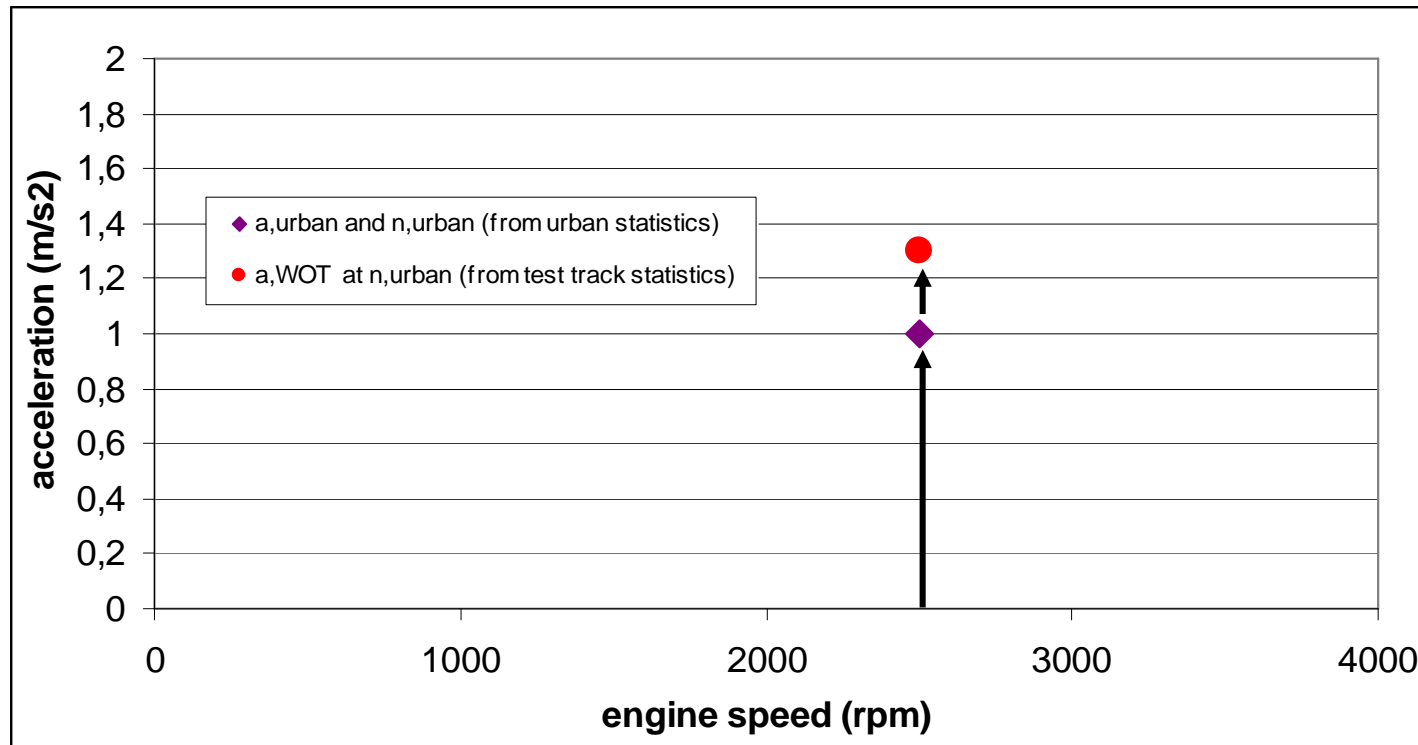
ASEP meeting June 2008

# Annex 3, based on urban driving



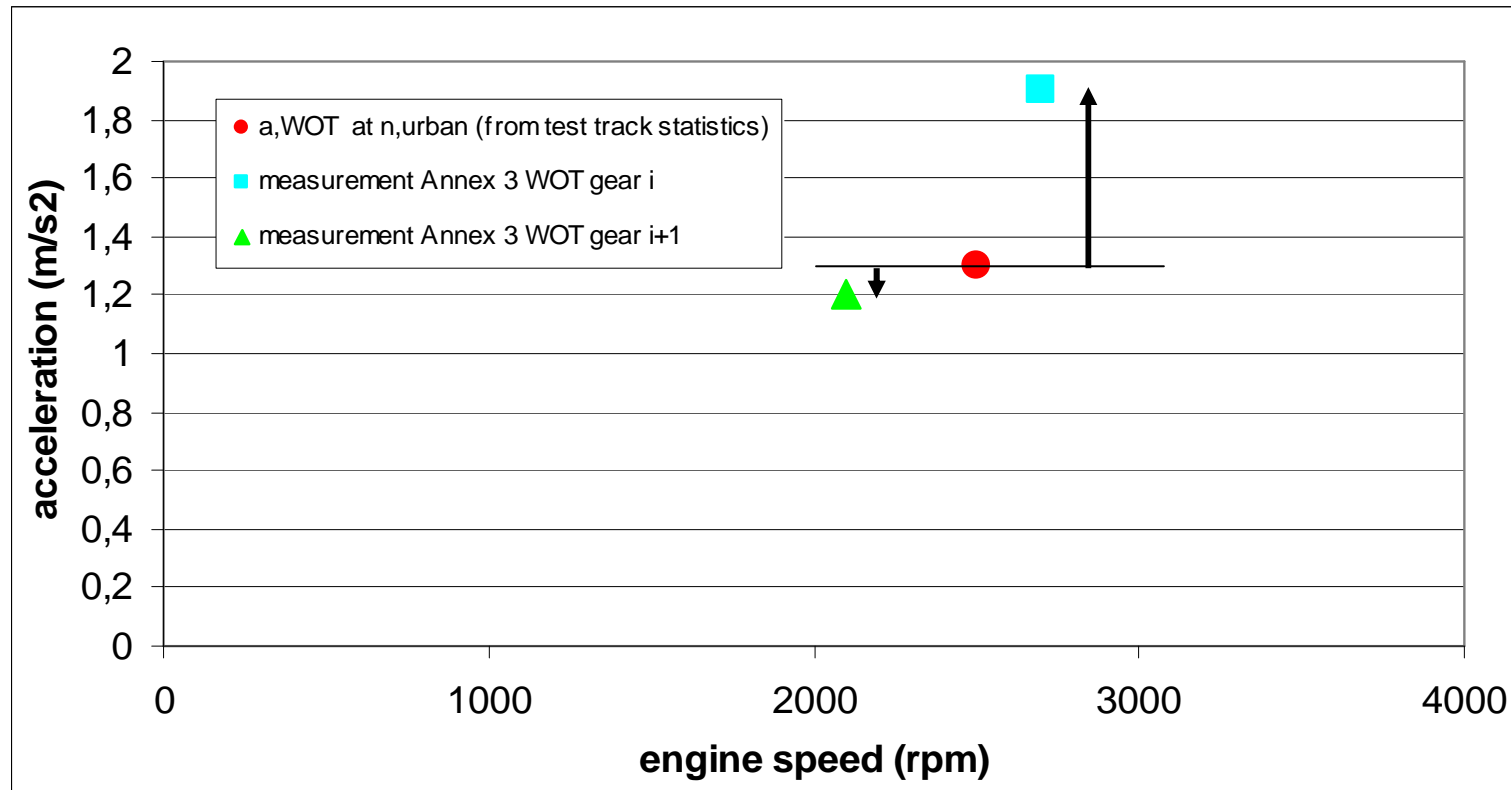
- $a_{,urban}$  and  $n_{,urban}$  where derived from urban statistics; both are described with a regression function depending on PMR

# Annex 3, the role of $n_{urban}$



- $n_{urban}$  is used to come from a partial throttle acceleration  $a_{urban}$  to a full throttle acceleration  $a_{WOT}$ . The full throttle acceleration  $a_{WOT}$  at  $n_{urban}$  was derived by testing many vehicles on the test track;  $a_{WOT}$  is also described with a regression function depending on PMR.
- $a_{WOT}$  is the target condition for annex 3 measurements; In annex 3 there is no target for engine speed. This is done to make annex 3 design independent.

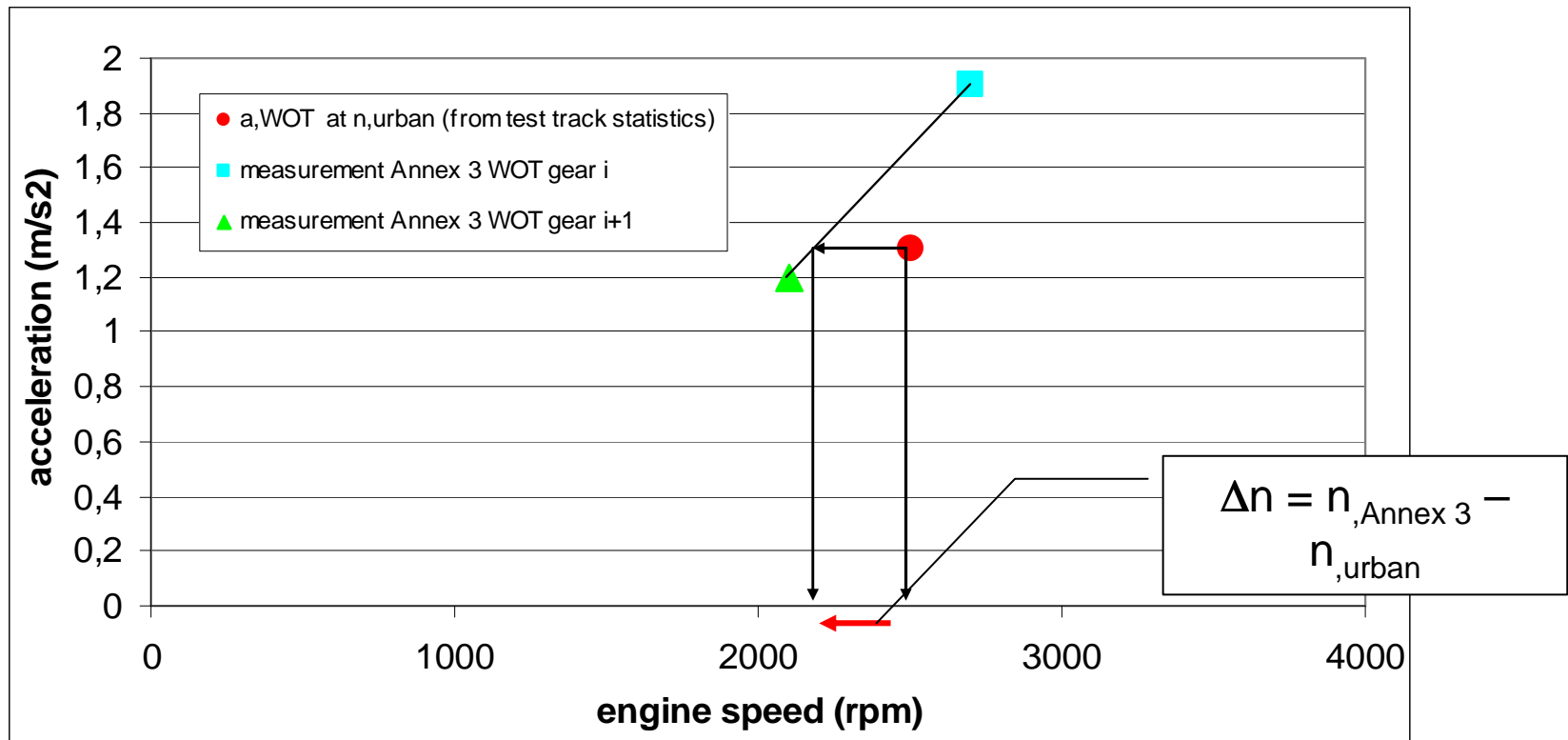
# Annex 3 testing on test track



- $a_{WOT}$  is the target condition in Annex 3; this can be reached with measurements in one or two gears
  - Measurement in 1 gear: measured acceleration should be close ( $\pm 5\%$ ) to  $a_{WOT}$
  - measurements in 2 gears: one gear with an acceleration higher than  $a_{WOT}$  and one with an acceleration lower than  $a_{WOT}$

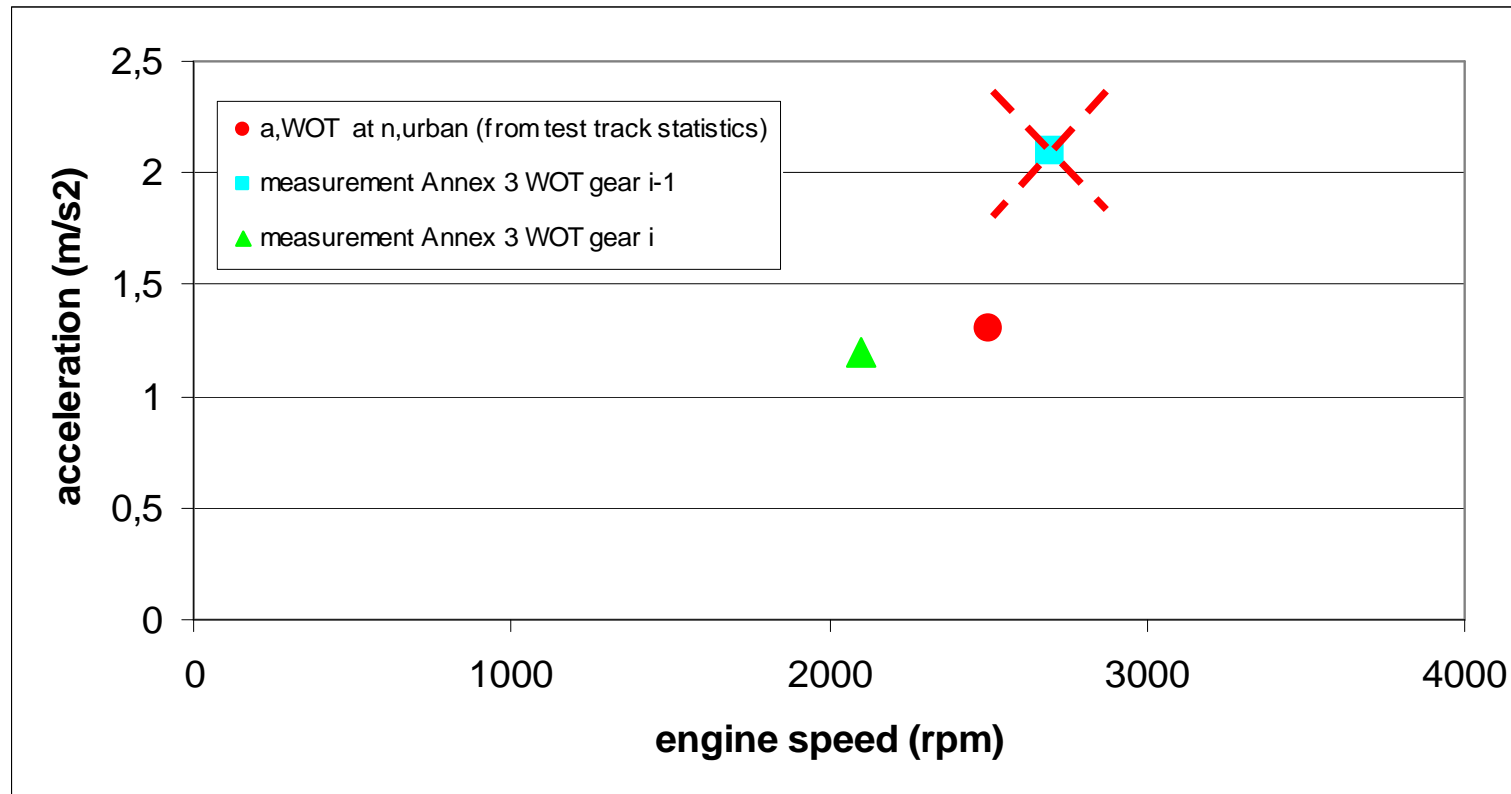
# Annex 3 measurements

real vehicles differ from average from statistics



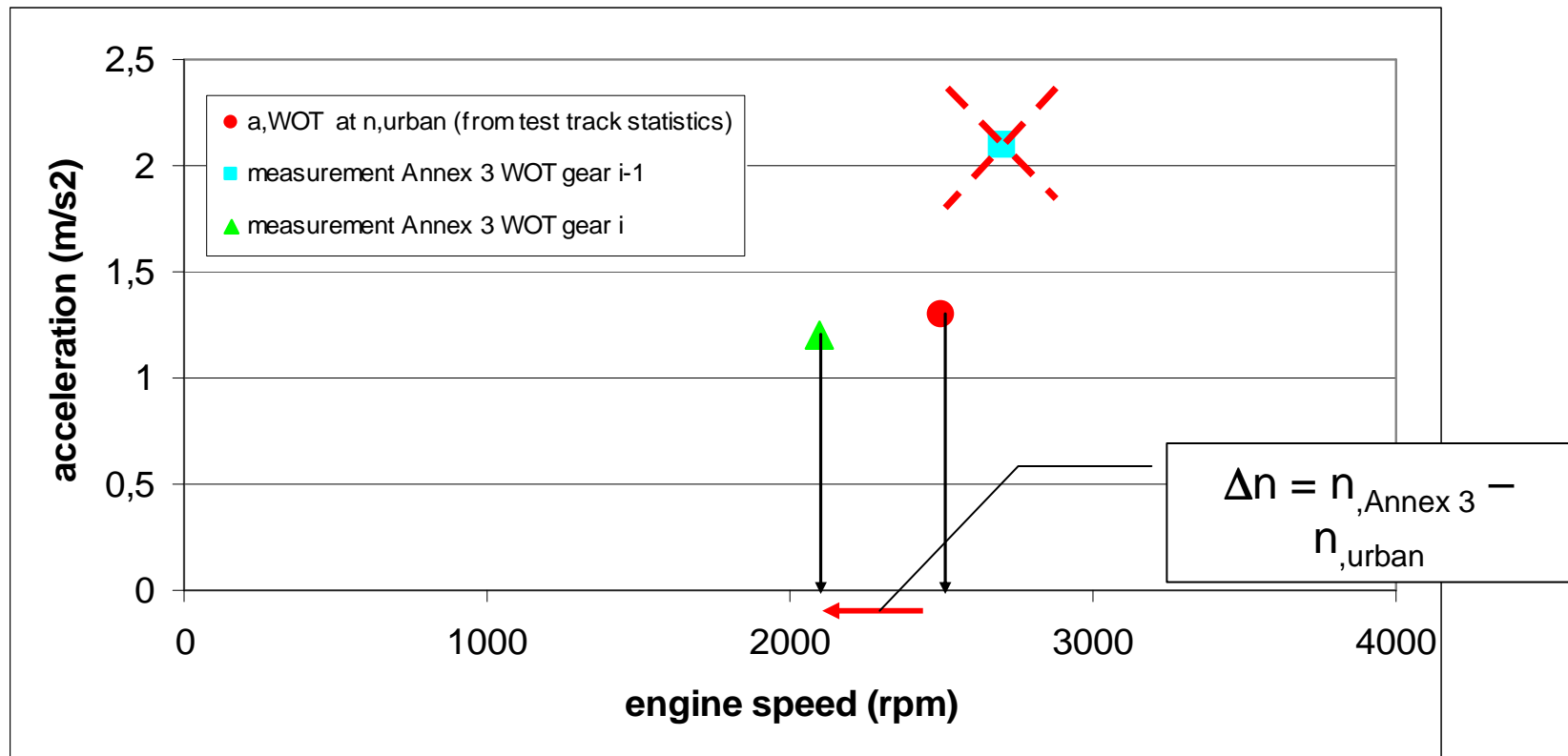
- The results from two gears have to be weighted depending on their acceleration relative to  $a_{,WOT}$
- The weighted engine speed from the annex 3 measurements will be different from  $n_{,urban}$  and depends on the acceleration potential of the specific vehicle under test.

# Annex 3 if acceleration $> 2 \text{ m/s}^2$



- If the acceleration in gear i exceeds  $2 \text{ m/s}^2$ : take the first higher gear which does not exceed  $2 \text{ m/s}^2$
- NB remember to check:
  - The measurement in the next gear higher is only valid if the measured acceleration is bigger than  $a_{,urban}$
  - The noise measurements at WOT and cruise have to be weighted according to the ratio between the measured acceleration and  $a_{,urban}$

# Annex 3 if acceleration > 2 m/s<sup>2</sup>

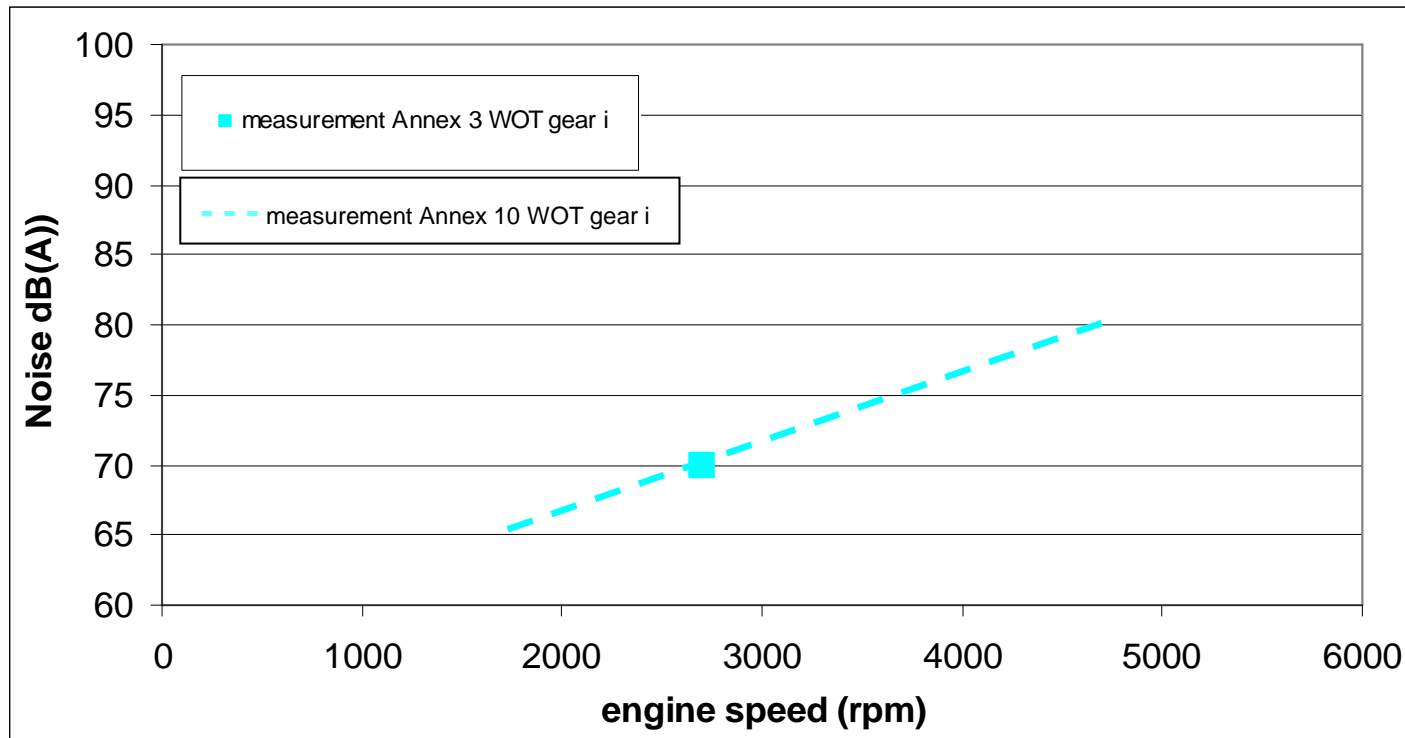


- Result on engine speed:
  - the actual engine speed from the annex 3 measurements will be significantly different from  $n_{\text{urban}}$  if the relevant accelerations exceed 2 m/s<sup>2</sup>

# Annex 3, conclusion

- The actual engine speed in annex 3 may be significantly different from the engine speed according to the urban statistics
  - Higher in case of
    - low torque engines
    - CVT's
  - Lower in case of
    - high torque engines
    - accelerations higher than  $2 \text{ m/s}^2$

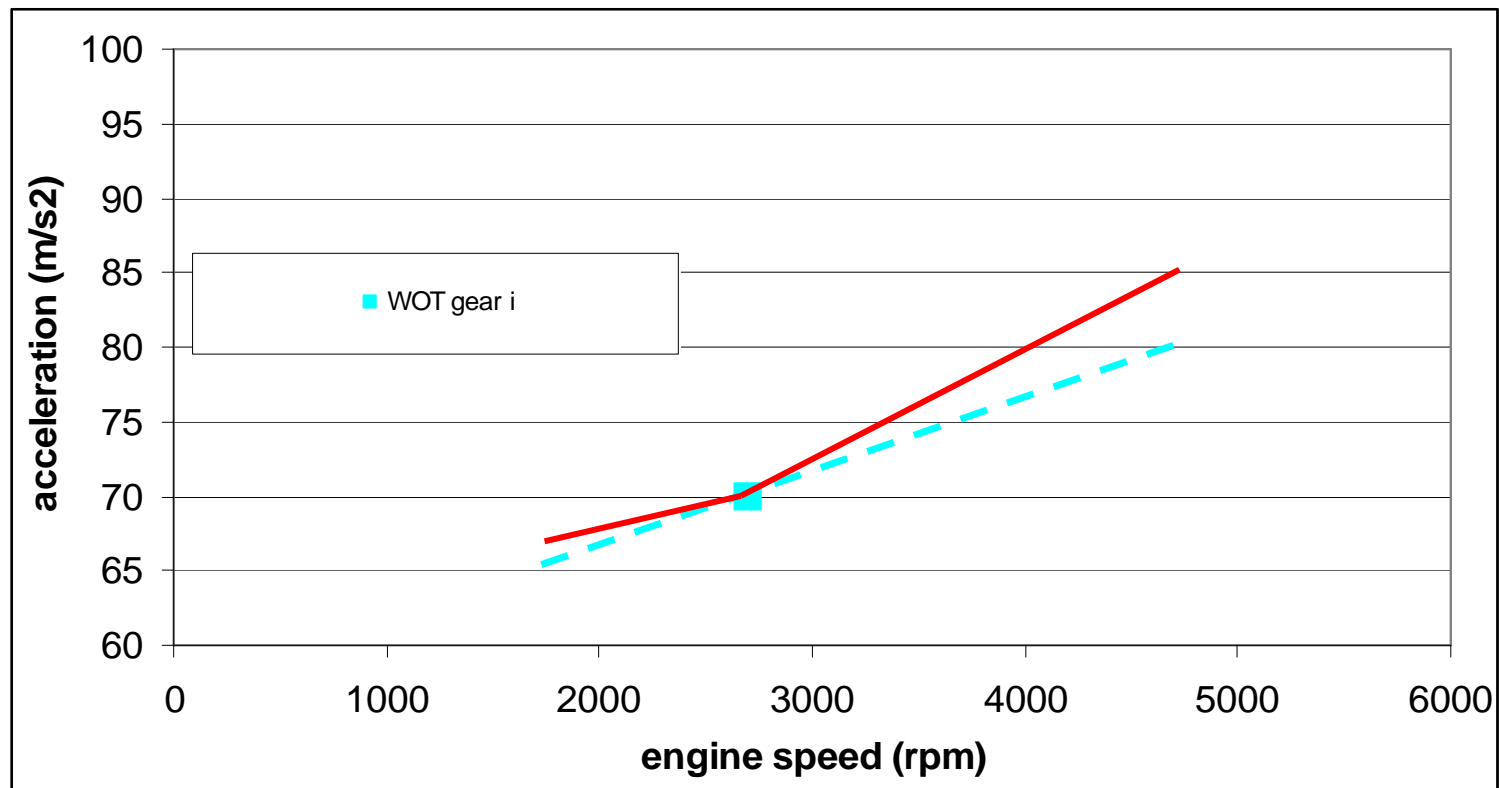
# Annex 10; the principles



- Annex 10 investigates the noise behavior around annex 3 measurement points
- All current proposals are based on engine speed
- This makes annex 10 design dependent
- In some proposals  $n_{urban}$  is back in the picture again

# Annex 10 limit; idea 1

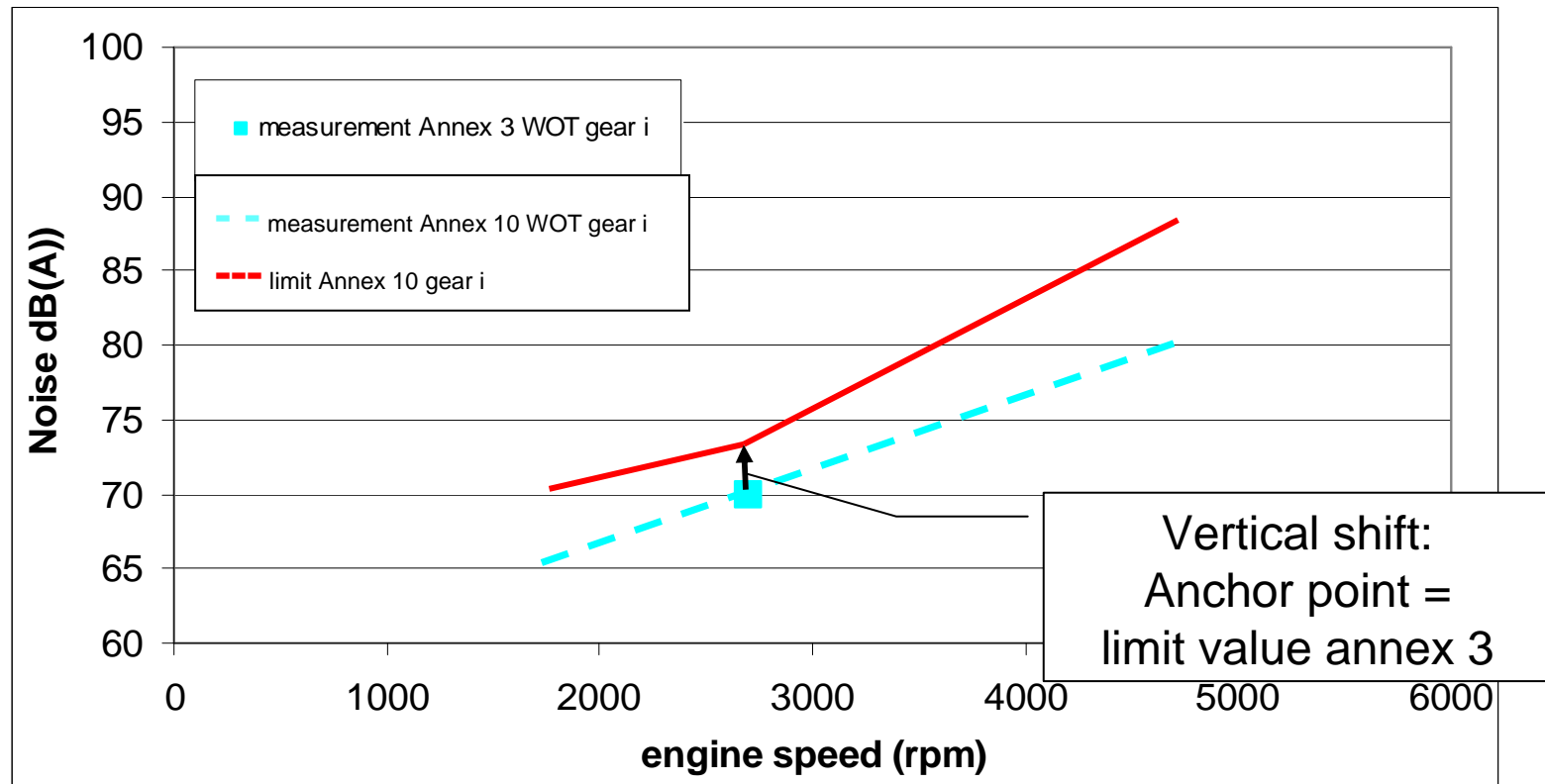
based on Annex 3 test result



- First idea on limit line was:
  - anchor point = test result annex 3 ( $L_{wot,i}$ )

# Annex 10 limit; idea 2

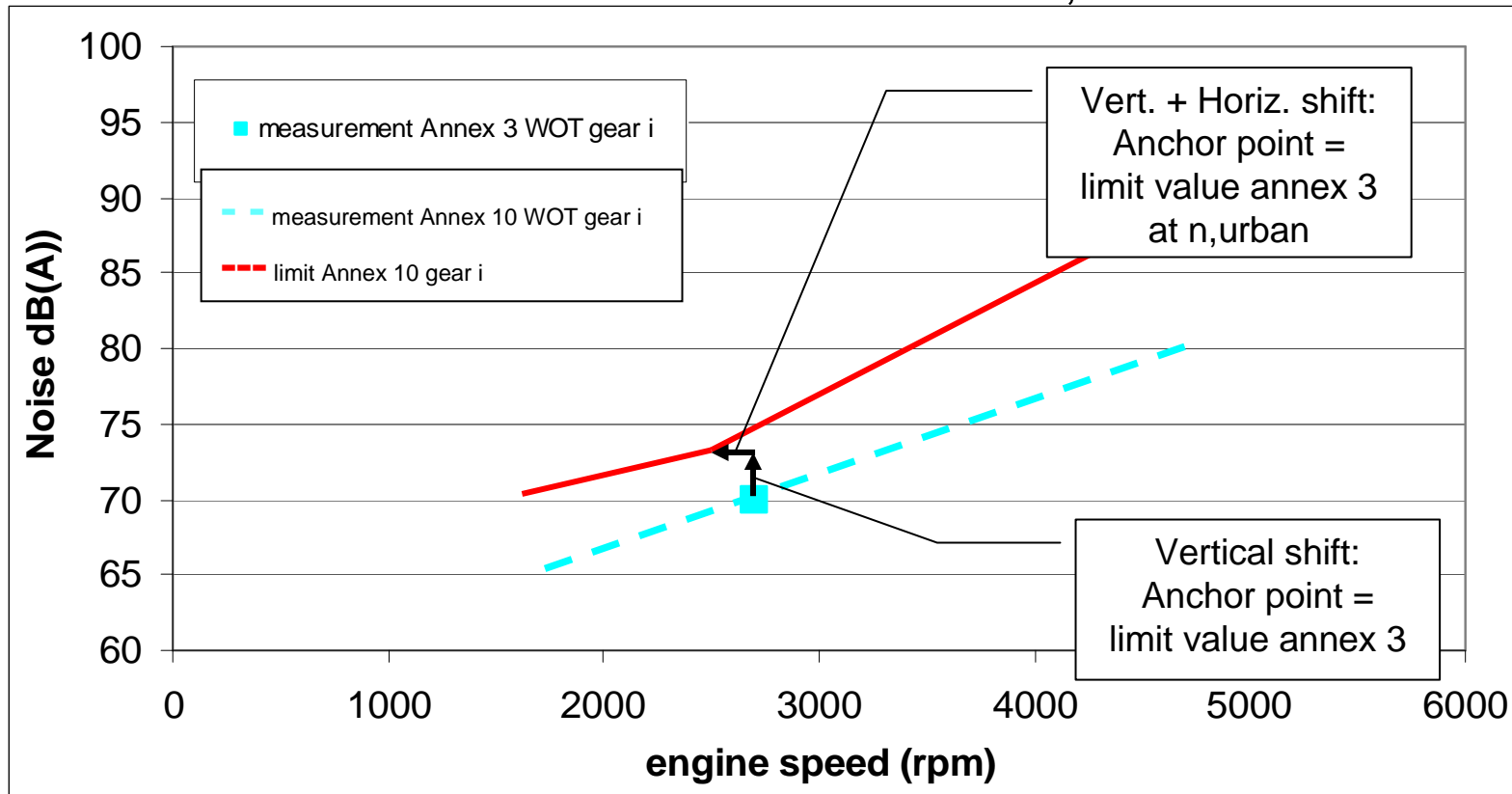
## based on limit Annex 3



- Second idea on limit line was:
  - anchor point = limit value of annex 3.
  - in order not to punish vehicles which are extra silent under annex 3.

# Annex 10 limit; idea 3

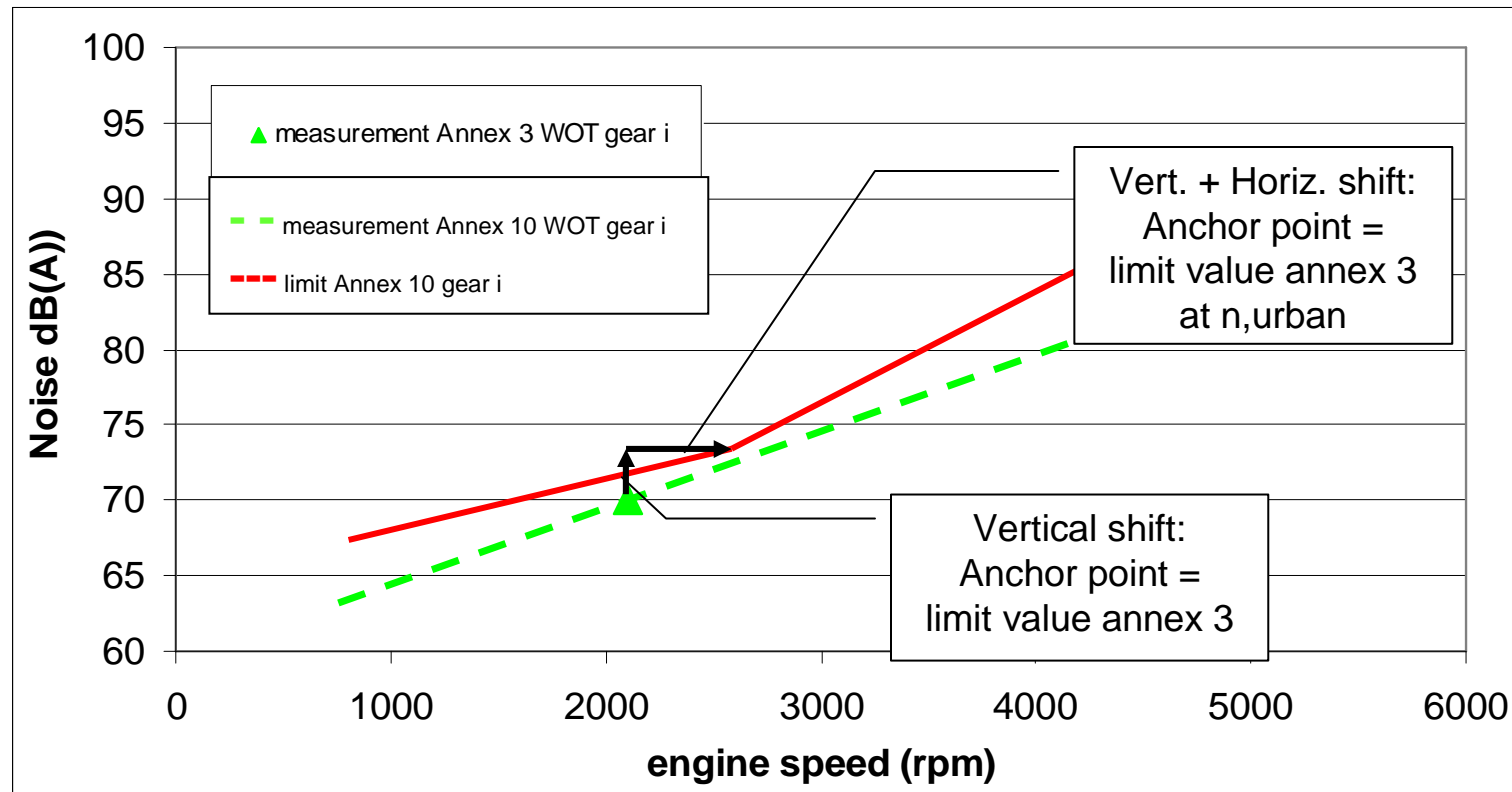
based on limit Annex 3 at  $n_{urban}$



- Third idea on limit line was:
  - Anchor point = limit value annex 3 at  $n_{urban}$
  - Anchor point can shift to the right or to the left

# Annex 10 limit; idea 3

based on limit Annex 3 at  $n_{urban}$



- Third idea on limit line :
  - Especially relevant for vehicles which are tested at low rpm in annex 3 due to  $2 \text{ m/s}^2$  constraint

# Annex 10

comparison of 3 “similar” vehicles from dBase

- Vehicle data:

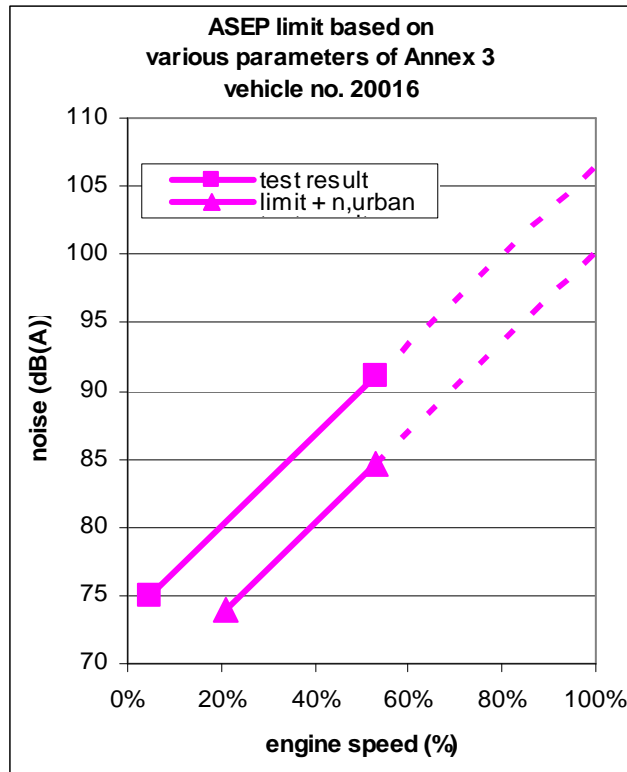
veh no.	103	20016	20013
P (kW)	382	377	357
S (rpm)	6000	6300	8500
n,idle (rpm)	700	800	900
pmr (kW/t)	246,5	239,2	205
n,test (rpm)	2040	1046	2235
n,i,Annex 3 (%)	25,3%	4,5%	17,6%

- Acceleration measurements: from dBase
- Assumptions on noise: all equal in annex 3

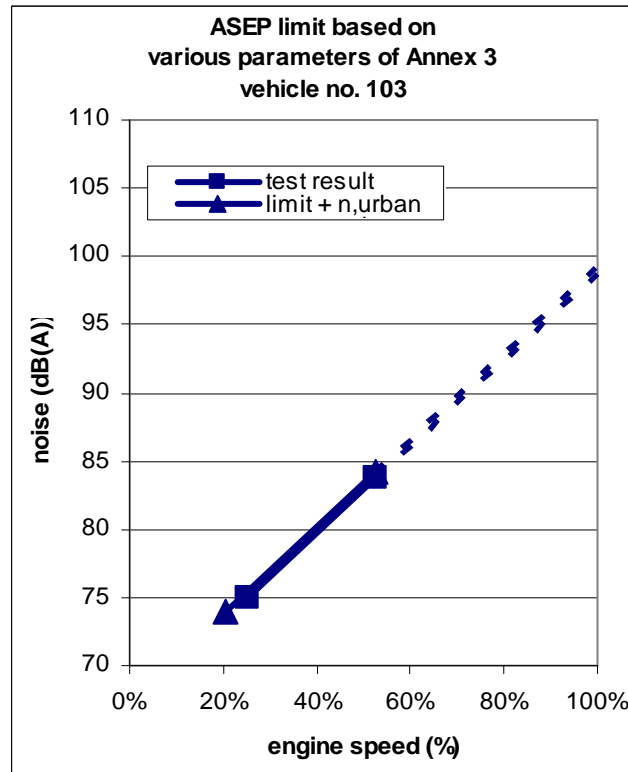
veh no.	103	20016	20013
limit annex 3	74	74	74
max slope annex 10	6	6	6
Lwot,i annex 3	75	75	75

# Annex 10

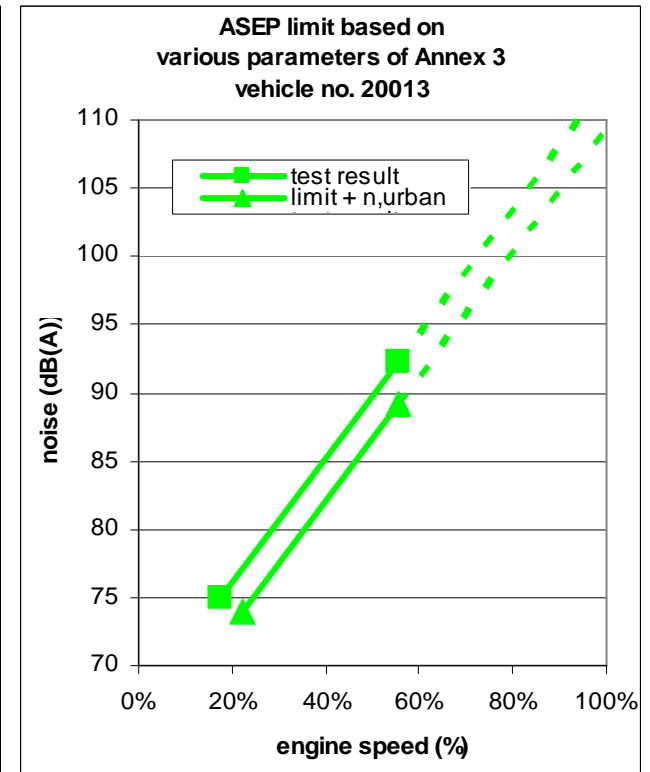
## Difference between method 1 and 3



$$\Delta L_p = 6,4 \text{ dB(A)}$$



$$\Delta L_p = -0,4 \text{ dB(A)}$$

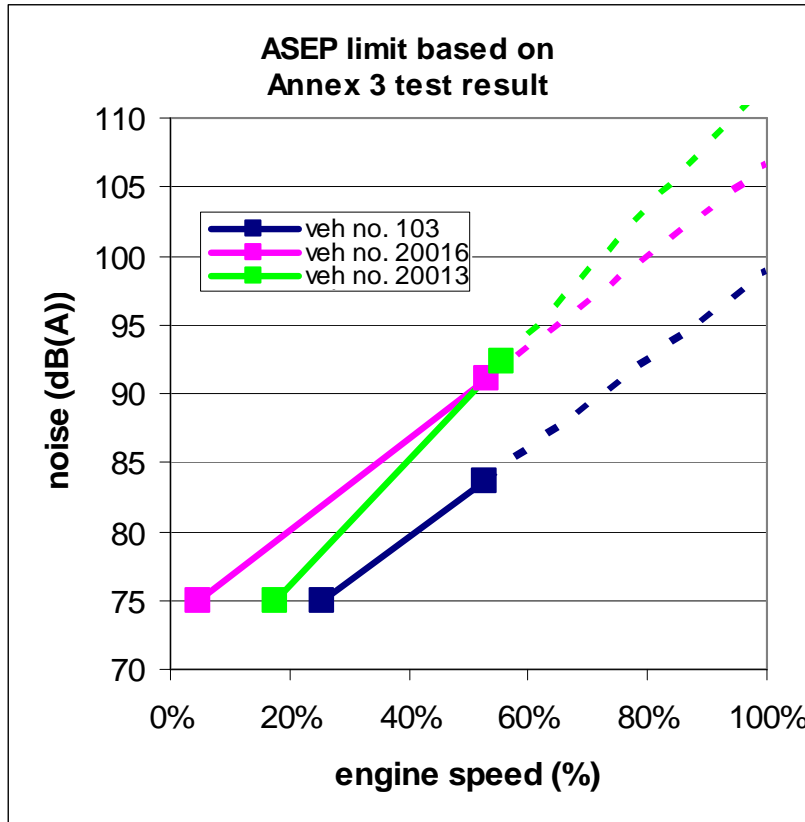


$$\Delta L_p = 3,2 \text{ dB(A)}$$

- Difference up to 6,4 dB(A) for vehicle with
  - high torque engine and
  - acceleration  $> 2 \text{ m/s}^2$

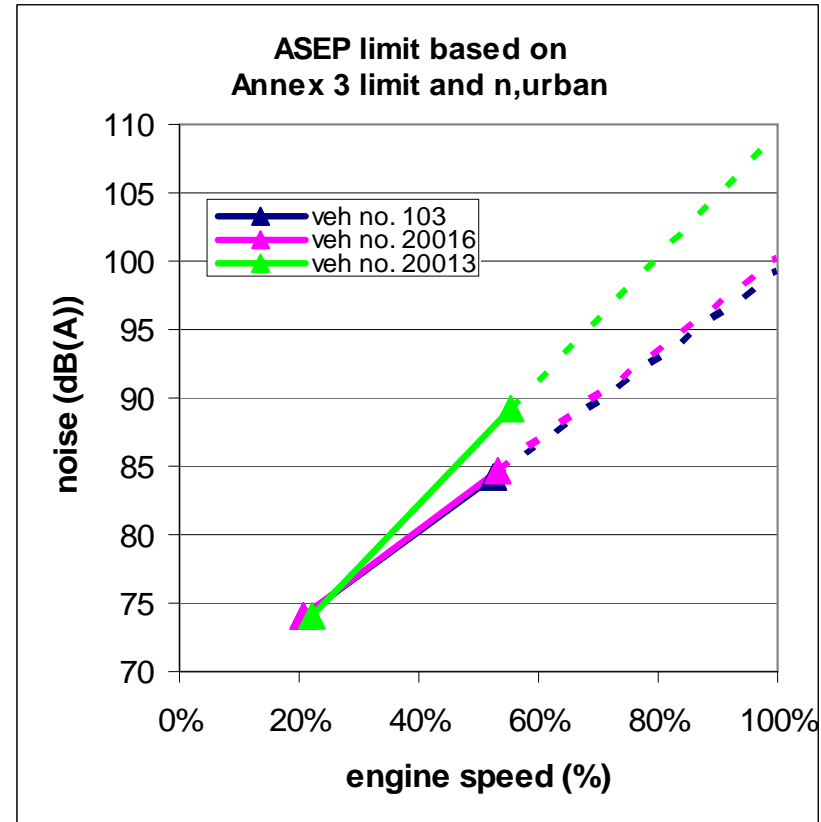
# Annex 10

## difference between the vehicles



$\Delta L_p = 13,8 \text{ dB(A)}$  at rated speed

- Different height due to difference in engine speed in Annex 3
- Different slope due to difference in rated engine speed



$\Delta L_p = 10,2 \text{ dB(A)}$  at rated speed

- Different slope due to difference in rated engine speed

# Result

Lower anchorpoint → weaker limit Annex10

Higher anchorpoint → tougher limit Annex10

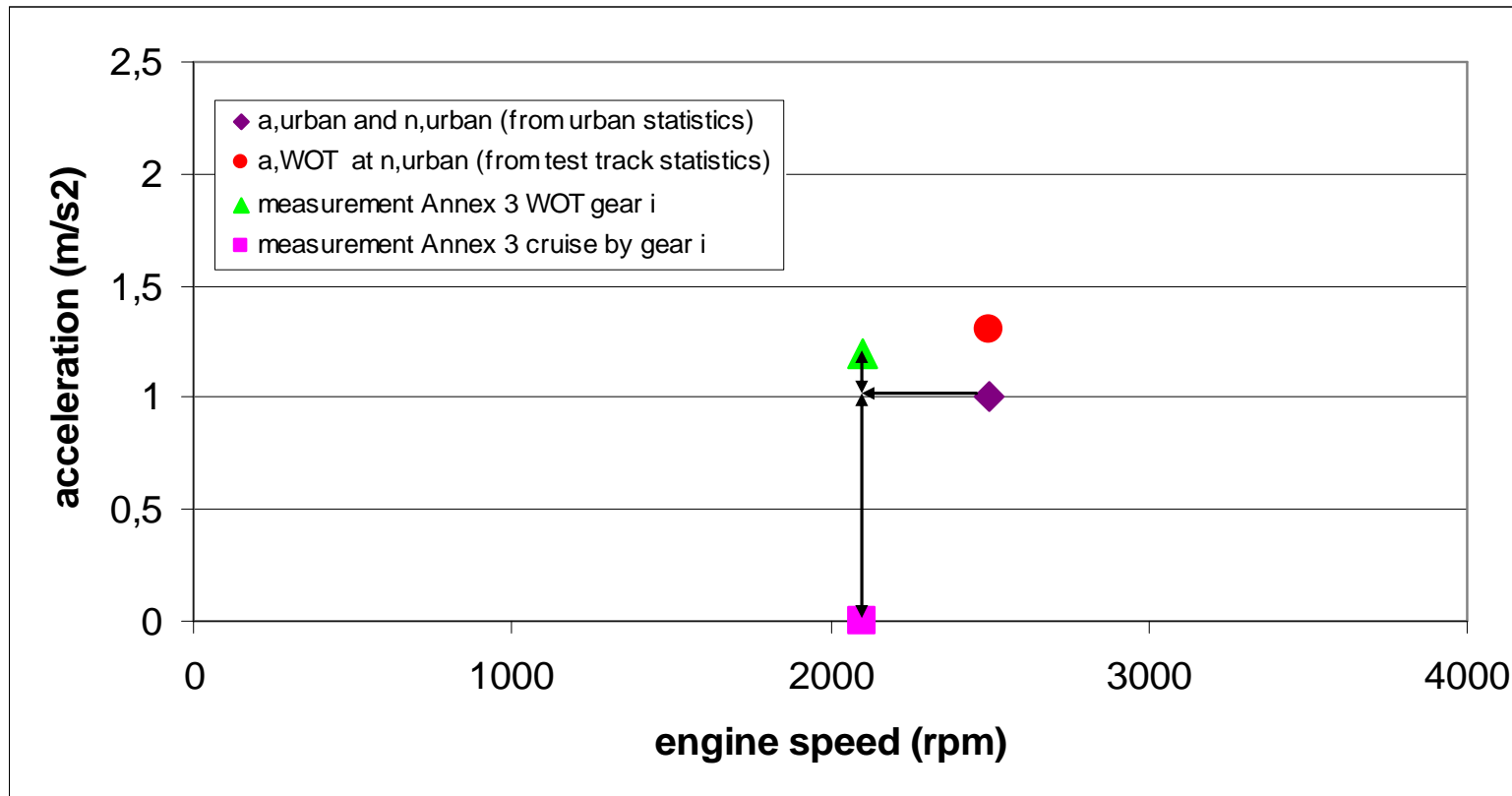
# Questions

- Did I correctly understand the alternatives for anchor points?
- How much is the difference between the various options (1, 3 or 10 dB?)
- Which vehicles will have really different outcome due to these alternatives



# Annex 3

check if acceleration  $> 2 \text{ m/s}^2$



- NB remember to check:
  - The measurement in the next gear higher is only valid if the measured acceleration is bigger than  $a_{urban}$
  - The noise measurements at WOT and cruise have to be weighted according to the ratio between the measured acceleration and  $a_{urban}$