

some observations on the base of the ASEP dBase

Prepared by the Netherlands
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Rough comparison of proposals

- Both the FD and UBA proposal are based on vehicle speed and engine speed. The NL proposal is based on vehicle speed and vehicle acceleration.
- UBA and FD limit curves look similar
 - UBA is often, but not always, the most stringent
- For majority of vehicles NL limit is quite in line with UBA and FD, but for some vehicles significantly different
 - NL tends to be more liberal for vehicles with high acceleration and tighter for vehicles with slow acceleration
 - NL tends to be more liberal in high gear ratios and tighter in low gear ratios
- The limit curves of all three proposals can be tuned in order to (dis)approve certain vehicle behavior

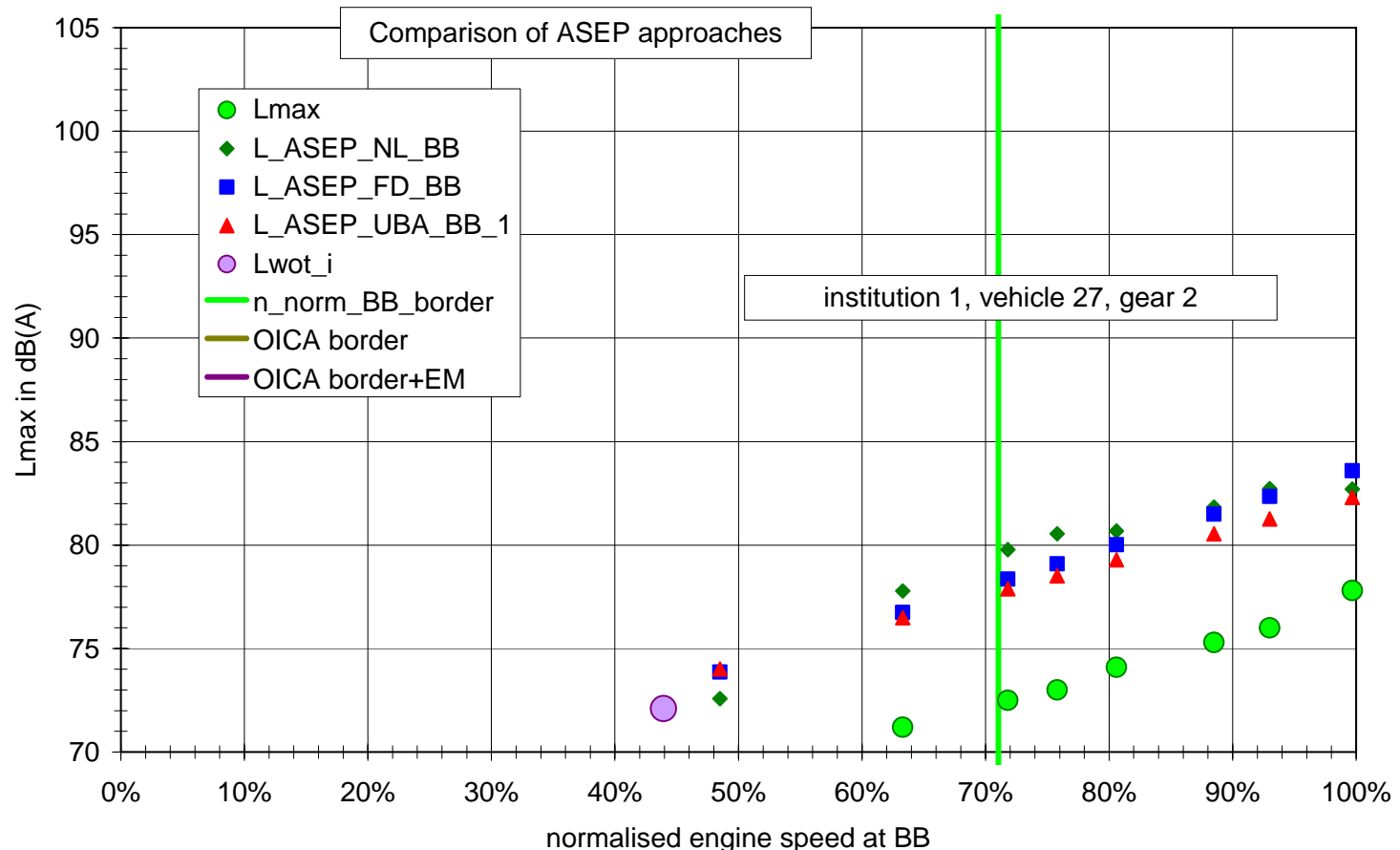
Rough comparison of proposals

- All three proposals are proven to be practicably executable
- Remaining issues
 - NL sometimes shows some scatter in limit values; especially in cases of automatic gearboxes which are shifting between AA' and BB'
 - FD and UBA contain a subtraction of tyre noise, which can cause big uncertainty in case of dominant tyre noise contribution
 - FD and UBA require an engine speed; some vehicles may not have an engine speed and can not be tested
- Practical solution can be found for these issues
- The principal choice is:
 - acceleration
 - design independent and in line with annex 3 philosophy
 - engine speed
 - reflects natural understanding of noise generation
 - often more stable to measure
 - applicable for most of the current technologies
 - only not applicable for types without engine speed like plug in hybrid (are such vehicles a concern for ASEP?)

Looking in detail to all sheets

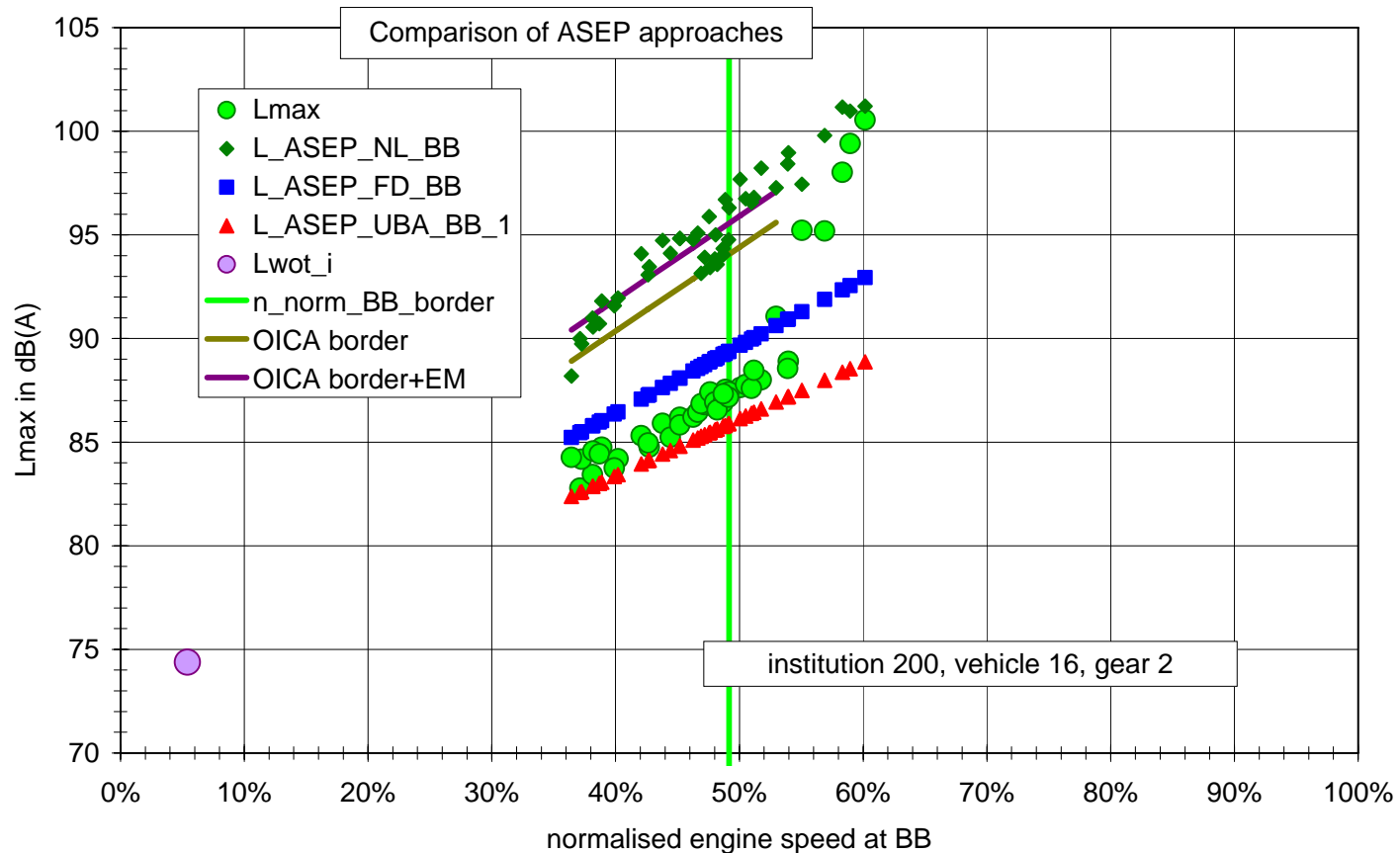
- The next slides show some detailed information gathered from the dBase

In many cases everything is “as expected”



- Noise curve is linear
- Maximum expected noise level around 80 dB(A) (diesel) to 85 dB(A) (petrol)
- Limits of NL, FD and UBA are close together
- Measured noise is well below limit

In some cases not everything is “as expected”



- Noise curve is not linear
- Maximum expected noise level far beyond 80 dB(A) (120 dB(A)??)
- Limits of NL, FD and UBA are more than 10 dB apart
- Measured noise is approved by one method, disapproved by the second and partly approved by the third (only within the boundary conditions)

Statistics on “approvals”

- Vehicles in dBase:
 - 124 different vehicles
 - 139 records; 15 are in twice with different analysis methods
- Limit now (R51.02)
 - 44 exceed pure limit
 - 24 exceed limit by more than 1,9 dB(A)
- If limit R51.03 annex 3 is 72/73/75
 - 24 exceed pure limit
 - 17 exceed limit by more than 0,4 dB(A)
- ASEP with these settings of the limit values
 - 33 exceed NL limit
 - 17 exceed FD limit
 - 35 exceed UBA limit
 - 13 have an obvious jump or non linearity in the noise curve

Vehicles of concern 1

- Criteria:
 - Exceed limit R51.02 by more than 1,9 dB(A)
 - Pass limit R51.03 annex 3 + 0,4 dB(A)
- 7 out of 124 vehicles in dBase fulfill these criteria
- Non of these vehicles are disapproved unanimously by all ASEP proposals
 - NL: 2
 - FD: 2
 - UBA: 6
- See examples in later sheets

Vehicles of concern 2

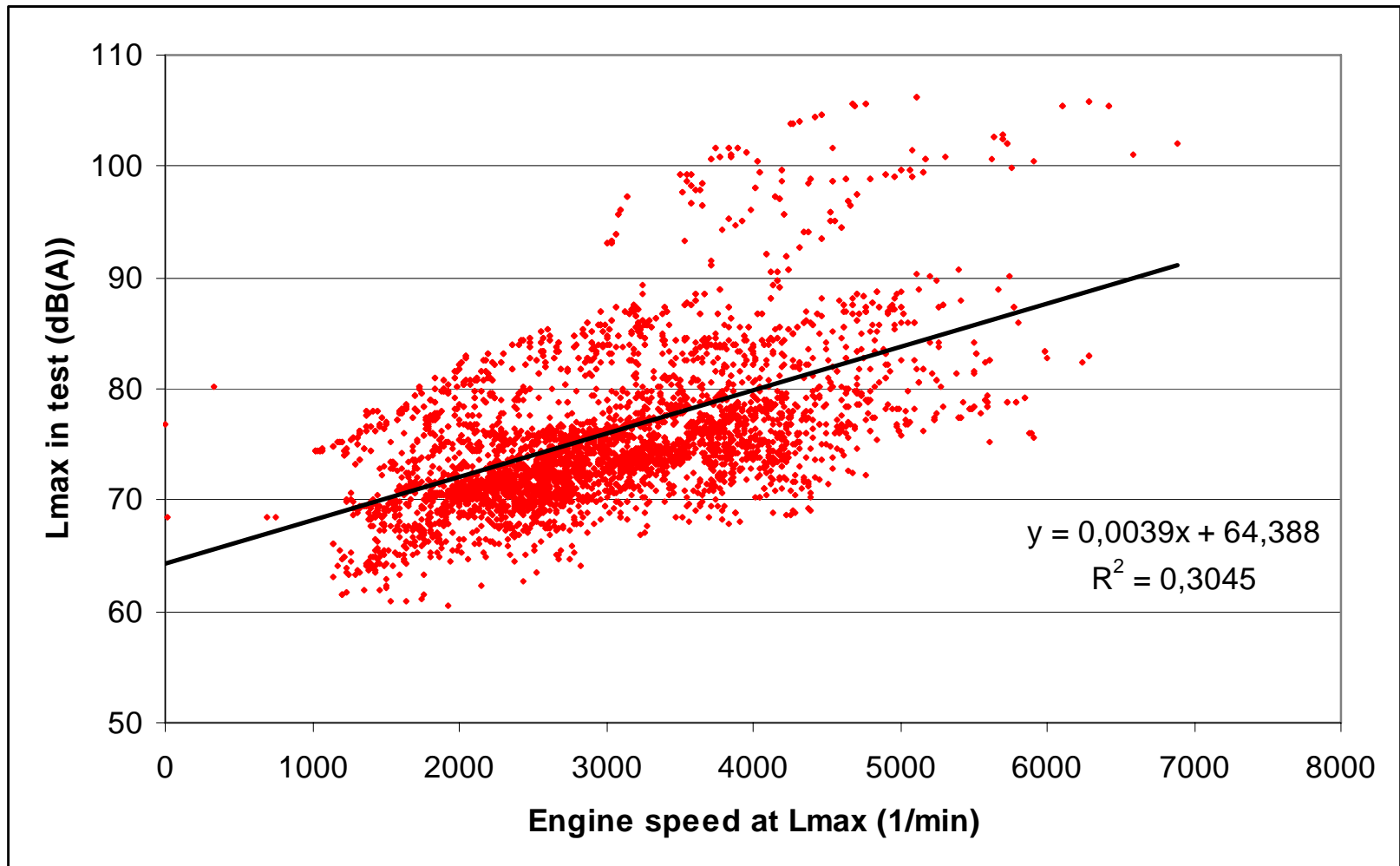
- Criteria:
 - Disapproved by all ASEP proposals (for this criterion the ASEP boundary conditions have not been taken into account)
 - Fulfills R51.02 limit +1,9
 - Fulfills annex 3 limit + 0.4
- 4 vehicles fulfill these requirements
- Those 4 shows all significant jumps or non linearity's
- See examples in later sheets

Vehicles with obvious non linearity's

- 13 vehicles
- See examples in later sheets

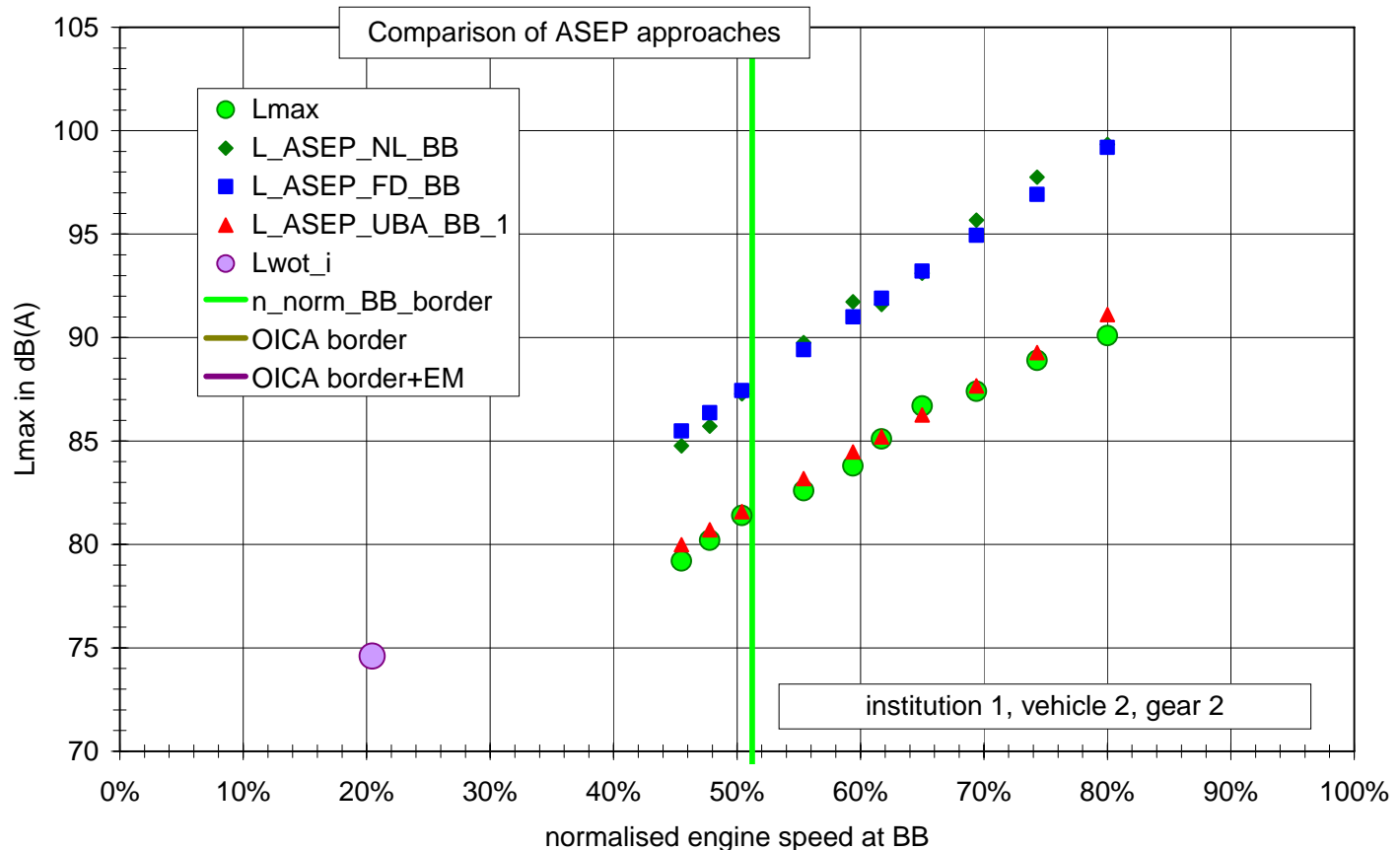
All measured data points of all vehicles

- Are there data points obviously beyond “normal behavior”, which should be detected by ASAP?



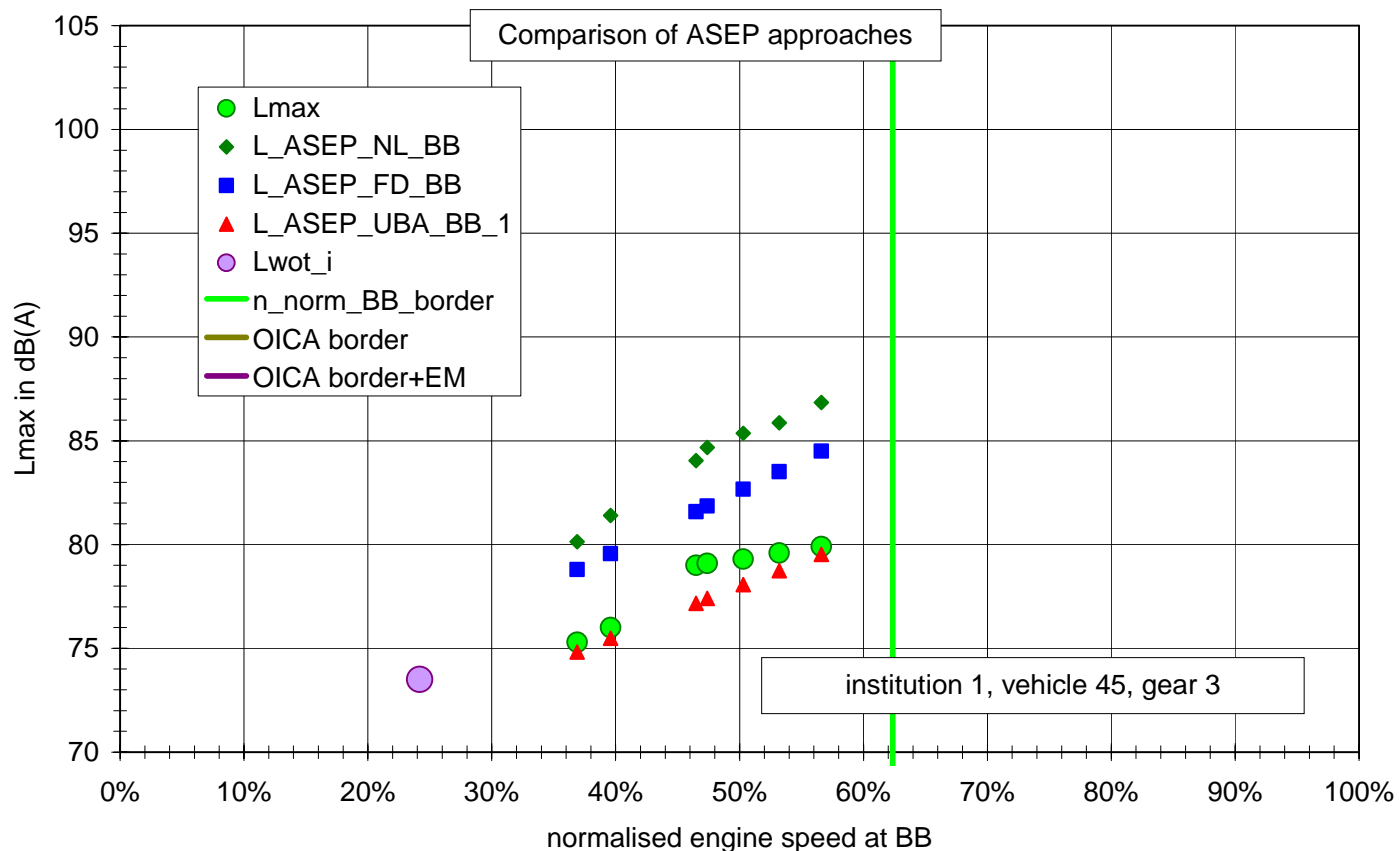
Vehicles of concern 1

- R51.02 = 77,1 Annex 3 = 73,3
- Vehicle is approved by all ASEP proposals



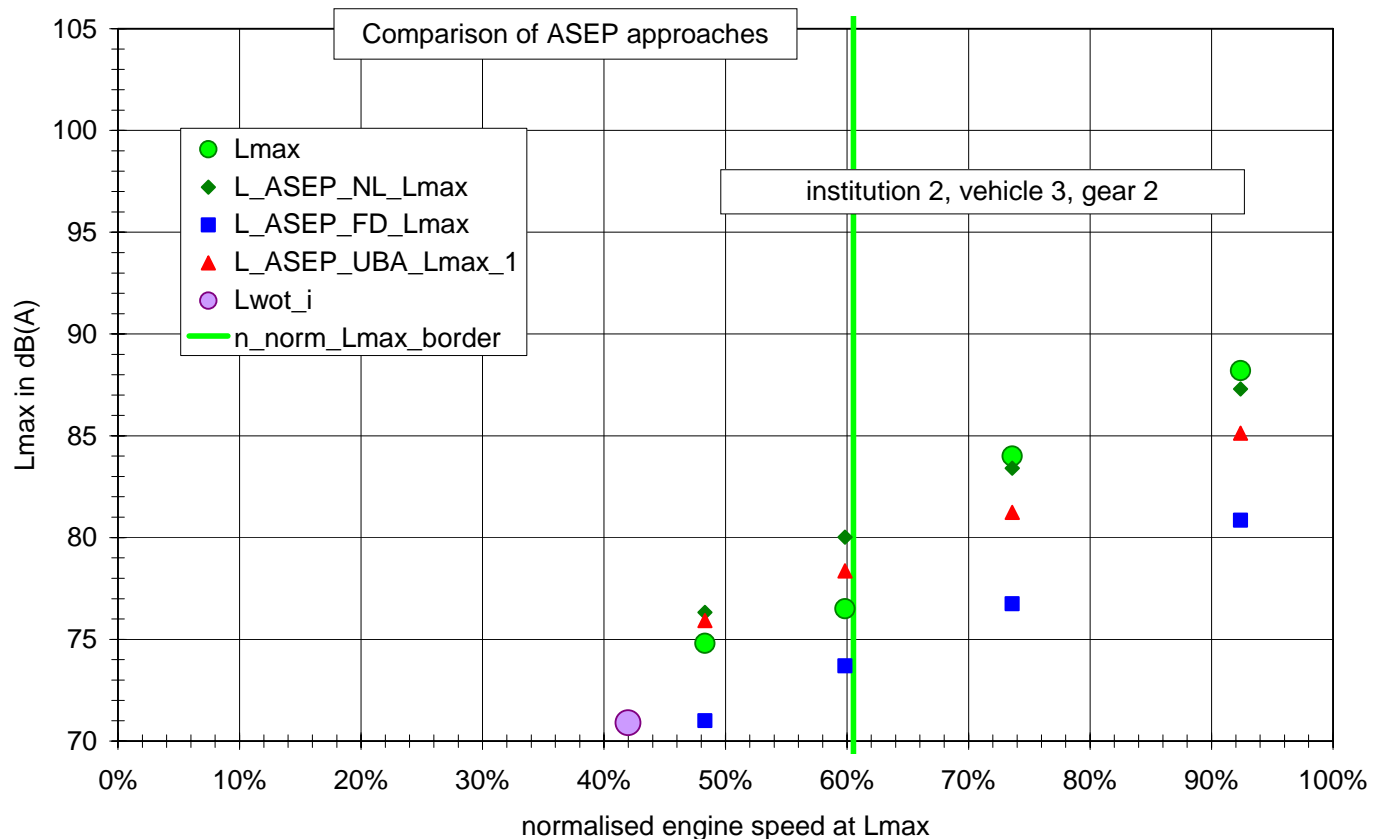
Vehicles of concern 1

- R51.02 = 77,0 Annex 3 = 72,4
- Vehicle is disapproved in ASEP only by UBA prop



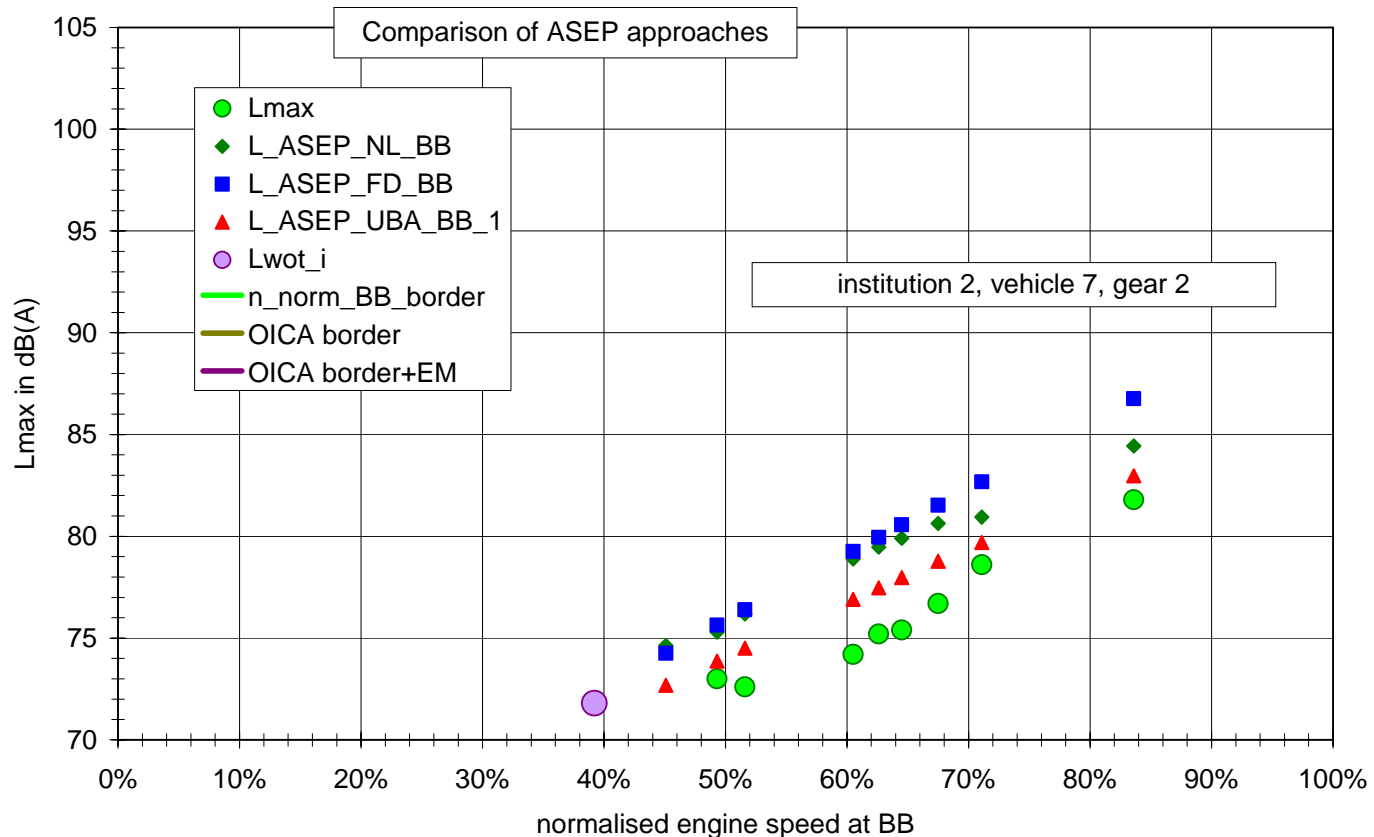
Vehicles of concern 1

- R51.02 = 79,5; Annex 3 = 70,4
- Vehicle is disapproved in ASEP only by FD proposal
- NB. Is limit for engine speed high enough?



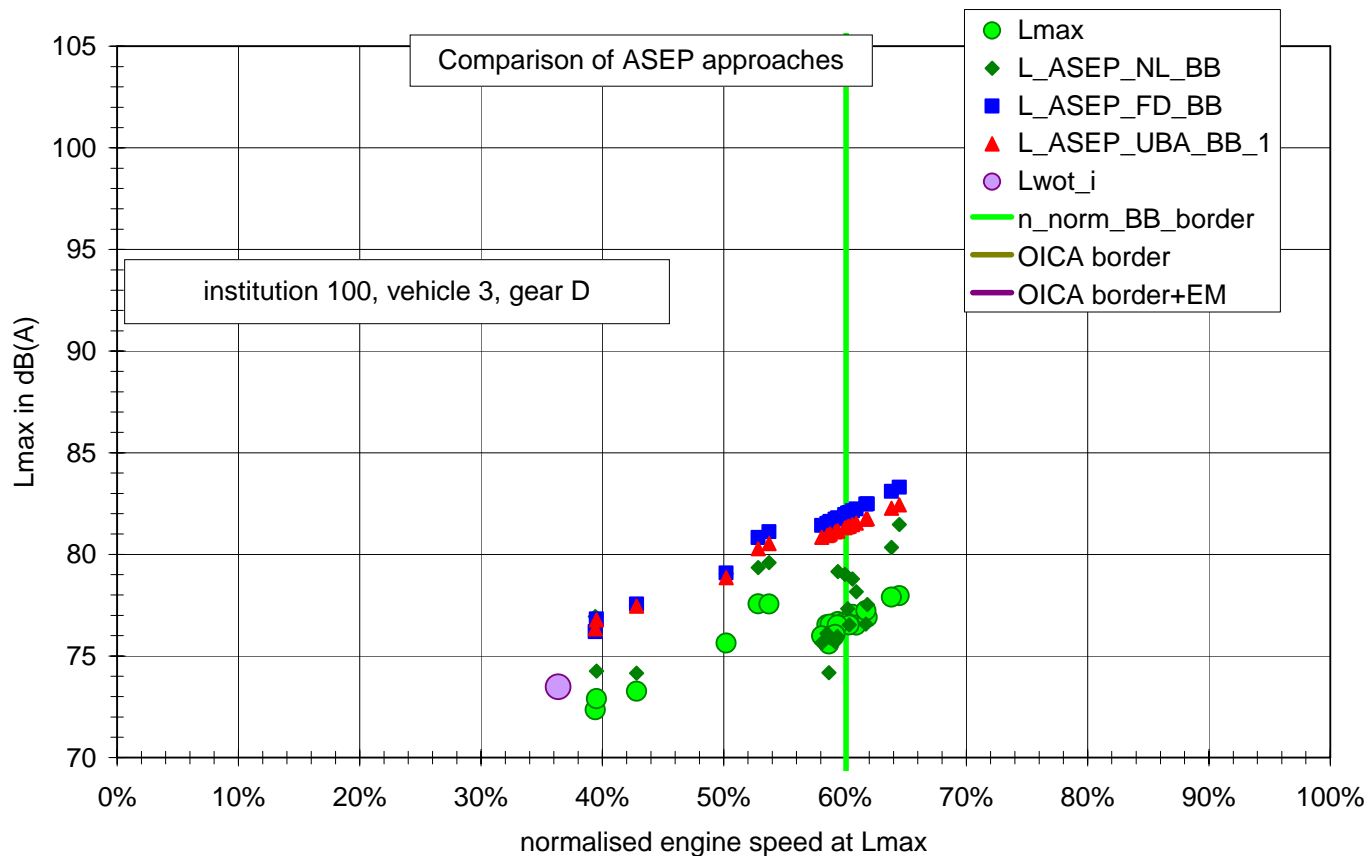
Vehicles of concern 1

- R51.02 = 76,0 Annex 3 = 71,4
- Vehicle is approved according to all ASEP proposals



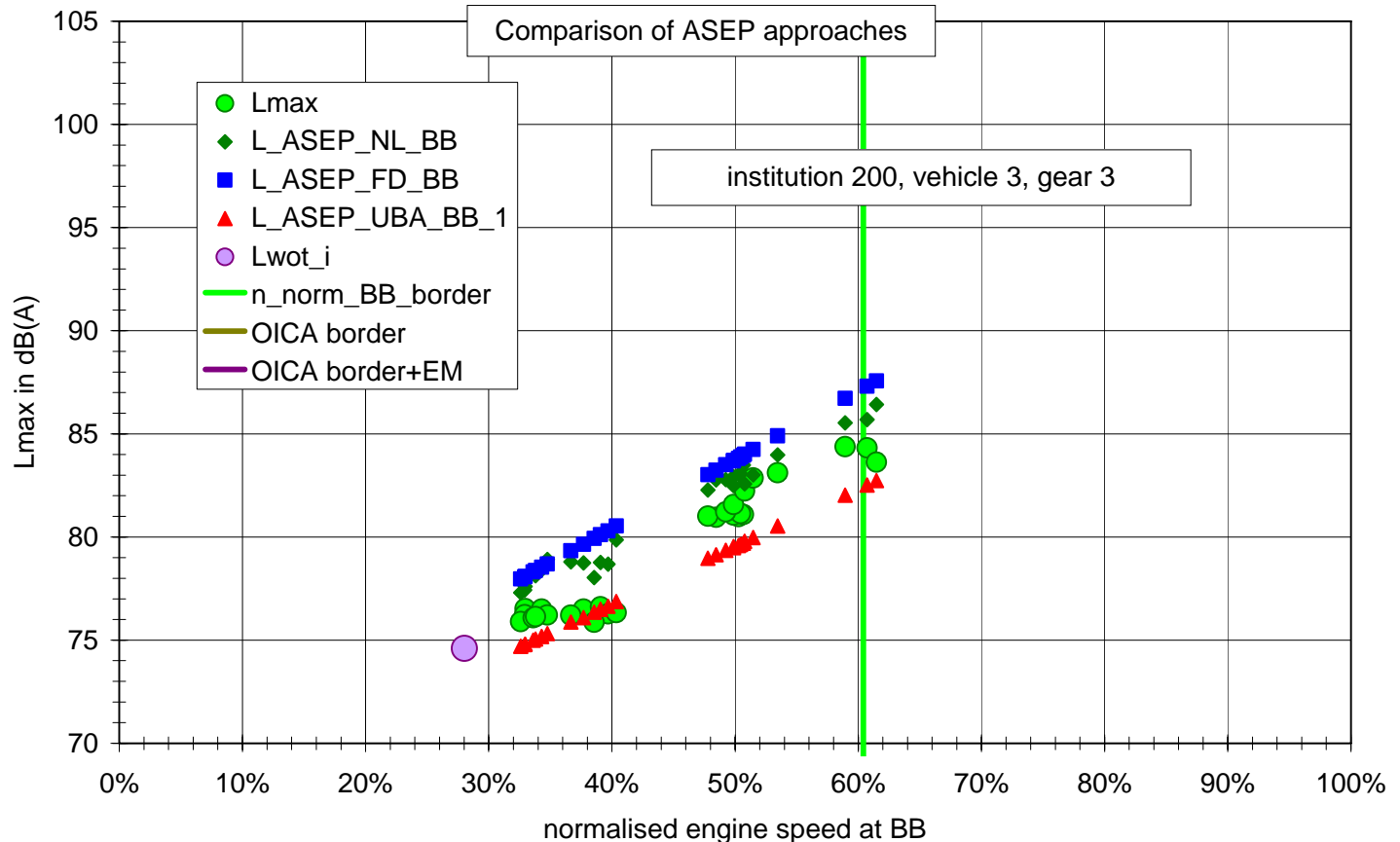
Vehicles of concern 1

- R51.02 = 76,7 Annex 3 = 71,4
- Vehicle is generally approved according to ASEP
 - Note: NL spread in limit values



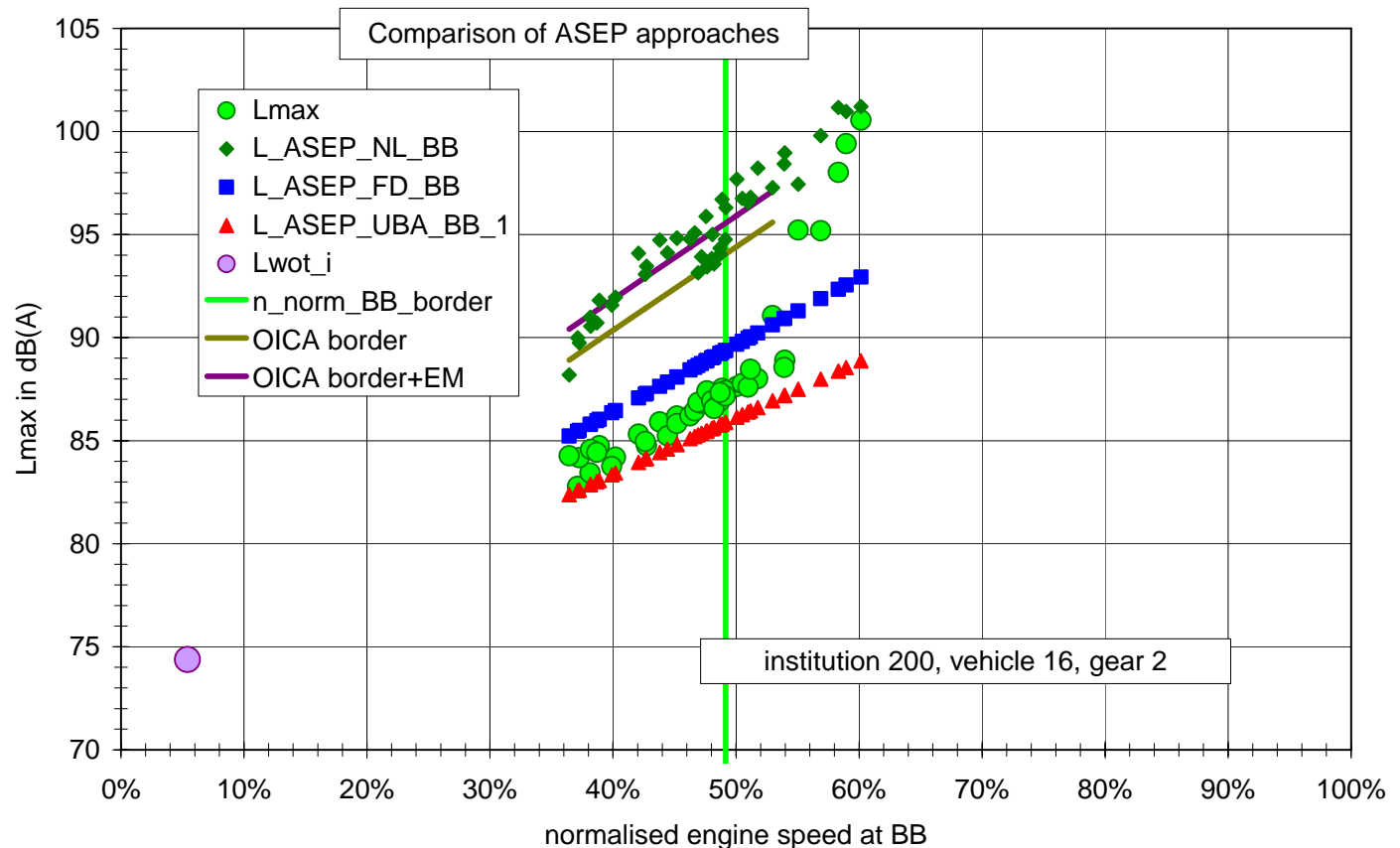
Vehicles of concern 1

- R51.02 = 81,1 Annex 3 = 71,7
- Vehicle is disapproved in ASEP only according to UBA prop



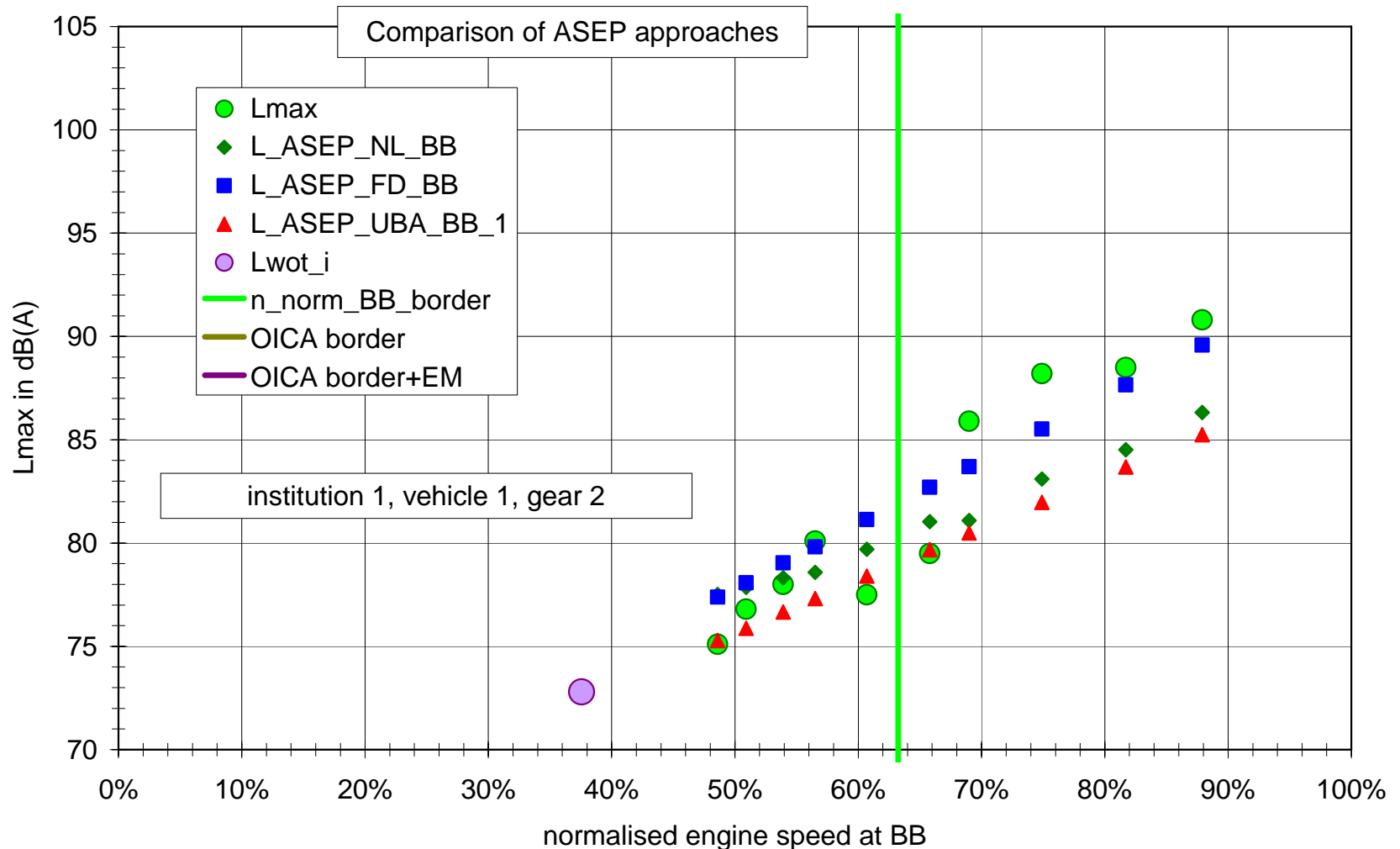
Vehicles of concern 1

- $R51.02 = 78,1$ Annex 3 = 73,5
- Vehicle is disapproved in ASEP only by UBA prop



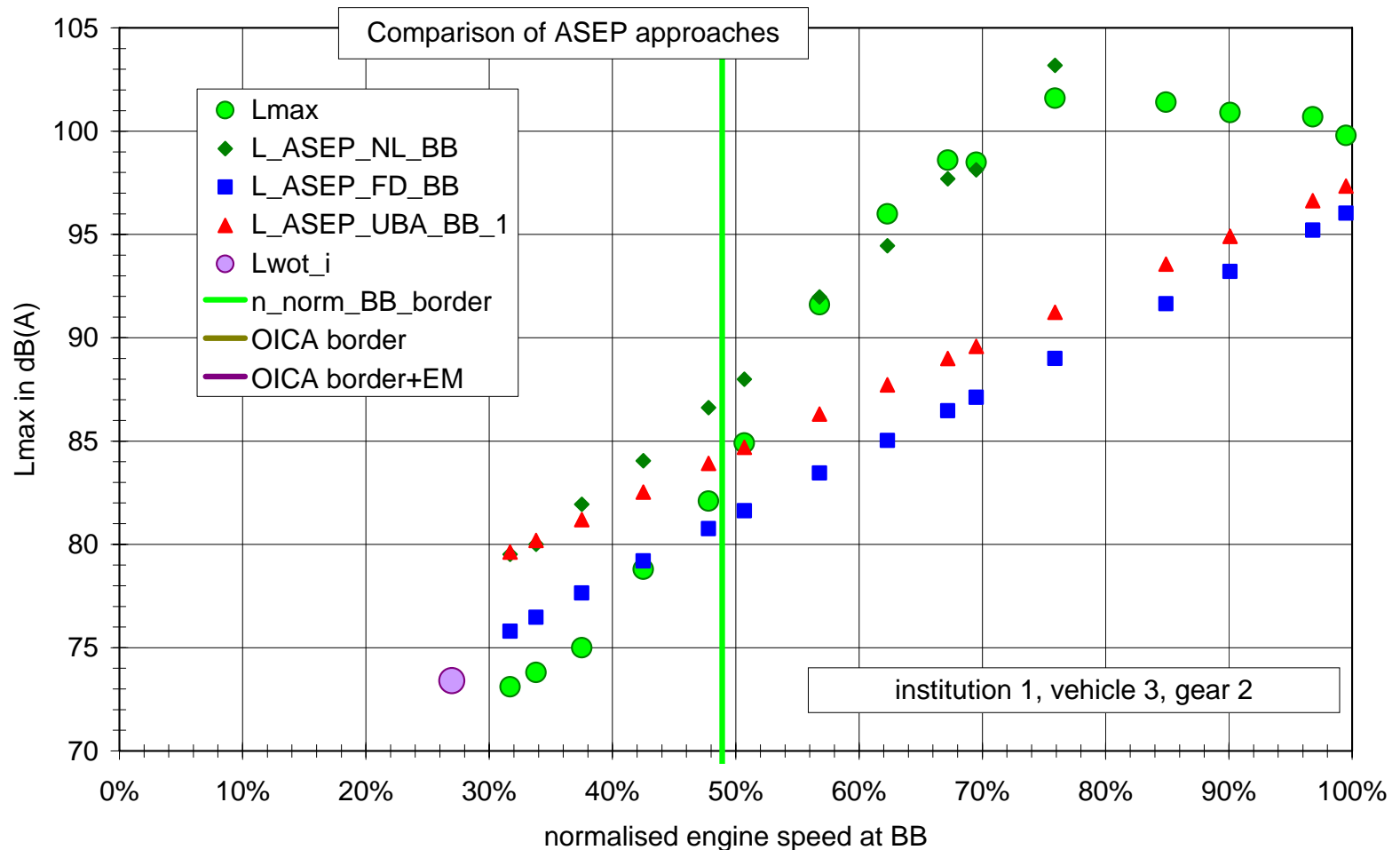
Vehicles of concern 2

- R51.02 = 75,2 Annex 3 = 71,9



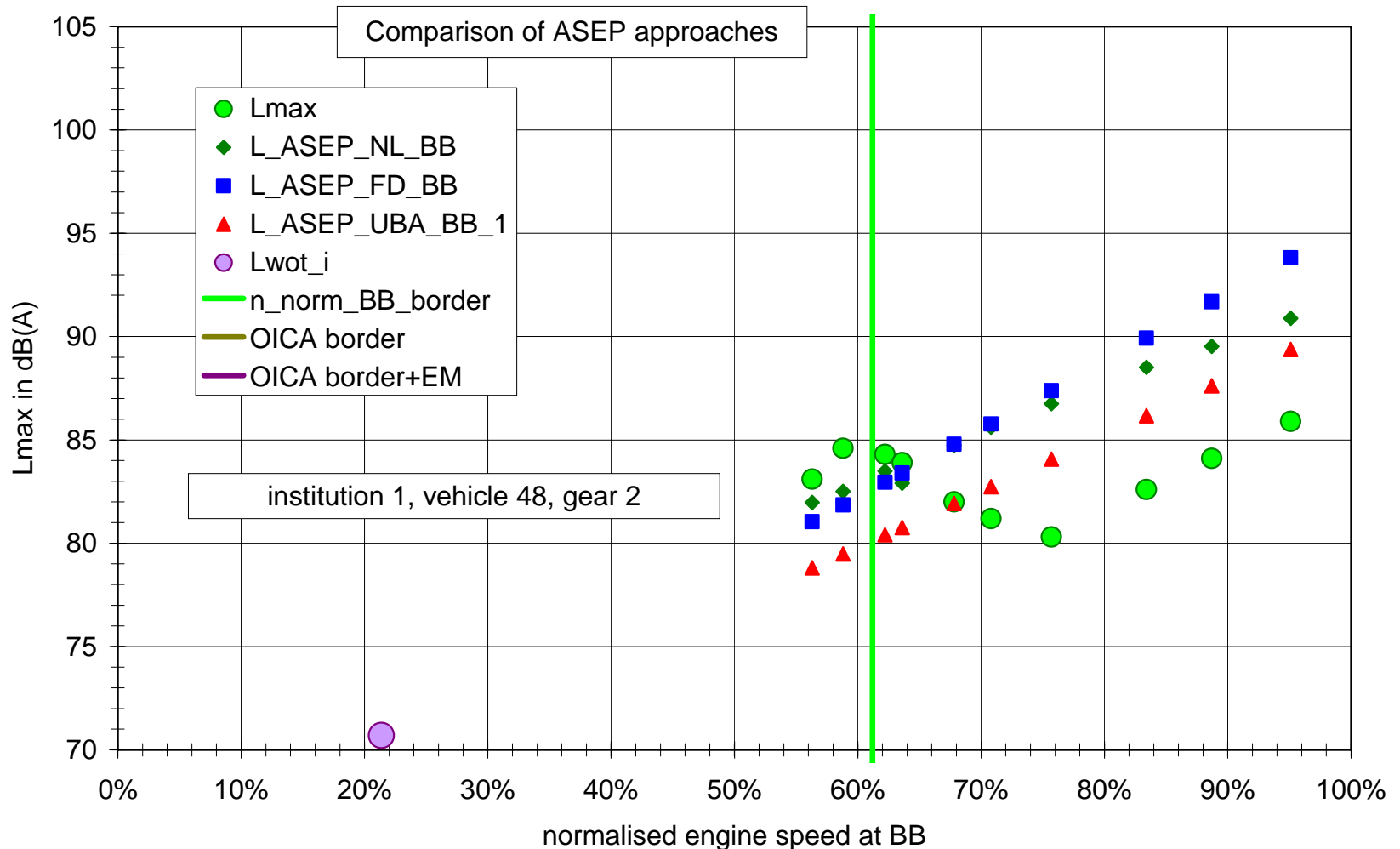
Vehicles of concern 2

- R51.02 = 74,7 Annex 3 = 72,8



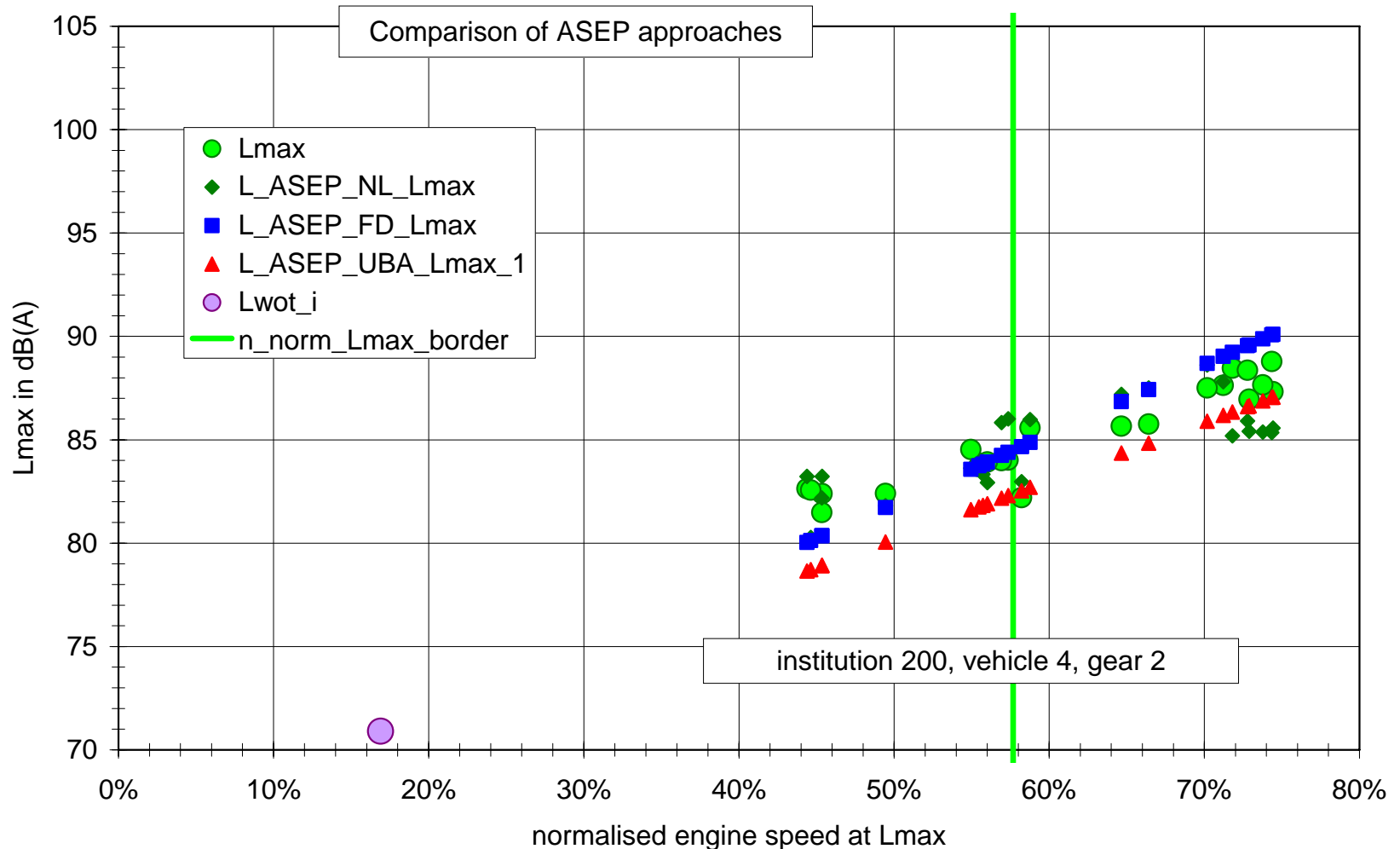
Vehicles of concern 2

- R51.02 = 70,0 Annex 3 = 70,3

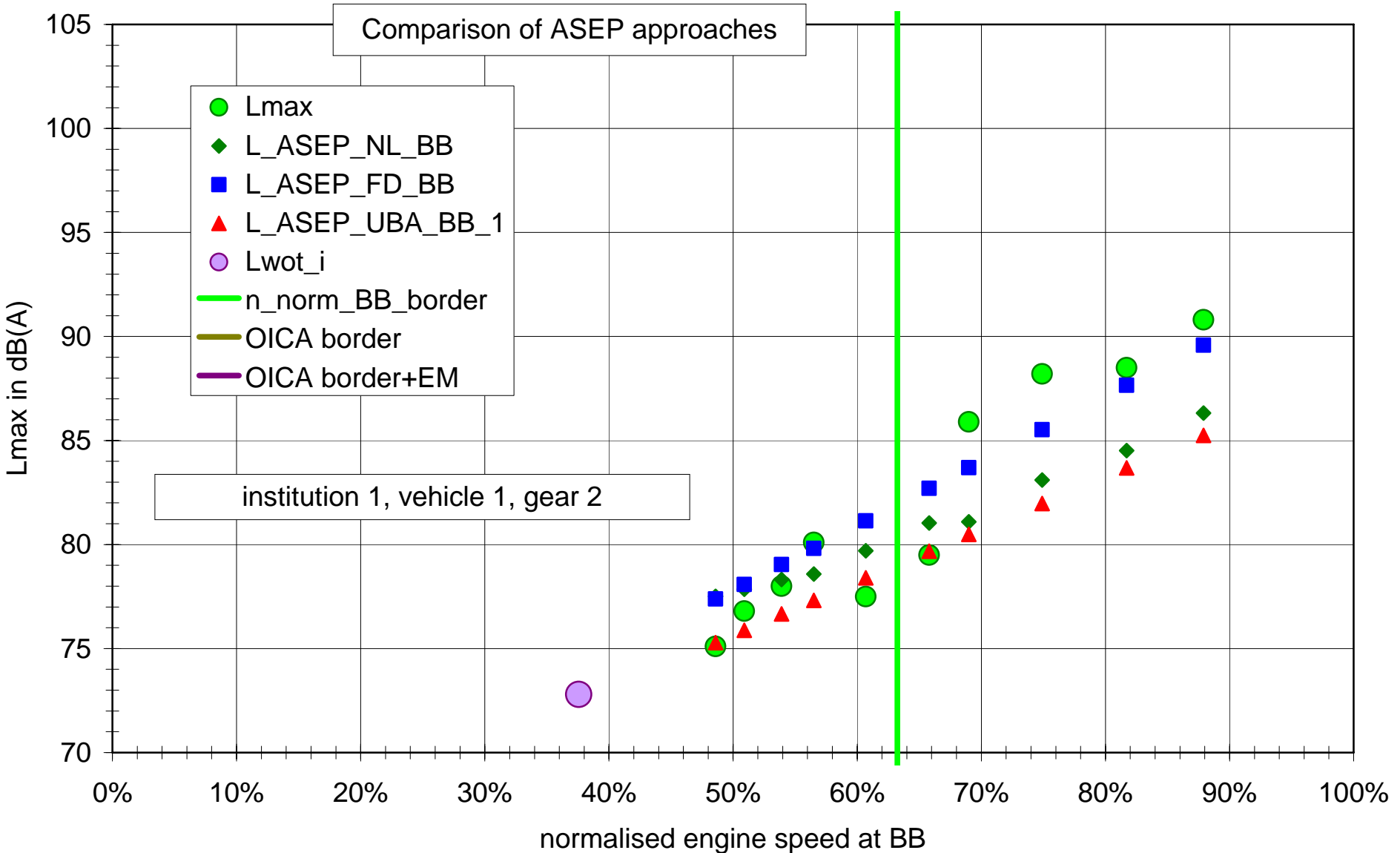


Vehicles of concern 2

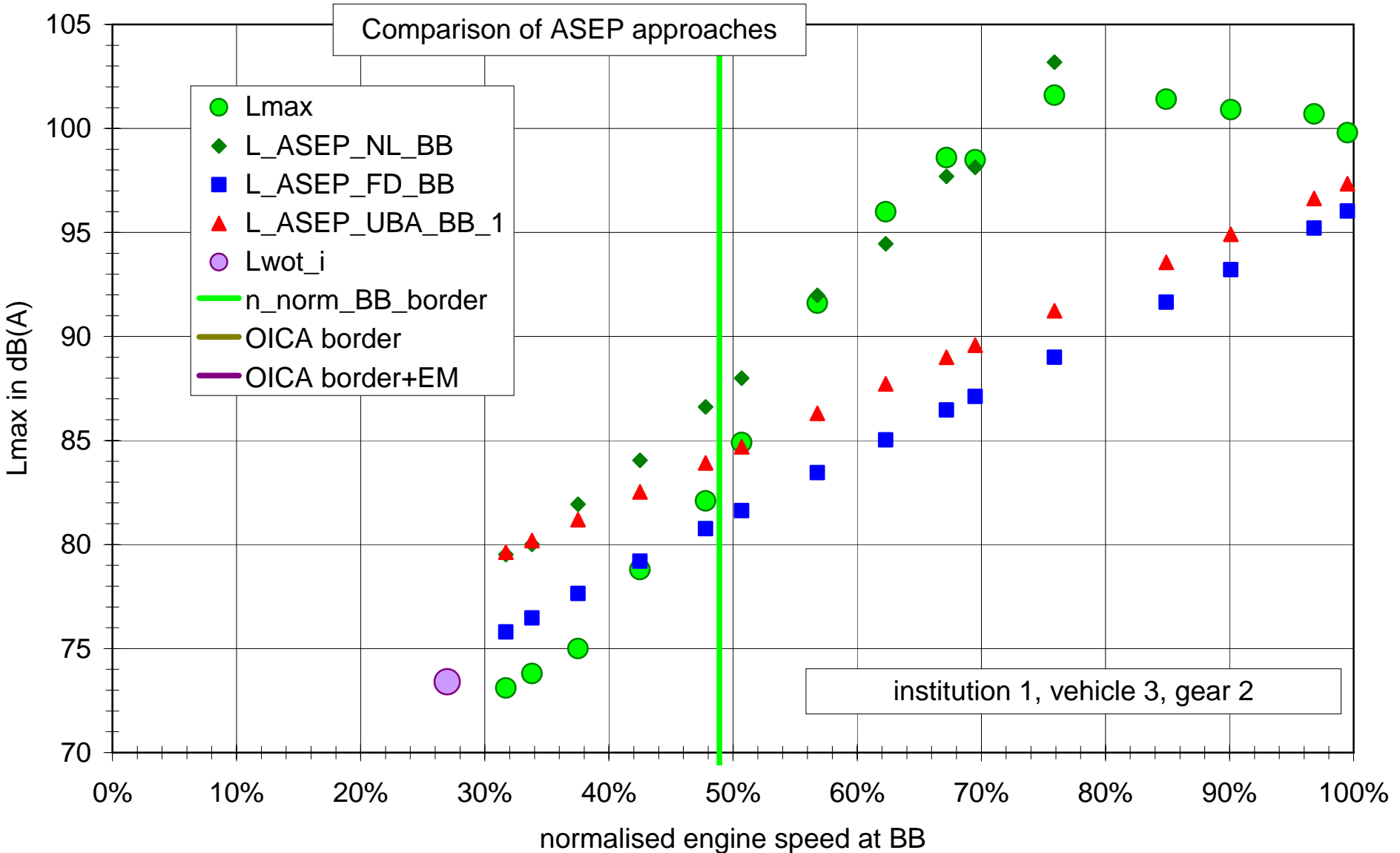
- R51.02 = 76,0 Annex 3 = 70,1



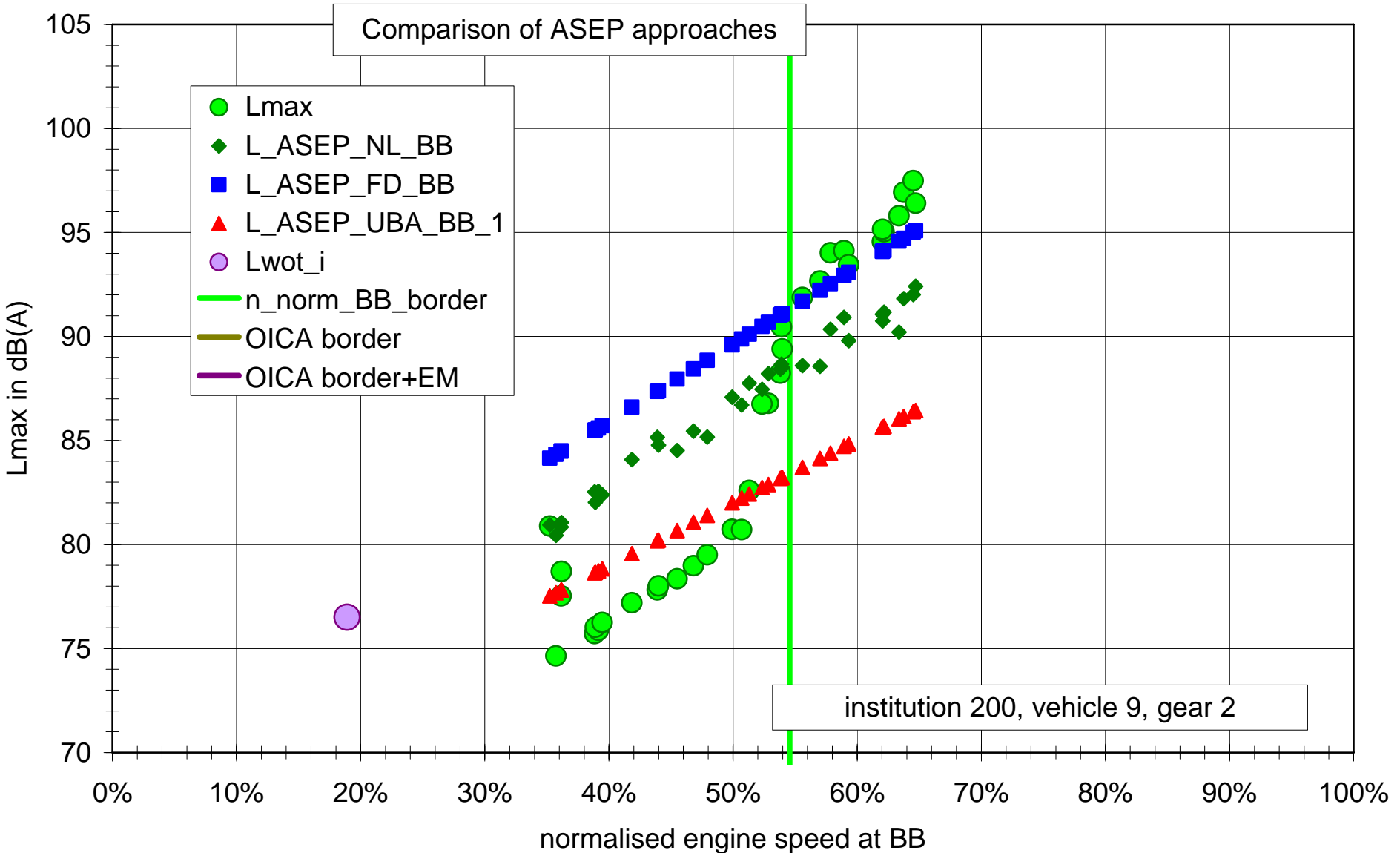
Vehicles with non linear behavior



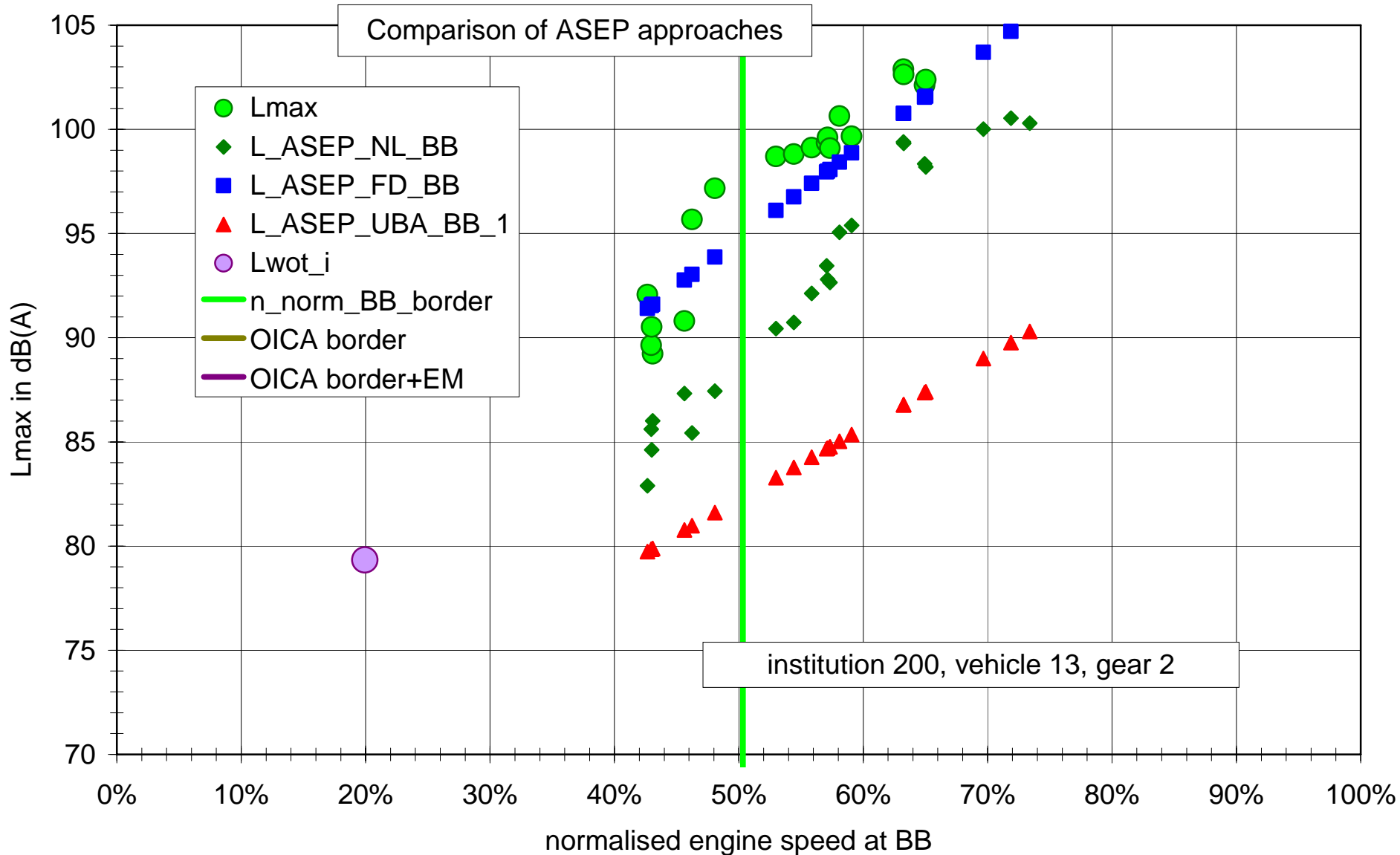
Vehicles with non linear behavior



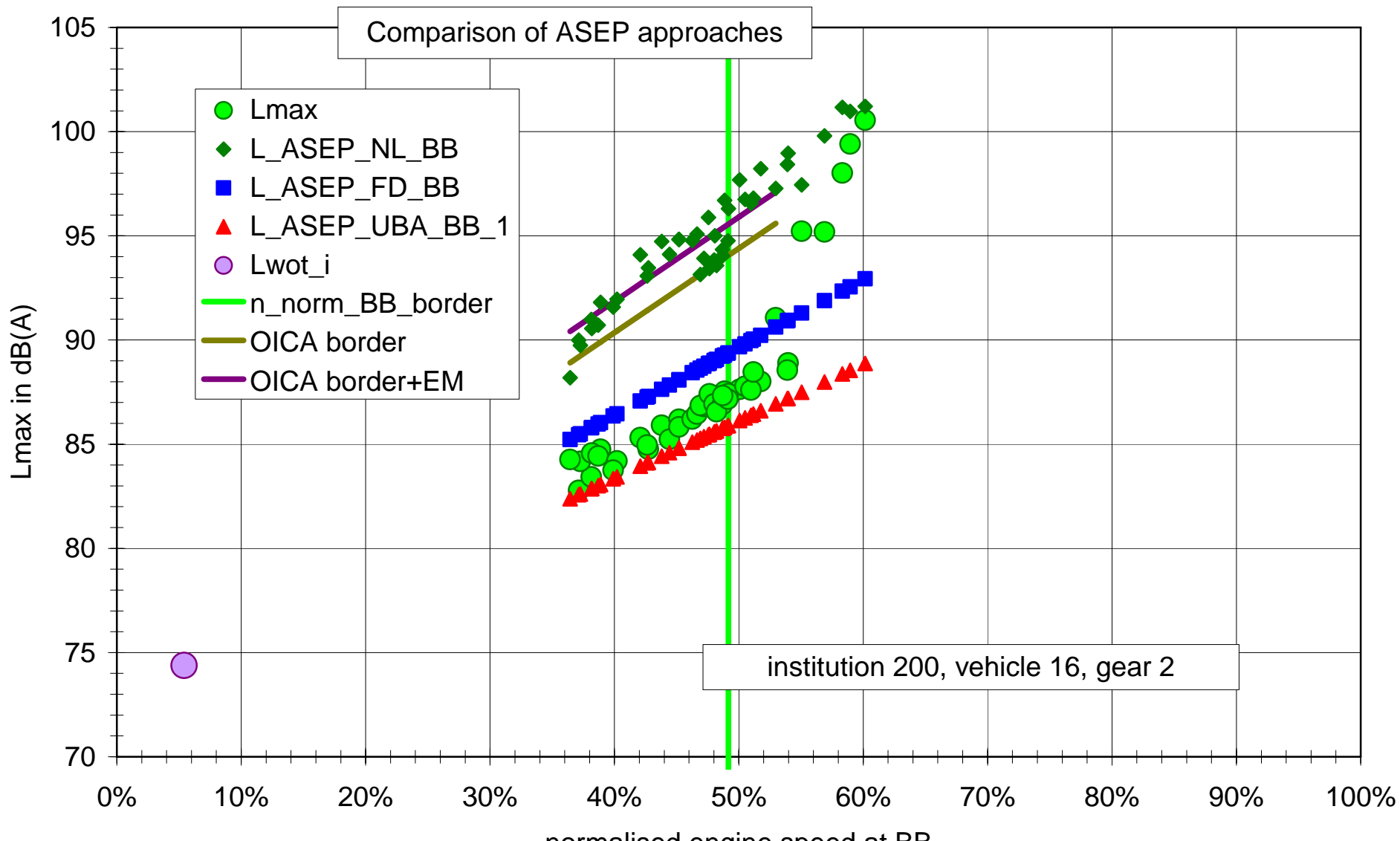
Vehicles with non linear behavior



Vehicles with non linear behavior



Vehicles with non linear behavior



Question to the group:

- The NL proposal was intended to be design independent: the vehicle is seen as a black box moving with a vehicle speed and a vehicle acceleration. What is causing its propulsion is not important.
- Could engine speed based ASEP proposals be design restrictive?

Exercise:

change PMR from 67 to 100 kW/t

- Basic vehicle:
 - 2 liter engine 100 kW 6000 rpm
 - Weight: 1500 kW
- Options to change
 - Increase capacity to 3 liter
 - Add turbo
 - Increase rated speed to 9000 rpm
 - Hybrid: Add electric engine
 - Reduce weight to 1000 kg
 - Other?
- How will this effect noise values?
 - In annex 3
 - In annex 10
 - In traffic