



# **Progress Report**

**DTP Subgroup**

**Lab Process Internal Combustion Engines**

**(LabProcICE)**

**Zuerich, 13. April 2011**



## Overview

### 1) State of the working progress

- 1.1) Meetings since Jan GRPE 2011
- 1.2) General issues (OIL, gtr draft, definitions)
- 1.3) LabProcICE issues on DTP level

### 2) Work in progress items / proposals / open issues

- 2.1) Lab Procedure
- 2.2) Measurement / Equipment
- 2.3) Road Load Determination

### 3) Next steps



## 1.1) Meetings since January GRPE 2011

- 21.-22.02.2011: Brussels workshop
- 25.03.2011: Tel/Web conference



## 1.2) General issues (OIL, gtr draft, definitions)

### Open issues list

has been updated (LabProcICE-047) and an additional classification was introduced (“ok” = closed issue)

**GTR draft** (LabProcICE-039) needs to be updated  
→ small draft working teams were established

### Tasks:

- Mark already confirmed proposals
- Identify open issues which are missing in OIL
- Introduce new proposals of last workshops
- Review of definitions



### 1.3) LabProcICE issues on DTP level

- Inertia classes
- Testroom and soak area temperature
- Method for subtraction of pollutant mass in intake air
- (common) definitions  
LabProcICE-049 Definition terms list  
LabProcICE-050 Definition list



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## 2.1) Lab Procedure – Vehicle dyno operation mode

### Justification:

The vehicle must be prepared in order to insure correct and safe vehicle operation on chassis dynamometer (e.g. deactivation of ABS/PSM system).

### Proposal:

A “dyno operation mode”, if any, shall be activated by using a manufacturer's instruction (e.g. using vehicle steering buttons in a special "pressing order", by using the manufacturer work shop tester, or fuse removal).

Activation or not of the mode shall be recorded in the test report.

"Dyno operation mode" shall not activate, modulate, delay or deactivate the operation of any part, that affects the emissions and fuel consumption under the test conditions.”



Comments received by UK and NL at DTP3 meeting:

need for improvements to ensure transparency of the mode to avoid cycle beating / abuse and ensure correct application in ISC?!

LabProcICE experts saw no need to improve wording → proposal kept

Additional feedback of NL:

Need of a regulation in the WLTP that all equipment on board of the vehicle which is active in normal operation on the road is also active during the dynamometer test (Power steering, radio, lights, AC – if it is on during normal driving)

Manufacturer has to guarantee that all equipment on board is normal functioning and if this is not possible then the manufacturer should explain why not

Manufacturer should also give a reason why he needs this "mode" and explain how it works.





## 2.1) Lab Procedure – multimode gear boxes / GSI

How to test a multimode gearbox?

### Emissions testing proposal:

Common understanding: Compliance with emissions standards in all modes.

Testing of agreed worst case is permissible

GSI considered to be a mode of a multimode gearbox

### CO<sub>2</sub> / FE testing proposal:

Single default mode – test in the default mode

No default mode or multi default modes – test in the agreed best and worst case modes, the CO<sub>2</sub> / FE result is the average of both modes.

Manual transmissions with GSI are considered as multimode, automatic transmissions with a manual mode are tested as automatics, independent of GSI

### Next Steps:

Develop gtr text including a procedure for use of GSI



## 2.1) Lab Procedure – battery SoC

The state of charge of the 12V starter battery at the beginning of the test has a remarkable influence on the test results → consideration necessary

Problem: to determine the battery state of charge is very difficult

**Proposal by TÜV/UBA:** (see LabProclCE-056rev1)

An appropriate conditioning test cycle should be started before official test with fully charged battery. The battery should remain in this condition for [X] hours.

The charge current should be monitored during official test. In case that  $\Delta E_{\text{batt}}$  always corresponds to a battery discharging and  $\Delta E_{\text{batt}}$  is not within [ X ] per cent of the energy content of the consumed fuel, it should be considered in the calculation of the CO<sub>2</sub> emissions similar to the method for not external chargeable hybrid-electric vehicles (NOVC) in ECE-R 101.



## 2.1) Lab Procedure – battery SoC

### Next steps:

- Further consideration necessary to develop a clear and efficient way.
- Evaluation of alternative methods for consideration of SoC
- COM study will deal with SoC influence too.
- Input from LabProcEV hybrid experts needed.



## 2.1) Lab Procedure – Others

- GRPE decision on **cooling fan requirements** (Informal Doc 61-19) will be transposed to gtr. The term “[...] conformity of production (COP) and in-service conformity (ISC) testing” of the GRPE document will be replaced by “[...] any subsequent testing”.
- **Reporting requirements** [test report, technical documentation....] to be to be dealt with in regional legislation  
→ certification issue



## 2.2) Measurement / Equipment – Dynamometer

### Proposal:

The dynamometer shall meet the following dyno requirements (**see LabProcICE-045 - proposal broadly as per CFR §1066.115**)

**Rolls speed synchronisation for 4WD dynos:** front and rear rolls speed shall be synchronous to within 0.16 kph. This criteria should be applied to a 1s moving average of the speed of each roller when measured at a frequency of 20 Hz. (to be demonstrated upon initial installation and after major maintenance)



## 2.2) Measurement / Equipment –Dyno requirements

### Japanese expert feedback:

some of today's equipment cannot comply with the requirements  
→ wider tolerances needed (see LabProcICE-058)

### Next steps:

EPA reference will be substituted by specific performance criteria and testing frequency (table based on CFR 1066) and Japanese feedback will be taken into account

→ Combined proposal to be discussed at next workshop



## 2.2) Measurement / Equipment – Hot-FID

GRPE proposals from OICA to amend the ECE-R83  
→ use only unheated FID (diesel & gasoline)

Contracting parties still raised concerns on this proposal and were in favor of hot FID measurements.

### Proposal:

Postpone the discussion to a later phase of gtr, if studies on the impact of future fuels, aftertreatment and combustion systems are available.



## 2.2) Measurement / Equipment – Others

- **Calibration intervals** had been reviewed and agreed  
→ see LabProcICE-043
- Proposal to bring the **FID response factors** in line with the specifications already defined in GTR4, ECE-R49 and ISO
  - CH<sub>4</sub>/Air      1.00 =< R<sub>f</sub> =< 1.15
  - C<sub>3</sub>H<sub>6</sub>/Air      0.90 =< R<sub>f</sub> =< 1.10
  - C<sub>7</sub>H<sub>8</sub>/Air      0.90 =< R<sub>f</sub> =< 1.10





## 2.3) Road Load Determination – Tire Pressure

### Proposal (see LabProcICE-053 by T&E):

The front and rear tires shall be inflated to the lower limit of the tire pressure range specified by the vehicle manufacturer.

### Justification:

The tire pressure depends on the tire model as well as on vehicle weight and specification. Representative for normal use is the recommended tire pressure for partly loaded vehicle, in general the minimum pressure specified by the manufacturer.

A closer link between certification data and vehicle labeling has to be discussed in certification issues.



## 2.3) RLD – “feedback approach”

Road load data are determined mainly with pre-series vehicles. In order to verify congruence with series vehicles, a feedback approach was proposed.

### Proposal by STAT&E:

Conformity checks of road load with series vehicles should verify the certification data. Differences should be fed back on certification data.

### Evaluation:

- No GTR task, but certification issue → further consideration on regional level
- GTR priority is to create the specifications in a technical correct way, to improve representativity and to tighten the specifications as much as possible for a higher reproducibility (by taking into account cost/benefit, practicability and feasibility)



## 2.3) RLD – Vehicle Coast Down Mode

Road load determination aims to evaluate the representative resistance of normal driving. Parasitic drags during vehicle coast down (e.g. regenerative braking) would distort the road load data (see LabProcICE-052 by T&E).

### Proposal in discussion:

“Vehicle coast down mode means a special mode of operation for which drivetrain components are mechanically and/or electrically decoupled from the wheels for the purpose of an accurate road load determination.

The vehicle coast down mode is not mandatory, however if components in the transmission system generate non-negligible and/or non-reproducible parasitic losses, implementing a coast down mode is recommended.

(...)



(...)

For vehicles without a vehicle coast down mode the manufacturer will prove to the technical service that parasitic losses behave in a reproducible fashion between driving on the road and on the chassis dynamometer.

The technical service may require appropriate instrumentation to be installed to verify the reproducibility of these parasitic losses.

If a vehicle is equipped with a vehicle coast down mode, it shall be engaged for any coastdown test, both on the road as on the chassis dynamometer.

For emission homologation testing the vehicle coast down mode shall be disengaged. The vehicle coast down mode shall not act as a defeat device.”



## 2.3) Road Load Determination – Other Proposals

### Vehicle Selection:

- Aerodynamic features (e.g. design line ): highest predicted sales volume
- Aerodynamic options (e.g. roof-rails): > 50 % (?) predicted sales volume considered
- tire selection criteria: regional legislation
- Tire tread wear: up to 50% based on ISO
- Wheel alignment and clearance as specified by manufacturer

### Load evaluation:

- One time moderate braking before vehicle warm up
- Consideration of rotary masses as described in ISO 10521
- Averaging of forces as described in ISO 10521
- Vehicle coast down mode switched on if any



### 3) Next steps

- Small teams (LabProc, ME, RLD) will continue work on draft gtr / OIL / definitions
- Next face-to-face workshop:  
**18./19. May 2011** in Brussels
- Additional Tel/web conferences
- Preparation of June 2011 DTP/GRPE
- Finalizing validation 2 parameter setting



# Thanks for your attention.

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