Revision and Amendments of International L-category Vehicle Approval in the Area of Environmental Performance and Propulsion Requirements - IEPPR
Agenda

- Introductions
- Current status of the L-category comitology package
- Aims and objectives
- Interactive session
  - L-category vehicle classification (L1Be, L3-A1 etc.)
  - Propulsion performance (peak power, torque, vehicle speed etc.)
  - Type I test – tailpipe emissions (over driving cycle)
  - Type III test – crankcase emissions
  - Type VII test - CO₂ emissions, fuel/energy consumption, and range
  - Type II test – idle emissions
  - Type V test – durability
  - Type IV test – evaporative emissions
  - Type VIII test – OBD (environmental part)

- Round-up
- Next steps
- AOB
Introduction to Study

- The EC is in the process of revising type approval procedures for L-category vehicles (powered cycles, mopeds, motorcycles, tricycles and quadricycles)

- A proposal, three delegated acts and one implementing act are currently being drafted:
  - European Commission proposal: the codecision act
  - Regulation on environmental and propulsion performance requirements (REPPR)
  - Regulation on vehicle functional safety requirements (RVFSR)
  - Regulation on vehicle construction requirements (RVCR)
  - Regulation on administrative requirements (RAR)

- The EC wishes, as far as possible, to replace the legislative text in the REPPR with references to international regulations to increase harmonisation

- On behalf of the EC, TRL and Ecorys are performing a study to propose changes to various UN regulations to achieve this
L-category vehicle type-approval test flow

L-category vehicle type approval of emissions

- International harmonisation of L-category vehicle classification (Task 4.10)
- Propulsion performance requirements (Task 4.9)
- Test Type I, tailpipe emissions test after cold start
- Test Type II, tailpipe emissions test at (increased) idle / free acceleration test
- Test Type III, emission test of crankcase gases
- Test Type VII, measurement of CO2 emissions, fuel consumption, electric energy consumption and electric range determination
- Test Type V, durability testing of pollution control devices (Task 4.6)
- Test Type IV, evaporative emissions test (Task 4.5)
- Test Type VIII, on-board diagnostics test (Environmental part only of OBD) (Task 4.8)

Test Process

1. Select Category
   - L-category vehicle type
   - Max power, max torque
   - Max speed
   - Masses, dimensions and number of wheels
   - Design maximum speed and propulsion power

2. Test performance
   - ICE, C, Hybrid

3. Approval criteria
   - Not performed as low occurrence

4. Test Type I
   - Emissions

5. Test Type II
   - Idle

6. Test Type III
   - Crankcase

7. Test Type V
   - Durability

8. Test Type IV
   - Evaporative emissions

9. Test Type VIII
   - On-board diagnostics

Update UN R3

- Map out issues
  - Maximum speed
  - State of the art
  - 50 or 65 (US, EU, EU)

- Motorcycle
  - Addition of dual category
  - ATV, 250

- Quadricycle
  - Sub categories
  - ATV, 250

Propulsion performance performed on different engine(s)/motor(s) and vehicle

Test Types I, II, III, VII performed on the same vehicle(s)

Test Types V, IV, and VIII performed on the same vehicle
Process Roadmap

Categories
- Measurement of maximum torque and power for engines and motors
- Measurement of maximum speed for vehicles
- Performance tests
- Validation of range of tests: Type I, II, III, IV
- Measure vehicle tank and CO2 emissions, fuel consumption and range
- Durability
- Evaporative
- OBD

Documents
- Maps issues: Maximum speed
  - Minimum speed: 0 - 20 (WC)
  - 40 - 80 (UK)
  - 50 - 30 (US, EU, UN)
- Motorcycle issues:
  - Brembo and Triumph variants of 1198-1199
  - Performance measure: Include U9 in addition to capacity
  - Hybrid/electric issue: Include weight of the batteries
  - Definition of vehicle weight/mass, how to be chosen
- Issue: Define Speed and Power tests for all category vehicles
- Issue: Define Power test for all drivetrains, incl. alternative drives
- Issue: Harmonising test methods: Test chemicals, temperature, tolerance, equipment
- Issue: Harmonising fixed numerical values between regions
- Issue: Validating any issues with the specifics of the evaporative tests
- Issue: Non-open standards
- Issue: OBD requirements

Page 5
Vehicle Classification

Doc: Resolution on the Construction of Vehicles, UN RE3

- **The maximum speed of mopeds (L1e, L2e, L6e)**
  - EU legislation states a maximum of 45 km/h (UK 30mph, 48km/h)
  - The US and UN legislation states 50 km/h

- **Additional sub-categories and suffixes**
  - 3 subdivisions: “A1” Leaner i.e. 125cm³, “A2” 35 kW, “A3” high performance
  - 2 suffixes for special types: “T” Trial, “E” Enduro

- **Additional sub-categories**
  - ATV, SbS, quadrimobile (mini-car)
  - Different power limits

- **Masses are measured differently per region**
  - Include batteries?
  - Gross weight, fluids, rider ...
  - **Power and Engine capacity**
  - Definitions in kW in addition to cm³
Propulsion Performance

Doc: No UN regulation for all L-category vehicles

- **Engine/Motor Tests**
  - Maximum torque
  - Maximum propulsive power
  - Vehicle tests

- **Vehicle tests**
  - Maximum vehicle speed

- **All engine/ motor/ powertrain types**
  - Petrol, Diesel, Electric, Hybrid
  - Per vehicle or per drive train?
  - Per engine or total propulsive power?

- **Which legislation?**
  - Consolidate, or separate by small and large?
  - Consolidate with emission tests?
Tail Pipe Emissions: Test types I, II, III, VI, VII

Doc: GTR No. 2, R40, R47, R101

- **Which legislation?**
  - Update R40 and/or R47
  - Update GTR No. 2
  - New UN ‘mirror’ regulation (along lines of R83), mirroring GTR No. 2
  - Open scope of R101 or duplicate test into L-cat regulations?

- **Test as much as possible at once?**
  - Test types I, III, and parts of VII and VIII could all be done at once or in sequence. NB test type VIII is performed through simulation of faulty components in the type I emission laboratory test cycle
  - (emissions while performing a driving cycle)

- **Type II (idling)**
  - Update and harmonise

- **Type VII (Range)**

- **Type VI (Type I test at -7°C)**
  - No intention to be included in L-category environmental tests
Tail Pipe Emissions: Test type I

Doc: GTR No. 2, R40, R47

- **Harmonise testing methods**
  - Harmonise test equipment for L, M, and N the basic configuration values so that test houses can easily do all/any test?
  - Test chemicals, measurement methods, measurement equipment, temperatures, ranges?

- **Harmonise cycles**
  - Move over to WMTC (in GTR No. 2) for all L-vehicle categories
  - R40 and R47 representative?
Tail Pipe Emissions: Test Type II

Doc: GTR No. 2, R40, R47

- **Type II (idling)**
- Update and harmonise
- Any other issues?
Tail Pipe Emissions: Test Type III

Doc: GTR No. 2, R40, R47

- **Type III (crankcase gases)**
  - Choose/design a test:

  - **R83**
    - R83 laboratory equipment requirements could be considered as benchmark for L-Category vehicle emission laboratory equipment requirements.

  - **ISO 6460**
    - Japan uses ISO 6460 for a wide range of L-category tests, this is based on driving the R40, R47, and WMTC cycles.
    - It provides a method for calculating crankcase gases indirectly: measure actual fuel used and calculate the fuel that has been burnt by measuring the emission gases.
    - The difference = the gases escaping from the crankcase
Tail Pipe Emissions: Test Type VI

Doc: GTR No. 2, R40, R47

- **Type VI (Type I test at -7°C)**
- Considered a low occurrence for L-category so not being brought over to L-category vehicles in Europe
Tail Pipe Emissions: Test Type VII

Doc: GTR No. 2, R40, R47

- **Test as much as possible at once?**
  - Test types I, III, and the measurement of CO2 and fuel/energy consumption VII could all be done at once.
  - Measurement of CO\(_2\) and all gases required for ISO 6460 style crankcase test are probably tested anyway, lab equipment for M and N category vehicle will be utilised.
  - CVS dilution air requirements are missing in GTR No 2
  - PM test equipment requirements are missing

- Update and harmonise

- **Type VII (Range) and Type VIII (OBD environmental)**
  - The measurement of range and OBD may still be separate, but following the Type I driving cycle
Durability test: Test Type V

Doc: GTR No. 2, R40, R47. R83

- Which legislation should be used to contain tests?
- Bring US EPA AMA test into international legislation
- Bring Standard Road Cycle custom-tailored for L-category vehicles into international legislation
- Initially do not define limits, distances, or which test as dependent on how the vehicle is used in a specific nation
Evaporative emission test: Test Type IV

Doc: GTR No. 2, R40, R47

- Bring both US EPA and CARB test into international legislation?
- US EPA permeation test
- US CARB SHED test
OBD : Test Type VIII (environmental only)

Doc: R83

- Envisaged paradigm change in comparison with passenger car OBD
- Main purpose of OBD is to allow effective and efficient repair of a defective vehicle
- Positive side-effects for environmental protection and functional safety
- Will be split into two parts in EU legislation:
  - Functional OBD (including functional safety)
  - Environmental OBD (comparable to comprehensive component testing in US)

**Which legislation?**
- Based on R83/ US EPA/ CARB/ other?
- Additional parameters to monitor?
- Standard communication protocol and socket
- Issue with non-open standards
- Which categories: Only those vehicles with ECUs?
- Use communication protocols already defined or others?
Thank you

Presented by Alaric Lester
IEPPR – 8th June 2012
Tel: +44 1344 770654
Email: alester@trl.co.uk