

Presented by Alaric Lester

8th June 2012

**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

Documents used for reference	<p>International harmonisation of L-category vehicle classification (Task 4.10)</p>	<p>Propulsion performance requirements (Task 4.9)</p>	<p>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; (task 4.2, 4.3, 4.4, 4.7)</p>	<p>Test Type V, durability testing of pollution control devices (Task 4.6)</p>	<p>Test Type IV, evaporative emissions test (Task 4.5)</p>	<p>Test Type VIII, on-board diagnostics test (environmental part only of OBD) (Task 4.8)</p>
Testing Process		<p>EU REPPR UN R3 EU Directive 2002/24/EC</p>	<p>EU REPPR UN R40, R47, GTR No.2, R101, R83 EU Directive 97/24/EC</p>	<p>EU REPPR US CRF Title 40 part 86</p>	<p>EU REPPR US CRF Title 40 part 86</p>	<p>EU RVCR UN R83 International standards</p>
Location for regulation and issues	<p>Update UN RE3</p> <p>Moped issue Maximum speed Km -> mile/h 45 -> 28 (EC) 48 -> 30 (UK) 50 -> 31 (US, UN, EU)</p> <p>Motorcycle issue Addition of: Enduro and Trail variants of L3e-A1/2/3</p> <p>Quadricycle issue Sub categories ATV, SbS Power, weight limits</p>	<p>New and consolidated Regulation OR Update motorcycle power test OR Add to Type I test regulation (when that is chosen)</p> <p>Issue Not all vehicles covered</p> <p>Issue Alternative drives</p>	<p>Update R40 and/or R47 OR Update GTR No. 2 OR Extend scope of R101 OR New regulation to encompass all</p> <p>Issue Harmonising test methods Test chemicals, temperatures, tolerances, equipment</p> <p>Issue Harmonising cycle between regions</p> <p>Type VII issue Open scope of R101 or consolidate</p> <p>Issue Which UN agreement to use: 1958 or 1998</p>	<p>US EPA AMA cycle EC SRC LeCV</p> <p>Transfer both into UN regulation</p> <p>Issue Harmonising specifics of the tests</p>	<p>US EPA permeation test US CARB SHED test</p> <p>Transfer both into UN regulation</p> <p>Issue Rectifying any issues with the specifics of the tests</p>	<p>Based on R83 PLUS Specifying additional parameters to monitor PLUS Standard communication protocol and socket</p> <p>Issue Non-open standards</p> <p>Issue Which categories to cover</p>
Vehicle	<p>Page ■ 4</p>	<p>Propulsion performance performed on different engine(s)/motor(s) And vehicle</p>	<p>Test Types I, II, III, VII performed on the same vehicle(s)</p>	<p>Test Types V, IV, and VIII performed on the same vehicle</p>		

Process Roadmap

	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14		
Meetings	MCWG	GRPE		WP.29			GRPE WP.29			MCWG		WP.29	MCWG	GRPE		WP.29		MCWG	GRPE WP.29			MCWG		WP.29	MCWG			
Documents		Roadmap (EC)					Roadmap							Roadmap	Mid-term report				Roadmap		Draft final report						Roadmap	Final report
Categories	The categories are defined in UN RE3 There are a number of issues which can be addressed separately						Moped issue Maximum speed Km -> mile/h 45 -> 28 (EC) 48 -> 30 (UK) 50 -> 31 (US, EU, UN)		Quadricycle issue Sub categories ATV, 50S Power, weight limits		Motorcycle issue Addition of: Enduro and Trail variants of L3e-A1/2/3								Performance measure Issue Include kW in addition to capacity		Hybrid/electric Issue Include weight of the batteries							
Performance tests	Measurement of maximum torque and power for engines and motors Measurement of maximum speed for vehicles						Performance: Which regulation to use?						Issue Defined Speed and Power tests for all i-category vehicles		Issue Defined Power test for all drivetrains, inc' alternative drives		Definition of vehicle weight/mass needs to be chosen											
Tailpipe Emissions	Combination of a range of tests: Type I, II, III, VII Measure vehicle toxic and CO2 emissions. Fuel consumption and range						Issue Which UN agreement to use: for emission tests? 1958 or 1998		Perform Type VII test (CO2 etc) Consolidate with Type I and III		Issue Harmonising test methods Test chemicals, temperatures, tolerances, equipment		Issue Harmonising cycle between regions															
Durability							Evap: Which regulation to use?				Issue Rectifying any issues with the specifics of the evaporative tests																	
Evaporative							Dura: Which regulation to use?				Issue Harmonising specifics of durability tests																	
OBD							OBD: Which regulation to use?		Signals to measure, connections to use, communication protocols		Issue Non-open standards		Issue Which categories to cover by OBD requirements															

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

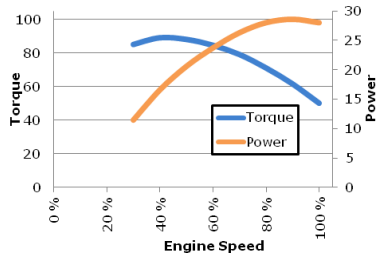


- **Additional sub-categories**
- ATV, SbS, quadrimobile (mini-car)
- Different power limits

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

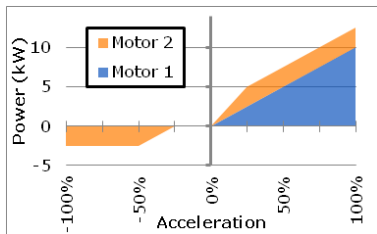
Propulsion Performance

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 CO₂ 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