From: [redacted] [mailto[redacted]@acea.be]
Sent: Tuesday, September 27, 2016 4:00 PM
To: [redacted] (GROW)
Subject: ACEA proposals to RDE Package 3
Importance: High

Dear [redacted],

Please find attached ACEA papers on the following:

- ACEA detailed comments to your proposal for Annex IIIA (RDE).
- Proposal for LCV speed conditions.
- Proposal on small volume manufacturers.
- Robust RDE Regulation – ACEA corrections to RDE Packages 1 & 2 (already sent to you and [redacted] this morning).

In particular:

Cold engine start:

- Option zero is supported.
- We need provisions how to drive an urban RDE trip and the specific urban BC's.
- Hardware implications means implementation from RDE Step 1 starting from September 2017 is infeasible. ACEA strongly supports cold engine start from RDE Step 2.

PN-PEMS:

- PN-PEMS for GDI is accepted. However, we seriously question the mandate for also including diesels and the need. The often quoted Regulation 459/2012 does not foresee an RDE PN test for anything except GDI.
- There are too many uncertainties with the PN-PEMS instruments to accept legal measurements from RDE Step 1, starting from September 2017.
- The proposed CF's are highly stringent based on current knowledge and experience with PN-PEMS. The RDE Step 2 CF should be no lower than 1.0 plus margin = 1.0.
- As a fallback, PN-PEMS for GDI could start from RDE Step 1 as a monitoring exercise to gather more data and experience.

In both cases of cold start and PN-PEMS, the COM roadmap for decision on RDE Package 3 foresees vote in TCMV now in December 2016. It is optimistic for COM to plan only 2 working days between the end of the public consultation (2 December) and the TCMV on 7 December. It is likely that a decision on RDE Package 3 might then be only possible in January/February 2017. Lead-time to the RDE Step 1 dates is then impossibly shortened.

LCV's:

- Adjustment to the speed conditions according to the speed limiter regulations is necessary.
- However, some member states apply lower speed limits for certain categories of LCV that are lower than the speed limiter restrictions. These national speed limits should be reflected in the LCV speed conditions.

Small volume manufacturers:

- The ESCA proposal is welcomed but we recommend the basis is like the passenger car CO_2 regulation. The attached proposal explains.

ACEA would be grateful for you taking all these views into consideration.

We look forward to seeing the next revision of RDE Package 3 including also the important recitals and Articles, which should also be transparent to stakeholders.

best regards,

best regards,

European Automobile Manufacturers' Association – ACEA
Avenue des Nerviens 85 | B-1040 Brussels | www.acea.be | @ACEA_eu
T | **M** | **F** | @acea.be

Date: 13/09/2016

DRAFT changes for RDE3 reflecting the RDE-LDV expert group discussions

Annex IIIA to Regulation (EC) No 692/2008 is amended as follows:

(1) a new point 1.2.39 is introduced

'1.2.39. For the purposes of this Annex, "*OVC-HEV*" (off-vehicle charging hybrid electric vehicle) means a hybrid electric vehicle that can be charged from an external source.

(2) a new point 1.2.40 is introduced

'1.2.40. For the purposes of this Annex, "*HV*" (hybrid vehicle" means a vehicle with at least two different energy converters and two different energy storage systems that are used for the purpose of vehicle propulsion and that cannot be charged from an external source.

(3) point 2.1.1 is amended as follows:

' 2.1.1 Final Conformity Factors

The conformity factor $CF_{pollutant}$ for the respective pollutant is specified as follows:

Pollutant	Mass of oxides of nitrogen (NOx)	Number of particles (PN)(2)	Mass of carbon monoxide (CO)(1)	Mass of total hydrocarbons (THC)	Combined mass of total hydrocarbons and oxides of nitrogen (THC + NOx)
$CF_{pollutant}$	1 + *margin* with *Margin NOx* = 0,5	1 + *margin* with *Margin PN* = 1,0 ~~0.5~~	-	-	-

(1) CO emissions shall be measured and recorded at RDE tests.

(2) For vehicles with GDI engines only.

margin is a parameter taking into account the additional measurement uncertainties introduced by the PEMS equipment for each pollutant, which are subject to an annual review and shall be revised as a result of the improved quality of the PEMS procedure or technical progress.

…to a periodic review and shall be revised as a result of demonstrated technical progress in PEMS instruments and proven quality control of the RDE test procedure.

(4) point 2.1.2 is amended as follows:

'2.1.2 Temporary Conformity Factors

By way of exception to the provisions of point 2.1.1, during a period of 5 years and 4 months following the dates specified in Article 10(4) and (5) of Regulation (EC) 715/2007 and upon request of the manufacturer, the following temporary conformity factors may apply:

Pollutant	Mass of oxides of	Number of particles	Mass of carbon	Mass of total hydrocarbons	Combined mass of total hydrocarbons

	nitrogen (NOx)	(PN) [2]	monoxide (CO)[1]	(THC)	and oxides of nitrogen (THC + NOx)
$CF_{pollutant}$	2,1	~~1.5~~]	-	-	-

(1) CO emissions shall be measured and recorded at RDE tests.

(2) For vehicles with GDI engines only.

The application of temporary conformity factors shall be recorded in the certificate of conformity of the vehicle.'

(5) point 3.1.0 is amended as follows:

The requirements of point 2.1 shall be fulfilled for the urban part and the complete PEMS trip. Upon the choice of the manufacturer the conditions of at least one of the two points 3.1.0.1 or 3.1.0.2 below shall be fulfilled. OVC-HEVs shall fulfil the conditions of point 3.1.0.3. A more complete solution will be found for the evaluation of such vehicles.

(6) A new point 3.1.0.3 is added as follows:

$M_t \leq$ NTEpollutant and $M_u \leq$ NTEpollutant with the definitions of point 2.1 of this Annex and point 4 of Appendix 7c.

(7) Point 3.1.3.2.2. is amended as follows

By entering the unique identification number of a PEMS test family:

– the full information as required by point 5.1 of Appendix 7,

– the lists described in points 5.3 and 5.4 of Appendix 7;

– the results of the PEMS tests as set out in point 6.3 of Appendix 5, point 3.9 of Appendix 6 and point 4 of Appendix 7c for all vehicle emission types in the list described in point 5.4 of Appendix 7. For HVs, the results of the PEMS tests as set out in point 6.3 of Appendix 5 shall be reported. For OVC-HEVs, the results of the PEMS test as set out in point 4 of Appendix 7c shall be reported.

(8) point 4.3 is amended as follows:

The approval authority shall propose a test trip in urban, rural and motorway environments meeting the requirements of point 6. For the purpose of trip design, the urban, rural and motorway parts shall be selected based on a topographic map. The urban part of the trip should be driven on urban roads with speed limit of 60 km/h or less. In case the urban part of the trip needs to be driven for a limited period of time in roads with speed limit higher than 60 km/h, then the vehicle shall be driven with speeds up to 60 km/h.

(9) point 4.5 is introduced:

In order to also assess emissions during hot start trips, at least one vehicle per PEMS family shall be measured with a hot engine. In such a case, the requirements of point 5.3 on vehicle conditioning for cold engine-start testing shall not be met.

(10) point 5.3 is amended as follows:

5.3. Vehicle conditioning for cold engine-start testing

Before RDE testing, the vehicle shall be preconditioned in the following way:

~~Driven for at least 30 min~~, parked with doors and bonnet closed and kept in key-off-engine-off status within moderate or extended altitude and temperatures according to points 5.2.2 to 5.2.6 between 6 and 56 hours. Exposure to extreme atmospheric conditions (heavy snowfall, storm, etc..) and excessive amounts of dust should be avoided. Before the test start, the vehicle and equipment shall be checked for damages and the absence of warning signals, suggesting malfunctioning.

(11) point 5.4.2 is amended as follows:

If the trip results are valid following the verifications according to point 5.4.1, the methods for verifying the normality of the test conditions as laid down in Appendices 5, 6, 7a and 7b to this Annex shall be applied. For OVC-HEVs only, the validity of a trip and the normality of test conditions are verified according to Appendix 7c, while Appendices 5 and 6 do not apply.

(12) point 6.2 is amended as follows:

The trip sequence shall always start with urban driving followed by rural and motorway driving according to the shares specified in point 6.6. The urban, rural and motorway operation shall be run continuously, but may also include a trip which starts and ends at the same point. Rural operation may be interrupted by short periods of urban operation when driving through urban areas. Motorway operation may be interrupted by short periods of urban or rural operation, e.g., when passing toll stations or sections of road work.

(13) Point 6.3 is amended as follows:

Rural operation is characterised by vehicle speeds higher than 60 and lower than or equal to 90 km/h. For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, rural operation is characterised by vehicle speed higher than 60 km/h and lower than or equal to 80 km/h.

(14) point 6.5 is amended as follows:

Motorway operation is characterised by speeds above 90 km/h. For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, motorway operation is characterised by speed higher than 80 km/h.

(15) Point 6.8 is amended as follows:

‘6.8 The average speed (including stops) of the urban driving part of the trip should be between 15 and 40 km/h. Stop periods, defined as vehicle speed of less than 1 km/h, shall account for 6-30 % of the time duration of urban operation. Urban operation may contain several stop periods of 10 s or longer. However, individual stop periods shall not exceed 300 consecutive seconds; else the trip shall be voided.

(16) Point 6.9 is amended as follows:

‘6.9 The speed range of the motorway driving shall properly cover a range between 90 and at least 110 km/h. The vehicle's velocity shall be above 100 km/h for at least 5 minutes.

For M2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 100 km/h, the speed range of the motorway driving shall properly cover a range between 80 and 100 km/h. The vehicle's velocity shall be above 90 km/h for at least 5 minutes.

For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, the speed range of the motorway driving of shall properly cover a range between 70 and 90 km/h. The vehicle's velocity shall be above 80 km/h for at least 5 minutes. '

(17) Point 6.11 is amended as follows:

The start and the end point of a trip shall not differ in their elevation above sea level by more than 100 m. In addition, the proportional cumulative positive altitude gain over the entire trip and over the urban part of the trip as determined according to point 4.3 shall be less than 1200 m/100km and be determined according to Appendix 7b.

(18) point 6.13 is added:

The average speed (including stops) during cold start period as defined in Appendix 4, point 4 shall be between 15 and 40 km/h. The maximum speed during the cold start period shall not exceed 60 km/h.

(19) point 7.6 is amended as follows:

The idling immediately after the first ignition of the combustion engine shall not exceed 30 s. The vehicle stop during the entire cold start period, as defined in point 4 of Appendix 4, shall not exceed 90 s. If the engine stalls during the test, it may be restarted, but the sampling shall not be interrupted.

(20) point 9.4 is amended as follows:

After establishing the validity of a trip according to Point 9.2 emission results shall be calculated using the methods laid down in Appendices 5 and 6 of this Annex. For OVC-HEVs the emission results shall be calculated using the method laid down in Appendix 7c of this Annex.

(21) point 9.6 is amended as follows:

The cold start is defined in accordance with point 4 of Appendix 4 of this Annex. Gaseous pollutant and particle number emissions during cold start shall be included in the normal evaluation according to Appendix 5 and 6. For OVC-HEVs the emission results shall be calculated using the method laid down in Appendix 7c of this Annex.

~~If the vehicle was conditioned for the last three hours prior to the test in an average temperature that falls within the extended range according to point 5.2, then the provisions of point 9.5 of the main text of Annex IIIA apply only to the cold start period, even if the~~

~~running conditions are not within the extended range. The corrective factor of 1.6 applies only once.~~

(22) Appendix 1 is amended as follows:

a. point 3.4.1 is amended as follows:

'3.4.1. General:

The installation of the PEMS shall follow the instructions of the PEMS manufacturer and the local health and safety regulations. The PEMS should be installed as to minimise during the test electromagnetic interferences as well as exposure to shocks, vibration, dust and variability in temperature. The installation and operation of the PEMS shall be leak-tight and minimise heat loss. The installation and operation of PEMS shall not change the nature of the exhaust gas nor unduly increase the length of the tailpipe. To avoid the generation of particles, connectors shall be thermally stable at the exhaust gas temperatures expected during the test. It is recommended not to use elastomer connectors to connect the vehicle exhaust outlet and the connecting tube. Elastomer connectors, if used, shall have no contact with the exhaust gas to avoid artefacts at high engine load.

b. point 3.4.2 is amended as follows:

The installation and operation of the PEMS sampling probes shall not unduly increase the pressure at the exhaust outlet in a way that may influence the representativeness of the measurements. It is thus recommended that only one sampling probe is installed in the same plane. If technically feasible, any extension to facilitate the sampling or connection with the exhaust mass flow meter shall have an equivalent, or larger, cross sectional area than the exhaust pipe. If the sampling probes obstruct a significant area of the tailpipe cross-section, backpressure measurement may be requested by the Type Approval Authority.

c. point 3.4.3 is amended as follows:

Whenever used, the exhaust mass flow meter shall be attached to the vehicle's tailpipe(s) according to the recommendations of the EFM manufacturer. The measurement range of the EFM shall match the range of the exhaust mass flow rate expected during the test. The installation of the EFM and any exhaust pipe adaptors or junctions shall not adversely affect the operation of the engine or exhaust after-treatment system. A minimum of four pipe diameters or 150 mm of straight tubing, whichever is larger, shall be placed at either side of the flow-sensing element. When testing a multi-cylinder engine with a branched exhaust manifold, it is recommended to position the exhaust mass flow meter downstream of where the manifolds combine and to increase the cross section of the piping such as to have an equivalent, or larger, cross sectional area from which to sample. If this is not feasible, exhaust flow measurements with several exhaust mass flow meters may be used, if approved by the Type Approval Authorities. The wide variety of exhaust pipe configurations, dimensions and exhaust mass flow rates may require compromises, guided by good engineering judgement, when selecting and installing the EFM(s). It is permissible to install an EFM with a diameter smaller than that of the exhaust outlet or the total cross-sectional area of multiple outlets, providing it improves measurement accuracy and does not adversely affect the operation or the exhaust after-treatment as specified in point 3.4.2. It is recommended to document the EFM set-up using photographs.

d. point 3.5 is amended as follows:

Emissions sampling shall be representative and conducted at locations of well-mixed exhaust where the influence of ambient air downstream of the sampling point is minimal. If applicable, emissions shall be sampled downstream of the exhaust mass flow meter, respecting a distance of at least 150 mm to the flow sensing element. The sampling probes shall be fitted at least 200 mm or three times the inner diameter of the exhaust pipe, whichever is larger, upstream of the point at which the exhaust exits the PEMS sampling installation into the environment. If the PEMS feeds back a flow to the tail pipe, this shall occur downstream of the sampling probe in a manner that does not affect during engine operation the nature of the exhaust gas at the sampling point(s). If the length of the sampling line is changed, the system transport times shall be verified and if necessary corrected.

If the engine is equipped with an exhaust after-treatment system, the exhaust sample shall be taken downstream of the exhaust after-treatment system. When testing a vehicle with a branched exhaust manifold, the inlet of the sampling probe shall be located sufficiently far downstream so as to ensure that the sample is representative of the average exhaust emissions of all cylinders. In multi-cylinder engines, having distinct groups of manifolds, such as in a "V" engine configuration, the sampling probe shall be positioned downstream of where the manifolds combine. If this is technically not feasible, multi-point sampling at locations of well-mixed exhaust may be used, if approved by the Type Approval Authority. In this case, the number and location of sampling probes shall match as far as possible those of the exhaust mass flow meters. In case of unequal exhaust flows, proportional sampling or sampling with multiple analysers shall be considered.

~~If particles are measured, the exhaust shall be sampled from the centreline of the exhaust stream~~. If particles are measured, the exhaust shall be sampled from the centre of the exhaust stream or cover the significant portions of the stream (e.g. multi-hole probes).

If several probes are used for emissions sampling, the particle sampling probe should be placed upstream of the other sampling probes. The particle sampling probe should not interfere with the sampling of gaseous pollutants. The type and specifications of the probe and its mounting shall be documented in detail.

If hydrocarbons are measured, the sampling line shall be heated to 463 ± 10 K (190 ± 10 °C). For the measurement of other gaseous components with or without cooler, the sampling line shall be kept at a minimum of 333 K (60°C) to avoid condensation and to ensure appropriate penetration efficiencies of the various gases. For low pressure sampling systems, the temperature can be lowered corresponding to the pressure decrease provided that the sampling system ensures a penetration efficiency of 95% for all regulated gaseous pollutants. If particles are sampled and not diluted at the tailpipe, the sampling line from the raw exhaust sample point to the point of dilution or particle detector shall be heated to a minimum of 373 K (100 °C). The residence time of the sample in the particle sampling line shall be less than 3 s until reaching first dilution or the particle detector.

All parts of the sampling system from the exhaust pipe up to the particle detector, which are in contact with raw or diluted exhaust gas, shall be designed to minimize deposition of particles. All parts shall be made from antistatic material to prevent electrostatic effects.

e. point 4.2 is amended as follows:

The PEMS shall be switched on, warmed up and stabilized according to the specifications of the PEMS manufacturer until key functional parameters, e.g., pressures, temperatures and flows have reached their operating set points before test start. To ensure correct functioning, the PEMS may be kept switched on or can be warmed up and stabilized during vehicle conditioning. The system shall be free of errors and critical warnings.

f. point 4.3 is amended as follows:

The sampling system, consisting of the sampling probe and sampling lines, and the analysers shall be prepared for testing by following the instruction of the PEMS manufacturer. It shall be ensured that the sampling system is clean and free of moisture condensation.

g. point 4.6 is amended as follows:

The zero level of the analyser shall be recorded by sampling HEPA filtered ambient air at an appropriate sampling point, usually at the inlet of the sampling line. The signal shall be recorded at a constant frequency of at least 1.0 Hz averaged over a period of 2 minutes; the final concentration shall be within the manufacturer's specifications, but shall not exceed 5000 particles per cubic-centimetre.

h. Point 4.8 added:

The PEMS shall function free of critical warning signals and error indication.

i. Point 5.1 is amended as follows:

Sampling, measurement and recording of parameters shall begin prior to the 'ignition on' of the engine. To facilitate time alignment, it is recommended to record the parameters that are subject to time alignment either by a single data recording device or with a synchronised time stamp. Before and directly after 'ignition on', it shall be confirmed that all necessary parameters are recorded by the data logger.

j. Point 5.2 is amended as follows:

'5.2 Test:
Sampling, measurement and recording of parameters shall continue throughout the on-road test of the vehicle. The engine may be stopped and started, but emissions sampling and parameter recording shall continue. Any warning signals, suggesting malfunctioning of the PEMS, shall be documented and verified. If any error signal(s) appear during the test, the test shall be voided. Parameter recording shall reach a data completeness of higher than 99 %. Measurement and data recording may be interrupted for less than 1 % of the total trip duration but for no more than a consecutive period of 30 s solely in the case of unintended signal loss or for the purpose of PEMS system maintenance. Interruptions may be recorded directly by the PEMS but it is not permissible to introduce interruptions in the recorded parameter via the pre-processing, exchange or post-processing of data. ~~If conducted, auto zeroing shall be performed against a traceable zero standard similar to the one used to zero the analyser. It is strongly recommended to initiate PEMS system maintenance during periods of zero vehicle speed. ';~~

k. Point 5.3 is amended as follows:

The end of the test is reached when the vehicle has completed the trip and the ignition is turned off. Excessive idling of the engine after the completion of the trip shall be avoided. The data recording shall continue until the response time of the sampling systems has elapsed.

l. Point 5.5.2 is amended as follows:

5.5.2. Vehicles equipped with regenerating systems

5.5.2.1. Vehicles equipped with periodically-regenerating systems

5.5.2.1.1 "Periodically regenerating systems" shall be understood according to the definition in paragraph 3.8.1 of Annex XXI of ECE 715/2007 ~~Article 2(6) of Regulation 692(2008).~~
5.5.2.1.2. ~~All~~ Final results complete PEMS trip will be ~~multiplied~~ corrected with the Ki factors or with the Ki offsets developed by the procedures in ~~section 3 of Annex 13 of UN/ECE Regulation No 83~~ sub-annex 6 of Annex XXI of ECE 715/2007 for type-approval of a vehicle type with a periodically regenerating system,

5.5.2.~~3.~~2 If the emissions do not fulfil the requirements of point 3.1.0, then the occurrence of regeneration shall be verified. The verification of a regeneration may be based on either an appropriate ECU signal, or by applying cross-correlation of several of the following signals, which may include exhaust temperature, PN, CO_2, O_2 measurements in combination with vehicle speed and acceleration.

If periodic regeneration occurred during the test, the result without the application of either the Ki factor or Ki offset shall be checked against the requirements of point 3.1.0.

If a regeneration was proved and if the emissions do not fulfil the requirements, then the test shall be voided and repeated once at the request of the manufacturer.

5.5.2.~~4.~~3 At the request of the manufacturer, even if the vehicle fulfils the requirements of point 3.1.0, the occurrence of regeneration may be verified as in point 5.5.2.~~3.~~2 above. If the presence of regeneration can be proved and with the agreement of the Type Approval the final results will be shown without ~~the multiplication~~ correction with the Ki factor or Ki offset.

5.5.2.~~5.4~~ The manufacturer may ensure the completion of the regeneration and precondition the vehicle appropriately prior to the second test.

5.5.2.~~6.~~5 If regeneration occurs~~the repetition of the~~ second RDE test, pollutants emitted during the repeated test shall be included in the emissions evaluation without the application of either the Ki factor or Ki offset.

m. Table 1 in point 6.1 is amended as follows

Pollutant	Absolute Zero response drift	Absolute Span response drift (1)
CO_2	≤2000 ppm per test	≤2% of reading or ≤2000 ppm per test, whichever is larger
CO	≤75 ppm per test	≤2% of reading or ≤75 ppm per test, whichever is larger
NO_X	≤5 ppm per test	≤2% of reading or ≤5 ppm per test, whichever is larger
CH_4	≤10 ppmC_1 per test	≤2% of reading or ≤10 ppmC_1 per test, whichever is larger
THC	≤10 ppmC_1 per test	≤2% of reading or ≤10 ppmC_1 per test, whichever is larger

(1) If the zero drift is within the permissible range, it is permissible to zero the analyser prior to verifying the span drift.

n. point 6.2 is amended as follows:

The zero level and leak check of the analyser shall be recorded according to point 4.6 above.

(23) Appendix 2 is amended as follows:

a. point 3.1 is amended as follows:

The accuracy and linearity of analysers, flow-measuring instruments, sensors and signals, shall be traceable to international or national standards. Any sensors or signals that are not directly traceable, e.g., simplified flow-measuring instruments shall be calibrated alternatively against chassis dynamometer laboratory equipment that has been calibrated against international or national standards.

b. Table 1 in point 3.2 is amended as follows:

Measurement parameter/instrument	$\lvert\chi_{min} \times (a_1 - 1) + a_0\rvert$	Slope a_1	Standard error SEE	Coefficient of determination r^2
Fuel flow rate(1)	≤1% max	0.98 - 1.02	≤2% max	≥0.990
Air flow rate(1)	≤1% max	0.98 - 1.02	≤2% max	≥0.990
Exhaust mass flow rate	≤2% max	0.97 - 1.03	≤2% max	≥0.990
Gas analysers	≤0.5% max	0.99 - 1.01	≤1% max	≥0.998
Torque(2)	≤1% max	0.98-1.02	≤2% max	≥0.990
PN analysers(3)	≤5% max	0.90-1.10	≤10% max	≥0.950

(1) optional to determine exhaust mass flow

(2) optional parameter

(3) The linearity check shall be verified with soot-like particles, as these are defined in point 6.2.

c. point 3.3 is amended as follows:

The linearity requirements according to point 3.2 shall be verified:

(a) for each gas analyser at least every six months or whenever a system repair or component change or modification is made that could influence the calibration;

(b) for other relevant instruments, such as PN analysers, exhaust mass flow meters and traceably calibrated sensors, whenever damage is observed, as required by internal audit procedures or by the instrument manufacturer but no longer than one year before the actual test.

The linearity requirements according to point 3.2 for sensors or ECU signals that are not directly traceable shall be performed with a traceably calibrated measurement device on the chassis dynamometer once for each PEMS-vehicle setup.

d. Table 2 in point 4.2.6 is amended as follows:

Pollutant	Absolute Zero response drift	Absolute Span response drift
CO_2	≤1000 ppm over 4 h	≤2% of reading or ≤1000 ppm over 4 h, whichever is larger
CO	≤50 ppm over 4 h	≤2% of reading or ≤50 ppm over 4 h, whichever is larger
PN	5000	According to manufacturer specifications
NO_X	≤5 ppm over 4 h	≤2% of reading or 5 ppm over 4h, whichever is larger
CH_4	≤10 ppmC_1	≤2% of reading or ≤10 ppmC_1 over 4 h, whichever is larger
THC	≤10 ppmC_1	≤2% of reading or ≤10 ppmC_1 over 4 h, whichever is larger

e. point 6 is amended as follows:

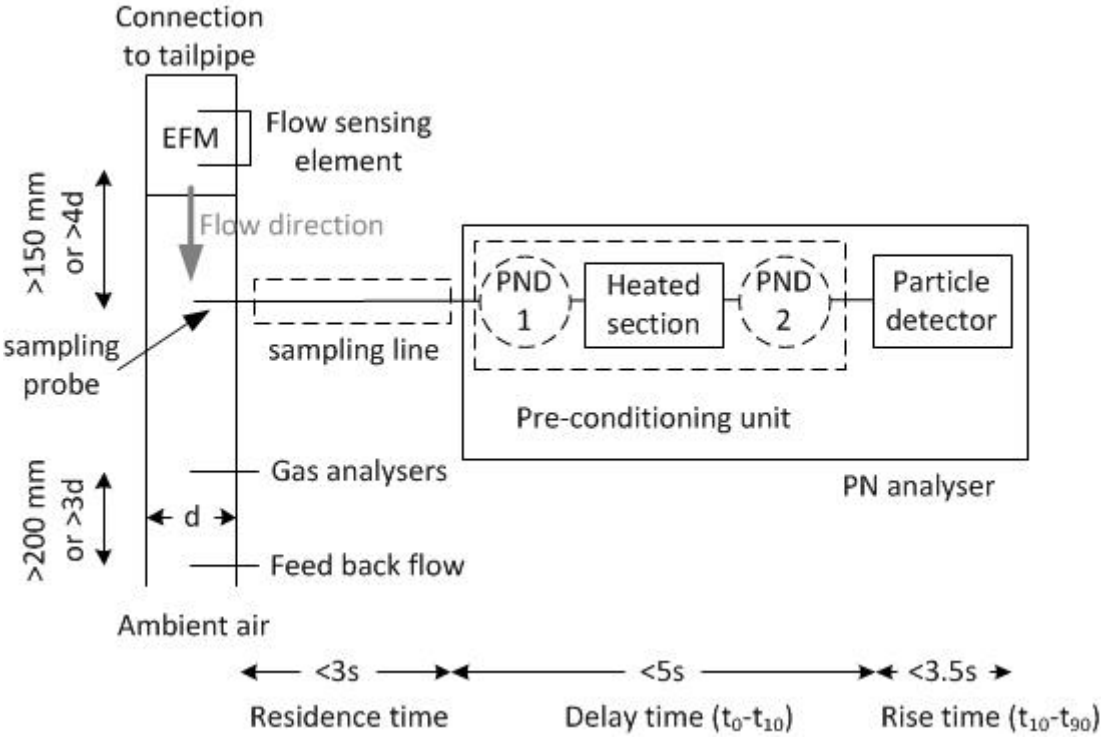
6 ANALYSERS FOR MEASURING (SOLID) PARTICLE EMISSIONS

6.1 General

The PN analyser shall consist of a pre-conditioning unit and a particle detector. It is permissible that the particle detector also pre-conditions the aerosol. The sensitivity of the analysers to shocks, vibration, aging, variability in temperature and air pressure as well as electromagnetic interferences and other impacts related to vehicle and analyser operation shall be limited as far as possible and shall be clearly stated by the equipment manufacturer in its support material. The PN analyser shall only be used within its manufacturer's declared parameters of operation.

Figure 1

Example of a PN analyser setup: Dotted lines depict optional parts. EFM = Exhaust mass Flow Meter, d = inner diameter, PND = Particle Number Diluter.



The PN analyser shall be connected to the sampling point via a sampling probe which extracts a sample from the centreline of the tailpipe tube. As specified in point 3.5 of Appendix 1, if particles are not diluted at the tailpipe, the sampling line shall be heated to a minimum temperature of 373 K (100 °C) until the point of first dilution of the PN analyser or the particle detector of the analyser. The residence time in the sampling line shall be less than 3 s.

All parts in contact with the sampled exhaust gas shall be always kept at a temperature that avoids condensation of any compound in the device. This can be achieved, e.g. by heating at a higher temperature and diluting the sample or oxidizing the (semi)volatile species.

The PN analyser shall include a heated section at wall temperature ≥573K. The unit shall control the heated stages to constant nominal operating temperatures, within a tolerance of ±10 K and provide an indication of whether or not heated stages are at their correct operating temperatures. Lower temperatures are acceptable as long as the volatile particle removal efficiency fulfils the specifications of 6.4.

Pressure, temperature and other sensors shall monitor the proper operation of the instrument during operation and trigger a warning or message in case of malfunction.

The delay time of the PN analyser shall be ≤5 s.

The PN analyser (and/or particle detector) shall have a rise time of ≤3.5 s.

Particle concentration measurements shall be reported normalised to 273 K and 101.3 kpa. If necessary, the pressure and/or temperature at the inlet of the detector shall be measured and reported for the purposes of normalizing the particle concentration measurements normalised to 273 K.

PN systems that comply with the calibration requirements of the UNECE Regulations 83 or 49 or GTR 15 automatically comply with the calibration requirements of this Annex.

6.2 Efficiency requirements

The complete PN analyser system including the sampling line shall fulfil the efficiency requirements of Table 4.

Table 4

PN analyser (including the sampling line) system efficiency requirements

d_p **[nm]**	**23**	**30**	**50**	**70**	**100**	**200**
$E(d_p)$ PN analyser[1]	0.2 – 0.6	0.3 – 1.2	0.6 – 1.3	0.7 – 1.3	0.7 – 1.3	0.5– 2.0

Efficiency $E(d_p)$ is defined as the ratio in the readings of the PN analyser system to a reference Condensation Particle Counter (CPC)'s (d_{50}=10nm or lower, checked for linearity and calibrated with an electrometer) or an Electrometer's number concentration measuring in parallel monodisperse aerosol of mobility diameter d_p and normalized at the same temperature and pressure conditions. The material should be thermally stable soot-like (e.g. spark discharged graphite or diffusion flame soot with thermal pre-treatment). If the efficiency curve is measured with a different aerosol (e.g. NaCl), the correlation to the soot-like curve must be provided as a chart, which compares the efficiencies obtained using both test aerosols. The differences in the counting efficiencies have to be taken into account by adjusting the measured efficiencies based on the provided chart to give soot-like aerosol efficiencies. The multiply charged fraction should be <10% and any correction for multiply charged particles should be applied and documented but shall not exceed 10%. These efficiencies refer to the PN analysers with the sampling line. The PN analyser can also be calibrated in parts (i.e. the pre-conditioning unit separately from the particle detector) as long as it is proven that PN analyser and the sampling line together fulfil the requirements of Table 4. The measured signal from the detector shall be >2 times the limit of detection (here defined as the zero level plus 3 standard deviations).

6.3 Linearity requirements

The PN analyser including the sampling line shall fulfil the linearity requirements of point 3.2 in Appendix 2 using monodisperse soot-like particles. The particle size should be at the plateau region of the analyser or a size that gives 100% efficiency. The reference instrument shall be an Electrometer or a Condensation Particle Counter (CPC) with d_{50}=10 nm or lower, verified for linearity. Alternatively, for the verification of linearity, polydisperse aerosol with a count median diameter of 50-60 nm (geometric standard deviation 1.6 ± 0.2) can be used, using as reference a particle number system compliant with UNECE Regulation 83.

In addition the PN analyser shall have an accuracy ±10% at all points checked (except the zero point). At least 5 points equally distributed (plus the zero) shall be checked. The maximum checked concentration shall be the maximum allowed concentration of the PN analyser.

If the PN analyser is calibrated in parts, then the linearity can be checked only for the PN detector, but the efficiencies of the rest parts and the sampling line have to be considered in the slope calculation.

[1] To be adapted along with the margin review process

6.4 Volatile removal efficiency

The system shall achieve >99% removal of ≥30 nm tetracontane ($CH_3(CH_2)_{38}CH_3$) particles with an inlet concentration of ≥10,000 particles per cubic-centimetre at the minimum dilution.

The system shall also achieve a >99% removal efficiency of polydisperse alcane (decane or higher) or emery oil with count median diameter >50 nm and mass >1 mg/m^3.

The volatile removal efficiency with tetracontane and/or polydisperse alcane or oil have to be proven only once for the instrument family. The instrument manufacturer though has to provide the maintenance or replacement interval that ensures that the removal efficiency does not drop below the technical requirements. If such information is not provided, the volatile removal efficiency has to be checked yearly for each instrument.

f. The first paragraph of point 8 is amended as follows:

Any sensor and auxiliary equipment used to determine, e.g., temperature, atmospheric pressure, ambient humidity, vehicle speed, fuel flow or intake air flow shall not alter or unduly affect the performance of the vehicle's engine and exhaust after-treatment system. The accuracy of sensors and auxiliary equipment shall fulfil the requirements of Table 5. Compliance with the requirements of Table 5 shall be demonstrated at intervals specified by the instrument manufacturer, as required by internal audit procedures or in accordance with ISO 9000.

(24) Table 1 in Appendix 3 is amended as follows:

Table 1

Permissible tolerances

Parameter [Unit]	Permissible absolute tolerance
Distance [km](1)	250 m of the laboratory reference
THC(2) [mg/km]	15 mg/km or 15% of the laboratory reference, whichever is larger
CH_4(2) [mg/km]	15 mg/km or 15% of the laboratory reference, whichever is larger
NMHC(2) [mg/km]	20 mg/km or 20% of the laboratory reference, whichever is larger
PN(2) [#/km]	$1 \cdot 10^{11}$ p/km or 50% of the laboratory reference[2] whichever is larger
CO(2) [mg/km]	150 mg/km or 15% of the laboratory reference, whichever is larger
CO_2 [g/km]	10 g/km or 10% of the laboratory reference, whichever is larger
NO_x(2) [mg/km]	15 mg/km or 15% of the laboratory reference, whichever is larger

(1) only applicable if vehicle speed is determined by the ECU; to meet the permissible tolerance it is permitted to adjust the ECU vehicle speed measurements based on the outcome of the validation test

(2) parameter only mandatory if measurement required by point 2.1 of this Annex.

[2] PMP system

(25) Appendix 4 is amended as follows:

a. Point 4 is amended as follows:

Cold start is the period from the first start of the combustion engine until the point when the combustion engine has run cumulatively for 5 min. If the coolant temperature is determined, the cold start period ends once the coolant has reached 343 K (70 °C) for the first time but no later than the point at which the combustion engine has run for 5 min after initial engine start.

b. point 12 is amended as follows:

The instantaneous particle number emissions [particles/s] shall be determined by multiplying the instantaneous concentration of the pollutant under consideration [particles/cm^3] with the instantaneous exhaust mass flow rate [kg/s], both corrected and aligned for the transformation time. If applicable, negative instantaneous emission values shall enter all subsequent data evaluations. All significant digits of intermediate results shall enter the calculation of the instantaneous emissions. The following equation shall be applied:

$$PN,i = c_{PN,i} q_{mew,i} / \rho_e$$

where:

PN,i is the particle number flux [particles/s]

$c_{PN,i}$ is the measured particle number concentration [#/m^3] normalized at 0°C

$q_{mew,i}$ is the measured exhaust mass flow rate [kg/s]

ρ_e is the density of the exhaust gas [kg/m^3] at 0°C (Table 1)

(26) Appendix 5 is amended as follows:

a. point 1 is amended as follows:

The Moving Averaging Window method provides an insight on the real-driving emissions (RDE) occurring during the test at a given scale. The test is divided in sub-sections (windows) and the subsequent statistical treatment aims at identifying which windows are suitable to assess the vehicle RDE performance.

The "normality" of the windows is conducted by comparing their CO_2 distance-specific emissions[3] with a reference curve. The test is complete when the test includes a sufficient number of normal windows, covering different speed areas (urban, rural, motorway).

Step 1. Segmentation of the data;

Step 2. Calculation of emissions by sub-sets or "windows" (section 3.1);

Step 3. Identification of normal windows; (section 4)

Step 4. Verification of test completeness and normality (section 5);

Step 5. Calculation of emissions using the normal windows (section 6).

[3] For hybrids, the total energy consumption shall be converted to CO_2. The rules for this conversion will be introduced in a second step.

b. the first and second paragraphs of point 3.1 are amended as follows:

The instantaneous emissions calculated according to Appendix 4 shall be integrated using a moving averaging window method, based on the reference CO_2 mass. The principle of the calculation is as follows: The mass emissions are not calculated for the complete data set, but for sub-sets of the complete data set, the length of these sub-sets being determined so as to match the CO_2 mass emitted by the vehicle over the reference laboratory cycle. The moving average calculations are conducted with a time increment Δt corresponding to the data sampling frequency. These sub-sets used to average the emissions data are referred to as "averaging windows". The calculation described in the present point may be run from the last point (backwards) or from the first point (forward).

The following data shall not be considered for the calculation of the CO_2 mass, the emissions and the distance of the averaging windows:

– The periodic verification of the instruments and/or after the zero drift verifications;

– Vehicle ground speed < 1 km/h;

The mass (or particle number) emissions $M_{gas,j}$ shall be determined by integrating the instantaneous emissions in g/s (or #/s for PN) calculated as specified in Appendix 4.

c. Point 3.2 is amended as follows:

The following shall be calculated for each window determined in accordance with point 3.1.,

- The distance-specific emissions $M_{gas,d,j}$ for all the pollutants specified in this annex;

- The distance-specific CO_2 emissions $M_{CO2,d,j}$;

- The average vehicle speed $\bar{v}_j$

In case an HV is tested, the window calculation shall start at the point of ignition on and include driving events during which no CO_2 is emitted.

a. point 5.2 is amended as follows:

The test shall be complete when it comprises at least 15% of urban, rural and motorway windows, out of the total number of windows. For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, the share of motorway windows in the complete test shall be at least 5 %.

b. The first two paragraphs of Point 5.3 are amended as follows:

The test shall be normal when at least 50% of the urban, rural and motorway windows are within the primary tolerance defined for the characteristic curve.

If the specified minimum requirement of 50% is not met, the upper positive tolerance tol_1 may be increased by steps of 1 percentage point until the 50% of normal windows target is reached. When using this approach, tol_1 shall never exceed 50%.

(27) Appendix 6, Point 3.5 is amended as follows:

Each moving average value calculated according to point 3.2 shall be sorted into the de-normalized wheel power class into which the actual 3 second moving average wheel power $P_{w,3s,k}$ fits. The de-normalised wheel power class limits have to be calculated according to point 3.3.

The classification shall be done for all three second moving averages of the entire valid trip data including also all urban trip parts. Additionally all moving averages classified to urban according to the velocity limits defined in table 1-1 shall be classified into one set of urban power classes independently of the time when the moving average appeared in the trip.

Then the average of all three second moving average values within a wheel power class shall be calculated for each wheel power class per parameter. The equations are described below and shall be applied once for the urban data set and once for the total data set.

Classification of the 3-second moving average values into power class j (j = 1 to 9):

$$if \quad P_{C,j\ lower\ bound} < P_{w,3s,k} \leq P_{C,j\ upper\ bound}$$

then: class index for emissions and velocity = j

The number of 3-second moving average values shall be counted for each power class:

$$if \quad P_{C,j\ lower\ bound} < P_{w,3s,k} \leq P_{C,j\ upper\ bound}$$

then: $counts_j = n + 1$ ($counts_j$ is counting the number of 3 second moving average emission values in a power class to check later the minimum coverage demands)

(28) the following Appendix 7c is inserted:

Appendix 7c

Verification of trip conditions and calculation of the final RDE emissions result for OVC-HEVs

1. INTRODUCTION

This Appendix describes the verification of trip conditions and the calculation of the final RDE emissions result for OVC-HEVs. The method proposed in the Appendix will undergo review in order to find a more complete one.

2. SYMBOLS, PARAMETERS AND UNITS

M_t	is the weighted distance-specific mass of gaseous pollutants [mg/km] or particle number [#/km], respectively emitted over the complete trip
m_t	is the mass of gaseous pollutant [g] or particle number [#] emissions, respectively emitted over the complete trip
$m_{t,CO2}$	is the mass of CO_2 [g] emitted over the complete trip

M_u is the weighted distance-specific mass of gaseous pollutants [mg/km] or particle number [#/km], respectively emitted over the urban part of the trip

m_u is the mass of gaseous pollutant or the particle number emissions, respectively emitted over the urban part of the trip [mg]

$m_{u,CO2}$ is the mass of CO_2 [g] emitted over the urban part of the trip

$M_{WLTC,CO2}$ is the distance-specific mass of CO_2 [g/km] for a test in charge sustaining mode over the WLTC

3. General Requirements

The gaseous and particle pollutant emissions of OVC-HEVs shall be evaluated in two steps. First, the trip conditions shall be evaluated according to point 4. Second, the final RDE emissions result is calculated according to point 5. It is recommended to start the trip in charge-sustaining battery status to ensure that the third requirement of point 4 is fulfilled. The battery shall not be charged externally during the trip.

4. Verification of trip conditions

It shall be verified in a simple three-step procedure that:

1. the trip complies with the general requirements, boundary conditions, trip and operational requirements, and the specifications for lubricating oil, fuel and reagents defined in points 4 to 8 of this Annex IIIa;
2. the trip complies with the trip conditions defined in Appendices 7a and 7b of this Annex IIIa.
3. the combustion engine has been working for a minimum cumulative distance of 12 km under urban conditions.

If the at least one of the requirements is not fulfilled, the trip shall be declared invalid and repeated until the trip conditions are valid.

5. Calculation of the Final RDE emissions Result

For valid trips, the final RDE result is calculated based on a simple evaluation of the ratios between the cumulative gaseous and particle pollutant emissions and the cumulative CO_2 emissions in three steps:

1. Determine the total gaseous pollutant and particle number emissions [mg;#] for the complete trip as m_t and over the urban part of the trip as m_u.
2. Determine the total mass of CO_2 [g] emitted over the complete RDE trip as $m_{t,CO2}$ and over the urban part of the trip as $m_{u,CO2}$.
3. Determine the distance-specific mass of CO_2 $M_{WLTC,CO2}$ [g/km] in charge-sustaining mode for the individual vehicles (declared value for the individual vehicle) as described in the xxx/2016; Type I test, including cold start).
4. Calculate the final RDE emissions result as:

$$M_t = \frac{m_t}{m_{t,CO2}} \cdot M_{WLTC,CO2}$$ for the complete trip;

$M_u = \frac{m_u}{m_{u,CO2}} \cdot M_{WLTC,CO2}$ for the urban part of the trip.

European Automobile Manufacturers Association

Comments regarding the speed requirements for M2 and N2 vehicles proposed by the European Commission in the version of Annex IIIA submitted to the TCMV meeting on 15 September 2016

In the TCMV meeting on 15 September 2016, COM presented a draft of RDE package 3. The draft also contains amendments to the already published RDE regulations relating to the speed requirements for RDE trips of category M2 and N2 vehicles.

ACEA certainly welcomes the fact that COM will propose special provisions for category M2 and N2 vehicles, taking into account that these vehicles must be equipped with speed limitation devices that limit the maximum speed of those vehicles to 100 km/h and 90 km/h respectively.

The special provisions are introduced in the CPM draft for RDE Package 3 in points (13), (14) and (16), which read as follows:

"(13) Point 6.3 is amended as follows:

Rural operation is characterised by vehicle speeds higher than 60 and lower than or equal to 90 km/h. For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, rural operation is characterised by vehicle speed higher than 60 km/h and lower than or equal to 80 km/h.

(14) Point 6.5 is amended as follows:

Motorway operation is characterised by speeds above 90 km/h. For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, motorway operation is characterised by speed higher than 80 km/h.

(16) Point 6.9 is amended as follows:

6.9. The speed range of the motorway driving shall properly cover a range between 90 and at least 110 km/h. The vehicle's velocity shall be above 100 km/h for at least 5 minutes.

For M2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 100 km/h, the speed range of the motorway driving shall properly cover a range between 80 and 100 km/h. The vehicle's velocity shall be above 90 km/h for at least 5 minutes.

For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, the speed range of the motorway driving of shall properly cover a range between 70 and 90 km/h. The vehicle's velocity shall be above 80 km/h for at least 5 minutes."

ACEA would like to draw the attention of the COM to the fact that point (16) is not compatible with sections (13) and (14).

ACEA therefore proposed to change section (16) as follows:

"(16) Point 6.9 is amended as follows:

6.9. The speed range of the motorway driving shall properly cover a range between 90 and at least 110 km/h. The vehicle's velocity shall be above 100 km/h for at least 5 minutes.

For M2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 100 km/h, the speed range of the motorway driving shall properly

cover a range **between 90 and 100 km/h**. ~~*The vehicle's velocity shall be above 90 km/h for at least 5 minutes.*~~

For N2 category vehicles that are equipped according to Directive 92/6/EEC with a device limiting vehicle speed to 90 km/h, the speed range of the motorway driving of shall properly cover a range **between 80 and 90 km/h**. ~~*The vehicle's velocity shall be above 80 km/h for at least 5 minutes.*~~"

Furthermore it has to be considered that the change of the speed ranges has an impact on the normalisation tools in Appendix 5 and in Appendix 6 and the verification of the overall trip dynamics in Appendix 7a of Annex IIIA to Regulation (EC) No 692/2008. Therefore, these Appendices need to be reviewed in RDE package #4. As a first step, however, Table 1-1 in Appendix 6 should be amended as follows:

Point 3.2 of Annex IIIA to Regulation (EC) No 692/2008 is amended as follows:

Classification of the moving averages to urban, rural and motorway

The standard power frequencies are defined for urban driving and for the total trip (see paragraph 3.4) and a separate evaluation of the emissions shall be made for the total trip and for the urban part. The three second moving averages calculated according to paragraph 3.3 shall therefore be allocated later to urban and extra-urban driving conditions according to the velocity signal (vi) from the actual second i as outlined in Table 1-1.

Table 1-1

Speed ranges for the allocation of test data to urban, rural and motorway conditions in the power binning method

		Urban	*Rural*	*Motorway*
M1, M2, N1 vehicles	*v_1 [km/h]*	*0 to ≤ 60*	*>60 to ≤90*	*>90*
N2 vehicles	**v_1 [km/h]**	**0 to ≤ 60**	**>60 to ≤80**	**>80**

The change of the table 1-1 takes the adaption of the speed ranges into account and resolves the inconsistency caused by the change of the speed ranges. In a second step, the review of the normalisation tools should be undertaken by the Normalisation Tools Task Force.

Finally, ACEA would like to point out that in many European member states there exist speed limits for category M2 and N2 vehicles which are even stricter than the technical speed limitations for these vehicles. For example, in Germany, category N2 vehicles are only allowed to drive up to a maximum speed of 80 km/h on public roads.

For this reason, ACEA has proposed the following speed ranges for the different categories:

	Proposal ACEA	
Category	M1, N1	**M2, N2**

Urban	v ≤ 60 km/h	**v ≤ 50 km/h**
Rural	60 km/h < v ≤ 90 km/h	**50 km/h < v ≤ 75 km/h**
Motorway	v > 90 km/h	**v > 75 km/h**
Motorway speed range	90 – **Legal Speed limit**	**75 – Legal Speed limit**
High speed period	**(None)**	**(None)**

To better reflect national speed limit legislation for category M2 and N2 vehicles, ACEA kindly asks the Commission to reconsider their proposal for the maximum speed conditions.

ACEA proposal on small volume manufacturers in RDE Package 3

Small volume manufacturers:

- ESCA has made a proposal to the Commission for addressing ultra low volume manufacturers and small volume manufacturers. The Commission has indicated it will address the ESCA proposal in RDE Package 3.
- ACEA supports the ESCA proposal but we would like to amend the ESCA proposal as shown in the following table:

ESCA proposal	ACEA proposal
Article 2: Definitions *Amend* 32. 'small volume manufacturers' (SVMs) means ***operationally independent*** vehicle manufacturers whose worldwide annual production is less than 10,000 units ***and who have their own design centre and production facility.***	**Article 2: Definitions** *Amend* 32. 'small volume manufacturers' (SVMs) means ~~***operationally independent***~~ vehicle manufacturers ~~**whose worldwide annual production is less than 10,000 units**~~ **responsible for less than 10,000 new passenger cars registered in the Community per calendar year** ***and who have their own design centre and production facility.***
48. 'ultra small volume manufacturers (USVMs)' means a small volume manufacturer as defined in Article 2(32) of this Regulation with registrations per calendar year of less than 1,000 within the European Union;	**48. 'ultra small volume manufacturers (USVMs)' means a small volume manufacturer as defined in Article 2(32) of this Regulation with registrations per calendar year of less than ~~1,000~~ 1,500 within the European Union;**
Justification: The definition of SVM should be aligned with the same approach in the passenger car CO2 Regulation 443/2209. "Operationally independent" is not a required criteria and is not part of the CO2 Regulation because the requirement of "own design centre and production facility" sufficiently covers and defines the independency of such smaller manufacturers. Furthermore, since there is no definition of "operationally independent" there is a risk this would cause confusion for applicants and decision makers. Defining a production volume for the world market is irrelevant for a EU regulation. The reason behind the SVM regulation is to give very small market participants with low volumes more time to adapt to RDE. It is appropriate to increase the ultra small volume manufacturer limit to 1,500 registrations per year in the EU. The limit of 1,000 units is not defined in the passenger car CO2 Regulation 443/2209. The environmental impact of such low numbers is negligible (almost zero) and USVMs provide customised special products to a very small group of people.	

Comments to RDE-Regulation in Europe (Package 1 and 2)

Basis:

COMMISSION REGULATION (EU) 2016/646 of 20 April 2016

Content:

1. **Revised content and reason/argument**
2. **Uncertainties**

	(Number of issue)	Annex or Appendix and Paragraph	Revised content and reason/arguement
RDE		COMMISSION REGULATION (EU) …/… of XXX (Package 1), Article 1, 2): New paragraph 10 (d) in Article 3	Original text: Where the requirements set out in Appendices 5 and 6 of Annex IIIA are satisfied for only one of the two data evaluation methods described in those Appendices, the following procedures shall be followed: (i) one additional RDE test shall be performed; (ii) where those requirements are again satisfied for only one method the analysis of the completeness and normality shall be recorded for both methods and the calculation required by point 9.3 of Annex IIIA may be limited to the method for which the completeness and normality requirements are satisfied. The data of both RDE tests and of the analysis of the completeness and normality shall be recorded and made available for examining the difference in the results of the two data evaluation methods. Revised text: Where the requirements set out in Appendices 5 and 6 of Annex IIIA are satisfied for only one of the two data evaluation methods described in those Appendices, the following procedures shall be followed:

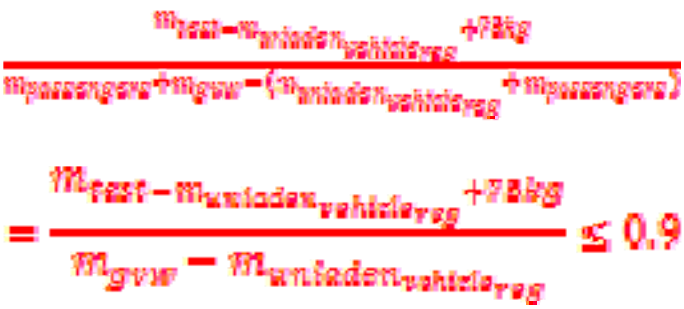
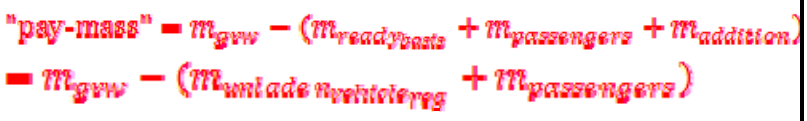
			~~(i) one additional RDE test shall be performed; (ii) where those requirements are again satisfied for only one method~~ **T**~~t~~he analysis of the completeness and normality shall be recorded for both methods and the calculation required by point ~~9.3~~ **9.4** of Annex IIIA may be limited to the method for which the completeness and normality requirements are satisfied. The data of both RDE tests and of the analysis of the completeness and normality shall be recorded and made available for examining the difference in the results of the two data evaluation methods. Argument: Experience shows that one of the evaluation methods indicates “trip invalid” quite often but the other one indicates “trip valid” and produces reliable results. In these cases repetition of the RDE test would be an unnecessary burden. Wrong paragraph reference.
RDE		Annex I Point 2.4.1 Figure I.2.4	Original text: 'Gaseous pollutants, RDE (Type 1A test) | Yes | Yes | Yes | Yes (4) | Yes (both fuels) | Yes (both fuels) | Yes (both fuels) | Yes (both fuels) | Yes (both fuels) | Yes ((both fuels) | Yes | — | — Particulate number, RDE (Type 1A test) (5) | Yes | — | — | — | Yes (both fuels) | Yes (both fuels | Yes (both fuels | Yes (both fuels) | — | Yes (both fuels) | Yes | — | —' Revised text: 'Gaseous pollutants, RDE (Type 1A test) | Yes | Yes | Yes | Yes (4) | Yes (both fuels) | Yes (both fuels) | Yes (both fuels) | Yes (both fuels) | Yes (both fuels) | Yes ~~((both fuels)~~ (B5/B7 only) Particulate number, RDE (Type 1A test) (5) | Yes | — | — | — | Yes ~~(both fuels)~~ (petrol only) | Yes ~~(both fuels~~ (petrol only) | Yes ~~(both fuels~~ (petrol only) | Yes (both fuels) | — | Yes ~~(both fuels)~~ (B5/B7 only) Argument: Regarding PI vehicles, PN requirements of RDE are not applied to mono fuel vehicles whose reference fuel is LPG, NG/Biomethane or Hydrogen. Therefore, they should be applied to bi-fuel vehicles and the vehicles should be tested with

			petrol only. Regarding CI vehicles, Type I test is conducted with B5/B7 only. Therefore, RDE should be conducted with B5/B7 only.
RDE		Annex IIIA Paragraph 1.2.16	Original text: "*Noise*" means two times the root mean square of ten standard deviations, each calculated from the zero responses measured at a constant recording frequency of at least 1.0 Hz during a period of 30 seconds. Revised text: "*Noise*" means two times the root mean square of ten standard deviations, each calculated from the zero responses measured at a constant recording frequency of ~~at least~~ 1.0 Hz during a period of 30 seconds. Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the data.
RDE		Annex IIIA Paragraph 1.2.18	Original text: "*Particle number*" (PN) means as the total number of solid particles emitted from the vehicle exhaust as defined by the measurement procedure provided for by this Regulation for assessing the respective Euro 6 emission limit defined in Table 2 of Annex I to Regulation 715/2007. Revised text: "*Particle number*" (PN) means ~~as~~ the total number of solid particles emitted from the vehicle exhaust as defined by the measurement procedure provided for by this Regulation for assessing the

			respective Euro 6 emission limit defined in Table 2 of Annex I to Regulation 715/2007. **Particle number emissions" (PN) means the total number of solid particles emitted from the vehicle exhaust quantified according to the dilution, sampling and measurement methods as specified in this Annex.** Argument: Typo correction: Delete “as”. The additional text was adopted by TCMV on 14.06.2016 in Regulation XXX/2016 (WLTP).
RDE		Annex IIIA Paragraph 2.4	Original text: Manufacturers shall ensure that vehicles can be tested with PEMS by an independent party on public roads, e.g. by making available suitable adapters for exhaust pipes, granting access to ECU signals and making the necessary administrative arrangements. If the respective PEMS test is not required by this Regulation the manufacturer may charge a reasonable fee as set out in Article 7(1) of Regulation (EC) No 715/2007. Revised text: Manufacturers shall ensure that vehicles can be tested with PEMS by an independent party on public roads, e.g. by making available suitable adapters for exhaust pipes, granting access to ECU signals and making the necessary administrative arrangements. If the respective PEMS test is not required by this Regulation the manufacturer may charge a reasonable fee ~~as set out~~ **comparable to the provision** in Article 7(1) of Regulation (EC) No 715/2007. Argument: Article 7(1) is related only to repair and maintenance information.

RDE		Annex IIIA Paragraph 3.1.2	Original text: If the approval authority is not satisfied with the data quality check and validation results of a PEMS test conducted according to Appendices 1 and 4, the approval authority may consider the test to be void. In such case, the test data and the reasons for voiding the test shall be recorded by the approval authority. Revised text: **From three years after the dates specified in paragraphs 4 and 5 of Article 10 of Regulation (EC) No 715/2007, ~~I~~if** the approval authority is not satisfied with the data quality check and validation results of a PEMS test conducted according to Appendices 1 and 4, the approval authority may consider the test to be void. In such case, the test data and the reasons for voiding the test shall be recorded by the approval authority. Argument: During the transitional period a test may be void because the provisions of Appendices 1 or 4 may reveal unexpected problems. Such problems should not be the reason for denial of approval.
RDE		Annex IIIA Paragraph 3.1.3.2.1	Original text: By entering the vehicle type approval number and the information on type, variant and version as defined in sections 0.10 and 0.2 of the vehicle's EC certificate of conformity provided by Annex IX of Directive (EC) 2007/46, the unique identification number of a PEMS test family to which a given vehicle emission type belongs, as set out in point 5.2 of Appendix 7. Revised Text: By entering the vehicle type approval number and

			the information on type, variant and version as defined in section~~s 0.10 and~~ 0.2 of the vehicle's EC certificate of conformity provided by Annex IX of Directive (EC) 2007/46, the unique identification number of a PEMS test family to which a given vehicle emission type belongs, as set out in point 5.2 of Appendix 7. Argument: Industry is not able to fulfill the new requirement on VIN based reporting which was not discussed in the RDE Task Force.
RDE		Annex IIIA Paragraph 4.2	Original text: The manufacturer shall demonstrate to the approval authority that the chosen vehicle, driving patterns, conditions and payloads are representative for the vehicle family. … Revised text: The manufacturer shall demonstrate to the approval authority that the chosen vehicle, driving patterns, conditions and payloads are representative for the vehicle **PEMS test** family. … Argument: Clarification
RDE		Annex IIIA Paragraph 5.1.2	Original text: For the purpose of testing some artificial payload may be added as long as the total mass of the basic and artificial payload does not exceed 90% of the sum of the “mass of the passengers” and the “pay-mass” defined in points 19 and 21 of Article 2 of Commission Regulation (EU) No 1230/2012(*). Revised text: For the purpose of testing some artificial payload

			may be added as long as the total mass of the basic and artificial payload does not exceed 90% of the sum of the “mass of the passengers” and the “pay-mass” defined in points 19 and 21 of Article 2 of Commission Regulation (EU) No 1230/2012(*), **as outlined by the following equations**.     Argument: Clarification
RDE		Annex IIIA Paragraph 5.2.1	Original text: The test shall be conducted under ambient conditions laid down in this section. The ambient conditions become “extended” when at least one of the temperature and altitude conditions is extended. Revised text : The test shall be conducted under ambient conditions laid down in this section. The ambient conditions become “extended” when at least one of the temperature and altitude conditions is

			extended. **If a part of the test is performed outside of extended conditions, the whole test is invalid.** Argument : For example, a test starts at -5 °C, but the temperature falls below -7 °C during uphill driving.
RDE		Annex IIIA Paragraph 5.2.6	Original text: By way of derogation from the provisions of points 5.2.4 and 5.2.5 the lower temperature for moderate conditions shall be greater or equal to 276K (3°C) and the lower temperature for extended conditions shall be greater or equal to 271K (-2°C) between the start of the application of binding NTE emission limits as defined in section 2.1 and until five years after the dates given in paragraphs 4 and 5 of Article 10, of Regulation (EC) No 715/2007. Revised text: By way of derogation from the provisions of points 5.2.4 and 5.2.5 the lower temperature for moderate conditions shall be greater or equal to 276K (3°C) and the lower temperature for extended conditions shall be greater or equal to 271K (-2°C) between the start of the application of binding NTE emission limits as defined in section 2.1 and until five years **and four months** after the dates given in paragraphs 4 and 5 of Article 10, of Regulation (EC) No 715/2007. Argument: Alignment with the implementation date of the Final Conformity Factors (Annex IIIA, Paragraph 2.1.2). This would eliminate another “mixed” type of vehicles in the field having the final temperature margins but not the final Conformity Factors.

RDE		Annex IIIA Paragraph 5.4.2	Original text: If the trip results as valid following the verifications according to point 5.4.1, the methods for verifying the normality of the test conditions as laid down in Appendices 5 and 6 to this Annex must be applied. Each method includes a reference for test conditions, ranges around the reference and the minimum coverage requirements to achieve a valid test. Revised text: If the trip results as valid following the verifications according to point 5.4.1, the methods for verifying the normality of the test conditions as laid down in Appendices 5 and 6 to this Annex must be applied. **Compliance of the software tool with the provisions laid down in Appendix 5 or 6 shall either be certified by the tool provider or testified by the type approval authority.** Each method includes a reference for test conditions, ranges around the reference and the minimum coverage requirements to achieve a valid test. Argument: The software provider should prove compliance with the methods laid down in Appendix 5 or 6 by an approval authority certificate. Compliance of non-certified software tools with the provisions of Appendix 5 or 6 should be testified by the type approval authority conducting or supervising the RDE tests.
RDE		Annex IIIA Paragraph 5.5.1	Original text: Auxiliary systems The air conditioning system or other auxiliary devices shall be operated in a way which corresponds to their possible use by a consumer at real driving on the road.

			Revised text: Auxiliary systems The air conditioning system or other auxiliary devices shall be operated in a way which corresponds to their ~~possible~~ **typical** use by a consumer at real driving on the road. **When using the air conditioning system, heating systems (e.g. seat heating or auxiliary heaters) shall be switched off and the vehicle windows shall be closed. When using heating systems (e.g. seat heating or auxiliary heaters), the air conditioning system shall be switched off.** Argument: "possible" would include also an intentionally unreasonable use of such a device. To avoid unreasonable use of heaters and coolers at the same time.
RDE		Annex IIIA New Paragraph 5.5.3	New text: **The vehicle windows shall be closed.** **The use of trailers or roof boxes and the transport of bicycles on their carriers is not permitted.** Argument: To avoid drag variations caused by such equipment.
RDE		Annex IIIA Paragraph 6.3	Original text: 6.3 Urban operation is characterised by vehicle speeds lower than or equal to 60 km/h. Revised text: 6.3 Urban operation ~~is characterised by~~ vehicle speeds ~~lower than or equal to 60 km/h~~.

			6.3.1 **For vehicles of categories M1 and N1 as defined in Annex II to Directive 70/156/EEC the urban operation is characterised by vehicle speeds lower than or equal to 60 km/h.** **6.3.2** **For M2 and N2 vehicles the urban operation is characterised by vehicle speeds between 0 and 50 km/h.** Argument: Pursuant to Article 2 of Regulation (EC) No 715/2007, the provisions of Appendix IIIA of Regulation (EC) No 692/2008 apply for vehicles of category M2 and N2 with a reference mass up to 2610 kg. Pursuant to Articles 2 and 3 of Directive 92/6/EEC, the maximum speed of category M2 and N2 vehicles has to be limited to 100 km/h and 90 km/h, respectively, by means of speed limiting devices. Currently is technically impossible to conduct a valid RDE trip for category M2 and N2 vehicles under the RDE regulation. There has to be a differentiation of urban operation between M1, N1 and M2, N2 vehicles to adopt the speed requirements of heavy duty regulation 595/2009 for M2 and N2 vehicles.
RDE	**Amended in Package 3**	Annex IIIA Paragraph 6.4	Original text: 6.4 Rural operation is characterised by vehicle speeds higher than 60 and lower than or equal to 90 km/h. Revised text: 6.4

			Rural operation ~~is characterised by~~ vehicle speeds ~~higher than 60 and lower than or equal to 90 km/h~~. **6.4.1** **For vehicles of categories M1 and N1 as defined in Annex II to Directive 70/156/EEC rural operation is characterised by vehicle speeds higher than 60 and lower than or equal to 90 km/h.** **6.4.2** **For M2 and N2 vehicles the rural operation is characterised by vehicle speeds higher than 50 and lower than or equal to 75 km/h.** Argument: Pursuant to Article 2 of Regulation (EC) No 715/2007, the provisions of Appendix IIIA of Regulation (EC) No 692/2008 apply for vehicles of category M2 and N2 with a reference mass up to 2610 kg. Pursuant to Articles 2 and 3 of Directive 92/6/EEC, the maximum speed of category M2 and N2 vehicles has to be limited to 100 km/h and 90 km/h, respectively, by means of speed limiting devices. Currently is technically impossible to conduct a valid RDE trip for category M2 and N2 vehicles under the RDE regulation. There has to be a differentiation of urban operation between M1, N1 and M2, N2 vehicles to adopt the speed requirements of heavy duty regulation 595/2009 for M2 and N2 vehicles.
RDE	**Amended in Package 3**	Annex IIIA Paragraph 6.5	Original text: 6.5 Motorway operation is characterised by speeds above 90 km/h.

			Revised text: 6.5 Motorway operation ~~is characterised by~~ **vehicle** speeds ~~above 90 km/h~~. **6.5.1** **For vehicles of categories M1 and N1 as defined in Annex II to Directive 70/156/EEC motorway operation is characterised by vehicle speeds above 90 km/h.** **6.5.2** **For M2 and N2 vehicles motorway operation is characterised by vehicle speeds above 75 km/h.** Argument: Pursuant to Article 2 of Regulation (EC) No 715/2007, the provisions of Appendix IIIA of Regulation (EC) No 692/2008 apply for vehicles of category M2 and N2 with a reference mass up to 2610 kg. Pursuant to Articles 2 and 3 of Directive 92/6/EEC, the maximum speed of category M2 and N2 vehicles has to be limited to 100 km/h and 90 km/h, respectively, by means of speed limiting devices. Currently is technically impossible to conduct a valid RDE trip for category M2 and N2 vehicles under the RDE regulation. There has to be a differentiation of urban operation between M1, N1 and M2, N2 vehicles to adopt the speed requirements of heavy duty regulation 595/2009 for M2 and N2 vehicles.

RDE		Annex IIIA Paragraph 6.8	Original text: The average speed (including stops) of the urban driving part of the trip should be between 15 and 40 km/h. Stop periods, defined as vehicle speed of less than 1 km/h, shall account for 6 to 30% of the time duration of urban operation. Urban operation shall contain several stop periods of 10s or longer. If a stop period lasts more the 180 s, the emission events during the 180 s following such an excessively long stop period shall be excluded from the emissions evaluation. Revised text: The average speed (including stops) of the urban driving part of the trip should be between 15 and 40 km/h. Stop periods, defined as vehicle speed of less than 1 km/h, shall account for 6 to 30% of the time duration of urban operation. Urban operation shall contain several stop periods of 10s or longer. If a stop period lasts more the 180 s, the **pollutant** emission ~~events~~ **data** during the 180 s following such an excessively long stop period shall be ~~excluded from~~ **set to zero for** the emissions evaluation. Argument: Clarification.
RDE	**Amended in Package 3**	Annex IIIA Paragraph 6.9	Original text: 6.9 The speed range of the motorway driving shall properly cover a range between 90 and at least 110 km/h. The vehicle's velocity shall be above 100 km/h for at least 5 minutes. Revised text: 6.9 ~~The s~~**S**peed range of ~~the~~ motorway driving ~~shall~~

			~~properly cover a range between 90 and at least 110 km/h. The vehicle's velocity shall be above 100 km/h for at least 5 minutes~~. **6.9.1** **For vehicles of categories M1 and N1 as defined in Annex II to Directive 70/156/EEC the speed range of the motorway driving shall properly cover a range between 90 and at least 110 km/h. The vehicle's velocity shall be above 100 km/h for at least 5 minutes**. **6.9.2** **For vehicles of categories M2 and N2 as defined in Annex II to Directive 70/156/EEC the speed range of the motorway driving shall properly cover a range between 75 km/h and the legal speed limit.** Argument: Pursuant to Articles 2 and 3 of Directive 92/6/EEC, the maximum speed of category M2 and N2 vehicles has to be limited to 100 km/h or 90 km/h, respectively, by means of speed limiting devices. Additionally legal speed limits may apply. Currently is technically impossible to conduct a valid RDE trip for category M2 and N2 vehicles under the RDE regulation. There has to be a differentiation of urban operation between M1, N1 and M2, N2 vehicles to adopt the speed requirements of heavy duty regulation 595/2009 for M2 and N2 vehicles.
RDE		Annex IIIA Paragraph 8.2	Original text : Samples of fuel, lubricant and reagent (if applicable) shall be taken and kept for at least 1 year.

			Revised text: **In the case of a PEMS test performed by an independent organisation, s~~S~~**amples of fuel, lubricant and reagent (if applicable) shall be taken and kept for at least 1 year **at a temperature between 10°C and 20°C and protected from light**. Argument: OEMs and TAA can bring the specifications of the fuel, oil and reagent they use – 3rd parties cannot.
RDE		Annex IIIA, Appendix 1 Paragraph 3.2	Original text: Test parameters as specified in Table 1 of this Appendix shall be measured, recorded at a constant frequency of 1.0 Hz or higher and reported according to the requirements of Appendix 8. If ECU parameters are obtained, these should be made available at a substantially higher frequency than the parameters recorded by PEMS. The PEMS analysers, flow-measuring instruments and sensors shall comply with the requirements laid down in Appendices 2 and 3 of this Annex. Revised text: Test parameters as specified in Table 1 of this Appendix shall be measured, recorded at a constant frequency of 1.0 Hz ~~or higher~~ and reported according to the requirements of Appendix 8. If ECU parameters are ~~obtained~~ **available**, these should be ~~made available~~ **requested** at ~~a substantially higher~~ **the same** frequency ~~than~~ **as** the parameters recorded by PEMS. The PEMS analysers, flow-measuring instruments and sensors shall comply with the requirements laid down in Appendices 2 and 3 of this Annex. Argument: ACEA recommends to use a fixed frequency of 1 Hz

			in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the data. Table 1 contains several values, the data source of which is marked as “ECU”. However the transmission of most of these values is not (or only optional) requested by the OBD regulation. Thus it cannot be anticipated that these values are available from the ECU. The available data rate depends on the type and amount of requested data and on the number of answering control units. A data rate “substantially higher“ than 1Hz may not be possible.
RDE		Annex IIIA, Appendix 1 Paragraph 4.6	Original text: The zero level of the analyser shall be recorded by sampling HEPA filtered ambient air. The signal shall be recorded at a constant frequency of at least 1.0 Hz over a period of 2 min and averaged; the permissible concentration value shall be determined once suitable measurement equipment becomes available. Revised text: The zero level of the analyser shall be recorded by sampling HEPA filtered ambient air. The signal shall be recorded at a constant frequency of ~~at least~~ 1.0 Hz over a period of 2 min and averaged; the permissible concentration value shall be determined once suitable measurement equipment becomes available. Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the

			data.
RDE		Annex IIIA, Appendix 1 Paragraph 6.3	Original text: The calibrated range of the analysers shall account at least for 90% of the concentration values obtained from 99% of the measurements of the valid parts of the emissions test. It is permissible that 1% of the total number of measurements used for evaluation exceeds the calibrated range of the analysers by up to a factor of two. If these requirements are not met, the test shall be voided. Revised text: **The used span gas concentration of the analysers as calibrated according to Appendix 1, paragraph 4.5 of this Annex shall cover at least 90%** of the concentration values obtained from 99% of the measurements of the valid parts of the emissions test. It is permissible that 1% of the total number of measurements used for evaluation exceeds **the used span gas** by up to a factor of two. If these requirements are not met, the test shall be voided. Argument: Clarification.
RDE		Annex IIIA, Appendix 2 Paragraph 3.4.2	Original text: (f) The values under evaluation and, if needed, the reference values shall be recorded at a constant frequency of at least 1.0 Hz over a period of 30 seconds. Revised text: (f) The values under evaluation and, if needed, the reference values shall be recorded at a constant frequency of ~~at least~~ 1.0 Hz over a period of 30 seconds.

			Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the data.
RDE		Annex IIIA, Appendix 2 Paragraph 4.2.4	Original text: The noise, defined as two times the root mean square of ten standard deviations, each calculated from the zero responses measured at a constant recording frequency of at least 1.0 Hz during a period of 30 seconds, shall not exceed 2% of full scale. Each of the 10 measurement periods shall be interspersed with an interval of 30 seconds in which the analyser is exposed to an appropriate span gas. Before each sampling period and before each span period, sufficient time shall be given to purge the analyser and the sampling lines. Revised text: The noise, defined as two times the root mean square of ten standard deviations, each calculated from the zero responses measured at a constant recording frequency of ~~at least~~ 1.0 Hz during a period of 30 seconds, shall not exceed 2% of full scale. Each of the 10 measurement periods shall be interspersed with an interval of 30 seconds in which the analyser is exposed to an appropriate span gas. Before each sampling period and before each span period, sufficient time shall be given to purge the analyser and the sampling lines. Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly

			Appendix 6) and to facilitate post-processing of the data.
RDE		Annex IIIA, Appendix 2 Paragraph 7.2.5	Original text: The noise, defined as two times the root mean square of ten standard deviations, each calculated from the zero responses measured at a constant recording frequency of at least 1.0 Hz during a period of 30 seconds, shall not exceed 2 per cent of the maximum calibrated flow value. Each of the 10 measurement periods shall be interspersed with an interval of 30 seconds in which the EFM is exposed to the maximum calibrated flow. Revised text: The noise, defined as two times the root mean square of ten standard deviations, each calculated from the zero responses measured at a constant recording frequency of ~~at least~~ 1.0 Hz during a period of 30 seconds, shall not exceed 2 per cent of the maximum calibrated flow value. Each of the 10 measurement periods shall be interspersed with an interval of 30 seconds in which the EFM is exposed to the maximum calibrated flow. Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the data.
RDE		Annex IIIA, Appendix 3 Paragraph 4.2	Original text: (c) At a constant frequency of at least 1.0 Hz, the signal under validation and the reference signal shall be correlated using the best-fit equation having the form:

			Revised text: (c) At a constant frequency of ~~at least~~ 1.0 Hz, the signal under validation and the reference signal shall be correlated using the best-fit equation having the form: Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the data.
RDE		Annex IIIA, Appendix 5 Paragraph 3.1	Original text: Definition of averaging windows The instantaneous emissions calculated according to Appendix 4 shall be integrated using a moving averaging window method, based on the reference CO2 mass. The principle of the calculation is as follows: The mass emissions are not calculated for the complete data set, but for sub-sets of the complete data set, the length of these sub-sets being determined so as to match the CO2 mass emitted by the vehicle over the reference laboratory cycle. The moving average calculations are conducted with a time increment Δt corresponding to the data sampling frequency. These sub-sets used to average the emissions data are referred to as "averaging windows". The calculation described in the present point may be run from the last point (backwards) or from the first point (forward). The following data shall not be considered for the calculation of the CO_2 mass, the emissions and the distance of the averaging windows: – The periodic verification of the instruments and/or after the zero drift verifications; – The cold start emissions, defined according to

			Appendix 4, point 4.4; – Vehicle ground speed < 1 km/h; – Any section of the test during which the combustion engine is switched off. … Revised text: Definition of averaging windows The instantaneous emissions calculated according to Appendix 4 shall be integrated using a moving averaging window method, based on the reference CO2 mass. The principle of the calculation is as follows: The mass emissions are not calculated for the complete data set, but for sub-sets of the complete data set, the length of these sub-sets being determined so as to match the CO2 mass emitted by the vehicle over the reference laboratory cycle. The moving average calculations are conducted with a time increment Δt corresponding to the data sampling frequency. These sub-sets used to average the emissions data are referred to as "averaging windows". The calculation described in the present point ~~may~~ **shall** be run ~~from the last point (backwards) or~~ from the first point (forward). The following data shall not be considered for the calculation of the CO_2 mass, the emissions and the distance of the averaging windows: – The periodic verification of the instruments and/or after the zero drift verifications; – The cold start emissions, defined according to Appendix 4, point 4.4; – Vehicle ground speed < 1 km/h **with engine on or off**; ~~– Any section of the test during which the combustion engine is switched off.~~ …

			Argument: To avoid possibly different results when running the calculation in opposite directions. ACEA recommends to delete the sentence “any section of the test during which the combustion engine is switched off” to allow advanced vehicle operation modes called “sailing” where the combustion engine is switched off during coasting.
RDE		ANNEX IIIa, Appendix 5, Paragraph 4.2	Original text: 4.2 CO 2 characteristic curve reference points The reference points P_1, P_2 and P_3 required to define the curve shall be established as follows: 4.2.1. *Point P_1* v_{P1} = 19 *km/h* (average speed of the Low Speed phase of the WLTP cycle) $M_{CO\ 2;d;P\ 1}$ = Vehicle CO_2 emissions over the Low Speed phase of the WLTP cycle × 1.2 [g/km]. 4.2.2. *Point P_2* 4.2.3. v_{P2} = 56.6 *km/h* (average speed of the High Speed phase of the WLTP cycle) $M_{CO\ 2;d;P\ 2}$ = Vehicle CO_2 emissions over the High Speed phase of the WLTP cycle × 1.1 [g/km]. 4.2.4. *Point P_3* 4.2.5. v_{P3} = 92.3*km/h* (average speed of the Extra High Speed phase of the WLTP cycle) $M_{CO\ 2;d;P\ 3}$ = Vehicle CO 2 emissions over the Extra High Speed phase of the WLTP cycle × 1.05 [g/km]. Revised text: 4.2 CO 2 characteristic curve reference points The reference points P_1, P_2 and P_3 required to define the curve shall be established as follows: 4.2.1. *Point P_1*

			Vehicles of categories M1 and N1: v_{P1} = 19 *km/h* (average speed of the Low Speed phase of the WLTP cycle) ***Vehicles of categories M2 and N2:*** **v_{P1} = [tbd]** $M_{CO\ 2;d;P\ 1}$ = Vehicle CO_2 emissions over the Low Speed phase of the WLTP cycle × 1.2 [g/km]. 4.2.2. *Point P_2* ***Vehicles of categories M1 and N1:*** ~~4.2.3.~~ v_{P2} = 56.6 *km/h* (average speed of the High Speed phase of the WLTP cycle) ***Vehicles of categories M2 and N2:*** **v_{P2} = [tbd]** $M_{CO\ 2;d;P\ 2}$ = Vehicle CO_2 emissions over the High Speed phase of the WLTP cycle × 1.1 [g/km]. 4.2.~~4~~**3**. *Point P_3* ***Vehicles of categories M1 and N1:*** ~~4.2.5.~~ v_{P3} = 92.3*km/h* (average speed of the Extra High Speed phase of the WLTP cycle) ***Vehicles of categories M2 and N2:*** **v_{P3} = [tbd]** $M_{CO\ 2;d;P\ 3}$ = Vehicle CO 2 emissions over the Extra High Speed phase of the WLTP cycle × 1.05 [g/km]. Argument: The calculation needs to consider the splitting of the speed requirements in M1, N1 and M2, N2 vehicles (see ANNEX IIIa, paragraph 6.3-6.5). According to that, the speed values have to be amended. Reasonable values should be evaluated by JRC or TU Graz.
RDE		ANNEX IIIa, Appendix 5,	Original text: 4.4. Urban, rural and motorway windows 4.4.1. Urban windows are characterised by average

		Paragraph 4.4	vehicle ground speeds v_j smaller than 45 km/h, 4.4.2. Rural windows are characterised by average vehicle ground speeds v_j greater than or equal to 45 km/h and smaller than 80 km/h, 4.4.3. Motorway windows are characterised by average vehicle ground speeds v_j greater than or equal to 80 km/h and smaller than 145 km/h Revised text: 4.4. Urban, rural and motorway windows 4.4.1. Urban windows are characterised by average vehicle ground speeds v_j smaller than 45 km/h **for vehicles of categories M1 and N1 resp. smaller than [tbd] km/h for vehicles of categories M2 and N2**, 4.4.2. Rural windows are characterised by average vehicle ground speeds v_j greater than or equal to 45 km/h and smaller than 80 km/h **for vehicles of categories M1 and N1 resp. greater than or equal to [tbd] km/h and smaller than [tbd] km/h for vehicles of categories M2 and N2**, 4.4.3. Motorway windows are characterised by average vehicle ground speeds v_j greater than or equal to 80 km/h and smaller than 145 km/h **for vehicles of categories M1 and N1 resp. greater than or equal to [tbd] km/h and smaller than [tbd] km/h for vehicles of categories M2 and N2.** Argument: The calculation has to consider the splitting of the speed requirements in M1, N1 and M2, N2 vehicles (see ANNEX IIIa, paragraph 6.3-6.5). According to that, the speed values have to be amended. Reasonable values should be evaluated by JRC or TU Graz.

RDE		Annex IIIA, Appendix 5 Paragraph 5.3	Original text: Verification of test normality … If the specified minimum requirement of 50% is not met, the upper positive tolerance tol_1 may be increased by steps of 1 percentage points until the 50% of normal windows target is reached. When using this approach, tol_1 shall never exceed 30%. Revised text: Verification of test normality … If the specified minimum requirement of 50% is not met, the ~~upper positive~~ tolerance tol_1 may be increased by steps of 1 percentage points until the 50% of normal windows target is reached. When using this approach, tol_1 shall never exceed **±**30%. Argument: Some vehicles may rather require a tolerance at the lower side to meet the minimum requirement of 50%.
RDE		Annex IIIA, Appendix 5 Paragraph 6.1	Original text: Calculation of weighted distance-specific emissions The emissions shall be calculated as a weighted average of the windows distance-specific emissions separately for the urban, rural and motorway categories and the complete trip. … Revised text: Calculation of weighted distance-specific emissions The emissions shall be calculated as a weighted average of the windows distance-specific emissions separately for the urban, rural and motorway categories and the complete trip. **In the following calculations tol_1 shall be 25% and tol_2 shall be**

			50%. Argument: When normality requirement is achieved by increasing tol_1, weight factor =1 area (±25%) should be keep to ±25% to normalize PEMS data correctly.
RDE		Annex IIIA, Appendix 5 Paragraph 7.2	Original text: a_1 = (96 - 154)/(56.6 - 19.0) = … = -1.543 … a_2 = (120 - 96)/(92.3 - 56.6) = … = 0.672 Revised text: a_1 = (96*1.1 - 154*1.2)/(56.6 - 19.0) = -2.106 a_2 = (120*1.05 – 96*1.1)/(92.3 - 56.6) = 0.571 Argument: Correction according to Section 4.2 of this Appendix.
RDE		Annex IIIA, Appendix 6 Paragraph 2, Symbols, parameters and units	Original text: i Time step for instantaneous measurements, minimum resolution 1Hz Revised text: i Time step for instantaneous measurements, ~~minimum~~ resolution 1Hz Argument: ACEA recommends to use a fixed frequency of 1 Hz in order to minimize interference with the provisions of the other Appendices (particularly Appendix 6) and to facilitate post-processing of the data.
RDE		ANNEX IIIa, Appendix 6,	Original text: Classification of the moving averages to urban, rural and motorway …

<table>
<tr>
<td></td>
<td></td>
<td>Paragraph 3.3</td>
<td>Table 1-1: Speed ranges for the allocation of test data to urban, rural and motorway conditions in the power binning method

<table><tr><td></td><td>Urban</td><td>Rural (1)</td><td>Motorway (1)</td></tr><tr><td>v_1 [km/h]</td><td>0 to ≤ 60</td><td>>60 to ≤90</td><td>>90</td></tr></table>
Revised text:
Classification of the moving averages to urban, rural and motorway
…
Table 1-1: Speed ranges for the allocation of test data to urban, rural and motorway conditions in the power binning method

<table><tr><td></td><td></td><td>Urban</td><td>Rural (1)</td><td>Motorway (1)</td></tr><tr><td>M1 & N1 vehicles</td><td>v_1 [km/h]</td><td>0 to ≤ 60</td><td>>60 to ≤90</td><td>>90</td></tr><tr><td>M2 & N2 vehicles</td><td>v_1 [km/h]</td><td>0 to ≤ 50</td><td>>50 to ≤75</td><td>>75</td></tr></table>
Argument:
The amendment of the speed ranges is corresponding to the adaption of the speed requirements in Annex IIIA, Paragraph 6.3 - 6.5. The speed ranges for M1 & N1 remain unchanged.</td>
</tr>
<tr>
<td>RDE</td>
<td></td>
<td>Annex IIIA, Appendix 6 Paragraph 3.6 Table 4</td>
<td>Original text:
Table 4 (Excerpt)
MINIMUM AND MAXIMUM SHARES PER POWER CLASS FOR A VALID TEST
<table><tr><td rowspan="2">Power class No.</td><td colspan="2"></td><td colspan="2">Total trip</td><td colspan="2">Urban trip parts</td></tr><tr><td></td><td></td><td>lower bound</td><td>upper bound</td><td>lower bound</td><td>upper</td></tr></table></td>
</tr>
</table>

			5 | 1.0% | 10% | >5 counts | 5% 6 | >5 counts | 2.5% | 0% | 2% Revised text : *Table 4 (Excerpt)* MINIMUM AND MAXIMUM SHARES PER POWER CLASS FOR A VALID TEST Power class No. | Total trip: lower bound, upper bound | Urban trip parts: lower bound, upper 5 | 1.0% | 10% | ≥5 counts | 5% 6 | ≥5 counts | 2.5% | 0% | 2% Argument: Contradiction to the wording following Table 4, see text marked yellow in the item below.
RDE		Annex IIIA, Appendix 6 Paragraph 3.6	Original text: … In addition to the requirements in Table 4, a minimum coverage of 5 counts is demanded for the total trip in each wheel power class up to the class containing 90% of the rated power to provide a sufficient sample size. A minimum coverage of 5 counts is required for the urban part of the trip in each wheel power class up to class No. 5. If the counts in the urban part of the trip in a wheel power class above number 5 are less than 5, the average class emission value shall be set to zero. Revised text: … ~~In addition to the requirements in Table 4, a minimum coverage of 5 counts is demanded for~~

			~~the total trip in each wheel power class up to the class containing 90% of the rated power to provide a sufficient sample size.~~ ~~A minimum coverage of 5 counts is required for the urban part of the trip in each wheel power class up to class No. 5. If the counts in the urban part of the trip in a wheel power class above number 5 are less than 5, the average class emission value shall be set to zero.~~ **For a valid test a sufficient number of measured emission values have to be allocated to the relevant power classes. This demand is checked by the number of 3 second average values (counts) allocated to each power class:** • **a minimum coverage of 5 counts is demanded for the total trip in each wheel power class up to class No. 6. or up to the class containing 90% of the rated power whatever gives the lower class number. If the counts in a wheel power class above number 6 are less than 5, the average class emission value (mgas,3s,k) and the average class velocity (v3s,k) shall be set to zero.** • **a minimum coverage of 5 counts is required for the urban part of the trip in each wheel power class up to class No. 5 or up to the class containing 90% of the rated power whatever gives the lower class number. If the counts in the urban part of the trip in a wheel power class above number 5 are less than 5, the average class emission value (mgas,3s,k) and the average class velocity (v3s,k) shall be set to zero.** Argument: Text of the latest CLEAR description. Leads to more

			valid trips.
RDE		Annex IIIA, Appendix 7 Paragraph 3	Original text: 3. PEMS TEST FAMILY BUILDING A PEMS test family shall comprise vehicles with similar emission characteristics. Upon the choice of the manufacturer vehicle emission types may be included in a PEMS test family only if they are identical with respect to the characteristics in points 3.1 and 3.2. 3.1. Administrative criteria 3.1.1. The approval authority issuing the emission type approval according to Regulation (EC) 715/2007 ('authority') 3.1.2. A single vehicle manufacturer. … Revised text: 3. PEMS TEST FAMILY BUILDING A PEMS test family shall comprise vehicles with similar emission characteristics. Upon the choice of the manufacturer **(*)** vehicle emission types may be included in a PEMS test family only if they are identical with respect to the characteristics in points 3.1 and 3.2. 3.1. Administrative criteria 3.1.1. The approval authority issuing the emission type approval according to Regulation (EC) 715/2007 ('authority') **(**)** 3.1.2. A single vehicle manufacturer. **(**)** **(*) In case of multi-stage type approvals according to Article 5 (2) of Directive 2007/46/EC upon the choice and consent of all involved manufacturers.** **(*) This requirement will not be mandatory in case**

			of multi-stage type approvals according to Article 5 (2) of Directive 2007/46/EC. … Argument: If not amended, this paragraph would force multi-stage manufacturers to repeat RDE tests for vehicles that meet the technical criteria of the original manufacturer PEMS family. This would be an unjustified and unfeasible burden for multi-stage manufacturers, and as discussed during RDE LDV meeting 16th June, it was not regulator intention to apply this provision for multi-stage manufacturers.
RDE		Annex IIIA, Appendix 7 Paragraph 5.3	Original text: The authority and the vehicle manufacturer shall maintain a list of vehicle emission types being part of a given PEMS test family on the basis of emission type approval numbers. For each emission type all corresponding combinations of vehicle type approval numbers, types, variants and versions as defined in sections 0.10 and 0.2 of the vehicle's EC certificate of conformity shall be provided as well. Revised text: The authority and the vehicle manufacturer shall maintain a list of vehicle emission types being part of a given PEMS test family on the basis of emission type approval numbers. For each emission type all corresponding combinations of vehicle type approval numbers, types, variants and versions as defined in section~~s 0.10 and~~ 0.2 of the vehicle's EC certificate of conformity shall be provided as well. Argument: Not possible to provide all the VIN.

RDE		Annex IIIA, Appendix 7a Paragraph 8.1.1 [Paragraph 3.1.1]	Original text: Data pre-processing … The correct speed trace builds the basis for further calculations and binning as described in paragraph 8.1.2. [3.1.2] Revised text: Data pre-processing … The correct speed trace builds the basis for further calculations and binning as described in paragraph 8.1.2 [3.1.2] **and 8.1.3 [3.1.3]**. Argument: Calculations are described in paragraph 8.1.2 [3.1.2], binning is described in paragraph 8.1.3 [3.1.3].
RDE		ANNEX IIIa, Appendix 7a Paragraph 8.1.3 [3.1.3]	Original text: Binning of the results After the calculation of a_i and $(v \cdot a)_i$, the values v_i , d_i , a_i and $(v \cdot a)_i$ shall be ranked in ascending order of the vehicle speed. All datasets with $v_i \leq 60$ *km/h* belong to the 'urban' speed bin, all datasets with 60 *km/h* $< v_i \leq 90$ *km/h* belong to the 'rural' speed bin and all datasets with $v_i > 90$ *km/h* belong to the 'motorway' speed bin. … Revised text: Binning of the results After the calculation of a_i and $(v \cdot a)_i$, the values v_i , d_i , a_i and $(v \cdot a)_i$ shall be ranked in ascending order of the vehicle speed. **For vehicles of categories M1 and N1 as defined in Annex II to Directive 70/156/EEC** ~~A~~**a**ll datasets with $v_i \leq 60$ *km/h* belong to the 'urban' speed bin, all

			datasets with 60 *km/h* < v_i ≤ 90 *km/h* belong to the 'rural' speed bin and all datasets with v_i > 90 *km/h* belong to the 'motorway' speed bin. **For vehicles of categories M2 and N2 as defined in Annex II to Directive 70/156/EEC all datasets with v_i ≤ [tbd] *km/h* belong to the 'urban' speed bin, all datasets with [tbd] *km/h* < v_i ≤ [tbd] *km/h* belong to the 'rural' speed bin and all datasets with v_i > [tbd] *km/h* belong to the 'motorway' speed bin.** … Argument: The calculation needs to consider the splitting of the speed requirements in M1, N1 and M2, N2 vehicles (see ANNEX IIIa, paragraph 6.3-6.5). According to that, the speed values have to be amended. Reasonable values should be evaluated by CLEAR tool experts, JRC or TU Graz.
RDE		ANNEX IIIa, Appendix 7a, Paragraph 9 [4]	Original text: VERIFICATION OF TRIP VALIDITY 4.1.1. *Verification of v*a_{pos}_[95] per speed bin (with v in [km/h])* If v_k ≤ 74.6 *km/h* and $(v \cdot a_{pos})_k$ [95] > (0.136 · v_k + 14.44) is fulfilled, the trip is invalid. If v_k> 74.6 *km/h* and $(v \cdot a_{pos})_k$ [95] > (0.0742 · v_k + 18.966) is fulfilled, the trip is invalid. 4.1.2. *Verification of RPA per speed bin* If v_k ≤ 94.05 *km/h* and RPA_k < (- 0.0016 · v_k + 0.1755) is fulfilled, the trip is invalid. If v_k> 94.05 *km/h* and RPA_k < 0.025 is fulfilled, the trip is invalid. Revised text:

			VERIFICATION OF TRIP VALIDITY 4.1.1. *Verification of v*a_{pos}_[95] per speed bin (with v in [km/h])* If $v_k \leq$ 74.6 *km/h* ***(M1/N1 vehicles)*** **resp. $v_k \leq$ [tbd] *km/h (M2/N2 vehicles)*** and $(v \cdot a_{pos})_k$ [95] > (0.136 · v_k + 14.44) is fulfilled, the trip is invalid. If v_k> 74.6 *km/h* ***(M1/N1 vehicles)*** **resp. $v_k \leq$ [tbd] *km/h (M2/N2 vehicles)*** and $(v \cdot a_{pos})_k$ [95] > (0.0742 · v_k + 18.966) is fulfilled, the trip is invalid. 4.1.2. *Verification of RPA per speed bin* If $v_k \leq$ 94.05 *km/h* ***(M1/N1 vehicles)*** **resp. $v_k \leq$ [tbd] *km/h (M2/N2 vehicles)*** and RPA_k < (- 0.0016 · v_k + 0.1755) is fulfilled, the trip is invalid. If v_k> 94.05 *km/h* ***(M1/N1 vehicles)*** **resp. $v_k \leq$ [tbd] *km/h (M2/N2 vehicles)*** and RPA_k < 0.025 is fulfilled, the trip is invalid. Argument: The calculation needs to consider the splitting of the speed requirements in M1, N1 and M2, N2 vehicles (see ANNEX IIIa, paragraph 6.3-6.5). According to that, the speed values have to be amended. Reasonable values should be evaluated by CLEAR tool experts, JRC or TU Graz.
RDE		Annex IIIA, Appendix 8 Paragraph 3.3	Original text: Intermediate and final results Summary parameters of intermediate results shall be recorded and structured as indicated in Table 3. The information in Table 3 shall be obtained prior to the application of the data evaluation methods laid down in Appendices 5 and 6. The vehicle manufacturer shall record the results of

			the two data evaluation methods in separate files. The results of the data evaluation with the method described in Appendix 5 shall be reported according to Tables 4, 5 and 6. The results of the data evaluation with the method described in Appendix 6 shall be reported according to Tables 7, 8 and 9. The header of the data reporting file shall be composed of three parts. The first 95 lines shall be reserved for specific information about the settings of the data evaluation method. Lines 101-195 shall report the results of the data evaluation method. Lines 201-490 shall be reserved for reporting the final emission results. Line 501 and all consecutive data lines comprise the body of the data reporting file and shall contain the detailed results of the data evaluation. Revised text: Intermediate and final results Summary parameters of intermediate results shall be recorded and structured as indicated in Table 3. The information in Table 3 shall be obtained prior to the application of the data evaluation methods laid down in Appendices 5 and 6. The vehicle manufacturer shall record the results of the two data evaluation methods**, as far as available,** in separate files. The results of the data evaluation with the method described in Appendix 5 shall be reported according to Tables 4, 5 and 6. The results of the data evaluation with the method described in Appendix 6 shall be reported according to Tables 7, 8 and 9. The header of the data reporting file shall be composed of three parts. The first 95 lines shall be reserved for specific information about the settings of the data evaluation method. Lines 101-195 shall report the results of the data evaluation method. Lines

			201-490 shall be reserved for reporting the final emission results. Line 501 and all consecutive data lines comprise the body of the data reporting file and shall contain the detailed results of the data evaluation. Argument: Article 3, Paragraph 10(d)(ii) requires to record the analysis of completeness and normality even if an evaluation method indicates “trip invalid” (but the other method not). In this case data availability may be restricted.
RDE		Annex IIIA, Appendix 8 Table 1, Footnote 2	Original text: Percentage shall indicate the deviation from the gross vehicle weight. Revised text: Percentage shall indicate the deviation from the ~~gross vehicle~~ weight **according to Paragraph 5.1.2 of Annex IIIA**. Argument: Clarification.
RDE		Annex IIIA, Appendix 8 Table 2	Original text (3rd column): ECU (appears in several lines of the table) Revised text(3rd column): ECU **(5)** Additional footnote under Table 2: **(5) if available** Argument: Table 2 contains several values, the data source of which is marked as “ECU”. However the transmission of most of these values is not (or only optional) requested by the OBD regulation. Thus it cannot be anticipated that these values are

			available from the ECU.

Uncertainties:

	(Number of issue)	Annex or Appendix and Paragraph	Uncertainties
RDE		Annex IIIA, Appendix 3 Section 3.2.2 Appendix 6 Section 3.4.1 VS. Appendix 5 Section 4.1	• Confused **Road Load Model situation**, e.g... o Many places in RDE regs use Reg83 RLM: ▪ PEMS validation procedure - Appendix 3 Section 3.2.2 ▪ Power Binning de-normalisation - Appendix 6 Section 3.4.1 o But other places use GTR15: ▪ Moving Averaging Windowing CO2 characteristic curve generation - Appendix 5 Section 4.1 ▪ Power Binning VeLine defnition - Appendix 6 Section 4 o However where GTR15 used, there's no definition of what RLM to use - TEL / TEH / value for actual vehicle being RDE tested?

RDE		Annex IIIA Appendix 7a Section 8.1.1 [3.1.1]	**Use of smoothed vehicle speed** • Situation w.r.t. **vehicle speed smoothing for V.A+ calculation** (if required due to a-res being too high) o Appendix 7a Section 3.1.1 says that, if a smoothed vehicle speed signal is calculated, to use it for "further calculations and binning as described in Section 3.2.2) o However the Binning is defined in Section 3.2.3 **Correction put into revised content list (see above)** o And surely the smoothed vehicle speed will be used in the rest of Appendix 7a calculations o AND... many other people seem to be assuming that, if a smoothed vehicle speed signal is calculated in Appendix 7a it will be used for all calculations throughout all of the RDE Regs – Annex IIIa and all Appendices... could do with better definition about whether this the intention or not?
RDE		Currently no reference	**Amendment of unexpected regulation issues** During the transitional period unexpected problems in applying the RDE regulation may be revealed. Such problems could be the reason for denial of approval. Would in such cases a text update at short notice be possible?