CORRIGENDA TO GTR No. 11

Global technical regulation concerning the test procedure for compression-ignition (C.I.) engines to be installed in agricultural and forestry tractors and in non-road mobile machinery with regard to the emissions of pollutants by the engine

#	WHERE	ERRATA	CORRIGE
1	3.1.8.	"Constant-speed engine" means an engine whose certification is limited to… [Missing type approval]	"Constant-speed engine" means an engine whose type approval or certification is limited to…
2	3.1.32 at end of paragraph; Guidance document only	[adding explanation regarding the denormalization speed]	Rated speed is replaced by the denormalization speed in the generation of steady-state 8-mode test cycle (discrete and ramp modal) for engines that are tested with both the steady state and also the transient cycle.
3	3.1.47	$PF_{C2H6} = 1 - E_E$ [wrong subscript]	$PF_{C2H6} = 1 - E_{C2H6}$
4	3.1.53 at end of paragraph; Guidance document only	Typographical error. [adding explanation regarding the denormalization speed]	Rated speed is replaced by the denormalization speed in the generation of steady-state 8-mode test cycle (discrete and ramp modal) for engines that are tested with both the steady state and also the transient cycle.
5	3.1.55	[Missing correction, according to corrigenda GRPE-58-11-Rev.2; alignment with requirement in paragraph 8.1.5.2]	"Response time" means the difference in time between the change of the component to be measured at the reference point and a system response of 90 per cent of the final reading (t_{90}) with the sampling probe being defined as the reference point, whereby the change of the measured component is at least 60 per cent full scale (FS) and ~~takes place~~ the devices for gas switching shall be specified to perform the gas switching in less than 0.1 second.
6	3.1.68	"Tolerance" means the interval in which 95 per cent of a set of recorded values of a certain quantity shall lie,	"Tolerance" means the interval in which 95 per cent of a set of recorded values of a certain quantity shall lie,

		with the remaining 5 per cent of the recorded values deviating from the tolerance interval ~~only due to measurement variability~~. The specified recording frequencies and time intervals shall be used to determine if a quantity is within the applicable tolerance. ~~For parameters not subject to measurement variability, tolerance means an absolute allowable range~~; [Simplification of text]	with the remaining 5 per cent of the recorded values deviating from the tolerance interval. The specified recording frequencies and time intervals shall be used to determine if a quantity is within the applicable tolerance;
7	3.2 Legal text only	θ_D kg/mm^2 Rotational inertia of the eddy current dynamometer D [Symbol does not appear in legal text. Delete from legal document only]	~~θ_D kg/mm^2 Rotational inertia of the eddy current dynamometer D~~
8	3.2.	[Variables should be in Italic (not Roman)]	a_0, a_1 and r^2
9	3.3	denorm Denormalized engine speed [The subscript denorm stands for denormalized and could be used not only for engine speed but also for other quantities. Replace engine speed by quantity]	denorm Denormalized quantity
10	6.3.3.	(see note h in the table of Annex A.5). [Reference is wrongly to h, but the note related to the removal of the auxiliaries is note g.]	(see note g in the table of Annex A.5).
11	6.6.1. 2nd and 3rd sentence	[6.6.1. deviates from 2nd paragraph in 6.6.2; the RMC has been missed in transcription]	The regeneration process shall occur at least once during the NRTC test or ramped modal cycle (RMC) and the manufacturer shall declare the normal conditions under which regeneration occurs (soot load, temperature, exhaust back-pressure, etc). In order to demonstrate that the regeneration process is continuous, at least 3 NRTC hot start tests or RMC

			shall be conducted.
12	6.6.1. and 6.6.2.	[The downward multiplicative adjustment factor is missing and the text improved]	[See the improved text at the end of this document]
13	Figure 7.1.	Figure 7.1 – Requested operations to calculate the engine emissions in steady-state and transient test cycles (see Annexes A.7. and A.8.) [The title of figure 7.1. is inaccurate.]	Figure 7.1 – Test procedures for emission measurement Requested operations to calculate the engine emissions in steady-state and transient test cycles (see Annexes A.7. and A.8.)
14	7.3.1.3.	(k) Any electronic integrating devices shall be zeroed or re-zeroed, before the start of any test interval. [wrong index]	(j) Any electronic integrating devices shall be zeroed or re-zeroed, before the start of any test interval.
15	7.4.2.	(see paragraph 7.7.) [Reference to wrong paragraph]	(see paragraph 7.7.2.) [Paragraph 7.7.2. is the paragraph related to "Generation of transient test cycle (NRTC denormalization)"]
16	7.5.(h)	samples shall be evaluated according to pre- (7.3.1.4.) and post-test (7.3.2.2.) procedures. [First reference to wrong paragraph]	samples shall be evaluated according to pre- (7.3.1.5.) and post-test (7.3.2.2.) procedures. [7.3.1.5. for "PM filter preconditioning and tare weighing."]
17	7.5. Figure 7.3	[Figure 7.3 is inaccurate.]	[The corrected figure 7.3, as prepared by Mr. Shikata, is at the end of this document.]
18	7.6. third paragraph	Where n_{hi} is the high speed, defined as the highest engine speed where 70 per cent of the rated power is delivered. [Use of two kinds of power definitions in the same paragraph, maximum power and rated power. Rated power is used only in this sentence of this gtr. The consistent term 'maximum' is used.]	Where n_{hi} is the high speed, defined as the highest engine speed where 70 per cent of the maximum power is delivered.
19	7.7.1.1. Guidance	[adding explanation regarding the denormalization	.........In case of the steady state cycle the calculated

	document only	speed]	denormalization speed (ndenorm) is tabled as rated speed. This means that the rated speed is replaced by the denormalization speed in the generation of the steady-state 8-mode test cycle (discrete and ramp modal), including the determination of the intermediate speed.
20	7.7.2.3. End of the paragraph	for the respective reference speed as determined in paragraph 7.6.3. [Reference to wrong paragraph]	for the respective reference speed as determined in paragraph 7.7.2.2. [Paragraph 7.6.3. is related to "Engine mapping for constant-speed engines" and paragraph 7.7.2.2. is related to "Denormalization of engine speed"]
21	7.8.2.4. Table 7.1	[Variables should be in Italic (not Roman)]	a_0, a_1, r^2 and *SEE*
22	7.8.3. para.2	Small normalized speed values near warm idle speed may cause low-speed idle governors to activate [Use of wrong term. Reference speed value is comparable with idle speed having the unit of 1/min while normalized speed is of the unit of % and thus not comparable to idle speed.]	Small denormalized speed values near warm idle speed may cause low-speed idle governors to activate
23	7.8.3.5. Eq. (7-6) and its legend and following sentence and in Table 7.2	[Variables should be in Italic (not Roman)]	a_0, a_1, r^2 and *SEE*
24	Table 7.2	$\leq$ 10 per cent of idle [Allowed intercept for speed is inconsistent, as criteria is written without absolute sign, i.e. $\leq$ shall be replaced by $\pm$]	$\pm$ 10 per cent of idle
25	Table 7.3	n_{ref} = 0 per cent [n_{ref} is not a normalised engine speed, thus the 0 %	$n_{ref} = n_{idle}$

		value has to be used in its denormalized form.]	.
26	8.1.4.3.(i)	At the minimum recording frequency, as specified in table 9.2, the reference value shall be measured for 30 s and the arithmetic mean of the recorded values, $\bar{y}_i$ recorded; [Wrong transcription of text; the original text read: 'At a recording frequency of at least f Hz, …']	At ~~the minimum~~ a recording frequency of at least the minimum frequency, as specified in table 9.2, the reference value shall be measured for 30 s and the arithmetic mean of the recorded values, $\bar{y}_i$ recorded;
27	8.1.4.3.(j)	Steps in paragraphs (f) through (h) of this paragraph shall be repeated until all reference quantities are measured. [Wrong references]	Steps in paragraphs (g) through (i) of this paragraph shall be repeated until all reference quantities are measured.
28	8.1.4.3.(k)	The calculations described in Annex A.2.2. shall be used. [Wrong reference]	The calculations described in Annex A.2. shall be used. Paragraph A.2.2.is related to Standard deviation. The intention of this paragraph (k) is to refer to all paragraphs in Annex 2.
29	8.1.8.4.2.(f)(i)	The mean flow rate of the reference flow meter, $\bar{n}_{ref}$ [For consistency with figure 8.1, $\bar{q}_{Vref}$ to be used in this paragraph]	The mean flow rate of the reference flow meter, $\bar{q}_{Vref}$
30	8.1.8.4.3.(f)(i)	The mean flow rate of the reference flow meter, $\bar{n}_{ref}$ [For consistency with figure 8.1, $\bar{q}_{Vref}$ to be used in this paragraph]	The mean flow rate of the reference flow meter, $\bar{q}_{Vref}$
31	8.1.8.4.4. Figure 8.1	[In the PDF document at Figure 8.1 the title line overlaps figure]	[Introduction of 6 points of space.]
32	8.1.8.5.1. (a)(iv)	The hydrocarbon contamination verification in the sample system shall be performed as described in paragraph 7.3.1.3. [Wrong reference]	The hydrocarbon contamination verification in the sample system shall be performed as described in paragraph 7.3.1.2. [7.3.1.2. is for "Verification of HC contamination" and

			7.3.1.3. is for "Preparation of measurement equipment for sampling".]
33	8.1.8.5.4. second sentence	If this procedure is used, the HC contamination procedure in paragraph 7.3.1.3. [Wrong reference]	If this procedure is used, the HC contamination procedure in paragraph 7.3.1.2.
34	8.1.8.5.7. (d)	If not, corrective action shall be taken as described in paragraph (a) of this paragraph. [Non-existent reference.]	If not, corrective action shall be taken ~~as described in paragraph (a) of this paragraph~~.
35	8.1.8.5.8. (a)	If a sample dryer is used as allowed in paragraph 9.3.2.3.1.2. to remove water from the sample gas, [Inaccurate reference]	If a sample dryer is used as allowed in paragraph 9.3.2.3.1. to remove water from the sample gas,
36	8.1.8.5.8.(d)(vii)	The sample dryer meets the verification if the result of paragraph (d)(6) of this paragraph is less than the dew point corresponding to the sample dryer specifications as determined in paragraph 9.3.2.3.1. plus 2 °C or if the mol fraction from (d)(6) is less than the corresponding sample dryer specifications plus 0.002 mol/mol or 0.2 Vol per cent. [Wrong references]	The sample dryer meets the verification if the result of paragraph (d)(vi) of this paragraph is less than the dew point corresponding to the sample dryer specifications as determined in paragraph 9.3.2.3.1. plus 2 °C or if the mol fraction from (d)(vi) is less than the corresponding sample dryer specifications plus 0.002 mol/mol or 0.2 Vol per cent.
37	8.1.8.5.8.(d)(vii)	less than the corresponding sample dryer specifications plus 0.002 mol/mol or 0.2 Vol per cent. [Typographical error]	less than the corresponding sample dryer specifications plus 0.002 mol/mol or 0.2 volume per cent.
38	8.1.8.6.1.(c)	Accuracies equivalent to method a) for q_{mp} are required. [missing bracket]	Accuracies equivalent to method (a) for q_{mp} are required.
39	8.1.8.6.3.	The carbon flow check shall be run at least each time a new engine is installed, or something significant is changed in the test cell configuration.	The carbon flow check should be run at least each time a new engine is installed, or something significant is changed in the test cell configuration.

		[Wrong transcription]	
40	8.1.8.7.1.	Upon initial sampling system installation, after major maintenance such as pre-filter changes, and 8 hours prior to each duty-cycle sequence, it shall be verified that there are no significant vacuum-side leaks using one of the leak tests described in this section. [Word missed during editing]	Upon initial sampling system installation, after major maintenance such as pre-filter changes, and within 8 hours prior to each duty-cycle sequence, it shall be verified that there are no significant vacuum-side leaks using one of the leak tests described in this section.
41	8.1.9.1.4.(d)	The humidified test gas shall be introduced downstream of any sample dryer, if one is used during testing. [Words missed during editing.]	The humidified test gas shall be introduced into the sampling system. The humidified test gas may be introduced downstream of any sample dryer, if one is used during testing.
42	8.1.9.2.4.(c)	The humidified CO_2 test gas shall be introduced downstream of any sample dryer, if one is used during testing. [Words missed during editing.]	The humidified CO_2 test gas shall be introduced into the sampling system. The humidified CO_2 test gas may be introduced downstream of any sample dryer, if one is used during testing.
43	8.1.10.1. 3.(a)	according to paragraphs 8.1.10.1.(a) and 8.1.10.2. at the most common analyzer range expected during emission testing. [Wrong reference]	according to paragraphs 8.1.10.1.1.(a) and 8.1.10.2. at the most common analyzer range expected during emission testing.
44	8.1.10.1.3. (c) (iii)	and the oxygen interference check according to paragraphs 8.1.10.1.(a) and 8.1.10.2. [Wrong reference]	and the oxygen interference check according to paragraphs 8.1.10.1.1.(a) and 8.1.10.2.
45	8.1.10.1.3. (c) (iv)	and below the manufacturer's specifications, repeating paragraphs 8.1.10.1.(a) and 8.1.10.2. for each flow. [Wrong reference]	and below the manufacturer's specifications, repeating paragraphs 8.1.10.1.1.(a) and 8.1.10.2. for each flow.
46	8.1.11.2.	CLD quench-check calculations shall be performed as described in paragraph 8.1.11.1. [Wrong reference]	CLD quench-check calculations shall be performed as described in this paragraph.

47	8.1.11.2.3.	$x_{H2Omeas}$ = measured mole fraction of water during the quench verification according to paragraph 8.1.11.1.4.(j) x_{NOmeas} = measured concentration of NO when NO span gas is blended with CO_2 span gas, according to paragraph 8.1.11.1.4.(j) x_{NOact} = actual concentration of NO when NO span gas is blended with CO_2 span gas, according to paragraph 8.1.11.1.4.(k) and calculated according to equation (8-5) x_{CO2exp} = maximum expected concentration of CO_2 during emission testing, according to paragraph 8.1.11.1.3. [Two wrong references]	$x_{H2Omeas}$ = measured mole fraction of water during the quench verification according to paragraph 8.1.11.1.5.(g) x_{NOmeas} = measured concentration of NO when NO span gas is blended with CO_2 span gas, according to paragraph 8.1.11.1.4.(j) x_{NOact} = actual concentration of NO when NO span gas is blended with CO_2 span gas, according to paragraph 8.1.11.1.4.(k) and calculated according to equation (8-5) x_{CO2exp} = maximum expected concentration of CO_2 during emission testing, according to paragraph 8.1.11.2.2.
48	8.1.11.3.4.(g) Eq. (8-6)	$$\left(\bar{x}_{NOx,CLD,meas} - \bar{x}_{NOx,NDUV,meas} \right) \cdot \left(\frac{\bar{x}_{HC,exp}}{\bar{x}_{HC,meas}} \right) \le 2\% \cdot \left(\bar{x}_{NOx,exp} \right)$$ [Missing Absolute Sign in first term of equation]	$$\left| \bar{x}_{NOx,CLD,meas} - \bar{x}_{NOx,NDUV,meas} \right| \cdot \left(\frac{\bar{x}_{HC,exp}}{\bar{x}_{HC,meas}} \right) \le 2\% \cdot \left(\bar{x}_{NOx,exp} \right)$$
49	8.1.11.3.4.(g)	Where: $\bar{x}$ [µmol/mol] or [ppm] is the mean concentration of: (i) NO_x measured by CLD ($\bar{x}_{NOx,CLD,meas}$) and by NDUV ($\bar{x}_{NOx,NDUV,meas}$)	Where: $\bar{x}_{NOx,CLD,meas}$ = the mean concentration of NO_x measured by CLD [µmol/mol] or [ppm] $\bar{x}_{NOx,NDUV,meas}$ = the mean concentration of NO_x

		(ii) HC measured ($\overline{x}_{HC,meas}$) (iii) HC expected at the standard ($\overline{x}_{HC,exp}$) (iv) NO$_x$ expected at the standard ($\overline{x}_{NOx,exp}$) [Wrong formatting of legend]	measured by NDUV [µmol/mol] or [ppm] $\overline{x}_{HC,meas}$ = the mean concentration of HC measured [µmol/mol] or [ppm] $\overline{x}_{HC,exp}$ = the mean concentration of HC expected at the standard [µmol/mol] or [ppm] $\overline{x}_{NOx,exp}$ = the mean concentration of NOx expected at the standard [µmol/mol] or [ppm]
50	8.1.11.3.4.(g)	$\left(\overline{x}_{NOx,CLD,meas} - \overline{x}_{NOx,NDUV,meas}\right)$ is the NO$_x$ difference $\left(\overline{x}_{NOx,CLD,meas} - \overline{x}_{NOx,NDUV,meas}\right)\cdot\left(\dfrac{\overline{x}_{HC,exp}}{\overline{x}_{HC,meas}}\right)$ is measured NO$_x$ difference corrected to expected HC. [These two sentences are wrongly copied.]	~~$\left(\overline{x}_{NOx,CLD,meas} \quad \overline{x}_{NOx,NDUV,meas}\right)$ is the NO$_x$ difference~~ ~~$\left(\overline{x}_{NOx,CLD,meas} \quad \overline{x}_{NOx,NDUV,meas}\right)\left(\dfrac{\overline{x}_{HC,exp}}{\overline{x}_{HC,meas}}\right)$ is measured~~ ~~NO$_x$ difference corrected to expected HC~~
51	8.2.4.5.	To stabilise PM samples, they shall be placed in one or more containers that are open to the PM-stabilization environment, which is described in paragraph 9.3.4.4. A PM sample is stabilized as long as it has been in the PM-stabilization environment for one of the following durations, during which the stabilization environment	To stabilise PM samples, they shall be placed in one or more containers that are open to the PM-stabilization environment, which is described in paragraph 9.3.4.3. A PM sample is stabilized as long as it has been in the PM-stabilization environment for one of the following durations, during which the stabilization environment

		has been within the specifications of paragraph 9.3.4.4.: [Two wrong references]	has been within the specifications of paragraph 9.3.4.3.:
52	8.1.12.2.5. Eq. (8-8)	[Multiplication sign missing]	$$m_{cor} = m_{uncor} \cdot \left(\dfrac{1 - \dfrac{\rho_{air}}{\rho_{weight}}}{1 - \dfrac{\rho_{air}}{\rho_{media}}} \right)$$
53	8.1.12.2.5. Legend for Eq. (8-8)	[Inaccuracy]	Where: m_{cor} = PM sample filter mass corrected for buoyancy m_{uncor} = PM sample filter mass uncorrected for buoyancy
54	8.1.12.2.5. Guidance only, in calculation example	[Wrong subscript in example (filter used instead of media) and multiplication sign missing]	$\rho_{\text{filtermedia}}$ = 920 kg/m^3 $$m_{cor} = m_{uncor} \cdot \left(\dfrac{1 - \dfrac{\rho_{air}}{\rho_{weight}}}{1 - \dfrac{\rho_{air}}{\rho_{media}}} \right)$$
55	9.3.2.3.1.2. (a)	Lacking a direct measurement, the nominal p_{total} is given by the dryer's lowest absolute pressure expected during testing. The dew point, T_{dew}, and absolute pressure, p_{total}, downstream of a sample dryer shall be monitored. [Wrong transcription.]	Lacking a direct measurement, the nominal p_{total} is given by the dryer's lowest absolute pressure expected during testing. The dew point, T_{dew}, and absolute pressure, p_{total}, downstream of a sample dryer shall be monitored.
56	9.3.2.3.1.2. (b)	The dew point, T_{dew}, and absolute pressure, p_{total}, downstream of an osmotic-membrane dryer shall be monitored. The amount of water shall be calculated as specified in Annexes A.7.-A.8 by using continuously recorded values of T_{dew} and p_{total} or their peak values observed during a test or their alarm set points. Lacking	The dew point, T_{dew}, and absolute pressure, p_{total}, downstream of a thermal chiller osmotic-membrane dryer shall be monitored. The amount of water shall be calculated as specified in Annexes A.7.-A.8 by using continuously recorded values of T_{dew} and p_{total} or their peak values observed during a test or their alarm set

		a direct measurement, the nominal p_{total} is given by the dryer's lowest absolute pressure expected during testing. [This paragraph (b) is about the thermal chiller. In the text reference is wrongly made to a dryer.]	points. Lacking a direct measurement, the nominal p_{total} is given by the ~~dryer's~~ thermal chiller's lowest absolute pressure expected during testing.
57	9.3.2.3.1.2. (b)	Lacking a direct measurement, the nominal p_{total} is given by the dryer's lowest absolute pressure expected during testing. The dew point, T_{dew}, and absolute pressure, p_{total}, downstream of a sample dryer shall be monitored. [The monitoring requirement for a sample dryer is not suitable for this subparagraph and the monitoring requirement for a thermal chiller is specified already at the beginning of the paragraph.]	Lacking a direct measurement, the nominal p_{total} is given by the thermal chiller's lowest absolute pressure expected during testing. ~~The dew point, T_{dew}, and absolute pressure, p_{total}, downstream of a sample dryer shall be monitored.~~
58	9.3.2.4. Table 9.1	polyvinyl fluoride (PVF), [2] Polyvinylidene fluoride, [2] polytetrafluoroethylene, [3] [Wrong position of footnote references]	polyvinyl fluoride (PVF) [2], Polyvinylidene fluoride [2], polytetrafluoroethylene [3],
59	9.3.2.4. Table 9.1	[Brand names have been replaced, according to the drafting rules, by their chemical equivalents. In order to simplify the use of table 9.1 the brand names are re-introduced in form of examples, as agreed with GRPE Secretariat.]	polyvinyl fluoride (PVF)[2] for example Tedlar[TM], Polyvinylidene fluoride [2] for example Kynar[TM], polytetrafluoroethylene [3] for example Teflon[TM],
60	9.4.4.1.2.	Torque induced by the inertia of accelerating and decelerating components connected to the flywheel, such as the drive shaft and dynamometer rotor, shall be compensated for. [Missing half-phrase, as the compensation of the torque induced by the inertia is not a mandatory issue.]	Torque induced by the inertia of accelerating and decelerating components connected to the flywheel, such as the drive shaft and dynamometer rotor, shall be compensated for as needed, based on good engineering judgment.

61	9.4.5.3.2.	For the purpose of controlling of a partial flow dilution system to extract a proportional raw exhaust sample, a flow meter response time faster than indicated in table 9.2 is required. [Wrong reference]	For the purpose of controlling of a partial flow dilution system to extract a proportional raw exhaust sample, a flow meter response time faster than indicated in table 9.3 is required.
62	9.4.7.3.	While also a non-methane cutter may be used to measure CH_4, as described in paragraph 9.4.7.2. a reference procedure based on a gas chromatograph shall be used for comparison with any proposed alternate measurement procedure under paragraph 5.3. [Wrong reference]	While also a non-methane cutter may be used to measure CH_4, as described in paragraph 9.4.7.2. a reference procedure based on a gas chromatograph shall be used for comparison with any proposed alternate measurement procedure under paragraph 5.1.3.
63	Table 9.4	Contamination < limit values [Wrongly transcribed <. Should read ≤, see also table 9.5]	Contamination ≤ limit values
64	A.2.1.	$$\bar{y} = \frac{\sum_{i=1}^{10} y_i}{N} \qquad \text{(A.2-1)}$$ [Range of summation wrongly limited to 10.]	$$\bar{y} = \frac{\sum_{i=1}^{N} y_i}{N} \qquad \text{(A.2-1)}$$
65	A.2-8.	$$SEE_y = \frac{\sqrt{\sum_{i=1}^{N}\left[y_i - a_{0y} - \left(a_{1y} \cdot y_{refi}\right)\right]^2}}{N-2} \qquad \text{(A.2-10)}$$ [Square root encloses wrongly only the numerator]	$$SEE_y = \sqrt{\frac{\sum_{i=1}^{N}\left[y_i - a_{0y} - \left(a_{1y} \cdot y_{refi}\right)\right]^2}{N-2}} \qquad \text{(A.2-10)}$$
66	A.4.1.	The specific equations for the carbon flows at each of the sample points are given below. [Wrong reference (not located below in the same page but are in the following paragraphs)]	The specific equations for the carbon flows at each of the sample points are given in the following paragraphs.

67	A.4.1 Figure A.4.1	[Use of undefined symbols in figure; replace by the defined symbols.]	[Corrected figure A.4.1. at end of this document]
68	A.4.3.(Last sentence)	If CO_2 is measured on a dry basis it shall be converted to a wet basis according to paragraph A.8.2.2. [Missing reference]	If CO_2 is measured on a dry basis it shall be converted to a wet basis according to paragraph A.7.3.2. or A.8.2.2.
69	A.4.4. (Last sentence)	If CO_2 is measured on a dry basis, it shall be converted to wet basis according to paragraph A.8.2.2. [Missing reference]	If CO_2 is measured on a dry basis, it shall be converted to wet basis according to paragraph A.7.3.2. or A.8.2.2.
70	A.4.5.	The molar mass of the exhaust gas shall be calculated according to equation (A.8-15) (see paragraph A.8.2.4.1.) [wrong reference]	The molar mass of the exhaust gas shall be calculated according to equation (A.8-15) (see paragraph A.8.2.4.2.)
71	A.5 note (h)	[item (i) is wrongly with in item (h); introduce a line break]	
72	A.7.0.1	[Variables should be in Italic (not Roman)]	a_0 and a_1
73	A.7.0.1.	[Unit for μ should be changed for consistency within document]	~~Pa·s~~ to [kg/(m·s)]
74	A.7.1.1. (End of para.)	M_{THC} = 13.875389 g/mol (total hydrocarbon[2]) [Wrong reference superscript number.]	M_{THC} = 13.875389 g/mol (total hydrocarbon[1])
75	A.7.1.1. (End of para.)	M_{NMHC} = 13.875389 g/mol (non-methane hydrocarbon[1]) M_{NOx} = 46.0055 g/mol (oxides of nitrogen[2]) M_{THC} = 13.875389 g/mol (total hydrocarbon[1]) [superscript numbers to be replaced by letters]	M_{NMHC} = 13.875389 g/mol (non-methane hydrocarbon[a]) M_{NOx} = 46.0055 g/mol (oxides of nitrogen[b]) M_{THC} = 13.875389 g/mol (total hydrocarbon[a])
76	A.7.1.4.1. (a)	If THC emissions are required to be determined,	If THC emissions are required to be determined,

		$x_{THC[THC-FID]}$ shall be calculated by using the initial THC contamination concentration $x_{THC[THC-FID]init}$ from paragraph 7.3.3. as follows: [Wrong reference]	$x_{THC[THC-FID]}$ shall be calculated by using the initial THC contamination concentration $x_{THC[THC-FID]init}$ from paragraph 7.3.1.2. as follows:
77	A.7.1.4.2.(b)	For non-methane cutters, x_{NMHC} shall be calculated using the non-methane cutter's penetration fractions (PF) of CH_4 and C_2H_6 from paragraph 8.1.10.3., and using the HC contamination and wet-to-dry corrected THC concentration [Error: wet-to-dry should read dry-to-wet]	For non-methane cutters, x_{NMHC} shall be calculated using the non-methane cutter's penetration fractions (PF) of CH_4 and C_2H_6 from paragraph 8.1.10.3., and using the HC contamination and dry-to-wet corrected THC concentration
78	A.7.1.4.2.(b)	using the HC contamination and wet-to-dry corrected THC concentration $x_{THC[THC-FID]cor}$ as determined in paragraph (a) of this paragraph. [Wrong reference]	using the HC contamination and wet-to-dry corrected THC concentration $x_{THC[THC-FID]cor}$ as determined in paragraph (a) of this paragraph A.7.1.4.1.
79	A.7.1.4.2.(b)(i)	$x_{THC[NMC-FID]}$ = concentration of THC, HC contamination (optional) and dry-to-wet corrected, as measured by the THC FID during sampling through the NMC. [Concentration, $x_{THC[NMC-FID]}$, is as measured by NMC FID and not by THC FID].	$x_{THC[NMC-FID]}$ = concentration of THC, HC contamination (optional) and dry-to-wet corrected, as measured by the THC NMC FID during sampling through the NMC
80	A.7.1.4.2.(b)(i)	$RF_{CH4[THC-FID]}$ = response factor of THC FID to CH4, according to paragraph 8.1.10.3.4. [Wrong reference]	$RF_{CH4[THC-FID]}$ = response factor of THC FID to CH4, according to paragraph 8.1.10.1.4.
81	A.7.1.4.2.(b) (i)	$RFPF_{C2H6[NMC-FID]}$ = non-methane cutter combined ethane response factor and penetration fraction, according to paragraph 8.1.10.3.4. [Wrong reference]	$RFPF_{C2H6[NMC-FID]}$ = non-methane cutter combined ethane response factor and penetration fraction, according to paragraph 8.1.10.3.4.1.

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82	A.7.1.4.2.(b)(ii)	$PF_{CH4[NMC-FID]}$ = non-methane cutter CH_4 penetration fraction, according to paragraph 8.1.10.3.5. [Wrong reference]	$PF_{CH4[NMC-FID]}$ = non-methane cutter CH_4 penetration fraction, according to paragraph 8.1.10.3.4.2.
83	A.7.1.4.2.(b)(ii)	$x_{THC[NMC-FID]}$ = concentration of THC, HC contamination (optional) and dry-to-wet corrected, as measured by the THC FID during sampling through the NMC. [Concentration, $x_{THC[NMC-FID]}$, is as measured by NMC FID and not by THC FID].	$x_{THC[NMC-FID]}$ = concentration of THC, HC contamination (optional) and dry-to-wet corrected, as measured by the ~~THC~~ NMC FID during sampling through the NMC
84	A.7.1.4.2.(b)(ii)	$PF_{C2H6[NMC-FID]}$ = non-methane cutter ethane penetration fraction, according to paragraph 8.1.10.3.5. [Wrong reference]	$PF_{C2H6[NMC-FID]}$ = non-methane cutter ethane penetration fraction, according to paragraph 8.1.10.3.4.2.
85	A.7.1.4.2.(b)(iii)	$PF_{CH4[NMC-FID]}$ = non-methane cutter CH_4 penetration fraction, according to paragraph 8.1.10.3.6. [Wrong reference]	$PF_{CH4[NMC-FID]}$ = non-methane cutter CH_4 penetration fraction, according to paragraph 8.1.10.3.4.3.
86	A.7.1.4.2.(b)(iii)	$x_{THC[NMC-FID]}$ = concentration of THC, HC contamination (optional) and dry-to-wet corrected, as measured by the THC FID during sampling through the NMC. [Concentration, $x_{THC[NMC-FID]}$, is as measured by NMC FID and not by THC FID].	$x_{THC[NMC-FID]}$ = concentration of THC, HC contamination (optional) and dry-to-wet corrected, as measured by the ~~THC~~ NMC FID during sampling through the NMC
87	A.7.1.4.2.(b)(iii)	$RFPF_{C2H6[NMC-FID]}$ = non-methane cutter CH_4 combined ethane response factor and penetration fraction, according to paragraph 8.1.10.3.6. [Wrong reference]	$RFPF_{C2H6[NMC-FID]}$ = non-methane cutter CH_4 combined ethane response factor and penetration fraction, according to paragraph 8.1.10.3.4.3.

88	A.7.1.4.2.(b)(iii)	$RF_{CH4[THC-FID]}$ = response factor of THC FID to CH_4, according to paragraph 8.1.10.3.4. [Wrong reference]	$RF_{CH4[THC-FID]}$ = response factor of THC FID to CH_4, according to paragraph 8.1.10.1.4.
89	A.7.1.4.2.(c)	For a gas chromatograph, x_{NMHC} shall be calculated using the THC analyzer's response factor (RF) for CH_4, from paragraph 8.1.10.3. [Wrong reference]	For a gas chromatograph, x_{NMHC} shall be calculated using the THC analyzer's response factor (RF) for CH_4, from paragraph 8.1.10.1.4.
90	A.7.1.4.2.(c)	and the HC contamination and wet-to-dry corrected initial THC concentration [Error: wet-to-dry should read dry-to-wet]	and the HC contamination and dry-to-wet corrected initial THC concentration
91	A.7.2.3. (a) and (b)	[Three uses of 'your']	Replace 'your' by 'the'
92	A.7.2.3. (b)	Equations in paragraph (c)(4) of this paragraph have to be entered into a computer program to iteratively solve for x_{H2Oexh}, $x_{Ccombdry}$ and $x_{dil/exh.}$ [Wrong references to equations and paragraph]	Equations (A.7-10 to A.7-26) in paragraph (d) of this paragraph A.7.2.3. have to be entered into a computer program to iteratively solve for x_{H2Oexh}, $x_{Ccombdry}$ and $x_{dil/exh.}$
93	A.7.2.3. (End of the paragraph)	At the end of the chemical balance, the molar flow rate $\dot{n}_{exh}$ is calculated as specified in paragraphs A.7.3.2. and A.7.4.2. [Two wrong references]	At the end of the chemical balance, the molar flow rate $\dot{n}_{exh}$ is calculated as specified in paragraphs A.7.3.3. and A.7.4.3.
94	A.7.3.3. (Beginning of para.)	The flow rate of the raw exhaust gases can be directly measured or can be calculated based on the chemical balance of paragraph A.7.2. [Wrong reference]	The flow rate of the raw exhaust gases can be directly measured or can be calculated based on the chemical balance of paragraph A.7.2.3.
95	A.7.3.3. (End of para.)	and the values calculated using the chemical balance in paragraph A.7.2. It shall be solved for the chemical balance in paragraph A.7.2.(c) at the same frequency that $\dot{n}_{int}$ or $\dot{m}_{fuel}$ is updated and recorded. [Two wrong references]	and the values calculated using the chemical balance in paragraph A.7.2.3. It shall be solved for the chemical balance in paragraph A.7.2.3. at the same frequency that $\dot{n}_{int}$ or $\dot{m}_{fuel}$ is updated and recorded.

96	A.7.4.1.(a) Legend for equation	(a) Continuous sampling, varying flow rate $$m_{gas} = \frac{1}{f} \cdot M_{gas} \cdot \sum_{i=1}^{N} \dot{n}_{exhi} \cdot x_{gasi} \qquad \text{(see A.7-29)}$$ [Missing legend]	(a) Continuous sampling, varying flow rate $$m_{gas} = \frac{1}{f} \cdot M_{gas} \cdot \sum_{i=1}^{N} \dot{n}_{exhi} \cdot x_{gasi} \qquad \text{(see A.7-29)}$$ Where: M_{gas} = generic emission molar mass [g/mol] $\dot{n}_{exhi}$ = instantaneous exhaust gas molar flow rate on a wet basis [mol/s] x_{gasi} = instantaneous generic gas molar concentration on a wet basis [mol/mol] f = data sampling rate [Hz] N = number of measurements [-]
97	A.7.4.1.(a) Legend for equation	Continuous sampling, constant flow rate $$m_{gas} = M_{gas} \cdot \dot{n}_{exh} \cdot \overline{x}_{gas} \cdot \Delta t \qquad \text{(see A.7-31)}$$ [Missing legend]	Continuous sampling, constant flow rate $$m_{gas} = M_{gas} \cdot \dot{n}_{exh} \cdot \overline{x}_{gas} \cdot \Delta t \qquad \text{(see A.7-31)}$$ Where: M_{gas} = generic emission molar mass [g/mol] $\dot{n}_{exh}$ = exhaust gas molar flow rate on a wet basis [mol/s] $\overline{x}_{gas}$ = mean gaseous emission molar fraction on a wet basis [mol/mol] Δt = time duration of test interval
98	A.7.4.1.(a) Legend for	(b) Batch sampling, regardless varying flow or	(b) Batch sampling, regardless varying flow or

	equation	constant rate is, the following equation shall be used: $$m_{\text{gas}} = \frac{1}{f} \cdot M_{\text{gas}} \cdot \overline{x}_{\text{gas}} \cdot \sum_{i=1}^{N} \dot{n}_{\text{exh}i} \quad \text{(see A.7-32)}$$ [Missing legend]	constant rate is, the following equation shall be used: $$m_{\text{gas}} = \frac{1}{f} \cdot M_{\text{gas}} \cdot \overline{x}_{\text{gas}} \cdot \sum_{i=1}^{N} \dot{n}_{\text{exh}i} \quad \text{(see A.7-32)}$$ Where: $M_{\text{gas}}=$ generic emission molar mass [g/mol] $\dot{n}_{\text{exh}i} =$ instantaneous exhaust gas molar flow rate on a wet basis [mol/s] $\overline{x}_{\text{gas}}=$ mean gaseous emission molar fraction on a wet basis [mol/mol] f = data sampling rate [Hz] N = number of measurements [-]
99	A.7.4.4.1.(b)	Where: $m_{\text{PMdil}}=$ PM mass in dilution air [g] DR = dilution ratio [-] defined as the ratio between the mass of the emission m and the mass of diluted exhaust $m_{\text{dil/exh}}$ ($DR = m/m_{\text{dil/exh}}$). The dilution ratio DR can be expressed as a function of $x_{\text{dil/exh}}$ [Missing line break, last line should not be part of legend]	Where: $m_{\text{PMdil}}=$ PM mass in dilution air [g] DR = dilution ratio [-] defined as the ratio between the mass of the emission m and the mass of diluted exhaust $m_{\text{dil/exh}}$ ($DR = m/m_{\text{dil/exh}}$). The dilution ratio DR can be expressed as a function of $x_{\text{dil/exh}}$
100	Annex A.7. – Appendix	This section describes the calculations for calibrating	This Appendix 1 describes the calculations for

	1	various flow meters. Paragraph (a) of this section [Twice 'section' must read 'Appendix 1']	calibrating various flow meters. Paragraph (a) of this Appendix 1
101	Annex A.7. – Appendix 1	This section describes the calculations for calibrating various flow meters. Paragraph (a) of this section [Wrong reference]	This Appendix 1 describes the calculations for calibrating various flow meters. Paragraph A.7.6.1. of this Appendix 1
102	Annex A.7. – Appendix 1 A.7.6.2. (d)	The procedure in paragraphs (b)(1) through (3) of this section shall be repeated [Wrong paragraph references]	The procedure in paragraphs (a) through (c) of this section shall be repeated
103	Annex A.7. – Appendix 1 A.7.6.2. (d)	The procedure in paragraphs (b)(1) through (3) of this section shall be repeated ['section' should read 'paragraph']	The procedure in paragraphs (a) through (c) of this paragraph shall be repeated
104	Annex A.7. – Appendix 1 A.7.6.3. 4th sentence	In paragraph (c)(4) of this section, other assumptions that may be made are described. [wrong reference]	In paragraph A.7.6.3.(d), other assumptions that may be made are described.
105	Annex A.7. – Appendix 1 A.7.6.3. Legend for Eq. (A.7-60)	C_d = Discharge coefficient, as determined in paragraph (c)(1) of this section [-] C_f = Flow coefficient, as determined in paragraph (c)(2) of this section [-] [Two wrong references]	C_d = Discharge coefficient, as determined in paragraph A.7.6.3.(a) [-] C_f = Flow coefficient, as determined in paragraph A.7.6.3.(b) [-]
106	Annex A.7. – Appendix 1 A.7.6.4.	[margin of equation A7-67 and its legend too far left; shift one stop to right]	
107	Annex A.7. – Appendix 2 A.7.7.1.	The calculations in this section are performed to determine if gas analyzer drift invalidates the results of a test interval. If drift does not invalidate the results of a test interval, the test interval's gas analyzer	The calculations in this Appendix 2 are performed to determine if gas analyzer drift invalidates the results of a test interval. If drift does not invalidate the results of a test interval, the test interval's gas analyzer

		responses shall be corrected for drift according to this section. [Twice 'section' must read 'Appendix 2']	responses shall be corrected for drift according to this Appendix 2.
108	Annex A.7. – Appendix 2 A.7.7.2.	The calculations in this section utilize ['section' must read 'Appendix 2']	The calculations in this Appendix 2 utilize
109	Annex A.7. – Appendix 2 A.7.7.3.	Then all gas analyzer signals shall be corrected for drift according to this section. ['section' must read 'Appendix 2']	Then all gas analyzer signals shall be corrected for drift according to this Appendix 2.
110	A.8.0.1.	[Variables should be in Italic (not Roman)]	a_0, a_1
111	A.8.0.1.	[Unit for μ should be changed for consistency within document]	Pa·s to [kg/(m·s)]
112	A.8.2.1.2.	The total mass per test of a gaseous emission m_{gas} [Variable should be in Italic]	The total mass per test of a gaseous emission m_{gas}
113	A.8.2.3.	This factor is valid for a humidity range between 0 and 25 g_{H2O}/kg dry air. [H_2O should not be subscript but part of unit]	This factor is valid for a humidity range between 0 and 25 g H_2O/kg dry air.
114	A.8.2.4.1. Table A.8.1	[Improved readability of table, no change of content; see at end of this document]	
115	A.8.3.2.	All concentrations in section A.8.3.2.shall be converted ['section' must read 'paragraph']	All concentrations in paragraph A.8.3.2.shall be converted
116	A.8.3.3. Table A.8.2	[Improved readability of table, no change of content; see at end of this document]	
117	A.8.3.4.1. Eq.s (A.8-36) and (A.8-37)	[In equation (A.8-36) and (A.8-37) inconsistent reference values for temperature and pressure are used.	$m_{ed} = 1.293 \cdot V_0 \cdot n_P \cdot \dfrac{p_p}{101.325} \cdot \dfrac{273.15}{T}$

		Correction to 273.15 K and 101.325 kPa]	
118	A.8.3.4.1. and A8.3.4.2. Legends of equations (A.8-36), (A.8-37) and (A.8-38), (A.8-39)	1.293 = air density [kg/m3] at 273.15 K and 101.325 kPa [The formulation for the air density is incorrect in legend of equations A.8-36, A.8-37 and A.8-38, A.8-39. The unit should be written with the value, as in legend equation A.8-40 and A.8-42.]	1.293 kg/m^3 = air density at 273.15 K and 101.325 kPa
119	A.8.3.4.1.	$$m_{\text{ed}} = 1.293 \cdot V_0 \cdot n_{\text{P}} \cdot \frac{p_{\text{p}}}{101.3} \cdot \frac{273}{T}$$ T = average temperature of the diluted exhaust gas at pump inlet [K] [Symbol for average temperature should be $\overline{T}$]	$$m_{\text{ed}} = 1.293 \cdot V_0 \cdot n_{\text{P}} \cdot \frac{p_{\text{p}}}{101.3} \cdot \frac{273}{\overline{T}}$$ $\overline{T}$ = average temperature of the diluted exhaust gas at pump inlet [K]
120	A.8.3.4.2.	Δt_i = time interval of the test [s] [Symbol Δ should not be in Italic]	Δt_i = time interval of the test [s]
121	A.8.3.4.3. Eq. (A.8-40) and (A.8-42)	$q_{v\text{SSV}}$ [Typographical error in both equations. Subscript should read VSSV, with first V in italic.]	$q_{v\text{SSV}}$
122	A.8.3.4.3. Legend for Eq. (A.8-42)	$q_{v\text{SSV}}$ = volumetric flow rate of the SSV [m^3/s] [Typographical error. Subscript should read VSSV, with first V in italic.]	$q_{v\text{SSV}}$ = volumetric flow rate of the SSV [m^3/s]
123	A.8.3.5.2.2.(b) Eq. (A.8-57)	$$q_{m\text{PM}i} = \frac{m_{\text{f}i}}{m_{\text{sep}i}} \cdot \overline{q_{medfi}} \cdot \frac{3600}{1000}$$ $\overline{q_{\text{medf}i}}$ must be $q_{\text{medf}i}$.	$$q_{m\text{PM}i} = \frac{m_{\text{f}i}}{m_{\text{sep}i}} \cdot q_{medfi} \cdot \frac{3600}{1000}$$
124	A.8.3.5.2.2.(b) Legend	Where:	Where:

	for Eq. (A.8-57)	q_{mPM} = particulate mass flow rate [g/s] m_f = particulate mass sampled over the cycle [mg] q_{medfi} = average equivalent diluted exhaust gas mass flow rate on wet basis [kg/s] [Mass flow rate of PM must be in [g/h]]	q_{mPM} = particulate mass flow rate [g/h] m_f = particulate mass sampled over the cycle [mg] q_{medfi} = equivalent diluted exhaust gas mass flow rate on wet basis at mode i [kg/s]
125	A.8.3.5.2.2.(b) Legend for Eq. (A.8-57)	[Subscript m should be in Italic]	Where: q_{mPM} = q_{medfi} =
126	A.8.3.5.2.2. (b)	The particulate mass flow rate q_{mPM} [g/h] may be background corrected as follows: [As the background correction may be applied not only to the single-filter method but also to the multi-filter method, the symbol of the flow rates for multi-filter is also required.]	The particulate mass flow rate q_{mPM} [g/h] or q_{mPMi} [g/h] may be background corrected as follows:
127	A.8.3.5.2.2. (b)	The particulate mass flow rate q_{mPM} [g/h] may be background corrected as follows: [This sentence belongs to A.8.3.5.2.2. and not to sub paragraph A.8.3.5.2.2.(b). Therefore the indent must be as same as the first sentence of A.8.3.5.2.2., "The particulate emission flow rate over cycle..."]	The particulate mass flow rate q_{mPM} [g/h] or q_{mPMi} [g/h] may be background corrected as follows:
128	A.8.3.5.2.2. (b) last sentence	[The sentence "The particulate mass flow rate q_{mPM} [g/h] may be background corrected as follows:" does not belong into chapter (b) but into A.8.3.5.2.2., as such the indent needs to be deleted]	
129	A.8.3.5.2.2.(c) (A.8-58)	For the single-filter method	For the single-filter method

		$$q_{m\text{PM}} = \left\{ \frac{m_\text{f}}{m_\text{sep}} - \left[\frac{m_\text{f,d}}{m_\text{d}} \cdot \sum_{i=1}^{N} \left(1 - \frac{1}{D_i} \right) \cdot WF_i \right] \right\} \cdot \frac{q_{medf}}{1000}$$ [N of summation must be in roman not italic.] [For the single-filter method, the diluted exhaust gas mass flow rate must be the average value as in sub-paragraph (a).] [$\overline{q_{medf}}$ is in [kg/s] (see also equations (A.8-56) and (A.8-57)) and the result is in kg/h. Thus 3600 is missing as multiplier.]	$$q_{m\text{PM}} = \left\{ \frac{m_\text{f}}{m_\text{sep}} - \left[\frac{m_\text{f,d}}{m_\text{d}} \cdot \sum_{i=1}^{N} \left(1 - \frac{1}{D_i} \right) \cdot WF_i \right] \right\} \cdot \overline{q_{medf}} \cdot \frac{3600}{1000}$$
130	A.8.3.5.2.2.(c) Legend for (A.8-58)	[Missing legend]	Where: $q_{m\text{PM}} =$ particulate mass flow rate [g/h] $m_\text{f} =$ particulate sample mass collected [mg] $m_\text{sep} =$ mass of diluted exhaust sample passed through the particulate sampling filter [kg] $m_\text{f,d} =$ particulate sample mass of the dilution air collected [mg] $m_\text{d} =$ mass of the dilution air sample passed through the particulate sampling filters [kg] $D_i =$ dilution factor at mode i (see equation (A.8-29) of paragraph A.8.3.2.2.) [-] $WF_i =$ weighting factor for the mode i [-] $\overline{q_{medf}} =$ average equivalent diluted exhaust gas

			mass flow rate on wet basis [kg/s]
131	A.8.3.5.2.2.(c) Legend for (A.8-58)	[Subscript m should be in Italic]	Where: $\overline{q_{m\text{edf}}} =$
132	A.8.3.5.2.2.(d) (A.8-59)	For the multiple-filter method $$q_{m\text{PM}} = \left\{ \frac{m_{\text{f}i}}{m_{\text{sep}i}} - \left[\frac{m_{\text{f,d}}}{m_{\text{d}}} \cdot \left(1 - \frac{1}{D} \right) \right] \right\} \cdot \frac{q_{m\text{edf}i}}{1000}$$ [For multi-filter method, particulate mass flow rate must be $q_{m\text{PM}i}$ and not $q_{m\text{PM}}$.] [$\overline{q_{m\text{edf}}}$ is in [kg/s] (see also equations (A.8-56) and (A.8-57)) and the result is in kg/h. Thus 3600 is missing as multiplier.]	For the multiple-filter method $$q_{m\text{PM}i} = \left\{ \frac{m_{\text{f}i}}{m_{\text{sep}i}} - \left[\frac{m_{\text{f,d}}}{m_{\text{d}}} \cdot \left(1 - \frac{1}{D} \right) \right] \right\} \cdot q_{m\text{edf}i} \cdot \frac{3600}{1000}$$
133	A.8.3.5.2.2.(d) Legend for (A.8-59)	Where: $q_{m\text{PM}} =$ particulate mass flow rate [g/h] $WF_i =$ weighting factor for the mode i [-] $m_{\text{f}} =$ particulate sample mass collected [mg] $m_{\text{f}i} =$ particulate sample mass collected at mode i [mg] $m_{\text{f,d}} =$ particulate sample mass of the dilution air collected [mg] $q_{m\text{edf}i} =$ equivalent diluted exhaust gas mass flow rate on wet basis at mode i [kg/h] $m_{\text{sep}} =$ mass of diluted exhaust sample passed through	Where: $q_{m\text{PM}i} =$ particulate mass flow rate at mode i [g/h] ~~$WF_i =$ weighting factor for the mode i [-]~~ ~~$m_{\text{f}} =$ particulate sample mass collected [mg]~~ $m_{\text{f}i} =$ particulate sample mass collected at mode i [mg] ~~$m_{\text{sep}} =$ mass of diluted exhaust sample passed through the particulate sampling filter [kg]~~ $m_{\text{sep}i} =$ mass of diluted exhaust sample passed through the particulate sampling filter at mode i [kg]

		the particulate sampling filter [kg]	$m_{f,d} =$ particulate sample mass of the dilution air collected [mg]
		$m_{sepi} =$ mass of diluted exhaust sample passed through the particulate sampling filter at mode i [kg]	$m_d =$ mass of the dilution air sample passed through the particulate sampling filters [kg]
		$m_d =$ mass of the dilution air sample passed through the particulate sampling filters [kg]	$D =$ dilution factor (see equation (A.8-29) of paragraph A.8.3.2.2.) [-]
		$D =$ dilution factor (see equation (A.8-29) of paragraph A.8.3.2.2.) [-]	$q_{medfi} =$ equivalent diluted exhaust gas mass flow rate on wet basis at mode i [kg/s]
		[Legend incomplete and symbols, which are not in the equation, included.] [Unit of q_{medfi} wrongly in [kg/h] instead of [kg/s].]	
134	A.8.3.5.2.2.(d) Last sentence	[The sentence "If more than one measurement is made, $m_{f,d}/m_d$ shall be replaced with $\overline{m_{f,d}/m_d}$." does not belong into chapter (d) but into A.8.3.5.2.2., as such the indent needs to be deleted]	
135	A.8.4.2.1. Legend for Eq. (A.8-64)	m_{PM} = total mass of particulates emission, calculated according to paragraph A.8.3.4. [g/test] [wrong reference]	m_{PM} = total mass of particulates emission, calculated according to paragraph A.8.3.5. [g/test]
136	A.8.4.3 Legend for Eq. (A.8-40)	[q_{vSSV} missing in legend]	$q_{vSSV}=$ air flow rate at standard conditions (101.325 kPa, 273.15 K) [m^3/s]
137	A.8.4.3 Eq. (A.8-41)	$$q_{VSSV} = A_0 d_V{}^2 C_d p_p \sqrt{\left[\frac{1}{T}\left(r_p^{1.4286} - r_p^{1.7143}\right)\cdot\left(\frac{1}{1 - r_D{}^4 r_p^{1.4286}}\right)\right]}$$ [Typographical error. Subscript should read VSSV,	$$q_{vSSV} = A_0 d_V{}^2 C_d p_p \sqrt{\left[\frac{1}{T_{in}}\left(r_p^{1.4286} - r_p^{1.7143}\right)\cdot\left(\frac{1}{1 - r_D{}^4 r_p^{1.4286}}\right)\right]}$$

		with first V in italic.] [Temperature at venturi inlet should read T_{in}.]	
138	A.8.4.3 Eq. (A.8-41)	$q_{VSSV} = A_0 d_V^2 C_d p_p \sqrt{\left[\frac{1}{T}\left(r_p^{1.4286} - r_p^{1.7143}\right)\cdot\left(\frac{1}{1 - r_D^4 r_p^{1.4286}}\right)\right]}$ [As the resulting volume flow of Eq. (A.8-41) is in volume per second but the right part of the equation results in volume per minute (due to the unit in A₀), A₀ is to be divided by 60.]	$q_{VSSV} = \frac{A_0}{60} d_V^2 C_d p_p \sqrt{\left[\frac{1}{T_{in}}\left(r_p^{1.4286} - r_p^{1.7143}\right)\cdot\left(\frac{1}{1 - r_D^4 r_p^{1.4286}}\right)\right]}$
139	A.8.5.1. Legends for Eq.s (A.8-68), (A.8-71), (A.8-72) and (A.8-74)	[Standard conditions in the legends of the 4 equations are incomplete and need to be corrected]	101.325 kPa and 273.15 K
140	A.8.5.2. Legend for Eq. (A.8-71)	$q_{VSSV} =$ air flow rate at standard conditions (101.3 kPa, 273 K) [m³/s] [Typographical error. Subscript should read VCVS as paragraph is on CVS] [Standard conditions are incomplete and need to be corrected]	$q_{VCVS} =$ air flow rate at standard conditions (101.325 kPa, 273.15 K) [m³/s]
141	A.8.5.3. Eq. (A.8-72)	$C_d = \dfrac{q_{VSSV}}{d_V^2 p_p \sqrt{\left[\frac{1}{T_{in,V}}\left(r_p^{1.4286} - r_p^{1.7143}\right)\left(\frac{1}{1 - r_D^4 r_p^{1.4286}}\right)\right]}}$ [Missing constant.]	$C_d = \dfrac{q_{VSSV}}{\frac{A_0}{60} d_V^2 p_p \sqrt{\left[\frac{1}{T_{in,V}}\left(r_p^{1.4286} - r_p^{1.7143}\right)\left(\frac{1}{1 - r_D^4 r_p^{1.4286}}\right)\right]}}$ $A_0 =$ collection of constants and units conversions =

		[As the resulting volume flow of Eq. (A.8-41) is in volume per second but the right part of the equation results in volume per minute (due to the unit in A_0), A_0 is to be divided by 60.] [Add A_0 to the legend]	$0.0056940 \left[\dfrac{m^3}{min} \cdot \dfrac{K^{\frac{1}{2}}}{kPa} \cdot \dfrac{1}{mm^2} \right]$
142	A.8.5.3. Eq. (A.8-73)	[The variable Re is wrongly typed as Re. Also the e should be in italic.]	Re
143	A.8.5.3. Eq. (A.8-73)	[As the volume flow rate of q_{VSSV} is in volume per second but the unit of A_1 is based on volume per minute, A_1 is to be multiplied by 60.]	$Re = A_1 \cdot 60 \cdot \dfrac{q_{VSSV}}{d_v \cdot \mu}$
144	A.8.5.3. Legend for Eq. (A.8-74)	A_1 = collection of constants and units conversions = $27.43831 \left[\dfrac{1}{m^3} \cdot \dfrac{min}{s} \cdot \dfrac{mm}{m} \right]$ [μ = absolute or dynamic viscosity of the gas [kg/ms]] [b = 1.458 x 10^6 (empirical constant) [kg/msK$^{0.5}$]] [Missing kg in unit of A_0] [Including brackets and dots for improved readability]	A_1 = collection of constants and units conversions = $27.43831 \left[\dfrac{kg}{m^3} \cdot \dfrac{min}{s} \cdot \dfrac{mm}{m} \right]$ μ = absolute or dynamic viscosity of the gas [kg/(m·s)] b = 1.458 x 10^6 (empirical constant) [kg/(m·s·K$^{0.5}$)]

Appendix 1:

Exhaustive explanations of some points from above list:

<u>Regarding point 12</u>:   Chapters 6.6.1 and 6.6.2. The formulation of the calculation has been simplified, the result is identical and the text has been improved for clarity.

6.6.1.   Continuous regeneration

For an exhaust aftertreatment system based on a continuous regeneration process the emissions shall be measured on an aftertreatment system that has been stabilized so as to result in repeatable emissions behaviour. The regeneration process shall occur at least once during the NRTC hot start test or ramped-modal cycle (RMC) test, and the manufacturer shall declare the normal conditions under which regeneration occurs (soot load, temperature, exhaust back-pressure, etc.). In order to demonstrate that the regeneration process is continuous, at least three NRTC hot start tests or ramped-modal cycle (RMC) tests shall be conducted.   In case of NRTC hot start test, the engine shall be warmed up in accordance with paragraph 7.8.2.1, the engine be soaked according to paragraph 7.4.2 and the first NRTC hot start test be run.   The subsequent NRTC hot start tests shall be started after soaking according to paragraph 7.4.2. During the tests, exhaust temperatures and pressures shall be recorded (temperature before and after the after-treatment system, exhaust back pressure, etc.). The aftertreatment system is considered to be satisfactory if the conditions declared by the manufacturer occur during the test during a sufficient time and the emission results do not scatter by more than ±15 per cent ± 25 per cent or 0.005 g/kWh, whichever is greater. If the exhaust aftertreatment has a security mode that shifts to a periodic (infrequent) regeneration mode, it shall be checked according to paragraph 6.6.2. For that specific case, the applicable emission limits could be exceeded and would not be weighted.

6.6.2.   Periodic (infrequent) regeneration

This provision only applies for engines equipped with emission controls that are regenerated on a periodic basis. For engines which are run on the discrete mode cycle this procedure cannot be applied.

The emissions shall be measured on at least three NRTC hot start tests or ramped-modal cycle (RMC) tests, one during with and two outside without a regeneration event on a stabilized aftertreatment system. The regeneration process shall occur at least once during the NRTC or RMC test. If regeneration takes longer than one NRTC or RMC test, consecutive NRTC or RMC tests shall be run and emissions continued to be measured without shutting the engine off until regeneration is completed and the average of the tests shall be calculated. If regeneration is completed during any test, the test shall be continued over its entire length. The engine may be equipped with a switch capable of preventing or permitting the regeneration process provided

this operation has no effect on the original engine calibration.

The manufacturer shall declare the normal parameter conditions under which the regeneration process occurs (soot load, temperature, exhaust back-pressure, etc.). The manufacturer shall also provide the frequency of the regeneration event in terms of ~~fraction~~ number of tests during which the regeneration occurs ~~(F)~~. The exact procedure to determine this ~~fraction~~ frequency shall be agreed by the type approval or certification authority based upon good engineering judgement. For a regeneration test, the manufacturer shall provide an aftertreatment system that has been loaded. Regeneration shall not occur during this engine conditioning phase. As an option, the manufacturer may run consecutive NRTC hot start or RMC tests until the aftertreatment system is loaded. Emissions measurement is not required on all tests.

Average emissions between regeneration phases shall be determined from the arithmetic mean of several approximately equidistant NRTC hot start or RMC tests. As a minimum, at least one hot NRTC or RMC as close as possible prior to a regeneration test and one hot NRTC or RMC immediately after a regeneration test shall be conducted.

During the regeneration test, all the data needed to detect regeneration shall be recorded (CO or NOx emissions, temperature before and after the after-treatment system, exhaust back pressure, etc.). During the regeneration process, the applicable emission limits may be exceeded. The test procedure is schematically shown in figure 6.1.

{Placeholder for figure 6.1; here not reported for space reasons}

The average specific emission rate related to hot start e_w [g/kWh] shall be weighted as follows (see figure 6.1):

$$[\textit{Deleted:}\ \overline{e}_w = \overline{e}_r \cdot F + (1-F) \cdot \overline{e}\ ]$$

$$e_w = \frac{n \times \overline{e} + n_r \times \overline{e}_r}{n + n_r}$$

where:

n = number of tests in which regeneration does not occur,

n_r = number of tests in which regeneration occurs (minimum one test),

~~F = frequency of the regeneration event in terms of fraction of tests during which the regeneration occurs [ ]~~

$\overline{e}$ = average specific emission without regeneration, g/kWh,

$\overline{e}_r$ = average specific emission with regeneration, g/kWh.

At the choice of the manufacturer and based on upon good engineering analysis, the regeneration

adjustment factor k_r, expressing the average emission rate, may be calculated either multiplicative or additive as follows:

multiplicative

$$k_{Ur} = \frac{e_w}{e} \quad \text{(upward adjustment factor)} \tag{6-4a}$$

$$k_{Dr} = \frac{e_w}{e_r} \quad \text{(downward adjustment factor)} \tag{6-4b}$$

additive

$$k_{Ur} = \overline{e}_w - \overline{e} \quad \text{(upward adjustment factor)} \tag{6-5}$$

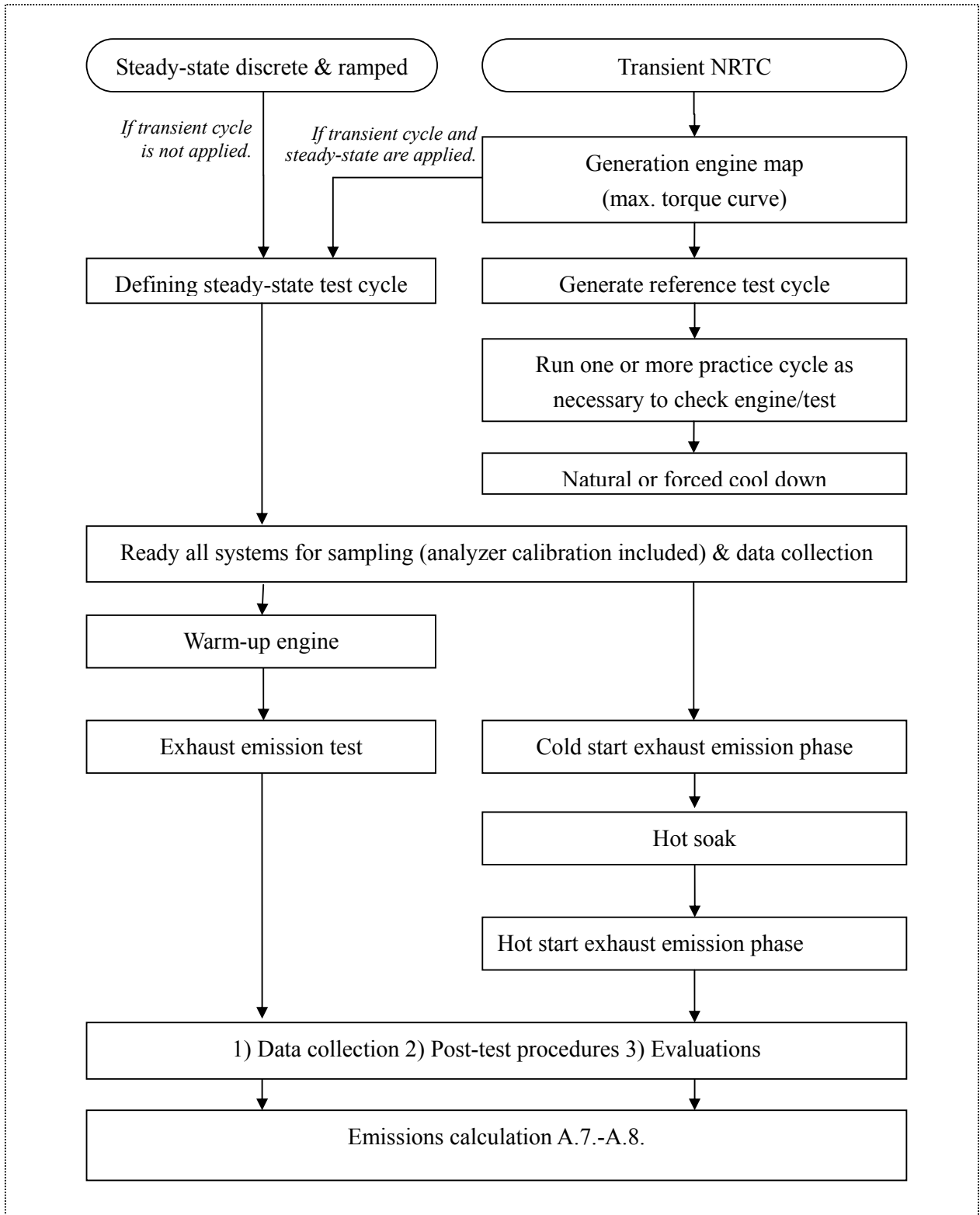$$k_{Dr} = \overline{e}_w - \overline{e}_r \quad \text{(downward adjustment factor)} \tag{6-6}$$

Upward adjustment factors are multiplied with or added to measured emission rates for all tests in which the regeneration does not occur. Downward adjustment factors are multiplied with or added to measured emission rates for all tests in which the regeneration occurs. The occurrence of the regeneration shall be identified in a manner that is readily apparent during all testing. Where no regeneration is identified, the upward adjustment factor shall be applied.

With reference to Annexes A.7.-8. on brake specific emission calculations, the regeneration adjustment factor:
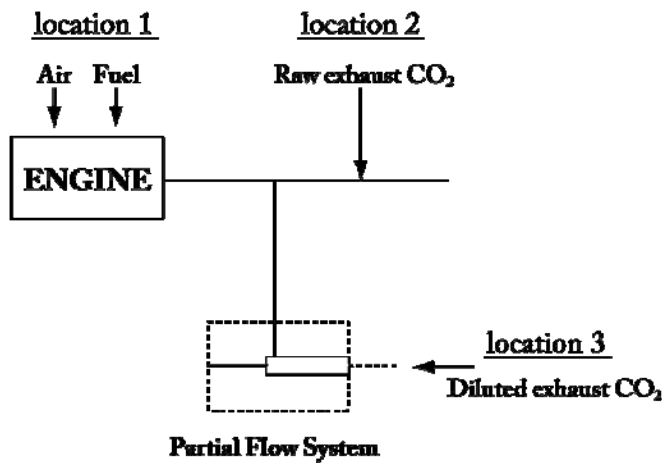
(a)   Shall be applied to the results of the weighted NRTC and RMC tests

(b)   ….

Regarding Point 17: Replacement of Figure 7.3

Regarding Point 67: Replacement of Figure A.4.1

location 1

Air   Fuel

ENGINE

location 2

Raw exhaust CO_2

location 3

Diluted exhaust CO_2

Partial Flow System

Regarding Point 114:

Gas		NO$_x$	CO	HC	CO$_2$	O$_2$	CH$_4$
ρ_{gas} [kg/m^3]		2.053	1.250	0.621	1.9636	1.4277	0.716
FUEL	ρ_e	Coefficient u_{gas} at $\lambda = 2$, dry air, 273 K, 101.3 kPa					
Diesel	1.2939	0.001587	0.000966	0.000479	0.001518	0.001103	0.000553

Table A.8.1 – Raw exhaust gas u and component densities

Corrected table

Gas		NO$_x$	CO	HC	CO$_2$	O$_2$	CH$_4$
ρ_{gas} [kg/m^3]		2.053	1.250	0.621	1.9636	1.4277	0.716
Fuel	ρ_e [kg/m^3]	Coefficient u_{gas} at $\lambda = 2$, dry air, 273 K, 101.3 kPa					
Diesel	1.2939	0.001587	0.000966	0.000479	0.001518	0.00110	0.000553

Table A.8.1 – Raw exhaust gas u and component densities

Regarding Point 116:

Fuel	ρ_{de}	Gas					
		NO$_x$	CO	HC	CO$_2$	O$_2$	CH$_4$
		ρ_{gas} [kg/m^3]					
		2.053	1.250	0.621	1.9636	1.4277	0.716
		Coefficient u_{gas} at $\lambda = 2$, dry air, 273 K, 101.3 kPa					
Diesel	1.293	0.001588	0.000967	0.000480	0.001519	0.001104	0.000553

Table A.8.2 – Diluted exhaust gas u values and component densities

Corrected table

Gas		NO$_x$	CO	HC	CO$_2$	O$_2$	CH$_4$
ρ_{gas} [kg/m^3]		2.053	1.250	0.621	1.9636	1.4277	0.716
Fuel	ρ_{de} [kg/m^3]	Coefficient u_{gas} at $\lambda = 2$, dry air, 273 K, 101.3 kPa					
Diesel	1.293	0.001588	0.000967	0.000480	0.001519	0.001104	0.000553

Table A.8.2 – Diluted exhaust gas u values and component densities