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World Forum for Harmonization of Vehicle Regulations

Working Party on Pollution and Energy

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Item 6(c) of the provisional agenda

AMENDMENTS TO UNECE REGULATIONS

REGULATION No. 83
(Emissions of M_1 and N_1 categories of vehicles)

Proposal for draft amendments to Regulation No. 83

Submitted by the expert from the International Organization of Motor Vehicle Manufacturers [*/]

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) in order to include an alternative preconditioning procedure for the Type I test, to allow the use of E5 and B5 biofuels as alternative reference fuels and to clarify and update specifications for the proportional speed fan. The modifications to the current text of the Regulation (including the proposed amendments of draft Supplement 7 to the 05 series of amendments based on ECE/TRANS/WP.29/GRPE/2007/8/Rev.1 as amended by Annex III of the GRPE report) are marked in **bold** and strikethrough characters.

[*/] In accordance with the programme of work of the Inland Transport Committee for 2006-2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance performance of vehicles with respect to pollution and energy. The present document is submitted in conformity with that mandate.

A. PROPOSAL

List of contents, annexes, Annex 10, amend to read:

"Annex 10: SPECIFICATIONS OF REFERENCE FUELS

1. SPECIFICATIONS OF REFERENCE FUELS FOR TESTING VEHICLES TO THE EMISSION LIMITS GIVEN IN ROW A OF THE TABLE IN PARAGRAPH 5.3.1.4. – TYPE I TEST
1.1. TECHNICAL DATA ON THE REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH POSITIVE-IGNITION ENGINES
1.2. TECHNICAL DATA ON THE REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH DIESEL ENGINE
2. SPECIFICATIONS OF REFERENCE FUELS FOR TESTING VEHICLES TO THE EMISSION LIMITS GIVEN IN ROW B OF THE TABLE IN PARAGRAPH 5.3.1.4. - TYPE I TEST
2.1. TECHNICAL DATA ON THE REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH POSITIVE-IGNITION ENGINES
2.2. TECHNICAL DATA ON THE REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH DIESEL ENGINE
3. SPECIFICATIONS OF REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH POSITIVE-IGNITION ENGINES AT LOW AMBIENT TEMPERATURE - TYPE VI TEST"

Paragraph 2.4., amend to read:

"2.4. "Gaseous pollutants" means the exhaust gas emissions of carbon monoxide, oxides of nitrogen, expressed of:
(a) C1H1,85 for petrol **(E0)**,
(b) C1H1,86 for diesel **(B0)**,
(c) C1H2.525 for LPG,
(d) C1H4 for NG,
(e) **$C_1H_{1.89}O_{0.016}$ for petrol (E5),**
(f) **$C_1H_{1.86}O_{0.005}$ for diesel (B5)**

Paragraph 2.18., amend to read:

"2.18. "Fuel requirement by the engine" means the type of fuel normally used by the engine:
(a) petrol **(E0 or E5)**,
(b) LPG (liquefied petroleum gas),
(c) NG (natural gas),
(d) either petrol or LPG,
(e) either petrol or NG,
(f) diesel fuel **(B0 or B5).**"

Annex 2, item 16.1., amend to read:

"16.1. Test Type I: .....

Pollutant	CO (g/km)	HC (g/km)	NOx (g/km)	HC + NOx (1) (g/km)	Particulates (1) (g/km)
measured					
calculated with deterioration factor (DF)					

(1) For compression-ignition engined vehicles only.

Position of the engine cooling fan during the test:
Height of the lower edge above ground: ..... **cm.**
Lateral position of fan centre:..... **cm.**
Right/left of vehicle centre-line 2/

16.1.1. In the case of vehicles fuelled with ……

……"

Annex 4,

Paragraph 5.3.1., amend to read:

"5.3.1. For compression-ignition engined vehicles for the purpose of measuring particulates, at most 36 hours and at least 6 hours before testing, the Part Two cycle described in Appendix 1 to this annex shall be used. Three consecutive cycles shall be driven. The dynamometer setting shall be indicated in paragraphs 5.1. and 5.2. above.

At the request of the manufacturer, vehicles fitted with positive-ignition engines may be preconditioned with one Part One and two Part Two driving cycles.

After this preconditioning, specific for compression-ignition engines, and before testing, compression-ignition and positive-ignition engined vehicles shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 and 30 °C). This conditioning shall be carried out for at least six hours and continue until the engine oil temperature and coolant, if any, are

within +/- 2 K of the temperature of the room.

As an alternative, after this preconditioning, the vehicle shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 and 30 °C) for not less than 12 hours nor for more than 36 hours prior to the exhaust emission test."

Paragraph 6.1.3., amend to read:

"6.1.3. A current of air of variable speed shall be blown over the vehicle. The blower speed shall be ~~**such that,**~~ within the operating range of 10 km/h to at least 50 km/h**, or as an alternative, at the request of the manufacturer, within the operating range of 10 km/h to at least the maximum speed of the test cycle being used. T**he linear velocity of the air at the blower outlet **shall be** within ±5 km/h of the corresponding roller speed **within the range of 10 km/h to 50 km/h. At the range over 50 km/h, the linear velocity of the air shall be within ±10 km/h of the corresponding roller speed. At roller speeds of less than 10 km/h, air velocity may be zero**.

The above mentioned air velocity shall be determined as an averaged value of 9 measuring points which are located at the centre of each rectangle dividing the whole of the blower outlet into 9 areas (dividing both horizontal and vertical sides of the blower outlet into 3 equal parts). Each value at those 9 points shall be within 10 per cent of the averaged value of themselves.

The device used to measure the linear velocity of the air shall be located at between 0 and 20 cm from the air outlet.

The final selection of the blower shall have the following characteristics:
(i) Area: at least 0.2 m^2;
(ii) Height of the lower edge above ground: approximately 20 cm;
(iii) Distance from the front of the vehicle: approximately 30 cm.

As an alternative, **at the request of the manufacturer** the blower speed shall be fixed at an air speed of at least 6 m/s (21.6 km/h).

~~**For special vehicles (e. g. vans, off-road), the**~~ **The** height **and lateral position** of the cooling fan can also be modified at the request of the manufacturer."

Paragraph 8.2., amend to read:

"8.2. Total mass of gaseous and particulate pollutants emitted

The mass M of each pollutant emitted by the vehicle during the test shall be determined by obtaining the product of the volumetric concentration and the volume of the gas in question, with due regard for the following densities under above-mentioned reference conditions:

In the case of carbon monoxide (CO): d = 1.25 g/l

In the case of hydrocarbons:

(a)	for **E0** petrol (CH1.85)	d = 0.619 g/l
(b)	for **B0** diesel (CH1.86)	d = 0.619 g/l
(c)	for LPG (CH2.525)	d = 0.649 g/l
(d)	for NG (CH4)	d = 0.714 g/l
(e)	**for E5 petrol ($C_1H_{1.89}O_{0.016}$)**	**d = 0.631 g/l**
(f)	**for B5 diesel ($C_1H_{1.86}O_{0.005}$)**	**d = 0.622 g/l** "

Annex 4, Appendix 8,

Paragraph 1.3., amend to read:

"1.3. CALCULATION OF THE …

.....

The dilution factor is calculated as follows:
For each reference fuel:

$$DF = \frac{X}{C_{CO2} + (C_{HC} + C_{CO}) \cdot 10^{-4}}$$

For a fuel of composition CxHyOz the general formula is:

$$X = 100 \frac{x}{x + \frac{y}{2} + 3.76\left(x + \frac{y}{4} - \frac{z}{2}\right)}$$

For the reference fuels contained Annex IX, the values of 'X' are as follows.

Fuel	X
Petrol (E0)	**13.4**
Diesel (B0)	**13.4**
LPG	**11.9**
NG	**9.5**
Petrol (E5)	**13.4**
Diesel (B5)	**13.5**

"

Annex 4a, (based on ECE/TRANS/WP.29/GRPE/2007/8/Rev.1 as amended by Annex III of the report ECE/TRANS/WP.29/GRPE/55)

Paragraph 3.4.2., amend to read:

"3.4.2. A current of air of variable speed shall be blown over the vehicle. The blower speed shall be ~~**such that**~~, within the operating range of 10 km/h to at least 50 km/h, **or as an alternative, at the request of the manufacturer within the operating range of 10 km/h to at least the maximum speed of the test cycle being used. T**he linear velocity of the air at the blower outlet ~~**is**~~ **shall be** within ±5 km/h of the corresponding roller speed **during the test cycle**. The final selection of the blower shall have the following characteristics:

(i) Area: at least 0.2 m^2;

(ii) Height of the lower edge above ground: approximately 0.2 m;

(iii) Distance from the front of the vehicle: approximately 0.3 m.

As an alternative, **at the request of the manufacturer** the blower speed shall be fixed at an air speed of at least 6 m/s (21.6 km/h).

~~**For special vehicles (e.g. vans, off-road),**~~ **T**he height **and lateral position** of the cooling fan can also be modified at the request of the manufacturer."

Paragraph 6.3.1., amend to read:

"6.3.1. For the purpose of measuring particulates, …….

……

…… are within ±2 K of the temperature of the room.

As an alternative, after this preconditioning, the vehicle shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 and 30 °C) for not less than 12 hours nor for more than 36 hours prior to the exhaust emission test."

Annex 10, paragraphs 2. and 3., amend to read:

"2. SPECIFICATIONS OF REFERENCE FUELS FOR TESTING VEHICLES TO THE EMISSION LIMITS GIVEN IN ROW B OF THE TABLE IN PARAGRAPH 5.3.1.4. - TYPE I TEST

2.1. TECHNICAL DATA ON THE REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH POSITIVE-IGNITION ENGINES

Type: Unleaded petrol **(E0)**

Parameter	Unit	Limits 1/		Test Method
		minimum	maximum	
Research octane number, RON		95.0	-	EN 25164
Motor octane number, MON		85.0	-	EN 25163
Density at 15 °C	kg/m^3	740	754	ISO 3675
Reid vapour pressure	kPa	56.0	60.0	PrEN ISO 13016-1 (DVPE)
Distillation:				
- Evaporated at 70 °C	per cent v/v	24.0	40.0	EN-ISO 3405
- Evaporated at 100 °C	per cent v/v	50.0	58.0	EN-ISO 3405
- Evaporated at 150 °C	per cent v/v	83.0	89.0	EN-ISO 3405
- final boiling point	°C	190	210	EN-ISO 3405
Residue	per cent v/v	-	2.0	EN-ISO 3405
Hydrocarbon analysis:				
Olefins	per cent v/v	-	10.0	ASTM D 1319
Aromatics	per cent v/v	29.0	35.0	ASTM D 1319
Saturates	per cent v/v	Report		ASTM D 1319
Benzene	per cent v/v	-	1.0	pr. EN 12177
Carbon/hydrogen ratio		Report		
Induction period 2/	minutes	480	-	EN-ISO 7536
Oxygen content	per cent m/m	-	1.0	EN 1601
Existent gum	mg/ml	-	0.04	EN-ISO 6246
Sulphur content 3/	mg/kg	-	10	ASTM D 5453
Copper corrosion		-	class 1	EN-ISO 2160
Lead content	mg/l	-	5	EN 237
Phosphorus content	mg/l	-	1.3	ASTM D 3231

1/ The values quoted in the specifications are "true values". In establishment of their limit values the terms of ISO 4259 "Petroleum products – Determination and application of precision data in relation to methods of test" have been applied and in fixing a minimum value, a minimum difference of 2R above zero has been taken into account; in fixing a maximum and minimum value, the minimum difference is 4R (R = reproducibility).
Notwithstanding this measure, which is necessary for technical reasons, the manufacturer of fuels should nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value in the case of quotations of maximum and minimum limits. Should it be necessary to clarify the questions as to whether a fuel meets the requirements of the specifications, the terms of ISO 4259 should be applied.

2/ The fuel may contain oxidation inhibitors and metal deactivators normally used to stabilise refinery gasoline streams, but detergent/dispersive additives and solvent oils must not be added.

3/ The actual sulphur content of the fuel used for the Type I test shall be reported.

ALTERNATIVELY

Type: Petrol (E5)

Parameter	Unit	Limits 1/		Test method
		Minimum	Maximum	
Research octane number, RON		95.0	—	EN 25164 prEN ISO 5164
Motor octane number, MON		85.0	—	EN 25163 prEN ISO 5163
Density at 15 °C	kg/m3	743	756	EN ISO 3675 EN ISO 12185
Vapour pressure	kPa	56.0	60.0	EN ISO 13016-1 (DVPE)
Water content	% v/v		0.015	ASTM E 1064
Distillation:				
– evaporated at 70 °C	% v/v	24.0	44.0	EN-ISO 3405
– evaporated at 100 °C	% v/v	48.0	60.0	EN-ISO 3405
– evaporated at 150 °C	% v/v	82.0	90.0	EN-ISO 3405
– final boiling point	°C	190	210	EN-ISO 3405
Residue	% v/v	—	2.0	EN-ISO 3405
Hydrocarbon analysis:				
– olefins	% v/v	3.0	13.0	ASTM D 1319
– aromatics	% v/v	29.0	35.0	ASTM D 1319
– benzene	% v/v	—	1.0	EN 12177
– saturates	% v/v	Report		ASTM 1319
Carbon/hydrogen ratio		Report		
Carbon/oxygen ratio		Report		
Induction period 2/	minutes	480	—	EN-ISO 7536
Oxygen content 4/	% m/m	Report		EN 1601
Existent gum	mg/ml	—	0.04	EN-ISO 6246
Sulphur content 3/	mg/kg	—	10	EN ISO 20846 EN ISO 20884
Copper corrosion		—	Class 1	EN-ISO 2160
Lead content	mg/l	—	5	EN 237
Phosphorus content	mg/l	—	1.3	ASTM D 3231
Ethanol 5/	% v/v	4.7	5.3	EN 1601 EN 13132

1/ The values quoted in the specifications are 'true values'. In establishment of their limit values the terms of ISO 4259 Petroleum products - Determination and application of precision data in relation to methods of test have been applied and in fixing a minimum value, a minimum difference of 2R above zero has been taken into account; in fixing a maximum and minimum value, the minimum difference is 4R (R = reproducibility).
Notwithstanding this measure, which is necessary for technical reasons, the manufacturer of fuels shall nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value in the case of quotations of maximum and minimum limits. Should it be necessary to clarify whether a fuel meets the requirements of the specifications, the terms of ISO 4259 shall be applied.

2/ The fuel may contain oxidation inhibitors and metal deactivators normally used to stabilise refinery gasoline streams, but detergent/dispersive additives and solvent oils shall not be added.

3/ The actual sulphur content of the fuel used for the Type 1 test shall be reported.

4/ Ethanol meeting the specification of prEN 15376 is the only oxygenate that shall be intentionally added to the reference fuel.

5/ There shall be no intentional addition of compounds containing phosphorus, iron, manganese, or lead to this reference fuel.

2.2. TECHNICAL DATA ON THE REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH DIESEL ENGINE

Type: Diesel fuel **(B0)**

Parameter	Unit	Limits 1/		Test Method
		minimum	maximum	
Cetane number 2/		52.0	54.0	EN-ISO 5165
Density at 15°C	kg/m^3	833	837	EN-ISO 3675
Distillation: 50 per cent point 95 per cent point - Final boiling point	 °C °C °C	 245 345 -	 - 350 370	 EN-ISO 3405 EN-ISO 3405 EN-ISO 3405
Flash point	°C	55	-	EN 22719
CFPP	°C	-	-5	EN 116
Viscosity at 40 °C	mm^2/s	2.3	3.3	EN-ISO 3104
Polycyclic aromatic hydrocarbons	per cent m/m	3.0	6,0	IP 391
Sulphur content 3/	mg/kg	-	10	ASTM D 5453
Copper corrosion		-	Class 1	EN-ISO 2160
Conradson carbon residue (10 per cent DR)	per cent m/m	-	0.2	EN-ISO 10370
Ash content	per cent m/m	-	0.01	EN-ISO 6245
Water content	per cent m/m	-	0.02	EN-ISO 12937
Neutralisation (strong acid) number	mg KOH/g	-	0.02	ASTM D 974
Oxidation stability 4/	mg/ml	-	0.025	EN-ISO 12205
Lubricity (HFRR wear scan diameter at 60 °C)	µm	-	400	CEC F-06-A-96
FAME	Prohibited			

1/ The values quoted in the specifications are "true values". In establishment of their limit values the terms of ISO 4259 "Petroleum products – Determination and application of precision data in relation to methods of test" have been applied and in fixing a minimum value, a minimum difference of 2R above zero has been taken into account; in fixing a maximum and minimum value, the minimum difference is 4R (R = reproducibility).
Notwithstanding this measure, which is necessary for technical reasons, the manufacturer of fuels should nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value in the case of quotations of maximum and minimum limits. Should it be necessary to clarify the questions as to whether a fuel meets the requirements of the specifications, the terms of ISO 4259 should be applied.

2/ The range for cetane number is not in accordance with the requirements of a minimum range of 4R. However, in the case of a dispute between fuel supplier and fuel user, the terms of ISO 4259 may be used to resolve such disputes provided replicate measurements, of sufficient number to archive the necessary precision, are made in preference to single determinations.

3/ The actual sulphur content of the fuel used for the Type I test shall be reported.

4/ Even though oxidation stability is controlled, it is likely that shelf life will be limited. Advice should be sought from the supplier as to storage conditions and life

ALTERNATIVELY

Type: Diesel fuel (B5)

Parameter	Unit	Limits 1/		Test method
		Minimum	Maximum	
Cetane number 2/		52.0	54.0	EN-ISO 5165
Density at 15 °C	kg/m3	833	837	EN-ISO 3675
Distillation:				
- 50 % point	°C	245	—	EN-ISO 3405
- 95 % point	°C	345	350	EN-ISO 3405
- final boiling point	°C	—	370	EN-ISO 3405
Flash point	°C	55	—	EN 22719
CFPP	°C	—	– 5	EN 116
Viscosity at 40 °C	mm2/s	2.3	3.3	EN-ISO 3104
Polycyclic aromatic hydrocarbons	% m/m	2.0	6.0	EN 12916
Sulphur content 3/	mg/kg	—	10	EN ISO 20846 / EN ISO 20884
Copper corrosion		—	Class 1	EN-ISO 2160
Conradson carbon residue (10 % DR)	% m/m	—	0.2	EN-ISO 10370
Ash content	% m/m	—	0.01	EN-ISO 6245
Water content	% m/m	—	0.02	EN-ISO 12937
Neutralisation (strong acid) number	mg KOH/g	—	0.02	ASTM D 974
Oxidation stability 4/	mg/ml	—	0.025	EN-ISO 12205
Lubricity (HFRR wear scan diameter at 60 °C)	µm	—	400	EN ISO 12156
Oxidation stability at 110 °C 4/ 6/	h	20.0		EN 14112
FAME 5/	% v/v	4.5	5.5	EN 14078

1/ The values quoted in the specifications are 'true values'. In establishment of their limit values the terms of ISO 4259 Petroleum products – Determination and application of precision data in relation to methods of test have been applied and in fixing a minimum value, a minimum difference of 2R above zero has been taken into account; in fixing a maximum and minimum value, the minimum difference is 4R (R = reproducibility).
Notwithstanding this measure, which is necessary for technical reasons, the manufacturer of fuels shall nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value in the case of quotations of maximum and minimum limits. Should it be necessary to clarify whether a fuel meets the requirements of the specifications, the terms of ISO 4259 shall be applied.

2/ The range for cetane number is not in accordance with the requirements of a minimum range of 4R. However, in the case of a dispute between fuel supplier and fuel user, the terms of ISO 4259 may be used to resolve such disputes provided replicate measurements, of sufficient number to archive the necessary precision, are made in preference to single determinations.

3/ The actual sulphur content of the fuel used for the Type 1 test shall be reported.

4/ Even though oxidation stability is controlled, it is likely that shelf life will be limited. Advice shall be sought from the supplier as to storage conditions and life.

5/ FAME content to meet the specification of EN 14214

6/ Oxidation stability can be demonstrated by EN-ISO 12205 or by EN 14112. This requirement shall be reviewed based on CEN/TC19 evaluations of oxidative stability performance and test limits

3. SPECIFICATIONS OF REFERENCE FUEL TO BE USED FOR TESTING VEHICLES EQUIPPED WITH POSITIVE-IGNITION ENGINES AT LOW AMBIENT TEMPERATURE - TYPE VI TEST

Type*:* Unleaded petrol **(E0)**

Parameter	Unit	Limits 1/		Test Method
		minimum	maximum	
Research octane number, RON		95.0	-	EN 25164
Motor octane number, MON		85.0	-	EN 25163
Density at 15 °C	kg/m^3	740	754	ISO 3675
Reid vapour pressure	kPa	56.0	95.0	prEN ISO 13016-1 (DVPE)
Distillation:				
- Evaporated at 70 °C	per cent v/v	24.0	40.0	EN-ISO 3405
- Evaporated at 100 °C	per cent v/v	50.0	58.0	EN-ISO 3405
- Evaporated at 150 °C	per cent v/v	83.0	89.0	EN-ISO 3405
- final boiling point	°C	190	210	EN-ISO 3405
Residue	per cent v/v	-	2.0	EN-ISO 3405
Hydrocarbon analysis:				
Olefins	per cent v/v	-	10.0	ASTM D 1319
Aromatics	per cent v/v	29.0	35.0	ASTM D 1319
Saturates	per cent v/v	Report		ASTM D 1319
Benzene	per cent v/v	-	1.0	pr. EN 12177
Carbon/hydrogen ratio		Report		
Induction period 2/	minutes	480	-	EN-ISO 7536
Oxygen content	per cent m/m	-	1,0	EN 1601
Existent gum	mg/ml	-	0.04	EN-ISO 6246
Sulphur content 3/	mg/kg	-	10	ASTM D 5453
Copper corrosion		-	Class 1	EN-ISO 2160
Lead content	mg/l	-	5	EN 237
Phosphorus content	mg/l	-	1.3	ASTM D 3231

1/ The values quoted in the specifications are "true values". In establishment of their limit values the terms of ISO 4259 "Petroleum products – Determination and application of precision data in relation to methods of test" have been applied and in fixing a minimum value, a minimum difference of 2R above zero has been taken into account; in fixing a maximum and minimum value, the minimum difference is 4R (R = reproducibility).
Notwithstanding this measure, which is necessary for technical reasons, the manufacturer of fuels should nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value in the case of quotations of maximum and minimum limits. Should it be necessary to clarify the questions as to whether a fuel meets the requirements of the specifications, the terms of ISO 4259 should be applied.

2/ The fuel may contain oxidation inhibitors and metal deactivators normally used to stabilise refinery gasoline streams, but detergent/dispersive additives and solvent oils must not be added.

3/ The actual sulphur content of the fuel used for the Type VI test shall be reported.

ALTERNATIVELY

Type: Petrol (E5)

Parameter	Unit	Limits 1/		Test method
		Minimum	Maximum	
Research octane number, RON		95.0	—	EN 25164 prEN ISO 5164
Motor octane number, MON		85.0	—	EN 25163 prEN ISO 5163
Density at 15 °C	kg/m3	743	756	EN ISO 3675 EN ISO 12185
Vapour pressure	kPa	56.0	95.0	EN ISO 13016-1 (DVPE)
Water content	% v/v		0.015	ASTM E 1064
Distillation:				
– evaporated at 70 °C	% v/v	24.0	44.0	EN-ISO 3405
– evaporated at 100 °C	% v/v	50.0	60.0	EN-ISO 3405
– evaporated at 150 °C	% v/v	82.0	90.0	EN-ISO 3405
– final boiling point	°C	190	210	EN-ISO 3405
Residue	% v/v	—	2.0	EN-ISO 3405
Hydrocarbon analysis:				
– olefins	% v/v	3.0	13.0	ASTM D 1319
– aromatics	% v/v	29.0	35.0	ASTM D 1319
– benzene	% v/v	—	1.0	EN 12177
– saturates	% v/v	Report		ASTM 1319
Carbon/hydrogen ratio		Report		
Carbon/oxygen ratio		Report		
Induction period 2/	minutes	480	—	EN-ISO 7536
Oxygen content 4/	% m/m	Report		EN 1601
Existent gum	mg/ml	—	0.04	EN-ISO 6246
Sulphur content 3/	mg/kg	—	10	EN ISO 20846 EN ISO 20884
Copper corrosion		—	Class 1	EN-ISO 2160
Lead content	mg/l	—	5	EN 237
Phosphorus content	mg/l	—	1.3	ASTM D 3231
Ethanol 5/	% v/v	4.7	5.3	EN 1601 EN 13132

1/ The values quoted in the specifications are 'true values'. In establishment of their limit values the terms of ISO 4259 Petroleum products - Determination and application of precision data in relation to methods of test have been applied and in fixing a minimum value, a minimum difference of 2R above zero has been taken into account; in fixing a maximum and minimum value, the minimum difference is 4R (R = reproducibility).
Notwithstanding this measure, which is necessary for technical reasons, the manufacturer of fuels shall nevertheless aim at a zero value where the stipulated maximum value is 2R and at the mean value in the case of quotations of maximum and minimum limits. Should it be necessary to clarify whether a fuel meets the requirements of the specifications, the terms of ISO 4259 shall be applied.

2/ The fuel may contain oxidation inhibitors and metal deactivators normally used to stabilise refinery gasoline streams, but detergent/dispersive additives and solvent oils shall not be added.

3/ The actual sulphur content of the fuel used for the Type 1 test shall be reported.

4/ Ethanol meeting the specification of prEN 15376 is the only oxygenate that shall be intentionally added to the reference fuel.

5/ There shall be no intentional addition of compounds containing phosphorus, iron, manganese, or lead to this reference fuel.

B. JUSTIFICATION

Alternative Preconditioning Procedure

The preconditioning requirements of the Type I test define a soak time of 6 to 36 hours and an engine oil and coolant temperature within +/- 2 °C of the soak area temperature before the emission test can be started.

Differing to this requirement the preconditioning of the Type VI test (emission test at low ambient temperatures) and the US FTP federal test procedure (40 CFR Part 86, §.86.132-96 (g)) define a soak time of 12 to 36 hours and have no requirement concerning the engine oil or coolant temperature. The Japanese TRIAS test procedure requires 6 to 36 hours without any restriction of oil or coolant temperature.

The proposed amendment harmonizes the test procedures of Type I test, Type VI test, US FTP and Japan TRIAS. This means, that for the Type I test, as an alternative to the present preconditioning, a soak time of 12 to 36 hours should be introduced without any restriction of oil or coolant temperature.

Actual vehicle/engine concepts use encapsulation measures to reduce external noise and aerodynamic drag. As a side effect this leads to extended cool down times of the power train after engine shutoff. Figure 1 shows the impact of these developments to the engine cool down times.

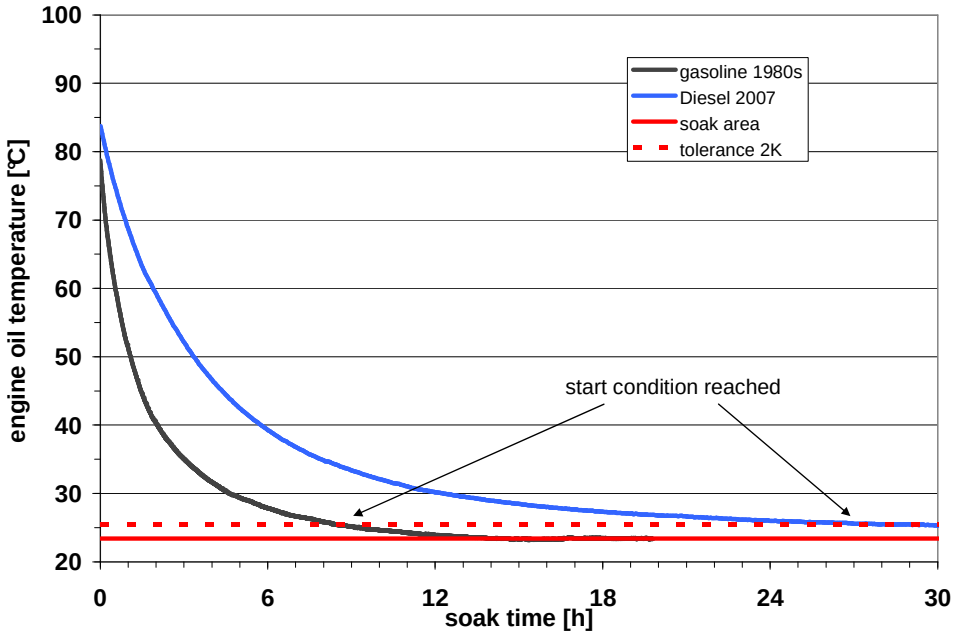

Fig. 1: Development of engine cool down times.

Contrary to the development of noise reduction and aerodynamic measures leading to longer cool down times, the preconditioning requirement of test Type I remained unchanged. The regulation defines a minimum soak period of 6 hours and a start condition of engine oil and

coolant temperature in between +/- 2°C of the temperature of the soak area (20-30 °C), before the emission test can be started. Modern vehicle concepts remain in a warmed up condition with engine temperatures above 2 K above ambient temperature for more than 24 hours. This situation causes increased workload in the development and type approval process as additional cooling fans have to be used to reduce the soak times between preconditioning cycle and emission test (forced cooling down).

Another aspect is the typical parking duration which is not reflected by the present preconditioning requirement. In practice, the mean cool down time for customer use between two trips is less than 12 hrs, because vehicles are used on average for more than two trips a day [KONTIV89, published 1992 by Ministry of Transport, Germany; Verkehrsverhalten (Traffic Studies), published 9/2001 by Ministry of Economics, State of North Rhine Westphalia, Germany].

The impact of the proposed alternative preconditioning procedure on emissions and fuel consumption is within the normal range of measurement deviations, regarding exhaust emissions a test variation up to 12 per cent and up to 1 per cent for fuel consumption occurred. These values are within normal test-to-test variations.

Reference Fuel

Regulation No. 83 does not allow any biodiesel or ethanol content in the specification of the reference fuel for Type I and Type VI testing.

The specific procedures, tests and requirements for type approval, which are now under discussion in the European Community, will define future reference fuels, such as petrol, diesel, gaseous fuels and biofuels, such as bioethanol, biodiesel and biogas The current commitology proposal (version of September 2007) allows only B5 and E5 fuel as reference fuel for Type I and Type VI testing of mono-fuel vehicles.

It is reasonable to allow the use of the proposed B5 and E5 reference fuel as an alternative in Regulations No. 83 to avoid double testing of Type I and Type VI testing and to .allow easier export of modern Euro 5 concepts to countries outside the European Community, which apply the UNECE Regulations.

Proportional Speed Fan

Vehicles require increasingly complex thermal management of the engine, the charge (intake) air and aftertreatment devices. It is therefore essential that the air flow over the vehicle and onto the radiators, intercoolers and/or EGR coolers during emission / fuel economy type approval testing on the chassis dynamometer is representative of that which the vehicle would experience when being driven on a road.

There is currently a choice of type of fan, a constant speed fan and a variable speed fan often called a 'road speed fan'. The Road speed fan specification requires updating for technical progress and for clarification. However, the existing requirements must also be maintained to allow appropriate testing of vehicles with an existing approval to be checked on conformity of

production / in-service compliance according to the test conditions used at the time of certification.

The specification is updated to align with the test cycle which operates at a maximum speed of 120 kph – but only at the manufacturers request, otherwise the 50 kmh^{-1} referenced in the existing text would apply. In response to comments by Poland and the EC, during the fifty-fifth session of GRPE and subsequently in writing, the fan speed tolerance has been modified from that proposed in informal document No. GRPE-55-09, and a detailed fan speed measurement method added, by adopting language taken from the recently adopted Worldwide Motorcycle Test Cycle (WMTC) gtr.

The final section of the paragraph is modified as it is important to position the fan such that the air flow over the radiator, intercoolers, EGR and charge coolers, etc. is correct, with full range of road speed to replicate as far as possible the normal air flow over the vehicle when driving on the road. Vehicle thermal management systems are highly complex and it is important to the correct emission performance of the vehicle that a representative air flow over the charge air cooling devices and the radiator is delivered during the test. This led to comments that if the fan position can be modified at the request of the manufacturer, then the fan position should be recorded. A proposal for recording the fan position in the Communication Form, along with the test results, has therefore been added.

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