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## Economic Commission for Europe

### Inland Transport Committee

### World Forum for Harmonization of Vehicle Regulations

#### 191st session

Geneva, 14–16 November 2023

Item 7.2. of the provisional agenda

#### 1997 Agreement (Periodical Technical Inspections)

#### Update of Rules annexed to the 1997 Agreement

## Proposal for a new amendment to UN Rule No. 1 (Protection of the environment)

### Submitted by the Working Party on Pollution and Energy\*

The text reproduced below was adopted by the Working Party on Pollution and Energy (GRPE) at its eighty-ninth session (ECE/TRANS/WP.29/GRPE/89, para. 91). It is based on ECE/TRANS/WP.29/GRPE/2023/9, GRPE-89-24-Rev.2 and as amended by Annex V of the report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.4) for consideration at their November 2023 sessions.

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\* In accordance with the programme of work of the Inland Transport Committee for 2023 as outlined in proposed programme budget for 2023 (A/77/6 (Sect. 20), table 20.6), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.





Item	Method	Main Reasons for Rejection	Defect Assessment		
			Minor	Major	Dangerous
<b>3.2. Compression ignition engine emissions</b>					
3.2.1. Exhaust emissions control equipment	Visual inspection	(a) Emission control equipment fitted by the manufacturer absent or obviously defective. (b) Leaks which would affect emission measurements		X  X	
3.2.2. Exhaust emissions measurement	Test procedures:  For vehicle up to emission classes Euro 5a and Euro V or equivalent: Apply 3.2.2.1.  For vehicles as of emission classes Euro 5b and Euro VI or equivalent: Apply either 3.2.2.1. or 3.2.2.2. according to national implementation.  Mutual recognition of periodic technical inspection certificate is not affected by the choice of the Exhaust emissions test procedures.				
3.2.2.1. Opacity Vehicles registered or put into service before 1 January 1980 are exempted from this requirement	For vehicle up to emission classes Euro 5 and Euro V or equivalent:  Exhaust gas opacity to be measure during free acceleration (no load from idle up to cut-off speed) with gear lever in neutral and clutch engaged or reading of OBD. The tailpipe testing shall be the default method of exhaust emissions assessment. On the basis of an assessment of equivalence, Contracting Parties may authorise the use of OBD in accordance with the manufacturer's recommendation and other requirements.  For vehicles as of emission classes Euro 6 and Euro VI or equivalent:  Exhaust gas opacity to be measured during free acceleration (no load from idle up to cut-off speed) with gear lever in neutral and clutch engaged or reading of OBD in accordance with the manufacturer's recommendations and other requirements <sup>1</sup>  Vehicle preconditioning:  1. Vehicles may be tested without preconditioning, although for safety reasons checks should be made that the engine is warm and in a satisfactory mechanical condition	(a) For vehicle registered or put into service for the first time after the date specified in the requirements <sup>1</sup>  Opacity exceeds the level recorded on the manufacturer's plate on the vehicle.		X	
	2. Precondition requirements:				

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	<p>(i) Engine shall be fully warm, for instance the engine oil temperature measured by a probe in the oil level dipstick tube to be at least 80°C or normal operating temperature if lower, or the engine block temperature measured by the level of infrared radiation to be at least an equivalent temperature. If, owing to the vehicle configuration, this measurement is impractical, the establishment of the engine's normal operating temperature may be made by other means, for example by the operation of the engine cooling fan.</p> <p>(ii) Exhaust system shall be purged by at least three free acceleration cycles or by an equivalent method.</p>				
	<p>Test procedure:</p> <p>1. Engine and any turbocharger fitted, to be at idle before the start of each free acceleration cycle. For heavy-duty diesels, this means waiting for at least 10 seconds after the release of the throttle.</p> <p>2. To initiate each free acceleration cycle, the throttle pedal must be fully depressed quickly and continuously (in less than one second) but not violently, so as to obtain maximum delivery from the injection pump.</p> <p>3. During each free acceleration cycle, the engine shall reach cut-off speed or, for vehicles with automatic transmissions, the speed specified by the manufacturer or, if this data is not available, then two thirds of the cut-off speed, before the throttle is released. This could be checked, for instance, by monitoring engine speed or by allowing a sufficient time to elapse between initial throttle depression and release, which in the case of vehicles of categories M2, M3, N2 and N3, should be at least two seconds.</p>	<p>(b) Where this information is not available or requirements<sup>1</sup> do not allow the use of reference values,</p> <ul style="list-style-type: none"> <li>- For naturally aspirated engines: 2.5 m<sup>-1</sup></li> <li>- For turbo-charged engines: 3.0 m<sup>-1</sup></li> <li>- For vehicles identified in requirements<sup>1</sup> or first registered or put into service for the first time after the date specified in requirements: for vehicles of emission classes Euro 5 and Euro V or equivalent 1.5 m<sup>-1</sup> for vehicles of emission classes Euro 6 and Euro VI or equivalent 0.7 m<sup>-1</sup></li> </ul>		X	
	<p>4. Vehicles shall only be failed if the arithmetic means of at least the last three free acceleration cycles are in excess of the limit value. This may be calculated by ignoring any measurement that depart significantly from the measured mean, or the result of any other statistical calculation that takes account of the scattering of the measurements.</p>				

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	<p>Contracting Parties may limit the number of test cycles.</p> <p>5. To avoid unnecessary testing, Contracting Parties may fail vehicles which have measured values significantly in excess of the limit values after fewer than three free acceleration cycles or after the purging cycles. Equally to avoid unnecessary testing, Contracting Parties may pass vehicles which have measured values significantly below the limits after fewer than three free acceleration cycles or after the purging cycles.</p>				
3.2.2.2. Particulate Number counting	<p>Vehicle preparation</p> <p>At the beginning of the test the vehicle should be:</p> <ul style="list-style-type: none"> <li>— Hot, i.e., engine coolant temperature &gt; 60 °C but preferably &gt; 70 °C</li> <li>— Conditioned, by operating for a period of time at low idling and/or performing stationary accelerations up to maximum 2 000 rpm engine speed or by driving. Conditioning is done in order to ensure that the DPF efficiency is not influenced by a recent regeneration. Conditioning time is considered the period in which the engine is switched on including pre-test phases (e.g., stabilization phase). The recommended total conditioning time is 300 seconds.</li> </ul> <p>A fast pass test is possible with engine coolant temperature &lt; 60 °C. However, if the vehicle fails to pass the test, then the test is repeated and the vehicle should fulfil the requirements set for the engine coolant temperature and the conditioning.</p> <p>PN-PTI instrument preparation:</p> <ul style="list-style-type: none"> <li>— The PN-PTI instrument is powered on for at least the warm-up time indicated by the manufacturer;</li> <li>— Self-checks of the instrument defined in Annex 1 to R.E.6 monitor the proper operation of the instrument during operation and trigger a warning or message in case of malfunction;</li> </ul> <p>Before each test, the good condition of the sampling system is verified,</p>	Measurement results exceed 1 000 000 (1/cm <sup>3</sup> )		X	

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	<p>including checking the sampling hose and probe for damage.</p> <p>Test procedure:</p> <ul style="list-style-type: none"> <li>— Before the start of a measurement, the following data is registered: <ul style="list-style-type: none"> <li>(a) vehicle registration number,</li> <li>(b) vehicle identification number,</li> <li>(c) type-approved emissions level (Euro emission standard);</li> </ul> </li> <li>— The software of the particle counter automatically guides the instrument operator through the test procedure;</li> <li>— The probe is inserted at least 0.20 m into the outlet of the exhaust system. In justified exemptions where sampling at this depth is not possible, the probe is inserted at least 0.05 m. The sampling probe does not touch the walls of the tailpipe;</li> <li>— If the exhaust system has more than one outlet, the test is done to all of them and the respective PN-PTI limit is respected at all tests. In this case, the highest measured PN concentration measured at different exhaust system outlets is considered to be the vehicle's PN concentration;</li> <li>— The vehicle operates at low idling. In case the engine of a vehicle is not switched on at static conditions then the start/stop system is deactivated by the test operator. For hybrid and plug-in hybrid vehicles, the thermal engine is required to be switched on (e.g., by switching on the air-conditioning system for hybrids or by selecting battery charging mode for plug-in hybrids);</li> <li>— After the probe has been inserted into the tailpipe, the following steps are followed for the PN-PTI test: <ul style="list-style-type: none"> <li>(a) A stabilization period of at least 15 seconds with the engine running at idle speed. Optionally, before the stabilization period 2-3 accelerations up to maximum 2 000 rpm engine speed are performed,</li> <li>(b) After the stabilisation period, the PN concentration emissions are</li> </ul> </li> </ul>				

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	<p>measured. The duration of the test is at least 15 seconds (total measurement duration). The test result is the average PN concentration of the measurement duration. If the measured PN concentration is more than two times the PN-PTI limit then the measurement may stop immediately before waiting for 15 seconds to elapse and the test result is reported.</p> <p>After the completion of the test procedure, the PN-PTI instrument reports (and stores or prints) the average PN concentration of the vehicle and a “PASS” or “FAIL” message.</p> <p>— If the test result is less than or equal to the PN-PTI limit, the instrument reports a “PASS” message and the test was passed.</p> <p>— If the test result is greater than the PN-PTI limit, the instrument reports a “FAIL” message and the test failed.</p>				

### 3.3. Test equipment

Vehicle emissions are tested using equipment designed to establish accurately whether the limit values prescribed or indicated by the manufacturer have been complied with.

For the particulate number counting test, the equipment shall comply with the requirements laid down in the Resolution R.E.6 on test-equipment, skills and training of inspectors, supervision, chapter 3.”