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Item 15.2. of the provisional agenda

**Consideration of technical regulations to be listed in
the Compendium of Candidates for UN GTRs, if any****Request to list in the compendium of candidate Global
Technical Regulations (compendium of candidates) the
United States of America's Durability Driving Enforcement
Procedure for two-wheeled vehicles****Submitted by the representative of the United States of America***

The document reproduced below is submitted by the United States of America to the Executive Committee (AC.3) for consideration. It is a request to include in the Compendium of Candidates the Durability Driving Enforcement Procedure. In order to be considered by AC.3, this request is accompanied by a copy of the regulations mentioned (see Article 5, paras. 5.2.1., 5.2.1.1. and 5.2.2. of the 1998 Agreement).

* In accordance with the programme of work of the Inland Transport Committee for 2021 as outlined in proposed programme budget for 2021 (A/75/6 (part V sect. 20) para 20.51), 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.



Request to list in the compendium of candidate Global Technical Regulations (compendium of candidates) the Durability Driving Enforcement Procedure

1. USA requests to include in the Compendium of Candidates the USA’s Durability Driving Enforcement Procedure. The USA requests to include in the Compendium of Candidates the California Air Resources Board (CARB) durability Driving Enforcement Procedure.

I. Background

2. The USA and CARB have had vehicle durability requirements since the initial regulation for on-highway motorcycles/motorcycles (two- and three- wheeled vehicles) in the 1970’s. The requirements are included in the next section.

II. Description of Regulations

3. The regulations below are listed in EPA 40 CFR §86.432-78 and §86.427-78. The language for the California Air Resources Board is listed in 13 CCR § 1958.

4. United States Environmental Protection Agency

Extract from §86.427-78 Emission tests:

(a) (i) Each test vehicle shall be driven with all emission control systems installed and operating for the following total test distances, or for such lesser distances as the Administrator may agree to as meeting the objectives of this procedure. (See §86.419 for class explanation.)

<i>Displacement class</i>	<i>Total test distance (kilometers)</i>	<i>Minimum test distance (kilometers)</i>	<i>Minimum number of tests</i>
I	6,000	2,500	4
II	9,000	2,500	4
III	15,000	3,500	4

(ii) A zero kilometre emission test may be performed prior to the beginning of service accumulation.

(b) All vehicles shall undergo at least four emission tests; one at the minimum test distance, one before and one after periodic maintenance, and one at the total test distance. If no maintenance is scheduled, then at least two tests will be performed, at equal intervals, between the minimum and total test distances. Additional tests may be performed; such tests must be at equal intervals and approved by the Administrator prior to starting service accumulation.

(c) Where the Administrator agrees to a lesser distance for service accumulation, he may modify the maintenance provisions of this subpart.

(d) All tests required by this subpart must be conducted at an accumulated distance within 250 kilometres (155 miles) of the nominal distance at each test point.

(e) (i) If a manufacturer conducts multiple tests at any test point at which the data are intended to be used in the calculation of the deterioration factor, the number of tests must be the same at each point and may not exceed three valid tests unless the manufacturer chooses to average the test results.

(ii) If the manufacturer chooses to average the test results at a test point, he may conduct more tests than the minimum number of tests conducted at any other test point.

The results of the multiple tests shall be averaged to create a single value which is the test point value used in the deterioration factor calculation specified in §86.432-78.

(iii) When using this option to generate data for a particular test point, the manufacturer must include in the average all valid test data generated at that test point.

(iv) The manufacturer shall follow the same procedure for all exhaust pollutants.

(v) The test results obtained from the emission tests performed before and after maintenance affecting emissions shall not be averaged.

(f) The Administrator may require that any one or more of the test vehicles be submitted to him, at such places as he may designate, for the purpose of conducting emissions tests. The Administrator may specify that he will conduct such testing at the manufacturer's facility, in which case instrumentation and equipment specified by the Administrator shall be made available by the manufacturer for test operations. Any testing conducted at a manufacturer's facility pursuant to this paragraph shall be scheduled by the manufacturer as promptly as possible.

(g) Whenever the Administrator conducts a test on a test vehicle, the results of that test, unless subsequently invalidated by the Administrator, shall comprise the data for the vehicle at that prescribed test point and the manufacturer's data for that prescribed test point shall not be used in determining compliance with emission standards.

(42 FR 1126, Jan. 5, 1977, as amended at 49 FR 48139, Dec. 10, 1984)

5. Extract from: §86.432-78 Deterioration factor.

(a) Deterioration factors shall be developed for each test vehicle from the emission test results. A separate factor shall be developed for each pollutant. The applicable data to be used in calculating these factors are:

(i) The results from all valid tests conducted by the manufacturer or Administrator at scheduled test intervals.

(ii) The results from tests conducted before and after scheduled maintenance unless specifically excluded by the Administrator.

(iii) The results from tests conducted before and after unscheduled maintenance, if approval of the maintenance by the Administrator was conditioned on the data being used in the deterioration factor calculation.

(b) Emission results which are less than 0.10 g/km shall be considered to be 0.10 g/km for purposes of this section.

(c) Test results for each pollutant shall be plotted as a function of the service accumulated at the start of the emission test, rounded to the nearest kilometre. These results shall be correlated to a straight line, fit by the method of least squares.

(d) An exhaust emission deterioration factor will be calculated by dividing the predicted emissions at the useful life distance by the predicted emissions at the total test distance. Predicted emissions are obtained from the correlation developed in paragraph (c) of this section.

Factor = Predicted total distance emissions ÷ Predicted total test distance emissions.

These interpolated and extrapolated values shall be carried out to four places to the right of the decimal point before dividing one by the other to determine the deterioration factor. The results shall be rounded to three places to the right of the decimal point.

(e) Deterioration factors computed to be less than 1.000 shall be 1.000.

(f) (i) The manufacturer has the option of applying an outlier test point procedure to completed durability data within its certification testing program for a given model year.

(ii) The outlier procedure will be specified by the Administrator.

(iii) For any pollutant, durability-data test points that are identified as outliers shall not be included in the determination of deterioration factors if the manufacturer has elected this option.

(iv) The manufacturer shall specify to the Administrator, before the certification of the first engine family for that model year, if it intends to use the outlier procedure.

(v) The manufacturer may not change procedures after the first engine family of the model year is certified.

(vi) Where the manufacturer chooses to apply the outlier procedure to a data set containing data which were averaged under §86.427-78(e), the outlier procedure shall be completed before averaging the data.

(42 FR 1126, Jan. 5, 1977, as amended at 42 FR 56737, Oct. 28, 1977; 49 FR 48139, Dec. 10, 1984; 81 FR 73979, Oct. 25, 2016)

6. California Air Resources Board:

Extract from 13 CCR § 1958 - § 1958. Exhaust Emission Standards and Test Procedures - Motorcycles and Motorcycle Engines Manufactured on or After January 1, 1978:

"...

(c) The test procedures for determining compliance with these standards are set forth in Subparts E and F, Part 86, Title 40, Code of Federal Regulations, as they existed on April 15, 1978, for 1978 through 1987 model years, and they existed on July 7, 1986, for 1988 and subsequent model years.

(i) When the word "Administrator" is used in these federal regulations, it shall mean the executive officer of the state board.

(ii) When a California service accumulation vehicle is used, the California standards for Class I and II motorcycles for the manufacturer designated standards (STDjx) for Class III motorcycles as defined above shall supersede corresponding federal standards in Subpart E of the federal regulations.

(iii) Pursuant to the federal certification protocol under 40 CFR Section 86.432-78, a manufacturer has the option of applying an outlier test point procedure. Where the manufacturer chooses to apply the optional procedure, the California statistical outlier procedure entitled "Calculation of t-Statistic for Deterioration Data Outlier Test," dated December 17, 1976, shall be used to test for irregular data from a durability-data set. If any data point is identified by the manufacturer as a statistical outlier, the executive officer shall determine, on the basis of an engineering analysis of the cause of the outlier submitted by the manufacturer, whether the outlier is to be rejected. The outlier shall be rejected only if the executive officer determines that the outlier does not reflect representative characteristics of the emission control system anomaly, test procedure error, or an extraordinary circumstance not expected to recur. Only the identified outlier shall be eliminated; other data at that test point (i.e., data for other pollutants) shall not be eliminated unless the executive officer determines, based on the engineering analysis, that they also do not reflect representative characteristics of the emission control system. All durability test data, including any outliers and the manufacturer's engineering analysis shall be submitted with the final application.

(iv) When a federal service accumulation vehicle does not meet the applicable California engine family standards, a stabilized "worst case" California configuration vehicle may be utilized to demonstrate compliance with the California standards.

Before an emission test is conducted, the vehicle shall accumulate the following applicable minimum test distance:

<i>Class</i>	<i>Distance (Kilometres)</i>
I	2500
II	2500
III	3500

The test shall be conducted at an accumulated distance within 250 kilometers (155 miles) of the nominal test distance.

A deterioration factor (DF) defined as the extrapolated useful life distance emissions divided by the interpolated minimum test distance emissions shall be computed using emissions data from the federal service accumulation vehicle. The DF shall be applied to the stabilized vehicle test data to obtain useful life emissions. The useful life emissions shall be equal to or less than the applicable California standards in order to obtain California Certification.

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III. Related documents

7. 40 CFR § 86.427-78 Emission tests - Code of Federal Regulations (ecfr.io)
 8. 40 CFR § 86.432-78 Deterioration factor - Code of Federal Regulations (ecfr.io)
 9. 13 CCR § 1958 § 1958. Exhaust Emission Standards and Test Procedures - Motorcycles and Motorcycle Engines Manufactured on or After January 1, 1978.
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