Transmitted by the Chairman of the GRPE informal group on Off-Cycle Emissions (OCE)

Informal document No. GRPE-56-14
(56th GRPE, 3-6 June 2008,
agenda item 2(a))

Draft global technical regulation on Off-Cycle Emissions (OCE)

TABLE OF CONTENTS

A. Statement of Technical Rationale and Justification

1. Introduction

Traditionally, vehicle emissions have been regulated by the use of standardised laboratory-based test cycles. Emissions which occur under conditions not well represented by the laboratory-based test cycles are called off-cycle emissions. The objective of this Global Technical Regulation ("gtr") is to establish a harmonized regulation which ensures that off-cycle emissions from heavy-duty engines and vehicles are appropriately controlled over a broad range of engine and ambient operating conditions encountered during normal in-use vehicle operation.

The gtr is designed to be applicable to engines certified or type approved under the test procedures of the World-Harmonized Heavy-duty Certification (WHDC) gtr. The intent behind this gtr is to control emissions during engine and ambient operating conditions that are broader than those covered in emissions testing using the two components of the WHDC, the World-Harmonized Transient Cycle and the World-Harmonized Steady-state Cycle.

This Off-cycle Emissions (OCE) gtr includes two components. First, it contains provisions that prohibit the use of defeat strategies. Second, it introduces a methodology, termed the World-Harmonised Not-to-Exceed (WNTE) methodology, for limiting off-cycle emissions. The WNTE includes harmonized off-cycle emissions factors, applicable under a broad range of engine and ambient operating conditions. When the emission factors are applied to the emission limits in force in a specific region, the resulting WNTE emission limits provide a level below which emissions from the tailpipe shall remain.

It is important to note that the WHDC gtr is being implemented as a global test procedure without emission limits as a first step towards the world harmonization of cycle-based emission certification requirements for heavy-duty engines. During this first stage, Contracting Parties are expected to introduce the WHDC test procedures into their individual regional legislation. However, it is anticipated there will continue to be a range of WHDC-based emission limits in effect in the various regions until such time that world-wide emission limits are adopted as part of the WHDC gtr. This being the case, the WNTE-based emission limits defined in this gtr relate directly to the emission limits to which a specific engine has been certified based on the WHDC test procedures. This structure enables regional authorities to implement a common approach to establishing WNTE-based emission limits, even in the period where global WHDC emission limits are not set out in the WHDC gtr. The eventual adoption of global WHDC-based emission limits will enable world harmonized WNTE emission limits to be set.

It is also important to note that the WNTE does not cover all vehicle and ambient operating conditions. Therefore, Contracting Parties may wish to implement additional requirements and/or test procedures to address off-cycle conditions not represented adequately by the WNTE. These requirements could be set in regional legislation or by future amendments to this gtr.

2. Background on Off-cycle Emissions

The basic regulatory approach historically utilized by a number of countries to reduce exhaust emissions from heavy-duty engines was to use a combination of an emissions certification test cycle with an emissions limit (or standard) and a prohibition against the use of defeat strategies.

The test cycle for heavy-duty engines, while different among various countries, had a number of common characteristics. The test cycle was based on an engine test, performed in a laboratory, under a limited range of ambient conditions, and the test cycle contained a pre-defined set of speed and load points always run in the same order. The prohibition against the use of defeat strategies generally required that the engine could not operate differently in-use in a manner which reduced the effectiveness of the engine's emission control system.

Heavy-duty vehicles are driven over a wide variety of operating conditions (e.g. starts, stops, accelerations, decelerations, steady cruises) and under varying ambient conditions (e.g. temperature, humidity and barometric pressure). The establishment of the WHDC gtr will result in a laboratory based test cycle which reflects world-wide on-road heavy-duty engine operation. However, as with any standardized test cycle, the wide variety of real world driving conditions cannot be fully incorporated within the WHDC.

Heavy-duty engines have progressed over the past decade to include very sophisticated electronic and mechanical systems. These systems are capable of controlling the performance of heavy-duty engines over a wide variety of driving conditions. A central aspect of this sophisticated engineering is the capability to continuously monitor a wide range of operating parameters, including engine rotational speed, vehicle ground speed, and intake manifold pressure and temperature, and to modify the performance of the engine and its emission control systems in real-time in response to the monitored data.

Defeat strategy provisions have not generally provided a quantified numerical emissions limit and associated test procedure for conditions outside of the regulatory test cycles. This has often resulted in the need for case-by-case decision making during the certification and type-approval process regarding whether a particular element of design constitutes a defeat strategy. These design-based reviews have become increasingly difficult as the engines and the emission control technologies have grown more complex.

The approach contained in this OCE gtr may reduce the reliance on case-by-case design reviews by requiring emission compliance during a wide range off-cycle operation. The provisions of this gtr supplement the prohibition against defeat strategies and can allow for a more efficient and objective performance-based means for evaluating off-cycle emissions behavior.

When considered as a whole, the WHDC gtr and this OCE gtr promote global harmonization of regulations that reduce air pollution from heavy-duty vehicles and engines.

3. Procedural Background and Development of GTR

This gtr was developed by the GRPE informal working group on Off-cycle Emissions (the OCE Informal group). A full report of the work of the OCE Informal group, its deliberations and conclusions is provided in the group's Technical Report, TRANS/WP.29/GRPE/xxxxx.

The work to develop this gtr began with the establishment of the OCE Informal group. The OCE Informal group had its first meeting in December 2001.

As required by the 1998 Global Agreement, a formal proposal for the establishment of a gtr was proposed to the Executive Committee for the 1998 Agreement (AC3) by the United States. At its session on 13th March 2005, the proposal from the United States was approved as a gtr project by AC.3 (TRANS/WP.29/AC.3/13).

The following is a summary of the key issues that were discussed and resolved during the development of this gtr by the OCE working group. Additional discussion of these issues can be found in the Technical Report.

WNTE Control Area
Ambient Operating Conditions (e.g. Temperature, Humidity, Altitude)
Definition of Defeat Strategy and related items

One of the key issues discussed during the development of the OCE gtr was the scope of the gtr with respect to in-use, on-vehicle emissions testing. After considerable debate by the OCE working group, it was decided the OCE gtr would not include specifications for in-use, on-vehicle emission measurement. However, the OCE gtr was developed with the specific intent of enabling the testing of compliance with the WNTE during in-use on-road operation. Therefore, it may be appropriate in the future to consider the development of a gtr which would include harmonized test procedures for in-use on vehicle emissions measurement.

The WNTE method originated as a concept that was enforced using in-use, on-vehicle testing. In order to provide flexibility to Contracting Parties as how to implement the gtr into regional legislation, additional provisions were included so that the WNTE methodology could also be applied as a laboratory based test procedure. This laboratory procedure was developed explicitly for the gtr and was not tested in a laboratory before inclusion in the legal text. For that reason there remain uncertainties as to the effectiveness of the laboratory based test procedure in preventing defeat strategies, so the procedure may need to be updated in a future version of the gtr. One of the aspects that will require validation is the applicability of the same WNTE components to an in-use on-vehicle test and a laboratory based test. The rationale for components being introduced in the first place relates to the wide variation in vehicle and ambient operating conditions on the road. In the much more stable laboratory tests conditions, the same rationale does not exist for a WNTE component so no adjustment to the WHTC emission limit may be necessary.

4. Technical and Economic Feasibility

The OCE gtr has been developed with the input and expertise from a large number of stakeholders, including regulatory authorities, type approval authorities, engine and vehicle manufacturers, and independent technical consultants. The gtr has built upon the experience of many organizations and individuals with expertise in addressing off-cycle emissions.

The gtr has been designed to improve the control of off-cycle emissions, and the WNTE requirements specified in the gtr are based, in-part, on the approaches which exist in some Contracting Parties' existing legislation.

The WNTE requirements in this gtr are a function of the laboratory-based test cycle limits, specifically emission limits associated with the WHDC gtr's transient test cycle (the WHTC). However, the WHDC gtr does not currently contain any limit values. For this reason, no formal analysis of the technical and economic feasibility of the WNTE limits in this OCE gtr has been undertaken. It is recommended that Contracting Parties consider the technical and economic feasibility of the OCE gtr when they adopt this regulation into their national requirements.

5. Anticipated Benefits

This gtr is expected to result in a number of benefits, including: improved emissions control, more efficient certification or type approval methods, and reduced costs for engine and vehicle manufacturers.

The addition of harmonized defeat strategy provisions and OCE requirements to the certification testing regime (e.g. the WHDC test cycles) will more adequately ensure that an appropriate control of emissions is achieved in-use, under a wide range of operating conditions. As a result, it can be expected that the adoption of this gtr by Contracting Parties will result in an improved level of emissions control.

The gtr may reduce the need for time consuming case-by-case design reviews and provide a more efficient and objective performance-based means for evaluating off-cycle emissions.

Finally, heavy-duty engines and vehicles are often produced for the world market. It is economically more efficient for manufacturers to design and produce models which meet emissions objectives specified in a common Global Technical Regulation rather than developing products to meet a wide array of different and potentially conflicting regulatory requirements in individual countries and regions. This in turn may allow manufacturers to develop new models more effectively at a lower cost.

6. Potential Cost Effectiveness

A formal cost-effectiveness analysis of the OCE gtr has not been performed for the reasons discussed in Section A.4.

However, it is fully expected that this information will be developed, generally, in response to the adoption of this regulation in national requirements and also at the time the WHDC gtr develops harmonized limit values, and the future corresponding amendments to this gtr. For example, each Contracting Party adopting this gtr into its national law will be expected to determine the appropriate level of stringency associated with using these new test procedures, with these new values being at least as stringent as comparable existing requirements. Also, experience will be gained by the heavy-duty engine industry as to any costs and cost savings associated with using this test procedure. The cost and emissions performance data could be analyzed as part of a possible future amendment to this gtr to determine the cost effectiveness of the test procedures along with the application of any future harmonized WHDC limit values. While no formal cost-effectiveness has been done, the belief of the GRPE experts is that there are clear benefits associated with this gtr, as discussed in Section A.5.

B. Text of Regulations

1. Purpose

This gtr establishes performance-based off-cycle emission requirements and a prohibition on defeat strategies for heavy-duty engines and vehicles so as to achieve effective control of emissions under a broad range of engine and ambient operating conditions encountered during normal in-use vehicle operation.

2. Scope

This regulation applies to the emission of gaseous and particulate pollutants from compression-ignition engines, and positive-ignition engines fuelled with natural gas (NG) or liquefied petroleum gas (LPG), used for propelling motor vehicles of categories 1-2 and 2[1], having a design speed exceeding 25 km/h and having a maximum mass exceeding 3.5 tonnes.

3. Definitions

3.1 Auxiliary Emission Strategy ("AES")

Means an emission strategy that becomes active and replaces or modifies a base emission strategy for a specific purpose or purposes and in response to a specific set of ambient and/or operating conditions and only remains operational as long as those conditions exist.

3.2 Base Emission Strategy ("BES")

Means an emission strategy that is active throughout the speed and load operating range of the engine unless an AES is activated.

[1] See Special Resolution number 1, "Special Resolution concerning the common definition of vehicle categories masses and dimensions [SR1]."

3.3 Defeat Strategy

Means an emission strategy that does not meet the performance requirements for a base and/or auxiliary emission strategy as specified in this gtr.

3.4 Element of Design

Means (a) the engine system
(b) any control system, including: computer software; electronic control systems; and computer logic;
(c) any control system calibration; or
(d) the results of any interaction of systems

3.5 Emission Strategy

Means an element or set of elements of design that is incorporated into the overall design of an engine system or vehicle and used in controlling emissions.

3.6 Emission Control System

Means the elements of design and emission strategies developed or calibrated for the purpose of controlling emissions.

3.7 Engine Family

Means a manufacturer's grouping of engines as defined in gtr No. 4[2]

3.8 Engine Starting

Means the process from the initiation of engine cranking until the engine reaches a speed 150 rpm below the normal, warmed up idle speed (as determined in the drive position for vehicles equipped with an automatic transmission).

3.9 Engine System

Means the engine, the emission control system and the communication interface (hardware and messages) between the engine electronic control unit(s) and any other powertrain or vehicle control unit.

3.10 Engine Warm-up

Means sufficient vehicle operation such that the coolant temperature reaches a minimum temperature of at least 70 degrees C.

3.11 Periodic Regeneration

Means the regeneration process of an exhaust aftertreatment system that occurs periodically in typically less than 100 hours of normal engine operation.

---

[2] Test Procedures for Compression-Ignition (C.I) Engines and Positive- Ignition Engines Fuelled with Natural Gas (NG) or Liquefied Petroleum Gas (LPG) with regard to the Emission of Pollutants (Established in The Global Registry on 15 November 2006). References to the gtr No.4 relate to the document established on 15 November 2006. Later changes to the WHDC gtr will have to be revaluated as to their applicability to the OCE GTR.

3.12 Rated Speed

Means the maximum full load speed allowed by the governor as specified by the manufacturer in his sales and service literature, or, if such a governor is not present, the speed at which the maximum power is obtained from the engine, as specified by the manufacturer in his sales and service literature

3.13 Regulated Emissions

Means “gaseous pollutants” defined as carbon monoxide, hydrocarbons and/or non-methane hydrocarbons (assuming a ratio of $CH_{1.85}$ for diesel, $CH_{2.525}$ for LPG and $CH_{2.93}$ for NG, and an assumed molecule $CH_3O_{0.5}$ for ethanol fuelled diesel engines), methane (assuming a ration of CH_4 for NG) and oxides of nitrogen (expressed in nitrogen dioxide (NO_2) equivalent) and “particulate matter” (PM) defined as any material collected on a specified filter medium after diluting exhaust with clean filtered air to a temperature between 315 K (42 ° C) and 325 K (52 ° C), as measured at a point immediately upstream of the filter, this is primarily carbon, condensed hydrocarbons, and sulphates with associated water.

.

4. General Requirements

Any engine system and any element of design liable to affect the emission of regulated pollutants shall be designed, constructed, assembled and installed so as to enable the engine and vehicle to comply with the provisions of this gtr.

4.1 Prohibition of Defeat Strategies

Engine systems and vehicles shall not be equipped with a defeat strategy.

4.2 WNTE Emission Requirement

This gtr requires that engine systems and vehicles comply with the WNTE emission limit values described in paragraph 5.2. For laboratory based testing according to paragraph 7.4 no test result shall exceed the emissions limits specified in paragraph 5.2.

5. Performance Requirements

5.1 Emission Strategies

Emission strategies shall be designed so as to enable the engine system, in normal use, to comply with the provisions of this gtr. Normal use is not restricted to the conditions of use as specified in paragraph 6.

5.1.1 Requirements for Base Emission Strategies

A BES shall not discriminate between operation on an applicable type approval or certification test and other operation and provide a lesser level of emission control under conditions not substantially included in the applicable type approval or certification tests.

5.1.2 Requirements for Auxiliary Emission Strategies

An AES shall not reduce the effectiveness of the emission control relative to a BES under conditions that may reasonably be expected to be encountered in normal vehicle operation and use, unless the AES satisfies one the following specific exceptions:

- its operation is substantially included in the applicable type approval or certification tests, including the WNTE provisions of paragraph 7.

- it is activated for the purposes of protecting the engine and/or vehicle from damage or accident.
- it is only activated during engine starting or warm up as defined in this gtr.
- its operation is used to trade-off the control of one type of regulated emissions in order to maintain control of another type of regulated emissions under specific ambient or operating conditions not substantially included in the type approval or certification tests. The overall affect of such an AES shall be to compensate for the effects of extreme. ambient conditions in a manner that provides acceptable control of all regulated emissions.

5.2 WNTE Limits for Gaseous and Particulate Exhaust Emissions

5.2.1 Exhaust emissions shall not exceed the applicable WNTE emission limits specified in 5.2.2 when the engine is operated in accordance with the conditions and procedures set out in paragraphs 6 and 7.

5.2.2 The applicable WNTE emission limits are determined, as follows:

WNTE Emission Limit =WHTC Emission Limit + WNTE Component

Where:

“WHTC Emission Limit” is the emission limit (EL) to which the engine is certified pursuant to the WHDC gtr; and

“WNTE Component” is determined by equations 1 to 4 in paragraph 5.2.3

5.2.3 The applicable WNTE Components shall be determined using the following equations, when the ELs are expressed in g/kWh:

for NOx:	WNTE Component = 0.25 * EL + 0.1	(1)
for HC:	WNTE Component = 0.15 * EL + 0.07	(2)
for CO:	WNTE Component = 0.20 * EL + 0.2	(3)
for PM:	WNTE Component = 0.25 * EL + 0.003	(4)

Where the applicable ELs are expressed in units other than units of g/kWh, the additive constants in the equations shall be converted from g/kWh to the appropriate units.

The WNTE Component shall be rounded to the number of places to the right of the decimal point indicated by the applicable EL in accordance with the rounding method of ASTM E 29-06.

6. Applicable Ambient and Operating Conditions

The WNTE emission limits shall apply at

- all atmospheric pressures greater than or equal to 82.5 kPa,
- all temperatures less than or equal to the temperature determined by equation 5 at the specified atmospheric pressure:

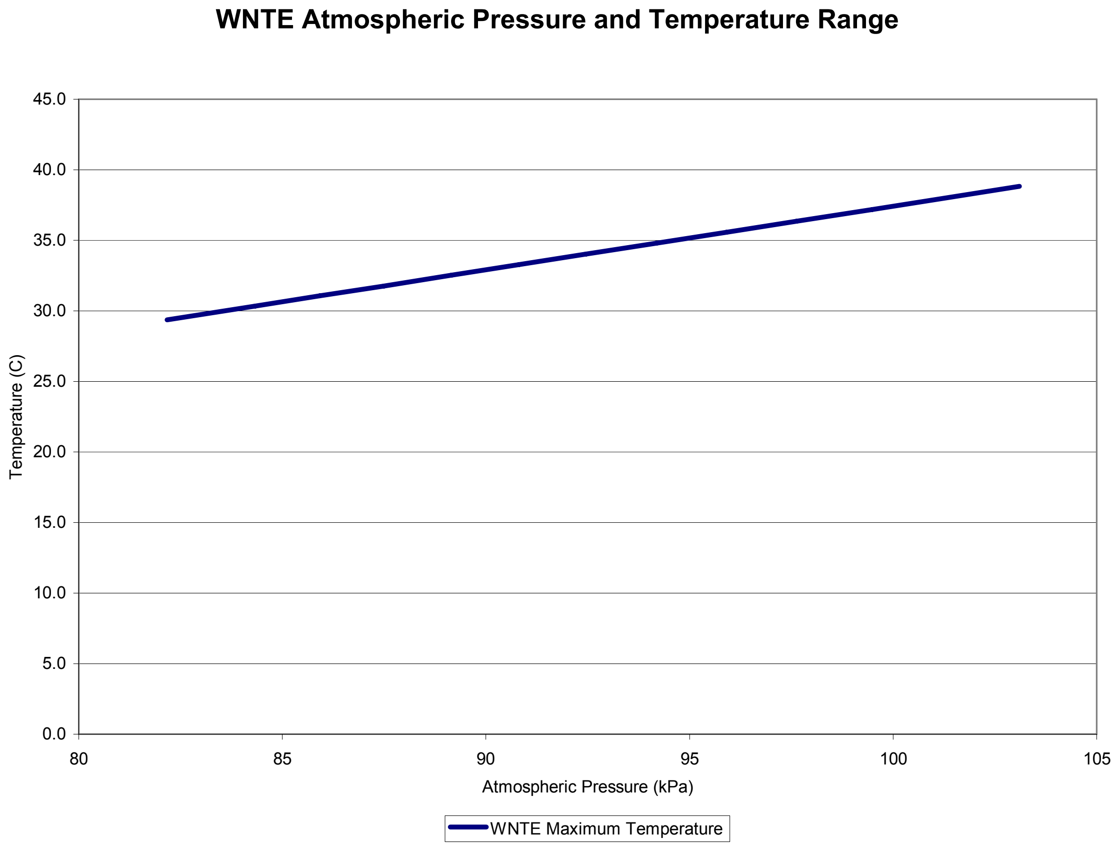
$$T = -0.4514 * (101.3 - p_b) + 311 \quad (5)$$

Where:
T is the ambient air temperature, K
p_b is the atmospheric pressure, kPa

– all engine coolant temperatures within the range of 343 K to 373 K (70°C to 100°C

The applicable ambient atmospheric pressure and temperature conditions are shown in figure 1.

Figure 1 : Illustration of Atmospheric Pressure and Temperature Conditions



7. WNTE Methodology

7.1 WNTE Control area

The WNTE control area consists of the engine speed and load points defined in Sections 7.1.1 through 7.1.6. Figure 2 is an example illustration of the WNTE control area.

7.1.1 Engine speed range

The WNTE control area shall include all operating speeds between the 30th percentile cumulative speed distribution over the WHTC test cycle, including idle, (n_{30}) and the highest speed where 70% of the maximum power occurs (n_{hi}). Figure 3 is an example of the WNTE cumulative speed frequency distribution for a specific engine.

7.1.2 Engine torque range

The WNTE control area shall include all engine load points with a torque value greater than or equal to 30% of the maximum torque value produced by the engine.

7.1.3 Engine power range

Notwithstanding the provisions of Sections 7.1.1 and 7.1.2, speed and load points below 30% of the maximum power value produced by the engine shall be excluded from the WNTE Control Area for all emissions.

7.1.4 Application of Engine Family Concept

In principal, any engine within a family with a unique torque/power curve will have its individual WNTE control area. For in-use testing, the individual WNTE control area of the respective engine shall apply. For type approval (certification) testing under the engine family concept of the WHDC gtr the manufacturer may optionally apply a single WNTE control area for the engine family under the following provisions:

- A single engine speed range of the WNTE control area may be used; if the measured engine speeds n_{30} and n_{hi} are within ± 3 % of the engine speeds as declared by the manufacturer. If the tolerance is exceeded for any of the engine speeds, the measured engine speeds shall be used for determining the WNTE control area.
- A single engine torque/power range of the WNTE control area may be used, if it covers the full range from the highest to the lowest rating of the family. Alternatively, grouping of engine ratings into different WNTE control areas is permitted.

Figure 2: Example WNTE Control Area

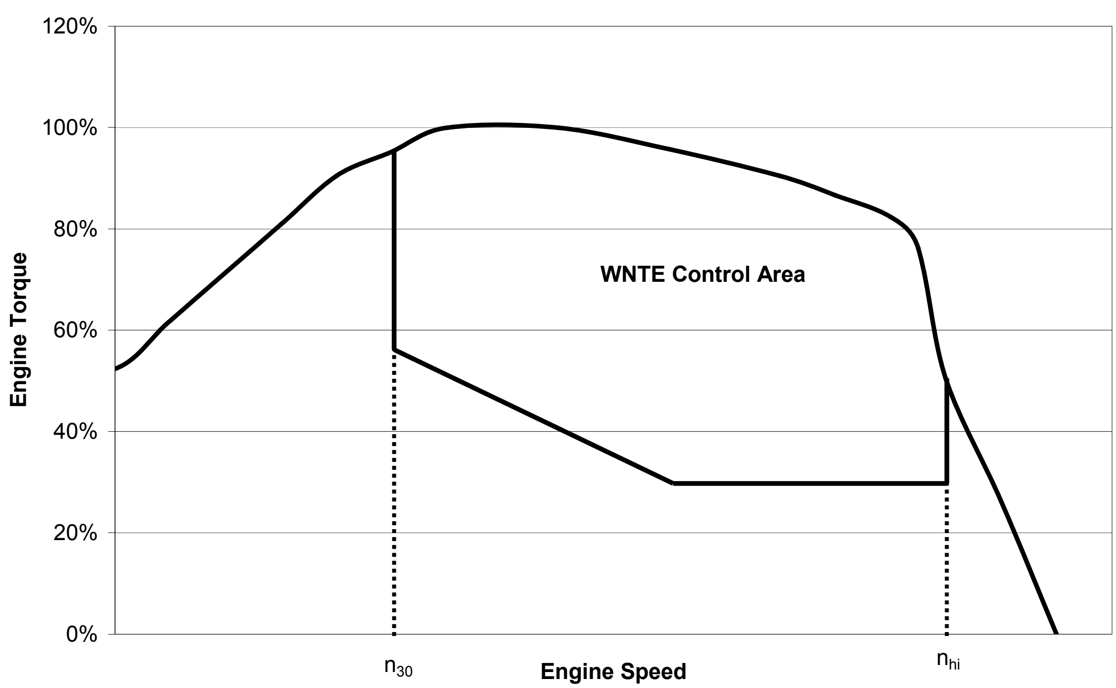
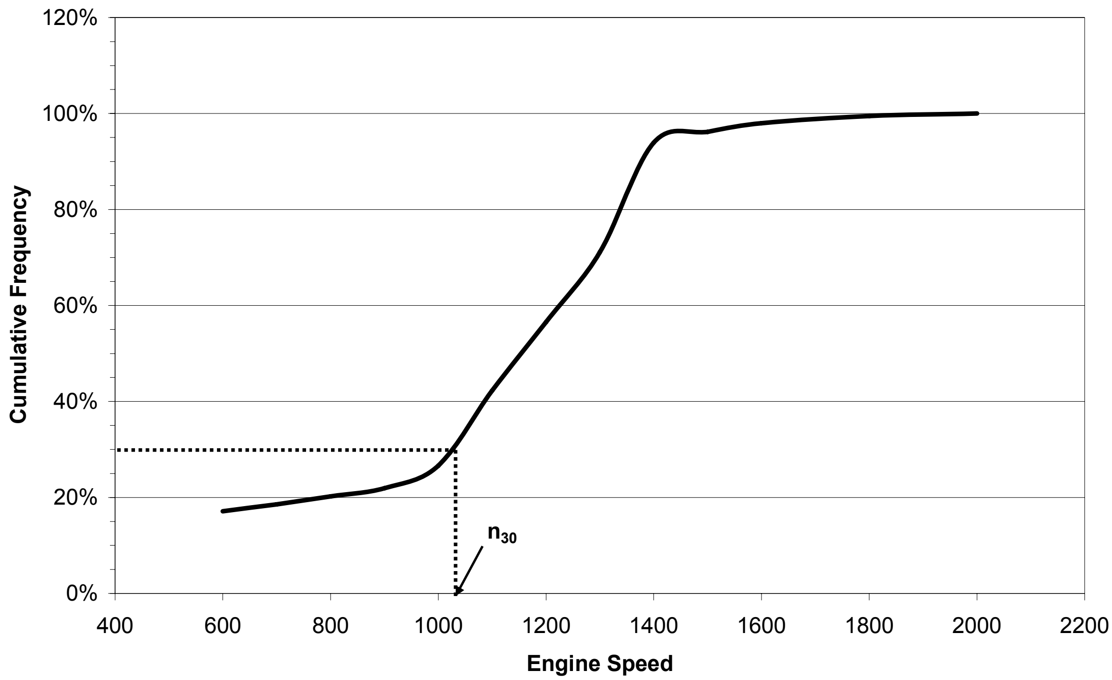


Figure 3: Example of WNTE cumulative speed frequency distribution



7.1.5 Compliance exclusion from certain WNTE operating points

The manufacturer may request that the approval authority excludes operating points from the WNTE control area defined in paragraph 7.1.1 through 7.1.4 during the certification/type approval. The approval authority may grant this exclusion if the manufacturer can demonstrate that the engine is never capable of operating at such points when used in any vehicle combination..

7. 2 Minimum WNTE Event Duration and Data Sampling Frequency

7.2.1 To determine compliance with the WNTE emissions limits specified paragraph 5.2, the engine shall be operated within the WNTE control area defined in paragraph 7.1 and its emissions shall be measured and integrated over a minimum period of 30 seconds. A WNTE event is defined as a single set of integrated emissions over the period of time. For example, if the engine operates for 65 consecutive seconds within the WNTE control area and ambient conditions this would constitute a single WNTE event and the emissions would be averaged over the full 65 second period. In the case of lab testing the integrating period of time of 7.5 shall apply.

7.2.2 For engines equipped with emission controls that include periodic regeneration events, if a regeneration event occurs during the WNTE test, then the averaging period shall be at least as long as the time between the events multiplied by the number of full regeneration events within the sampling period. This requirement only applies for engines that send an electronic signal indicating the start of the regeneration event.

7.2.3 A WNTE event is a sequence of data collected at the frequency of at least 1hz during engine operation in the WNTE control area for the minimum event duration or longer. The measured emission data shall be averaged over the duration of each WNTE event.

7.3 WNTE in-use testing

If a Contracting Party selects this gtr as basis for in-use testing, the engine shall be operated under actual in-use conditions. The test results out of the total data set that comply with the provisions of sections 6, 7.1 and 7.2 shall be used for determining compliance with the WNTE emission limits specified in paragraph 5.2. It is understood that emission during some WNTE events may not be expected to comply with the WNTE emission limits; therefore,; Contracting Parties should define and implement statistical methods for determining compliance that are consistent with Sections 7.2 and 7.3

7.4 WNTE laboratory testing

If a contracting party selects this gtr for the basis for laboratory testing the following provision shall apply.

7.4.1 The specific mass emissions of regulated pollutants shall be determined on the basis of randomly defined test points distributed across the WNTE control area. All the test points shall be contained within 3 randomly selected grid cells imposed over the control area. The grid shall comprise of 9 cells for engines with a rated speed less than 3000 rpm and 12 cells for engines with a rated speed greater than or equal to 3000 rpm. The grids are defined as follows:

- The outer boundaries of the grid are aligned to the WNTE control area;
- 2 vertical lines spaced at equal distance between engine speeds n30 and ,n_{hi} for 9 cell grids, or 3 vertical lines spaced at equal distance between engine speeds n30 and n_{hi} for 12 cell grids; and
- 2 lines spaced at equal distance of engine torque (⅓) at each vertical line within the WNTE control area.

Examples of the grids applied to specific engines are shown in Figure 5 and 6.

7.4.2 The 3 selected grid cells shall each include 5 random test points, so a total of 15 random points shall be tested within the WNTE control area. Each cell shall be tested sequentially; therefore all 5 points in one grid cell are tested before transiting to the next grid cell. The test points are combined into a single ramped steady state cycle.

7.4.3 The order in which each of the grid cells are tested, and the order of testing the points within the grid cell, shall be randomly determined. The 3 grid cells to be tested, the 15 test points, the order of testing the grid cells, and the order of the points within a grid cell shall be selected by the type approval or certification authority using acknowledged statistical methods of randomization.

7.4.4 The average specific mass emissions of regulated gaseous pollutants shall not exceed the WNTE limit values specified in paragraph 5.2 when measured over any of the cycles in a grid cell with 5 test points.

7.4.5 The average specific mass emissions of regulated particulate pollutants shall not exceed the WNTE limit values specified in paragraph 5.2 when measured over the whole 15 test point cycle.

7.5. Laboratory test procedure

7.5.1 After completion of the WHSC cycle, the engine shall be preconditioned at mode 9 of the WHSC for a period of three minutes. The test sequence shall start immediately after completion of the preconditioning phase.

7.5.2 The engine shall be operated for 2 minutes at each random test point. This time includes the preceding ramp from the previous steady state point. The transitions between the test points shall be linear for engine speed and load and shall last 20 ± 1 seconds.

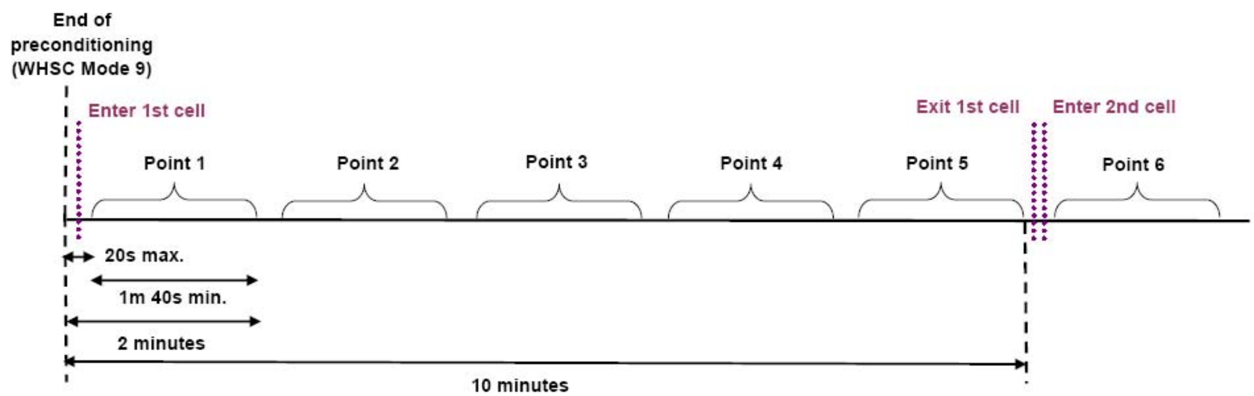
7.5.3 The total test time from start until finish shall be 30 minutes. The test of each set of 5 selected random points in a grid cell shall be 10 minutes, measured from the start of the entry ramp to the 1st point until the end of the steady state measurement at the 5th point. Figure 5 illustrates the sequence of the test procedure.

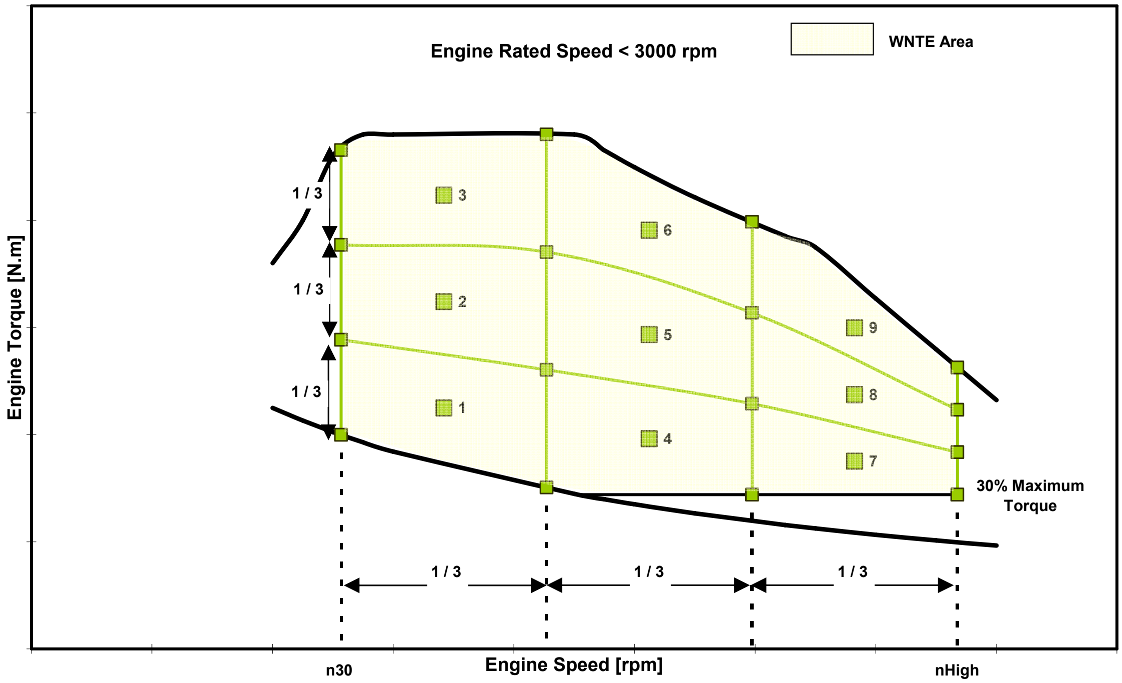
7.5.4 The WNTE laboratory test shall meet the validation statistics of paragraph 7.7.2 of the WHDC gtr.

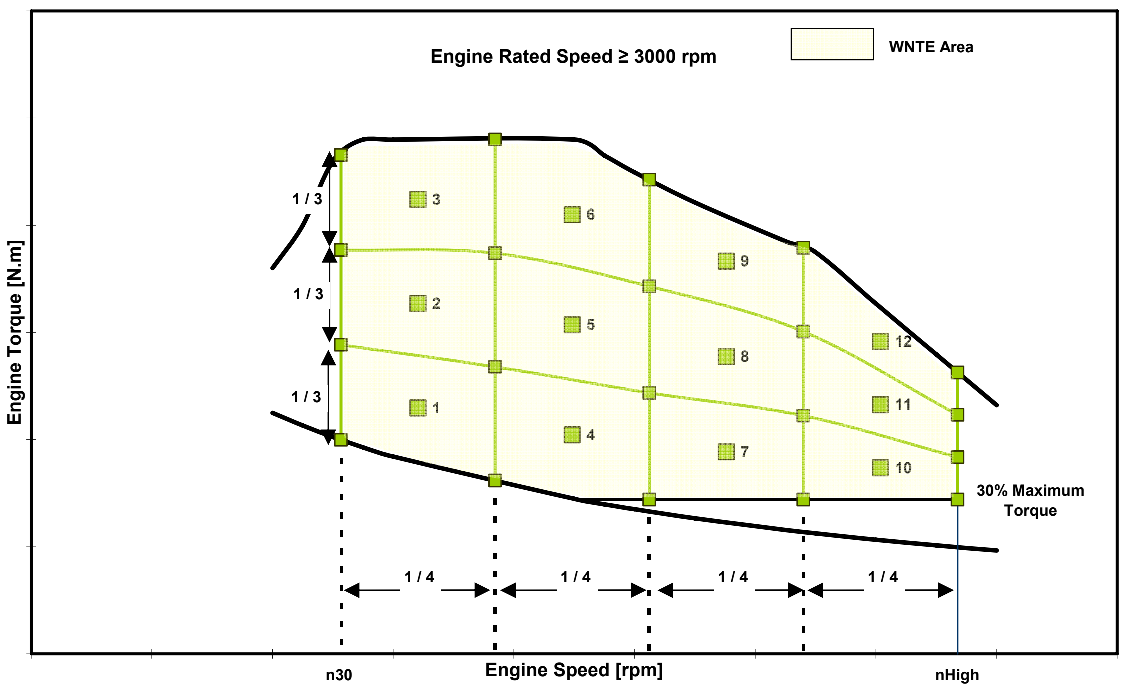
7.5.5 The measurement of the emissions shall be carried out in accordance with paragraph 7.8 of WHDC gtr.

7.5.6 The calculation of the test results shall be carried out in accordance with paragraph 8 of WHDC gtr.

Figure 4: Schematic example of the start of the WNTE test cycle







Figures 5 and 6: WNTE test cycle grids

7.6 Rounding.

Each final test result shall be rounded in one step to the number of places to the right of the decimal point indicated by the applicable WHDC emission standard plus one additional significant figure, in accordance with ASTM E 29-06. No rounding of intermediate values leading to the final brake specific emission result is permitted.

8. WNTE Deficiencies

The concept of a deficiency is to allow an engine or vehicle to be certified as compliant with a regulation even though specific requirements, limited in scope, are not fully met. A WNTE deficiency provision would allow a manufacturer to apply for relief from the WNTE emission requirements under limited conditions, such as extreme ambient temperatures and/or severe operation where vehicles do not accumulate significant mileage. Contracting parties may wish to consider providing WNTE deficiency provisions in regional legislation.

9. WNTE Exemptions

The concept of a WNTE exemption is a set of technical conditions specified by a Contracting Party under which the WNTE emission limits set out in this gtr would not apply. A WNTE exemption shall apply to all engine and vehicle manufacturers.

A Contracting Party may decide to provide a WNTE exemption, in particular with the introduction of more stringent emission limits. For example a WNTE exemption may be necessary if a Contracting Party determines that certain engine or vehicle operation within the WNTE control area cannot achieve the WNTE emission limits. In such a case, the Contracting Party may determine that it is not necessary for engine manufacturers to request a WNTE deficiency for such operation, and that the granting of a WNTE exemption is appropriate. The Contracting Party can determine both the scope of the exemption with respect to the WNTE requirements, as well as the period of time for which the exemption is applicable.

10 Statement of OCE compliance

In the application for certification or type approval the manufacturer shall provide a statement that the engine family or vehicle complies with the requirements of this OCE gtr. In addition to this statement, compliance with the WNTE limits shall be verified through additional tests and certification procedures defined by the contracting parties.

10.1. Example statement of OCE compliance

The following is an example compliance statement:

> "(Name of manufacturer) attests that the engines within this engine family comply with all requirements of the OCE gtr. (Name of manufacturer) makes this statement in good faith, after having performed an appropriate engineering evaluation of the emissions performance of the engines within the engine family over the applicable range of operating and ambient conditions."

10.2 Basis for OCE compliance statement

The manufacturer shall maintain records at the manufacturer's facility which contain all test data, engineering analyses, and other information which provides the basis for the OCE compliance statement. The manufacturer shall provide such information to the Certification or Type Approval Authority upon request.

11. Documentation

A contracting party may decide to require that the manufacturer provides a documentation package. This should describe any element of design and emission control strategy of the engine system and the means by which it controls its output variables, whether that control is direct or indirect.

The information may include a full description of the emission control strategy. In addition, this could include information on the operation of all AES and BES, including a description of the parameters that are modified by any AES and the boundary conditions under which the AES operate, and indication of which AES and BES are likely to be active under the conditions of the test procedures in this gtr.

Editorial Comment: Figures 2, 3, 4, 5 and 6 will be updated and provided by OICA.