Code of Practice
for
Designated Vehicle Emission Testing Centres

Applicable to Testing
Petrol/ Liquefied Petroleum Gas(LPG) and Hybrid
Vehicles of Gross Vehicle Weight (GVW) up to 5,500 kg

- Volume 3 -

Date : 17 September 2021

Issued by the Commissioner for Transport under Section 77F(1)(a)

of the Road Traffic Ordinance (CAP.374)

Table of Contents

Part D Quality Control for Vehicle Emission Tests

Part E Test Centre Management

Tables of Abbreviations

IVE---Institution of Vocational Education, Hong Kong

VTC---Vocational Training Council, Hong Kong

VMAS---Vehicle Mass Analysis System

NOx---Nitrogen Oxides

HC---Hydrocarbons

NO---Nitric Oxide

O_2---Oxygen

CO_2---Carbon Dioxide

ppm---Parts Per Million

BAR-97---Emissions Inspection System Specifications (dated May 1996 with March 26, 1997 addenda) issued by the Bureau of Automotive Repair, California, USA.

Kph---kilometres per hour

70/220/EEC---Council Directive of 20 March 1970 on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from engines of motor vehicles of the European Economic Community

IHP--- Indicated Horse Power

PAU---Power Absorption unit

CVS--- Constant Volume Sampling

IM240---Stands for "Inspection/Maintenance", an "enhanced" emissions testing program with a tailpipe test that lasts 240 seconds on a chassis dynamometer.

RW---Reference Weight

GVW---Gross Vehicle Weight

CVT---Continuous Variable Transmission

NDIR---Non-Dispersive Infrared

FID---Flame Ionization Detector

USEPA--- United States Environmental Protection Agency

RPM---Revolutions Per Minute

Unit Conversions

1 foot=0.3048 meter

1 mile= 1.609 kilometer

1 mph= 1.609 km/h

1 horse power (hp)= 0.7457 kW

1mmHg=13.5951 Pa

$t_C=5/9(t_F-32^oF)$ $^oC/^oF$ (Where t_C and $t_{F\ are}$ ^oC and ^oF respectively)

1cfm= 28.32 litres per minute

1 inch of water=249 Pa

Part A - General Administration Description

1. Emission Testing Fee

1.1 The fee chargeable for each emission test shall be as stipulated in the tenth schedule of the Road Traffic Ordinance and published in the Government Gazette. This fee shall be reviewed and any amendment shall be published in the Government Gazette.

2. Designation Fee

2.1 The designation fee for new application or renewal application for designating a place as a vehicle emission testing centre (Centre) is stipulated in the tenth schedule of the Road Traffic Ordinance and published in the Government Gazette. The designation of a Centre shall be valid for a period of three (3) years from the date specified in the designation letter.

2.2 The designation fee requirement shall not apply to any Centre operated solely by the relevant authorities of the Government of the Hong Kong Special Administrative Region for the enforcement of the Road Traffic Ordinance and its subsidiary regulations.

3. Certificate of Compliance

3.1 A Centre shall purchase books of Certificates of Compliance from the Commissioner for Transport (the Commissioner) at a price as stipulated in the tenth schedule of the Road Traffic Ordinance and published in the Government Gazette.

3.2 Blank certificates shall be returned to the Commissioner after the revocation or termination of the designation of a Centre, and the Commissioner shall refund the Centre with the appropriate amount.

4. Appointment of Approved Vehicle Emission Tester (Tester)

4.1 Each Centre shall nominate suitable staff to attend the training provided by the Environmental Protection Department. After the training, their qualification as a Tester shall be assessed and if the result is found satisfactory, a Letter of Approval shall be issued by the Commissioner, which shall be valid for a period of three (3) years. The Letter of Approval may be renewed for a further period of three (3) years subject to the satisfactory completion of any further training or assessment as considered necessary by the Commissioner. The Testers may be required to attend training during the valid period of the Letter of Approval if it is deemed necessary as specified by the Director of Environmental Protection (the Director) for the proper operation of this Code of Practice.

4.2 The qualifications for consideration of a Tester are that the Tester shall:-

4.2.1 possess one of the following qualifications:

a) a Hong Kong Polytechnic/Technical Institute/ IVE/ VTC Higher Certificate in motor vehicle engineering or equivalent and at least two years full time relevant practical post apprenticeship experience; or

b) a craft certificate or equivalent and at least four years full time relevant practical post apprenticeship experience; or

c) have appropriate recent full time experience in motor vehicle engineering which shall not normally be less than ten years; and

4.2.2 be able to speak in Cantonese and write in Chinese, preferably also speak and write in English; and

4.2.3 have a valid Hong Kong driving licence for driving the type of vehicles to be tested.

5. Appointment and Authority of Responsible Person

5.1 The qualifications for consideration of a Responsible Person shall be no less than that for a Tester.

5.2 Each designated Centre shall nominate Responsible Persons who shall have the following authority:-

5.2.1 to sign the test related forms or documents on behalf of the Centre;

5.2.2 to amend any item marked on an Emission Test Form by a Tester of the Centre;

5.2.3 to supervise the Testers and assistants and ensure they carry out the tests in accordance with the procedures stated in this Code of Practice;

5.2.4 to maintain the daily on-duty record for the Testers to ensure the manpower deployment for conducting the test complies with this Code of Practice.

5.3 The appointment of Testers and Responsible Persons shall be authorized by the Commissioner in writing.

5.4 During the operating hours for emission test, the Centre shall maintain a roster for Responsible Persons and a minimum of one Responsible Person shall be on duty.

6. Emission Testing Appointment

6.1 Emission testing appointments shall be made in accordance with the following procedures:

6.1.1 Each Centre shall be solely responsible for arranging its own testing appointments and maintaining a Register of Appointments in a form acceptable to the Director (Form 1 of Appendix I)

6.1.2 Testing appointments shall only be made within the period specified in the Emission Testing Notice (Form 3 of Appendix I) or otherwise specified in writing by the Commissioner, and by classes of vehicle for which the Centre has been designated for.

6.1.3 The Centre may require the testing fee to be paid at the time when a testing appointment is made, and may retain such fees if the vehicle owner fails to cause the concern vehicle to attend the specified appointment.

6.1.4 Should a Centre cease to perform its function for any reason, any fees for testing received in advance shall be refunded in full to the owners of the vehicle to be tested or his/her representative within a reasonable time.

6.1.5 At the time of confirming an advance testing appointment, an Appointment Form in a format acceptable to the Director (Form 2 of Appendix I) shall be issued as confirmation, and the appointment shall be entered in the Register of Appointments.

6.1.6 If a change in appointment time is requested by the customer, the original Appointment Form shall remain valid until the revised appointment is accepted by the concerned Centre.

6.1.7 Providing that there is available capacity, a Centre may conduct emission test for immediate test appointments. Under this circumstance, the appointment procedures shall be followed and executed.

6.1.8 Once the testing fee for an appointment is paid for in accordance with Section 77C of the Road Traffic Ordinance, the vehicle owner is deem to have fulfilled the testing fee requirement under this regulation.

6.2 The Commissioner shall specify the date and time of an emission testing appointment for vehicles to be tested in the Centre operated solely by the Environmental Protection Department (the EPD).

7. Refusal of Emission Test

7.1 The Centres shall refuse to conduct the emission tests under the following circumstances:-

7.1.1 The compliance date of the Emission Testing Notice is overdue.

7.1.2 The Emission Testing Notice/copy of Vehicle Registration Document is not produced.

7.1.3 The class of vehicle to be tested is not covered under the designation of the Centre.

7.1.4 The vehicle information is not consistent with those in the vehicle registration documents and Emission Testing Notice.

7.1.5 The condition of the vehicle is not safe to undergo the emission test. In such cases the Centre shall advise the owner or his/her representative of the above and enter into the Emission Test Form.

7.2 In the event of a test being refused for any one of the above reasons, the Emission Test Form shall be signed by the Tester and the Responsible Person. The Centre shall notify the Director of Environmental Protection in case the vehicle owner or his representative has any dispute on the above decisions.

7.3 The Centre shall have the right not to refund the test fee to the vehicle owner or his/her representative for all refused tests. Application for change of appointment shall be considered if the Emission Testing Notice is still valid.

Part B – The Hong Kong Transient Emission Test (HKTET) for Petrol/Liquefied Petroleum Gas (LPG)/Hybrid Vehicles

8. Introduction

8.1 The emissions of petrol/LPG/Hybrid vehicles shall be tested by driving the vehicle on the chassis dynamometer following a prescribed speed-time trace (drive cycle) applicable to the concerned vehicle in a Centre, where performance of vehicle test shall strictly be based on the conditions of designation of the Centre.

8.2 A Centre shall observe all the requirements set out in this part in conducting the emission test for petrol/LPG/Hybrid vehicles. The requirements cover the following:

Layout and general provisions in the Centre
Safety and precautionary measures
Staffing and manpower
Test equipment
Test procedures
Evaluation of test results

8.3 The setup of the facilities in a Centre shall be installed in accordance with the approved scheme during its designation. Prior approval shall be obtained from the Director before any alteration of approved scheme can be carried out.

9. Layout and General Provisions

9.1 The Centre shall have a waiting room and a test bay. The waiting room shall be maintained in a reasonably comfortable environment for owners/drivers/agents to stay while their vehicles are under testing. It shall include an area for the posting of notices regarding the approved test fee, corruption prevention, etc. The details of the fee are stipulated in the tenth schedule of the Road Traffic Ordinance and published in the Government Gazette.

9.2 The test bay for conducting vehicle emission test shall meet the following requirements:

9.2.1 The test bay shall be well lit, properly ventilated and its air temperature shall be maintained below 35^{o} C. It shall be equipped with an effective ventilation system to prevent the accumulation of vehicle exhaust. All relevant installation shall be properly designed to ensure compliance with all statutory requirements.

9.2.2 The headroom of access roads and the test bay shall have comfortable clearance for the passage of vehicles. The design shall be capable of accommodating vehicles of overall height up to 3.5 metres. Moreover, the

width of the access lane shall be no less than 5.0 metres. Only with the approval of the Commissioner shall any Centre be allowed to operate with deviation from the above requirements. If the approval is granted on conditions, then the Centre shall comply with all the conditions.

9.2.3 The test bay shall be of suitable dimensions such that there is an access clearance of not less than 1.3 metres between the wall or any fixed structures to any part of the chassis dynamometer body, ramps or vehicle body. The access to the test bay shall be free of any structure or obstruction. Appropriate markings on the floor to clearly indicate the traffic control arrangement and the position of this access area shall be provided.

9.2.4 The chassis dynamometer and its access ramps, if any, shall be securely mounted on the floor. The access ramp if used shall be robust and made of suitable metal or suitable robust structure.

9.2.5 The chassis dynamometer shall either be mounted level and flush with ground into a pit or above ground. In the latter case, its access ramps shall be so installed that when the test vehicle is loaded onto the chassis dynamometer, the line joining the centres of the axles shall be within 5 degrees to the spirit level. The approaching and departing angles of the ramps shall be of a suitable design that they shall in general be no greater than 10 degrees. Forced ventilation of the pit shall be sufficiently provided for pit mounted chassis dynamometer.

9.2.6 All service wires and relevant connections shall be fitted inside conduits. Separate conduits shall be provided for signal line, power line and pneumatic line, and preferably be laid underground. If above-ground arrangement is necessary, stepping ramps shall be installed with clear colour markings indicating different floor levels.

9.2.7 The mounting brackets for the vehicle restraints shall be flushed with the floor.

9.2.8 A properly designed signaling or any other suitable system shall be installed to facilitate effective communication between the Testers.

9.2.9 Emergency buttons shall be installed at strategic locations such that the Tester outside the vehicle can signal the Tester in control of the vehicle under test to suspend the test and switch off the engine power.

10. Safety and Precautionary Measures

10.1 A Centre shall incorporate in its facility design, testing installations as well as operational management practice the appropriate precautionary measures to prevent accidents.

10.2 As a general practice, a Centre shall not conduct or shall terminate the emission test on a vehicle under the following situations or any other situations that its Responsible Person

deemed to be unsuitable for conducting the test:

10.2.1 No qualified and authorized Testers attending the test or no Responsible Persons supervising the Centre operation.

10.2.2 Insufficient manpower for conducting the test.

10.2.3 Any of the equipment, including chassis dynamometer, gas analyzer, VMAS volumetric flow meter, tachometer, auxiliary cooling fan, exhaust extraction system, warning lights and communication systems are not functioning properly.

10.2.4 The subject vehicle is found unsafe to be tested on the chassis dynamometer.

10.3 Centre management shall duly consider occupational health & safety issues associated with the emission test operation, and devise appropriate workplace management measures to prevent industrial accidents and direct actions in case of incidents. These measures shall include, but not be limited to, the following:

10.3.1 provide safety barriers at strategic locations such as along the driving path of the vehicles.

10.3.2 impose restricted access to the test bay - only the operators shall be allowed to enter the test bay. Any other person shall not enter the bay except on special circumstance with the authorization of the Responsible Person of the Centre.

10.3.3 provide clearly marked walking paths inside the test bay designated only for Centre staff use.

10.4 The emission test shall be suspended if the Centre staff has doubts about the test procedures or encounter situations that may endanger the safety of personnel or cause damage to the test equipment or properties. In such circumstances, the Centre management shall record the incident and, if practicable, immediately notify the EPD Hotline at 3619 6610.

11 Staffing and Manpower

11.1 The emission test shall be performed by at least two qualified and authorized Testers – one of the Testers as the tester-driver and the other as tester-observer. They shall work as a team throughout the test with their roles defined below.

11.2 The test-driver shall:

11.2.1 load the vehicle to be tested onto the dynamometer before the emission test begins,

11.2.2 dismount the vehicle from the dynamometer after the emission test, and

11.2.3 operate the vehicle throughout the test.

11.3 The test-observer shall:

11.3.1 oversee safety in the test bay and prevent unauthorized entry;

11.3.2 watch out for any abnormalities throughout the test;

11.3.3 man the automatic control module to execute the automated emission test sequence; and

11.3.4 provide any other supports as needed for conducting the test.

12 Testing Equipment

12.1 The Centre shall use a HKTET system consists of chassis dynamometer, 5-gas exhaust analyzer, VMAS volumetric flow meter, non-contact type engine speed tachometer, engine oil temperature probe, ambient temperature, pressure, humidity meters, auxiliary engine cooling fan and control computer for the emission test. The chassis dynamometer, like a rolling road, is used to simulate on-road driving conditions over a selected and authorized drive cycle. The 5-gas analyzer measures NO_x as well as HC, CO, O_2 and CO_2 concentrations, VMAS volumetric flow meter dilutes the total exhaust emission and measures exhaust emission flow rate. Tachometer is used to check engine RPM and the control computer is used to control the equipment, monitor the signal from the hardware, provide step by step instructions of the test sequence, collect measurement data and perform calculations, carry out quality assurance routines and provide system engineering and quality control utilities.

12.2 Chassis dynamometer component requirements

12.2.1 The design and construction of the chassis dynamometer with respect to the precision accuracy, installation and calibration of the chassis dynamometer shall meet or exceed the requirements as set out in BAR-97 specifications administered by the Bureau of Automotive Repair of California, USA or any other standards considered as equivalent by the Director. The chassis dynamometer may be suitable for testing two-wheel drive and/or full time

all-wheel drive petrol/LPG and hybrid vehicles. Chassis dynamometer for testing full time all-wheel drive vehicles shall have suitable mechanism for adjusting the distance between the centres of the front and the rear roller axles from 2240mm to 3230mm to meet or accommodate the length of wheel base of different make of vehicles to be tested in the Centre.

12.2.2 The chassis dynamometer rollers shall be of cradle roll type where the rolls for left and right tracks shall be solidly connected. Bi-directional operation is allowed in which case the front and rear rollers must be coupled. All the rollers shall be properly prepared (coating or knurling) to maintain maximum tyre to roll traction and minimum slip under prolonged operation. The roller diameter and spacing shall conform to BAR-97 specifications.

12.2.3 The power absorption unit shall be of eddy current or motor type. The power absorption unit should preferably be mounted directly to the front roller set (the roller set near to the front of vehicle). In case flexible coupling are applied between driven rolls and the power absorption unit, the interval of replacement of the coupling devices must be specified.

12.2.4 The frame of the chassis dynamometer must be of steel structure and be able to withstand test vehicle weight up to 5500kg. The chassis dynamometer shall be mounted level and flush with ground into a pit or above ground. In the latter case, the level line of the test vehicle shall not be elevated by more than 5 degree from the spirit level when mounting or rested onto the chassis dynamometer rollers.

12.2.5 The roller, power absorption unit and all rotating assemblies shall be dynamically balanced for operation up to speed of 160kph.

12.2.6 The basic inertia of the chassis dynamometer shall be 910kg equivalent vehicle weight. Additional inertia simulation shall be provided by electric means in 0.5kg increments up to the maximum gross vehicle weight specified in this document. Inertia simulation on deceleration is not regulated if eddy current type power absorption unit is used.

12.2.7 A coast down motor shall be provided which can speed up the rollers to 95kph.

12.2.8 Suitable vehicle restraints shall be provided.

12.2.9 The chassis dynamometer controller shall have operative analogue channels and test ports for load cell force and roller speed signal which shall be compatible with the signal connections of the test equipment for auditing purpose by the Director during emission testing.

12.3 Chassis dynamometer control requirements

12.3.1 A set of drive cycles shall be provided by the Director. The system shall allow the loading of a selected driving schedule via an external media (refer to Appendix II for further information).

12.3.2 The chassis dynamometer must be able to simulate the driving load of roller speed up to 90kph and the following accelerations: 3.0kph/s from 0 to 15kph, 2.2kph/s from 15 to 35kph, 1.9kph/s from 35 to 50kph, 1.6kph/s from 50 to 70kph and 0.9kph/s from 70 to 90kph for equivalent inertia up to 2270kg for petrol/LPG/hybrid vehicles (except LPG light buses) and up to 4350kg for LPG light buses with maximum speed of 75kph.

12.3.3 The roller speed shall be monitored continuously and used to calculate the vehicle speed. The accuracy of vehicle speed shall be ±0.2kph and distance measurement shall be accurate to ±0.02km over the test cycle.

12.3.4 The chassis dynamometer shall be able to measure and indicate load to an accuracy of ±5%. Chassis dynamometer with bi-directional operation feature shall be checked for both drive directions.

12.3.5 The road load simulation by setting the power absorption shall be carried out according to sections 1 and 2 of Appendix 2, Chassis Dynamometer, of Annex III of the European Directive 70/220/EEC for equivalent inertia up to 2270 kg. The road load simulation for vehicle with equivalent inertia of 4,350 kg of LPG light buses shall be calculated using the empirical equation solely for the HKTET up to 90 kph as follows:

Road load = 669.5291-2.707898*V+0.1217935*V*V+0.0000574*V*V*V:

where V is the wheel speed in kph and Road load is in Newtons (N)

The load setting must be accurate within ±5% at speed of 120, 100, 80, 60 and 40kph, and ±10% at 20kph and must be positive at speeds below 20kph. Alternative proposals for power absorption shall obtain prior approval from the Director.

12.3.6 The total basic inertia of the chassis dynamometer must be labeled and the total inertia (basic plus simulated) must be known. The total inertia must be within ±20kg of the inertia class for the test. The simulated total inertia must be verified and meet the accuracy as in Appendix 4, Verification of inertias other than mechanical, of Annex III of the European Directive 70/220/EEC.

12.3.7 The load absorbed by the brake and the chassis dynamometer internal frictional effects can be determined from the equation shown in 1.2.2 and the look-up table in 3.2.1, Appendix 2 of Annex III of the European

Directive 70/220/EEC. Alternative proposal for load absorbed by brake and the chassis dynamometer internal frictional effects shall obtain prior approval from the Director.

12.3.8 An inertia simulation error (ISE) shall be calculated every second when the actual roller speed of the chassis dynamometer is above 16kph and below 95kph according to the equation below and shall not exceed 2% for overall test cycle and 5% for any instantaneous moment of the inertia weight selected (IW_s) for the vehicle under test.

$$ISE=[(IW_s - I_t)/(IW_s)]$$

$$I_t=I_m+(1/V)\int_0^t(F_m-F_{rl})\,dt,$$

Where:

I_t= total inertia being simulated by the dynamometer (kg)

I_m= base (mechanical inertia of dynamometer, in kg)

V= measured roll speed (m/s)

F_m= force measured by the load cell (N)

F_{rl}= road load force,(N) required by the indicated power at the measured roll speed (V)

T= time (second)

Alternative proposal for inertia simulation error shall obtain prior approval from the Director.

12.3.9 The chassis dynamometer response shall meet the conditions that the torque response to a step change shall be at least 90% of the requested change within 200 milliseconds after a step change is applied by the control system and shall be within 2% of the applied torque by 300 milliseconds after the torque is applied. Overshoot shall not exceed 25% of the final torque value. Alternative proposal for response time shall obtain prior approval from the Director.

12.4 5-Gas analyzer and the exhaust sampling system

12.4.1 The gas analyzer shall meet the requirement set out by the California Bureau of Automotive Repair (BAR). The analytical instruments shall meet

the requirements contained under Section 2.4-Exhaust Gas Analysis Equipment for the BAR-97, dated May 1996 or equivalent. The gas analyzer shall be one of the approved apparatus for measuring emission from vehicles under the Road Traffic (Construction and Maintenance of Vehicles) Regulations, regulation 31A. The sampling system shall draw exhaust gas directly from the vehicle, shall remove particulate matter and aerosols from the sampled gas and shall drain condensed water from the sample before entering into sensors of the analyzer. The sample exhaust gas shall then be delivered to extraction system. The sampling system shall at a minimum, consist of a tailpipe probe, flexible sample line (25 feet (7.62m) +/- 6 inches (0.1524m)), water condensation and removal system, sample pump and flow control components. All materials in contact with exhaust gas prior to and through the measurement portion of the system shall be unaffected by and shall not affect the sample. The sample probe shall be constructed of steel or other non-corrosive, non-reactive material which can withstand exhaust gas temperature at the probe tip of up to 1100^{o}F (593.3^{o}C) for 10 minutes.

12.4.2 The exhaust flow volume measurement shall draw the total exhaust from the vehicle and combine it with ambient air through a collection cone. The combination of the exhaust and the ambient air shall be pulled by a blower capable of delivering 250 cfm (7080 litres per minute) @5-6 inches of water static pressure (1245-1494 Pa) and 300cfm (8496 litres per minute) through 40 feet (12.19m) of 4.25 inches (0.108m) diameter hose. The blower shall be direct driven with 3/4 horse power (0.56 KW) rated at 3600 rpm and high temperature bearing and high temperature shaft seal, or equivalent. The dilute exhaust flow rate shall be measured by VMAS by Sensors, Inc (part no. 9110-(068-075)), or equivalent. The oxygen concentration in the dilute exhaust shall be measured by VMAS or equivalent.

12.4.3 The engine speed measurement unit shall be of non-contact type and shall withstand the temperature of hot surface near the engine compartment of up to 600^{o}F (315.5^{o}C) for 10 minutes and can measure engine speed up to 6000 rpm.

12.4.4 The oil temperature measurement unit shall be of bi-metal type and shall measure the engine oil temperature up to 230^{o}F (110^{o}C) for 10 minutes. A clamp or similar device shall be provided to keep the length of temperature probe inserted into the oil pan of the vehicle during the emission test.

12.4.5 The mass measurement result of the exhaust pollutants using the gas analyzer and the VMAS shall be corrected using a standard CVS or IM 240 system by an accredited emission test laboratory or equivalent accepted by the Director. The correction factor equations and test results for all

pollutants shall be submitted to the Director for approval for new centre designation application and replacement of major components of the mass measurement device in emission test centre still under designation.

12.5 Ambient Temperature, Pressure and Humidity

12.5.1 The temperature, atmospheric pressure and relative humidity meters shall be calibrated and be accurate within ±1.5degree C, ±0.1 kPa and ±5% respectively.

12.6 Cooling Fan

12.6.1 Cooling fan shall be mobile or moveable in front of the vehicle, and adjustable in such a manner that the engine is sufficiently cooled and the catalyst is not cooled abnormally. The fan shall have a minimum and maximum outer diameter of 60 and 76 cm respectively and provide at least 16.1 km/h air velocity averaged over the cross section of the fan.

12.7 Control software

12.7.1 The technical specifications of the control software can be found in Appendix II.

13. Test Procedures

13.1 The HKTET is a chassis dynamometer based, transient drive cycle test, which shall measure CO, HC, CO_2, O_2 and NOx. There are five main parts in the HKTET, which are pretest inspection, vehicle and test cell data entry, positioning vehicle on the chassis dynamometer, background emission sampling and the exhaust emission test sequence. The detailed descriptions of each of the above five parts are shown in Appendix III.

13.2 Upon completion of the drive trace on a chassis dynamometer, the total grams of emissions from the tested vehicle, time used and total kilometers driven shall be measured and recorded. With the above data, the control system shall compute and report the tested vehicle emissions (g/km), which shall be compared with the pass criteria of the concerned test vehicle prescribed in Part C of this Code. Failing to satisfy the requirements of any part of the test shall result in failing the test.

13.3 Before handing the test report to the vehicle owner/driver/agent, the Tester shall make sure that the information printed on the report is correct and put a stamp on the report only if there is no abnormality found in the emission test results. The vehicle owner/driver/agent shall then sign an acknowledgment of receipt of the test results. After printing out the test report, the control computer shall prompt the following:

a) End of HK Transient Emission Test,

b) Remove all testing instruments such as tachometer, sample probe.

c) Make sure the vehicle and the drive way is clear of any obstacles

13.4 Slowly drive the vehicle off the testing area to a designated place.

13.5 Park the vehicle and get ready for the vehicle owner/driver/agent's collection.

Part C – Vehicle Exhaust Emission Limit

14. Vehicle Emission Standards and Evaluation Criteria

14.1 The HKTET requirements are summarized below: The Director may need to include additional emission limit for certain vehicles from time to time and shall notify the Centre accordingly.

由 1975 年到 1991 年製造的私家車
Private Car of Manufacture year from 1975 to 1991

一氧化碳 (克/公里) CO [g/km]	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
RW ≤750	49.36	49.36	49.36	39.49	39.49	39.49	39.49	32.08	32.08	32.08	32.08	32.08	28.63	28.63	28.63	28.63	28.63
751≤ RW ≤ 850	53.80	53.80	53.80	42.94	42.94	42.94	42.94	35.04	35.04	35.04	35.04	35.04	28.63	28.63	28.63	28.63	28.63
851≤ RW ≤ 1 020	57.75	57.75	57.75	46.40	46.40	46.40	46.40	37.51	37.51	37.51	37.51	37.51	28.63	28.63	28.63	28.63	28.63
1 021≤ RW ≤ 1 250	66.14	66.14	66.14	52.81	52.81	52.81	52.81	42.94	42.94	42.94	42.94	42.94	33.07	33.07	33.07	33.07	33.07
1 252 ≤ RW ≤ 1 470	75.02	75.02	75.02	60.22	60.22	60.22	60.22	48.86	48.86	48.86	48.86	48.86	37.51	37.51	37.51	37.51	37.51
1 471≤ RW ≤ 1 700	83.42	83.42	83.42	66.63	66.63	66.63	66.63	54.29	54.29	54.29	54.29	54.29	41.46	41.46	41.46	41.46	41.46
1 701≤ RW ≤ 1 930	91.81	91.81	91.81	73.54	73.54	73.54	73.54	59.72	59.72	59.72	59.72	59.72	45.90	45.90	45.90	45.90	45.90
1 930 ≤ RW ≤ 2 150	100.20	100.20	100.20	79.96	79.96	79.96	79.96	65.15	65.15	65.15	65.15	65.15	49.85	49.85	49.85	49.85	49.85
RW > 2150	108.59	108.59	108.59	86.87	86.87	86.87	86.87	70.58	70.58	70.58	70.58	70.58	54.29	54.29	54.29	54.29	54.29

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	碳氫化合物 (克/公里) HC [g/km]						碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]										
RW ≤750	3.95	3.95	3.95	3.36	3.36	3.36	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
751≤ RW ≤ 850	4.15	4.15	4.15	3.50	3.50	3.50	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
851≤ RW ≤ 1 020	4.29	4.29	4.29	3.65	3.65	3.65	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
1 021≤ RW ≤ 1 250	4.64	4.64	4.64	3.95	3.95	3.95	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12
1 252 ≤ RW ≤ 1 470	4.99	4.99	4.99	4.24	4.24	4.24	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86
1 471≤ RW ≤ 1 700	5.33	5.33	5.33	4.54	4.54	4.54	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60
1 701≤ RW ≤ 1 930	5.63	5.63	5.63	4.79	4.79	4.79	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34
1 930 ≤ RW ≤ 2 150	5.97	5.97	5.97	5.08	5.08	5.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08
RW > 2150	6.32	6.32	6.32	5.38	5.38	5.38	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82

車輛之最高質量 Vehicle Maximum Mass	車輛之參考質量 (公斤) Vehicle Reference Mass (Kg)	製造日期 Date of manufacture	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
≤ 2.5 tonnes or ≤ 6 passengers incl. driver ≤2.5 公噸 或 ≤ 6 位乘客包括司機	-	01/01/1992 - 31/12/1997	-	5.44	-	1.94
		01/01/1998 - 31/12/2000	-	4.40	-	1.00
> 2.5 tonnes or > 6 passengers incl. driver > 2.5 公噸 或 > 6 位乘客包括司機	RW ≤1250	01/01/1992 - 31/12/1998	-	5.44	-	1.94
		01/01/1999 - 31/12/2000	-	4.40	-	1.00
	RW >1250 and RW ≤1700	01/01/1992 - 31/12/1999	-	10.34	-	2.80
		01/01/2000 - 31/12/2000	-	8.00	-	1.20
	RW >1700	01/01/1992 - 31/12/1999	-	13.80	-	3.40
		01/01/2000 - 31/12/2000	-	10.00	-	1.40

由 2001 年 1 月 1 日到 2002 年 1 月 1 日之前製造的私家車
Private Car of Manufacture date on or after 01/01/2001 and before 1/1/2002

車輛之最高質量 (公噸) Vehicle Maximum Mass	車輛之參考質量 (公斤) Vehicle Reference Mass	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
≤2.5	-	0.40	4.60	0.30	-
>2.5	RW ≤1250	-	4.40	-	1.00
	RW >1250 and RW ≤1700	-	8.00	-	1.20
	RW >1700	-	10.00	-	1.40

在 2002 年 1 月 1 日或之後製造的私家車
Private Car of Manufacture date on or after 01/01/2002

車輛之最高質量 (公噸) Vehicle Maximum Mass	車輛之參考質量 (公斤) Vehicle Reference Mass	製造日期 Date of manufacture	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
≤2.5	-	01/01/2002 - 31/12/2005	0.40	4.60	0.30	-
		On or after 01/01/2006	0.20	2.00	0.16	-
>2.5	RW ≤1305	01/01/2002 - 31/12/2006	0.40	4.60	0.30	-
		On or after 01/01/2007	0.20	2.00	0.16	-
	RW >1305 and RW ≤1760	01/01/2002 - 31/12/2006	0.50	8.34	0.36	-
		On or after 01/01/2007	0.26	3.62	0.20	-
	RW >1760	01/01/2002 - 31/12/2006	0.58	10.44	0.42	-
		On or after 01/01/2007	0.32	4.54	0.22	-

由 1975 年到 1991 年製造的貨車
Goods Vehicle of Manufacture year from 1975 to 1991

一氧化碳 (克/公里) CO [g/km]	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
RW ≤750	49.36	49.36	49.36	39.49	39.49	39.49	39.49	32.08	32.08	32.08	32.08	32.08	28.63	28.63	28.63	28.63	28.63
751≤ RW ≤ 850	53.80	53.80	53.80	42.94	42.94	42.94	42.94	35.04	35.04	35.04	35.04	35.04	28.63	28.63	28.63	28.63	28.63
851≤ RW ≤ 1 020	57.75	57.75	57.75	46.40	46.40	46.40	46.40	37.51	37.51	37.51	37.51	37.51	28.63	28.63	28.63	28.63	28.63
1 021≤ RW ≤ 1 250	66.14	66.14	66.14	52.81	52.81	52.81	52.81	42.94	42.94	42.94	42.94	42.94	33.07	33.07	33.07	33.07	33.07
1 252 ≤ RW ≤ 1 470	75.02	75.02	75.02	60.22	60.22	60.22	60.22	48.86	48.86	48.86	48.86	48.86	37.51	37.51	37.51	37.51	37.51
1 471≤ RW ≤ 1 700	83.42	83.42	83.42	66.63	66.63	66.63	66.63	54.29	54.29	54.29	54.29	54.29	41.46	41.46	41.46	41.46	41.46
1 701≤ RW ≤ 1 930	91.81	91.81	91.81	73.54	73.54	73.54	73.54	59.72	59.72	59.72	59.72	59.72	45.90	45.90	45.90	45.90	45.90
1 930 ≤ RW ≤ 2 150	100.20	100.20	100.20	79.96	79.96	79.96	79.96	65.15	65.15	65.15	65.15	65.15	49.85	49.85	49.85	49.85	49.85
RW > 2150	108.59	108.59	108.59	86.87	86.87	86.87	86.87	70.58	70.58	70.58	70.58	70.58	54.29	54.29	54.29	54.29	54.29

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
	碳氫化合物 (克/公里) HC [g/km]						碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]										
RW ≤750	3.95	3.95	3.95	3.36	3.36	3.36	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
751≤ RW ≤ 850	4.15	4.15	4.15	3.50	3.50	3.50	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
851≤ RW ≤ 1 020	4.29	4.29	4.29	3.65	3.65	3.65	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38
1 021≤ RW ≤ 1 250	4.64	4.64	4.64	3.95	3.95	3.95	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12	10.12
1 252 ≤ RW ≤ 1 470	4.99	4.99	4.99	4.24	4.24	4.24	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86	10.86
1 471≤ RW ≤ 1 700	5.33	5.33	5.33	4.54	4.54	4.54	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60	11.60
1 701≤ RW ≤ 1 930	5.63	5.63	5.63	4.79	4.79	4.79	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34	12.34
1 930 ≤ RW ≤ 2 150	5.97	5.97	5.97	5.08	5.08	5.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08	13.08
RW > 2150	6.32	6.32	6.32	5.38	5.38	5.38	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82	13.82

由 1992 年 1 月 1 日到 1996 年 1 月 1 日之前製造的貨車
Goods Vehicle of Manufacture date on or after 01/01/1992 and before 1/1/1996

車輛之最高質量 (公噸) Vehicle Maximum Mass	車輛之參考質量 (公斤) Vehicle Reference Mass	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
DW ≤2.5	RW ≤1250	-	5.44	-	1.94
	RW >1250 and RW ≤1700	-	10.34	-	2.80
	RW >1700	-	13.80	-	3.40
DW >2.5 and DW ≤ 3.5	RW ≤ 1 020	-	28.63	-	9.38
	RW ≤ 1 250	-	33.07	-	10.12
	RW ≤ 1470	-	37.51	-	10.86
	RW ≤ 1700	-	41.46	-	11.60
	RW ≤ 1930	-	45.90	-	12.34
	RW ≤ 2150	-	49.85	-	13.08
	RW > 2150	-	54.29	-	13.82

由 1996 年 1 月 1 日到 2000 年 12 月 31 日製造的貨車
Goods Vehicle of Manufacture date on or after 01/01/1996 and on before 31/12/2000

車輛之參考質量 (公斤) Vehicle Reference Mass	製造日期 Date of manufacture	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
RW ≤1250	01/01/1996 - 31/12/1998	-	5.44	-	1.94
	01/01/1999 - 31/12/2000	-	4.40	-	1.00
RW >1250 and RW ≤1700	01/01/1996 - 31/12/1999	-	10.34	-	2.80
	01/01/2000 - 31/12/2000	-	8.00	-	1.20
RW >1700	01/01/1996 - 31/12/1999	-	13.80	-	3.40
	01/01/2000 - 31/12/2000	-	10.00	-	1.40

由 2001 年 1 月 1 日到 2005 年 12 月 31 日製造的貨車
Goods Vehicle of Manufacture date on or after 01/01/2001 and on before 31/12/2005

車輛之參考質量 (公斤) Vehicle Reference Mass	製造日期 Date of manufacture	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
RW ≤1305	01/01/2001 - 31/12/2005	0.40	4.60	0.30	-
RW >1305 and RW ≤1760	01/01/2001 - 31/12/2001	-	8.00	-	1.20
	01/01/2002 - 31/12/2005	0.50	8.34	0.36	-
RW >1760	01/01/2001 - 31/12/2001	-	10.00	-	1.40
	01/01/2002 - 31/12/2005	0.58	10.44	0.42	-

由 2006 年 1 月 1 日到 2006 年 12 月 31 日製造的貨車
Goods Vehicle of Manufacture date on or after 01/01/2006 and on before 31/12/2006

車輛之最高質量 (公噸) Vehicle Maximum Mass (tonnes)	車輛之參考質量 (公斤) Vehicle Reference Mass (Kg)	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]
DW ≤ 1.7	RW ≤ 1305	0.20	2.00	0.16
1.7 < DW ≤ 3.5	RW ≤ 1305	0.40	4.60	0.30
	RW >1305 and RW ≤1760	0.50	8.34	0.36
	RW > 1760	0.58	10.44	0.42

在 2007 年 1 月 1 日或之後製造的貨車
Goods Vehicle of Manufacture date on or after 01/01/2007

車輛之參考質量 (公斤) Vehicle Reference Mass (Kg)	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]
RW ≤ 1305	0.20	2.00	0.16
RW >1305 and RW ≤1760	0.26	3.62	0.20
RW > 1760	0.32	4.54	0.22

Taxi (LPG) 的士(石油氣)

製 造 日 期 Date of manufacture	碳氫化合物 (克/公里) HC [g/km]	一氧化碳 (克/公里) CO [g/km]	氮氧化物 (克/公里) NOx [g/km]	碳氫化合物+氮氧化物 (克/公里) HC + NOx [g/km]
On or before 31/12/2003 在 2003 年 12 月 31 日或之前	-	4.40	-	1.00
01/01/2004 - 31/12/2005	0.40	4.60	0.30	-
On or after 1/1/2006# 在 2006 年 1 月 1 日或之後#	0.20	2.00	0.16	-

Light Bus (LPG and petrol) 小巴(石油氣及汽油)

Date of manufacture	HC [g/km]	CO [g/km]	NOx [g/km]
On or before 30/9/2006 在 2006 年 9 月 30 日或之前	2.4	14	2.4
On or after 1/10/2006# 在 2006 年 10 月 1 日或之後#	1.2	14	1.2

備註 Remarks :

- DW (Design Weight 車輛之設計重量) means, in relation to a particular motor vehicle, the maximum design loaded vehicle weight recommended by its manufacturer for motor vehicles of the same class or description as the particular vehicle
- RW (Vehicle Reference Mass 車輛之參考質量) means the mass of the vehicle in running order less the uniform mass of the driver of 75 kg and increased by a uniform mass of 100 kg
- # These are the draft emission requirements. Requirements subject to revision when more appropriate information becomes available.
  這是草擬排放要求。 有關要求會在獲得更多適當資料時加以修訂。

14.3 The vehicle shall fail the test if it fails to:

14.3.1 meet the test requirements specified in Section 13.2 for Transient Emission Test (HKTET) or

14.3.2 pass the pretest inspection stated in Section 3 of Appendix III, or

14.3.3 complete the emission test because of vehicle/engine problems.

Part D - Quality Control for Vehicle Emission Tests

15. Quality Control

15.1 In order to maintain consistency in the test procedures and the test results, each Centre shall implement a quality control scheme. Separate quality control requirements are specified for the chassis dynamometer for Hong Kong transient Emission Test (HKTET) for petrol, LPG and hybrid vehicles. All in-house quality control schemes shall be documented. In addition, the associated records such as service, calibration records / documentations and other relevant records shall be kept for a period of one year for inspection by the Director.

15.2 Appendix IV describes the minimum requirements on the frequency and standards for quality control of the emission test for petrol, LPG and hybrid vehicles described in Part B of this Code. Greater frequency or tighter standards may be used as necessary. Subject to prior approval of the Director, a Centre may adopt an alternative scheme as recommended by equipment manufacturers.

15.3 The Director may carry out quality control checks on the performance of VMAS system. The following tests will be conducted on each quality control check:-

a) Hose Off Flow Test - this test should be performed by having remove the hoses from the VMAS unit at the inlet to the blower and the exit port of the VMAS. The measured flow rate and the factory-calibrated hose off flow for the unit should be compared.

b) Dilution Measurement Accuracy Test - In this test, the accuracy of the oxygen sensor in the VMAS unit will be found by injecting different standard gases which contained known oxygen content. The accuracy of the oxygen sensor of the VMAS system could be calculated by the difference between the known oxygen content of the standard gases and the readings of oxygen sensor of VMAS.

c) Flow Measurement Accuracy Test - this test should be performed by using a Flow Reference Device connecting to the inlet of the VMAS blower. This test should be conducted at three flow readings and then the readings of the Flow Reference Device and the VMAS should be compared.

In addition, the Director may also carry out appropriate quality control checks using suitable dynamometer performance tester provide by the Director but not limited to the DynoCal or Sierra Dynamometer Testing Kit on the performance of the chassis dynamometers of each Centre providing vehicle emission test services. The Centre shall be notified in advance and he shall make appropriate arrangement to facilitate the smooth operation of the performance check conducted by the Director.

Part E - Test Centre Management

16. Management of Test Records

16.1 All Emission Test Forms and vehicle emission testing centre Daily Summary (Form 5 of Appendix I) shall be forwarded to the Director within three working days following the completion of the test. NIL returns are required. Each Centre shall provide a computer for generating and transmitting the returns by electronic means. Detail requirements of the computer and transmission are in Appendix VI. The Centre operator may retrieve the information of the test vehicle for conducting emission test from the barcode printed on the Emission Testing Notice (ETN) using a barcode system that is compatible with the barcode system used by the Authority for printing the ETN. The Centre operator shall obtain latest specifications from the Director before setting up the barcode system and supporting accessories.

17. Issuance of Certificate of Compliance

17.1 A Certificate of Compliance shall be issued to a vehicle which has passed a test. The Tester shall record the details of the vehicle identity, sign and stamp the Centre's company chop on the Certificate of Compliance (in duplicate) before issuing the original to the client.

17.2 The duplicate copies of the Certificate of Compliance, the Emission Test Form and the Appointment Register shall be retained by the Centre for a period of no less than one year.

17.3 If an error is made in the completion of a Certificate, it shall be cancelled and a replacement be issued. A Centre is not permitted to make any alterations to the documents and shall retain all cancelled Certificates for inspection by the Commissioner for a period of one year.

18. Issuance of Emission Test Form

18.1 After an emission test, the Tester shall provide the owner of the vehicle or his/her representative with an Emission Test Form advising the details and outcome of the test. He/she shall explain to the client of the test result and sign the test form with relevant details before issuing.

18.2 The transient emission test for petrol/LPG/Hybrid vehicles, that is the chassis dynamometer based emission test, shall produce a computer generated test form (Form 4 of Appendix I).

18.3 Upon receipt of the Emission Test Form indicating the failure of the test, the vehicle

owner or his representative may immediately or later make an appointment for another test. Full fees as scheduled in the Road Traffic Ordinance shall be paid and the same booking procedures as described in Section 6 shall be followed.

18.4 A Tester shall try his/her best to explain to the owner of the vehicle or his representative any inquiries or complaints about the test method or test results.

18.5 If the matter remains unresolved, the Tester shall refer the case to the duty Responsible Person for handling. In the event that the owner or his representative remains unsatisfied with the Responsible Person's explanation, the matter shall be brought to the attention of the Director.

19. Closure of Designated Vehicle Emission Testing Centres

19.1 A Centre shall not close or partially close during the normal opening hours without prior approval from the Mobile Source Group of the Environmental Protection Department.

19.2 A Centre shall close in the event of the breakdown of any essential test equipment such as a dynamometer, a gas analyzer, a VMAS volumetric flow meter or adverse weather conditions including tropical cyclone and rainstorm warning, and shall report to the Mobile Source Group of the Environmental Protection Department immediately.

19.3 At the time of closure, the Centre shall put up a clear notice in the Designated Vehicle Emission Testing Centre waiting area and any other prominent places in the Centre to inform the public of the temporary service suspension.

19.4 In case a Centre cannot deliver vehicle emission test service to any test appointment because of test system or equipment breakdown and the situation will likely take a considerable time to rectify, it shall, try its best, to arrange an alternative test appointment acceptable to both parties or refund the collected test fees to the affected clients, whatever suits the situation. The Centre shall also try to contact the client of any affected appointments to work out the appropriate alternative arrangement as soon as possible.

******** END ********

Appendix I

List of Forms

Form

1. Register of Appointment
2. Appointment Form
3. Emission Testing Notice
4. Emission Test Form
5. Vehicle Emission Testing Centre Daily Summary

Register of Appointments (APPENDIX I—F

Date & Time	SERIAL NO	REG'N MARK	ENT REF	ETN DUE DATE	(REGISTERED OWNERS)NAME	AMOUNT RECEIVED	RECEIPT NO.	VEHICLE CLASS	REMARKS
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			
						$			

APPENDIX I

Form 2

No._____
編號

DESIGNATED
VEHICLE EMISSION TESTING CENTRE

指定的車輛廢氣測試中心

Appointment Form
預約時間表格

Name of Owner _____
車主姓名

Registration Mark _____
登記號碼

Make and Model _____
車廠及型號

Emission Testing Notice No. _____
廢氣測試通知書編號

Specified Due Date _____
指定的屆滿日期

Date of Appointment _____
預約日期

Time of Appointment _____
預約時間

Fee Paid _____
繳費

Receipt No. _____
收據編號

N.B. Alternative date and time of appointment can only be made on presentation of this form and official receipt.
註：更改預約的日期及時間，只可在出示此表格及正式收據，方會獲得批準。

Alternative Date :_____
更改的日期:

Time:_____
時間:

Appendix I Form 3

Environmental Protection Department
Mobile Source Group
34/F, Revenue Tower
5 Gloucester Road
Wan Chai, Hong Kong

環境保護署
流動污染源組
香港灣仔
告士打道5 號
稅務大樓34樓

電話
TEL. NO. : 2827 0858

CHAN, XXXX
FLAT/ROOM 9999, XXXXX HOUSE OI
MAN ESTATE,
HO MAN TIN, KOWLOON

2011000001945

第374章道路交通條例

ROAD TRAFFIC ORDINANCE CAP.374

將車輛送交車輛廢氣測試中心通知書

EMISSION TESTING NOTICE TO REQUIRE A VEHICLE TO BE TESTED AT A VEHICLE EMISSION TESTING CENTRE

車輛登記號碼： RR1XXX Taxi (HK & KLN) **檔 號：** EP/G 1/082600153/2011

Vehicle Registration Mark : Reference Number :

請注意：據報上述車輛於下述日期、時間及地點 VIN number **底盤號碼** : XXXXXXXXXXXXXXX

PLEASE TAKE NOTE that in connection with a report made against the above-mentioned vehicle as follows:

日期:	25/09/2011	**地點:**	**荃灣路**
Date :		Location :	TSUEN WAN ROAD
時間:	16:24:22	**舉報因由：**	**排放過量氮氧化合物**
Time :		Cause of report :	Excessive Emission of Nitrogen Oxides

為此，特根據香港法例第374章道路交通條例第77B條的規定，著令閣下，貴為該車輛的登記車主，將車輛連同本通知及車輛登記文件副本，按照下述指示，送交測試：

You, as the registered owner of the above-mentioned vehicle, are required in accordance with section 77B of the Road Traffic Ordinance, Cap. 374 to produce the vehicle, together with this notice and a copy of the Vehicle Registration Document, for testing in a manner as stated below :

日期： 2011年10月28日 **或以前**

Date : Not later than 28/10/2011

車輛廢氣測試中心： **附頁所載的任何一間車輛廢氣測試中心以確定該車輛所噴冒的廢氣，可符合既定的準則。**

Vehicle emission testing centre : One of the centres given in the attached list for the purpose of ascertaining whether the vehicle complies with vehicle emission standards.

車輛測試標準 Vehicle Testing Standards

底盤功率機駕駛工況廢氣測試
Transient Emission Test on Chassis Dynamometer

(1) 碳氫化合物不超過 Hydrocarbons (HC) not over	0.4	克/千米 g/km	(3) 氮氧化合物不超過 Nitrogen Oxides (NOX) not over	0.3	克/千米 g/km
(2) 一氧化碳不超過 Carbon Monoxide (CO) not over	4.6	克/千米 g/km	(4) 碳氫化合物+氮氧化合物不超過 HC + NOX not over	---	克/千米 g/km

驗車費用每次為: 六百二十元正 The fee for each emission test is :$ 620.00

要是測試結果證實該車廢氣不符既定的準則，本人有權拒絕簽發車輛牌照或將車輛牌照撤銷。是以閣下最遲須於

2011年10月28日 **向車輛廢氣測試中心取得一份[驗車合格證明書]**

I must point out that I may refuse to license or cancel the licence of a motor vehicle if on testing the vehicle is found not to comply with vehicle emission standards. In this respect you are required to obtain a certificate of compliance from the vehicle emission testing centre not later than 28 October 2011

根據同一條例第25(1)(ib)條規定，本人有權在勒令車主將車送交車輛廢氣測試中心測試而車主又無遵囑辦理者，拒絕簽發車輛牌照或將車輛牌照撤銷，希為垂注。

Please also note that in accordance with section 25(1)(ib) of the Ordinance. I may refuse to license or cancel the licence of a motor vehicle if the registered owner of the vehicle fails to have the vehicle tested at a vehicle emission testing centre when required to do so by me.

日期: 13/10/2011
Date : 13/10/2011

2011000001945

運輸署署長 (代行)
( )
for Commissioner for Transport

(註：請留意背頁所列的車主須知)
EPD 121

車主須知

你的車輛已被環境保護署（環保署）的路邊遙測儀器發現排放過量廢氣。你必須立刻安排維修你的車輛，然後將它送交指定車輛廢氣測試中心進行廢氣測試。請注意，車輛廢氣測試中心的測試目的不是查證你的車輛在本廢氣測試通知書列載的時間和地點有否排放過量廢氣。這測試的目的是確認車輛過量排放廢氣的問題已經修妥，車輛廢氣排放已符合排放標準。如你有實質理據反對本廢氣測試通知書，可向環保署提出，詳情請見第 11 點。

車主的跟進事項

1. 請將你的車輛交由具相關經驗的車輛維修技工修妥排放過量廢氣的問題，然後把車輛送交指定車輛廢氣測試中心進行廢氣測試，以確定問題已經修妥。請盡快維修車輛，以減少路邊空氣污染。
2. 請盡早與指定車輛廢氣測試中心預約進行測試。指定車輛廢氣測試中心的名稱、地點及電話號碼，列於附頁。
3. 當你把車輛送交指定車輛廢氣測試中心進行測試時，請確保車輛的引擎、傳動系統及剎車裝置等在合適狀況，並可讓廢氣測試在安全情況下進行，而車輛不得載有貨物。

   如車輛未能在廢氣測試通知書所訂明的期限前通過廢氣測試，有關車輛牌照會被吊銷。在車輛未通過廢氣測試前，不可辦理任何與車輛牌照有關的手續。

在指定車輛廢氣測試中心進行廢氣測試

4. 指定車輛廢氣測試中心會根據《道路交通條例》（第 374 章）第 77F 條發出的實務守則所訂明的測試方法進行廢氣測試。如車輛的引擎或底盤沒有問題，廢氣測試不會對車輛造成損壞。對於車輛在進行廢氣測試期間或之後出現的任何損壞，指定車輛廢氣測試中心概不負責。
5. 每次使用指定車輛廢氣測試中心的測試服務，均須支付測試費用港幣 620 元。
6. 在進行廢氣測試前，車輛需接受測試前檢查，以查看是否有以下問題：

1. 底盤號碼不符	6. 傳動系統洩漏波箱油／液體	11. 引擎水溫錶不能運作
2. 沒有配備空氣濾清器	7. 燃料洩漏	12. 未能符合測試標準
3. 廢氣喉洩漏	8. 車胎及車輪不適宜進行測試	13. 排氣喉噴出可見煙霧
4. 引擎洩漏冷卻液	9. 傳動系統有零件過鬆	
5. 引擎洩漏潤滑油	10. 滑油警告燈不能運作	

如你的車輛有任何以上問題，指定車輛廢氣測試中心不會對其進行廢氣測試，而你的車輛會視作未能通過廢氣測試。

7. 如車輛通過廢氣測試，指定車輛廢氣測試中心會向你簽發一份「驗車合格證明書（車輛廢氣排放標準）」，並會在進行廢氣測試後的兩個工作天內，把測試結果送交環保署流動污染源組。該組會要求運輸署執行工作，讓你可辦理與車輛牌照有關的手續。如你想在該兩個工作天內向運輸署申請辦理牌照手續，請先帶同「驗車合格證明書」向流動污染源組申領一份摘要書以作證明，然後才申請辦理牌照手續。
8. 如車輛未能通過測試前檢查或廢氣測試，你須安排車輛作進一步維修，並在廢氣測試通知書所指明的期間內，再次預約進行廢氣測試。每次使用指定測試中心的測試服務，均須支付須知第 5 項所述的測試費用。

法律條文

9. 根據《道路交通條例》第 25(1)(ib)條和第 25(1)(iib)條，如車輛的廢氣未能符合訂明的廢氣排放標準，或在運輸署署長根據《道路交通條例》（第 374 章）第 77 條作出要求時，車輛的登記車主未有將車輛交由指定車輛廢氣測試中心進行測試，運輸署署長可拒予發牌或撤銷有關的車輛牌照。

查詢及投訴

10. 如對廢氣測試通知書有任何查詢及投訴，請於以下服務時間內致電熱線（3619 6610）與我們聯絡 –

    星期一至五： 上午 9 時至下午 5 時；　　星期六、日及公眾假期: 休息。

11. 如你有實質理據反對這廢氣測試通知書（例如車輛是較新及仍在製造商保養期內，或一直正常使用及已進行妥善的定期維修，或車輛最近經底盤式功率機進行的廢氣測試確認排放正常等），並希望申請取消廢氣測試通知書，請備妥支持申請的證據，致電上述熱線與我們聯絡。請勿與指定車輛廢氣測試中心安排測試。我們將考慮你提交的證據是否充分，並在認為有需要時檢查或測試你的車輛。

12. 如你在維修車輛時遇有實際困難而未能按照廢氣測試通知書的規定通過測試，請於廢氣測試通知書上的限期前，以書面向我們申請延長廢氣測試的期限。

13. 一切有關車輛廢氣測試的申請，例如延期、取消、暫准續牌等，必須於廢氣測試通知書所訂定的期限屆滿前，連同有關的證明文件，以書面向環保署流動污染源組申請。單憑電話或在期限屆滿後的申請，概不受理。

常見問題

1. 車輛排放標準是如何釐定？
   - 車輛排放標準是根據車輛不同設計標準而釐定，限值為設計標準的兩倍，而設計標準會隨車輛製造年份而有所不同。

2. 我的車輛已通過運輸署的年檢，是否還需要在指定車輛廢氣測試中心進行額外的測試？
   - 被遙測儀器發現排放過量廢氣的車輛，必須在指定車輛廢氣測試中心接受廢氣測試。運輸署每年的續牌檢查不可以取代這項測試。
   - 車輛年檢中的排氣污染物測試並不等同環保署的車輛廢氣排放測試，汽油和石油氣車輛即使通過年檢，亦未必代表能通過環保署的路邊遙測及以底盤式功率機輔助進行的廢氣測試。
   - 另外，未能在指定車輛廢氣測試中心通過廢氣測試的車輛將被禁止過戶或續牌。如在廢氣測試通知書上的限期屆滿後，車輛仍未能通過廢氣測試，車輛牌照將會被吊銷。

3. 如我的車輛通過「測試中心」的廢氣測試，政府會否豁免或退還測試的費用?
   - 不會。廢氣測試的目的是確認車輛過量排放廢氣的問題已經修妥，車輛廢氣排放已符合排放標準。若車輛通過測試便可獲豁免或退還「測試中心」的服務費用，不符測試制度的原意。廢氣測試中心並非政府部門，並以用者自付的原則運作，使用其測試服務的人士，須要繳付測試費用而不設退款機制。

****

Notes to Vehicle Owner

Your vehicle has been found emitting excessively by the Environmental Protection Department (EPD)'s roadside remote sensing equipment. You must arrange to repair your vehicle immediately, and then send it to a Designated Vehicle Emission Testing Centre (DVETC) for an emission test. Please note that the purpose of the emission test at the DVETC is not to verify if your vehicle has emitted excessively at the time and location specified in the emission testing notice (ETN). The purpose of the emission test is to ascertain the rectification of the vehicle's excessive emission problem and compliance of its emissions with the emission standards. If you have strong ground against the ETN, you may raise it to the EPD. For details, please refer to point no. 11.

Your Action

1. Please have your vehicle's excessive emission problem fixed by a competent vehicle mechanic and then take the vehicle to a DVETC for an emission test to ascertain the rectification of the problem. Your prompt action to repair the vehicle will help reduce roadside air pollution.

2. Please make an appointment for testing with a DVETC as early as possible. Attached is a list showing the names, locations and telephone numbers of DVETCs.

3. When taking your vehicle to a DVETC for testing, please ensure that your vehicle's engine, transmission and brake etc. are in a condition permitting the emission test to be carried out safely and the vehicle should not be loaded.

   If the vehicle fails to pass the emission test before the deadline stipulated on the ETN, its vehicle licence will be cancelled. Before the vehicle passes the emission test, transaction relating to vehicle licence cannot proceed.

The Emission Test at a DVETC

4. The DVETC will conduct the emission test according to the test method stipulated in the Code of Practice issued under Section 77F of the Road Traffic Ordinance (Cap. 374). The emission test will not cause damage to a vehicle without defects in its engines or chassis. The DVETC shall not be responsible for any damage to the vehicle that appears during or after the emission test.

5. You will have to pay a test fee of HK$620 to the DVETC every time for using the test service.

6. Before the emission test, the vehicle will undergo a pre-test inspection, which checks for the following defects:

1. Chassis No. Incorrect	6. Transmission System Oil/Fluid Leak	11.Coolant Temperature Gauge Not in Operation
2. Air Filter not Equipped	7. Fuel Leak	12. The Test Requirement were Not Met
3. Exhaust Pipe Leak	8. Tyres and Wheels Not Suitable for Test	13.Visible Smoke Emitted from Exhaust Pipe
4. Engine Coolant Leak	9. Loose Part in Transmission System	
5. Engine Lubricant Leak	10. Lubrication Oil Warning Light Not in Operation	

   If your vehicle have any of the above defects, the DVETC will not conduct the emission test on your vehicle and we shall regard the vehicle as failing the emission test.

7. If the vehicle passes the emission test, the DVETC will issue a Certificate of Compliance for Motor Vehicles (Vehicle Emission Standards) to you. It will also send the test results to the Mobile Source Group of Environmental Protection Department in 2 working days after the emission test. The Group will request the Transport Department to take necessary actions such that transactions relating to vehicle licence can proceed. If you would like to apply for a licence transaction with the Transport Department within the 2 working days, please apply with the Certificate of Compliance to the Mobile Source Group to obtain a written memo as a support before proceeding with the licence transaction application.

8. If the vehicle fails to pass the pre-test inspection or the emission test, you should arrange further repair for the vehicle and make another appointment for emission testing within the period specified in the ETN. You will have to pay the test fee mentioned in Note 5 every time you use the test service at a DVETC.

Legal Provisions

9. By virtue of Section 25(1)(ib) and 25(1)(iib) of the Road Traffic Ordinance, the Commissioner for Transport may refuse to license or may cancel the licence of a vehicle if: its exhaust emission is found not complying with the prescribed vehicle emission standards, or the registered owner of the vehicle fails to have the vehicle tested at a DVETC when required to do so by the Commissioner for Transport under Section 77, of the Road Traffic Ordinance (Cap. 374).

Enquiries and Complaints

10. Please contact us via our hotline (3619 6610) for enquiries and complaints relating to the ETN during the following operation hours –

    Monday - Friday: 9:00 am to 5:00 pm; Saturday, Sunday and Public Holiday: closed.

11. If you have strong ground against the ETN (e.g. the vehicle is relatively new and still under manufacturer's warranty, or has been used normally and is under a proper regular maintenance programme, or the vehicle has its emission confirmed normal recently by a dynamometer-based emission test, etc.) and would like to apply for cancellation of the ETN, please contact us via the above hotline with your supporting evidence and DO NOT arrange the test with a DVETC. We will consider your application on the strength of the supporting evidence and may inspect or test your vehicle if necessary.

12. If you have practical difficulty repairing the vehicle to pass the emission test as required by the ETN, you may apply to us in writing to defer the deadline for passing the emission test.

13. Applications for ETN deadline deferment, ETN cancellation, permission for licence transaction, etc. will be processed if the Mobile Source Group receives a written request with supporting documents before the deadline stipulated in the ETN. Telephone requests or any request received on or after the deadline will not be considered.

Frequently Asked Questions

1. How are the vehicle emission standards set?
   - The vehicle emission standards are set according to the design standard which varies with the year of manufacture of the vehicle. The limits are two times of that in the design standard.
2. My car has already passed the annual examination by the Transport Department. Does it require additional tests at DVETC?
   - Vehicles found to have excessive emission by the remote sensing equipment must be tested at a DVETC. This test cannot be replaced by the Transport Department's annual examination for licence renewal.
   - Exhaust emission test in annual vehicle examination is not equivalent to the EPD's vehicle emission test. A petrol or LPG vehicle that passes annual vehicle examination may still not be able to pass EPD's roadside remote sensing and chassis dynamometer aided emission test.
   - Meanwhile, vehicles that have not passed the test at the DVETC will be barred from transfer of ownership or licence renewal. If the vehicle fails to pass the emission test before the deadline stipulated on the ETN, the vehicle licence will be cancelled.
3. If my vehicle passed the emission test at the DVETC, will the Government waive or refund the test fee?
   - No. The purpose of the emission test is to ascertain the rectification of the vehicle's excessive emission problem and compliance of its exhaust emissions with the emission standards. It will not conform to the intent of the test system if exemption or refund of test fee is given to the vehicle which passed the emission test. The DVETC is not a government department and is operated on user-pay principle. The user of the test service at the DVETC has to pay the test fee without a refund mechanism.

****

Form 4

EMISSION TEST FORM
廢氣測試表格

Serial No. _____

Vehicle Emission Testing Centre:
車輛廢氣測試中心

Vehicle Registration Mark 車輛登記號碼		Recorded Mileage 已行駛的里數	km 公里
Emission Testing Notice No. 廢氣測試通知書編號		Vehicle Manufacture Year 車輛製造年份	
Test Date測試日期	Time時間	Fuel燃料	PETROL/LPG/HYBRID/OTHERS 電油/石油氣/混能/其他

A. Pre-test Inspection
測試前檢查

(i) VIN/Chassis No. is correct YES/NO — Ifincorrect, Stamped No. _____
車輛底盤號碼正確 是/否 如不正確，蓋戳編號

(ii) Vehicle Satisfied the Pre-test Inspection YES/NO
車輛通過測試前檢查 是/否

B. Drive Cycle Emission Test on Chassis Dynamometer
底盤功率機駕駛工況廢氣測試

Test Result 測試結果		Emission limits applicable to vehicle class and year of manufacture 適用於該車輛類型及製造年份的排放限額	
(i) Measured Hydrocarbons (HC) 量度所得碳氫化合物	g/km 克/千米	Emission Limit 排放限額	g/km 克/千米
(ii) Measured Carbon Monoxide (CO) 量度所得一氧化碳	g/km 克/千米	Emission Limit 排放限額	g/km 克/千米
(iii) Measured Nitrogen Oxides (NO_x) 量度所得氮氧化合物	g/km 克/千米	Emission Limit 排放限額	g/km 克/千米
(iv) Measured HC + NO_x 量度所得碳氫化合物+氮氧化合物	g/km 克/千米	Emission Limit 排放限額	g/km 克/千米

C. Test Result
測試結果

Approved Vehicle Emission Tester
認可的車輛廢氣測試員

(i) Emission Test Result PASSED/FAILED
廢氣測試結果 合格

(ii) For reason(s) of Item(s): No. _____ as indicated in the footnotes.
由於發現如附註所述的第 _____ 項問題。

_____
(Tester's No. & Signature)
測試員編號及簽名

Footnote 附註

1. Chassis No. Incorrect
   底盤號碼不符
2. Air Filter not Equipped
   沒有配備空氣濾清器
3. Exhaust Pipe Leak
   廢氣喉洩漏
4. Engine Coolant Leak
   引擎洩漏冷卻液
5. Engine Lubricant Leak
   引擎洩漏滑油
6. Transmission System Oil/Fluid Leak
   傳動系統洩漏滑油/液體
7. Fuel Leak
   燃料洩漏
8. Tyres and Wheels Not Suitable for Test
   車胎及車輪不適宜進行測試
9. Loose Part Found in Transmission System
   傳動系統有零件過鬆
10. Lubrication Oil Warning Light Not in Operation
    滑油警告燈操作不正常
11. Engine Coolant Temperature Gauge Not in Operation
    引擎水溫錶操作不正常
12. The Test Requirement were Not Met
    未能符合測試合格標準
13. Visible Smoke Emitted from Exhaust Pipe
    排氣喉噴冒可見煙霧
14. Others (as specified) _____
    其他事項(如述)

Supplementary Emission Test Information Serial No. _____
附加廢氣測試資料

Drive cycle駕駛工況 TUV

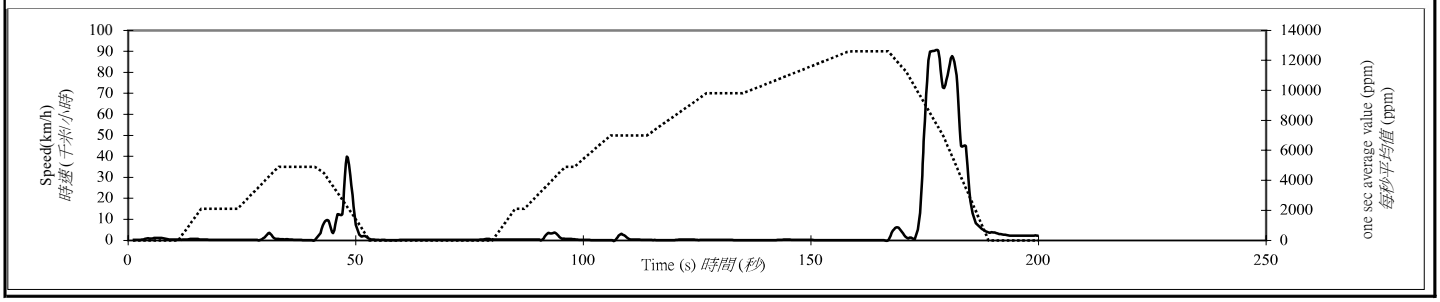
Standard Drive Distance 駕駛工況路程 _____ km千米

Standard Drive Cycle Tim 駕駛所需時間 _____ s秒

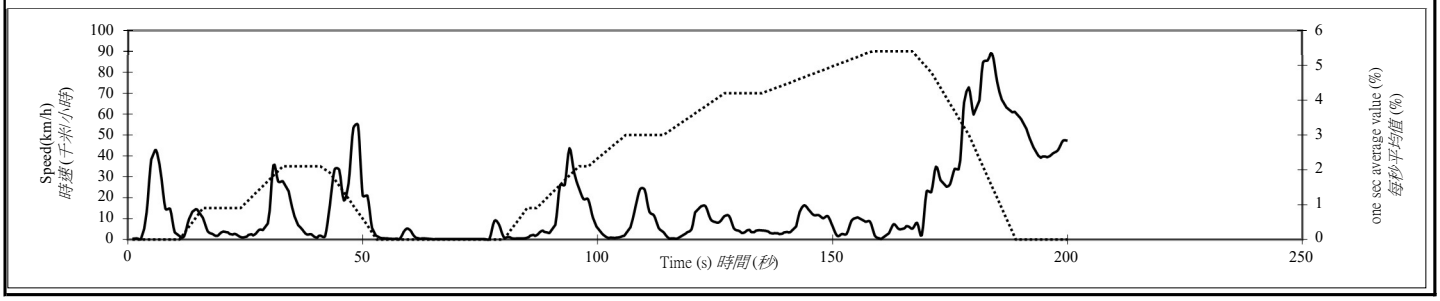
Emission Distribution During Drive Cycle Test駕駛測試中廢氣排放分佈情況

Legend: 圖解 Speed時速 _____ Test Vehicle測試車輛 _____

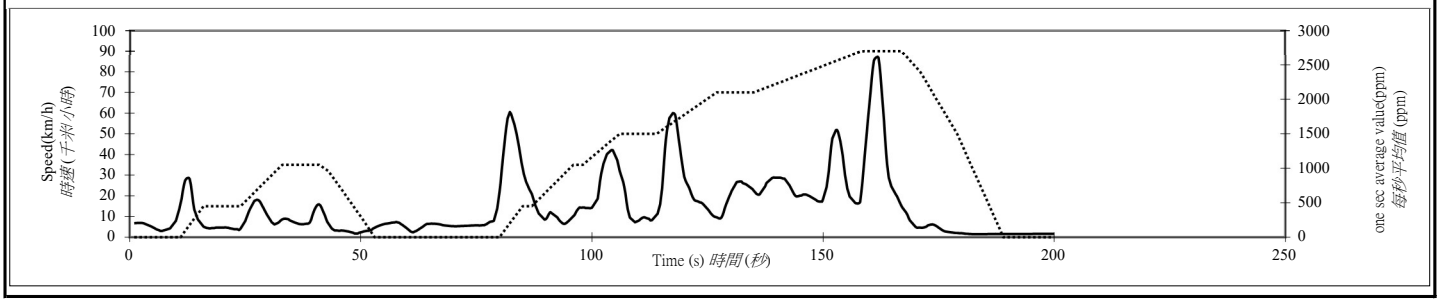
(i) Hydrocarbons (HC) 碳氫化合物 (ppm)



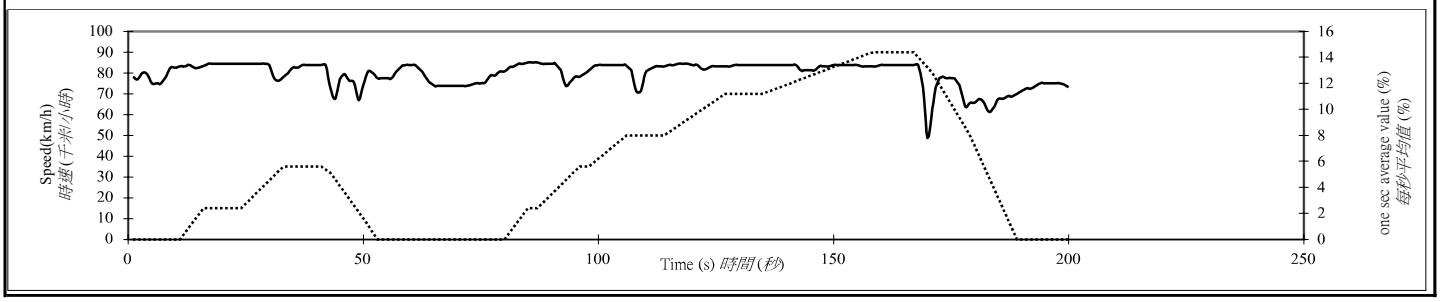
(ii) Carbon Monoxide (CO) 一氧化碳 (%)



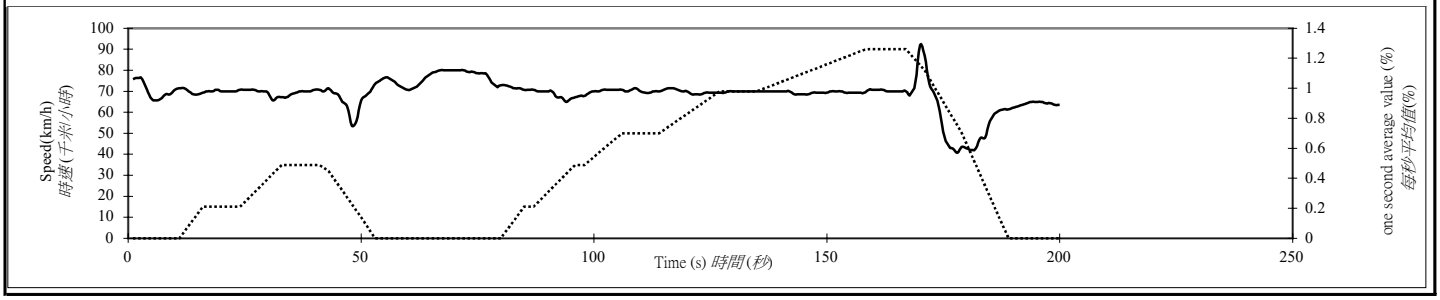
(iii) Nitrogen Oxides (NOx) 氮氧化合物 (ppm)



(iv) Carbon Dioxide (CO2) 二氧化碳 (%)



(v) Lambda (λ) 過量空氣系數



APPENDIX I
Form 5

Vehicle Emission Testing Centre Daily Summary for Hong Kong Transient Emission Test (HKTET)

VETC Name: _____ **Test Date:** _____ **Page**_____**of** _____

Reg Mark	Emission Testing Notice No.	Test Time	Test Results						Vehicle not tested or pre-test failed (Put down item no. from Part B of test form)	Tester No.	Certificate of Compliance No.
			Readings in g/km				Pass/Fail (P/F)	Fail Reasons (See Note)			
			HC	CO	NO_X	HC+NO					

I certify that no vehicle other than those stated above were tested/or inspected under the Designated Vehicle Emission Testing Centre Scheme in the above specified test date.

Note: Reasons for failing the test: S-Not comply with emission standard, P-Pre-test failed, V-Validation not met.

_____

Responsible Person's Signature

VETC Chop:_____ Date : _____

Appendix II

Hong Kong Environmental Protection Department
Hong Kong Transient Emission Test (HKTET)
Detailed Specifications for Computerized Control Test Procedures

General

1. This document is written primarily for the use of the software designer/programmer, which contains the logic flow and requirements of the control software, and essential instructions for the control of the system equipment in order to conduct transient emission test of vehicle on chassis dynamometer.

2. The programmers are reminded that these specifications aim to lay down the essential features that are required to perform the aforementioned test promulgated under this document. Except for the default start up screen to be provided by the Director, there is no specified graphical user interface. Individual manufacturers may incorporate additional routines or user friendly features on top of the essential requirements in the test system. However, it is essential that the additional features would not violate the basic principle of the programme flow and control of the dynamometer and the related equipment. The control software shall be designed such that it runs the transient emission test program as per the sequence specified below:

Test System Identification

3. Display a Centre ID request dialogue box for the Tester to key in as identification.

4. Request for the input of the System ID by the test centre manger as an identification of the test system and software version.

5. Prompt to provide the Director approval ID, the final approval of the test system to be specified by the Director.

6. Enable System Lock Out feature, which shall only be activated by the Director or automatically by the control software.

Enabling System Utilities

7. Load/verify drive trace(s) from designated file directory (Excel or ASCII format) with protection for alteration. The drive trace file will contain target speed – time, second by second speed violation limits, gear selection, clutch engage time and time periods for

dynamometer controller check (refer to section 43). Only the Director shall have the access to alter the drive trace file. The Director may need to include additional drive trace for certain vehicle from time to time and shall notify the Centre accordingly.

8. Initiate test drive with dynamometer load and inertia settings randomly selected by control computer.

9. Load/verify power absorption and inertia class lookup table (Excel or ASCII format) from designated file directory with protection for alteration. Only the Director shall have the access to alter the designated file directory.

10. Prompt the Tester to key in the relevant emission limits from the lookup table, which shall be provided by the Director.

11. Enter/verify fuel dependent correction factor store in designated file directory with protection for alteration. Only the Director shall have the access to alter the designated file directory.

12. Initiate chassis dynamometer system inertia by measuring, checking and verifying the inertia simulation.

13 Store chassis dynamometer basic inertia and record simulation error for quality assurance.

14. Measure and check the chassis dynamometer indicated and actual load (according to EU Directive 70/220/EEC). Store load curves for each inertia classes and carry out daily random verification by coast down for quality assurance. Retain the load curve with curve coefficient for printing purpose if needed.

15. Load cell static calibration and store results for quality assurance.

16. Check the indicated roller speed (kph) and distance covered by drive cycle.

17. Perform emission analyzer check including self diagnostic, leak check and calibration according to BAR-97 section 3.9. Store calibration curve and sensors responses.

18. Perform VMAS check including self diagnostic, O_2 and flow check. Prior to each test an ambient O_2 reading shall be taken. The VMAS bower must have been running for one minute prior to this reading. The limits for this O_2 reading shall be 20.8% +/- 0.3%. If the VMAS ambient collection is out of this range, the host shall display a warning message, and then prompt the operator to check to make sure that the cone is off the exhaust pipe. When the operator hits ―continue‖, the host should then retry the ambient reading with outside ambient air. If it fails again, then the host should automatically perform a calibration followed by a new ambient collection. The control unit must monitor all

available analyzer bench status bits passed through VMAS. The test shall abort if the condition exists, as a minimum, for more than 5 consecutive seconds for any status bits that are not already addressed. The control unit must also monitor whether VMAS is still in the data collection mode. If VAMS has dropped from data collection mode, the test shall abort. The low flow in the VMAS shall be set to 200cfm (5664 litres per minute). If the flow falls below this value for more than 5 seconds, the test shall abort. Store calibration curve and sensors responses.

19. Print out the reports and charts from stored test data.

System Startup

20. The Tester shall verify date and time with local standard. The formats of date and time shall be displayed as DDMMYYYY and 24-hh:mm, respectively.

21. The control software shall start the system as follows:

a) Warm up the chassis dynamometer, analyzer and VMAS before each system startup or every 24 hours.

b) Perform chassis dynamometer coast down check for every system startup or reboot. Selection of inertia class and load setting shall be carried out randomly. Confirm accuracy is within 5% of the stored load curve.

c) Check if the chassis dynamometer load curve, analyzer (including leak check) and VMAS calibration are valid and up to BAR-97 specifications.

d) Monitor error messaged from all hardware, including interfacing devices and system locked out by the Director.

e) Prompt Tester the control system is ready. If not, redo the system startup is necessary.

Automatic Test Sequence

22. The test sequence shall follow in the same order unless instructed otherwise.

23. When the Tester requests for a new official test, the control system shall refresh all registers and allocate a new sequential Test Serial Number (TSN) (i.e., serial number of a permanent array append from the last stored serial number) [integer] [positive]. The control unit may retrieve information of the test vehicle by reading the barcode printed on the ETN. For those information not available from barcode, the Tester shall input the all

other necessary data manually.

24. After the Tester enters Emission Testing Notice number and final date of testing, the control software shall check and only accept the valid format and non-expired final date of testing. [Date: DDMMYYYY].

25. If Tester terminates the process, no data shall be stored.

26. The control software shall prompt the Tester to collect test fee and carry out a thorough pre-test safety inspection if the aforementioned entries are valid.

27. Prompt the Tester to enter the vehicle's registration number and the result of the pre-test inspection. Registration mark: max 10 character [text]; pre-test inspection check passed: [Boolean].

28. Stop the test if the vehicle is found unsafe/not fitted for emission testing on the chassis dynamometer. Conclude the testing and store all data.

29. Otherwise, the control software shall display the data entry screen for the Tester to key in the vehicle's information. The required data include:

a) Vehicle identification number [text]

b) Vehicle make; Max 20 character [text]

c) Odometer reading (km); Max XXXXXXX [integer] [positive]

d) Vehicle class; Either Private Car, Taxi, Light Bus, Light Goods Vehicle or Others [text] (pull down menu)

e) Year of manufacturer; XXXX [integer], [1900-2099]

f) Engine capacity (c.c); Max XXXX [integer]

g) Fuel type; one of the following: Petrol, LPG, Hybrid or Others [text] (pull down menu)

h) Transmission type; one of the following: Automatic, Manual or CVT [text] (pull down menu)

i) Gross vehicle weight, GVW (kg) for light bus;
Max XXXX [integer] [0-5500]
(for light bus only)

j) Vehicle reference weight, RW (kg)
(referring to the mass of vehicle in running order less the uniform mass of driver of 75kg and increase by a uniform mass of 100kg)
Max XXXX [integer] [0-5500]
(for private car, taxi, light goods vehicles and others)

k) Emission standard to be used as the criteria according to the look-up table to be provided by the Director.

30. The control software shall interpret the vehicle data so as to select and display HC correction factor on screen according to fuel type, select manual/automatic drive trace according to transmission type, select vehicle inertia, weight class and chassis dynamometer load. Display values including emission standards on screen.

31. Prompt the Tester to enter the test cell ambient data including

a) Temperature (degree C) XX.X [real] [positive, max 35 degree C] and

b) Atmospheric pressure (kPa) XXX.X [real] [positive] [range check – reserved].

32. Prompt the test-driver to slowly and safely mount the vehicle onto chassis dynamometer, connect tachometer, oil temperature probe, VMAS flow meter. Advise the test-driver to refer to the proper procedures described in the Appendix III.

33. Prompt the Tester to place the cooling fan in front of the vehicle.

Background Emission Sampling, Vehicle Hot Soaking and Stabilization

Vehicle engine is considered hot if it has attained operation temperature within 30 minutes prior to arrival at the Centre. Before conducting actual driving test, the vehicle engine shall be turned off for hot soaking for minimum of 5 and maximum of 10 minutes during which administrative procedure and safety inspection are performed in parallel. After the soaking time the vehicle engine shall be turned on for 2 minutes during which vehicle shall be mounted onto the dynamometer and shall include a 1 minute driving at 50 kph if the hot soaking exceeds 10 minutes. Engine shall idle for at least 10 seconds prior to the start of drive cycle sequence and sampling of exhaust.

34. Prepare background emission sample.

35. Prompt the Tester to make sure the VMAS cone is off the tailpipe of the vehicle and switch on the VMAS for not less than one minute.

36. Start to take the ambient O_2 collection by VMAS upon obtaining the satisfactory

pre-inspection results. Halt the test if check fails. Display value on screen and prompt Tester for action if necessary.

37. Conduct zero and span check for the analyzer. Halt the test if check fails. Display value on screen and prompt Tester for action if necessary.

38. Conduct HC hang up check. Display value on screen and prompt Tester for action if necessary.

39. Collect sample of background emission levels. The position of the sampling device for the background sample shall be within 12 lateral, 12 longitudinal, 3 vertical feet from the vehicle tail pipe. Display value on screen and prompt Tester for action if necessary.

40. Check the engine oil temperature. Engine oil temperature shall be measured by the data acquisition system at 5 Hz for at least 30 seconds prior to and during the test. The 5 Hz data shall be converted into 1-second average values. The 1-second average oil temperature data during the test shall be recorded in the emission test record. Display value on screen and prompt Tester for action if necessary.

41. Prompt the Tester to insert the sampling probe, position VMAS cone, switch engine on, shift the transmission in neutral, release clutch pedal and turn all accessories off.

42. Prompt the Tester to stop the test and recheck the equipment connections should there be any abnormities found/readings not detectable.

Drive Trace

43. The control software shall display the following on screen during driving:

a) Drive trace chart including Chart ID, Manual/ Automatic/CVT, target speed vs time, speed excursion zone and gear. Screen shall be flashed when vehicle speed is outside the excursion zone. The control software shall select suitable drive trace for concerned test vehicle according to its vehicle type and transmission method. Please refer to drive trace in Appendix VA for petrol private cars, petrol goods vehicles and LPG taxis with reference weight up to 2750kg and the drive trace in Appendix VB for LPG light buses with reference weight over 2750kg.

b) Second by second emission concentration chart including the time corrected concentrations of the 5 gases and lambda be displayed and overlaid on the drive trace.

c) Engine oil temperature (in degree C)

d) Simulated inertia (in kg)

e) Power absorption (in kW)

f) Vehicle speed (in kph)

g) Vehicle acceleration (reserved) (in kph/s)

h) Engine speed (in rpm)

44. The control software shall monitor the following parameters and abort the driving immediately if violation occurs:

a) Speed violation according to preset speed excursion zone (it does not apply to deceleration phase provided that service brake is not applied).

b) VMAS flow rate less than 200 cfm (5664 litres per minute) for 5 consecutive seconds

c) VMAS status bit violation for 5 consecutive seconds

d) VMAS collection mode violation if the control unit detects that the VMAS has dropped from the data collection mode.

e) Tailpipe flow volume low – the second by second exhaust flow rate is less than 90% of the weight class of the vehicle being tested as per table to be provided by the Director.

f) Gas analyzer sample flow rate low if the flow is below the required flow for the analyzer to work properly according to manufacturers' specification.

g) Gas analyzer sample concentration out of range if the CO_2 concentration is above 16 % or the concentration for O_2 is less than -0.1% or the concentration of CO is less than -0.06% or the concentration for HC is less than -13ppm.

h) Gas analyzer off full scale.

45. The control software shall monitor the following parameters and invalidate the test result after driving is completed:

a) Incorrect cycle distance if absolute difference between the measured and the theoretical distance of the actual test exceeds 0.16km

b) Calculated fuel economy better than 2.48 L/100km

c) Dynamometer controller check fail if the absolute difference between the theoretical power and the measured power for the specific time interval exceeds 0.38kw using the time period specified in the drive trace file.

d) Inertia weight error if the instantaneous or overall observed inertia simulation error exceeds 5% or 2% respectively.

e) Inertia simulation error if the instantaneous or overall simulation error exceeds 5% or 2% respectively.

f) Analyzer zero drift after test.

Data File [Bar Code (BC) – field information available in bar code on ETN]

46. Data files are to be identified by their respective test serial number and stored in designated directory. Data files shall be protected from amendments. Data are to be stored in Windows compatible text format with field identifier and delimiter "|".

a) Test date and time [Date: DDMMYYYY Time: 24-hh:mm] Computer console date/ time at step (24).

b) Emission Testing Notice number [To be provided by EPD].[BC]

c) Vehicle registration mark [XXXXXXXXXX [text]] [non-entered character to be confirmed]. [BC]

d) Vehicle identification number [BC]

e) Vehicle make [20 character [text]]. [BC]

f) Year of manufacture [XXXX [integer]]. [BC]

g) Engine capacity (c.c.) [XXXX [integer]]. [BC]

h) Vehicle class [text] one of the following: [BC]
Private Car,
Taxi,
Light Bus,
Light Goods Vehicle, or
Others.

i) Odometer reading (km) [XXXXXXX [integer]].

j) Transmission type [text] select one of the following:
Automatic,
Manual, or
CVT.

k) Fuel type [text] select one of the following: [BC]
Petrol,
LPG,
Hybrid or
Others.

l) Gross Vehicle Weight GVW(kg) [XXXX [integer]] (for light bus only). [BC]

m) Vehicle reference Weight RW(kg) [XXXX [integer]] (for private car, taxi, light goods vehicle and others).

n) Ambient Temperature (degree C) [XX.X [real]].

o) Atmospheric pressure (kpa) [XXX.X [real]].

p) Relative humidity (%) [XXX.X [real]].

q) Absolute humidity [XX.XX [real]] (According to section 50).

r) NO humidity correction factor [X.XXXXX [real]] (According to section 50).

s) Background emission levels [All in real numbers and mean values of 1 minute samples]
CO_2 XX.XXXXX(%)
CO XX.XXXXX(%)
HC XXXX.XXXXX(ppm)
O_2 XX.XXXXX(%)
NO XXXX.XXXXX(ppm)

t) Engine oil temperature at start and end of driving (degree C) [XXX [integer]].

u) Second by second tailpipe emission concentrations [From gas analyzer, corrected for time delay and synchronized with the drive trace. All in one second average real numbers]

CO_2 XX.XXXXX(%)

CO XX.XXXXX(%)
HC XXXX.XXXXX(ppm)
O_2 XX.XXXXX(%)
NO XXXX.XXXXX(ppm)
Lambda X.XXX

v) Second by second operation parameters [All in one second average]
Engine RPM XXXX
Dynamometer speed (kph) XX.X
Dynamometer HP (kW) XX.X
Simulated inertia (kg) XXXX.X

w) VMAS exhaust temperature (degree C or degree K) and pressure (kpa) [From VMAS data].

x) Second by second tailpipe exhaust and diluted exhaust flow rate (Litre/min) from VMAS data, corrected to 273.2 degree K and 101.33 kPa [Tailpipe exhaust: XXXXX [integer] Diluted exhaust: XXXXX [integer]].

y) Second by second mass emission of CO_2, CO, HC and NOx (gram) Calculated from tailpipe flow rate and concentration according to section 51 [XXX.XXXXX [real]].

z) Total km driven [X.XX [real]].

aa) g/km of CO_2, CO, HC and NOx [XXX.XX [real]].

bb) Aborted or invalid test

(i) Speed violation [Boolean]
(ii) VMAS flow rate less than 200 ACFM [Boolean]
(iii) VMAS status bit violation [Boolean]
(iv) VMAS collection mode violation [Boolean]
(v) Tailpipe flow volume low [Boolean]
(vi) Gas analyzer sample flow rate low [Boolean]
(vii) Gas analyzer sample concentration out of range [Boolean]
(viii) Gas analyzer off scale [Boolean]
(ix) Incorrect cycle distance [Boolean]
(x) Calculated fuel economy better than 2.48L/100km [Boolean]
(xi) Dynamometer controller check fail [Boolean]
(xii) Inertia weight error [Boolean]
(xiii) Inertia simulation error [Boolean]
(xiv) Analyzer zero drift after test [Boolean]

cc) Emission standard applied [BC]

CO (g/km) XX.XX
HC (g/km) XX.XX
NOx (g/km) XX.XX
HC+NOx (g/km) XX.XX

dd) Pass / fail determination: Pass – no pollutant over the limits (compare up to 2 significant digits) Pass test: [Boolean].

ee) "Invalid Test" shall be shown in case of any invalid/abort test (see Section 46 (bb) of Appendix II).

47. The control software shall store the data in the designated file directory with protection for alteration. Only center manager or the Director shall have the access to alter the designated file directory.

48. The control software shall prompt the Tester to back up all the individual data files into a master log file and a removable drive, and print a daily summary record before confirming to shut down the control system.

Emission Calculation

49. All emission measurements and calculations shall be corrected to 273.2 degree K and 101.33 kpa. Metric units shall be used.

50. The NOx humidity correction factor (K_H) shall be calculated according to the following equation:

$K_H = 1 / (1 - 0.0329*(H - 10.71))$
$H = 6.211*Ra*Pd/(PB – Pd*Ra*10\text{-}2)$

where:

H = absolute humidity expressed in grams of water per kilogram of dry air,
Ra = relative humidity of the ambient air in %,
Pd = saturation vapour pressure at ambient temperature in kPa,
PB = atmospheric pressure in KPa.

51. The mass emission equation:

Mass/sec = Volume of pollutant/sec * density
= Pollutant Concentration (volume % or ppm) * Tailpipe exhaust volume/sec * density

where:

The pollutant concentration shall be adjusted for hydrocarbons adjustment factor or NOx humidity correction as appropriate;

The tailpipe exhaust volume shall be corrected to 273.2K and 101.33 kPa according to methods as recommended by VMAS.

52. The following gas densities at 293.2K and 101.33 kPa shall be adopted

	HC	CO	NOx	CO_2
Density (grams/litre)	0.58	1.16	1.91	1.83

53. Report format (please refer to Form 4 in Appendix I)

54. Alternative proposals for the control of equipment or calculations may be considered on a case by case basis.

55. The Lambda value shall be calculated as follows:

$$\text{Lambda} = ([CO_2] + [CO]/2 + [O_2] + (H_{CV}/4 * 3.5/(3.5+[CO]/[CO_2]) - O_{CV}/2) * ([CO_2] + [CO])) * ((1+H_{CV}/4 - O_{CV}/2) * ([CO_2] + [CO] + k1 * [HC]))^{-1}$$

where

[ ] = Concentration in % vol.
k1 = Conversion factor for NDIR measurement to FID measurement (provided by manufacturer of measurement equipment)

H_{CV} = Atomic ratio of hydrogen to carbon [1.7261] (for petrol vehicles) [2.525] (for LPG vehicles)

O_{CV} = Atomic ratio of oxygen to carbon [0.0175] (for petrol vehicles) [0] (for LPG vehicles)

Appendix III

Hong Kong Transient Emission Test (HKTET) Procedure for Petrol, Hybrid and Liquefied Petroleum Gas (LPG) Vehicles

1. The Hong Kong Transient Emission Test (HKTET) shall be conducted in accordance with the procedures set out below in this document. The exhaust emission measurement for petrol, LPG and hybrid vehicles on chassis dynamometer comprises the following key steps: vehicle hot soaking and stabilization, pretest inspection, vehicle and test cell data entry, positioning vehicle on the chassis dynamometer, background emission sampling and the exhaust emission test sequence.

2. Vehicle engine is considered hot if it has attained operation temperature within 30 minutes prior to arrival at the Centre. Before conducting actual driving test, the vehicle engine shall be turned off for hot soaking for minimum of 5 and maximum of 10 minutes during which administrative procedure and safety inspection are performed in parallel. After the soaking time the vehicle engine shall be turned on for 2 minutes during which vehicle shall be mounted onto the dynamometer and shall include a 1 minute driving at 50 kph if the hot soaking exceeds 10 minutes. Engine shall idle for at least 10 seconds prior to the start of drive cycle sequence and sampling of exhaust.

3. Pre-Test Vehicle Inspection

It is very important to carry out a thorough vehicle inspection before performing HKTET to prevent vehicle and/or chassis dynamometer system damage.

Only personnel authorized by the Director are allowed to operate the test vehicle, equipment or conduct inspections in relation to HKTET.

3.1 After enabling system utilities and getting the system started up, the control system shall prompt the Tester to collect test fee and conduct a thorough pre-test inspection as shown in Attachment 1 of Appendix III. The main purposes of having a pre-test inspection are to examine whether the vehicle is safe to be tested on the chassis dynamometer and to assess the suitability of vehicle to conduct emission test on chassis dynamometer. A pre-test inspection shall be made to check various vehicle parts covering vehicle tyres, engine, dashboard meters, power transmission and engine cooling system, in particular, the Tester must:

3.1.1 Confirm both drive wheel tyres are the same size and type. Adjust the tyre pressure to specification and inspect the tread for defects, bulges or tyre cord protrusions.

3.1.2 Not operate the vehicle on the chassis dynamometer if a temporary spare tyre is installed on one of the vehicle's drive wheels, if tyre cord is visible on any of the tyres, or if there are any other tyre defects.

3.1.3 Inspect the vehicle for fuel, coolant, and oil leaks.

3.1.4 Not operate a vehicle on the chassis dynamometer if it leaks fluid. Make sure vehicle fluid levels (oil, transmission, coolant, etc.) meet the vehicle manufacturer's requirements.

3.1.5 Inspect the vehicle for exhaust leaks. Repair any leaks before performing tests to prevent sample dilution errors and ensure accurate test results.

3.1.6 Make sure all strategic brake and torque transmission system (except automatic speed retarders) are disabled. These systems may include anti-lock braking, traction control, yaw control which will result in the brake being applied on the driving axle automatically.

3.1.7 Make sure all equipment on board the vehicle using the engine power to operate is switched off or the power take off is isolated.

3.1.8 Confirm the vehicle is not loaded with any goods or passengers. Any add on power equipment installed shall be properly restrained. Use a weight bridge to verify if the load capacity of the chassis dynamometer can accommodate the total weight of the drive axle, if necessary.

3.1.9 Pay attention to a few vehicle driving system designs.

a) For all wheel drive vehicles, select the rear wheel drive mode.

b) If the vehicle is of multiple closely spaced drive axles or full time all wheel drive, it shall only be tested on the all wheel drive chassis dynamometer.

3.1.10 Should the vehicle be found to be equipped with full time all wheel drive, permanent traction control or any other device that makes emission test on two wheel drive chassis dynamometer not suitable, the Tester shall stop the test and advise the driver to approach a Centre installed with chassis dynamometer suitable for conducting transient emission test for full time all wheel drive vehicles.

3.2 Attachment 1 of Appendix III prescribes the requirements of the pretest inspection. The results and details of the inspection shall be recorded in an Emission Test Form (ETF) for Hong Kong Transient Emission Test in the format as shown in Form 4 in

Appendix I. The transient emission test must not be applied if a vehicle fails to satisfy the requirements set out in Attachment 1of Appendix III.

3.3 The Tester shall enter the vehicle's registration mark and the result of the pre-test inspection.

4. Enter Vehicle and Test Cell Parameters

The Centre shall have option to install suitable bar code system that is compatible with the barcode system used by the Authority for printing the ETN to retrieve the information of the test vehicle automatically for conducting emission test from the barcode printed on the Emission Testing Notice (ETN) and manually key in information which is not provided in the bar code of ETN or key in the vehicle data including vehicle identification number (VIN), vehicle make, odometer reading (km), vehicle class, manufacturing year, engine capacity (c.c.), fuel type, transmission type, gross or reference vehicle weight (kg). The Centre operator shall obtain latest specifications from the Director before setting up the barcode system and supporting accessories.

The Tester may need to measure the weight of the vehicle using standard portable wheel load scale if the weight of the vehicle is not readily available.

Having entered the above vehicle data, the control computer shall determine the emission standard to be used according to the look up table in Part C of the Code of Practice or subsequently provided by the Director.

Aforementioned vehicle data shall be interpreted by the control software and be used to determine HC correction factor, vehicle inertia weight class, dynamometer load, etc.

When prompted by the control system, the Tester shall enter test cell ambient temperature (degree C) and Atmospheric pressure (kPa).

5. Positioning Vehicle on the Chassis Dynamometer

The control computer shall prompt the test-driver to drive the vehicle onto the chassis dynamometer. In order to ensure accurate testing results and safe operation of the control software, the test-driver should carefully follow the procedure below to position the vehicle on the chassis dynamometer, laterally stabilize, restrain, and chock the vehicle properly.

a) Conduct a thorough pre-test vehicle inspection (see section 3).

b) Enter the required vehicle information.

c) Make certain the chassis dynamometer lift plate is up. Raise the lift.

d) Clear obstructions (e.g. the lateral wheel restraints if they are attached to the dynamometer) away from the driving path to the chassis dynamometer.

e) The Tester shall direct the test-driver to position the vehicle's drive wheels in front of and square with the chassis dynamometer rolls.

f) Slowly drive the vehicle's drive wheels into position on the chassis dynamometer rolls.

g) Lower the lift.

h) Restrain and align the vehicle on the chassis dynamometer rolls.

The Tester shall laterally stabilize, restrain and chock the vehicle on the chassis dynamometer.

Make sure the vehicle is properly aligned with the chassis dynamometer rolls.

When prompted by the control computer, the Tester must place the engine cooling fan in front of the vehicle to aid in engine cooling. It is important to avoid undesirable cooling of catalytic converters.

6. The Tester shall connect the tachometer, oil temperature probe and VMAS flow meter according to the screen instruction. Before conducting actual driving test, the vehicle engine shall be turned off for hot soaking for minimum of 5 and maximum of 10 minutes during which administrative procedure and safety inspection are performed in parallel. After the soaking time the vehicle engine shall be turned on for 2 minutes during which vehicle shall be mounted onto the dynamometer and shall include a 1 minute driving at 50 kph if the hot soaking exceeds 10 minutes when the other Tester is entering the other necessary data into the control computer. Engine shall idle for at least 10 seconds prior to the start of drive cycle sequence and sampling of exhaust.

7. Background emissions sampling

When prompted by the control computer, the Tester shall make sure the VMAS cone is off the tailpipe and run the VMAS blower for not less than one minute.

Take an ambient O_2 reading.

If the VMAS ambient collection is out of the pre-set range, Tester shall be instructed to check the cone connection.

If it fails again, recalibration shall be performed automatically followed by a new ambient collection.

Followed by proper ambient O_2 measurement, the control computer shall automatically perform a zero check, span check, HC hang up check, background measurement of HC, CO, NOx, CO_2 and engine oil temperature measurement.

The Tester shall be prompted to insert sampling probe, position VMAS cone, switch engine on, shift transmission in neutral, make sure clutch pedal is not depressed and all accessories are off.

8. Testing Sequence

When the preconditioning sequence and load setting has been successfully completed, the test-driver shall be prompted to start the HKTET by following the drive trace displayed on the monitor.

During the driving, the automatic control module is programmed to monitor a number of parameters and abort driving if any violation occurs according to the control software specifications in Appendix II.

The control system shall abort/invalidate the test if there is any error found upon completing the driving as described in Section 46(bb) of Appendix II.

During the driving, the control computer shall measure and record all the necessary parameters. For instance,

a) Second by second tailpipe emission concentrations including CO_2 (%), CO (%), HC (ppm), O_2 (%), NOx (ppm) and, Lambda.

b) Second by second operation parameters including Engine RPM, Chassis dynamometer speed (kph), Chassis dynamometer horse power HP (kW) and, simulated inertia weight (kg).

c) Second by second tailpipe exhaust and diluted exhaust flow rate (Litre/min) from VMAS data, corrected to 273.2 degree K and 101.33 kPa.

At the completion or termination of the test, the final mass emission concentrations for the pollutants CO, HC, NOx in g/km shall be calculated by the control computer.

The control system compares the measured pollutant concentrations with the applied emission standard.

The control computer shall determine the testing result (Pass/Fail) and print out a test report containing vehicle information and emission test result.

For an invalid/aborted test, the control system shall allow for the original and two additional attempts. However, the test shall be deemed invalid if proper result cannot be obtained upon the completion of the third attempt. No second chance test shall be considered.

Before handing the test report to the vehicle owner/driver/agent, the Tester shall make sure the information printed on the report is correct and put a stamp on only if there is no abnormality found in the emission test results and let the vehicle owner/driver/agent sign an acknowledgment of receipt of the test results.

After printing out the test report, the control computer shall prompt the following:

d) End of HKTET,

e) Remove restraining system from vehicle,

f) Remove all testing instruments such as cooling fan, tachometer, sample probe, VMAS cone,

g) Raise the chassis dynamometer lift to lock the rolls in place,

h) Make sure the vehicle and the drive away is clear of any obstacles.

Slowly drive the vehicle off the chassis dynamometer platform to a designated place.

Park the vehicle and get ready for the vehicle owner/driver/agent's collection.

Attachment 1 of Appendix III

Pretest Inspection Requirements for HKTET
for Petrol, Hybrid and LPG Vehicles of GVW up to 5.5 Tonnes

1. This attachment sets out the requirements of pretest inspection of the transient emission test. The inspection can be divided into two parts: vehicle identity verification and safety check. If a vehicle fails to satisfy the pretest inspection, it shall not be allowed to undergo subsequent stages of the test.

2. Vehicle Identity Validation. The operator shall inspect the vehicle to verify if the identity of the vehicle matches that recorded on the vehicle registration document. If the vehicle identity could not be positively verified, it shall not be allowed to undergo the test.

3. Safety Inspection. Safety inspection aims to ascertain if the condition of a vehicle is suitable for undergoing the emission test. The operator shall check the overall conditions of the vehicle presented for test. If any of the conditions/defects listed below are observed, he shall not allow the test to proceed with.

3.1 Instrument panel

3.1.1 Malfunctioning of any of the installed equipment listed below:

a) Speedometer

b) Lubricant pressure low warning light.

c) Coolant temperature monitoring gauge.

d) Low brake fluid warning light.

3.2 Driver's control

3.2.1 When either of the following conditions is observed:

a) If the engine cannot be shut off by the driver within the reach from the driver seat.

b) The brake does not work.

3.3 Vehicle body or structure

3.3.1 When any of the following conditions is observed:

a) If the driver's access door cannot be open from inside within a reasonable short period of time.

b) If any part of the vehicle body or structure shall be in contact with any of the driving wheels or propeller shaft.

c) Any add on body parts which shall be damaged or cause damage to the structure of the testing facilities during the loading or unloading procedures.

3.4 Vehicle engine and cooling system

When any of the following conditions is observed:

a) Engine coolant is not topped up;

b) Serious leakage in the cooling system.

c) Cracks in the radiator hoses.

d) Damaged or malfunctioned cooling air fan(s).

e) Drive belts missing, worn out or cracked.

f) Engine lubricant is not at the right level when measured immediately after the engine is switched off from idle with the vehicle at level ground.

g) Serious leakage of lubricant when the engine is being operate, loaded or unloaded, which may result in the failure of supply of lubricant due to level low or supply pressure low.

h) Any leakage in lubricant which shall spill onto any part of the engine exhaust pipe.

i) Any sign of leakage in the lubrication circuit for the turbo charger.

j) Engine air filter missing or damaged; or air to air inter-cooler seriously blocked.

k) Damaged vacuum hoses.

l) Damaged electrical wire or loose connectors.

m) Tar drain cork of LPG vehicle is opened.

n) LPG supplies to engine cannot be shut off.

o) Any sign of leakage in fuel supply or injection system (LPG vehicles –use a portable gas detector to detect for LPG leakage).

p) Loosen adjustment points of the engine or transmission control linkages.

q) Engine speed runs away after the engine is switched off.

r) Heavy visible emissions (white or blue smoke) at tail pipe when the vehicle engine is at idle.

s) Engine intake or exhaust manifold is loosen.

t) Serious leakage in the engine exhaust system.

u) Any abnormal knocking sound when the engine is being operated.

v) Linen being trapped in the fuel supply/metering systems or the exhaust manifold.

3.5 Transmission and drive lines

3.5.1 When any of the following conditions is observed:

a) Front wheel drive vehicles cannot maintain lateral position while driving on rollers.

b) Vehicle engine or drive system is overridden by the vehicle dynamic control system such as traction control.

c) Serious leakage in transmission fluid.

d) Loosen or missing holding bolts for the propeller shaft couplings.

e) Excessive play in the propeller shaft support bearing.

f) Abnormal noise in the differential gear or gearbox.

g) Leakage of lubricant from differential gear or gearbox that shall spill onto any part of the exhaust pipe.

3.6 Wheels and tyres on the driving axle

3.6.1 When any of the following conditions is observed:

a) Wheels are damaged, cracked or seriously out of truth which shall result in the tyres not able to sustain the driving load or unable to maintain its lateral position.

b) Loosen or missing holding bolts.

c) Tyres are damaged, cracked.

d) Tyre thread of minimum depth of 1 millimetre does not cover more than 90% of the tyre/road surface contact path, or tyre rubber worn to the warning marks made by the manufacturer.

e) Tyres are not properly inflated for driving or tyre speed rating less than 95 kilometres per hour.

f) Tyres of different sizes are used on the same axle.

g) Tyres of radial and cross ply are used on the same axle.

h) Foreign objects are trapped between the tyres.

Appendix IV

Quality Control for Vehicle Emission Tests

Hong Kong Transient Emission Test (HKTET) for Petrol, Hybrid and LPG Vehicles

1. Calibrations, Frequency and Overview

1.1 Attachment 1 of Appendix IV lists the recommended calibration and service schedule for the major instruments of the test system. This is the minimum standard acceptable to the Director. Individual Centre can adopt a more stringent regime or an alternative scheme recommended by equipment manufacturers subject to the approval of the Director.

1.2 Instruments used for the vehicle emission test including a dynamometer, gas analyzer, VMAS volumetric flow meter, tachometer and others shall be serviced/calibrated at least annually or after any maintenance which could alter calibrations.

1.3 The dynamometer manufacturer shall propose a method for roll speed/counter accuracy determination to verify that the relevant measurement is within the specified BAR-97 specifications for consideration by the Director. Deviation outside the acceptable criteria shall require corrective action.

1.4 Dynamometer Calibration

1.4.1 A Coast Down Check shall be performed automatically on the dynamometer before the start of a day's work to verify performance by an automated procedure approved by the Director of Environmental Protection. Either the Coast Down Check specified under the USEPA Acceleration Simulation Mode Test or the BAR-97 Acceleration Simulation Mode Test between the speeds of 30-20 miles/hr and 20-10 miles/hr shall be adopted. All rotating dynamometer components shall be included in the coast down check. Speed windows smaller than ±5 miles/hr may be used provided that they show the same calibration capabilities.

1.4.2 The check shall use a reliable roll driving method such as a drive motor or any other suitable methods acceptable to the Director. If either the measured 30-20 miles/hr coast-down time or 20-10 miles/hr coast-down time is outside the window bounded by Calculated Coast Down Time (CCDT) (seconds) ±7% then it shall be locked out for official inspection purposes until recalibration allows a passing value.

14.3 The base dynamometer inertia shall be checked at two random horsepower settings for each speed range. The two random horsepower settings shall be between 8.0 and 18.0 horsepower. A shunt resistor for a load cell performance check shall not be used.

a) Randomly select an IHP_{25} value that is between 8.0 and 18.0 horsepower and set dynamometer power absorption unit (PAU) to this value. Coast down dynamometer from 30-20 miles/hr.

$$CCDT_{@25mph^*} = \frac{(\frac{0.5^*DIW}{32.2}) * (V_{30}{}^2 - V_{20}{}^2)}{550^*(IHP_{25} + PLHP_{25})}$$

Where:
DIW = Dynamometer inertia, lb. Total inertia weight of all rotating components in dynamometer.
V_{30} = Velocity in feet/sec at 30 mph
V_{20} = Velocity in feet/sec at 20 mph
IHP_{25} = Randomly selected PAU indicated horsepower
$PLHP_{25}$ = Parasitic horsepower for specific dynamometer at 25 mph
*** mph denotes miles per hour**

b) Randomly select an IHP_{15} value that is between 8.0 and 18.0 horsepower and set dynamometer power absorption unit (PAU) to this value. Coast down dynamometer from 20-10 miles/hr.

$$CCDT_{@15mph^*} = \frac{(\frac{0.5^*DIW}{32.2}) * (V_{20}{}^2 - V_{10}{}^2)}{550^*(IHP_{15} + PLHP_{15})}$$

Where:
DIW = Dynamometer inertia, lb. Total inertia weight of all rotating components in dynamometer.
V_{20} = Velocity in feet/sec at 20 mph
V_{10} = Velocity in feet/sec at 10 mph
IHP_{15} = Randomly selected PAU indicated horsepower
$PLHP_{15}$ = Parasitic horse power for specific dynamometer at 15 mph

14.4 *Parasitic Value Calculatio*n. It aims to determine a dynamometer's frictional losses for calculating the actual wheel power measured in the test procedure. The measured wheel power includes the dynamometer friction as well as the power absorbed by the power absorption unit. The indicated power setting of

the PAU shall be set to zero for the calibration. There are two requirements on parasitic losses determination.

a) Before a suitable dynamometer can be used for the loaded test, it shall have its parasitic losses determined and a recalibration is required for every twelve months. The parasitic values shall be calculated at a minimum of 4 points evenly distributed over the operation speed range from 15 to 50 miles/hr (25-80 km/hr) including the before mentioned start and end points with a method approved by the Director of Environmental Protection. A vehicle on-dynamometer method or equivalent may be used for the purpose.

   i) Parasitic losses at 15 miles/hr for a dynamometer with specified diameter rollers shall be determined automatically according to the relation below:

$$PLHP_{15} = \frac{(\frac{0.5^{*}DIW}{32.2}) * (V_{20}{}^{2} - V_{10}{}^{2})}{550^{*}ACDT}$$

   Where:

   DIW = Dynamometer inertia, lb. Total inertia weight of all rotating components in dynamometer.
   V_{20} = Velocity in feet/sec at 20 mph
   V_{10} = Velocity in feet/sec at 10 mph
   ACDT = Actual coast-down time required for dynamometer to coast from 20 to 10 mph

   ii) Similarly, the parasitic losses for other calibration speed points shall be determined automatically according to the relation below:

$$PLHP_{\frac{Vi+v}{2}} = \frac{(\frac{0.5^{*}DIW}{32.2}) * (V_{i}{}^{2} - V_{f}{}^{2})}{550^{*}ACDT}$$

   Where:
   DIW = Dynamometer inertia, lb. Total inertia weight of all rotating components in dynamometer.
   V_i = Velocity in feet/sec at the start speed (i mph) of selected parasitic losses speed window,
   V_f = Velocity in feet/sec at the end speed (f mph) of selected parasitic losses speed window,
   ACDT = Actual coast-down time required for dynamometer to coast from i to f mph.

b) If a dynamometer is unable to pass the coast down check, it's parasitic losses shall be calculated using the above equations at 15 and 25 mph. The initial and final speeds for respective calibration points are 20-10 miles/hr and 30-20 miles/hr. Based on the calibrated values and appropriate mathematical methods acceptable to the Director of Environmental Protection, the parasitic losses curve can be fitted for use in subsequent tests.

1.4.5 If the dynamometer fails a coast down check or requires a recalibration for any other reasons, the load measuring device shall be checked using a deadweight method according to manufacturer's direction. It shall cover at least three points evenly distributed over the range of loads used for vehicle testing. Dead weights shall be traceable to acceptable international standards (e.g. US National Institute of Standards and Technology (NIST), UK National Physical Laboratory (NPL) and other national bodies) and shall be accurate to within ±0.5%.

Attachment I of Appendix IV

Quality Control Requirements

for Hong Kong Transient Emission Test (HKTET)

for Petrol, Hybrid and LPG Vehicles

1. Test System Annual Service (Table A)

Instrument	Scope of Service	Performance Criteria
Dynamometer	a) Control programme maintenance b) Manufacturers recommended services on dynamometer mechanical and electronic modules including calibration of various sensors	a) Uninterrupted functioning of programme *b) Chassis Dynamometer* i) Mechanical structure and parts are fully functional ii) Pass Coast down test requirements
Gas Analyzer	Change System Filters and Sensors, as recommended by manufacturers Process initialization of new parts Services and calibration recommended by manufacturers	Service report# showing the recommended services completed and the calibration within the manufactures' specified range
VMAS	Change O_2 Sensors, as recommended by manufacturer Check vortex strut General cleaning, services and calibration recommended by manufacturer	Service report# showing the recommended services completed and the calibration within the manufacturer's specified range
Tachometer	Services recommended by manufacturers	Service report# showing the recommended services completed

Issued by manufacturers, their authorized dealers or other bodies certified to ISO 9000 or equivalent standards acceptable by the Director.

2. Operational Calibration and Service Schedule (Table B)

Instrument	Items of Service	Acceptable Criteria	Frequency
Dynamometer	a) Coast down test b) Load cell calibration and roll speed check c) Parasitic loss calibration d) Parasitic losses calibration covering speed range from 15 to 50 miles/hr (25-80 km/hr)	Within acceptable range recommended by manufacturer	a) Daily b) Biweekly c) Monthly or if coast down test failed d) Annually
VMAS volumetric flow meter	a) Vortex Flow Meter Calibration b) O_2 Sensor c) Vortex Strut Check	Within acceptable range recommended by manufacturer	a) Semi-annually b) At the start of each session of work (morning/afternoon) c) Monthly
Gas Analyzer	a) Gas bench calibration b) Leak check c) HC hang-up check d) Zero calibration e) Ambient air sampling f) Change sample system filters g) Change gas bottle h) New NOx sensor initialization	Within acceptable range recommended by manufacturer	At the start of each session of work (morning/afternoon) f) Weekly or low flow g) pressure is less than the one specified by the manufacturer h) Whenever the NOx sensor is replaced
Sampling Probe	Clear off loose soot accumulated on the inner surface by flushing with water or other suitable means	--	Before the start of each session of work (morning/afternoon)

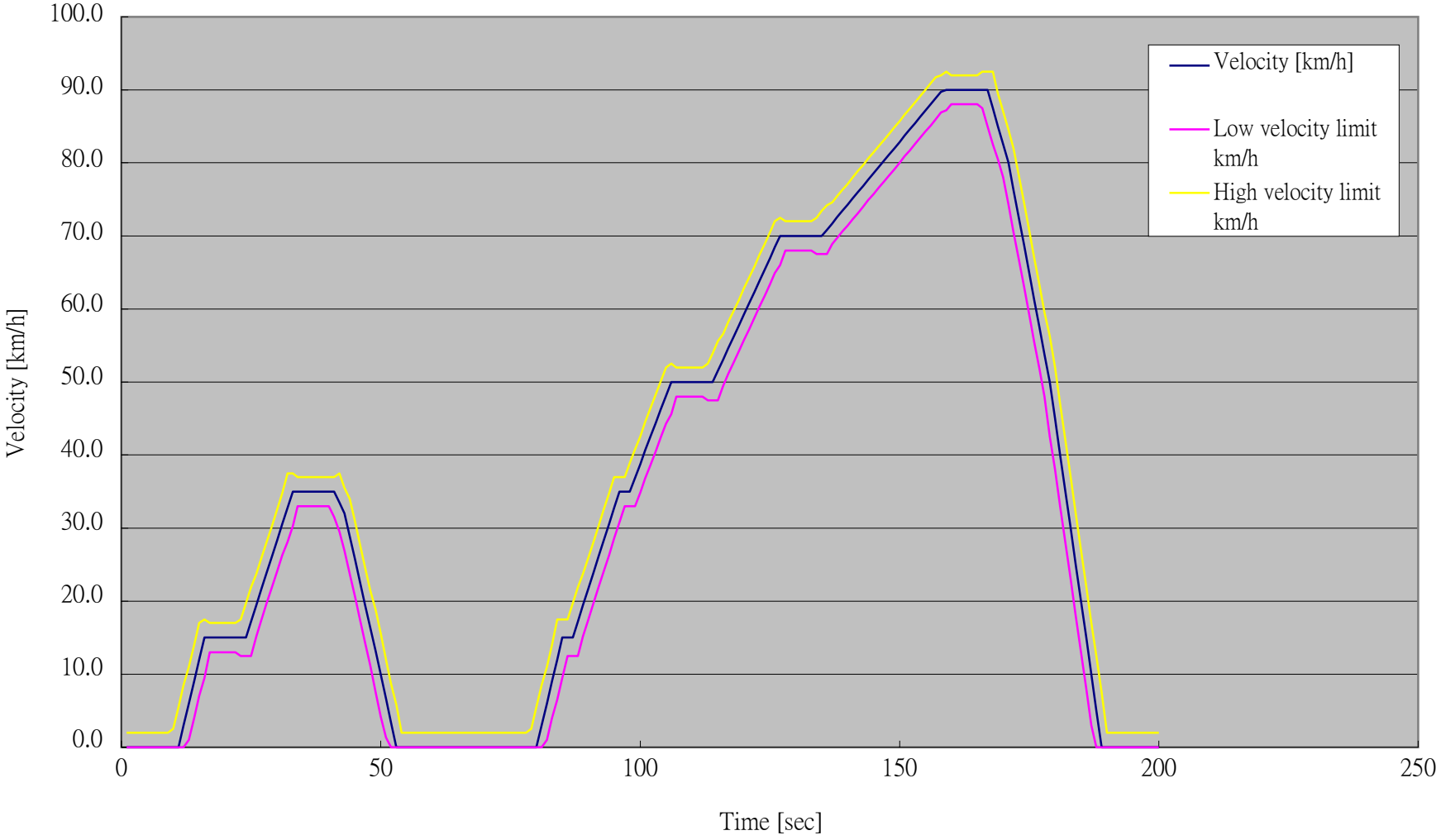
Instrument	Items of Service	Acceptable Criteria	Frequency
Tachometer	In-house accuracy check	Within acceptable range recommended by manufacturers	Biweekly

3. Operational Calibration and Service Checklist (Table C)

Instrument	Items of Service	Frequency	Inspection		
			Yes	No	N.A.
Dynamometer	d) Coast down test	c) Daily			
	e) Load cell calibration and roll speed check	d) Biweekly			
	f) Parasitic loss calibration	e) Monthly or if coast down test failed			
	g) Parasitic losses calibration covering speed range from 15 to 50 miles/hr (25-80 km/hr)	f) Annually			
VMAS volumetric flow meter	a) Vortex Flow Meter Calibration	a) Semi-annually			
	b) O_2 Sensor	b) At the start of each session of work (morning/afternoon)			
	c) Vortex Strut Check	c) Monthly			
Gas Analyzer	a) Gas bench calibration	At the start of each session of work (morning/afternoon)			
	b) Leak check				
	c) HC hang-up check				
	d) Zero calibration				
	e) Ambient air sampling				
	f) Change sample system filters	f) Weekly or low flow			
	g) Change gas bottle	g) pressure is less than the one specified by the manufacturer			
	h) New NOx sensor initialization	h) Whenever the NOx sensor is replaced			
Sampling Probe	Clear off loose soot accumulated on the inner surface by flushing with water or other suitable means	Before the start of each session of work (morning/afternoon)			
Tachometer	In-house accuracy check	Biweekly			

The TÜV- driving cycle (automatic transmission for vehicles up to 2750kg RW)

Appendix VA(A)



Hong Kong Transient Emission Test **Appendix VA(A)**

Standard Drive Trace TÜV - Automatic Transmission

Description of drive trace:

1. For vehicle equipped with automatic transmission up to 2750kg RW
2. Total distance travelled is 1969 metres
3. Maximum speed is 90 km/h
4. Total drive time is 200 seconds
5. Dynamometer check starts from second 34 to second 40 total for 7 seconds
6. N = Gear box in neutral
7. D=Drive
8. A tolerance of ± 2km/h is allowed between the indicated speed and the theoretical speed during acceleration, steady speed and deceleration when vehicle's brake are used. A larger tolerance of ±2.5km/h is allowed during phase change.
9. The time tolerance are ±1.0 second

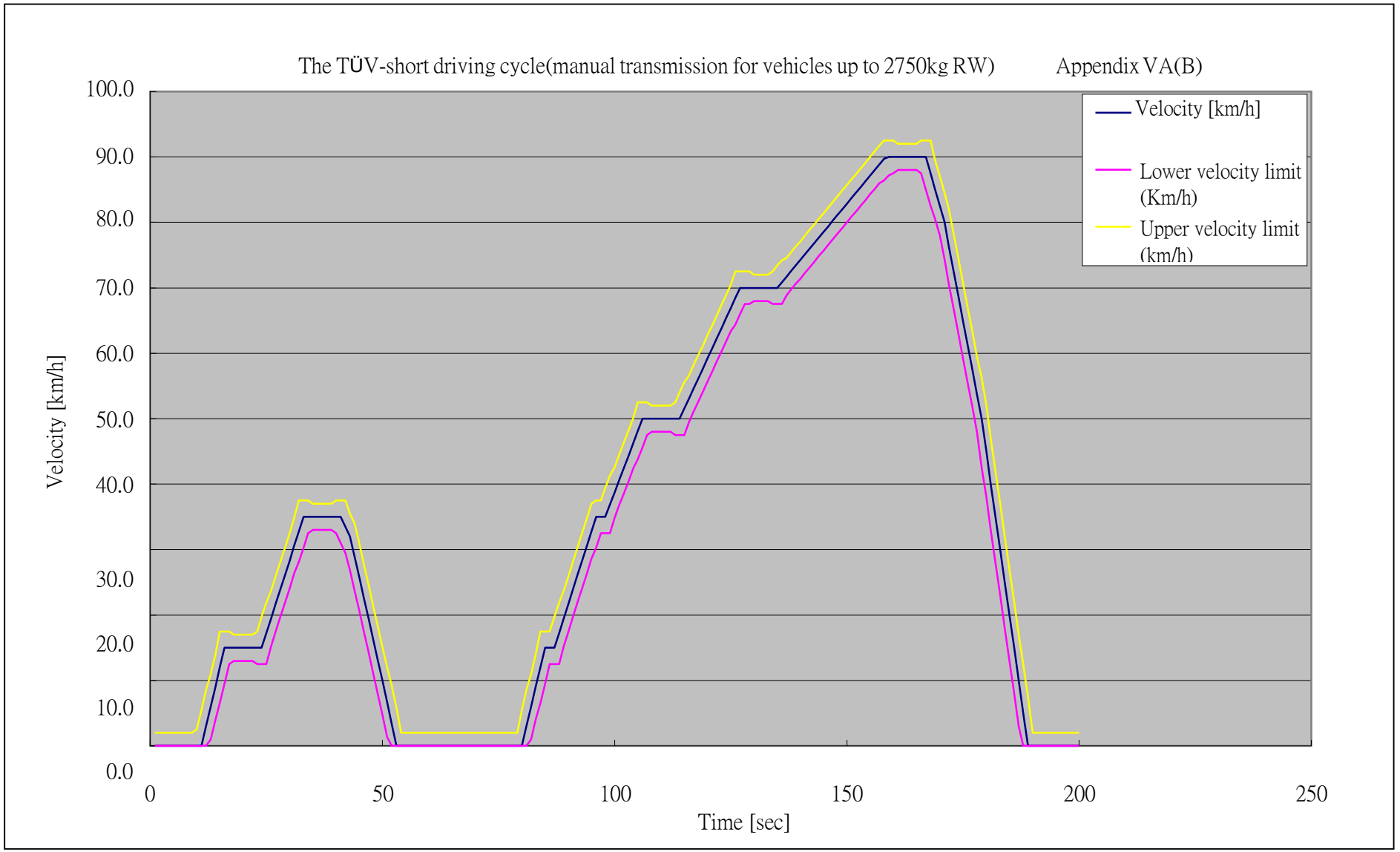
Time [s]	Velocity [km/h]	Gear (c = clutch)	Low velocity limit km/h	High velocity limit km/h	Gear change
1	0.0	N	0	2	
2	0.0	N	0	2	
3	0.0	N	0	2	
4	0.0	N	0	2	
5	0.0	N	0	2	
6	0.0	N	0	2	
7	0.0	N	0	2	
8	0.0	N	0	2	
9	0.0	N	0	2	
10	0.0	N	0	3	
11	0.0	D	0	5.5	N to D
12	3.0	D	0	8.5	
13	6.0	D	1	11	
14	9.0	D	4	14	
15	12.0	D	7	17.0	
16	15.0	D	9.5	17.5	
17	15.0	D	13	17	
18	15.0	D	13	17	
19	15.0	D	13	17	
20	15.0	D	13	17	
21	15.0	D	13	17	
22	15.0	D	13	17	
23	15.0	D	12.5	18	
24	15.0	D	12.5	19.7	

25	17.2	D	12.5	21.9	
26	19.4	D	15.2	23.7	
27	21.7	D	17.4	25.9	
28	23.9	D	19.7	28.1	
29	26.1	D	21.9	30.3	
30	28.3	D	24.1	32.6	
31	30.6	D	26.3	34.8	
32	32.8	D	28.1	37.5	
33	35.0	D	30.3	37.5	
34	35.0	D	33	37	
35	35.0	D	33	37	
36	35.0	D	33	37	
37	35.0	D	33	37	
38	35.0	D	33	37	
39	35.0	D	33	37	
40	35.0	D	33	37	
41	35.0	D	31.5	37	
42	33.5	D	29.5	37.5	
43	32.0	D	26.9	35.5	
44	28.9	D	23.7	34	
45	25.7	D	20.6	30.9	
46	22.6	D	17.4	27.7	
47	19.4	D	14.3	24.6	
48	16.3	D	11.1	21.4	
49	13.1	D	7.5	18.8	
50	10.0	N	4.2	15.6	D to N
51	6.7	N	1.3	12	
52	3.3	N	0	8.7	
53	0.0	N	0	5.8	
54	0.0	N	0	2	
55	0.0	N	0	2	
56	0.0	N	0	2	
57	0.0	N	0	2	
58	0.0	N	0	2	
59	0.0	N	0	2	
60	0.0	N	0	2	
61	0.0	N	0	2	
62	0.0	N	0	2	
63	0.0	N	0	2	
64	0.0	N	0	2	
65	0.0	N	0	2	
66	0.0	N	0	2	
67	0.0	N	0	2	
68	0.0	N	0	2	
69	0.0	N	0	2	
70	0.0	N	0	2	
71	0.0	N	0	2	

72	0.0	N	0	2	
73	0.0	N	0	2	
74	0.0	N	0	2	
75	0.0	N	0	2	
76	0.0	N	0	2	
77	0.0	N	0	2	
78	0.0	N	0	2	
79	0.0	N	0	3	
80	0.0	D	0	5.5	N to D
81	3.0	D	0	8.5	
82	6.0	D	1	11.0	
83	9.0	D	4	14.0	
84	12.0	D	6.5	17.5	
85	15.0	D	9.5	17.5	
86	15.0	D	12.5	17.5	
87	15.0	D	12.5	19.7	
88	17.2	D	12.5	21.9	
89	19.4	D	15.2	23.7	
90	21.7	D	17.4	25.9	
91	23.9	D	19.7	28.1	
92	26.1	D	21.9	30.3	
93	28.3	D	24.1	32.6	
94	30.6	D	26.3	34.8	
95	32.8	D	28.6	37	
96	35.0	D	30.8	37.0	
97	35.0	D	33	37.0	
98	35.0	D	33	38.9	
99	36.9	D	33	40.8	
100	38.8	D	34.9	42.6	
101	40.6	D	36.8	44.5	
102	42.5	D	38.6	46.4	
103	44.4	D	40.5	48.3	
104	46.3	D	42.4	50.1	
105	48.1	D	44.3	52.0	
106	50.0	D	45.6	52.5	
107	50.0	D	48	52	
108	50.0	D	48	52	
109	50.0	D	48	52	
110	50.0	D	48	52	
111	50.0	D	48	52	
112	50.0	D	48	52.0	
113	50.0	D	47.5	52.5	
114	50.0	D	47.5	53.9	
115	51.5	D	47.5	55.6	
116	53.1	D	49.5	56.6	
117	54.6	D	51.1	58.2	
118	56.2	D	52.6	59.7	

119	57.7	D	54.2	61.2	
120	59.2	D	55.7	62.8	
121	60.8	D	57.2	64.3	
122	62.3	D	58.8	65.8	
123	63.8	D	60.3	67.4	
124	65.4	D	61.8	68.9	
125	66.9	D	63.4	70.5	
126	68.5	D	64.9	72.0	
127	70.0	D	66	72.5	
128	70.0	D	68	72.0	
129	70.0	D	68	72.0	
130	70.0	D	68	72.0	
131	70.0	D	68	72.0	
132	70.0	D	68	72.0	
133	70.0	D	68	72.0	
134	70.0	D	67.5	72.5	
135	70.0	D	67.5	73.4	
136	70.9	D	67.5	74.2	
137	71.7	D	68.9	74.6	
138	72.6	D	69.7	75.4	
139	73.4	D	70.6	76.3	
140	74.3	D	71.4	77.1	
141	75.1	D	72.3	78.0	
142	76.0	D	73.1	78.9	
143	76.9	D	74	79.7	
144	77.7	D	74.9	80.6	
145	78.6	D	75.7	81.4	
146	79.4	D	76.6	82.3	
147	80.3	D	77.4	83.1	
148	81.1	D	78.3	84.0	
149	82.0	D	79.1	84.9	
150	82.9	D	80	85.7	
151	83.7	D	80.9	86.6	
152	84.6	D	81.7	87.4	
153	85.4	D	82.6	88.3	
154	86.3	D	83.4	89.1	
155	87.1	D	84.3	90.0	
156	88.0	D	85.1	90.9	
157	88.9	D	86	91.7	
158	89.7	D	86.9	92.0	
159	90.0	D	87.2	92.5	
160	90.0	D	88	92	
161	90.0	D	88	92	
162	90.0	D	88	92	
163	90.0	D	88	92	
164	90.0	D	88	92	
165	90.0	D	88	92	

166	90.0	D	87.5	92.5	
167	90.0	D	85	92.5	
168	87.5	D	82.5	92.5	
169	85.0	D	80.5	89.5	
170	82.5	D	78	87	
171	80.0	D	74.3	84.5	
172	76.3	D	70.5	82	
173	72.5	D	66.8	78.3	
174	68.8	D	63	74.5	
175	65.0	D	59.3	70.8	
176	61.3	D	55.5	67	
177	57.5	D	51.8	63.3	
178	53.8	D	48	59.5	
179	50.0	N	42.5	56.3	D to N
180	45.0	N	38	52.0	
181	40.0	N	33	47.0	
182	35.0	N	28	42.0	
183	30.0	N	23	37.0	
184	25.0	N	18	32.0	
185	20.0	N	13	27.0	
186	15.0	N	8	22.0	
187	10.0	N	3	17.0	
188	5.0	N	0	12.5	
189	0.0	N	0	7.5	
190	0.0	N	0	2	
191	0.0	N	0	2	
192	0.0	N	0	2	
193	0.0	N	0	2	
194	0.0	N	0	2	
195	0.0	N	0	2	
196	0.0	N	0	2	
197	0.0	N	0	2	
198	0.0	N	0	2	
199	0.0	N	0	2	
200	0.0	N	0	2	


The TÜV-short driving cycle(manual transmission for vehicles up to 2750kg RW)
Appendix VA(B)
Velocity [km/h]
Lower velocity limit (Km/h)
Upper velocity limit (km/h)
Velocity [km/h]
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
50
100
150
200
250
Time [sec]

Hong Kong Transient Emission Test **Appendix VA(B)**

Standard Drive Trace TÜV - Manual Transmission

Description of drive trace:

1. For vehicle equipped with manual transmission up to 2750kg RW
2. Total distance travelled is 1969 metres
3. Maximum speed is 90 km/h
4. Total drive time is 200 seconds
5. Dynamometer check starts form second 34 to second 40 total for 7 seconds
6. N= gearbox in neutral
7. C1, C2, C3 or C5 = first, second, third or fifth gear engaged, clutch off
8. A tolerance of ± 2km/h is allowed between the indicated speed and the theoretical speed during acceleration, steady speed and deceleration when vehicle's brake are used. A larger tolerance of ±2.5km/h is allowed during phase change.
9. The time tolerance are ±1.0 second

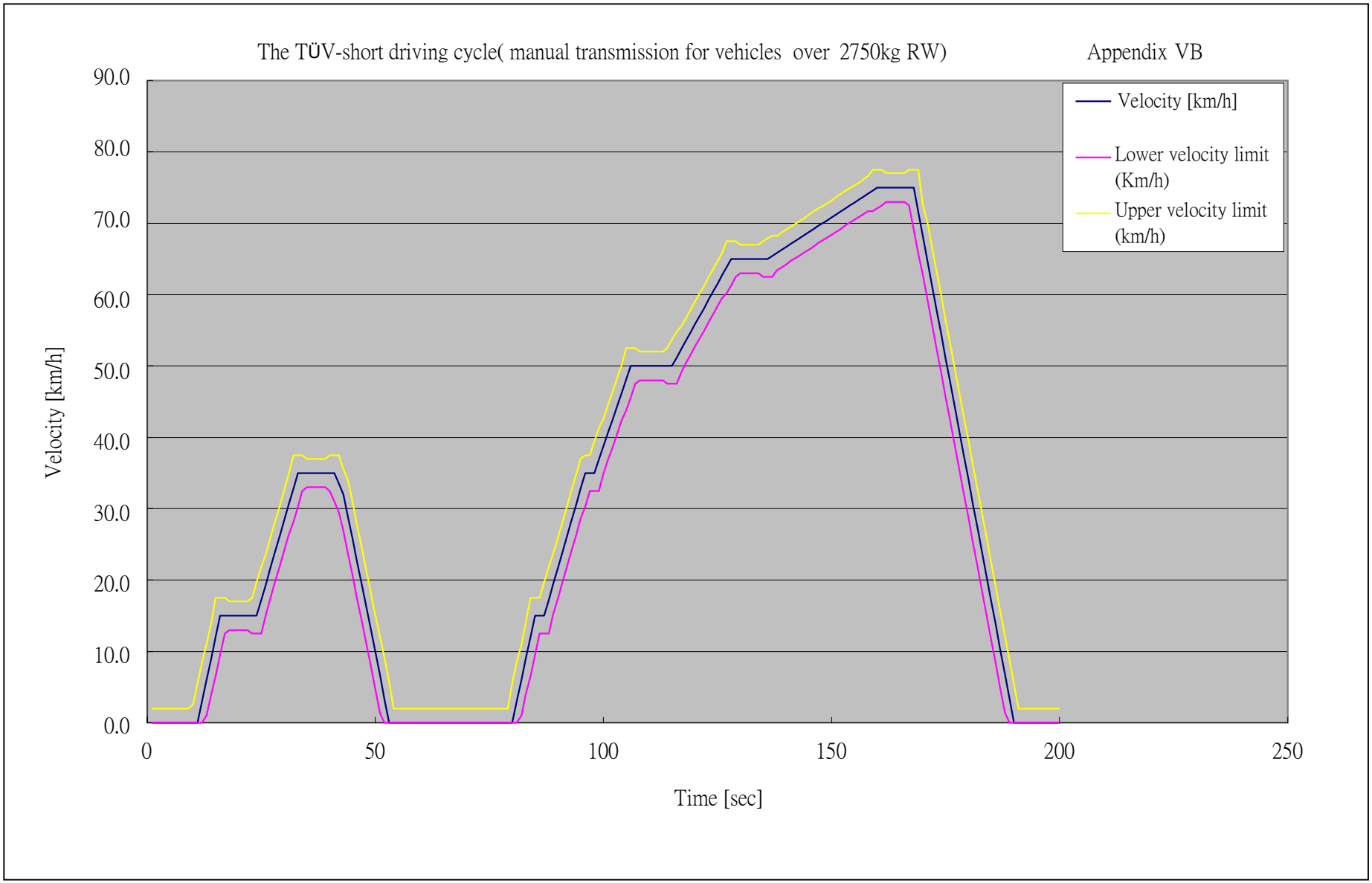
Time [s]	Velocity [km/h]	Gear (c = clutch)	Lower velocity limit (Km/h)	Upper velocity limit (km/h)	Gear change
1	0.0	N	0	2	
2	0.0	N	0	2	
3	0.0	N	0	2	
4	0.0	N	0	2	
5	0.0	N	0	2	
6	0.0	c1	0	2	gear 1, clutch
7	0.0	c1	0	2	
8	0.0	c1	0	2	
9	0.0	c1	0	2	
10	0.0	c1	0	2.5	
11	0.0	1	0	5.5	clutch on
12	3.0	1	0	8.5	
13	6.0	1	1	11	
14	9.0	1	4	14	
15	12.0	1	6.5	17.5	
16	15.0	1	9.5	17.5	
17	15.0	1	12.5	17.5	
18	15.0	1	13	17	
19	15.0	1	13	17	
20	15.0	1	13	17	
21	15.0	1	13	17	
22	15.0	1	13	17.0	
23	15.0	2	12.5	17.5	gear 1 to 2
24	15.0	2	12.5	19.7	
25	17.2	2	12.5	21.9	

26	19.4	2	15.2	23.7	
27	21.7	2	17.4	25.9	
28	23.9	2	19.7	28.1	
29	26.1	2	21.9	30.3	
30	28.3	2	24.1	32.6	
31	30.6	2	26.3	34.8	
32	32.8	2	28.1	37.5	
33	35.0	2	30.3	37.5	
34	35.0	2	32.5	37.5	
35	35.0	2	33	37	
36	35.0	2	33	37	
37	35.0	2	33	37	
38	35.0	2	33	37	
39	35.0	2	33	37	
40	35.0	2	32.5	37.5	
41	35.0	2	31	37.5	
42	33.5	2	29.5	37.5	
43	32.0	2	26.9	35.5	
44	28.9	2	23.7	34	
45	25.7	2	20.6	30.9	
46	22.6	2	17.4	27.7	
47	19.4	2	14.3	24.6	
48	16.3	2	11.1	21.4	
49	13.1	2	8	18.3	
50	10.0	c2	4.7	15.1	clutch off
51	6.7	c2	1.3	12	
52	3.3	c2	0	9.2	
53	0.0	N	0	5.8	neutral
54	0.0	N	0	2	
55	0.0	N	0	2	
56	0.0	N	0	2	
57	0.0	N	0	2	
58	0.0	N	0	2	
59	0.0	N	0	2	
60	0.0	N	0	2	
61	0.0	c1	0	2	clutch off
62	0.0	c1	0	2	
63	0.0	c1	0	2	
64	0.0	c1	0	2	
65	0.0	c1	0	2	
66	0.0	c1	0	2	
67	0.0	c1	0	2	
68	0.0	c1	0	2	
69	0.0	c1	0	2	
70	0.0	c1	0	2	
71	0.0	c1	0	2	
72	0.0	c1	0	2	

73	0.0	c1	0	2	
74	0.0	c1	0	2	
75	0.0	c1	0	2	
76	0.0	c1	0	2	
77	0.0	c1	0	2	
78	0.0	c1	0	2	
79	0.0	c1	0	2	
80	0.0	1	0	5.5	clutch on
81	3.0	1	0	8.5	
82	6.0	1	1	11.0	
83	9.0	1	4	14.0	
84	12.0	1	6.5	17.5	
85	15.0	1	9.5	17.5	
86	15.0	2	12.5	17.5	gear 1 to 2
87	15.0	2	12.5	19.7	
88	17.2	2	12.5	21.9	
89	19.4	2	15.2	23.7	
90	21.7	2	17.4	25.9	
91	23.9	2	19.7	28.1	
92	26.1	2	21.9	30.3	
93	28.3	2	24.1	32.6	
94	30.6	2	26.3	34.8	
95	32.8	2	28.6	37	
96	35.0	2	30.3	37.5	
97	35.0	3	32.5	37.5	gear 2 to 3
98	35.0	3	32.5	39.4	
99	36.9	3	32.5	41.3	
100	38.8	3	34.9	42.6	
101	40.6	3	36.8	44.5	
102	42.5	3	38.6	46.4	
103	44.4	3	40.5	48.3	
104	46.3	3	42.4	50.1	
105	48.1	3	43.8	52.5	
106	50.0	3	45.6	52.5	
107	50.0	3	47.5	53	
108	50.0	3	48	52	
109	50.0	3	48	52	
110	50.0	3	48	52	
111	50.0	3	48	52	
112	50.0	3	48	52.0	
113	50.0	4	47.5	52.5	gear 3 to 4
114	50.0	4	47.5	54.0	
115	51.5	4	47.5	55.6	
116	53.1	4	49.5	56.6	
117	54.6	4	51.1	58.2	
118	56.2	4	52.6	59.7	
119	57.7	4	54.2	61.2	

120	59.2	4	55.7	62.8	
121	60.8	4	57.2	64.3	
122	62.3	4	58.8	65.8	
123	63.8	4	60.3	67.4	
124	65.4	4	61.8	68.9	
125	66.9	4	63.4	70.5	
126	68.5	4	64.4	72.5	
127	70.0	4	66	72.5	
128	70.0	4	67.5	72.5	
129	70.0	4	67.5	72.5	
130	70.0	4	68	72.0	
131	70.0	4	68	72.0	
132	70.0	4	68	72.0	
133	70.0	4	68	72.0	
134	70.0	5	67.5	72.5	gear 4 to 5
135	70.0	5	67.5	73.4	
136	70.9	5	67.5	74.2	
137	71.7	5	68.9	74.6	
138	72.6	5	69.7	75.4	
139	73.4	5	70.6	76.3	
140	74.3	5	71.4	77.1	
141	75.1	5	72.3	78.0	
142	76.0	5	73.1	78.9	
143	76.9	5	74	79.7	
144	77.7	5	74.9	80.6	
145	78.6	5	75.7	81.4	
146	79.4	5	76.6	82.3	
147	80.3	5	77.4	83.1	
148	81.1	5	78.3	84.0	
149	82.0	5	79.1	84.9	
150	82.9	5	80	85.7	
151	83.7	5	80.9	86.6	
152	84.6	5	81.7	87.4	
153	85.4	5	82.6	88.3	
154	86.3	5	83.4	89.1	
155	87.1	5	84.3	90.0	
156	88.0	5	85.1	90.9	
157	88.9	5	86	91.7	
158	89.7	5	86.4	92.5	
159	90.0	5	87.2	92.5	
160	90.0	5	87.5	93	
161	90.0	5	88	92	
162	90.0	5	88	92	
163	90.0	5	88	92	
164	90.0	5	88	92	
165	90.0	5	88	92	
166	90.0	5	87.5	92.5	

167	90.0	5	85	92.5	
168	87.5	5	82.5	92.5	
169	85.0	5	80.5	89.5	
170	82.5	5	78	87	
171	80.0	5	74.3	84.5	
172	76.3	5	70.5	82	
173	72.5	5	66.8	78.3	
174	68.8	5	63	74.5	
175	65.0	5	59.3	70.8	
176	61.3	5	55.5	67	
177	57.5	5	51.8	63.3	
178	53.8	5	48	59.5	
179	50.0	c5	42.5	56.3	clutch off
180	45.0	c5	38	52.0	
181	40.0	c5	33	47.0	
182	35.0	c5	28	42.0	
183	30.0	c5	23	37.0	
184	25.0	c5	18	32.0	
185	20.0	c5	13	27.0	
186	15.0	c5	8	22.0	
187	10.0	c5	3	17.0	
188	5.0	c5	0	12.5	
189	0.0	N	0	7.5	neural
190	0.0	N	0	2	
191	0.0	N	0	2	
192	0.0	N	0	2	
193	0.0	N	0	2	
194	0.0	N	0	2	
195	0.0	N	0	2	
196	0.0	N	0	2	
197	0.0	N	0	2	
198	0.0	N	0	2	
199	0.0	N	0	2	
200	0.0	N	0	2	


The TÜV-short driving cycle(manual transmission for vehicles over 2750kg RW)
Appendix VB
Velocity [km/h]
Lower velocity limit (Km/h)
Upper velocity limit (km/h)
Velocity [km/h]
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
0
50
100
150
200
250
Time [sec]

Hong Kong Transient Emission Test **Appendix VB**

Standard Drive Trace TÜV - Manual Transmission

Description of drive trace:

1. For vehicle equipped with manual transmission over 2750kg
2. Total distance travelled is 1782 metres
3. Maximum speed is 75 km/h
4. Total drive time is 200 seconds
5. Dynamometer check starts form second 34 to second 40 total for 7 seconds
6. N= gearbox in neutral
7. C1, C2, C3 or C5 = first, second, third or fifth gear engaged, clutch off
8. A tolerance of ± 2km/h is allowed between the indicated speed and the theoretical speed during acceleration, steady speed and deceleration when vehicle's brake are used. A larger tolerance of ±2.5km/h is allowed during phase change.
9. The time tolerance are ±1.0 second

Time [s]	Velocity [km/h]	Gear (c = clutch)	Lower velocity limit (Km/h)	Upper velocity limit (km/h)	Gear change
1	0.0	N	0	2	
2	0.0	N	0	2	
3	0.0	N	0	2	
4	0.0	N	0	2	
5	0.0	N	0	2	
6	0.0	c1	0	2	gear 1, clutch off
7	0.0	c1	0	2	
8	0.0	c1	0	2	
9	0.0	c1	0	2	
10	0.0	c1	0	2.5	
11	0.0	1	0	5.5	clutch on
12	3.0	1	0	8.5	
13	6.0	1	1	11	
14	9.0	1	4	14	
15	12.0	1	6.5	17.5	
16	15.0	1	9.5	17.5	
17	15.0	1	12.5	17.5	
18	15.0	1	13	17	
19	15.0	1	13	17	
20	15.0	1	13	17	
21	15.0	1	13	17	
22	15.0	1	13	17.0	
23	15.0	2	12.5	17.5	gear 1 to 2
24	15.0	2	12.5	19.7	
25	17.2	2	12.5	21.9	

26	19.4	2	15.2	23.7	
27	21.7	2	17.4	25.9	
28	23.9	2	19.7	28.1	
29	26.1	2	21.9	30.3	
30	28.3	2	24.1	32.6	
31	30.6	2	26.3	34.8	
32	32.8	2	28.1	37.5	
33	35.0	2	30.3	37.5	
34	35.0	2	32.5	37.5	
35	35.0	2	33	37	
36	35.0	2	33	37	
37	35.0	2	33	37	
38	35.0	2	33	37	
39	35.0	2	33	37	
40	35.0	2	32.5	37.5	
41	35.0	2	31	37.5	
42	33.5	2	29.5	37.5	
43	32.0	2	26.9	35.5	
44	28.9	2	23.7	34	
45	25.7	2	20.6	30.9	
46	22.6	2	17.4	27.7	
47	19.4	2	14.3	24.6	
48	16.3	2	11.1	21.4	
49	13.1	2	8	18.3	
50	10.0	c2	4.7	15.1	clutch off
51	6.7	c2	1.3	12	
52	3.3	c2	0	9.2	
53	0.0	N	0	5.8	neutral
54	0.0	N	0	2	
55	0.0	N	0	2	
56	0.0	N	0	2	
57	0.0	N	0	2	
58	0.0	N	0	2	
59	0.0	N	0	2	
60	0.0	N	0	2	
61	0.0	c1	0	2	clutch off gear 1
62	0.0	c1	0	2	
63	0.0	c1	0	2	
64	0.0	c1	0	2	
65	0.0	c1	0	2	
66	0.0	c1	0	2	
67	0.0	c1	0	2	
68	0.0	c1	0	2	
69	0.0	c1	0	2	
70	0.0	c1	0	2	
71	0.0	c1	0	2	
72	0.0	c1	0	2	

73	0.0	c1	0	2	
74	0.0	c1	0	2	
75	0.0	c1	0	2	
76	0.0	c1	0	2	
77	0.0	c1	0	2	
78	0.0	c1	0	2	
79	0.0	c1	0	2	
80	0.0	1	0	5.5	clutch on
81	3.0	1	0	8.5	
82	6.0	1	1	11.0	
83	9.0	1	4	14.0	
84	12.0	1	6.5	17.5	
85	15.0	1	9.5	17.5	
86	15.0	2	12.5	17.5	gear 1 to 2
87	15.0	2	12.5	19.7	
88	17.2	2	12.5	21.9	
89	19.4	2	15.2	23.7	
90	21.7	2	17.4	25.9	
91	23.9	2	19.7	28.1	
92	26.1	2	21.9	30.3	
93	28.3	2	24.1	32.6	
94	30.6	2	26.3	34.8	
95	32.8	2	28.6	37	
96	35.0	2	30.3	37.5	
97	35.0	3	32.5	37.5	gear 2 to 3
98	35.0	3	32.5	39.4	
99	36.9	3	32.5	41.3	
100	38.8	3	34.9	42.6	
101	40.6	3	36.8	44.5	
102	42.5	3	38.6	46.4	
103	44.4	3	40.5	48.3	
104	46.3	3	42.4	50.1	
105	48.1	3	43.8	52.5	
106	50.0	3	45.6	52.5	
107	50.0	3	47.5	53	
108	50.0	3	48	52	
109	50.0	3	48	52	
110	50.0	3	48	52	
111	50.0	3	48	52	
112	50.0	3	48	52.0	
113	50.0	4	48	52.0	gear 3 to 4
114	50.0	4	47.5	52.5	
115	50.0	4	47.5	53.7	
116	51.2	4	47.5	54.8	
117	52.3	4	49	55.5	
118	53.5	4	50.3	56.6	
119	54.6	4	51.5	57.8	

120	55.8	4	52.6	58.9	
121	56.9	4	53.8	60.1	
122	58.1	4	54.9	61.2	
123	59.2	4	56.1	62.4	
124	60.4	4	57.2	63.5	
125	61.5	4	58.4	64.7	
126	62.7	4	59.5	65.8	
127	63.8	4	60.2	67.5	
128	65.0	4	61.3	67.5	
129	65.0	4	62.5	67.5	
130	65.0	4	63	67.0	
131	65.0	4	63	67.0	
132	65.0	4	63	67.0	
133	65.0	4	63	67.0	
134	65.0	5	63	67.0	
135	65.0	5	62.5	67.5	
136	65.0	5	62.5	67.9	gear 4 to 5
137	65.4	5	62.5	68.3	
138	65.8	5	63.4	68.2	
139	66.2	5	63.8	68.7	
140	66.7	5	64.2	69.1	
141	67.1	5	64.7	69.5	
142	67.5	5	65.1	69.9	
143	67.9	5	65.5	70.3	
144	68.3	5	65.9	70.7	
145	68.7	5	66.3	71.2	
146	69.2	5	66.7	71.6	
147	69.6	5	67.2	72.0	
148	70.0	5	67.6	72.4	
149	70.4	5	68	72.8	
150	70.8	5	68.4	73.2	
151	71.2	5	68.8	73.7	
152	71.7	5	69.2	74.1	
153	72.1	5	69.7	74.5	
154	72.5	5	70.1	74.9	
155	72.9	5	70.5	75.3	
156	73.3	5	70.9	75.7	
157	73.7	5	71.3	76.2	
158	74.2	5	71.7	76.6	
159	74.6	5	71.7	77.5	
160	75.0	5	72.1	78	
161	75.0	5	72.5	78	
162	75.0	5	73	77	
163	75.0	5	73	77	
164	75.0	5	73	77	
165	75.0	5	73	77	
166	75.0	5	73	77.0	

167	75.0	5	72.5	77.5	
168	75.0	5	69.1	77.5	
169	71.6	5	65.7	77.5	
170	68.2	5	62.8	73	
171	64.8	5	59.4	70.2	
172	61.4	5	56	67	
173	58.0	5	52.5	63.4	
174	54.5	5	49.1	60.0	
175	51.1	5	45.7	56.5	
176	47.7	5	42.3	53	
177	44.3	5	38.9	49.7	
178	40.9	5	35.5	46.3	
179	37.5	c5	32.1	42.9	clutch off
180	34.1	c5	28.7	39.5	
181	30.7	c5	25.3	36.1	
182	27.3	c5	21.9	32.7	
183	23.9	c5	18.4	29.3	
184	20.4	c5	15	25.9	
185	17.0	c5	11.6	22.4	
186	13.6	c5	8.2	19.0	
187	10.2	c5	4.8	15.6	
188	6.8	c5	1.4	12.2	
189	3.4	N	0	8.8	neutral
190	0.0	N	0	5.4	
191	0.0	N	0	2	
192	0.0	N	0	2	
193	0.0	N	0	2	
194	0.0	N	0	2	
195	0.0	N	0	2	
196	0.0	N	0	2	
197	0.0	N	0	2	
198	0.0	N	0	2	
199	0.0	N	0	2	
200	0.0	N	0	2	

Appendix VI

Basic Specifications of DVETC Workstation & Network Requirement and Interface File

1. Workstation Requirement

● Intel® Quad-Core Process Core i7-860 or above
● 4GB Memory or above
● 250GB SATA 3Gbps Hard Drive or above
● Integrated 10/100 Ethernet NIC
● Internal DVD ROM
● 19" LCD Monitor with 1280x1024@60Hz Contract Ratio 800:1 or above
● USB/ PS/2 Keyboard (Traditional Chinese)
● USB/ PS/2 Optical Mouse with scroll
● Windows 7
● MS Office 2007
● Anti-virus software (e.g. Symantec End-Point Protection 11)
● SFTP Client (e.g. WinSCP)
● Barcode Reader - High-speed laser engine, USB Interface

2. Network Requirement

Broadband connection for upload the test result data file to EPD

3. Printer for printing hard copies of the forms

Ink jet or laser monochrome printer shall be provided and connected to the workstation for printing filing hard copies of the forms.

4. DVECT Interface File Specification

The test result data file should be in **CSV format**. The fields and the formats are listed below:

Item	Field Name	Format	Description
1	CENTRE_NO	X(3)	DVETC Centre code (Refer DVETC Database)
2	EXAMDATE	X(10)	Emission testing date (dd/mm/yyyy)
3	EXAMTIME	X(5)	Emission testing time (hh:mm)
4	REGMARK	X(8)	The request vehicle registration mark
5	EXAMORD	X(20)	ETN reference number (Should tally with the proposed database structure)
6	MILEAGE	X(6)	Recorded mileage of vehicle
7	TESTCO	9(5)	Test result - CO (g/km)
8	TESTNOX	9(5)	Test result - NOx (g/km)
9	TESTHC	9(5)	Test result - HC (g/km)
10	TESTHC_NOX	9(5)	Test result - HC + NOx (g/km)
11	TESTRESULT	X(5)	PASS /FAIL /NT*XX* (*XX* - refer NT Codes)
12	TESTMETHOD	X(5)	IET - Idling emission test; TET - Transient emission test.
13	NT_OTHERS	X(60)	Description for other irregularity (i.e. NT14)
14	ALT_OTHERS	X(60)	Description for other reason for using alt. test
15	LIMIT_CO	9(5)	Standard CO (g/km)
16	LIMIT_NOX	9(5)	Standard NOx (g/km)
17	LIMIT_HC	9(5)	Standard HC (g/km)
18	LIMIT_HC_NOX	9(5)	Standard HC + NOx (g/km)
19	VEHICLE_WT	9(5)	Measured vehicle weight (kg)
20	CERT_NO	9(8)	Number of Certificate of Compliance (Pass only)
21	VIN Number Checked	X(3)	VIN Number checked (YES or NO)