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Limits of Fuel Consumption for Light-Duty Commercial Vehicles

(Draft for approval)

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Preface

The entire content of the standard is compulsory.

This is the first national compulsory standard to control the fuel consumption of commercial vehicles.

This standard not only specifies the limits of fuel consumption for light-duty commercial vehicles, but also raises the requirements for measuring and recording CO_2 emissions. This standard also provides the basic data for controlling CO_2 emissions by light-duty commercial vehicles in the future.

Appendix A and Appendix B are specification appendices.

This standard was proposed by the National Development and Reform Commission of China.

This standard is under the jurisdiction of the National Automotive Standardisation Technical Committee.

The organisation in charge of drafting this standard was China Automotive Technology & Research Centre.

The main organisations involved in drafting this standard include Dongfeng Motor Co. Ltd, Jiangling Motors Co. Ltd, Nanjing Automotive Group Co. Ltd, Beiqi Foton Motor Co. Ltd, Jianghuai Motor Co. Ltd, Changan Motor (Group) Co. Ltd, Changcheng Motor Co. Ltd, Shanghai GM Wuling Motor Co. Ltd, Bosch Automotive Diesel System Co. Ltd, National Automotive Quality Supervision and Inspection Centre (Xiangfan), and National Automotive Quality Supervision and Inspection Centre (Changchun).

Other organisations that participated in drafting this standard were Daimler Chrysler Benz (China) Investment Co. Ltd, Volkswagen (China) Investment Co. Ltd, Nissan (China) Investment Co. Ltd, and Toyota Motor Technology Centre (China) Co. Ltd.

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Limits of fuel consumption for light-duty commercial vehicles

1. Scope

This standard sets the limits of fuel consumption for light-duty commercial vehicles.

This standard applies to Category N_1 vehicles with a maximum design speed greater than or equal to 50 km/h and Category M_2 vehicles with a maximum design mass no greater than 3500 kg and driven by spark ignition or compression ignition engines.

This standard does not apply to non-spark ignition or compression ignition engine driven vehicles and vehicles with special operating devices (such as road sweeping vehicles, water spray vehicles, bullet-proof money transportation vehicles), fire engines, police cars, emergency engineering vehicles and ambulances.

2. Normative References

The provisions of the following documents become provisions of this standard after being referenced. For dated reference documents, all later amendments (excluding corrigenda) and versions do not apply to this standard; however, the parties to the agreement are encouraged to study whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this standard.

GB/T 15089-2001	Classification of Motor Vehicles and Trailers
GB 18352.3-2005	Limits and measurement methods of evaporative pollutants from
	light motor vehicles (China III, IV Stages)
GB/T 19233	Fuel consumption test method for light motor vehicles

3. Terms and Definitions

The terms and definitions set out in GB 18352.3-2005 apply to this standard.

4. Application for Type Approval

4.1 The application for type approval for the fuel consumption of any given type of vehicle must be submitted by its manufacturer or its legal representative.

4.2 The following documents and detailed information (the illustrations must be in an appropriate scale and with a full explanation, if appropriate) must be attached to the application. Three copies of documents must be supplied in A4 size:

4.2.1 An explanation of the characteristics of the engine system specified in Appendix A.

4.2.2 A report of the type approval of fuel consumption specified in Appendix B without filling in the content in Chapter B.8 and Chapter B.9.

4.3 One representative vehicle must be provided to the organisation in charge of the type approval test.

5. Test Method

The fuel consumption test should be carried out according to the General Requirements, Test Conditions and Emission Measurements of CO₂, CO and HC specified in GB/T 19233.

6. Calculation of Fuel Consumption

The calculation of fuel consumption should be carried out according to the Calculating Fuel Consumption section in GB/T 19233.

7. Ratification and Recording of Type Approval

7.1 The inspection organisation in charge of the type approval ratifies the type approval of the fuel consumption (comprehensive fuel consumption) according to the Determination Values of Type Approval article in the Fuel Consumption Calculation section in GB/T 19233.

7.2 Compare the type approval values with the corresponding limit values in Table 1, Table 2, Table 3 or Table 4 and record the comparison results in the type approval ratification report specified in Appendix B.

8. Limits of Fuel Consumption

The limits of fuel consumption for light-duty commercial vehicles are shown in Table 1, Table 2, Table 3 and Table 4.

They apply to vehicles with one or more of the structures below:

- a) Category N₁ van type vehicles;
- b) Category N1 tank type vehicles;
- c) Vehicles with auto transmission;
- d) All wheel driven vehicles.

The limits are the numbers rounded off to point one of the values in Table 1, Table 2, Table 3 or Table 4 multiplied by 1.05.

Table 1 Fuel Consumption Limits for Category N1 Petrol Motor Venicles			
Maximum Design Mass	Engine Displacement	First Stage Limits	Second Stage Limits
(M) kg	(V) 1	l/100 km	l/100 km
M≤2000	Total	8.0	7.8
2000 <m≤ 2500<="" td=""><td>V≤1.5</td><td>9.0</td><td>8.1</td></m≤>	V≤1.5	9.0	8.1
	$1.5 < V \le 2.0$	10.0	9.0
	$2.0 \le V \le 2.5$	11.5	10.4
	V>2.5	13.5	12.5
2500 <m≤ 3000<="" td=""><td>V≤2.0</td><td>10.0</td><td>9.0</td></m≤>	V≤2.0	10.0	9.0
	$2.0 \le V \le 2.5$	12.0	10.8
	V>2.5	14.0	12.6
M>3000	V≤2.5	12.5	11.3
	2.5 <v≤3.0< td=""><td>14.0</td><td>12.6</td></v≤3.0<>	14.0	12.6
	V>3.0	15.5	14.0

Table 1 Fuel Consumption Limits for Category N1 Petrol Motor Vehicles

Maximum Design Mass (M) kg	Engine Displacement (V) 1	First Stage Limits l/100 km	Second Stage Limits 1/100 km
M≤ 2000	Total	7.6	7.0
2000 <m≤ 2500<="" td=""><td>V≤2.5</td><td>8.4</td><td>8.0</td></m≤>	V≤2.5	8.4	8.0
	2.5 <v≤3.0< td=""><td>9.0</td><td>8.5</td></v≤3.0<>	9.0	8.5
	V> 3.0	10.0	9.5
2500 <m≤ 3000<="" td=""><td>V≤2.5</td><td>9.5</td><td>9.0</td></m≤>	V≤2.5	9.5	9.0
	$2.5 < V \le 3.0$	10.0	9.5
	V>3.0	11.0	10.5
M>3000	V≤2.5	10.5	10.0
	$2.5 < V \le 3.0$	11.0	10.5
	$3.0 < V \le 4.0$	11.6	11.0
	V>4.0	12.0	11.5

Table 3 Fuel Consumption Limits for Category M2 Petrol Motor Vehicles with a
Maximum Design Mass of Less Than 3.5 Tons

Maximum Design Mass	Engine Displacement	First Stage Limits	Second Stage Limits
(M) kg	(V) 1	l/100 km	l/100 km
M≤ 3000	V≤2.0	10.7	9.7
	$2.0 < V \le 2.5$	12.2	11.0
	$2.5 < V \le 3.0$	13.5	12.2
	V>3.0	14.5	13.1
M>3000	V≤2.5	12.5	11.3
	2.5 <v≤3.0< td=""><td>14.0</td><td>12.6</td></v≤3.0<>	14.0	12.6
	V>3.0	15.5	14.0

Table 4 Fuel Consumption Limits for Category M2 Diesel Motor Vehicles with a
Maximum Design Mass of Less Than 3.5 Tons

Maximum Design Mass	Engine Displacement	First Stage Limits	Second Stage Limits
(M) kg	(V) 1	l/100 km	l/100 km
M≤ 3000	V≤2.5	9.4	8.5
	V>2.5	10.5	9.5
M>3000	V≤3.0	11.5	10.5
	V>3.0	12.6	11.5

9. Production Conformity

9.1 For vehicles ratified with type approval according to this standard, the manufacturer should ensure that the vehicles produced conform to the type-approved vehicle. If the vehicles produced cannot meet the conformity requirements, the type approval should be revoked.

9.2 According to the extent to which the regular inspections made by the manufacturer on the fuel consumption of the type-approved vehicle are passed satisfactorily, the organisation in charge will decide how the production conformity inspection will be conducted.

9.3 The production conformity inspection of the vehicle's fuel consumption should be based on Appendix B and carried out according to the production conformity provisions in GB/T 19233.

10. Modification and Extension

If any modification has been carried out on the type-approved vehicle, the organisation in charge of the type approval should be informed. The organisation in charge can then make one of the following decisions:

10.1 If it is considered that the modification will not affect the fuel consumption of the modified vehicle, the type approval of the original vehicle will still apply to the modified vehicle.

10.2 A type approval report on the modified vehicle will need to be submitted in accordance with the production conformity provisions in GB/T 19233.

11. Implementation Date

From 1 January 2008 newly type-approved base vehicles and modified vehicles based on them should conform to the requirements of the second stage limits.

From 1 January 2009 vehicles in production and modified vehicles based on them should conform to the requirements of the first stage limits.

From 1 January 2011 all vehicles to which this standard applies should conform to the requirements of the second stage limits.

Appendix A (Specification appendix) Explanation of Engine System Characteristics

A.1 Manufacturer:

A.1.1 Engine Model of Manufacturer:

A.2 Internal Combustion Engine

A.2.1 Engine Characteristic Data

A.2.1.1 Working Principle: Spark Ignition/Compression Ignition, Four-stroke

Cycle/Two-stroke Cycle¹⁾

A.2.1.2 Cylinder Number, Layout and Ignition Order:

A.2.1.2.1 Cylinder Bore²: (mm)

A.2.1.2.2 Stroke²): (mm)

A.2.1.3 Engine Displacement³): (cm³)

A.2.1.4 Volume Compression Ratio⁴):

A.2.1.5 Drawings of Combustion Chamber and Piston Crown:

A.2.1.6 Idle Speed⁴: (r/min)

A.2.1.7 Emitted Carbon Monoxide Quantity in Volume Specified by Manufacturer at Engine's Idle Speed²⁾ (%) (only applicable to spark ignition engines):

A.2.1.8 Maximum Net Power at ...r/min: (kW)

A.2.2 Fuel: Diesel/Unleaded Petrol¹):

A.2.3 Unleaded Petrol, RON:

A.2.4 Fuel Supply

A.2.4.1 Carburettor: Yes/No¹⁾

A.2.4.1.1 Factory Brand:

A.2.4.1.2 Model:

A.2.4.1.3 Installation Number:

A.2.4.1.4 Adjustment⁴):

A.2.4.1.4.1 Jet

A.2.4.1.4.2 Throat

A.2.4.1.4.3 Bowl Float Level:

A.2.4.1.4.4 Bowl Mass:

A.2.4.1.4.5 Bowl Pin Valve

(A.2.4.1.4.1 to A.2.4.1.4.5 – or the fuel supply curve drawn by the air flow volume and the required value set to keep to this curve)

A.2.4.1.5 Cold Start System: Automatic/Manual¹⁾

A.2.4.1.5.1 Working Principle:

A.2.4.1.5.2 Operating Limits/Setting^{1) 4}):

A.2.4.2 Fuel Injection Type (only applicable to compression ignition type): Yes/No¹⁾

A.2.4.2.1 System Explanation:

A.2.4.2.2 Working Principle: Direct Injection/Pre-combustion Chamber/Swirl Combustion Chamber¹⁾

A.2.4.2.3 Injection Pump

A.2.4.2.3.1 Factory Brand:

A.2.4.2.3.2 Model:

A.2.4.2.3.3 Maximum Fuel Supply^{1) 4}: ... mm^3 /stroke, or at the pump speed of ... r/min, ... mm^3 /cycle, or shown by the fuel supply/characteristic curve:

A.2.4.2.3.4 Fuel Injection Timing⁴):

- A.2.4.2.3.5 Fuel Ahead Injection Curve⁴):
- A.2.4.2.3.6 Calibration Procedure: Test Bed/Engine¹):
- A.2.4.2.4 Speed Adjustor
- A.2.4.2.4.1 Model:
- A.2.4.2.4.2 Fuel Cut-off Point
- A.2.4.2.4.2.1 Fuel Cut-off Point with Load: (r/min)
- A.2.4.2.4.2.2 Fuel Cut-off Point without Load: (r/min)
- A.2.4.2.5 Fuel Injector
- A.2.4.2.5.1 Factory Brand:
- A.2.4.2.5.2 Model:
- A.2.4.2.5.3 Opening Pressure²): ...kPa or Characteristic Curve²):
- A.2.4.2.6 Cold Start System
- A.2.4.2.6.1 Factory Brand:
- A.2.4.2.6.2 Model:
- A.2.4.2.6.3 Explanation:
- A.2.4.2.7 Auxiliary Starter
- A.2.4.2.7.1 Factory Brand:
- A.2.4.2.7.2 Model:
- A.2.4.2.7.3 Explanation:
- A.2.4.3 Fuel Injection (only applicable to spark ignition type): Yes/No¹⁾
- A.2.4.3.1 System Explanation:
- A.2.4.3.2 Working Principle: Intake Manifold (Single Point/Multi Point¹⁾)/Direct
- Injection /Others (with full explanation)¹⁾
 - Control Unit Model (or type):
 - Fuel Adjustor Model:
 - Air Flow Sensor Model:
 - Fuel Distributor Model:
 - Pressure Adjustor Model:
 - Mini Switch Model:
 - Idle Adjusting Screw Model:
 - Throttle Valve Model:
 - Water Temperature Sensor Model:
 - Air Temperature Sensor Model:
 - Air Temperature Switch Model:
 - (The above items' relevant details of non-continuous injections need to be supplied)
 - Anti Electromagnetic Explanation or Drawings:
- A.2.4.3.3 Factory Brand:
- A.2.4.3.4 Model:
- A.2.4.3.5 Fuel Injector: Opening Pressure⁴) ...kPa or Characteristic Curve⁴):
- A.2.4.3.6 Fuel Injection Timing:
- A.2.4.3.7 Cold Start System:
- A.2.4.3.7.1 Working Principle:
- A.2.4.3.7.2 Operating Limits/Setting^{1) 2)}:
- A.2.4.4 Fuel Pump
- A.2.4.4.1 Pressure²) ... kPa or Characteristic Curve:
- A.2.5 Ignition Device
- A.2.5.1 Factory Brand:
- A.2.5.2 Model:
- A.2.5.3 Working Principle:

A.2.5.4 Ahead Ignition Curve²):

A.2.5.5 Static Ignition Timing²): Before TDC ... degrees

A.2.5.6 Contact Point Gap²: (mm)

A.2.5.7 Closing Angle: (degrees)

A.2.5.8 Spark Plug

A.2.5.8.1 Factory Brand:

A.2.5.8.2 Model:

A.2.5.8.3 Spark Plug Gap Setting: (mm)

A.2.5.9 Ignition Coil:

A.2.5.9.1 Factory Brand:

A.2.5.9.2 Model:

A.2.5.10 Ignition Capacitor:

A.2.5.10.1 Factory Brand:

A.2.5.10.2 Model:

A.2.6 Cooling System: Liquid/Air Cooling¹)

A.2.7 Air Intake System

A.2.7.1 Compressor: Yes/No¹⁾

A.2.7.1.1 Factory Brand:

A.2.7.1.2 Model:

A.2.7.1.3 System Explanation (Maximum Compression: (kPa), Air Discharging Method (if any):

A.2.7.2 Intercooler: Yes/No¹

A.2.7.3 Explanation and Drawings of Intake Pipe and Accessories (compression chamber, heating device and additional air intake):

A.2.7.3.1 Intake Manifold Explanation (including drawings and/or pictures):

A.2.7.3.2 Air Cleaner and Drawing: ..., or

A.2.7.3.2.1 Factory Brand:

A.2.7.3.2.2 Model:

A.2.7.3.3 Intake Silencer and Drawing: ..., or

A.2.7.3.3.1 Factory Brand:

A.2.7.3.3.2 Model:

A.2.8 Exhaust System

A.2.8.1 Explanation and/or Drawing of Exhaust System:

A.2.9 Valve Timing or Equivalent Data

A.2.9.1 Maximum Valve Lift, Opening and Closing Angles, or Timing Details of Corresponding Reaching Points of Alternative Distribution System

A.2.9.2 References and/or Setting Ranges¹):

A.2.10 Lubricants

A.2.10.1 Factory Brand:

A.2.10.2 Model:

A.2.11 Measures for Air Pollution Prevention

A.2.11.1 Crankcase Air Recycling Device (explanation and/or drawings):

A.2.11.2 Additional Pollution Control Device (if any and not included in other items):

A.2.11.2.1 Catalytic Converter: Yes/No¹⁾

A.2.11.2.1.1 Number of Catalytic Converter and Catalytic Unit:

A.2.11.2.1.2 Size and Shape of Catalytic Converter (volume of ...):

A.2.11.2.1.3 Reaction Type of Catalytic Converter

A.2.11.2.1.4 Total Content of Precious Metals:

A.2.11.2.1.5 Relative Density:

A.2.11.2.1.6 Carrier (structure and materials):

- A.2.11.2.1.7 Hole Density:
- A.2.11.2.1.8 Housing Type of Catalytic Converter:
- A.2.11.2.1.9 Position of Catalytic Converter (position at the exhaust pipe and its reference distance):
- A.2.11.2.1.10 Oxygen Sensor Model:
- A.2.11.2.1.10.1 Oxygen Sensor Position:
- A.2.11.2.1.10.2 Oxygen Sensor Control Range:
- A.2.11.2.2 Air Injection: Yes/No¹⁾
- A.2.11.2.2.1 Type (impulse air, air pump):
- A.2.11.2.3 Exhaust Recycle: Yes/No¹⁾
- A.2.11.2.3.1 Characteristics (flow volume, etc):
- A.2.11.2.4 Evaporative Pollutant Emission Control System
- A.2.11.2.4.1 Detailed Comprehensive Explanation of Devices and Their Setting:
- A.2.11.2.4.2 Illustration of Evaporative Pollutant Emission Control System:
- A.2.11.2.4.3 Drawing of Carbon Canister:
- A.2.11.2.4.4 Drawing of Fuel Tank with Explanation of Volume and Materials:
- A.2.11.2.5 Particle Trapper: Yes/No¹⁾
- A.2.11.2.5.1 Size and Shape (volume) of Particle Trapper:
- A.2.11.2.5.2 Type and Structure of Particle Trapper:
- A.2.11.2.5.3 Position of Particle Trapper (reference distance at the exhaust pipe):
- A.2.11.2.5.4 Recycling System/Method, Explanation and Drawings:
- A.2.11.2.6 Other Systems (explanation and working principle):
- 1) Delete as appropriate.
- 2) Rounded to point one mm.
- 3) Use π =3.1416 and round off to the nearest cm³.
- 4) Define the tolerance.

Appendix B (Specification appendix) Fuel Consumption Type Approval Report/Fuel Consumption Type Approval Application Report¹⁾

(Maximum size: A4 (210 x 297 mm))

B.1 Vehicle Brand Name or Name of Manufacturer:

B.2 Type of Vehicle:

B.3 Category of Vehicle²):

B.4 Name and Address of Manufacturer:

B.5 Name and Address of Manufacturer's Legal Representative (if applicable):

B.6 Details of Vehicle

B.6.1 Gross Weight: (kg) B.6.2 Maximum Design Weight: (kg) B.6.3 Nominal Passenger Number: B.6.4 Vehicle Body Type: B.6.5 Driving Wheel: Front, Rear or 4 x 4¹⁾ B.6.6 Engine B.6.6.1 Engine Model: B.6.6.2 Engine Displacement: (1) B.6.6.3 Fuel Supply System: Carburettors/Injector B.6.6.4 Fuel Recommended by Manufacturer: B.6.6.5 Maximum Net Power (kW at r/min) B.6.6.6 Supercharger: Yes/No¹⁾ B.6.6.7 Ignition System: Compression Ignition/Traditional Ignition/Electronic Ignition¹⁾ **B.6.7** Transmission B.6.7.1 Type of Transmission: Manual/Auto/CVT¹⁾ B.6.7.2 Number of Gears: B.6.7.3 Overall Speed Ratio (calculate by the rolling perimeter of the tyres under load): (road speed/1000 r/min), (km/h) First Gear: Second Gear: Third Gear: Fourth Gear Fifth Gear: Overdrive Gear: B.6.7.4 Transmission Ratio: B.6.8 Tyre: Size: Model: Rolling Perimeter under Load:

B.7 Data Submitted by Manufacturer

B.7.1 CO₂ emissions B.7.1.1 CO₂ emissions: (urban area): (g/km)

1) Delete as appropriate.

2) Defined in GB/T 15089-2001

B.7.1.2 CO₂ emissions: (suburban area): (g/km)
B.7.1.3 CO₂ emissions: (combined): (g/km)
B.7.2 Fuel Consumption
B.7.2.1 Fuel Consumption (urban area): (l/100 km)
B.7.2.2 Fuel Consumption (suburban area): (l/100 km)
B.7.2.3 Fuel Consumption (combined): (l/100 km)
B.7.3 Determination Method of Driving Resistance During Test: Road Skidding Energy Change Method/Road Constant Speed Torque Measurement Method/Table Check Method¹⁾
B.7.4 Fuel Used for Test (only applicable to petrol):
B.7.4.1 RON:
B.7.4.2 Additives: Additive Proportion: (%)

B.8 Type Approval Test Result

B.8.1 CO₂ emissions

B.8.1.1 CO₂ emissions: (urban area): (g/km)

B.8.1.2 CO₂ emissions: (suburban area): (g/km)

B.8.1.3 CO₂ emissions: (combined): (g/km)

B.8.2 Fuel Consumption

B.8.2.1 Fuel Consumption (urban area): (l/100 km)

B.8.2.2 Fuel Consumption (suburban area): (l/100 km)

B.8.2.3 Fuel Consumption (combined): (l/100 km)

B.8.3 Determination Method of Driving Resistance During Test: Road Skidding Energy Change Method/Road Constant Speed Torque Measurement Method/Table Check Method¹⁾

B.8.4 Fuel Used for Test (only applicable to petrol):

B.8.4.1 RON:

B.8.4.2 Additives: Additive Proportion: (%)

B.9 Type Approval Values and Limits

Type Approval Values of This Vehicle: (l/100 km) Corresponding Limits of This Vehicle: (l/100 km) Type Approval Values of This Vehicle ≤Limits >Limits¹

B.10 Date Vehicle Submitted for Type Approval:

B.11 Inspection Organisation in Charge of Type Approval:

B.12 Result Report Serial Number:

B.13 Place:

B.14 Date:

B.15 Signature:

¹⁾ Delete as appropriate.