

Translated English of Chinese Standard: GB/T 29125-2012

www.ChineseStandard.net

Sales@ChineseStandard.net

GB

NATIONAL STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 43.020

T 40

GB/T 29125-2012

Test methods for fuel consumption of CNG vehicles

压缩天然气汽车燃料消耗量试验方法

GB/T 29125-2012 How to BUY & immediately GET a full-copy of this standard?

1. www.ChineseStandard.net;
2. Search --> Add to Cart --> Checkout (3-steps);
3. No action is required - Full-copy of this standard will be automatically & immediately delivered to your EMAIL address in 0~25 minutes.
4. Support: Sales@ChineseStandard.net. Wayne, Sales manager

Issued on: December 31, 2012

Implemented on: July 01, 2013

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China;

Standardization Administration of the PRC.

Table of contents

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
4 Symbols, codes and abbreviations.....	7
5 Test conditions	9
6 Test equipment.....	9
7 Test items and test methods	11
8 Calculation method of fuel consumption.....	12
Appendix A (Normative) Compressed natural gas vehicle - Natural gas flowmeter installation method.....	17
Appendix B (Normative) Calculation method of natural gas density and calorific value	21
Appendix C (Normative) Test results report.....	29
Appendix D (Informative) Compressed natural gas vehicle natural gas - liquid fuel consumption conversion method.....	33

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard made reference to the technical information on the natural gas consumption in the Regulation ECE R101-02 “Unified provisions on the certification of the passenger vehicles installed with the internal combustion engine only or hybrid power system based on the carbon dioxide emissions and fuel consumption, AND the certification of the passenger vehicles installed with hybrid power system and the pure electric motor type M1 and N1 based on the power consumption and electric driving mileage” by the United Nations Economic Commission for Europe (ECE) as effected in April 4, 2005.

This standard was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This standard shall be under the jurisdiction of the National Automotive Standardization Technical Committee (SAC/TC 114).

The drafting organizations of this standard: China Automotive Technology Research Center, Dongfeng Chaoyang Diesel Engine Co., Ltd., United Automotive Electronics Co., Ltd. and Guangxi Yuchai Machinery Co., Ltd.

The main drafters of this standard: You Linhua, Liu Guibin, Cao Xiaofeng, Jia Guiqi, Jia Yu, Li Yu, Ma Yue, Ma Jie, Ma Zonghua, Dai Chunbei, Liu Zhiwen, He Zhaoxin.

Test methods for fuel consumption of CNG vehicles

1 Scope

This standard specifies the test method for the natural gas fuel consumption of passenger vehicles and commercial vehicles using the compressed natural gas (CNG) as fuel.

This standard is applicable to the natural gas fuel consumption test of the passenger vehicles and commercial vehicles using the compressed natural gas single gas fuel, AND it is also applicable to the natural gas fuel consumption test of the passenger vehicles and commercial vehicles using compressed natural gas dual purpose fuel.

The natural gas fuel consumption test for other types of vehicles equipped with compressed natural gas single fuel engines or dual purpose fuel engines may make reference to this standard.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

GB/T 12534 Motor vehicles - General rules of road test method

GB/T 12545.1 Measurement methods of fuel consumption for automobiles - Part 1: Measurement methods of fuel consumption for passenger cars

GB/T 12545.2 Commercial vehicle - Fuel consumption test method

GB/T 13610 Analysis of natural gas by gas chromatography

GB 17691 Limits and measurement methods for exhaust pollutants from compression ignition and gas fueled positive ignition engines of vehicles (III, IV, V)

GB 18047 Compressed natural gas as vehicle fuel

GB 18352.3 Limits and measurement methods for emission from light-duty vehicles (III, IV)

GB/T 19233 Measurement methods of fuel consumption for light duty vehicles

GB/T 20604-2006 Natural gas - Vocabulary

GB/T 22723 Energy determination for natural gas

GB/T 27840 Fuel consumption test methods for heavy-duty commercial vehicles

QC/T 746 High-pressure pipelines for compressed natural vehicles

3 Terms and definitions

The terms and definitions as defined in GB/T 20604-2006 apply to this document.

3.1

Natural gas; NG

It refers to the methane-based complex hydrocarbon mixtures, usually containing ethane, propane and very small amounts of heavier hydrocarbons, as well as a number of incombustible gases such as nitrogen and carbon dioxide.

[GB/T 20604-2006, Definitions 2.1.1.1]

3.2

Dry natural gas

It refers to the natural gas for which the water vapor mole fraction is not more than 0.005% [50×10^{-6} (mol)].

[GB/T 20604-2006, Definitions 2.1.1.9]

3.3

Combustion reference condition

It refers to the purely theoretical pressure and temperature conditions as specified for natural gas combustion.

[GB/T 20604-2006, Definition 2.6.1.1]

Superior calorific value

It refers to, under the conditions that the pressure (p_1) of the combustion reaction is kept constant, all the combustion products other than water are returned to the gaseous state at the same temperature (T_1) as the reactant, AND the water is condensed into a liquid having a temperature of T_1 , the energy as released in the form of heat when a certain amount of fuel gas is completely burned in the air.

[GB/T 20604-2006, Definition 2.6.4.1]

3.10

Inferior calorific value

It refers to, under the conditions that the pressure (p_1) of the combustion reaction is kept constant AND all the combustion products other than water are returned to the gaseous state at the same temperature (T_1) as the reactant, the energy as released in the form of heat when a certain amount of fuel gas is completely burned in the air.

[GB/T 20604-2006, Definition 2.6.4.2]

4 Symbols, codes and abbreviations

4.1 The symbols, codes and abbreviations in Table 1 apply to this standard.

Table 1 Symbols, codes and abbreviations

5 Test conditions

5.1 Road test conditions shall comply with the provisions of GB/T 12534.

5.2 When using the chassis dynamometer test or carbon balance method, the light vehicle test conditions shall comply with the provisions of GB/T 19233 and GB18352.3; AND the heavy-duty vehicle test conditions shall comply with the provisions of GB/T 27840.

5.3 The natural gas fuel for the test of light vehicle and heavy vehicle shall respectively complies with the requirements of GB18352.3 and GB17691, OR the vehicle natural gas fuel complying with the provisions of GB 18047 may be used, with its components, density and heat and other parameters being known AND complying with the requirements of the automobile and engine manufacturers.

5.4 Lubricants for test purposes shall comply with the requirements of the enterprise AND shall be indicated in the test report.

6 Test equipment

6.1 Natural gas flowmeter

6.1.1 Allowable natural gas flowmeter type

6.1.1.1 Variable pressure mass flowmeter: an instrument using the Coriolis principle (or similar principle) to measure the mass flow.

6.1.1.2 Constant pressure volume flowmeter: an instrument used to measure the natural gas volume flow under certain test pressure (excluding the mass flow meter for constant pressure measurement), AND the test pressure can be adjusted and set by the regulator.

6.1.1.3 Low-pressure flowmeter: a fuel flowmeter for measurement in low-pressure piping installed between the pressure regulator and the engine.

6.1.1.4 High-pressure flowmeter: a fuel flowmeter for measurement in high-pressure piping installed between the compressed natural gas supply device (including vehicle CNG cylinders, fixed type CNG gas supply equipment and CNG storage cylinders, etc.) and the pressure regulator.

6.1.2 Natural gas flowmeter accuracy

Natural gas flowmeter accuracy shall be $\pm 0.5\%$ of the measured value.

6.1.3 Installation of natural gas flowmeter

6.1.3.1 When using a high-pressure flowmeter for measurement, it shall install a relief valve in the pipeline to release the air pressure from the pipeline before disassembling the flowmeter.

6.1.3.2 The high-pressure flowmeter shall be connected using high-pressure pipe.

6.1.3.3 For fixed pressure type high-pressure flowmeter, it shall install an upstream pressure regulator; AND the outlet pressure of the regulator shall be set at the specified value of the flowmeter.

6.1.3.4 When using the low-pressure flowmeter for measurement, it shall install such devices as regulator box between the flowmeter and the engine, in order to eliminate the fuel pressure pulsation.

6.1.3.5 The installation of devices such as regulator box between the flowmeter and the engine shall not affect the normal operation of the engine.

6.1.3.6 In order to ensure the normal function of the fuel flowmeter, the flowmeter and accessories shall be arranged, connected and installed reasonably, AND not be loosened or disengaged in the test. It is not allowed for all connection pipelines and connection parts to have any leakage.

6.1.3.7 The high-pressure gas pipeline for flowmeter connection shall comply with the provisions of QC/T 746.

6.1.3.8 When testing on a chassis dynamometer, if using the natural gas fuel flowmeter to measure the consumption of natural gas, the installation of the flow meter shall comply with the provisions of Appendix A.

6.1.3.9 When the test on the chassis dynamometer is supplied with gas by the on-board CNG cylinder, the installation of the natural gas fuel flowmeter shall comply with the provisions of Figure A.1, Figure A.2, or Figure A.3.

6.1.3.10 When the test on the chassis dynamometer is supplied with gas by the fixed type CNG supply equipment, the installation of the natural gas fuel flowmeter shall comply with the provisions of Figure A.4, Figure A.5 or Figure A.6.

6.1.3.11 During the road test, the installation of the natural gas fuel flowmeter shall comply with the provisions of Figure A.1, Figure A.2 or Figure A.3 of Appendix A.

6.1.4 Other equipment

7.2.3 Natural gas fuel consumption may be measured by flowmeter through carbon balance method.

7.2.4 If using the flowmeter to measure the natural gas consumption, it shall simultaneously measure and record the travel time and travel distance.

7.2.5 When using the volume flowmeter to measure the natural gas consumption, it shall, at the same time, measure the temperature and pressure at the flowmeter inlet or outlet, in order to correct the fuel flow.

7.2.6 When using the carbon balance method, it shall, in accordance with the relevant requirements, measure the emissions such as CO₂, CO and THC (or CH₄ and NMHC).

7.3 Test of compressed natural gas vehicle using gasoline starting

7.3.1 As for the compressed natural gas single gas fuels and dual purpose fuel vehicles operated with gasoline starting and then switching to gaseous fuel operation, the manufacturer shall provide a control strategy for the engine starting process. When conducting the fuel consumption test using the operating condition method as specified in the standard GB/T 19233 or GB/T 27840, it shall comply with the provisions of 7.3.2 and 7.3.3.

7.3.2 When using the carbon balance method, if the time from the engine start with gasoline to switch to gaseous fuel operation is not more than 60 s, it may, based on the measured emission of CO, CO₂ and THC (or CH₄ + NMHC) in accordance with the requirements of GB/T19233 or GB/T 27840, use the equation (1) of 8.1 to calculate the natural gas consumption.

7.3.3 When using the natural gas flowmeter for measurement, it shall convert the gasoline consumed in the startup process into the natural gas consumption, AND include it into the total consumption of the natural gas.

8 Calculation method of fuel consumption

8.1 Carbon balance method

8.1.1 When using the carbon balance method, the natural gas density is the average (0.654 kg/m³) of G₂₀ and G₂₃ under standard reference conditions (288.15 K, 101.325 kPa).

8.1.2 Natural gas consumption can be calculated in accordance with equation (1) based on the measured CO, CO₂ and THC (or CH₄ + NMHC) emissions:

FC_r - Test natural gas consumption under standard reference conditions (15 °C, 101.325 kPa), $m^3/100\text{ km}$;

FC'_r - Test natural gas consumption corrected to the standard environment conditions for road test (15 °C, 101.325 kPa), $m^3/100\text{ km}$;

k_1 - Ambient temperature correction factor;

k_2 - Atmospheric pressure correction factor;

P_{air} - Actual atmospheric pressure for road test, kPa;

T_{air} - Actual air temperature under road test environment, K.

8.4 Corrected to reference natural gas consumption

8.4.1 When using the flowmeter to measure the vehicle natural gas consumption, if it is required to correct the test result into the reference natural gas consumption, it shall conduct calculation in accordance with the method as specified in 8.4.2 and 8.4.3.

8.4.2 During chassis dynamometer test, USE the equation (7) to correct it into the reference natural gas consumption.

$$FC_0 = FC_r \times \frac{H_{NG, low}}{\left(\frac{H_{G_{20}} + H_{G_{23}}}{2} \right)} \quad \dots\dots\dots (7)$$

Where:

FC_0 - Reference natural gas consumption (15 °C, 101.325 kPa), $m^3/100\text{ km}$;

FC_r - Test natural gas consumption under standard reference conditions (15 °C, 101.325 kPa), $m^3/100\text{ km}$;

$H_{G_{20}}$ - Inferior calorific value of reference fuel G_{20} (15 °C, 101.325 kPa), MJ/m^3 ;

$H_{G_{23}}$ - Inferior calorific value of reference fuel G_{23} (15 °C, 101.325 kPa), MJ/m^3 ;

$H_{NG, low}$ - Inferior calorific value of test natural gas (15 °C, 101.325 kPa), MJ/m^3 ;

8.4.3 During road test, USE the equation (8) to correct it into the reference natural gas consumption:

Appendix B

(Normative)

Calculation method of natural gas density and calorific value

B.1 Overview

This appendix specifies the calculation method of natural gas density and calorific value.

B.2 Calculation of compression factor

Taking into account the non-ideal nature of the real gas, when calculating the volume calorific value, density, and other parameters, it shall correct the gas volume.

The correction of volume non-ideal nature is conducted by the compression factor Z_{mix} . Under the metering reference conditions (temperature t_2 , pressure p_2), the compression factor Z_{mix} is calculated using the equation (B.1) as below:

$$Z_{\text{mix}}(t_2, p_2) = 1 - \left(\sum_{j=1}^N x_j \times \sqrt{b_j} \right)^2 \quad \dots\dots\dots (B.1)$$

Where:

$\sqrt{b_j}$ - Summation factor.

Table B.2 provides the values of the summation factors for the natural components of the natural gas under the three metrological reference conditions, AND the compression factor Z_j of each pure component, wherein the relationship between b_j and Z_j is: $b_j = 1 - Z_j$.

B.3 Density calculation

B.3.1 Ideal gas

The ideal gas density is calculated in accordance with the equation (B.2):

$$\rho^0(t, p) = \left(\frac{p}{R \times T} \right) \sum_{j=1}^N x_j \times M_j \quad \dots\dots\dots (B.2)$$

Where:

$\rho^0(t, p)$ - The density of ideal gas (temperature t , pressure p);

R - Molar gas constant ($R = 8.314510 \text{ J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$);

T - Absolute temperature ($T = t + 273.15$), K;

x_j - The molar fraction of component j in the mixture;

M_j - The molar mass of component j in the mixture.

Table B.1 provides the molar mass of each component in natural gas.

B.3.2 Real gas

The real gas density is calculated in accordance with the equation (B.3):

$$\rho(t, p) = \frac{\rho^0(t, p)}{Z_{\text{mix}}(t, p)} \quad \dots\dots\dots (\text{ B. 3 })$$

Where:

$\rho(t, p)$ - Real gas density (temperature t , pressure p);

$\rho^0(t, p)$ - Ideal gas density (temperature t , pressure p);

$Z_{\text{mix}}(t, p)$ - Gas compression factor (temperature t , pressure p).

B.4 Calculation of calorific value

B.4.1 Calculation of molar calorific value

B.4.1.1 Ideal gas

The molar calorific value of the known composition mixture under the temperature t_1 is calculated in accordance with the equation (B.4):

$$\overline{H}^0(t_1) = \sum_{j=1}^N x_j \times \overline{H}_j^0(t_1) \quad \dots\dots\dots (\text{ B. 4 })$$

Where:

$\overline{H}^0(t_1)$ - The ideal molar calorific value (superior or inferior) of the mixture;

$\overline{H}^0(t_1)$ - The ideal molar calorific value of the mixture (superior or inferior);

x_j - The molar fraction of component j in the mixture.

The mass calorific value of the mixture of known composition under the temperature t_1 can also be calculated in accordance with the equation (B.7):

$$\dot{H}^0(t_1) = \sum_{j=1}^N \left(x_j \times \frac{M_j}{M} \right) \dot{H}_j^0(t_1) \quad \dots\dots\dots (B.7)$$

Where:

$\dot{H}_j^0(t_1)$ - Ideal mass calorific value of the component j in the mixture (superior or inferior).

Table B.4 provides the ideal gas mass calorific value for each component of natural gas under different combustion reference conditions.

B.4.2.2 Real gas

In this standard, the actual gas mass calorific value and the ideal gas mass calorific value are regarded as equivalent in value.

B.4.3 Calculation of volume calorific value

B.4.3.1 Ideal gas

The ideal gas volume calorific value of the mixture of known composition under the combustion temperature t_1 , metering temperature t_2 and the pressure p_2 is calculated in accordance with the equation (B.8):

$$\widetilde{H}^0[t_1, V(t_2, p_2)] = \overline{H}^0(t_1) \times \frac{p_2}{R \times T_2} \quad \dots\dots\dots (B.8)$$

Where:

$\widetilde{H}^0[t_1, V(t_2, p_2)]$ - The ideal gas volume calorific value of the mixture (superior or inferior);

$\overline{H}^0(t_1)$ - The ideal molar calorific value (superior or inferior) of the mixture;

R - Molar gas constant;

T_2 - Absolute temperature ($T_2 = t_2 + 273.15$), K.

In addition, the ideal gas volume calorific value can also be calculated using the equation (B.9):

$$\tilde{H}^0[t_1, V(t_2, p_2)] = \sum_{j=1}^N x_j \tilde{H}_j^0[t_1, V(t_2, p_2)] \quad \text{..... (B. 9)}$$

Where:

$\tilde{H}_j^0(t_1, V(t_2, p_2))$ - The ideal gas volume calorific value of the component j in the mixture (superior or inferior);

Table B.5 provides the ideal gas volume calorific value for each component of natural gas under different combustion reference conditions.

B.4.3.2 Real gas

The real gas volume calorific value of the gas mixture under the combustion temperature t_1 and pressure p_1 AND the metering temperature t_2 and the pressure p_2 is calculated in accordance with the equation (B.10):

$$\tilde{H}[t_1, V(t_2, p_2)] = \frac{\tilde{H}^0[t_1, V(t_2, p_2)]}{Z_{\text{mix}}(t_2, p_2)} \quad \text{..... (B. 10)}$$

Where:

$\tilde{H}[t_1, V(t_2, p_2)]$ - The real gas volume calorific value of the mixture (superior or inferior);

$\tilde{H}^0[t_1, V(t_2, p_2)]$ - The ideal gas volume calorific value of the mixture (superior or inferior);

$Z_{\text{mix}}(t_2, p_2)$ - The compression factor under the metering reference condition.

Table B.1 Molar mass of each component of natural gas

Appendix C

(Normative)

Test results report

[Maximum size: A4 (210 mm × 297 mm)]

- C.1** Brand (product name of the manufacturer)
- C.2** General description on type and product
- C.3** Type identification method
- C.4** Type of vehicle
- C.5** Production date
- C.6** Vehicle identification number (VIN)
- C.7** Odometer reading (km)
- C.8** Manufacturer name and address
- C.9** Chassis model and production enterprises (heavy duty)
- C.10** Address of the assembly plant (light duty)
- C.11** Maximum design speed (km/h)
- C.12** Windward area (m²)
- C.13** Air resistance coefficient
- C.14** Vehicle mass (light duty)
- C.15** Vehicle mass and shaft load (heavy duty)
- C.16** Maximum design total mass (light duty)
- C.17** Maximum design total mass and shaft load (heavy duty)
- C.18** Maximum design static load (kg) for semi-trailers (heavy duty)
- C.19** Maximum design traction mass (kg) (heavy duty)

- C.20** Load mass utilization factor (heavy duty)
- C.21** Maximum total mass of train (kg) (heavy duty)
- C.22** Dimensions: L × W × H (mm) (heavy duty)
- C.23** Rated number of passengers (light duty)
- C.24** Rated number of passengers (including driver) (heavy duty)
- C.25** Cab attendance (heavy duty)
- C.26** Body type (light duty)
- C.27** drive wheel: front, rear, 4 x 4 (light duty)
- C.28** Drive Type (heavy duty)
- C.29** Engine
 - C.29.1** Model and production enterprises
 - C.29.2** Type
 - C.29.3** Displacement (cm³)
 - C.29.4** Numbering
 - C.29.5** NG fuel supply system principle: mixer/jet
 - C.29.6** Maximum power (kW)
 - C.29.7** Maximum torque (Nm)
 - C.29.8** Idling speed (r/min)
 - C.29.9** Supercharger: Yes/No
 - C.29.10** Ignition system: conventional ignition/electronic ignition ¹⁾
 - C.29.11** Recommended fuels by the manufacturer (NG)
 - C.29.12** CNG cylinder number and model
- C.30** Transmission
 - C.30.1** Transmission model and production enterprises
 - C.30.2** Transmission type: manual/auto

C.30.3 Primary and secondary transmissions (heavy duty) (with/without)

C.30.4 Number of gears

C.30.5 Each gear ratio

C.30.6 Main reduction ratio

C.31 Tires

C.31.1 Tire production enterprises

C.31.2 Model/size/inflation pressure (front/rear)

C.31.3 Rolling perimeter under load (light duty)

C.31.4 Number of tires (heavy duty)

C.31.5 Rolling radius (heavy duty)

C.31.6 Rolling resistance coefficient (heavy duty)

C.31.7 Semi-trailer tire type, number and production enterprises (heavy duty)

C.31.8 Semi-trailer tire pressure (front/rear) (kPa) (heavy duty)

C.32 Lubricants

C.32.1 Brand

C.32.2 Model

C.33 Travel resistance

C.33.1 Determination method of travel resistance

C.33.2 If using the taxiing method, it shall attach the duplicated copy of the test report, calculation report, or other relevant data

C.34 Test results

C.34.1 Light duty vehicles

C.34.1.1 CO₂ emissions

C.34.1.1.1 Urban CO₂ emissions (g/100 km)

C.34.1.1.2 Suburb CO₂ emissions (g/100 km)

Appendix D

(Informative)

Compressed natural gas vehicle natural gas - liquid fuel consumption conversion method

D.1 Overview

D.1.1 This Appendix describes the method of converting the natural gas vehicle consumption of compressed natural gas vehicle into the equivalent liquid fuel consumption such as gasoline or diesel.

D.1.2 The fuel consumption of natural gas fuel vehicles is generally expressed in $\text{m}^3/100 \text{ km}$, that is, the number of cubic meters of natural gas fuel consumed by vehicles traveling at 100 km distance. Petrol or diesel and other liquid fuel vehicle fuel consumption is generally expressed in $\text{L}/100 \text{ km}$, that is, the number of liters of liquid fuel consumed by vehicles travelling at 100 km distance. In general, the calorific value per cubic meter of natural gas fuel is not equal to the calorific value per liter of liquid fuel. Therefore, it is not possible to simply compare the consumption of natural gas fuel with liquid fuel such as gasoline and diesel. Therefore, it must establish the relationship between the consumption of natural gas fuels and the consumption of liquid fuels such as gasoline or diesel. This Appendix is intended to establish a conversion relationship between natural gas fuel consumption and liquid fuel consumption such as gasoline and diesel.

D.2 Conversion method

D.2.1 CONDUCT conversion based on the equivalent relationship between the inferior calorific value of the natural gas fuel and the liquid fuel under standard reference conditions.

D.2.2 Determination of natural gas fuel components shall comply with the provisions of GB/T 13610.

D.2.3 Natural gas inferior calorific value shall be determined in accordance with the method specified in GB/T 22723 OR calculated by the method specified in Appendix B.

This is an excerpt of the PDF (Some pages are marked off intentionally)

Full-copy PDF can be purchased from 1 of 2 websites:

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, Sales@ChineseStandard.net

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

----- The End -----