

ICS 75.160.20

CCS E 31



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB 18350-2013

Replacing GB 18350-2001

Denatured fuel ethanol

变性燃料乙醇

Issued on: September 18, 2013

Implemented on: May 1, 2014

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Requirements	2
5 Test methods	3
6 Inspection rules	3
7 Marking, packaging, transportation and storage	5
Annex A (Normative) Determination of ethanol and methanol content in denatured fuel ethanol (gas chromatography)	6
Annex B (Normative) Determination of water content in denatured fuel ethanol (Karl Fischer titration)	11
Annex C (Normative) Determination of chloride ion content in denatured fuel ethanol	14
Annex D (Normative) Determination of the acidity of denatured fuel ethanol	19
Annex E (Normative) Determination of copper content in denatured fuel ethanol (graphite furnace atomic absorption)	21
Annex F (Normative) Determination of the pH of denatured fuel ethanol	23
National standard amendments No. 1 and No. 2	26

Foreword

Clause 4 of this standard is mandatory; the remaining clauses are recommended.

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

This standard replaces GB 18350-2001 "Denatured fuel ethanol". Compared with GB 18350-2001, the main changes are as follows: a sulfur content index of not more than 30 mg/kg was added; the addition of denaturant was revised, the volume ratio of fuel ethanol to denaturant changing from 100:2 to 100:5 into 100:1 to 100:5; and the inorganic chloride content was revised from not more than 32 mg/L to not more than 8 mg/L.

This standard was proposed by, and is under the jurisdiction of, the National Technical Committee on Denatured Fuel Ethanol and Fuel Ethanol of Standardization Administration of China (SAC/TC 349).

Drafting organizations: Henan Tianguan Enterprise Group Co., Ltd.; China National Research Institute of Food and Fermentation Industries; Jilin Fuel Ethanol Co., Ltd.; COFCO Group; Research Institute of Petroleum Processing, China Petroleum & Chemical

Corporation.

Principal drafters: Du Fengguang, Wang Zhiqiang, Guo Xinguang, Qiao Qing'an, Zheng Wei, Yue Guojun, Liu Jiuxin, Ni Bei.

The previous edition of the standard replaced by this one is GB 18350-2001.

1 Scope

This standard specifies the terms and definitions, the requirements, the test methods, the inspection rules and the marking, packaging, transportation and storage of denatured fuel ethanol.

It applies to fuel ethanol made from starch, sugar, cellulose and similar feedstock by fermentation, distillation and dehydration, and denatured by the addition of a denaturant.

2 Normative references

The following documents are indispensable to the application of this document. For dated references, only the edition bearing the date applies; for undated references, the latest edition (including all amendments) applies.

GB 190 Packing symbol of dangerous goods · GB/T 191 Packaging - Pictorial marking for handling of goods · GB/T 601 Chemical reagent - Preparation of standard volumetric solutions · GB/T 602 Chemical reagent - Preparation of standard solutions for impurity determination · GB/T 603 Chemical reagent - Preparation of reagent solutions for use in test methods · GB/T 611-2006 Chemical reagent - General method for the determination of density · GB/T 683 Chemical reagent - Methanol · GB/T 4472 Determination of density and relative density for chemical products · GB/T 6682-2008 Water for analytical laboratory use - Specification and test methods · GB/T 8019 Determination of gum content in fuels - Jet evaporation method · GB/T 9722 Chemical reagent - General rule for gas chromatography · GB/T 9724 Chemical reagent - General rule for the determination of pH value · GB/T 9725-2007 Chemical reagent - General rule for potentiometric titration · GB 18351 Ethanol gasoline for motor vehicles (E10) · GB/T 22030 Ethanol gasoline blend stock for motor vehicles · GB 50016 Code for fire protection design of buildings · GB 50074 Code for design of oil depot · SH/T 0253 Determination of total sulfur in light petroleum products - Electrometric method · SH/T 0689 Determination of total sulfur in light hydrocarbons, motor fuels and oils - Ultraviolet fluorescence method

3 Terms and definitions

The following terms and definitions apply to this document.

3.1 Fuel ethanol - ethanol to which no denaturant has been added and that can be used as a fuel.

3.2 Denaturant - the ethanol gasoline blend stock, or the ethanol gasoline for motor vehicles, added to fuel ethanol to make it unfit for drinking.

3.3 Denatured fuel ethanol - fuel ethanol to which a denaturant has been added, used for blending ethanol gasoline for motor vehicles and not fit for drinking. It may be blended with gasoline in the prescribed proportion as a fuel for spark-ignition internal combustion engines in vehicles.

3.4 pHe - a measure of the acid strength in denatured fuel ethanol.

4 Requirements

4.1 Requirements for the main raw materials. 4.1.1 Fuel ethanol: the density of the fuel ethanol at 20 °C shall be within the range 0.791 8 g/cm³ to 0.789 3 g/cm³. 4.1.2 Denaturant: the denaturant added to the fuel ethanol shall meet the requirements of GB/T 22030 or GB 18351, and no other oxygenate shall be added deliberately.

4.2 Technical requirements. 4.2.1 Amount of denaturant added: the volume ratio of fuel ethanol to denaturant shall be 100:1 to 100:5, that is, the volume fraction of denaturant in the denatured fuel ethanol shall be 0.99 % to 4.76 %. (Amended by national standard amendment No. 2, in force from 1 May 2021, to a volume ratio of 100:0.5 to 100:2, that is a volume fraction of 0.50 % to 1.96 %.)

4.2.2 Metal corrosion inhibitor: an effective metal corrosion inhibitor shall be added so as to satisfy the copper strip corrosion requirement for ethanol gasoline for motor vehicles.

4.2.3 Physical and chemical indices: the physical and chemical indices of denatured fuel ethanol shall meet the requirements of Table 1 - appearance: clear and transparent, free of visible suspended matter and sediment; ethanol, volume fraction, not less than 92.1 %; methanol, volume fraction, not more than 0.5 %; solvent-washed gum not more than 5.0 mg/100 mL; water, volume fraction, not more than 0.8 %; inorganic chloride (as Cl⁻) not more than 8 mg/L; acidity (as acetic acid) not more than 56 mg/L; copper not more than 0.08 mg/L; pHe from 6.5 to 9.0; sulfur not more than 30 mg/kg. (By national standard amendment No. 1, in force from 16 December 2016, the sulfur index becomes 30 mg/kg for the stage at which China IV ethanol gasoline is supplied and 10 mg/kg for the stage at which China V ethanol gasoline is supplied.)

5 Test methods

5.1 Density of the fuel ethanol: the density at 20 °C is determined by the pycnometer method of GB/T 611-2006 or by the digital density meter method of GB/T 4472.

5.2 Denatured fuel ethanol. 5.2.1 Appearance: at indoor ambient temperature, 50 mL of the sample is placed in a 100 mL colorimetric tube and examined visually in bright light. 5.2.2 Ethanol and 5.2.3 methanol: determined by the method of Annex A. 5.2.4 Solvent-washed

gum: determined by the method of GB/T 8019. 5.2.5 Water: determined by the method of Annex B. 5.2.6 Inorganic chloride: determined by the method of Annex C, the potentiometric titration being the referee method. 5.2.7 Acidity: determined by the method of Annex D. 5.2.8 Copper: determined by the method of Annex E. 5.2.9 pHe: determined by the method of Annex F. 5.2.10 Sulfur: determined by SH/T 0689 or SH/T 0253, SH/T 0689 being the referee method.

6 Inspection rules

6.1 Batch. The product is accepted by batch. For product packed in tank cars or tankers, each tank filling and each tank car constitutes one batch; where this definition is not used, the batch shall be agreed between the two parties to the contract.

6.2 Sampling. 6.2.1 A purpose-made stainless steel sampler is used (see Figure 1). Product in a tank car is sampled once from the middle; product in a tank is sampled from the upper, middle and lower parts of the liquid in the vessel, in the proportion 2:3:2 by volume for a vertical tank and 1:3:1 by volume for a horizontal tank, and the portions are mixed in a glass bottle. 6.2.2 Two litres of sample are taken from each batch, mixed, and divided between two 1 L narrow-mouth glass reagent bottles, labelled with the product name, the batch number (tank or tank car number), the manufacturer, and the date, place and name of the sampler. One bottle goes to the laboratory for testing; the other is sealed and kept for one month for verification.

6.3 Classification of inspection. 6.3.1 Factory inspection: before the product leaves the works, the quality inspection department of the manufacturer shall inspect it in accordance with this standard, and it may be sold only when it has passed and a certificate of quality has been issued. The factory inspection items are appearance, ethanol, methanol, water, acidity and pHe. 6.3.2 Type inspection: the items are all the physical and chemical requirements of Table 1. Type inspection is carried out every six months and also in any of the following cases: a) when equipment or a main raw material is changed; b) when production is resumed after a long stoppage; c) when the factory inspection results differ appreciably from those of the last type inspection; d) when the national quality supervision authority requires it.

6.4 Rules of decision. 6.4.1 If any one item of the factory inspection results fails to meet the requirements of this standard, a double quantity of sample shall be taken again from the batch originally sampled and re-tested, and the result of the re-test governs; if one item is still unsatisfactory, the batch is judged unacceptable. 6.4.2 The rules of decision for type inspection are the same as for factory inspection.

7 Marking, packaging, transportation and storage

7.1 Marking. 7.1.1 The tank car or tanker used for shipment shall be marked with the