DPNS/DOE QS 008:2017
ICS xxxxxxx

Petroleum Products - E-Gasoline fuel – Specification

Foreword

This Philippine National Standard PNS/DOE QS 008:2017, Specification for E-Gasoline was prepared by the Department of Energy through the Technical Committee on Petroleum Products and Additives (DOE/TCPPA) and was approved for adoption as Philippine National Standard by the Bureau of Philippine Standards.

This standard was made in line with the DOE's policy and program of updating the fuel quality specification of E-Gasoline fuel in terms of current requirement of the industry, its users and manufacturers and also by endeavoring to harmonize internationally/regional environmental standards for fuels.

Specifically, this standard is a revision/update of PNS/DOE QS 008:2012 corresponding with the January 2016 implementation of the Euro 4-PH specification for the sulfur requirement of 50 ppm, maximum in gasoline fuel and updating the test methods.

Further, this standard is consistent with the continuing program of the government towards the use of cleaner fuels and promoting the use of indigenous and renewable energy resources with the end view of reducing dependence on imported oil.

This standard cancels and replaces PNS/DOE QS 008:2012.

This entire standard is subject for review and/or revision when necessary

1 Scope

This standard specifies the requirements for bioethanol-blended gasoline, otherwise referred to as E-gasoline used as fuel in spark-ignition internal combustion engines. This standard does not include aviation gasoline.

2 References

The title of the standard publications referred to in this standard are listed on the inside back cover.

3 Definitions

For the purpose of this standard, the following definitions apply:

3.1
base gasoline
refers to unleaded gasoline that shall be blended with fuel bioethanol to produce E-gasoline

3.2
bioethanol
refers to ethanol, produced from a variety of feedstock such as grains, agricultural wastes, and other biomass resources

3.3
E-gasoline
refers to base gasoline blended with fuel bioethanol

3.4
fuel bioethanol
refers to the bioethanol denatured with unleaded gasoline for use as blending component to unleaded gasoline, as provided in the PNS for Anhydrous Bioethanol Fuel

4 Requirements

E-gasoline shall conform to the chemical and physical requirements specified in Table 1. Annex A provides guide specification for base gasoline

Table 1 – Chemical and physical requirements for E-Gasoline (Euro 4-PH)

Property	Regular	Premium	Premium Plus	Test Method
Appearance	Clear and bright, visibly free of suspended or precipitated contaminants			Visual
Color	Green	Red	Blue	Visual
Copper corrosion, 3 hr at 50^{O}C, max.	1	1	1	PNS ASTM D130
Density at 15 ^{O}C, kg/L	0.725-0.783 0.783 max	0.725-0.783	0.725-0.783	PNS ASTM D1298 or PNS ASTM D4052 or PNS ASTM D 7777
Distillation temperature, ^{O}C at: 10% recovered, max. 50% recovered 90% recovered, max. End point, max. Residue, % vol, max.	 70 70 - 110 77 - 100 66 - 110 180 215 2	 70 70-110 180 215 2	 70 70-110 180 215 2	PNS ASTM D86
Existent gum, mg/100 mL, max.	4	4	4	PNS ASTM D381
Hydrocarbons [a]: Aromatics, % vol, max	35	35	35	PNS ASTM D5443 or PNS ASTM D5580 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS/ASTM D6839
Benzene, % vol, max	2	2	2	PNS ASTM D3606 or PNS ASTM D5443 or PNS ASTM D5580 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6277 or PNS ASTM D6729 or PNS ASTM D6730 or PNS/ASTM D6839
Ethanol (C2) [b], % vol,	9.0 – 10	9.0 – 10	9.0 – 10	PNS ASTM D4815 or PNS ASTM D5599 or PNS ASTM D5845 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS/ASTM D 6839
Ethers (e.g. MTBE) [c, d,] % vol, max	2	2	2	PNS ASTM D4815 or PNS ASTM D5599 or PNS ASTM D5845 or PNS ASTM D5986 or PNS ASTM D6729 or PNS/ASTM D6730 or PNS/ASTM D 6839
Lead content (not added) [c] g/L, max.	0.005	0.005	0.005	PNS ASTM D3237 or PNS ASTM D3348 or PNS ASTM D5059
Octane rating, min. Research Octane Number (RON) Anti-knock index (AKI) [e]	91	95 87.5	97	PNS ASTM D2699

Table 1 *(concluded)*

Sulfur, % mass max.	0.005	0.005	0.005	PNS ASTM D1266 or PNS ASTM D2622 or PNS ASTM D4294 or PNS ASTM D5453 or PNS ASTM D7039
Vapor Pressure at 37.8 ^{O}C, kPa, max.	68	62	62	PNS ASTM D4953 or PNS ASTM D5191 or PNS ASTM D5482
Water content, % v/v, max.	0.1	0.1	0.1	PNS ASTM E203 or PNS ASTM D6304

[a] Based on certificate from production site. The product shall not contain more than 0.05% methanol, using the same test methods for ethanol.

[b] As per specification for Fuel Bioethanol in the PNS of Anhydrous Bioethanol Fuel

[c] Allowable contamination tolerance only. Intentional addition not permitted for both imported and locally-produced gasoline

[d] Methyl Tertiary Butyl Ether

[e] To be reported quarterly with Motor Octane Number (MON) using ASTM D 2700

[f] Oxygen content to be reported preferably not to exceed 4.0% mass max.

5 Sampling

E-gasoline shall be sampled in accordance with PNS ASTM D 4057.

6 Marking/Labeling

The dispensing pump for E-gasoline shall carry the following consumer advisory:

1. This E-gasoline contains 10% Bioethanol

7 Test methods

E-gasoline shall be tested in accordance with the methods specified in Table 1.

Annex A – Minimum Reference Specification for Base Gasoline

Property	Base Gasoline	Test Methods
Color	Undyed	Visual
Copper corrosion, 3 hr @ 50^{O}C, max.	1	PNS ASTM D 130
Density at 15 ^{O}C, kg/L, max.	0.783	PNS ASTM D 1298 or PNS ASTM D 4052 or PNS ASTM D 7777
Distillation temperature, ^{O}C at: 10% recovered, max. 50% recovered 90% recovered, max. End point, max. Residue, % volume, max.	 70 90-121 180 221 2	PNS ASTM D 86
Existent gum, mg/100 mL, max.	4	PNS ASTM D 381
Hydrocarbons : Aromatics, % volume, max	 38.5	PNS ASTM D5443 or PNS ASTM D5580 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS/ASTM D6839
Benzene, % volume, max	2	PNS ASTM D3606 or PNS ASTM D5443 or PNS ASTM D5580 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6277 or PNS ASTM D6729 or PNS ASTM D6730 or PNS/ASTM D6839
Lead content, (not added) g/L, max.	0.005	PNS ASTM D 3237 or PNS ASTM D 5059 or PNS ASTM D 3348
Research Octane Number (RON), min	87	PNS ASTM D 2699
Oxygen Content, % mass	0	PNS ASTM D 4815
Sulfur, % mass max.	0.005	PNS ASTM D 1266 or PNS ASTM D 2622 or PNS ASTM D 4294 or PNS ASTM D 5453 or PNS ASTM D 7039
Vapor Pressure at 37.8 ^{O}C, kPa, max.	62	PNS ASTM D 4953 or PNS ASTM D 5191 or PNS ASTM D 5482
Water content, % v/v	0	PNS ASTM E 203 or PNS ASTM D 6304

References:

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

PNS ASTM D 86-16a (ASTM published 201_), Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure

PNS ASTM D 130-15 (ASTM published 201_), Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

PNS ASTM D 381-12 (ASTM published 201_), Standard Test Method for Gum Content in Fuels by Jet Evaporation

PNS ASTM D 1266-13 (ASTM published 201_), Standard Test Method for Sulfur in Petroleum Products (Lamp Method)

PNS ASTM D 1298-12b (ASTM published 201_), Standard Test Method for Density, Relative Density or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

PNS ASTM D 2622-16 (ASTM published 201_), Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

PNS ASTM D 2699-16 (ASTM published 201_), Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel

PNS ASTM D 2700-16a (ASTM published 201_), Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel

PNS ASTM D 3237-12 (ASTM published 201_), Standard Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy

PNS ASTM D 3348-12 (ASTM published 201_), Standard Test Method for Rapid Field Test for Trace Lead in Unleaded Gasoline (Colorimetric Method)

PNS ASTM D 3606-10e1 (ASTM published 201_), Standard, Test Method for Determination of Benzene and Toluene in Finished Motor and Aviation Gasoline by Gas Chromatography

PNS ASTM D 4052-15 (ASTM published 201_), Standard Test Method for Density, Relative Density, and API gravity of Liquids by Digital Density Meter

PNS ASTM D 4057-12 (ASTM published 201_), Standard Practice for Manual Sampling of Petroleum and Petroleum Products

PNS ASTM D 4294-16e1 (ASTM published 201_), Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy-Dispersive X-Ray Fluorescence Spectrometry

PNS ASTM D 4814-16ee1 (ASTM published 201_), Standard Specification for Automotive Spark-Ignition Engine Fuel

PNS ASTM D 4815-15b (ASTM published 201_), Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C_1 to C_4 Alcohols in Gasoline by Gas Chromatography

PNS ASTM D 4953-15 (ASTM published 201_), Standard Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)

PNS ASTM D 5059-14 (ASTM published 201_), Standard Test Methods for Lead in Gasoline by X-Ray Spectroscopy

PNS ASTM D 5191-15 (ASTM published 201_) , Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method)

PNS ASTM D 5443-14 (ASTM published 201_), Standard Test Method for Paraffin, Naphthene, and Aromatic Hydrocarbon Type Analysis in Petroleum Distillates Through 200°C by Multi-Dimensional Gas Chromatography

PNS ASTM D 5453-16e1 (ASTM published 201_), Standard Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence

PNS ASTM D 5482-07(2013) (ASTM published 201_), Standard Test Method for Vapor Pressure of Petroleum Products (Mini-Method-Atmospheric)

PNS ASTM D 5580-15 (ASTM published 201_), Standard Test Method for Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, o-Xylene, C_9 and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography

PNS ASTM D 5599-15 (ASTM published 201_), Standard Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection

PNS ASTM D 5769-15 (ASTM published 201_), Standard Test Method for Determination of Benzene, Toluene, and Total Aromatics in Finished Gasolines by Gas Chromatography/Mass Spectrometry

PNS ASTM D 5845-01(2016) (ASTM published 201_), Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, Methanol, Ethanol, and Tertiary-Butanol in Gasoline by Infrared Spectroscopy

PNS ASTM D 5986-96(2015) (ASTM published 201_), Standard Test Method for Determination of Oxygenates, Benzene, Toluene, C_8-C_{12} Aromatics and Total Aromatics in Finished Gasoline by Gas Chromatography/Fourier Transform Infrared Spectroscopy

PNS ASTM D 6277-07 (2012) (ASTM published 201_) , Standard Test Method for Determination of Benzene in Spark-Ignition Engine Fuel Using Mid-Infrared Spectroscopy

PNS ASTM D 6304-16e1 (ASTM published 201_), Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration

PNS ASTM D 6729-14 (ASTM published 201_), Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Metre Capillary High Resolution Gas Chromatography

PNS ASTM D 6730-01(2016) (ASTM published 201_), Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100-Metre Capillary (With Precolumn) High Resolution Gas Chromatography.

PNS ASTM D 6839-16 (ASTM published 201_), Standard Test Method for Hydrocarbon Types, Oxygenated Compounds and Benzene in Spark Ignition Engine Fuels by Gas Chromatography

PNS ASTM D 7039-15a (ASTM published 201_), Standard Test Method for Sulfur in Gasoline, Diesel Fuel, Jet Fuel, Kerosine, Biodiesel, Biodiesel Blends, and Gasoline-Ethanol Blends by Monochromatic Wavelength Dispersive X-ray Fluorescence Spectrometry

PNS ASTM D7777-13 (ASTM published 201_), Standard Test Method for Density, Relative Density, or API Gravity of Liquid Petroleum by Portable Digital Density Meter

PNS ASTM E 203-16 (ASTM published 201_), Standard Test Method for Water Using Volumetric Karl Fischer Titration

Abbreviations

ASTM - American Society for Testing and Materials

PNS - Philippine National Standard

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Virginia S. Llamo*
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16 Myra Magabilin
Bureau of Philippine Standards, DTI

17 Hermelina H. Bion
Corazon G. Magpantay*
Industrial Technology Development Institute, DOST

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21 Joselito Magalona
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Secretariat

Oil Industry Standards & Monitoring Division,
Oil Industry Management Bureau
Department of Energy

*** Alternate**