



Republic of the Philippines  
**DEPARTMENT OF ENERGY**

The Department of Energy through the Oil Industry Management Bureau (DOE-OIMB) is mandated to set the fuel quality specifications in the downstream oil industry and ensure effective implementations. The fuel quality standards development is in line with the objectives of the Philippine Clean Air Act of 1999 (RA 8749), the Biofuels Act of 2006 (RA 9367), the continuing improvements of the emission requirements, and the evolving clean fuel initiatives and environmental policies relating to fuel quality.

The DOE, as chair and co-chair with the DENR, through the Technical Committee on Petroleum Products and Additives (DOE-TCPPA) proposed and developed the *Philippine National Standard for Petroleum Products – E-Gasoline Fuel (E20) – Specification (DPNS/DOE QS 019:2023)*

This standard addresses the technical requirements of gasoline containing 20% v/v bioethanol or E-Gasoline (E20) and suitable test methods. Said standard, also incorporates the limit of sulfur content at 50 ppm, maximum to comply the Euro 4/IV emission requirement under the DENR DAO 2015-04 and 2016-23.

This standard is in line with the DOE's thrust for the continuing development and utilization of various alternative fuels. This will support the future energy policies towards the integration of higher bioethanol blends in petroleum/fuel sector and promoting the use of indigenous and renewable energy resources with the end view of reducing dependence on imported oil.

Further, this is also consistent with the continuing program of the government towards the use of cleaner fuels by considering the regional/global thrust towards harmonization of fuel quality standard specification, vehicle technology and emission standards with due regard to the environment, vehicle performance, health and safety of the public as well as ensuring supply availability.

Enclosed is a copy of the draft standard for your comments. It is suggested that any proposed changes to the specifications be supported with explanations/justifications.

We appreciate receiving your comments/positions through mail or email at [tcppa.oismd@doe.gov.ph](mailto:tcppa.oismd@doe.gov.ph) on or before **September 10, 2023**, for it to be considered in the finalization of the standard. Non- receipt of your comments on the specified date shall be construed as an approval of the adoption of the standard.

Thank you for your usual cooperation.

Very truly yours,

**Atty. RINO E. ABAD**

*TCPPA Chairperson*

*Director*

**OIL INDUSTRY MANAGEMENT BUREAU**

**DPNS/DOE QS 019:2023**  
**ICS xxxxxxx**

**Petroleum Products – E-Gasoline Fuel (E20) – Specification**

**Foreword**

This Philippine National Standard PNS/DOE QS 019:2023, Petroleum Products – E-Gasoline Fuel (E20) – Specification, was prepared by the Department of Energy (DOE) 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 addresses the technical requirement of gasoline containing 20% v/v bioethanol or E-Gasoline (E20) and suitable test methods.

This standard was made in line with the DOE's thrust for the continuing development and utilization of various alternative fuels. Said standard will support the future energy policies towards the integration of higher bioethanol blends in petroleum/fuel sector and promoting the use of indigenous and renewable energy resources with the end view of reducing dependence on imported oil.

Further, this is also consistent with the continuing program of the government towards the use of cleaner fuels by considering the regional/ global thrust towards harmonization of fuel quality standard specification, vehicle technology and emission standards with due regard to the environment, vehicle performance, health and safety of the public as well as ensuring supply availability.

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

## **1 Scope**

This standard specifies the requirements for 20% v/v bioethanol-blended gasoline, otherwise referred to as E-Gasoline (E20), suitable for used as fuel in spark-ignition internal combustion engines. This standard does not include aviation gasoline.

## **2 Normative 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 (E20).

### **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 (E20)**

Refers to base gasoline blended with 20% v/v 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 (E20) shall conform to the chemical and physical requirements specified in Table 1.

**Table 1 – Chemical and Physical Requirements for E-Gasoline (E20)**

Property	Premium	Test Methods*
Appearance	Clear and bright, visibly free of suspended or precipitated contaminants	Visual
Color	Red	Visual
Copper corrosion, 3 hr at 50°C, max.	1	PNS ASTM D130
Density at 15°C, kg/L, max.	0.783	PNS ASTM D1298 or PNS ASTM D4052 or PNS ASTM D7777
Distillation temperature, °C at: 10% recovered, max. 50% recovered 90% recovered, max. End point, max. Residue, % volume, max.	65 65-110 180 215 2	PNS ASTM D86
Existent gum, mg/100 mL, max.	4	PNS ASTM D381
Hydrocarbons:  Aromatics, % volume, max.	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, % volume, max.	1	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
Oxygenates:  Ethanol (C2) <sup>a,d</sup> , % volume	19 - 20	PNS ASTM D5599 or PNS ASTM D5845 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS/ASTM D6839
Methanol (C1), % volume, max.	0.2	PNS ASTM D4815 or PNS ASTM D5599 or PNS ASTM D5986

Ethers (e.g. MTBE <sup>b</sup> ) (not added), % volume, max.	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 D6839
Oxygen content, % mass, max.	Report	PNS ASTM D6839
Oxidation stability, minutes, min.	360	PNS ASTM D525
Lead content, (not added), g/L, max.	0.005	PNS ASTM D3237 or PNS ASTM D5059
Octane rating, min. Research Octane Number (RON) Anti-knock Index (AKI)	95 87.5	PNS ASTM D2699 PNS ASTM D2700
Sulfur, % mass, max.	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°C, kPa, max.	62	PNS ASTM D4953 or PNS ASTM D5191 or PNS ASTM D5482
Water content, % v/v	0.7	PNS ASTM E203 or PNS ASTM D6304
<p>* Test results shall be subject to the reproducibility limits of the corresponding test method.  <sup>a</sup> As per specification for Fuel Bioethanol in the PNS of Anhydrous Bioethanol Fuel.  <sup>b</sup> Methyl Tertiary Butyl Ether  <sup>c</sup> To be reported quarterly with Motor Octane Number (MON) using ASTM D 2700.  <sup>d</sup> To be reported quarterly by the downstream oil industry participants to DOE-OIMB as part of the quality monitoring requirement.</p>		

Annex 1 provides minimum reference specification for base gasoline oil.

## 5 Sampling

E-Gasoline (E20) shall be sampled in accordance with PNS ASTM D 4057.

## 6 Marking / Labeling

The dispensing pump for E-Gasoline (E20) shall carry the following consumer advisory: "This E-Gasoline contains 20% Bioethanol".

## 7 Test methods

E-Gasoline (E20) shall be tested in accordance with the methods specified in Table 1.

**Annex A**  
**Minimum Reference Specification for Base Gasoline**  
**(Informative)**

**Table A.1 – Minimum Reference Specification for Base Gasoline**

Property	Base Gasoline	Test Methods
Color	Undyed	Visual
Copper corrosion, 3 hr at 50°C, max.	1	PNS ASTM D130
Density at 15°C, kg/L, max.	0.783	PNS ASTM D1298 or PNS ASTM D4052 or PNS ASTM D7777
Distillation temperature, °C at: 10% recovered, max. 50% recovered 90% recovered, max. End point, max. Residue, % volume, max.	70 90-110 170 200 2	PNS ASTM D 86
Existent gum, mg/100 mL, max.	4	PNS ASTM D381
Hydrocarbons:  Aromatics, % volume, max.	38	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.	1.1	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
Oxidation stability, minutes, min.	360	PNS ASTM D525
Oxygen Content, % mass	0	PNS ASTM D4815
Lead content, (not added) g/L, max.	0.005	PNS ASTM D3237 or PNS ASTM D5059
Research Octane Number (RON), min.	87	PNS ASTM D2699
Sulfur, % mass, max.	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°C, kPa, max.	54.5	PNS ASTM D4953 or PNS ASTM D5191 or PNS ASTM D 5482
Water content, % v/v, max	0.7	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 D86-2020b (ASTM published 20 ) Standard Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure

PNS ASTM D130-2019 (ASTM published 20 ) Standard Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

PNS ASTM D381-2022 (ASTM published 20 ), Standard Test Method for Gum Content in Fuels by Jet Evaporation

PNS ASTM D525–2012a (2019) (ASTM published 20 ), Standard Test Method for Oxidation Stability of Gasoline (Induction Period Method)

PNS ASTM D1266-2018 (ASTM published 20 ), Standard Test Method for Sulfur in Petroleum Products (Lamp Method)

PNS ASTM D1298-202012b (2017) (ASTM published 20 ), Standard Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

PNS ASTM D2622-2021 (ASTM published 20 ), Standard Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

PNS ASTM D2699-2021 (ASTM published 20 ), Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel

PNS ASTM D2700-2022b (ASTM published 2 ), Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel

PNS ASTM D3237-2022 (ASTM published 20 ), Standard Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy

PNS ASTM D3606-2022 (ASTM published 201 ), Standard Test Method for Determination of Benzene and Toluene in Spark Ignition Fuels by Gas Chromatography

PNS ASTM D4052-2022 (ASTM published 201 ), Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

PNS ASTM D4057-2022 (ASTM published 20 ), Standard Practice for Manual Sampling of Petroleum and Petroleum Products

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PNS ASTM D4294-2021 (ASTM published 20 ), Standard Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry

PNS ASTM D4814-2021c (ASTM published 20 ), Standard Specification for Automotive Spark-Ignition Engine Fuel

PNS ASTM D4815-2022 (ASTM published 20 ), Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography

PNS ASTM D4953-2020 (ASTM published 20 ), Standard Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)

PNS ASTM D5059-2021 (ASTM published 20 ), Standard Test Methods for Lead and Manganese in Gasoline by X-Ray Fluorescence Spectroscopy

PNS ASTM D5191-2022 (ASTM published 20 ), Standard Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method)

PNS ASTM D5443-2014(2018) (ASTM published 20 ), Standard Test Method for Paraffin, Naphthene, and Aromatic Hydrocarbon Type Analysis in Petroleum Distillates Through 200 °C by Multi-Dimensional Gas Chromatography

PNS ASTM D5453-2019a (ASTM published 20 ), 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 D5482-2020a (ASTM published 20 ), Standard Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method—Atmospheric)

PNS ASTM D5580-2017 (ASTM published 20 ), Standard Test Method for Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, o-Xylene, C9 and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography

PNS ASTM D5599-2022 (ASTM published 20 ), Standard Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection

PNS ASTM D5769-2022 (ASTM published 20 ), Standard Test Method for Determination of Benzene, Toluene, and Total Aromatics in Finished Gasolines by Gas Chromatography/Mass Spectrometry

PNS ASTM D5845-2021 (ASTM published 20 ), Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, Methanol, Ethanol and tert-Butanol in Gasoline by Infrared Spectroscopy

PNS ASTM D5986-1996(2019) (ASTM published 20 ), Standard Test Method for Determination of Oxygenates, Benzene, Toluene, C8–C12 Aromatics and Total Aromatics in Finished Gasoline by Gas Chromatography/Fourier Transform Infrared Spectroscopy

PNS ASTM D6277-2007 (2022) (ASTM published 20 ), Standard Test Method for Determination of Benzene in Spark-Ignition Engine Fuels Using Mid Infrared Spectroscopy

PNS ASTM D6304-2020 (ASTM published 20 ), Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration

PNS ASTM D6729-2020 (ASTM published 20 ), Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 100 Metre Capillary High Resolution Gas Chromatography

PNS ASTM D6730-2021 (ASTM published 20 ), 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 D6839-2021a (ASTM published 20 ), Standard Test Method for Hydrocarbon Types, Oxygenated Compounds, Benzene, and Toluene in Spark Ignition Engine Fuels by Multidimensional Gas Chromatography

PNS ASTM D7039-2015a (ASTM published 20 ), 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 D7777-2013(2018)e1 (ASTM published 20 ), Standard Test Method for Density, Relative Density, or API Gravity of Liquid Petroleum by Portable Digital Density Meter

PNS ASTM E203-2017 (ASTM published 20 ), 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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