Philippine National Standards (PNS) on Petroleum

E-Power Mo: Empowering Filipinos through Informed Energy Plans and Policies

Grand Xing Imperial Hotel H. Montinola cor. Muelle Loney St., Iloilo City
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Ma. Cristina Carmela C. Manocan
Oil Industry Standards and Monitoring Division
Oil Industry Management Bureau
Standardization Mandate

**Downstream Oil Industry Deregulation Act (R.A. 8479)**

- ensure a truly competitive market for petroleum products under a regime of fair price, adequate and continuous supply of environmentally, clean and high quality petroleum products
- Use of clean and safe (environment and worker-benign) technologies

**Clean Air Act of 1999 (R.A. 8749)**

- Set the specifications for all types of fuel and fuel-related products (Section 26)
- Every two (2) years or thereafter or as the need arises, the specification of ULG and diesels shall be reviewed and revised (Section 26)

**Biofuels Act of 2006 (R.A. 9367)**

- Establish technical fuel quality standards for biofuels and biofuel-blend gasoline and diesel which comply with the PNS (Section 7c)
Standardization Technical Committees

A.) Technical Committee on Petroleum Products & Additives (TCPPA)

- Chair: DOE and DENR
- Members

Government:
- DOE
- DENR
- BPS-DTI
- ITDI-DOST

Oil Industry Sector:
- Petron
- Shell
- Chevron
- PIP
- IPPCA

Engine Suppliers/Manufacturers:
- CAMPI, AMMDA, MDPPA

Consumer Sector/NGO:
- FilCar Foundation, AWMA

Academe:
- UP-NCTS, AIPSI
Standard Development Process

1. PNS
2. Endorsement to BPS
3. Finalization of the Final Draft Standard
4. Consolidation of Comments
5. Circulation of the Draft Standard (Public Consultation)
6. Drafting of the Standard
7. Deliberation of the Proposal by the TCPPA
8. Proposal for Need
Elements of PNS Development

- Local condition
- Minimum requirement
- Multi-sectoral
- Consultative
- Dynamic
- Regulatory
- Reference based
- Technically based

PNS
Fuel Quality Standard Development

CLEAN AIR ACT (CAA)
BIOFUELS ACT
WORLD WIDE FUEL CHARTER (WWFC)
Fuel Quality and Vehicle Regional Harmonization
Alternative Fuels / Energy Security and Sufficiency

TCPPA: Review and Formulate Standards
Monitoring: Sampling & Testing

Int’l Fuel Quality Stds
Emission Stds / Regulations
Fuel Security Testing

R&D on Fuel Specs
Vehicle Technology Dev’t
Local Supply & Demand

Fuel Additives Dev’t
IRR for Standards

Multi-lateral bodies: ERIA, JAMA, JPEC, etc.
Inter-agency cooperation: DOE, DENR, DOST, BIR, TC, DOF, etc.

Others: Industry – Oil/Car, NGOs, Academe

Why we work to

What we work for

How we work by

Who we work with
PHILIPPINE NATIONAL
STANDARD

Petroleum products – E-Gasoline fuel –
Specification

BUREAU OF PRODUCT STANDARDS

Member to the International Organization for Standardization (ISO)
Standards and Conformance Portal: www.bps.dti.gov.ph

PHILIPPINE NATIONAL
STANDARD

Petroleum products – FAME-blended diesel oils –
Specification

BUREAU OF PRODUCT STANDARDS

Member to the International Organization for Standardization (ISO)
Standards and Conformance Portal: www.bps.dti.gov.ph
Table 1 – Chemical and physical requirements for E-Gasoline

<table>
<thead>
<tr>
<th>Property</th>
<th>Regular</th>
<th>Premium</th>
<th>Premium plus</th>
<th>Euro 4-PH +</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Clear and bright, viable free of suspended or precipitated contaminants</td>
<td>Visual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td>Green</td>
<td>Red</td>
<td>Blue</td>
<td>91RON - Green 99RON - Red 97RON - Blue</td>
<td>Visual</td>
</tr>
<tr>
<td>Copper corrosion, 3 hr at 50°C, max.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>PNS ASTM D133</td>
</tr>
<tr>
<td>Density at 15°C, kg/L, max.</td>
<td>0.725-0.783</td>
<td>0.725-0.783</td>
<td>0.725-0.783</td>
<td>0.725-0.783</td>
<td>PNS ASTM D1296 or PNS ASTM D4062</td>
</tr>
<tr>
<td>Distillation temperature, °C at: 10% recovered, max.</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>70</td>
<td>PNS ASTM D86</td>
</tr>
<tr>
<td>50% recovered, max.</td>
<td>70-110</td>
<td>70-110</td>
<td>70-110</td>
<td>70-110</td>
<td>PNS ASTM D86</td>
</tr>
<tr>
<td>90% recovered, max.</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>PNS ASTM D86</td>
</tr>
<tr>
<td>End point, max.</td>
<td>216</td>
<td>215</td>
<td>216</td>
<td>215</td>
<td>PNS ASTM D86</td>
</tr>
<tr>
<td>Residue, % vol, max.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>PNS ASTM D381</td>
</tr>
<tr>
<td>Existing gum, mg/100 mL, max.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>PNS ASTM D381</td>
</tr>
<tr>
<td>Hydrocarbons *</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>PNS ASTM D5443 or PNS ASTM D5680 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS ASTM D6839</td>
</tr>
<tr>
<td>Aromatics, % vol, max.</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>PNS ASTM D5606 or PNS ASTM D5660 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS ASTM D6839</td>
</tr>
<tr>
<td>Benzene, % vol, max.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>PNS ASTM D6729 or PNS ASTM D6730 or PNS ASTM D6839</td>
</tr>
<tr>
<td>Ethanol (C2), % vol.</td>
<td>9.0-10</td>
<td>9.0-10</td>
<td>9.0-10</td>
<td>9.0-10</td>
<td>PNS ASTM D4815 or PNS ASTM D5699 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS ASTM D6839</td>
</tr>
<tr>
<td>Ethers (e.g. MTBE)**</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>PNS ASTM D4815 or PNS ASTM D5699 or PNS ASTM D5769 or PNS ASTM D5986 or PNS ASTM D6729 or PNS ASTM D6730 or PNS ASTM D6839</td>
</tr>
<tr>
<td>Lead content (not added) g/L, max.</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>0.005</td>
<td>PNS ASTM D5297 or PNS ASTM D5348 or PNS ASTM D5053</td>
</tr>
<tr>
<td>Octane rating, min.</td>
<td>91</td>
<td>95</td>
<td>97</td>
<td>91/95/97</td>
<td>PNS ASTM D2699</td>
</tr>
<tr>
<td>Research Octane Number (RON)</td>
<td>87.5</td>
<td></td>
<td></td>
<td></td>
<td>PNS ASTM D4814</td>
</tr>
</tbody>
</table>

Table 1 (concluded)

<table>
<thead>
<tr>
<th>Property</th>
<th>Regular</th>
<th>Premium</th>
<th>Premium plus</th>
<th>Euro 4-PH +</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur, % mass, max.</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.005</td>
<td>PNS ASTM D1296 or PNS ASTM D2622 or PNS ASTM D4246 or PNS ASTM D6453</td>
</tr>
<tr>
<td>Vapor Pressure at 37.8°C, KPa, max.</td>
<td>68</td>
<td>62</td>
<td>62</td>
<td>68</td>
<td>PNS ASTM D4953 or PNS ASTM D5159 or PNS ASTM D5282</td>
</tr>
<tr>
<td>Water content, % v/v, max.</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>PNS ASTM E203 or PNS ASTM D336</td>
</tr>
</tbody>
</table>

* Based on certificate of production site. The product shall not contain methanol.
** As per specification for Fuel Blendstock in the PNS of Alyobad Bioethanol Fuel.
*** Allowable contamination tolerance only. Intentional addition not permitted for both imported and locally-produced gasoline.
**** Methanol (Benzene, Ethanol, etc.)
***** To be reported quarterly with Motor Octane Number (MON) using ASTM D2700.
****** Oxygen content to be reported preferably not to exceed 4.0% mass max.
******* Euro 4-PH (50 ppm sulfur) gasoline to be introduced not later than January 1, 2016.
4.2 Industrial diesel oil (IDO) – Diesel oil used for off-road vehicles, marine vessels, direct driven equipment such as pumps and compressors, and stationary equipment such as power generators, boilers and furnaces.

5 Requirements

FAME-blended diesel oils shall conform to the chemical and physical requirements specified in Table 1.

Annex 1 provides minimum reference specification for base diesel oils.

Table 1 – Chemical and physical requirements for FAME-blended diesel oils

<table>
<thead>
<tr>
<th>Property</th>
<th>ADO</th>
<th>IDO</th>
<th>Euro IV–PH†</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturation number, min. or Derived saturation number, min.</td>
<td>50'</td>
<td>50</td>
<td>50</td>
<td>PNS ASTM D 613 or PNS ASTM D 6990 or PNS ASTM D 7172</td>
</tr>
<tr>
<td>Carbon residue on 10% distillation, % mass, max.</td>
<td>0.15</td>
<td>0.35</td>
<td>0.15</td>
<td>PNS ASTM D 199 or PNS ASTM D 524 or PNS ASTM D 4699</td>
</tr>
<tr>
<td>Corrosion or Ramsbottoms or Micro</td>
<td></td>
<td></td>
<td></td>
<td>PNS ASTM D 1590</td>
</tr>
<tr>
<td>Color, ASTM</td>
<td>2.5 max</td>
<td>5.0 min</td>
<td>2.5 max.</td>
<td>PNS ASTM D 1500</td>
</tr>
<tr>
<td>Copper strip corrosion, 3 h at 50°C, max.</td>
<td>No. 1</td>
<td>No. 1</td>
<td>No. 1</td>
<td>PNS ASTM D 1300 or PNS IDO 2160</td>
</tr>
<tr>
<td>Density at 15°C, kg/L</td>
<td>0.820 - 0.860</td>
<td>0.880 max</td>
<td>0.820 - 0.860</td>
<td>PNS ASTM D 1298 or PNS ASTM D 4002</td>
</tr>
<tr>
<td>Distillation, 50% recovered, °C, max.</td>
<td>370</td>
<td>Report</td>
<td>370</td>
<td>PNS ASTM D 86</td>
</tr>
<tr>
<td>FAME ‡ content, % vol.</td>
<td>1.7 - 2.2</td>
<td>1.7 - 2.2</td>
<td>1.7 - 2.2</td>
<td>PNS EN 14078 or PNS/DOE TM 01 or PNS/DOE TM 02</td>
</tr>
<tr>
<td>Flash point, Pensky-Martens, °C, min.</td>
<td>55</td>
<td>55</td>
<td>55</td>
<td>PNS ASTM D 93</td>
</tr>
<tr>
<td>Kinematic viscosity, mm²/s at 40°C</td>
<td>2.0 - 4.5</td>
<td>1.7 - 5.5</td>
<td>2.0 - 4.5</td>
<td>PNS ASTM D 444 or PNS ASTM D 7042</td>
</tr>
<tr>
<td>Lubricity, (HRR), wear scar dia. (50°C, micron, max.)</td>
<td>460</td>
<td>460</td>
<td>460</td>
<td>PNS ASTM D 6079</td>
</tr>
<tr>
<td>Methyl laurate (C12 ME), % mass, min.</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>PNS/DOE TM 01</td>
</tr>
<tr>
<td>Sulfur, % mass, max.</td>
<td>0.05</td>
<td>0.05</td>
<td>0.005</td>
<td>PNS ASTM D 4294 or PNS ASTM D 2632 or PNS ASTM D 5493</td>
</tr>
<tr>
<td>Water, % volume, max.</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>PNS ASTM D 6304 or PNS ISO 12937 or PNS ASTM E 203</td>
</tr>
<tr>
<td>Water and sediment, % volume, max.</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>PNS ASTM D 2709</td>
</tr>
</tbody>
</table>

† Euro IV–PH (50 ppm sulfur) automotive diesel oil (ADO) to be introduced not later than January 1, 2016.

‡ As per PNS for B100
# Fuel Quality Standards Developed

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Specifications</th>
<th>Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Gasoline (E10)</td>
<td>PNS/DOE QS 008:2018</td>
<td>May 2018</td>
<td>On-going</td>
</tr>
<tr>
<td>CME-blended Automotive Diesel Oil (ADO B2)</td>
<td>PNS/DOE QS 004:2017</td>
<td>18 December 2017</td>
<td>On-going</td>
</tr>
<tr>
<td>CME-blended Industrial Diesel Oil (IDO B2)</td>
<td>PNS/DOE QS 013:2017</td>
<td>18 December 2017</td>
<td>On-going</td>
</tr>
</tbody>
</table>
## Fuel Quality Standards Developed

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Standard Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coconut Methyl Ester (B100)</td>
<td>• PNS/DOE QS 002:2015 [27 November 2015]</td>
</tr>
<tr>
<td></td>
<td>• Implementing the Modified Philippine National Standard Specification for Biofuels-Coconut Methyl Ester [Department Circular DC No. 2016-05-006]</td>
</tr>
<tr>
<td>High FAME Blended Diesel Oils (B5)</td>
<td>• PNS/DOE QS 004:2017 [27 November 2015]</td>
</tr>
<tr>
<td>Liquified Petroleum Gases (LPG) as Non-Motor Fuel</td>
<td>• PNS/DOE QS 005:2016 [22 December 2016]</td>
</tr>
<tr>
<td></td>
<td>• Implementing the New Standard Specification for LPG [Department Circular : On-going]</td>
</tr>
<tr>
<td>Liquified Petroleum Gases (LPG) as Motor Fuel</td>
<td>• PNS/DOE QS 012:2016 [22 December 2016]</td>
</tr>
<tr>
<td></td>
<td>• Implementing the New Standard Specification for LPG [Department Circular : On-going]</td>
</tr>
</tbody>
</table>
Fuel Quality Standards Developed

- **Kerosene**
  - PNS/DOE QS 009:2007 [24 August 2007]

- **Aviation Gasoline Grade 100L**
  - PNS/DOEASTM D910:2010 [2010]

- **Two-stroke (2T) Lubricating Oil**
  - PNS/DOE QS 003:2003
Standards Harmonization in Downstream Petroleum Industry

Cleaner Fuels and Safer Technologies

**Code of Practice**
- LPG Vehicle Conversion
- Retail Operation
- Bulk Storage
- Handling & Distribution

**Fuel Quality**
- Conventional
- Biofuels & blends
- Alternative fuels

**Facilities**
- Gasoline stations
- LPG tanks/conversion kits terminals
- Control equipment (correlation)
Standardization Technical Committees

B.) Technical Committee on Petroleum Facilities and Processes (TCPPF)

- Chair: DOE
- Members

Government:
- DTI-BPS
- DENR-EMB
- DILG-BFP
- DOLE (BWC, OSHC)

Industry:
- Petron
- Shell
- Chevron
- Total
- IPPCA

Testing:
- DOST-MIRDC, UP

Prof. Assoc.:
- SOPI
Facilities / Practice – Liquid Fuels

Prohibited Acts

Informational/Safety Signs

OCTANE RATING
MINIMUM
91
Facilities/Practice - Auto LPG

illegal practice

correct practice
## Facility Standards Developed

<table>
<thead>
<tr>
<th>Facility Standards Developed</th>
<th>Details</th>
</tr>
</thead>
</table>
| **LPG Refilling Plant – General Requirements** | - Final Draft PNS/DOE FS: 2 - 2018 [June 2018]
  - Endorsed to DTI – BPS for promulgation |
| **Code of Safety Practices in LPG Refilling Plant** | - Covers the typical activities associated in the normal operations of an LPG Refilling Plant |
| **Code of Safety Practices for LPP in Retail Outlet** | - PNS/DOE FS: 10 - 2017
  - Covers the typical activities associated in the normal operations of a Retail Outlet applicable to all kind of lots from mid-block lot, corner lot and passing –thru lot. |
| **Code of Safety Practice in Auto-LPG Dispensing Station** | - PNS/DOE FS: 9 - 2016
  - Intended for managers/operators collectively referred to as Responsible Officer of Auto-LPG dispensing station focusing on safety and good practice procedures with reference to relevant health and safety standards. |
**Facility Standards Developed**

- **Transportation of Petroleum Product by Pipeline**
  - PNS/DOE FS: 8 - 2013
  - To ensure the safety of the general public and pipeline workers and the protection of the environment against the risk of petroleum contamination, fire and other similar hazards in areas where the pipeline system operates and/or transverses.

- **Storing and Handling of CME and CME-Blends in LPP Depot**
  - PNS/DOE FS: 5 – 2009
  - Describes practices and requirements for the storing and handling and fire protection of CME and CME blends at LPP Depot.

- **Liquid Petroleum Product Depot**
  - PNS/DOE FS: 4 - 2007
  - Covers the design and constructions of depots and associated facilities involved in marketing/redistribution of liquid petroleum product.

- **Auto LPG Dispensing Station (Revision)**
  - PNS/DOE FS: 3 - 2013
  - Covers the requirements for the installation of Auto-LPG Dispensing Stations for Retail Operation and Garage based sites for on-vehicle dispensing of LPG for vehicle of any type.
Facility Standards Developed

Storing and Handling of B5 in Retail Outlet

- **PNS/DOE FS: 7 - 2011**
- Review of PNS 1-4 Retail Outlet pursuant to Sec. 8 of the BPS Directives, Second Edition 2004 (Maintenance of Standards) and likewise covers the facilities, clearances and distances therein intended for retail outlets storing and handling up to B5 and applicable to all kinds of locations either with mid-block lot, corner lot and passing-thru lot.

Storing and Handling of E-Gasoline in Retail Outlets

- **PNS/DOE FS: 6 – 2011**
- Describes good engineering practices, as well as safety, environmental and fire protection requirements for the Storing and Handling of E-Gasoline in Retail Outlets

Retail Outlet
Health, Safety and Environment
Underground Storage Tank
Piping System
Dispensing Pumps

- **PNS/DOE FS: 1-4 : 2005**
- Covers the requirements for the installations of LPP Retail outlet including its associated appurtenances
On-going Standards Development (DPNS)

Fuel Quality Standards

A. Marine Fuels
B. Emulsified Fuel
C. Bunker Oil
D. Kerosene
Enforcement of PNS

A.) Denaturing of Imported Ethanol
Enforcement of PNS

B.) Petroleum Product sampling and facilities check

Sampling frequency:
At least once a year inspected for major facilities nationwide
Enforcement of PNS

C.) Mobile Lab Testing for PNS Compliance on Retail Stations
Enforcement of PNS

Instrument Based Sample Testing

Portable Fuel Analyzer

MINISCAN IR VISION
Top Performer in Portable Fuel Analysis

The MINISCAN IR VISION is a high speed, compact and robust FTIR fuel analyzer for the comprehensive and automatic measurement of gasoline, jet and diesel fuels. The analyzer is configured to measure more than 100 fuel parameters and components for fuel blending, for quality inspection and to check compliance with fuel specifications directly at the point of sale.

Portable Sulfur Analyzer
Enforcement of PNS

Instrument Based Sample Testing
“Quality in a service or product is not what you put into it. It is what the client or customer gets out of it.”

– Peter Drucker
Thank You!

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