ASTM D 6751 – 02
Standard Specification for Biodiesel Fuel (B 100) Blend Stock for Distillate Fuels
Summary

- This module describes the key elements in ASTM Specifications and Standard Test Methods.
- ASTM Specification D 6751 – 02, the specification of B 100 (biodiesel) fuel is described in detail.
- Key properties of B 100 are discussed in terms of their tests and specifications.
Biodiesel – a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B 100.
ASTM Testing Procedures

- ASTM Standards are based upon the use of a number of ASTM Methods to perform the property measurements.
- The Methods provide very explicit directions with respect to the equipment, the measurements, and the data analysis.
- Standardization of procedure and reproducibility of results among laboratories is the goal of the process.
ASTM Methods Structure

1. Scope
2. Referenced Documents
3. Terminology
4. Summary of Test Method
5. Significance and Use
6. Interferences
7. Apparatus
ASTM Methods Structure, cont.

8. Reagents and Reference Materials
9. Sampling
10. Apparatus Standard Operating Conditions or Preparation of Apparatus
11. Calibration
12. Procedure
ASTM Methods Structure, cont.

13. Quality Control Checks
14. Calculations
15. Report
16. Precision and Bias
17. Keywords
Flash Point

- Method ASTM D 93
- Limit: 130°C minimum
- Temperature
- A sample is heated in a close vessel and ignited. When the sample burns, the temperature is recorded.
Water and Sediment

- Method D 2709
- 0.050 % volume maximum
- 100 mL of sample are centrifuged at 800 rcf for 10 min at 21° to 32°C in calibrated tube.
Kinematic Viscosity

- Test Method D 445
- Measured at 40°C
- Limits: 1.9 – 6.0° mm²/s
- Generally higher than Petrodiesel
- Volume of liquid flows under gravity through calibrated capillary
Sulfated Ash

- Test Method ASTM D 874
- Limits: 0.020 % mass maximum
- Sample ignited and burned
- Ash + carbon (C removed by H$_2$SO$_4$)
- Indication of concentration of metal additives (Ba, Ca, Mg, Na, K, Sn, Zn)
Sulfur

- Test Method ASTM D 5453
- Limits: 0.05 % mass maximum
- S oxidized to SO$_2$ at high temperatures
- UV phluorescence of emitted gases SO$_2$ $\rightarrow$ SO$_2$ $^*$ $\rightarrow$ SO$_2$
- S limits dictated by environmental considerations
- Limits vary according to State regulations
Copper strip corrosion

- Test Method ASTM D 130
- Limits: No 3 maximum
- A copper strip is immersed into a fixed volume of sample and heated for a certain period. The color of the strip is compared to standards.
- Amount of S not directly correlated to corrosivity of fuel.
<table>
<thead>
<tr>
<th>Method</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Cetane Number

- **Test Method** ASTM D 613
- **Limits**: 47 minimum
- **Comparison of combustion characteristics with reference fuels.**
- **Measure of ignition characteristics**
- **Compression ratio is varied for the sample and 2 bracketing standards.**
Cloud point

- Test Method ASTM D 2500
- Limits: No established limits
- Reported in ºC
- Sample cooled and examined visually until first cloud appears.
- Indicates the lowest temperature at which fuel is usable.
- Generally higher than Petrodiesel.
Carbon Residue

- Test Method ASTM D 4530
- Limits: 0.050 % mass maximum
- Sample heated at 500°C under inert atmosphere (N₂)
- Tests the tendency of the sample to form deposits under degradation
Acid Number

- Test Method ASTM D 664
- Limits: 0.8 mg KOH/g maximum
- pH sensitive electrode
- May also be determined using indicators
Free and Total Glycerin

- Test Method ASTM D 6584
- Limits: 0.020 % mass free glycerin
- 0.240 % mass total glycerin
- Gas Chromatography with FID detection
- Quantifies glycerine, mono-, di- and triglycerides
Phosphorous content

- Test Method ASTM D 4951
- Limits: 0.001 % mass maximum
- ICP – Determines 8 elements (Ba, B, Ca, Cu, Mg, P, S, Zn)
- Intended for additive packages
Distillation Temperature

- Test Method ASTM D 1160
- Limits: 360°C maximum when 90% recovered
- Bears relation with viscosity, vapor pressure, heating value, average molecular weight, etc
- Indication of suitability for desired application.