



**Valero Energy Corporation**

# **Octane Rating by the Dynamic Falling Level, Operation and Maintenance**

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## Valero-McKee Laboratory



- Dynamic Falling Level used for D2699, D2700 and D2885

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## Dynamic Falling Level

- Background
    - Bracketing method: 2 PRFs encompassing a range of 2.0 octane units (octane range of 80-100).
    - CRI at barometric pressure compensated octane number between that of PRFs.
    - Double pass:
      - Sample, PRF1, and PRF2
      - Sample, PRF2 and PRF1
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## Engine Preparation and Qualification

- Standard operating conditions.
  - Perform fit for use.
  - Check octane spread.
  - Establish standard KI and adjust to 50.
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## Preparation for Sample Testing

- Prepare reference fuels.
  - Drain carburetors.
  - Open carburetor valves and pour samples into bowls.
  - Allow float chamber to fill; fuel level visible in carburetor sight glass.
  - Adjust fuel level in gauge tube (~0.4 in).
  - Close carburetor valves.
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# Carburetor

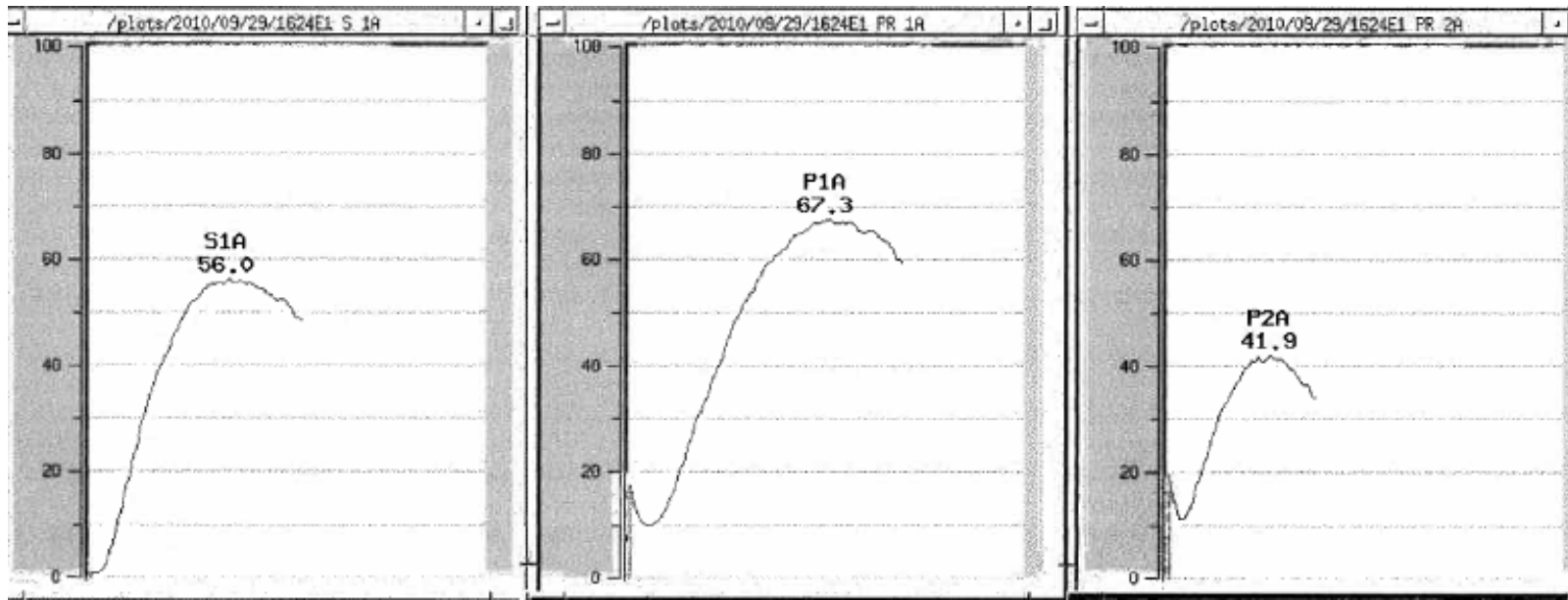


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## Rating Sequence

- Start pass 1: Sample, PRF1 and PRF2.
  - Refill float chambers.
  - Start pass 2: Sample, PRF2 and PRF1.
  - Check that the maximum K.I. occurs at a level between 0.7 to 1.7 in.
  - Switch to the next fuel in the sequence should be done after K.I. decreases at least 10 units from the maximum.
  - Enter octane of PRFs in software to calculate sample octane number.
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# Knock Intensity Curves





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## Method Requirements.

- The delta octane between the first and second pass must not exceed 0.3 octane. If the delta exceeds 0.3 octane, perform a third pass.
  - The average K. I. of the sample should be bracketed by the knock intensities of the reference fuels.
  - The average K. I. of the sample must fall within 45 and 55.
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## Testing Issues

- TSF or QC samples do not meet specification.
  - Temperature tuning does not bring TSF within specification
  - Knock intensities do not repeat very well.
  - Delta octane for sample passes not within 0.3 octane.
  - Erratic or noisy K. I. curve.
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## General Maintenance

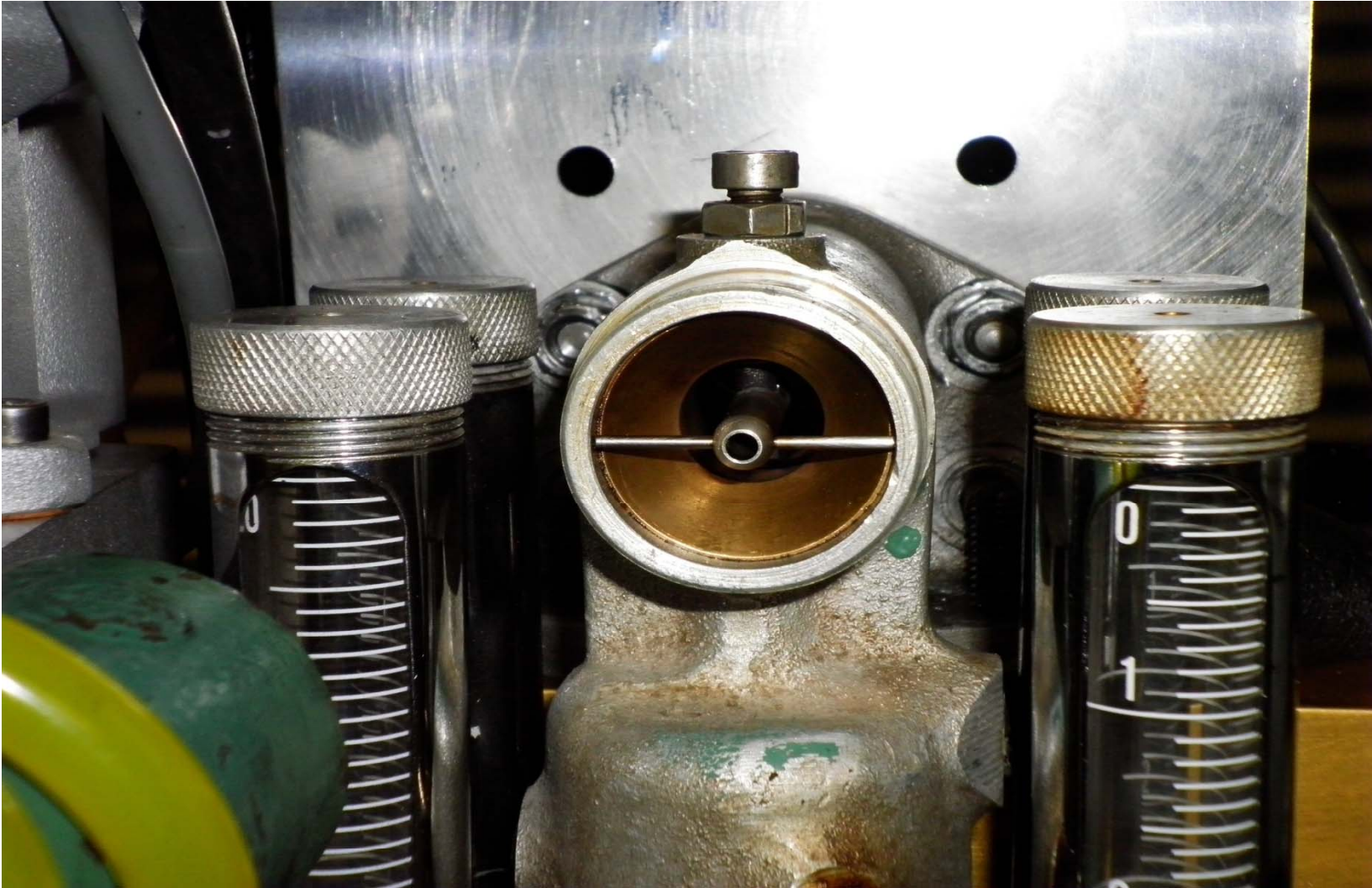
- Spark plug and wire.
  - Vacuum.
  - Oil pressure.
  - Condenser.
  - Standard operating conditions.
  - Ignition timing.
  - Cylinder height indexed properly.
  - RPMs.
  - Carbon blasting of cylinder, intake and exhaust.
  - Cylinder replacement.
  - Cam lift.
  - Carburetor and intake maintenance.
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## Carburetor Maintenance

- Clean carburetor parts with solvent to remove gum:
    - Venturi
    - Air bleed tube (insure copper washer is installed)
    - Vertical jet
    - Fuel jet
  
  - Clean and grease selector valve.
  
  - Clean carburetor bowl and components in float chamber.
  
  - Clean delivery valve on carburetor valve. Replace o-ring if necessary.
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Carburetor-Body



## Carburetor-Air Bleed Tube & Vertical Jet



## Carburetor-Float chamber



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## Carburetor-Delivery Valve





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## Summary

- Gum formation in carburetor can affect octane testing.
  - Fuel path: delivery valve, float chamber, jet, vertical jet, air bleed tube and into venturi.
  - Periodic cleaning can improve testing performance.
  - Perform carburetor maintenance at least on a monthly basis depending on use.
  - Perform other routine maintenance as recommended in *CFR Operation & Maintenance Manual*.
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