Herzog Cetane ID 510

Highest Precision in Determining Derived Cetane Number of Diesel Fuel Oils

- Significant savings on investment and maintenance
- Robust and fully automated technology for high ease of use
- Approved standard methods: ASTM D7668, EN 16715, IP 615 & GOST R 58440
- Excellent correlation to ASTM D613, ISO 5165 & IP 41
- Approved in diesel specifications: ASTM D975, D6751 and D7467, EN 590 & GOST R 52368
Accurate analysis of Derived Cetane Number (DCN) is crucial for diesel and biodiesel fuel blenders and refineries to maintain fuel consistency and quality. Existing technologies such as CFR Engine and CVCC methods do not meet current market requirements with their high investment and operational cost, difficult operation and poor system performance. Herzog’s Cetane ID 510 has a unique technology that is proven to provide the best precision in the market for determining DCN of all types of Diesel Fuels, Biodiesel, FAME, HVO, BTL, B100, Jet Fuel and GTL. It is a compact, easy to use, and fully automated analyzer, that offers excellent return on investment, and is in compliance with today’s safety requirements. The CID 510 patented method is approved as standard ASTM D7668, EN 16715, IP 615 and GOST R 58440. It’s also officially approved in diesel specifications: ASTM D975, D6751, D7467, EN 590 and GOST R52368.

**KEY ADVANTAGES**

**BEST PRECISION AND IN PERFECT CORRELATION TO ASTM D613**
- Proven performance from ASTM/EI Inter Laboratory Study - included 20 samples*:
- Precision (r & R) exceeds CFR Engine and other CVCC instruments
- Cross Method Reproducibility (Rxy) is much better than other CVCC alternatives
- Excellent correlation of the Cetane ID 510 to the mean value of the CFR Engine
- Calibration is based on the same Primary Reference Fuels than CFR Engine ASTM D613
- Long term calibration stability, no frequent calibration is required

**HIGH STANDARDS FOR SAFE OPERATION**
- Built-in fire monitoring and suppression system
- Fuel level sensor to avoid the injection system from running dry
- Over pressure protection for fuel injection system
- Over pressure protection for combustion chamber
- CVCC heaters guarded by thermal fuse
- Coolant flow detection to protect fuel injection system and chamber pressure sensor
- Automated diagnostic functions —Leak test for combustion chamber

**SIGNIFICANT SAVINGS ON INVESTMENT AND MAINTENANCE**
- Requires much less valuable space than CFR Engine (no separate room necessary)
- Automated calibration for long-term stability minimizes down-time risks
- No special user training required
- Lower investment cost than alternatives
- No cleaning of test chamber required: sootless combustion eliminates cleaning of Fuel Injection System, Combustion Chamber & Pressure Sensor

**ROBUST AND FULLY AUTOMATED TECHNOLOGY FOR HIGH EASE OF USE**
- Fully automated, one button operation allows minimal operator training
- Electronically controlled High Pressure Fuel Injection contributes to high accuracy
- Automatic Calibration with Primary Reference Fuels
- Automated diagnostic functions
- Flexible report formats for built-in printer and export to LIMS or Excel

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*13 distillate fuels, 2 blends of biodiesel in distillate fuel (B2-87 and B20), 4 B-100 biodiesels (Soy, Canola, Tallow, and a 30/70 blend of soy and rapeseed, respectively), and 1 aviation turbine fuel
The excellent precision and correlation of this technology allows refineries to run their process closer to the specification limit for the cetane number. In addition the costs associated with cetane improvers is reduced, which ultimately increases a refinery's profitability.

The initial investment cost is less than half than the competition. With the CID 510 the cost for reference fuels, and the operator and maintenance cost can be reduced by 80%.

“We have made great use of our CID 510 in fuel studies varying from blending response of fuels, to validation of surrogate fuel mixtures that are intended to mimic the ignition behavior of full boiling range fuels, to characterizing the ignition delay response to diluents in the air charge. The strength of the CID 510 is that through the keypad interface you can vary injection pressure, injection duration, chamber pressure and chamber temperature, in addition to running the ASTM D7668. That means that the CID 510, as received from PAC, can serve in routine testing of DCN, but also as a research instrument. We obtain very reliable and repeatable results on ignition delay, and have studied diesel fuels, gasolines, jet fuels and many model compound mixtures.”

André L. Boehman, Ph.D., P.E., FSAE
Professor of Mechanical Engineering
Department of Mechanical Engineering
University of Michigan

The fuel injection system is a modern high pressure common rail injection system which is electronically actuated offering ultimate precision. The common rail injector allows for much higher injection pressures (up to 1500 bar) yielding a completely volatilized test sample and therefore better, soot-free combustion than other Constant Volume Combustion Chamber (CVCC) instruments. The faster evaporation makes the pre-flame reactions observable.

The pre-flame clearly shows the effects of cetane improvers such as 2-ethylhexyl nitrate on the combustion process. The electronically controlled injector guarantees high precision in fuel injection volume making the results more repeatable.
**Specifications**

### Operation

<table>
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<tr>
<th>Measurement Principle</th>
<th>Constant Volume Combustion Chamber (CVCC) with electronically controlled high pressure injector and patented Multi Point ID measurement</th>
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<tr>
<td>Standard Test Methods</td>
<td>ASTM D7668, EN 16715, IP 615. Correlates to ASTM D613, ISO 5165, IP 41, GOST R 58440</td>
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<td>Fuel Specifications</td>
<td>ASTM D975, D7467, D6751, EN 590, GOST R 52368</td>
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<tr>
<td>Precision</td>
<td>Published precision of the CID 510 ASTM D7668 is much better than the CFR Engine and other CVCC instruments. [ r = 0.6, \quad R = 1.44 ] at 52CN</td>
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### User Interface

- LC Display with solvent-proof numeric keypad with alphanumeric capabilities

### Combustion Chamber

- 6 mm stainless steel

### Injector

- Modern high pressure common rail injector

### Sample Introduction

- Sample is directly poured into the sample vessel

### Sample Volume

- 60 to 160 ml for testing (depending on number of tests) approx. 100 ml more for cleaning if done with next sample

### Timings

- Test Duration: Approx. 30 minutes
- Warming up Time: Approx. 40 minutes

### Measuring Range

- 15 - 100 DCN

### Cleaning

- With next sample or appropriate solvent

### Unit Protection

- Built-in fire suppressing system with 2 fire sensors

### Software Functions


### Computer Interface

- 3 * USB for memory stick. RS232C serial port for LIMS and service. Ethernet RJ45 port for PC connection.

### Measurements

- Chamber Temperature: Approx. 600 °C (adjustable 535 °C to 650 °C)
- Pressure: 20 bar (adjustable 0 to 25 bar)
- Injection Time: 2500 µs (adjustable 400µs to 3000 µs)
- Pressure: 1000 bar (adjustable 600 to 1400bar)

### External Connections

- **Combustion Air**
  - Compressed Synthetic Air, 19.5% to 20.5% O2; balance is N2 <0.003 Vol.% hydrocarbons and <0.025 vol.% water;
  - Delivery Pressure 22 to 25 bar; Fitting 1/4A Swagelok for tube ID 6.4mm
- **Nitrogen**
  - Compressed Nitrogen, 99.9% purity; Delivery Pressure 8 to 10 bar; Fitting 1/4A Swagelok for tube ID 6.4mm
- **External Cooling System**
  - Liquid circulating bath: cooling power 260 W @ +50°C. Pump pressure 500mbar. Flow rate of 22 l/min
  - No-flow monitor locks the instrument if cooling system is off.

### Other Specifications

- **Electrical Connection**
  - Dual Voltage 115 or 230V with automatic selection. Power 1800W.
- **Operating Requirements**
  - Temperature 10 to 35 °C (50 to 95° F). Relative humidity up to 80% at 35 °C (95° F).
- **Size & Weight**
  - W x H x D: 60 x 66 x 66 cm (23.6x 26.0x 26.0 in.) 80 kg (177 lbs)
- **Options & Accessories**
  - External Cooler. Regulators for Nitrogen and Synthetic Air.

Continuing research and development may result in specifications or appearance changes at any time.