Highest Precision in Determining Derived Cetane Number of Diesel Fuel Oils

Cetane ID 510

PAC

www.paclp.com

herzog by PAC

World-class Analysis of Derived Cetane Number for Diesel Fuels

- Increases refinery profits with best precision and perfect correlation to ASTM D613
- Significant savings on investment and maintenance
- Robust and fully automated technology for high ease of use
- High standards for safe operation

Cetane ID 510

WORLD-CLASS ANALYSIS OF DERIVED CETANE NUMBER FOR DIESEL FUELS

Accurate analysis of Derived Cetane Number (DCN) is an important tool 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 present market requirements with their high investment and operational cost, difficult operation and poor system performance. Herzog by PAC pioneered the Cetane ID 510 instrument: 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, and GTL. It is a compact, easy to use, and fully automated analyzer, that offers excellent return on investment, and that is in compliance with today's safety requirements. The CID 510 is in perfect correlation to ASTM D613, and approved as standard ASTM D7668.

✓BEST PRECISION AND IN PERFECT CORRELATION TO ASTM D613

✓ HIGH STANDARDS FOR SAFE OPERATION

✓SIGNIFICANT SAVINGS ON INVESTMENT AND MAINTENANCE

✓ ROBUST AND FULLY AUTOMATED TECHNOLOGY FOR HIGH EASE OF USE

ROI STUDY

EXCELLENT PRECISION INCREASES REFINERS PROFITABILITY

The CID 510 is proven to offer the best performance in the market. 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.

Figure 1 shows the annual savings a refinery can achieve when producing diesel that is from .5 to 1 cetane number closer to specification. For a refinery producing 100,000 barrels per day diesel, being 1 cetane number closer to the specification would save a refinery around $800,000 USD.

CASESTUDY - Assumptions:
- Refinery capacity diesel production: 100.000 bpd
- Increase Diesel Fuel with 2 CN (from 50 to 52)
- Addition 250 ppm cetane improver (2-EHN) in Diesel
- Require 1200 ton 2-EHN per year ($1,400 per ton)
- Total Annual Cost: $1,680K

Refinery savings with Cetane ID510 excellent precision:
- Closer to specification by 0.5 CN to 1 CN
- Less give-away cetane improver
- Total Annual Savings: $400K - $800K

Figure 2 shows the instrument pay-back time and savings in the first year. When producing diesel 1 cetane number closer to spec, the return on investment is within 3 months.

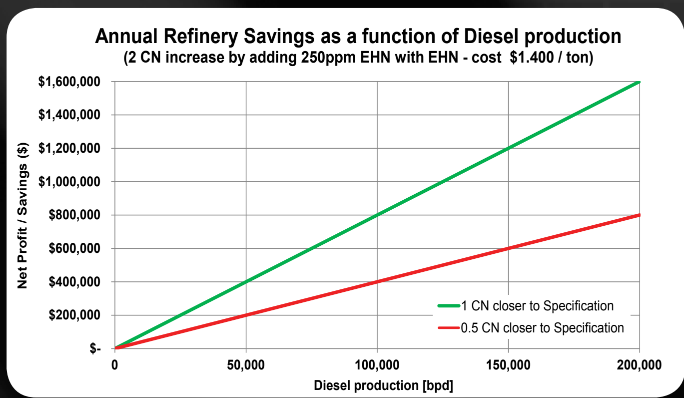


Figure 1. CID 510 leads to significant total anual savings

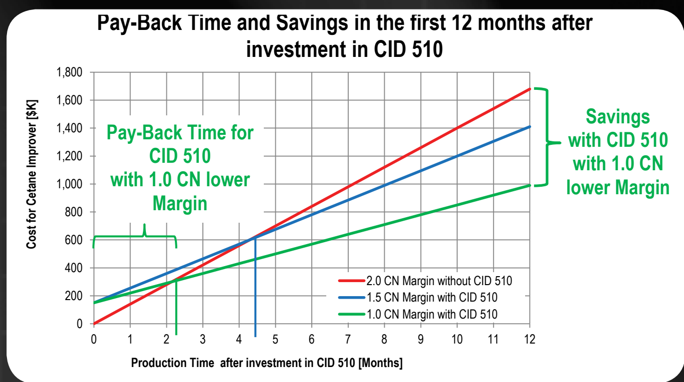


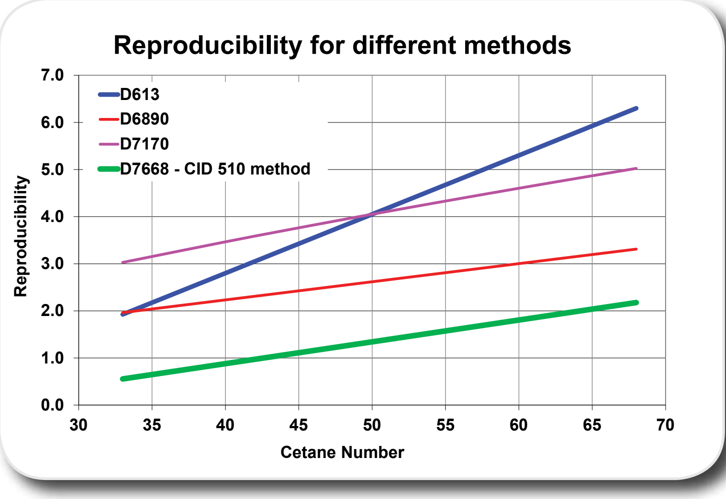
Figure 2. CID 510 payback time and savings

BEST PRECISION AND IN PERFECT CORRELATION TO ASTM D613

Proven performance from joint ASTM /EI Inter Laboratory Study - March’13 that included a set of 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 (PRF) than the CFR Engine ASTM D613
- Long term calibration stability, no frequent calibration is required like CVCC alternatives
- No Carry-Over Effect for sample measurements containing Cetane Improver

**13 distillate fuels, 2 blends of biodiesel in distillate fuel (B2-B7 and B20), 4 B-100 biodiesels (Soy, Canola, Tallow, and a 30/70 blend of soy and rapeseed, respectively), and 1 aviation turbine fuel*



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
- Minimal operation and maintenance cost
- Lower investment cost than alternative technologies
- No special user training 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 → Heaters will be shut down if coolant is not flowing
- Automated diagnostic functions → Leak test for combustion chamber

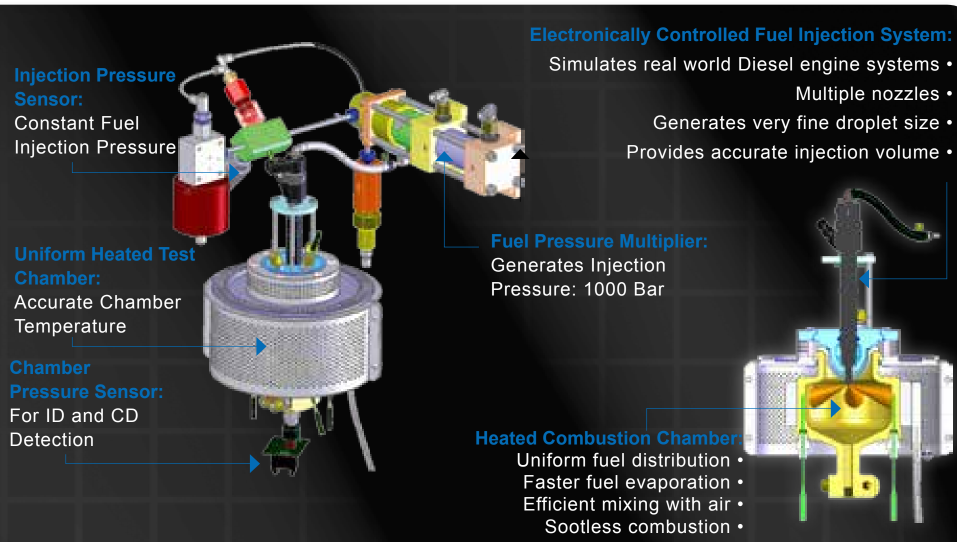
ROBUST AND FULLY AUTOMATED TECHNOLOGY FOR HIGH EASE OF USE

- Fully automated, easy to use, one button operation allows minimal operator training
- Electronically controlled High Pressure Fuel Injection Design contributes to high accuracy
- No cleaning of the test chamber required: soot less combustion eliminates cleaning of Fuel Injection System, Combustion Chamber and Pressure Sensor
- Automatic Calibration with Primary Reference Fuels
- Automated diagnostic functions
- Flexible report formats for built-in printer and export to LIMS or Excel

Unique and Advanced CID 510 Technology for Best Performance

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 èffects of cetane improvers such as 2-ethylhyxylnitrate on the combustion process. Finally, the electronically controlled injector guarantees high precision in fuel injection volume making the results more repeatable.



solidpartners provensolutions

U.S.A.
PAC, LP | 8824 Fallbrook Drive | Houston, Texas 77064
T: +1 800.444.TEST | O: +1 281.940.1803 | F: +1 281.580.0719
sales.usa@paclp.com | service.usa@paclp.com

FRANCE
BP 70285 | Verson | 14653 CARPIQUET Cedex
T: +33 231 264 300 | F: +33 321 266 293
sales.france@paclp.com | service.france@paclp.com

GERMANY
Badstrasse 3-5 | P.O.Box 1241 | D-97912 Lauda-Königshofen,
T: +49 9343 6400 | F: +49 9343 640 101
sales.germany@paclp.com| service.germany@paclp.com

SINGAPORE
61 Science Park Road | #03-09/10 The Galen
Singapore Science Park III | Singapore 117525
T: +65 6412 0890 | F: +65 6412 0899
sales.singapore@paclp.com | service.singapore@paclp.com

NETHERLANDS
P.O.Box 10.054 | 3004 AB Rotterdam
Innsbruckweg 35 | 3047 AG Rotterdam
T: +31 10 462 4811 | F: +31 10 462 6330
sales.netherlands@paclp.com | service.netherlands@paclp.com

RUSSIA
Shabolovka Street | 34, Bldg. 2 | 115419 Moscow
T: +7 495 617 10 86 | F: +7 495 913 97 65
sales.russia@paclp.com | service.russia@paclp.com

CHINA
Room 1003, Sunjoy Mansion | No. 6 RiTan Rd.
Chao Yang District | Beijing 100020
T: +86 10 650 72236 | F: +86 10 650 72454
sales.china@paclp.com | service.china@paclp.com

INDIA
1508 | Dev Corpora | Pokhran Road No.1
Eastern Express Highway | Thane (W) - 400 601
T : +91-22-6700 4848 | F: +91-22-4228 4950
sales.india@paclp.com | service.india@paclp.com

MIDDLE EAST
A1 Quds Street, A1 Tawar road | LIU#H13 Dubai Airport Freezone
Near Dubai Airport (terminal 2) | P.O.Box #54781 | Dubai, UAE
T: +971 04 2947 995 | F: +971 04 2395 465
sales.middleeast@paclp.com | service.middleeast@paclp.com

SOUTH KOREA
#621 World Vision Building | 24-2, Youido-dong
Seoul 150-010
T: +82 2785 3900 | F: +82 2785 3977
sales.southkorea@paclp.com | service.southkorea@paclp.com

THAILAND
26th Floor, M. Thai Tower | All Seasons Place
87 Wireless Road | Lumpini, Phatumwan | Bangkok 10330
T: +66 2627 9410 | F: +662627 9401
sales.thailand@paclp.com | service.thailand@paclp.com

PAC Authorized Representatives are also located in most countries worldwide. For more information visit www.paclp.com

SPECIFICATIONS

Operation	
Combustion Chamber	Stainless Steel
Sample Introduction	Poured into sample vessel, then automatically pressurized by externally connected nitrogen supply
Sample Volume	60-160 ml
Test Duration	30 minutes
Unit Warm Up	40 minutes
Range for Measured Derived Cetane Number	15 - 100 DCN
Cleansing	Using the following sample
Measurement Reports	
Operators	Up to 10 names of operators
Verification of test Conditions	Set-point and measurement conditions values stored in the instrument memory
Diagnostics and Calibration	Automatic Calibration Sequence. Error message and instrument test functions for easy unit diagnostics
Documentation	Detailed report of test results with the date and time of the measurement, database for storing results of the last 100 tests, result printed on built-in printer
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	No-flow monitor locks the instrument if cooling system is not on.
Other Specifications	
Electrical Connection	115 or 230V, 50/60Hz with automatic switching over, input power of max. 3kW
Operating Requirements	Conditions Operating temperature: 10° to 35°C, recommended 15° to 25°C 80% relative humidity at 35°C
Size	WxHxD: 600mm x 660mm x 660mm (23.6'x 26.0"x 26.0")
Weight	Weight 80kg (177lbs)

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

herzog by PAC

HERZOG BY PAC

Herzog, originally established in 1937, is a long-established comprehensive line of laboratory instruments for testing distillation, flash point, vapor pressure, bitumen testing, cold flow, properties, viscosity and other physical properties of materials.

www.paclp.com

ISL · ac · Alcor · herzog · PetroSpec · PSPI · ANTEK · Cambridge Viscosity

USA • FRANCE • GERMANY • NETHERLANDS • UAE • RUSSIA • CHINA • SINGAPORE • SOUTH KOREA • THAILAND • INDIA