AFIDA - Indicated Cetane Number

Advanced Fuel Ignition Delay Analyser

ASTM D8183; IP 617; EN 17155

Direct correlation with ASTM D613; EN ISO 5165; DIN 51773

Approved AFIDA test methods

- ASTM D8183

Standard test method for determination of Indicated Cetane Number (ICN) of diesel fuel oils using a constant volume combustion chamber - reference fuels calibration method*

- IP 617

Determination of indicated cetane number (ICN) of fuels using a constant volume combustion chamber - primary reference fuels calibration (PRFC) method

- EN 17155

Liquid petroleum products - determination of Indicated Cetane Number (ICN) of middle distillate fuels - primary reference fuels calibration using a constant volume combustion chamber*

Testing fuel to ASTM D975

ASTM D975 (5.1.10) states:

*5.1.10 Cetane Number - Test Method D613 is used for all fuel grades in Table 1. Test Methods D6890, D7170, D7668 (see Note 4), or **D8183** (see Note 5) may be used for all No. 1-D and No. 2-D grades with the DCN or **ICN (D8183)** result being compared to the cetane number specification requirement of 40. Test Method D613 shall be the referee method.*

Testing fuel to EN 590

EN 590 diesel fuel specification already specifies CVCC apparatus for cetane determination.
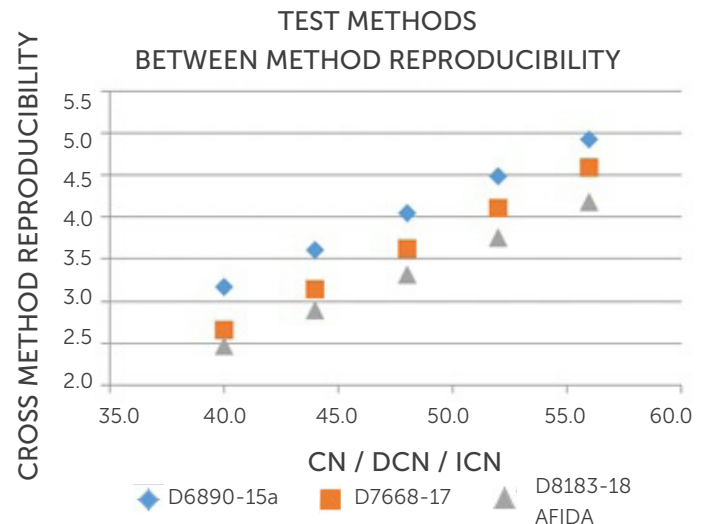
EN 590 (5.7.4) states:

5.7.4 In cases of dispute concerning cetane number, EN ISO 5165 shall be used. For the determination of cetane number alternative methods to those indicated in Table 1 and Table 3 may be used, provided that these methods originate from a recognised methods series, and have a valid precision statement, derived in accordance with EN ISO 4259, which demonstrates precision at least equal to that of the referenced method. The test result, when using an alternative method, shall also have a demonstrable relationship to the result obtained when using the referenced method.

AFIDA - best cross method Reproducibility

- Closest result to the reference test - D613
- Best cross method Reproducibility of all the currently published test methods

TEST METHODS BETWEEN METHOD REPRODUCIBILITY

Legend: D6890-15a, D7668-17, D8183-18 AFIDA

AFIDA fully meets the criteria specified in EN 590 section 5.7.4

- AFIDA has three recognised and approved test methods, IP 617, ASTM D8183, D975 and EN 17155
- The precision statement in the method is compliant with EN ISO 4259 and ASTM D6300
- The Reproducibility (precision) of the AFIDA test method falls within that of the referenced method
- Demonstrable relationship = the degree of agreement with EN ISO 5165 and ASTM D613 was assessed using ASTM D6708. This determined that over the published precision range for D613 the AFIDA method has NO BIAS

AFIDA - twice the precision of the engine reference test - D613

New generation technology gives precision that is an order of magnitude better than the reference test method - D613.

TEST METHOD REPRODUCIBILITY

Legend: D8183-18 AFIDA, D613-17b, D6890-15a, D7668-17
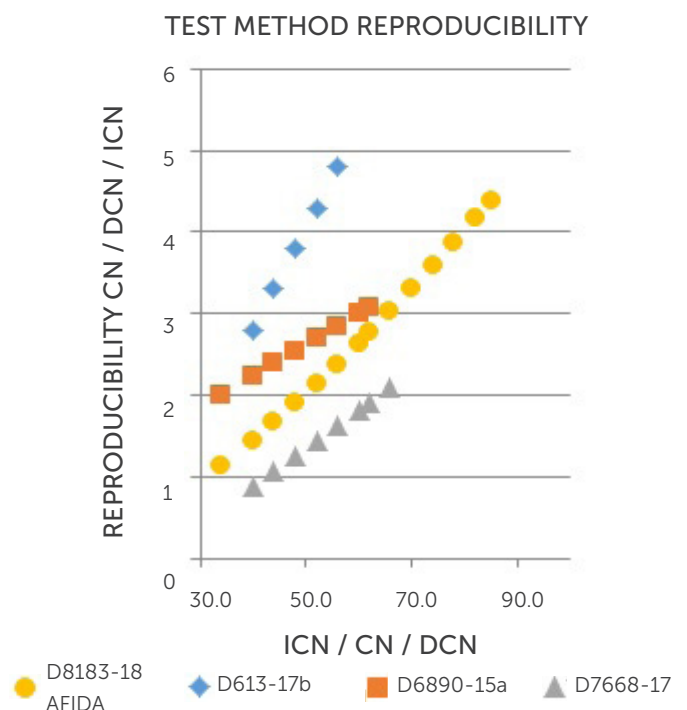
AFIDA - published precision over the widest cetane range

The AFIDA test method precision covers a range of 35 to 85 numbers - this is the widest range of ALL the published test methods.

- D8183 AFIDA = range of 35 ICN to 85 ICN with precision covering the full range - THIS IS THE WIDEST PRECISION RANGE AVAILABLE

Other methods:

- D7668 = 30 DCN to 70 DCN, however published precision only for 40 DCN to 65 DCN (see table 2 of D7668) - THE SMALLEST PRECISION RANGE OF ALL THE TEST METHODS
- D6890 = 33 DCN to 64 DCN with precision covering the full range

Note: D613's published precision is 40-56 CN so any comparison is only possible across this cetane range.

AFIDA - ICN - Indicated Cetane Number

The ICN number is the measurement parameter used to identify AFIDA results by test method ASTM D8183; D975; IP 617 and EN 17155.

The AFIDA test methods use primary reference fuels (PRF's) to generate a curve of ignition delay against the expected Cetane number of the PRF blends. From this the ICN number can be determined directly by AFIDA.

The relationship between the ICN number and CN number as derived from ASTM D613 has been proven using ASTM D6708 analysis which concluded that no bias correction was required to improve the statistical agreement between an ICN test result and a CN test result obtained using ASTM D613.

AFIDA - calibrated using Primary Reference Fuels (PRF)

AFIDA utilises the same Primary Reference Fuels which defined the original cetane number scale as ASTM D613. The PRF blends used in the AFIDA method provide a calibrated indicated cetane number measurement over the range 30 to 85 ICN.

AFIDA - the many other operational advantages

- Fully automated measurement, minimising technician time
- Integral 36 place carousel and auto sampler
- Small sample volumes (approx 40 ml/ analysis including flushing)
- Short analysis time of approximately 20 minutes per sample
- Safe operation - integral safety monitoring functions
- Low running costs, single gas supply for combustion air
- Lowest cost per test
- No specialist gas or air required
- More consistent results versus the engine helps to improve refinery yields

Further information about AFIDA, SA6000-0 can be found at

www.stanhope-seta.co.uk/5061/AFIDA

or by scanning the QR code