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New revisions to the Hydrogen Sulfide test method (IP 570) referenced in ISO 8217

An updated version of the Energy Institute test method IP 570 is due to be published by the end of November 2014 and will appear in the 2015 method books. The revisions now referenced as IP 570/14a are a result of industry feedback and research at Stanhope-Seta, they demonstrate the continued improvement of this widely adopted method.

IP 570 covers the testing of hydrogen sulfide (H_2S) content of fuel oils including marine residual fuels, distillates and petroleum blend stocks in the liquid phase. The method details two procedures (A and B) and the relevant apparatus.

The main changes cover three aspects; samples that contain FAME (Fatty Acid Methyl Ester or biofuel), a new sample test vessel design and an update to liquid verification methods.

1. FAME inclusion

Samples containing FAME were subjected to a number of tests at the manufacturer then the results were presented at the Energy Institute. The data obtained from theses samples indicated that the presence of FAME had no effect on the results. In IP 570/14a the scope has been expanded, via Note 4, to allow samples that contain FAME to be tested.

2. New sample test vessel design

Following a detailed study and robustness trial a new test vessel has been approved for use in the method. The new test vessel, pictured opposite simplifies the sample introduction. The inlet and outlet connections have been enhanced to make connections to the instrument quick and easy, and prevent incorrect orientation. Upgrades to accommodate this new system are easy and can be achieved in the field via an upgrade kit available from Stanhope-Seta (part number SA4022-0)

3. Verification of the instrument

Arguably the most important change to the method is the inclusion of a mandated verification process within section 9.5, 'Validation of apparatus performance'. This section has been revised to mandate the verification of the instrument via a solution of H_2S every three months or whenever maintenance (such as detector replacement) is carried out. The instrument is capable of measuring to sub-ppm levels and therefore it is essential that each component is working correctly, the best way to achieve this is to run liquid samples with known H_2S content.

Creating stable samples containing H_2S has proved to be a difficult exercise in the past, however Stanhope-Seta has developed a unique solution that has been used successfully for the last 18 months as part of a proficiency test scheme (PTS). A research report published in 2013 is available from the Energy Institute under the heading 'Development of Stabilised Liquid Phase Hydrogen Sulfide Verification Solutions'.

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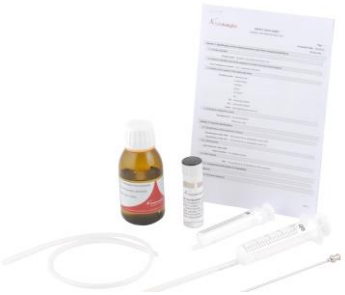
H_2S IP 570 Proficiency Test Scheme (PTS) and stabilised verification solutions

The PTS, run by SetaAnalytics, was launched in early 2013 to allow participants to measure the performance of their instrument and compare it to others participating in the scheme. The scheme is run on a subscription basis with either monthly or quarterly options available. The quarterly scheme enables laboratories to instantly comply with the new verification requirements of IP 570/14a, as well as requirements in ISO 17025 (General requirements for the competence of testing and calibration laboratories) and ultimately ISO 8217, the marine fuel specification.



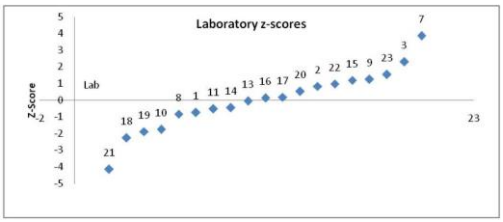
Sample H_2S Test Pack

The PTS offered by SetaAnalytics provides each subscriber with a stabilised solution which, when introduced to the test vessel, mimics the performance of real world fuels and releases a known amount of H_2S. The amount of H_2S released will depend upon each batch produced and is varied each month to ensure the instruments are working at a range of H_2S detection levels. Each solution provides enough for three consecutive tests. Once results have been obtained they can be keyed into an online reporting tool. On entry of the data the user is given an immediate indication of performance for this safety critical parameter. Any non-compliance is immediately identified and support offered on remedial action. Further samples are available to members of the PTS to assist fault diagnosis and confirm compliance with verification requirements of the test method. The data is collated and at the end of each PTS cycle the customer is provided with a full set of statistics allowing an immediate evaluation of the performance of their instrument. At the end of each PTS year all customers that have participated will receive an annual report showing their performance throughout the 12 month period.

Summary of the 2013/14 PTS

The 2013/14 IP 570 Proficiency Testing Scheme was highly successful. In its first year of operation 473 tests on 12 H_2S verification sample batches were conducted by 43 laboratories in 26 countries on a monthly basis. The Reference Values for the PT Scheme samples correlated very well with the Participants Mean, with R^2 of 0.97, a gradient close to 1 and an offset close to 0. This demonstrated the successful manufacture, worldwide delivery and measurement of the stabilised samples containing known quantities of H_2S.

93% of laboratories achieved an average Z-Score below 2 which showed that over a prolonged period both the instruments and samples maintained a satisfactory performance and, in terms of the method, the results by the majority were well within the method precision. With such a significant number of laboratories participating inevitably there were some results that fell outside the acceptable band and for these customers a root cause analysis on the reason was performed. In every case the cause was identified and corrected, a new sample was then supplied and the results obtained met the method precision. The most significant root causes were found to be the use of expired calibration gas bottles, contaminated filters and pipework, and in some cases incorrect procedures.



Example of Laboratory z-scores

Summary

IP 570/14a contains 3 main updates and is to be released in November 2014, it will be published in the Energy Institute 2015 method books. It represents a further development of this widely accepted test method and has been developed in conjunction with the industry and positively welcomed.

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Further information & notes:

1. IP 570/14a can be downloaded from the Energy Institute Website.

2. Details of the SetaAnalytics PTS, including sample reports, can be downloaded from www.seta-analytics.com/ip-570-proficiency-testing-scheme.htm

3. The PTS Test Pack is packaged using the latest Biodegradable material based around mycelium - the root-like structure under a mushroom. The new, bio-compostable material, known as Restore™, is grown into custom shapes that exactly fit the components being packed. Once used, the waste packaging is 100% compostable and presents no environmental impact.
http://www.packagingeurope.com/Packaging-Europe-News/60424/MushroomBased-Packaging-Becomes-a-Reality.html