

WLTP Additional Gases Working Group

HORIBA Comments On The Proposed Methods For the Measurement Of NH3 and NO2

Introduction

HORIBA has reviewed the methods proposed for the measurement of NH3 and NO2 in the exhaust of light duty passenger vehicles.
ref WLTP-DTP-02-07e NH3 Proposal.PDF and WLTP-DTP-02-06e NO2 Proposal.PDF

Please refer to the comments below

Ref : WLTP-DTP-02-07e for NH3 measurement

Ref 3.0 Measurement Principle

HORIBA requests the use of Mid Infra-Red Laser and Dual CLD method in addition to the FTIR and Laser Diode Spectrometer mentioned within the proposal.

The request for the use of the Mid Infra-Red Laser is based on the availability of this new technique which is suitable for the measurement of NH3 in both "in situ" and extractive configurations.
The request for the use of the dual CLD method is based in its existing acceptance in ISO-8178.
In both cases, the use of these additional analytical methods is conditional on their meeting the accuracy, speed of response and general performance requirements described in the proposal.,

Ref : OICA Presentation - Measurement Principle

HORIBA propose that the temperature of the sample piping and entire sampling system including filter should be > 110 deg C to prevent condensation and consequent NH3 loss. The entire length of the piping from the sample point in the exhaust pipe to the analyzer must be heated with no cold spots.

Ref : Effects leading to measurement errors

For an extractive type measurement, the filter material used to remove contamination from the exhaust gas sample must be made from a material that does not cause loss of NH3.

Ref : FTIR Analyzer

Cross interference

The spectral resolution of the laser shall be within 0.5 cm⁻¹ in order to minimize cross interference from other gases present in the exhaust gas

HORIBA propose that an additional requirement is added to limit the potential interference as the amount of interference is not just a function of wavelength resolution.

HORIBA propose that the analyzer response should not exceed +/- 2 ppm at the maximum CO2 and H2O concentration expected during the vehicle test.

Ref : Analyser Specification

Accuracy

The accuracy, defined as the deviation of the analyzer reading from the reference value, shall not exceed ± 3 per cent of the reading or ± 2 ppm, whichever is larger.

NH3 calibration gas

A gas mixture with the following chemical composition shall be available. NH3 and purified nitrogen. The true concentration of the calibration gas shall be within ± 2 percent of the nominal value, and shall be traceable to national or international standards. The concentration of NH3 shall be given on a volume basis (volume percent or volume ppm). The expiration date of the calibration gases stated by the manufacturer shall be recorded.

HORIBA has a concern with the above accuracy limit validation due to what we believe is the general lack of availability of calibration gas mixtures with an accuracy better than +/- 3 % of value.

HORIBA recommends that the analyzer accuracy specification should be modified to allow for the limited accuracy of the calibration gases.

Ref : WLTP-DTP-02-06 Draft NO2 Measurement Procedure

Ref 3.0 Measurement Principle

HORIBA requests the use of the Mid IR Laser in addition to the CLD and NDUV-RAS specified in the proposal. The Mid IR Laser can be used for the measurement of NO2 concentration directly from the diluted exhaust stream as proposed as the default method.

Ref : Text based on Reg. 83

Sampling System Requirements

- The sampling system response time (from the probe to the analyser inlet) shall be no more than [TBD] seconds.

HORIBA suggest a system response time < 10 seconds and a rise time (T_{10} to T_{90}) < 2.5 secs. These are consistent with the parameters specified in the existing GTRs for HDD and NRMM.

- No gas drying device shall be used before the analyzer.

HORIBA propose that this should not be a requirement as NO is not significantly soluble in water. US regulations recommend the use of the cooler (after the NOx converter), with a dew point less than 7 deg C, to minimize the reduction of NOx measurement due to water interference.