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SCHEDULE 3

(Annex III to Directive 97/68/EC)
TEST PROCEDURE

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Appendix 2

Water quench check

1.9.2.2. This check applies to wet gas concentration measurements only. Calculation of water quench must consider dilution of the NO span gas with water vapour and scaling of water vapour concentration of the mixture to that expected during testing. A NO span gas having a concentration of 80 to 100% of full scale to the normal operating range shall be passed through the (H)CLD and the NO value recorded as D. The NO gas shall be bubbled through water at room temperature and passed through the (H)CLD and the NO value recorded as C. The analyser's absolute operating pressure and the water temperature shall be determined and recorded as E and F, respectively. The mixture's saturation vapour pressure that corresponds to the bubbler water temperature (F) shall be determined and recorded as G. The water vapour concentration (in %) of the mixture shall be calculated as follows:

$$H = 100 \times \left(\frac{G}{E} \right)$$

and recorded as H. The expected diluted NO span gas (in water vapour) concentration shall be calculated as follows:

$$De = D \times \left(1 - \frac{H}{100} \right)$$

and recorded as De. For diesel exhaust, the maximum exhaust water vapour concentration (in %) expected during testing shall be estimated, under the assumption of a fuel atom H/C ratio of 1.8 to 1, from the undiluted CO₂ span gas concentration (A, as measured in section 1.9.2.1) as follows:

$$Hm = 0.9 \times A$$

and recorded as Hm.

The water quench shall be calculated as follows:

$$\% \text{ H}_2\text{O Quench} = 100 \times \left(\frac{De - C}{De} \right) \times \left(\frac{Hm}{H} \right)$$

and must not be greater than 3% of full scale

De:	expected diluted NO concentration (ppm)
C:	diluted NO concentration (ppm)
Hm:	maximum water vapour concentration (%)
H:	actual water vapour concentration (%)

Note: It is important that the NO span gas contains minimal NO₂ concentration for this check, since absorption of NO₂ in water has not been accounted for in the quench calculations.