

PMP PROGRAMME

The text reproduced below has already been submitted by OICA to the Chairman of the PMP Informal Group in response to a request made during an Informal Group meeting. As no further Informal Group meeting is scheduled before the 55th session of GRPE, it is submitted to GRPE for consideration under agenda item 3.

OICA Proposal for VPR validation based on fr corresponding gas dilution factors

VPR operation quality check (validation) using gas dilution

The VPR operation quality check should be performed under typical measurements conditions (eg. fr = 150, fr = 1500) at the instrument manufacturer's recommended operation temperatures, measuring the corresponding gas dilution factors.

If certified gas is being used (eg.: CO or NO, c = 100.000 ppm) for the diluter calibration then upstream measurement of the raw gas concentration is not required. The only measurement that needs to be made is the gas concentration downstream of the VPR.

Dilution Factor Determination Procedure:

Prepare the particle number system (VPR) for normal use.

- Where appropriate clean any dilution mechanisms within the VPR as advised by the manufacturer .
- Perform any routine maintenance of the VPR as advised by the manufacturer (eg replacement of filters, tubing etc).
- Prepare the appropriate certified gas analyser for use, following manufacturers guidance for stabilisation/warm up period.
- Zero and span the analysers according to the manufacturers instructions.
- Connect the gas analyser to the VPR outlet (PNC position), ensuring that flow rates in the VPR meet the manufacturer's specifications.

Supply the VPR with gas ensuring that the system does not become over pressurised. This can easily be done by using a flow meter at the inlet of the VPR with a flow splitter to provide gas at ambient pressure to the first diluter, allowing excess gas to be vented to an exhaust or using a bag evacuated and then filled with certified gas.

- Select the first dilution setting for calibration and begin recording data from the analyser. Allow the downstream measurement to stabilise and record data for at least 2 minutes. Once a stable measurement has been recorded select the next dilution and allow to stabilise. Repeat this step for the 2nd dilution setting at least .
- If the VPR comprises more than one diluter, they must be measured as a system under the instrument manufacturer's recommended operation conditions.

Once calibration of the dilution factors is complete the analyser zero and span should be repeated to ensure analyser performance has not drifted during the procedure. The calibration is considered acceptable if the difference between the two zero and span analyses is less than 2 percent.

Calculation of the dilution factors:

To assess the performance of the diluters, dilution factors should be calculated from the average downstream gas concentration measurements.

$$\text{Dilution Factor} = \frac{\text{Certified gas concentration (ppm)}}{\text{Average downstream gas concentration (ppm)}}$$

The gas dilution factor calculation should be performed for both dilution conditions measured.

The maximum permissible deviation between the gas dilution factors derived from the primary calibration and the quantity measured during the VPR operation quality check should be within ± 5 per cent.

Required equipment (specific gas DF)	Purpose
1 calibrated gas analyser (recommended CO or NOx analyser with converter)	Calibration of the diluters
1 bottle of certified gas (recommended \geq 50.000 ppm CO or NO, quality better than 2%)	Calibration of the diluters
1 calibrated flow meter/rotameter	To indicate inlet flow of gas supply to diluter to ensure ambient pressure at diluter inlet.

For a volatile particle remover that incorporates temperature monitoring alarms and in this way indicates that there is no change in the particle loss characteristics, the determination of dilution factors performed more frequently (eg. every 3 month, deviation less than 5 % compared to primary calibration) prolongs the reduction factor validation to a 24 month interval.
