

## Exemplary chapter about the Emission Testing acc. MEPC.340(77) for an Onboard Monitoring Manual (OMM) of an Exhaust Gas Cleaning System (EGCS).

Below is an example of what the chapter regarding exhaust gas analyzer in the OMM of an ECGS could be, when using the MES 1002 by Danfoss IXA. The example is based on Appendix 5 of MEPC.340(77).

### Exhaust gas

SO <sub>2</sub> / CO <sub>2</sub> measurement		
Analyzer	SO <sub>2</sub>	CO <sub>2</sub>
Analyzer manufacturer	Danfoss IXA	
Model reference	MES 1002 – SO <sub>2</sub> /CO <sub>2</sub> CEMS (Product no. 100500)	
Onboard identification reference	<insert MES 1002 Serial number> (Example: ES2-2332-0012)	
Arrangement	In situ	
Probe location	Analyzer unit is mounted directly on the exhaust stack after (downstream of) the EGCS.	
Probe description	<p>The MES 1002 is a stand-alone analyzer unit consisting of a probe, which is mechanically fixated to a backend. The complete analyzer unit is mounted directly on the exhaust stack via a standard flange. The probe is situated inside the stack and has an opening, where exhaust gas passes freely through the measurement volume.</p> <p>With fixed intervals (at least every 15 min), the MES 1002 performs zero-point reference measurements. The probe has a mechanical valve which closes periodically and blocks the opening to restrict the flow of exhaust gas through the measurement volume.</p> <p>The backend sits on the outside of the exhaust stack and holds all external connections: Power, Compressed air, and data communication.</p>	
Technical user documentation	<ul style="list-style-type: none"> <li>• MES 1002 Data Sheet</li> <li>• MES 1002 Installation and Operation Guide</li> <li>• MES 1002 Service and Maintenance Guide</li> <li>• Installation Drawing, MES 1002</li> <li>• MES 1002 Accessories and Spare Parts Catalogue</li> </ul>	
Maximum measurement range	0 – 200 ppm	0 – 15 %
Used measurement range(s)	0 – 200 ppm	0 – 15 %



Zero gas specification	<p>Pure N<sub>2</sub> is used for full gas calibration at manufacturer.</p> <p>Air from compressed air supply is used for the periodic zero-point reference measurements (at least every 15 min).</p>	
Span gas specification	<p>Nominal SO<sub>2</sub> conc: 63 ppm (mixed with N<sub>2</sub>)</p>	<p>Nominal CO<sub>2</sub> conc: 4.7 % (mixed with N<sub>2</sub>)</p>
Additional information on span gas concentrations	<p>Note that the span gas concentrations (for gas calibration) differ from the analyzer’s operational measurement range, because a different sampling technique is used during calibration.</p> <p>During span gas calibration, the entire probe is filled with span gas making the effective measurement pathlength 3.19 times larger than during normal operation. Therefore, the span gas concentrations must be 3.19 times smaller to have equivalent absorbance levels.</p> <p>The applied span gas concentrations of 63 ppm for SO<sub>2</sub> and 4.7 % for CO<sub>2</sub> is equivalent to 100% of full scale:</p> <ul style="list-style-type: none"> <li>• 63 ppm x 3.19 = 200 ppm for SO<sub>2</sub></li> <li>• 4.7 % x 3.19 = 15 % for CO<sub>2</sub></li> </ul>	
<p>Details of: Service, maintenance, calibration schedules</p>	<p>Maintenance schedule and tasks:</p> <p>Maintenance monthly:</p> <ul style="list-style-type: none"> <li>• Visual inspection of installation (flanges, bolts etc.)</li> <li>• Check for active alarms or warnings.</li> <li>• Inspect air filter and replace filter elements as needed.</li> </ul> <p>Maintenance quarterly:</p> <ul style="list-style-type: none"> <li>• Visual inspection of probe.</li> <li>• Cleaning of probe and optics.</li> <li>• Check for software updates.</li> </ul> <p>Maintenance when notified:</p> <ul style="list-style-type: none"> <li>• Replace light sources when notified by alarm (gas calibration not needed after light source replacements).</li> </ul> <p>Service biannually:</p> <ul style="list-style-type: none"> <li>• The MES 1002 calibration is valid for 24 months.</li> <li>• The MES 1002 shall be replaced every 24 months with a newly serviced and calibrated unit.</li> </ul> <p>The maintenance schedule and tasks are listed and explained in detail in the MES 1002 Service and Maintenance Guide.</p>	
Additional information	<p>The frequent zero-point reference measurements ensure that calibration does not drift over time when complying with the above maintenance schedule. Any changes to the analyzer</p>	



	<p>operation that may affect the performance and/or calibration will raise an associated alarm.</p> <p>A replacement scheme with a replacement interval of 24 months will be applied for the MES 1002 analyzer. After 24 months of operation, a newly calibrated MES 1002 will be installed, and the previous unit will be returned to the manufacturer. Upon return, the existing calibration will be checked, before the analyzer undergoes full service and re-calibration.</p> <p>In accordance with statement stamped by DNV, checking of gas calibration with zero and span gas is not needed within the 24-month period.</p>
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