

Verification emissions measurement

World-class expertise mapping your emissions

The marine industry is facing a number of challenges related to emissions standards and fuel regulations, pressures to reduce CO₂ emissions, and IMO and local regulations that affect international commercial shipping. Regulatory restrictions on air pollution, greenhouse gas emissions (GHG) and ecosystem disruptions will enforce significant compliance costs on shipping companies. Environmental compliance thus becomes central to the financial and operating priorities of these companies.

As a specific example, IMO Tier III legislation will require reductions in regulatory NO_x of >70% compared to Tier 2, with the limit value in the region of 2g/kWh. In most cases this will require efficient exhaust NO_x control. The technology of choice for marine applications is Selective Catalytic Reduction (SCR), which has recently seen considerable technological advances through implementation in on-road applications for light- and heavy-duty vehicles. Many challenges exist in the specification, design, control and implementation of SCR technology for marine applications. Ricardo has considerable experience of delivering SCR technology solutions in many engine sectors and has transferred this knowledge to the marine industry.



In-use exhaust emissions measurements

Ricardo has been active in aftertreatment and chemical analysis for over forty years, bringing together world-class knowledge and expertise in global legislation, emissions measurement, mobile source emissions and control technologies. A global community of specialist engineers provide designs for full engines or individual components. Ricardo performs in-service measurements in accordance with ISO 8178 from engines in their normal operating regimes, including the measurement of NO_x, NO₂, CO, CO₂ and total hydrocarbons (THC). Methane is also possible upon specific request.

Measurement equipment

Our Portable Emissions Measurement Systems (PEMS) provide real-time emissions data. These systems are already being used for regulatory purposes on light-duty and heavy duty vehicles in Europe, but also for insights into real emissions in the urban environment and proving tests for retrofit aftertreatment systems under representative operating conditions. Ricardo PEMS measurements are performed according to a strict methodology including calibration checks of the equipment before each run. The mobility and straightforward implementation of PEMS equipment allows clients to study real-time measurements of operating assets following their normal duty cycles, together with accessing Ricardo provision of high-value, high expertise measurement and analysis capabilities. Measurements are possible at test facilities or in the field. This approach helps our customers to understand, at a detailed level, the characteristics and origins of emissions. This high quality, high resolution data enables transport fleet operators and local authorities to make informed judgements.

Technical specifications

PEMS instruments are maintained and calibrated in accordance with Ricardo procedures for accredited measurements, and with European regulatory requirements for on-road measurement equipment. Prior to, and following any measurement campaign, the PEMS is validated through correlation with lab-based analysers with traceable calibrations. Our team's support during installation and performance of measurements ensures high quality data is collected. To ensure reliable operation of the PEMS, installation conditions for mounting and use of the equipment are stated:

- Loggable data at 1 Hz
- Heated line length within 4 m of sampling point
- Footprint 1m x 1m, minimum height 2m, weather protected environment, stable temperature conditions
- Required power: 24V DC supply c50amps or, 240V AC supply with back up 24V DC battery supply – to prevent disruption due to power failure
- Data acquisition, a PC based data logging system for data storage and presentation is used. Measurement signals are transferred from the measurement instruments to a PC

Benefits and savings opportunities

Ricardo offers a full range of services for exhaust emissions control implementation: from initial specification and design, through to control and calibration of the final solution.

Meeting the legislative limits with a robust cost effective solution is key to ensuring efficient NO_x control for Marine applications, and full confidence in operational emissions compliance. Effective use of the latest PEMS technology requires expert handling, but applied intelligently use can yield extremely valuable insights into the true emissions impacts and benefits of emissions control solutions. With combined engineering and measurement expertise, Ricardo can assist in the validation of improvement initiatives to enhance vessel performance in real-world operation.

For further information please contact:

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