EMISSION MEASUREMENT INSTRUMENTS

AVL OPACIMETER

THE CHALLENGE

Recent emissions legislation has tightened the requirements for transient test procedures. To pass future emissions limits, it will also be necessary to monitor the engine's particulate emissions during transient operation even in the early stages of an engine R&D process. Therefore, an instrument with a very fast response time combined with a high accuracy is required.

Measurements in front of an engine aftertreatment system, where high exhaust pressures and temperatures are present, must also be possible, e.g. upstream of a diesel particulate filter (DPF).

THE SOLUTION

The AVL Opacimeter is a highly dynamic partial-flow measuring instrument for the continuous measurement of exhaust gas opacity (in particular from diesel engines). It can be used during stationary and transient engine operation and is therefore perfectly suited for R&D, certification purposes and for production conformity tests.

The Opacimeter measures the loss of light intensity between a light source and a receiver. The opacity N [%] and the light absorption coefficient k [m^{-1}] can be calculated. The very fast response time of 0.1 seconds, the compliance to legal requirements for emission certification testing (e.g. HD Euro III, IV, V and ECE R 24), together with the easy-to-use data evaluation and the ability to measure upstream and downstream of a DPF make the AVL Opacimeter a unique product.

COMPLIANCE WITH TECHNICAL REQUIREMENTS AND REGULATIONS

- ECE R24
- 72/306/EEC, 77/537/EEC
- ELR test cycle for
  - Euro III according to 1999/96/EC
  - Euro IV and V according to 2005/55/EC and 2005/78/EC
- GB 3847-2005
- ISO 8178-9
- ISO 11614
- SAE J 1667

The algorithms for the different test runs stipulated by law have already been programmed into the AVL Opacimeter and can be invoked at any time.

HIGH PRESSURE OPTION

The growing trend toward developing engines with different exhaust aftertreatment systems requires special application components for particle measurement instruments. With the AVL Opacimeter, a high pressure option can be included to extend the scope of application. It enables opacity measurements using the standard equipment with exhaust gas pressure peaks up to 3,000 mbar (relative to ambient pressure) and exhaust gas temperatures up to 800 °C.

HIGHLIGHTS

- High measurement dynamics for transient test runs
- Preprogrammed parameters such as ELR and ECE R24
- High measurement value resolution and signal stability thanks to the conditioning of all essential parts
- Applicable for exhaust gas back pressures of up to +3,000 mbar (with high pressure option)

TECHNICAL DATA

Measurement principle	Measurement of light extinction
Measurement value output	Opacity N [%] or light absorption coefficient k [m^{-1}]
Measurement range	N = 0 to 100 % or k = 0 to 10 m^{-1}
Measurement value resolution	0.01 % or 0.001 m^{-1}
Detection limit	0.02 % or 0.0025 m^{-1}
Zero stability	{0.1 % or 0.0025 m^{-1}} / 30 min (drift with zero gas)
Rise time	0.1 s
Max. exhaust temperature	600 °C (800 °C with high pressure option)
Maximum exhaust pressure (relative to ambient pressure including pulsation peaks)	-100 mbar to +400 mbar (0 mbar to +3,000 mbar with high pressure option)
Interfaces	TCP/IP, RS232 with AK protocol, digital inputs/outputs, analog inputs/outputs
Data rate	Up to 10 Hz 50 Hz with analog output
Power requirement	1 kVA (max.)
Compressed air requirement	Max. 100 l/min @ 4 to 10 bar
Weight (basic unit)	Approx. 49 kg
Dimension (basic unit, W x H x D)	680 x 440 x 460 mm
Sample flow	40 to 50 l/min
Ambient conditions	5 to 50 °C/max. 90 % relative humidity (non-condensing)

FIND OUT MORE:

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