AVL FUEL REFERENCE

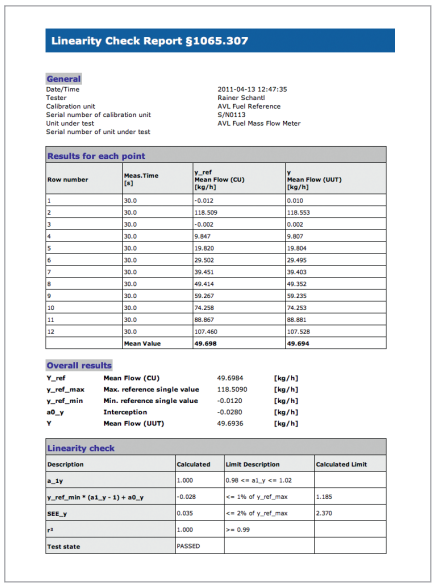
Efficient and professional calibration of AVL fuel consumption measurement devices

You need fuel consumption measurement data you can compare throughout the test field? You want to raise your test bed efficiency by avoiding repeat measurements? You want to reduce time, effort and cost of calibration?

AVL Fuel Reference is an efficient calibration system that gives you a simple way to check various types of fuel consumption measurement devices including the way they are set up on the test bed. Depending on your requirements, it is capable of reducing time and effort for calibration (including test-bed installation) to as little as 60 minutes. This is made possible by simple installation and operation, automatic execution of calibration procedures and automatic generation of calibration reports.

Your benefits:

- Calibration of the entire fuel consumption measurement chain (measurement device and test bed installation)
- Reproducible and precise calibration results thanks to special device design
- Compliance with all statutory guidelines and standards (ISO, US EPA 40 C.F.R. Part 1065 and UN ECE R49)
- Commissioning work on the test bed is reduced to 30 minutes
- Loss-less calibration of measurement devices by returning fuel to the measurement device or fuel supply system
- Compatible with all current AVL fuel consumption measurement devices and PLU sensors



Linearity Check Report §1065.307

General

Date/Time	2011-04-13 12:47:35
Tester	Rainer Schantl
Calibration unit	AVL Fuel Reference
Serial number of calibration unit	S/N0113
Unit under test	AVL Fuel Mass Flow Meter
Serial number of unit under test	

Results for each point

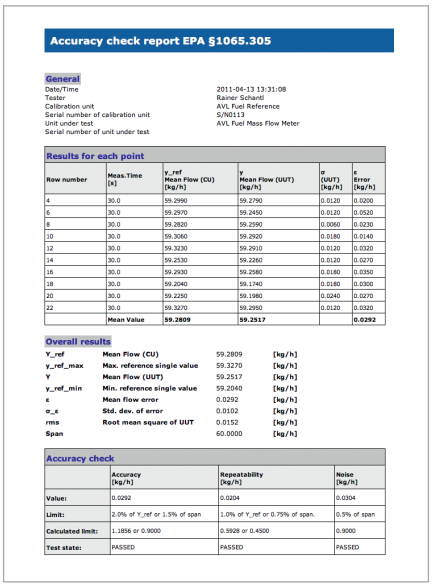
Row number	Meas.Time [s]	y_ref Mean Flow (CU) [kg/h]	y Mean Flow (UUT) [kg/h]
1	30.0	-0.012	0.010
2	30.0	118.509	118.553
3	30.0	-0.002	0.002
4	30.0	9.847	9.807
5	30.0	19.820	19.804
6	30.0	29.502	29.495
7	30.0	39.451	39.403
8	30.0	49.414	49.352
9	30.0	59.267	59.235
10	30.0	74.258	74.253
11	30.0	88.867	88.881
12	30.0	107.460	107.528
	Mean Value	49.698	49.694

Overall results

Y_ref	Mean Flow (CU)	49.6984	[kg/h]
y_ref_max	Max. reference single value	118.5090	[kg/h]
y_ref_min	Min. reference single value	-0.0120	[kg/h]
a0_y	Interception	-0.0280	[kg/h]
Y	Mean Flow (UUT)	49.6936	[kg/h]

Linearity check

Description	Calculated	Limit Description	Calculated Limit
a_1y	1.000	0.98 <= a1_y <= 1.02	
y_ref_min * (a1_y - 1) + a0_y	-0.028	<= 1% of y_ref_max	1.185
SEE_y	0.035	<= 2% of y_ref_max	2.370
r²	1.000	>= 0.99	
Test state	PASSED		



Accuracy check report EPA §1065.305

General

Date/Time	2011-04-13 13:31:08
Tester	Rainer Schantl
Calibration unit	AVL Fuel Reference
Serial number of calibration unit	S/N0113
Unit under test	AVL Fuel Mass Flow Meter
Serial number of unit under test	

Results for each point

Row number	Meas.Time [s]	y_ref Mean Flow (CU) [kg/h]	y Mean Flow (UUT) [kg/h]	σ (UUT) [kg/h]	ε Error [kg/h]
4	30.0	59.2990	59.2790	0.0120	0.0200
6	30.0	59.2970	59.2450	0.0120	0.0520
8	30.0	59.2820	59.2590	0.0060	0.0230
10	30.0	59.3060	59.2920	0.0180	0.0140
12	30.0	59.3230	59.2910	0.0120	0.0320
14	30.0	59.2530	59.2260	0.0120	0.0270
16	30.0	59.2930	59.2580	0.0180	0.0350
18	30.0	59.2040	59.1740	0.0180	0.0300
20	30.0	59.2250	59.1980	0.0240	0.0270
22	30.0	59.3270	59.2950	0.0120	0.0320
	Mean Value	59.2809	59.2517		0.0292

Overall results

Y_ref	Mean Flow (CU)	59.2809	[kg/h]
y_ref_max	Max. reference single value	59.3270	[kg/h]
Y	Mean Flow (UUT)	59.2517	[kg/h]
y_ref_min	Min. reference single value	59.2040	[kg/h]
ε	Mean flow error	0.0292	[kg/h]
σ_ε	Std. dev. of error	0.0102	[kg/h]
rms	Root mean square of UUT	0.0152	[kg/h]
Span		60.0000	[kg/h]

Accuracy check

	Accuracy [kg/h]	Repeatability [kg/h]	Noise [kg/h]
Value:	0.0292	0.0204	0.0304
Limit:	2.0% of Y_ref or 1.5% of span	1.0% of Y_ref or 0.75% of span.	0.5% of span
Calculated limit:	1.1856 or 0.9000	0.5928 or 0.4500	0.9000
Test state:	PASSED	PASSED	PASSED

On the left: Automatically generated calibration reports compliant with US EPA CFR Part 1065

Top: Set-up on test bed – calibration of AVL FuelExact using AVL Fuel Reference

- Calibration of the entire measurement chain permits you to analyze measurement uncertainties and their origin and reduce these effectively. With returnless fuel injection systems this feature is even ensured during engine operation.
- Its hydraulic design ensures realistic pressures and constant flows. This improves the reproducibility of calibration results and helps save time, effort and costs.
- The evaluation algorithms in the operating software as well as AVL Fuel Reference's constructive design enable the automatic generation of calibration reports in compliance with the guidelines.
- Standardized hydraulic and electrical connections as well as pre-configurable calibration procedures ensure the quick operational readiness of this mobile unit on different kinds of test beds.
- Its direct coupling to the fuel consumption measurement device enables safe and environmentally friendly calibration without wasting fuel or generating disposal costs.
- Its compatibility with various different fuel consumption measurement devices enables universal use and comparability of calibration results across the test field.

Technical Data

Measurement principle:	PLU or mass flow
Measurement range:	
• PLU	0.03…500 l/h*)
• Mass flow rate	0…500 kg/h*)
Systematic measurement uncertainty	
• Sensor:	≤ 0.1% (in accordance with DIN 1319)
• Density:	1 g/dm³
Interfaces to measurement devices:	
• AVL measurement devices:	Ethernet, RS 232,
• PLU sensors (only with Fuel Reference PLU):	frequency, temperature (PT100), density sensor, thermocouple
Fuels:	100% biofuels
Power supply:	230/110V, 50-60 Hz
Ambient temperature:	15…45 °C
Dimensions (W x H x D):	610 x 1145 x 545 mm
Weight:	approx. 120 kg

* with different type sensors

For further information please contact:

AVL List GmbH, Hans-List-Platz 1, A-8020 Graz, Austria
Phone: +43 316 787-0, Fax: +43 316 787-400, Email: info@avl.com, www.avl.com

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