



Separator Performance Tester SPT 140
Filter Test Rig for oil mist separators

Application

The test rig's purpose is the testing of oil mist separators re capture rate, flowrate curve (pressure loss relative to flowrate), pressure regulation curve and leakage.

The unit to be tested will be fed with an oil aerosol (flowrate and temperature adjustable) either in positive or negative pressure conditions. The immediate vicinity of the filter is temperature controlled.

During the collection efficiency measurement the separated and the let-to-pass oil amounts are measured in dependence on the volumetric flow. They are automatically recorded, applying the gravimetric method, by means of an absolute filter. The amount of oil leaving the separator can be recorded online. Additionally, the leakage of the oil drain valve can be measured.

The test rig simulates the operating conditions in typical fields of oil aerosol separator application. When recording the pressure control characteristic, the „pressure in the crankcase“ is simulated in dependence on the „suction pipe pressure“ for different flow rates.

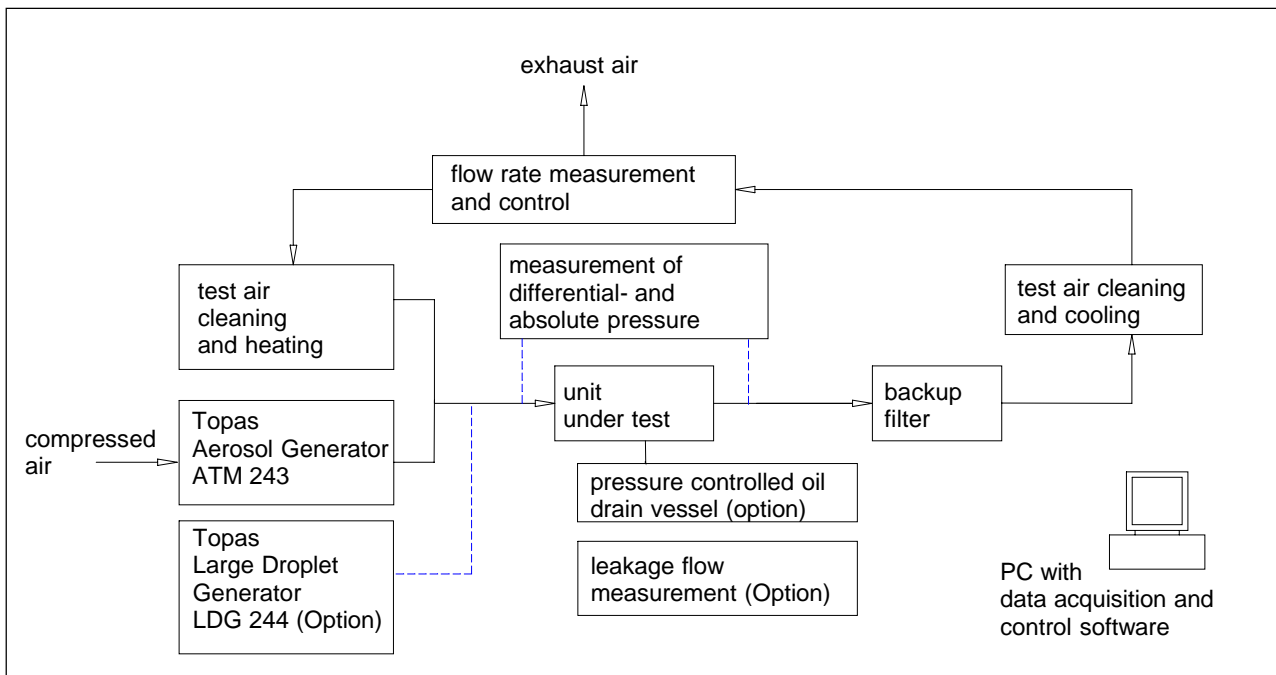
Special Advantages

- Wide range of flow rate for overpressure and underpressure operation mode
- Special operating mode for testing pressure control valves
- Sample holder adjustable for different sample dimension
- Heatable test chamber (ambient temperature up to 120°C/248°F)
- Closed loop test air recovery system (with cooling stage)
- Aerosol generation by means of ATM 243 and/or LDG 244
- Safe test chamber with hinged cover
- Software guided testing procedure
- Convenient Windows software for test rig control, data acquisition and data export



Test chamber (opened) with upstream and downstream test piece connectors, being adjustable for different test object sizes. Integrated in the rear plate the heater blower combination.

Principle



Schematic of the test rig SPT 140

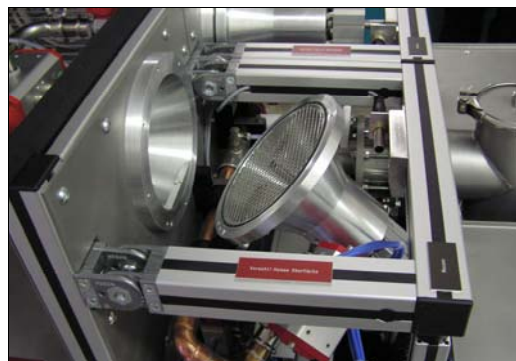
Design

The test rig consists of:

- a volumetric flow unit to implement varying volume flows in overpressure or underpressure mode
- a specially configured aerosol generator
- a facility for gravimetric collection efficiency measurement
- a multitude of sensors and controllers for the measurement of temperature and differential pressure
- switch box, rack and test rig control

The test rig requires certain media supply connections as electric power, pressurized air and cooling water connecting lines. The cooling system permits either to emit the exhaust air in a common discharge system or to conduct a recirculated air operation. It is recommended to connect to an exhaust system for safety reasons.

A special technical solution applying a backup filter was developed to allow the determination of the separation performance of the unit under test over a determined period under constant test conditions. Two filters, each of which separately replaceable, are alternately connected. In the start-up period initially the first filter is used until the test conditions do not vary anymore. For the measurement itself it is changed over to the second filter.



Convenient access to the replaceable filters next to the test chamber

Atomizer Aerosol Generator ATM 243 Large Droplet Generator LDG 244

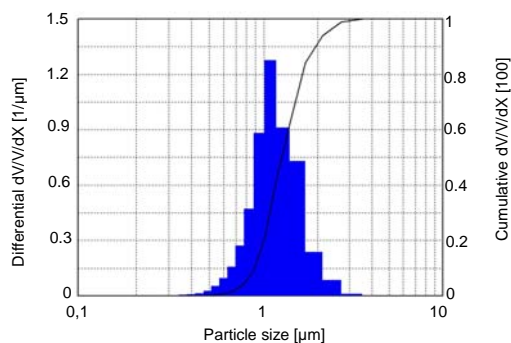
Atomizer Aerosol Generator ATM 243

The ATM 243 was specially developed to meet the requirements on test aerosol to be produced for testing oil separators (and is subject to utility model protection). Its design ensures a highly stable particle size distribution and concentration with high reproducibility and high aerosol output. The oil is atomized by binary nozzles. The binary nozzles as well as the carrier gas and the oil storage are heated to the required temperature.



ATM243 (with pressure-proof housing) in the Test Rig SPT 140

The particle size of the generated aerosol is mainly adjusted by the operating temperature. The mass flow depends on the following parameters: number of nozzles engaged, compressed air pressure and operating temperature. Additionally, mass flow and particle size distribution depend on the brand and the type of the oil used.



Particle size distribution of the aerosol generated by ATM 243 ($d_{50,3}$ ca. 1.5µm, engine oil 0W30 grade)

Aerosol Generator LDG 244 for coarse oil dosage

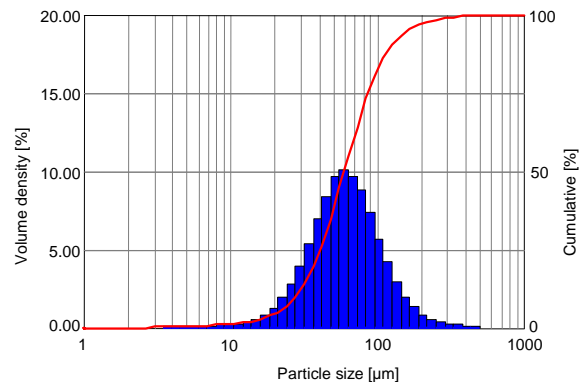
For special applications requiring large oil amounts, e. g. simulation of gushes of oil and wall film respectively, a new generator for the dosage of coarse oils (subject to utility model protection) was developed as an attachment for the SPT 140. By means of a heated single medium nozzle and an integrated oil preheater (temperature range 90 to 120°C/194 to 248°F) oil droplets with an extremely large diameter (50 to 100 µm) and in a very high



throughput mass flow can be generated.

LDG 244 (left) and oil reservoir (right)

The throughput oil mass flow is adjusted by impulse operation of the single substance nozzle, the nozzle being opened and closed periodically in short intervals, the lengths of which varying according to the desired mass flow.

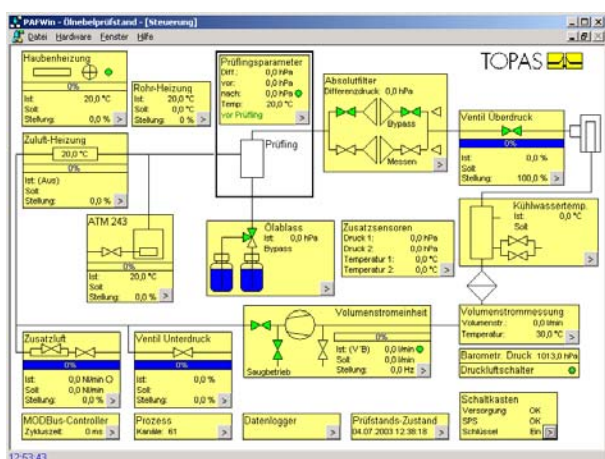


Particle size distribution of an aerosol generated by the LDG 244 generator (engine oil, 0W30 grade)

Specification

Control and Data Acquisition Software SPTWin

For control of the test rig and data acquisition the user friendly software SPTWin has been developed. This software is widely self-explanatory. It runs under Windows and displays the current status of the test rig in graphical format by means of real-time visualization.



Visualisation of the test rig by means of the control and data acquisition software SPTWin

Further distinctive features of the Control and Data Acquisition Software SPTWin are:

- Very largely automated test procedures
- Manual control for calibration, single component services or research purposes
- Data monitor for independent data recording (long-term behaviour measurements)
- Data presentation in tables *and* diagrams
- Temporary data storage function for data-exchange with other Windows applications
- Online help function
- Software integrated select-language feature (English/German)

Technical Data

Flow rate	15...300 l/min alternative 20...400 l/min
Pressure range of unit under test	± 150 mbar
Differential Pressure	200 mbar
Testing liquid	mineral or synthetic engine oil
ATM 243	Generated oil aerosol Nozzle temperature max. 5...60 g/h ¹⁾ d _{50,3} approx. 1.5 µm 80°C 120°C (176°F ... 248°F)
Option LDG 244	Generated oil aerosol Nozzle temperature 50 ... 2000 g/h d _{50,3} =50...100 µm 90°C 120°C
Temperature range of the testing chamber	ambient air temperature up to 120°C (248°F)
Supply air quality requirements	room air (common laboratory grade)
Cooling water	tap water; max. 6 bar, max. 20 l/h, cooling circuit (outlet temperature max. 40°C)
Compressed air supply	max. 6 bar; 300 l/min
Power Supply	400 V, 16 A
Dimensions(L x W x H)	2100 x 925 x 1200 mm
Weight	approx. 400 kg

¹⁾ dependent on brand and type of oil

QMS certified to
DIN EN ISO 9001.



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For more information please visit our website at www.topas-gmbh.de

Specifications are subject to change without notice.

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