Dichtheitsprüfung · Durchflussprüfung · Funktionsprüfung

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Testing systems for

Differential pressure and breathing resistance

of

Mouth-nose masks (DIY masks, temporary masks, community face coverings) according to CWA 17553

Filtering masks (FFP masks) according to DIN EN 149

Medical masks (MNS, OP mask) according to DIN EN 14683

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Basics

	Mouth-nose-mask DIY-mask Community face coverings, Scarf	Medical mask OP-mask mouth-nose-protection	Filtering mask (FFP-mask) without valve	Filtering mask (FFP-mask) with valve
				
breathing resistance (according to DIN14683)	up to 175%*	100%	60% - 175%	inhale 60% - 175% exhale ca. 60%
Filtration rate of the used material	>70% or 90%****	Typ I: ≥95%** Typ II:≥98%** Typ IIR:≥98%**	FFP1: > 80%*** FFP2: > 94%*** FFP3: > 99%***	FFP1: > 80%*** FFP2: > 94%*** FFP3: > 99%***
standard	CWA 17553	DIN EN 14683	DIN EN 149	DIN EN 149
self protection	with limitations	with limitations		
external protection				

* NEW according to CWA 17553:2020-06; ** Bacterial filter performance (aerosol MPS 3 µm);
*** Separation efficiency (liquid and solid aerosols <2.5 µm); **** Separation efficiency (liquid and solid aerosols 3.0 ± 0.5 µm)

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General obligation to wear a mask!?

Essential for the wearing comfort and thus the acceptance of a mouth-nose-cover as it is specified today, is certainly the "ease of breathing" under the mask, which can be quantified with the measurement of the breathing resistance or pressure difference.

Patients with breathing problems, who have to wear mouth-nose-masks for external protection, will have experiences of feeling of suffocated when the breathing resistance is high.

Mouth-nose-covers, without references to a standard have, according to our measurements

- often a much higher breathing resistance than allowed by DIN standards and
- often a very irregular structure, which makes doubts about the effectiveness.

In June 2020 the new European guideline CWA 17553 was published, which sets minimum standards for "community face coverings".

- **Over the time, consumers will give preference to products in which they feel comfortable and the quality they trust.**
- **An in-line-test of the masks during production is therefore essential to achieve a consistently good quality and a solid positioning on the market.**
- **The development of recyclable and good-looking masks and mouth-nose-covers with comfortable wearing characteristics, will be very important.**

➢ **We recommend the following test systems for testing in parallel with production and for selecting alternative materials.**

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Test bench for pressure difference on Medical-face-masks according to DIN EN 14683 and community face coverings according to CWA 17553

automated version

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Features:

With the test station for pressure difference on medical-face-masks, the test is performed according to the specifications of DIN EN 14683 or CWA 17553. The material to be tested (mask, filter material) is manually inserted between the top and bottom part of the sample-holder without wrinkles and closed manually. Using the automatic testing device INTEGRA *DFM 14683*, the device provides edited settings and monitors all specifications and test parameters automatically.

Channel 1 is used for adjustment and counter measurement of the flow rate, according to internal test guidelines.
Channel 2 measures and monitors the pressure difference in Pa/cm².
Channel 3 (option) is used to measure and evaluate the supplied air flow rate.

The system is equipped with 256 testing parameter sets (programs) which can be used to store processing times, default values and limit values for specific products.
To start the testing process, it is enough to press the start-button. The process runs automatically. When the test is finished, a green or red signal at the display of the device indicates whether the preset limit values have been maintained or exceeded.
This system is ideal for periodic spot checks during production by semi-skilled employees.

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Automated mass-flow- and pressure measuring device
INTEGRA *DFM 14683* (art. no. 1635)

- automatic test run incl. presetting of values and limits
- limit value monitoring of measured values
- 256 test parameter sets for various product variants
- mass-flow-controller 0...16 l/min with counter measurement of the vacuum mass-flow
- measuring range of pressure difference 0...1400 Pa / cm² (basing on a cross-section of 4.9 cm²)
- internal data storage and RS232 printer interface for measured value documentation
- power supply 110-230V / 50(60) Hz; app. 600 W
- vacuum supply min. 12 Nl/min at 90 % final vacuum
- size 450mm x 185mm x 380mm (w x h x d)

Option:
Mass-flow-sensor 0… 16 l/min for measuring the supplied air as a leak test of the sample-holder

Reference conditions:
23° C / 1000 mbar abs.

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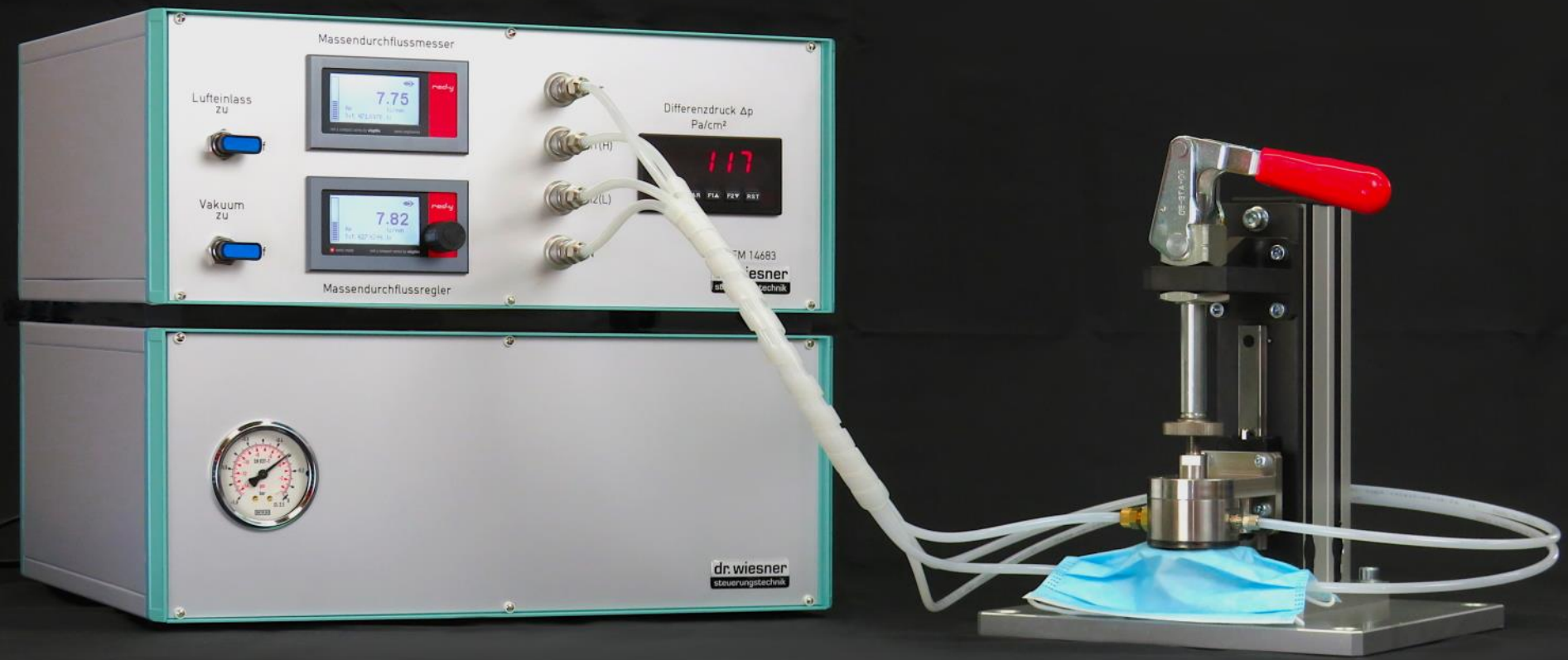
Test bench for pressure difference on medical face masks according to DIN EN 14683 and community face coverings according to CWA 17553

manual version



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Features:

With the test bench for pressure difference on medical face masks, the test is performed according to the specifications of DIN EN 14683 and CWA 17553.
The material to be tested (mask, filter material) is manually inserted between the top and bottom part of the sample holder without wrinkles and closed manually. After having opened the air supply and vacuum, a quantity of air flows, when the vacuum supply is switched on. This quantity of air is shown on the display of the mass-flow-controller and can easily be adjusted with the adjusting knob next to it.
The specification of the standard is 8 l/min.

The upper display (optional) of the mass-flow-meter should be at the same value with a maximum deviation of 0.2 l/min. If the shown value is out of range more than 0.2 l/min, the inserted material must be checked for creases and the sample-holder for correct closure.
The sample-holder can be adjusted to different material thicknesses by a fine adjustment.
The differential pressure in Pa/cm² is displayed on the digital display, installed on the right side of the unit.
The required transformation from the real area to 1 cm² was already taken into calculation during the calibration of the device.

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manual
mass-flow- and pressure measuring device
(art. no. 1633)

- manual valve- and flow-rate adjustment
- Mass-flow-controller 0...16 l/min with counter measurement of the vacuum mass-flow
- measuring range of pressure difference 0...1400 Pa / cm² (with a flow area of 4.9 cm²).
- power supply 230V / 50 Hz; app. 600 W
- vacuum supply min. 12 Nl/min at 90 % final vacuum
- size 450mm x 185mm x 380mm (w x h x d)

Option:
Mass-flow-sensor 0… 16 l/min for measuring the supplied air as a leak test of the sample-holder

Reference conditions:
23° C / 1000 mbar abs.

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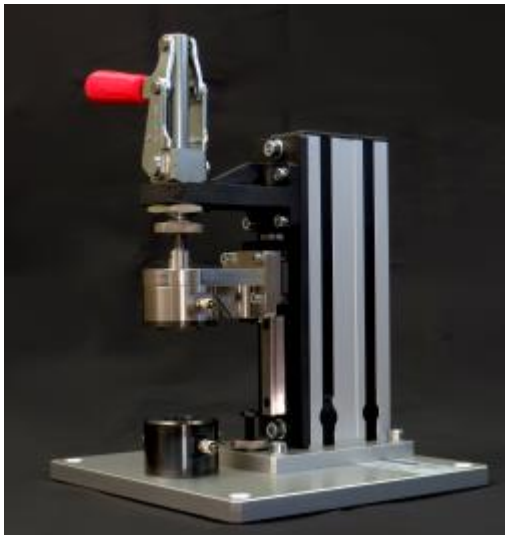
Other components of the test bench:
To set up a complete test station, the following components are required.



Sample-holder to test breathability / pressure difference (art. no. 1632)
The sample-holder is equipped with the opening width of 25 mm according to DIN 14683. The material specimen / mask is placed on the underside of the holder, the upper part is closed manually from above. The sample-holder is equipped with a height fine adjustment for different material thicknesses.
The vacuum connection is located at the bottom, left side of the sample-holder. The supply air connection is located above. On the right side are the connections for measuring the pressure difference.

All connection lines between sample-holder and test device are equipped with quick connectors.

Vacuum station for tests according to DIN EN 14683 (art. no. 1637)

- integrated vacuum pump capacity of 12 Nl/min and final pressure 50 mbar abs.
- vacuum reservoir 750 ml
- vacuummeter 0…-1 bar in the front plate
- supply voltage 230V / 50 Hz 120 Watt
- size 450mmx185mmx380mm (w x h x d)

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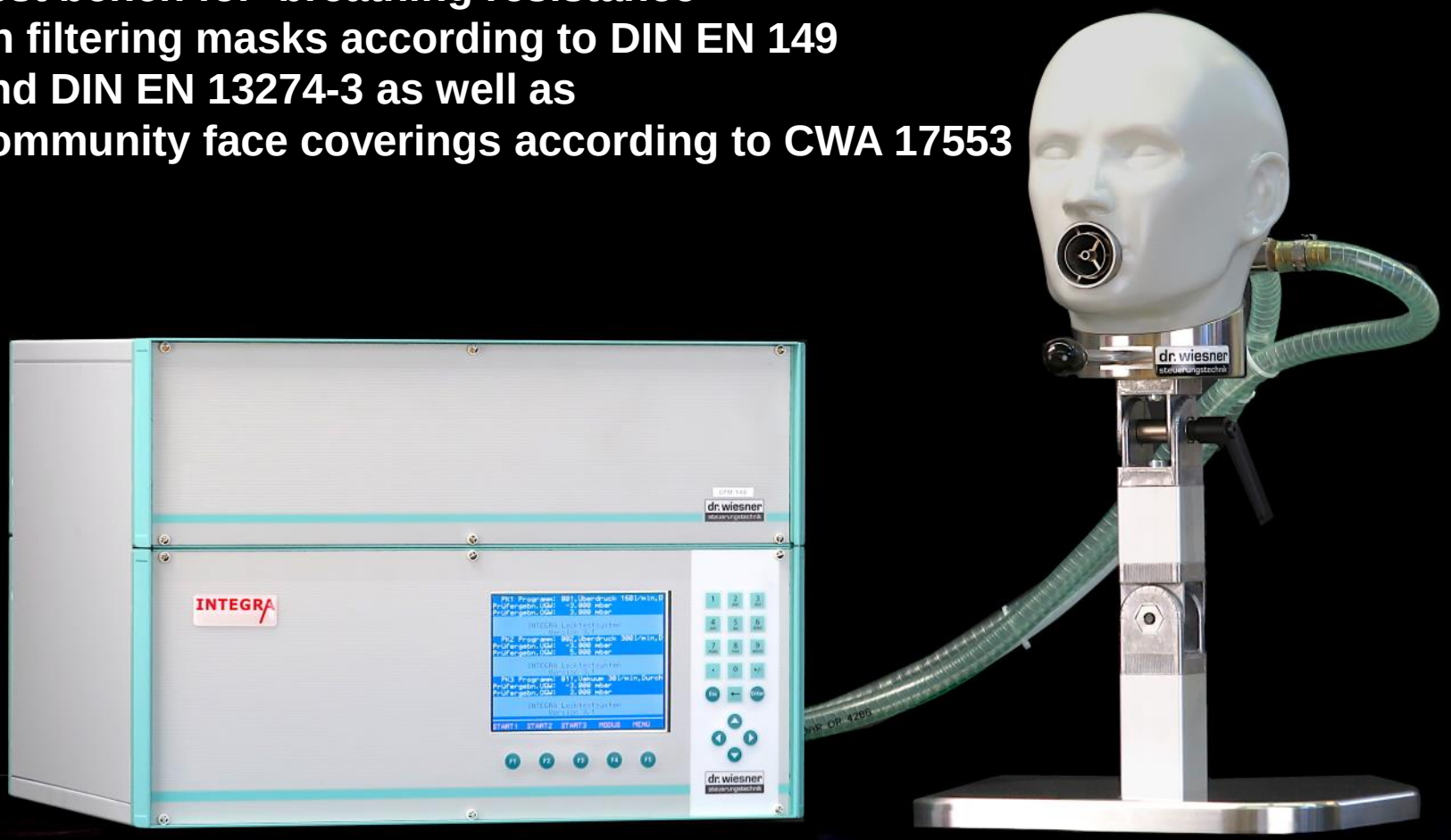
Test bench for breathing resistance on filtering masks according to DIN EN 149 and DIN EN 13274-3 as well as community face coverings according to CWA 17553



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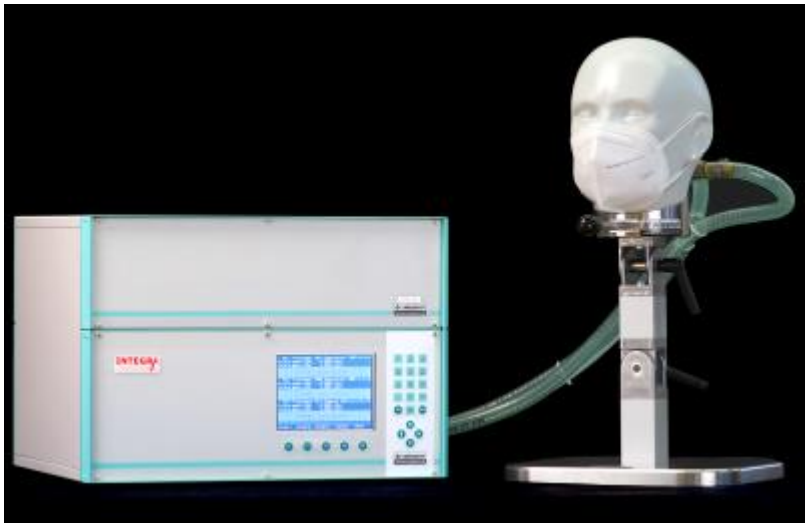
Features:



With the test bench for breathing resistance on filtering masks according to DIN EN 149 and DIN EN 13274-3 as well as community face coverings according to CWA 17553, exhalation and inhalation processes with a static flow of up to 300 l/min (exhalation) and up to 120 l/min (inhalation) can be simulated. At the same time the resulting pressure in the "mouth area" of the Sheffield-testing-head for breathing resistance can be measured. This enables all breathing resistance measurements to be realized according to DIN EN 149, CWA 17553 and DIN EN 13274-3.

The INTEGRA *DFM 149* test device is based on our INTEGRA test device family, which has been proven in hundreds of applications for years.

256 user-configurable test parameter sets (programs) can be used to test a wide range of requirements of national and international standards and internal factory regulations.

The automated testing process with full automatic monitoring allows tests to be performed by semi-skilled employees. The serial printer interface enables automatic documentation with date and time.

The Sheffield-testing-head is equipped with the measuring tube, as shown in DIN EN 149 and DIN EN 13274-3. The Sheffield-testing-head is swingable up to 90 degrees in all directions. This makes it possible to detect the influence of gravity on valves in masks.

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automated mass-flow and pressure measuring device
INTEGRA *DFM 149* (art. no. 1639)

- for measuring the inhalation and exhalation resistance
  - exhalation up to 300 l/min (static)
  - inhalation up to 120 l/min (static)
- full automatic test process with digital specification of all settings
- limit monitoring of all measured values
- 256 test parameter sets for various product variants
- internal data storage and RS232 printer interface for measured value documentation
- mass-flow-control-unit 0…300 l/min with mass-flow precheck, reversible flow direction (Conditions: 23° C / 1000 mbar abs.)
- breathing resistance measuring range ± 20 mbar

- power supply 110-230V / 50(60) Hz; app. 600 W
- vacuum supply min. 120 Nl/min at 90 % final vacuum
- supply pressure 6 bar
- size 450mm x 325mm x 380mm (w x h x d)

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Sheffield – testing – head (art. no. 1638)

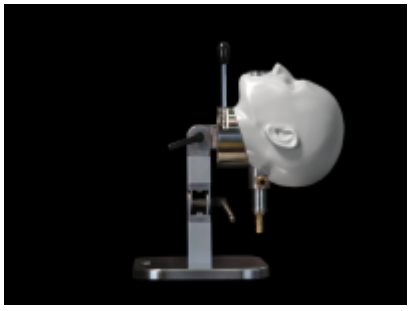
to perform various breathing resistance tests, e.g.

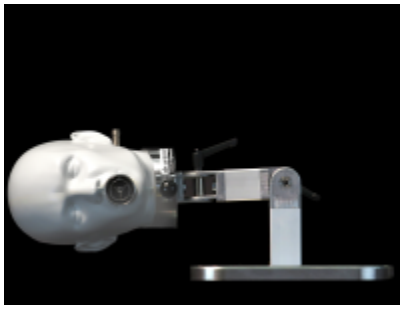
- according to DIN EN 149, §§ 8.9.2, 8.9.3
- according to DIN EN 13274, §§ 7.3.2, 7.3.3

with concentric aspiration-, pressure- and measuring tube in the mouth area

90° swingable:
to the front, to the back, to the left, to the right

with hose connections nominal diameter 15 for inhalation and exhalation and nominal diameter 4 for pressure measurement





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Vacuum station for testing according to DIN EN 149, DIN EN 13274-3 and CWA 17553 (art. no. 1647)

- 2 x rotary vane pumps with capacitor-motor, IP54; 230V +/-10%, 50Hz, 0.35 kW,
- pump capacity: air capacity per pump approx. 10 m³/h against 0 bar (in summary 20m³/h)
- final vacuum -850 mbar - (85%) 150 mbar abs.
- housing system „CompactAir“ with pull-out bar and solid wheels.
- front cover in aluminium, RAL 7015 colored, main frame parts in aluminium.
- additional 230V power supply socket at the rear (protection via the main fuse of the building 16A)
- on/off switch backlit (green)
- internal vacuum filter and exhaust air silencer
- electrical connection cable with strain relief and safety plug (Schuko) app. L= 1.8 m.

Accessory:

Log printer

- Citizen CBM-910II
- print technology: Dot Matrix
- type: POS printer
- size of letter: 1,08 x 2,4 mm
- colour: white
- lifetime of tape: 200 million letters
- connection technology: cable
- standard interface: parallel
- dimensions: 10.6 x 18 x 8.8 cm
- weight: 470 g

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