

Test Report

Report no.: 972471-01



**DANISH
TECHNOLOGICAL
INSTITUTE**

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No. of encl.: 1
Init.: JAE/JEC

Customer: CUBO Investment

Samples: One kind of medical face masks; CUBO Medical clean Type IIR Medical face mask: Type IIR 17.6 x 9.5 cm LOT: NN (see page 2)

Sampling: 5 masks of taken randomly from the received boxes, measurement on five areas on each mask. The samples have been received here on 16 March 2021.

Period: The testing has been carried out on 19 March 2021.

Procedure: Method for determination of breathability (differential pressure) DS/EN 14683:2019+AC:2019

Result: The masks pass the requirement for type IIR. The requirement is ΔP less than 60 Pa/cm² at 8 L/min for type IIR. For 0 out of 5 tested masks, the averages of five measurements on a mask is over the limit.

The standard requires an AQL of 4 %, with 5 samples the product pass if 0 are over the limit. If 1 or more are over the limit they fail.

	Pressure ΔP Pa	Pressure / area $\Delta P/\text{area}$ Pa/cm ²
Average	224	46
Std Dev.	4.9	1.0

	Type IIR Limit
	<60 Pa/cm ²
FAIL	0
PASS	5

Storage: According to the general terms and conditions of The Danish Technological Institute

Conditions: The test has been performed according to the conditions laid down by DANAK (The Danish Accreditation), cf. www.danak.dk, and the general terms and conditions of The Danish Technological Institute. This test report may be reproduced in extract only if the Laboratory has approved the extract in writing.

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Test Reg. no. 300

Test

Measurement of differential pressure over mask with a flow of 8 L/min over an area of 4.9 cm² (a circle 25 mm in diameter). Performance requirement for type I and type II is < 40 Pa/cm² and for type IIR < 60 Pa/cm² in DS/EN 14683:2019+AC:2019.

Test methods

Following the standard: Method for determination of breathability (differential pressure) DS/EN 14683:2019+AC:2019. In annex C of this standard there is a figure (C.1) showing the setup. Air is sucked through the section for the mask with a pump, flow is controlled with a mass flow controller. The mask is held in a sample holder with an orifice 25 mm in diameter above and below the mask. A differential pressure meter is used to measure the differential pressure and a flow meter is used to monitor the flow into the setup. During testing, the setup is clamped. The differential pressure meter and the flow meter have been accredited calibrated.

All the tested masks have a uniform surface. Measurements are conducted on five areas on each mask.

The masks were in a box with 81.7 %RH and 23.0 °C for over 4 hours prior to tests. The tests were performed in a room with 50 % RH and 23 °C. One mask at a time is taken from the box to the test setup.

Samples

Medical facial masks, from CUBO Investment, marked "CUBO Medical clean Type IIR Medical face mask: Type IIR 17.6 x 9.5 cm " The masks have the same stitching and colour.



Figure 1, Pictures of packaging



Figure 2, Picture of masks two masks front and back.

Equipment

Differential pressure meter: DP measurement Buckingham, marked DPM1 (ID: 187390), calibrated 23 November 2020. Brooks mass flow meters, with controller unit. Two vacuum pumps, Vacuubrand ME1. Mesalab defender 520H flow calibration unit, calibrated 4 December 2020, (ID: 187863). Sample holder and setup according to DS/EN 14683:2019+AC:2019.

Test results

All the results are shown in the enclosure, a summary is shown in the table below.

	Pressure ΔP	Pressure / area $\Delta P/\text{area}$		Type IIR Limit
	Pa	Pa/cm ²		<60 Pa/cm ²
Average	224	46	FAIL	0
Std Dev.	4.9	1.0	PASS	5

Table 1. Summary of results, differential pressure measured over 4.9 cm² at a flow of 8 L/min of air, number of masks that pass and fail.

Table with all measurements:

CUBO Medical clean Type IIR Medical face mask: Type IIR 17.6 x 9.5 cm						
Sample	Position	Air flow	Pressure ΔP	Average pressure	Pressure per area $\Delta P/\text{area}$	
Units:		L/min	Pa	Pa	Pa/cm ²	
1	1	8.00	244			
1	2	8.01	189			
1	3	8.00	233			
1	4	8.01	230			
1	5	8.01	180	215	43.9	PASS
2	1	8.00	238			
2	2	8.00	198			
2	3	8.00	231			
2	4	8.00	229			
2	5	8.00	207	221	45.1	PASS
3	1	8.00	242			
3	2	8.00	231			
3	3	8.00	210			
3	4	8.00	237			
3	5	8.00	214	227	46.3	PASS
4	1	8.00	236			
4	2	8.00	227			
4	3	8.00	222			
4	4	7.99	222			
4	5	8.00	232	228	46.5	PASS
5	1	8.00	241			
5	2	8.00	261			
5	3	8.00	212			
5	4	8.00	228			
5	5	8.01	194	227	46.4	PASS
Average		8.00	223.7	223.7	45.6	
Std. Dev.		0.00	18.66	4.93	1.01	
Max		8.01	260.9	228.0	46.5	

Table 2. Measurements on all masks. 5 places on each mask