



Determination of the dust holding capacity of air filter CD325/660/141/18.5 NA 141 GT TURBO

| Requested by: NORDIC AIR FILTRATION A/S



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Task **Determination of the dust holding capacity of air filter
CD325/660/141/18.5 NA 141 GT TURBO**

Sample One air filter which is detailed in Appendix 1, Device tested.

The sample was received 25.3.2002.

The measurements were carried out 26.3. - 10.4.2002.

Test method The tests were carried out according to EUROVENT 4/9 - 1997 "Method of testing air filters used in general ventilation for determination of fractional efficiency".

The loading dust was ISO 12103-1, Fine test dust A2 instead of the ASHRAE test dust demanded by the method.

In the initial fractional efficiency measurements according to EUROVENT 4/9 - 1997 the test aerosol was DEHS and the bipolar aerosol charger (neutraliser) was a radioactive Am-241 source. The particle counter was of type PMS LAS-X.

The air flow rate was measured with a calibrated orifice plate with corner pressure tappings. The orifice plate has been calibrated against an orifice plate built according to ISO 5167 - 1980 "Measurement of fluid flow by means of orifice plates, nozzles and venturi tubes in circular conduits running full".

Results

The results of the tests are presented in Appendix 1.

The initial fractional efficiency is presented in Appendix 2.

Measurement data relating to pressure drop and dust loading are presented in Appendix 3.

The results are only valid for the tested filter sample.

Espoo, 10.4.2002

Juhani Laine
Senior Research Scientist

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APPENDICES

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DISTRIBUTION

Customer
VTT

Original (2 pcs)
Original

EUROVENT 4/9 - 1997. AIR FILTER TEST RESULTS

GENERAL

Test no.:	021566	Date of test:	26.3 - 10.4.2002	Supervisor:	RHo
Test requested by:	Nordic Air Filtration A/S				
Device delivered by:	Nordic Air Filtration A/S				

DEVICE TESTED

Model		Manufacturer		Received i laboratory
CD325/660/141/18.5 NA 141 GT TURBO		Nordic Air Filtration A/S		25.3.2002
Type of media	Net effective filter area	Face dimensions	Depth	Additional information
NA 141 GT	18.5 m ²	φ 325 mm	660 mm	Cylindrical filter

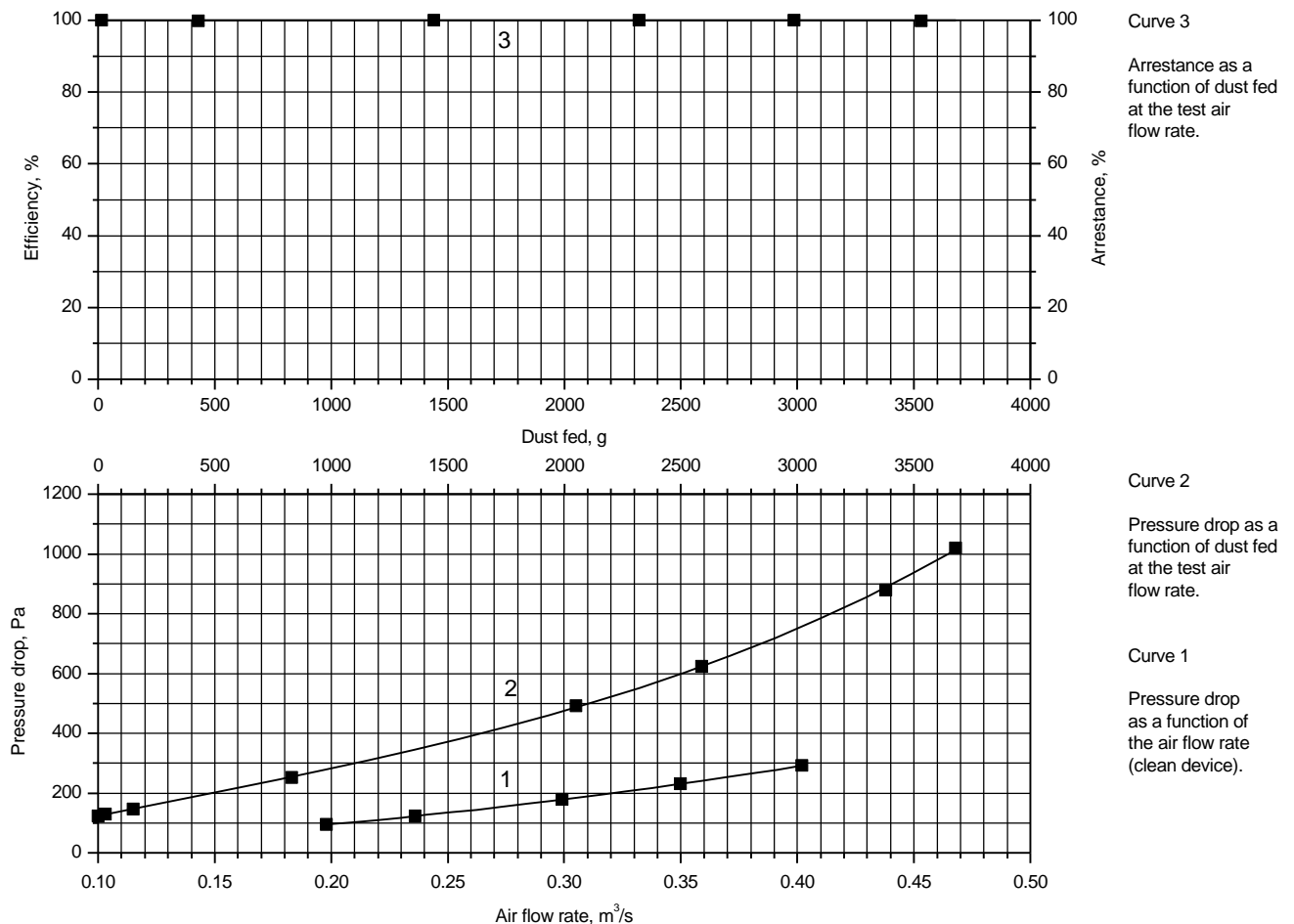
TEST DATA

Test air flow rate	Test air temperature	Test air relative humidity	Dust feeding rate *)
0.236 m ³ /s	20 - 22 °C	14 - 27 %	70 mg/m ³

RESULTS

Initial pressure drop	Initial arresstance	Initial fractional efficiency (0.4 μm)	Dust holding capacity	Additional information The results are only valid for the tested item
123 Pa	>99 %	88 %	430 / 2085 / 3380 / 3640 g	
Final pressure drop	Average arresstance	Average fractional efficiency (0.4 μm)	Filter class (450 Pa)	
250 / 500 / 880 / 1000 Pa	> 99 %	-	-	

*) Loading dust : ISO 12103-1, Fine Test Dust A2



Air filter: CD325/660/141/18.5 NA 141 GT TURBO
Initial fractional efficiency
EUROVENT 4/9 - 1997

Test no: 021566

Test aerosol: DEHS

 Air flow rate: 0.236 m³/s

The uncertainty of the measured efficiencies is reported on 95 % confidence level.

Particle size, μm		Fractional efficiency, % after different dust loading phases		
Interval	Mean	Pressure drop, Pa / Dust fed, g		
		123 Pa 0 g	-	-
0.20 ... 0.25	0.225	84.0 \pm 1.5	-	-
0.25 ... 0.35	0.3	85.1 \pm 1.2	-	-
0.35 ... 0.45	0.4	87.9 \pm 0.7	-	-
0.45 ... 0.60	0.525	91.4 \pm 1.2	-	-
0.60 ... 0.75	0.675	94.2 \pm 0.4	-	-
0.75 ... 1.00	0.875	95.9 \pm 0.5	-	-
1.00 ... 1.50	1.25	97.9 \pm 0.7	-	-
1.50 ... 2.00	1.75	99.3 \pm 0.2	-	-
2.00 ... 3.00	2.5	99.8 \pm 0.3	-	-
3.00 ... 4.50	3.75	99.9 \pm 0.2	-	-

Air filter: CD325/660/141/18.5 NA141 GT TURBO

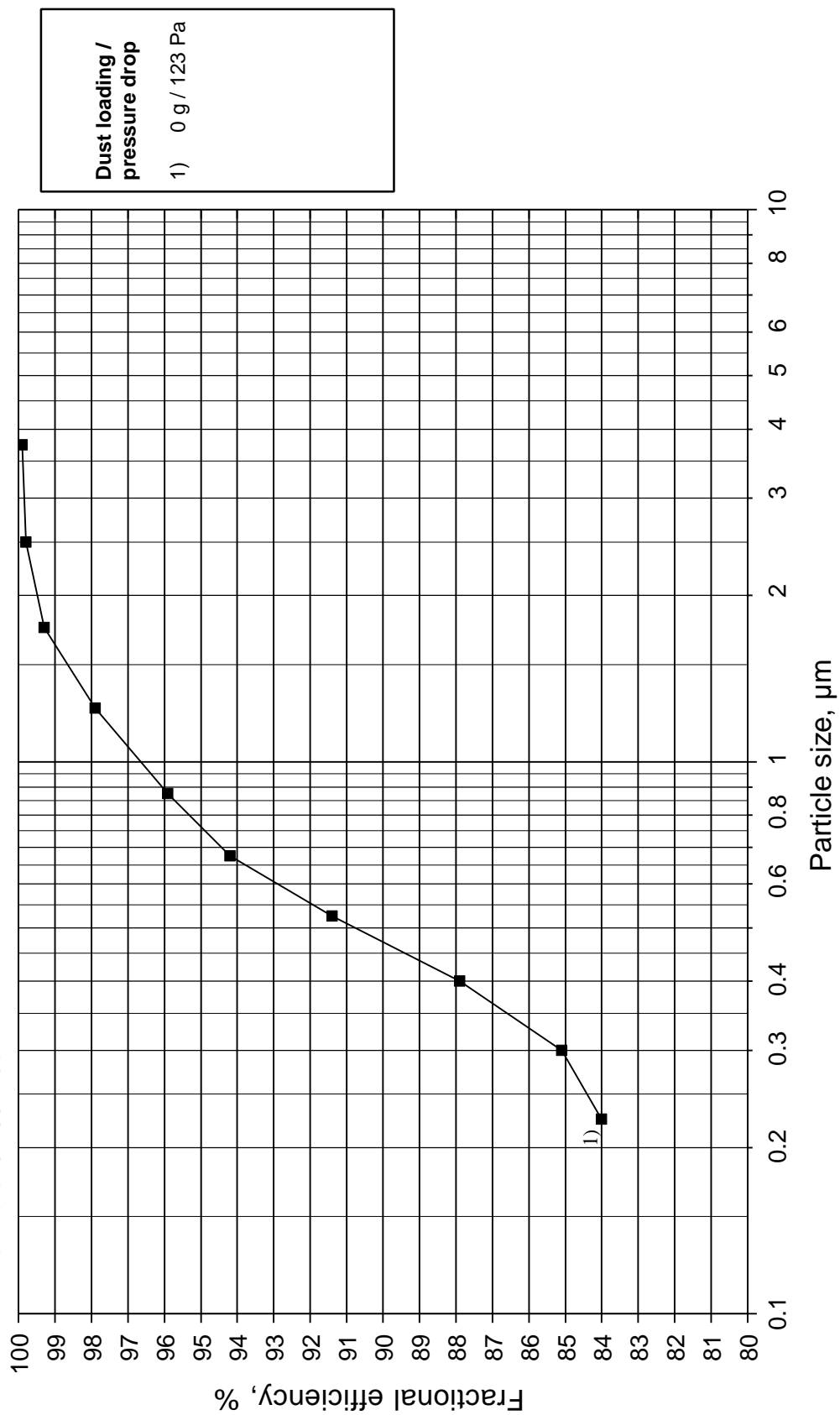
Initial fractional efficiency

EUROVENT 4/9 - 1997

Test no.: 021567

Test aerosol: DEHS

Air flow rate: 0.236 m³/s



Air filter: CD325/660/141/18.5 NA 141 GT TURBO
Air flow rate and pressure drop after different dust loading phases
EUROVENT 4/9 - 1997

Test no: 021566

Date	Dust fed m_{tot} g	Calibrated orifice plate ¹⁾				Filter						
		t °C	p_s kPa	Δp Pa	q_m kg/s	t_f °C	ϕ %	p_a kPa	ρ kg/m ³	q_{Vf} m ³ /s	Δp Pa	$\Delta p_{1.20}$ Pa
Clean filter												
26.3.2002	0	21.1	-0.286	192	0.484	21.7	26.3	102.0	1.203	0.402	293	292
"	0	21.0	-0.229	146	0.421	21.6	26.4	102.0	1.203	0.350	233	232
"	0	20.9	-0.177	106	0.359	21.6	26.1	102.0	1.203	0.299	179	178
"	0	20.9	-0.124	66	0.284	21.6	26.0	102.0	1.203	0.236	123	123
"	0	20.8	-0.095	46	0.238	21.6	26.0	102.0	1.203	0.198	95	95
Clean filter pressure drop is proportional to $(q_{Vf})^n$, where $n = 1.595$												
Dust loading phase												
27.3.2002	0	20.1	-0.159	67	0.287	20.3	26.6	102.2	1.211	0.237	124	123
"	30	20.3	-0.162	67	0.286	20.7	25.7	102.2	1.209	0.237	131	130
"	30	20.2	-0.161	67	0.286	20.9	25.3	102.2	1.208	0.237	130	129
"	150	20.4	-0.177	66	0.284	21.0	25.9	102.2	1.208	0.235	147	146
"	831	20.4	-0.278	66	0.283	20.8	26.7	101.6	1.201	0.236	251	251
2.4.2002	831	19.8	-0.287	67	0.288	20.1	23.6	102.8	1.219	0.236	252	250
"	2051	20.4	-0.528	68	0.288	20.9	22.9	102.6	1.213	0.237	496	492
4.4.2002	2051	20.2	-0.523	66	0.286	20.9	22.1	102.6	1.213	0.235	494	490
"	2591	20.2	-0.661	66	0.285	20.9	13.5	102.1	1.208	0.236	627	624
8.4.2002	2591	19.9	-0.636	67	0.288	20.2	22.1	103.0	1.221	0.236	609	603
"	3380	20.3	-0.919	67	0.287	20.9	16.5	102.8	1.216	0.236	888	880
9.4.2002	3380	20.3	-0.891	69	0.290	20.9	16.4	102.8	1.216	0.238	854	847
"	3680	20.6	-0.106	67	0.287	21.0	18.6	102.7	1.214	0.236	1028	1020

1* measured before next dust increment

2* measured after dust increment

Symbols and units

Δp	orifice plate differential pressure, Pa	q_m	air mass flow rate, kg/s
m_{tot}	total mass of dust fed to filter, g	q_{Vf}	air flow rate at filter, m ³ /s
Δp	filter pressure drop, Pa	t	temperature at orifice plate, °C
$\Delta p_{1.20}$	filter pressure drop at air density 1.20 kg/m ³ , Pa	t_f	temperature upstream of filter, °C
p_a	absolute air pressure upstream of filter, kPa	ϕ	relative humidity upstream of filter, %
p_s	orifice plate static pressure, kPa	ρ	air density upstream of filter, kg/m ³

¹⁾ Orifice plate dimensions

Duct dimensions: 610 mm x 610 mm

Orifice diameter: 216 mm

Air filter: CD325/660/141/18.5 NA 141 GT TURBO
Pressure drop and arrestance after different dust loading phases
EUROVENT 4/9 - 1997

Test no: 021566

Date	Δp_1 Pa	dm g	m_{tot} g	Δp_2 Pa	m_1 g	m_2 g	Δm g	m_d g	A %
27.3.2002	123	30	30	130	3256.1	3256.0	0.0	0.0	100.0
"	129	120	150	146	3256.0	-	-	-	-
"	146	681	831	251	-	3256.6	0.6	0.0	99.9
2.4.2002	250	1220	2051	492	3255.5	3256.0	0.5	0.0	100.0
4.4.2002	490	540	2591	624	3256.0	3255.1	0.0	0.0	100.0
8.4.2002	603	789	3380	880	3255.2	3255.2	0.0	0.0	100.0
9.4.2002	847	300	3680	1020	3255.2	3255.4	0.2	0.0	99.9

Symbols and units

A	arrestance, %
dm	dust increment, g
Δp_1	pressure drop before dust increment (air density 1.20 kg/m ³), Pa
Δp_2	pressure drop after dust increment (air density 1.20 kg/m ³), Pa
m_d	dust in duct after device, g
m_1	mass of final filter before dust increment, g
m_2	mass of final filter after dust increment, g
m_{tot}	total mass of dust fed to filter, g
Δm	mass gain of final filter, g

Mass of tested device

Initial mass of tested device:	-
Final mass of tested device:	-

Test dust

Type:	ISO 1203-1, Fine Test Dust A2
Manufactured by:	Powder Technology Incorporated
Batch no.:	Analysis 4891F 04 NOV 1999