

Performance of Dahl Suomi Oy circular ducts

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Assignment	Performance of Dahl Suomi Oy circular ducts
Sample details	<p>Straight ducts in five different duct sizes were tested; Ø100 mm, Ø125 mm, Ø160 mm, Ø200 mm and Ø250 mm. The specification of the ducts and test setup is in Appendix 1.</p> <p>Measurements were carried out at Dahl Suomi Oy factory in Vantaa at 12.2.2025.</p>
Methods	<p>Ducts dimensions were measured according to standard EN 1506:2007 /1/.</p> <p>Strength and leakage were measured according EN 12237:2003 /2/. In the tests the joint between duct and end caps were taped.</p> <p>Air static pressure was measured in the ducting. Air flow rates were measured according to ISO 5167-1:2022 and ISO 5167-2:2022 /3/ using orifice plates with corner tappings.</p> <p>FINAS Finnish Accreditation Service has accredited our laboratory (T001) to perform measurements according to standards EN 12237:2003, ISO 5167-1:2022 and ISO 5167-2:2022. All other measurements and tests, which are referred to in this test report are not accredited.</p>
Results	Measured duct dimensions are presented in Appendix 2. All tested ducts dimensions met the standard limits.

The measurement results of ducts leakage at positive and negative pressure are presented in Appendix 3. All tested duct achieved leakage class D.

Uncertainty of the measurements are presented in Appendix 4.

The instruments used in the measurements are presented in Appendix 5.

The test results relate only to the sample tested.

References

/1/ EN 1506:2007. Ventilation for buildings – Sheet metal air ducts and fittings with circular cross-section – Dimensions.

/2/ EN 12237:2003. Ventilation for buildings – Ductwork – Strength and leakage of circular sheet metal ducts.

/3/ ISO 5167-1:2022. Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full. Part 1: General principles and requirements.

ISO 5167-2:2022. Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full. Part 2: Orifice plates.

Espoo, 19.2.2025

Pekka Kettunen

Senior expert

Appendices 5

Distribution Customer, electronically approved

Dahl Suomi Oy circular ducts

Description of the sample (according to information from the client).



Total of five different ducts (Ø100 mm, Ø125 mm, Ø160 mm, Ø200 mm and Ø250 mm) were measured with the same test principal.

In the tests the joint between duct and end caps were taped.

Ducting: Dahl Suomi Oy circular ducts

Ducts dimensions

EN 1506:2007

Duct	Min tolerance	Max tolerance	Measured d, mm	Lenght l, mm	Wall thickness, mm
Duct Ø100 mm	100,0	100,5	100,0 / 100,0	3000	0,51 / 0,51
Duct Ø125 mm	125,0	125,5	125,1 / 125,1	3000	0,52 / 0,52
Duct Ø160 mm	160,0	160,6	160,1 / 160,1	3000	0,52 / 0,52
Duct Ø200 mm	200,0	200,7	200,0 / 200,0	2999	0,52 / 0,52
Duct Ø250 mm	250,0	250,8	250,3 / 250,3	3000	0,53 / 0,53

Duct: Dahl Suomi Oy Ø100 mm duct, length 3000 mm

Duct leakage and strength

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,51 mm

Joint length L: 2.51 m

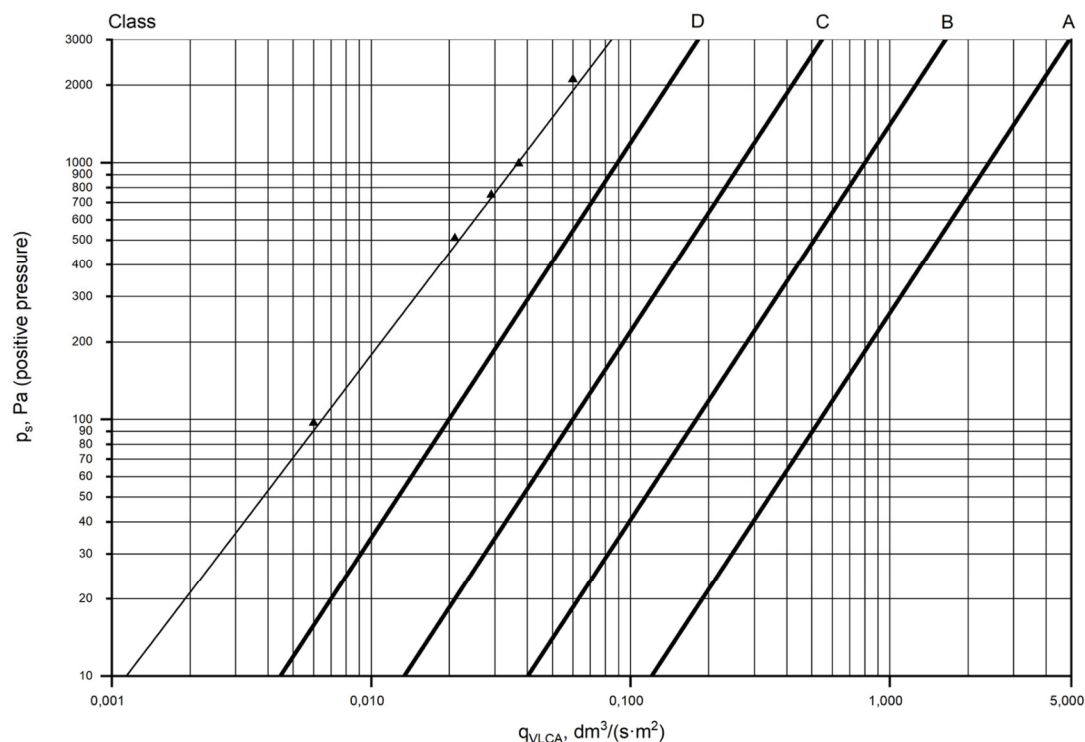
Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)

(positive test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
97,0	0,005	0,006	D
508	0,020	0,021	D
749	0,028	0,029	D
993	0,035	0,037	D
2104	0,057	0,060	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



The results are only valid for the tested sample(s).
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Duct: Dahl Suomi Oy Ø100 mm duct, length 3000 mm

Duct leakage and strenght

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,51 mm

Joint length L: 2.51 m

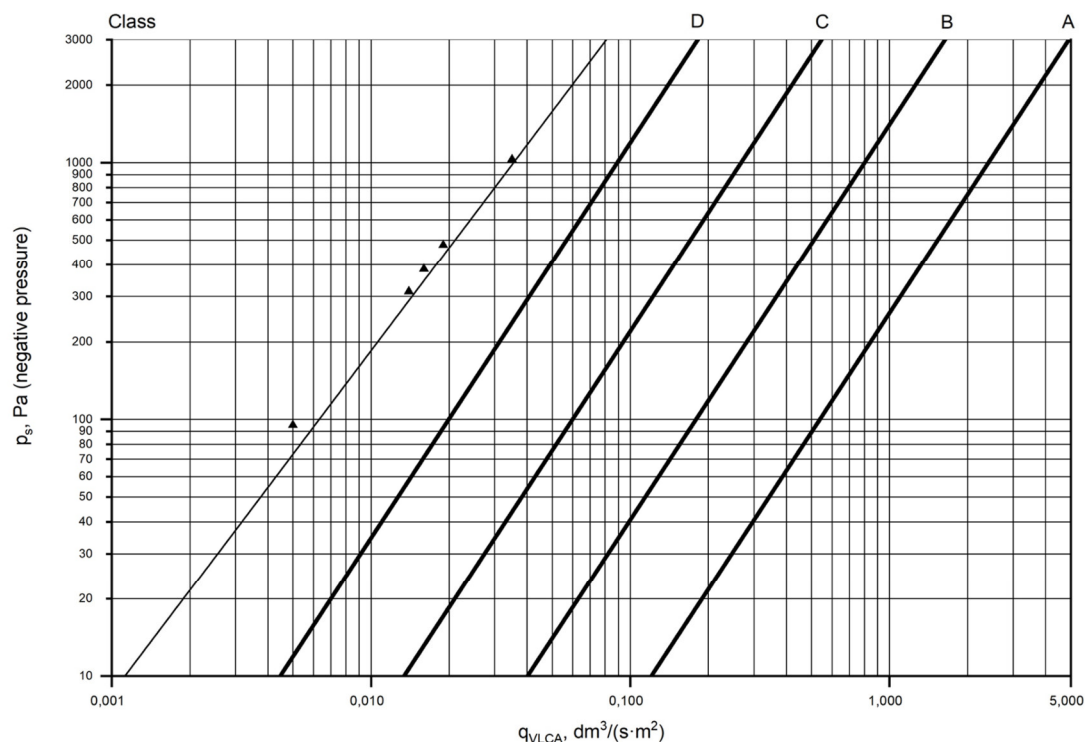
Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)

(negative test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
-95,2	0,005	0,005	D
-314	0,013	0,014	D
-384	0,015	0,016	D
-479	0,018	0,019	D
-1030	0,033	0,035	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø125 mm duct, length 3000 mm

Duct leakage and strength

EN 12237:2003

Length L: 3000 mm

Material thickness: 0,52 mm

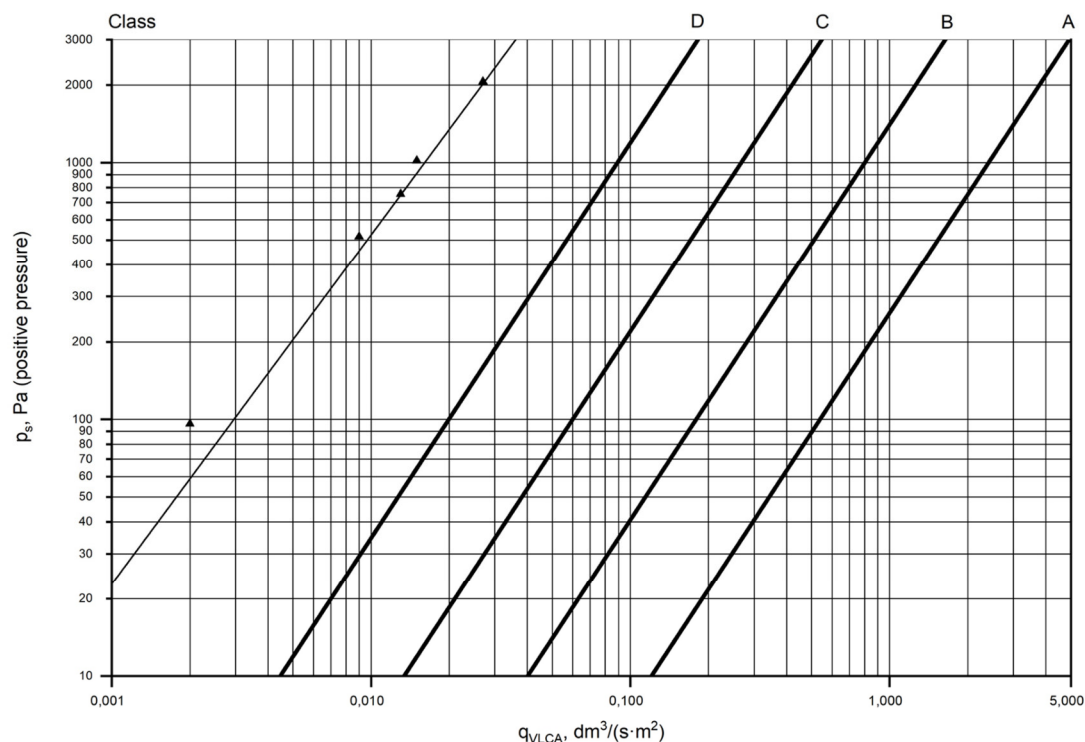
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(positive test pressure).



p_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
95,8	0,003	0,002	D
516	0,011	0,009	D
756	0,015	0,013	D
1017	0,018	0,015	D
2064	0,032	0,027	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø125 mm duct, length 3000 mm

Duct leakage and strenght

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,52 mm

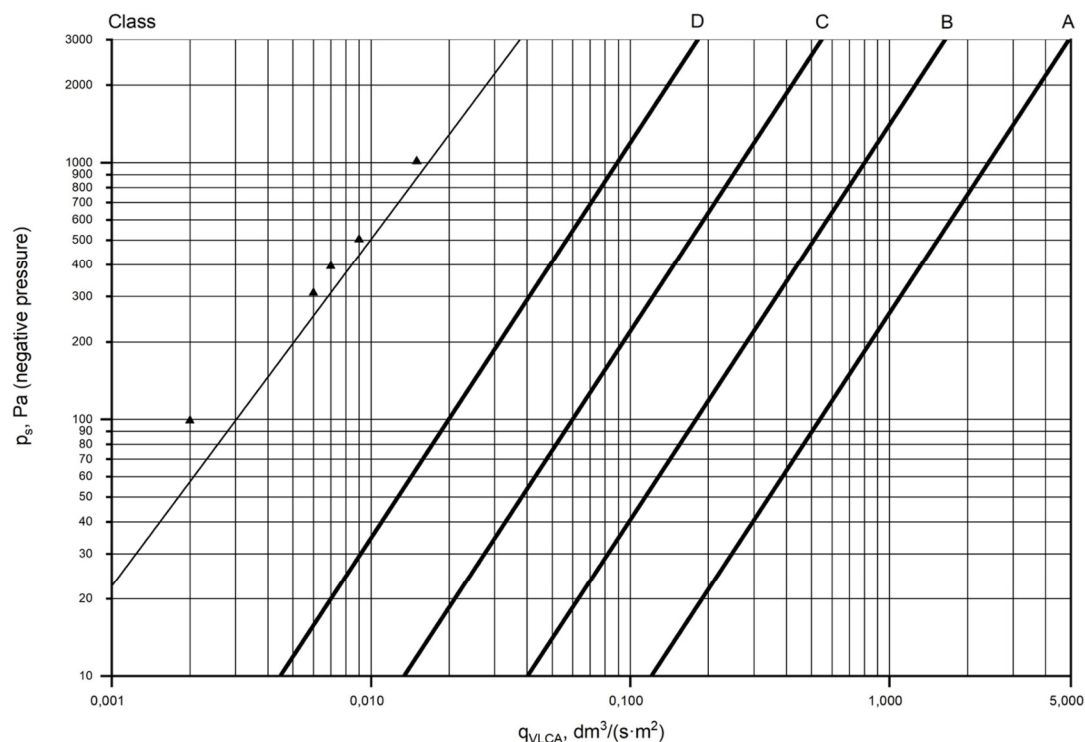
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(negative test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
-99,3	0,003	0,002	D
-310	0,007	0,006	D
-394	0,009	0,007	D
-502	0,010	0,009	D
-1013	0,018	0,015	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø160 mm duct, length 3000 mm

Duct leakage and strength

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,52 mm

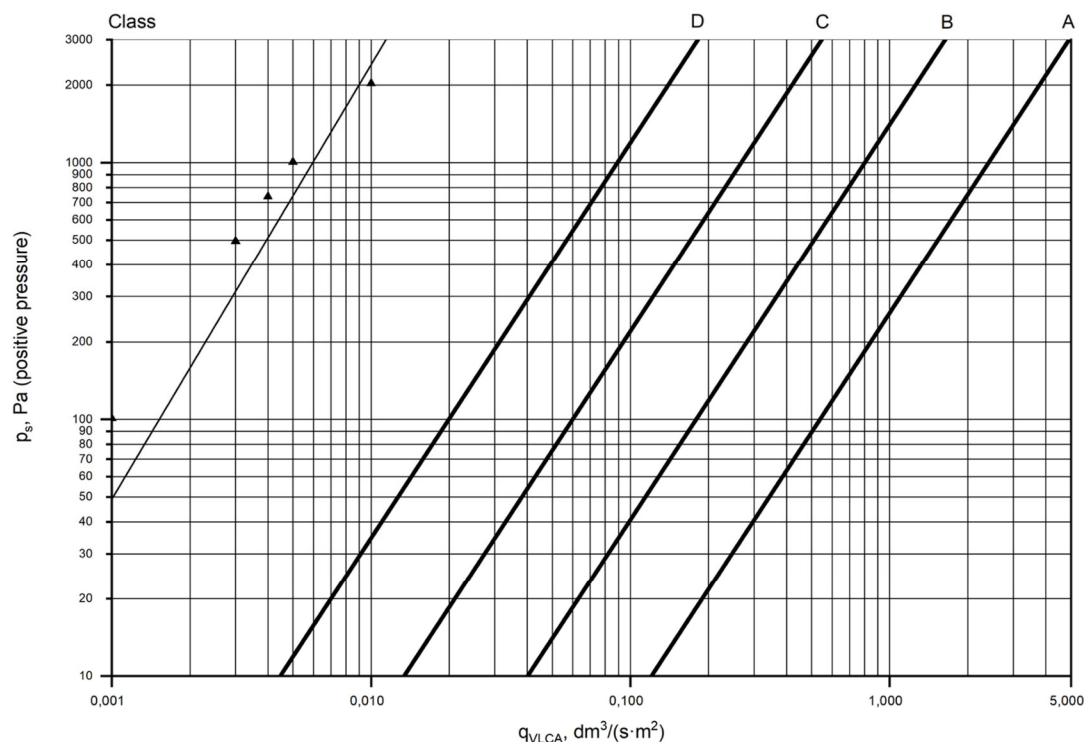
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(positive test pressure).



p_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
101	0,002	0,001	D
495	0,005	0,003	D
739	0,006	0,004	D
1007	0,008	0,005	D
2031	0,015	0,010	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø160 mm duct, length 3000 mm

Duct leakage and strenght

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,52 mm

Joint length L: 2.51 m

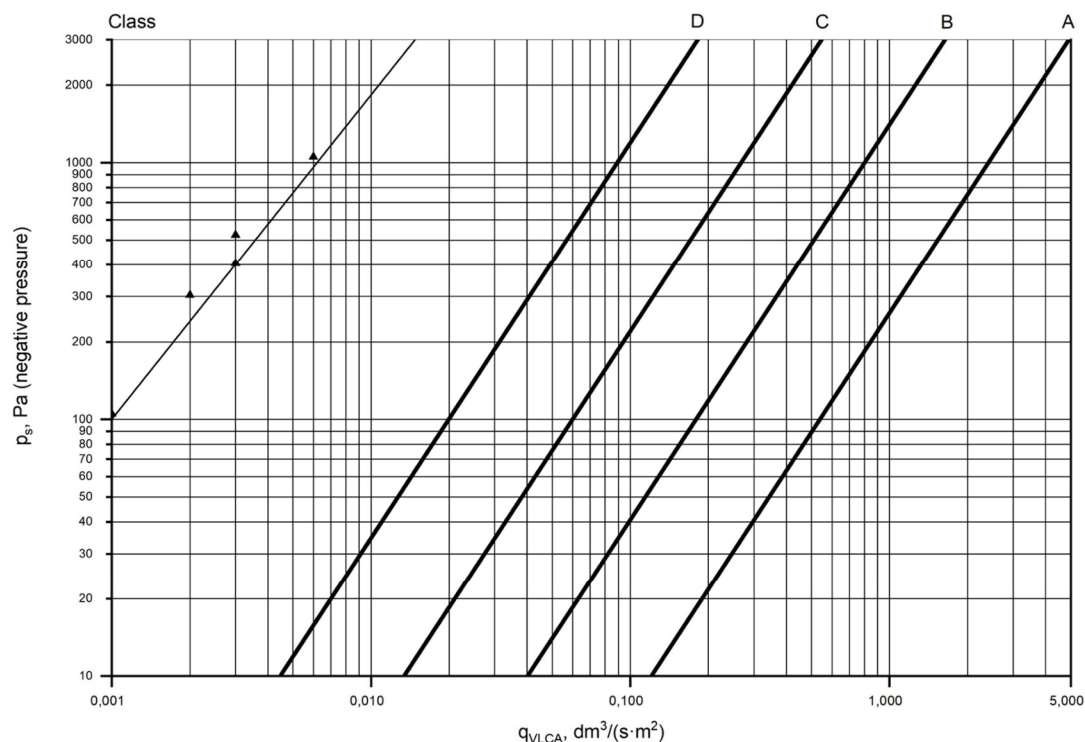
Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)

(negative test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
-105	0,001	0,001	D
-304	0,003	0,002	D
-405	0,004	0,003	D
-523	0,005	0,003	D
-1053	0,010	0,006	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø200 mm duct, length 2999 mm

Duct leakage and strenght

EN 12237:2003

Length l: 2999 mm

Material thickness: 0,52 mm

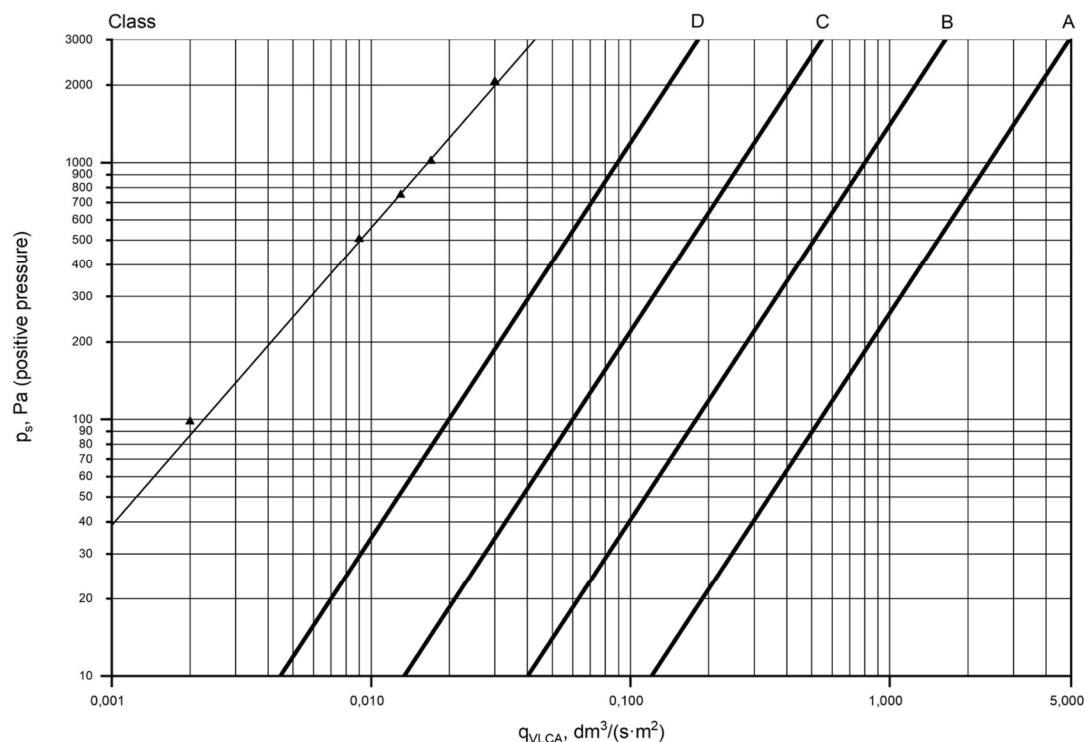
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(positive test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
97,8	0,004	0,002	D
504	0,018	0,009	D
750	0,025	0,013	D
1016	0,033	0,017	D
2062	0,056	0,030	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø200 mm duct, length 2999 mm

Duct leakage and strength

EN 12237:2003

Length l: 2999 mm

Material thickness: 0,52 mm

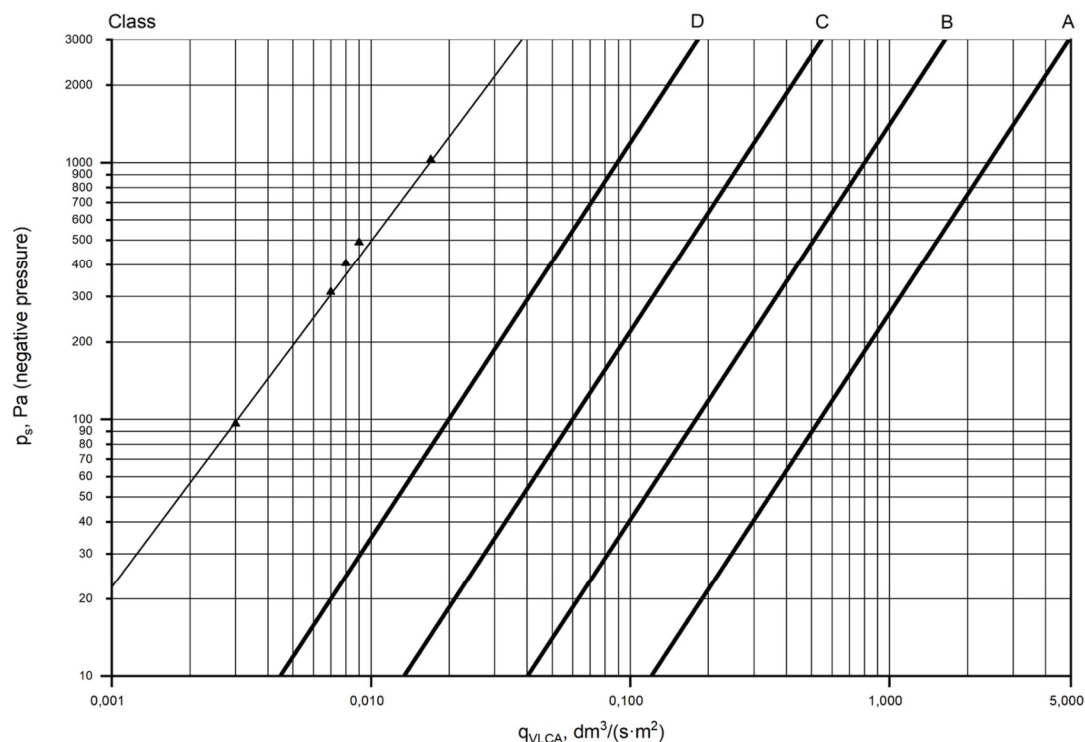
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(negative test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
-95,7	0,005	0,003	D
-313	0,013	0,007	D
-405	0,015	0,008	D
-489	0,016	0,009	D
-1027	0,032	0,017	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø250 mm duct, length 3000 mm

Duct leakage and strength

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,53 mm

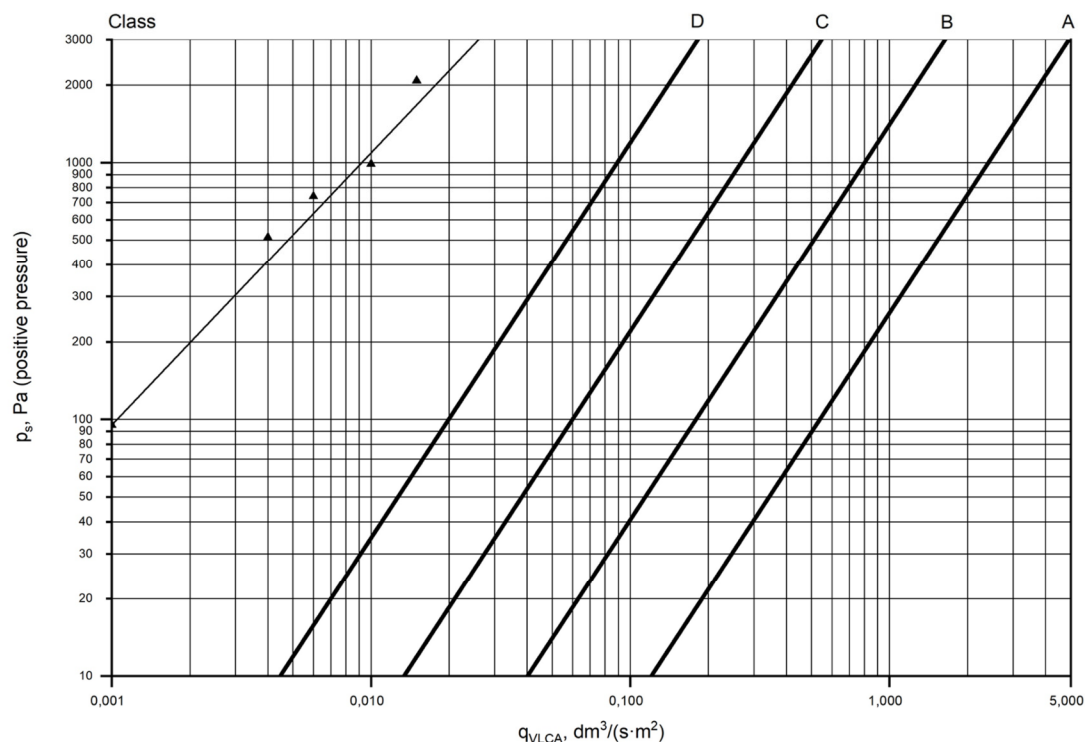
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(positive test pressure).



P_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
95,0	0,001	0,001	D
513	0,010	0,004	D
740	0,014	0,006	D
988	0,022	0,010	D
2082	0,035	0,015	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Duct: Dahl Suomi Oy Ø250 mm duct, length 3000 mm

Duct leakage and strenght

EN 12237:2003

Length l: 3000 mm

Material thickness: 0,53 mm

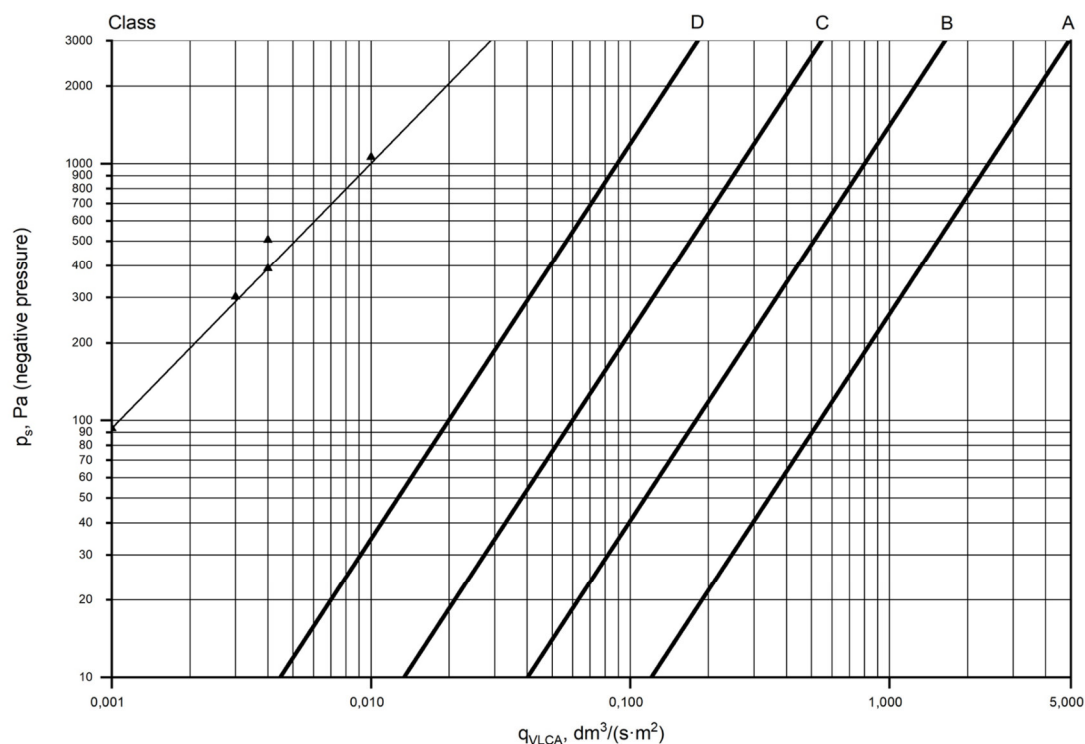
Joint length L: 2.51 m

Reference casing area A: 3.77 m²

Ratio between the total joint length L and ductwork surface area A: 0,7 1/m

Air density: 1.20 kg/m³

Ductwork fulfills the requirement of leakage class D (EN 12237:2003)
(negative test pressure).



p_s Pa	q_{VL} dm ³ /s	q_{VLCA} dm ³ /(s·m ²)	Leakage class
-93,3	0,002	0,001	D
-302	0,006	0,003	D
-390	0,008	0,004	D
-505	0,010	0,004	D
-1061	0,023	0,010	D

Symbols and units

p_s Static test pressure, Pa

q_{VL} Leakage air flow, dm³/s

q_{VLCA} Leakage air flow per reference casing area, dm³/(s·m²)



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Uncertainty of measurement

The results from the test are based partly on measurements and partly on calculations. The total uncertainty of measurements of the results in the report has been calculated in accordance with the following estimates of uncertainties of measurements and calculation. The uncertainty has been calculated with a coverage factor $k=2$ which provides a level of confidence of approximately 95 % for a normal distribution of measured values.

Total uncertainty of air flow measurements is 3 %. Total uncertainty of static pressure measurement is 2 %. Uncertainty of dimension measurements is 0,08 mm for diameter and 5 mm for length of ducts and components.

Pressure difference

Manufacturer Furness
Type FCO432
Range ± 2500 Pa
Accuracy 10% to 100% range: $< \pm (0.25\% \text{ reading} + 1 \text{ digit})$
0 to 10% range: $< \pm (0.025\% \text{ range} + 1 \text{ digit})$
Serial number 2211003

Manufacturer Furness
Type FCO432
Range ± 2500 Pa
Accuracy 10% to 100% range: $< \pm (0.25\% \text{ reading} + 1 \text{ digit})$
0 to 10% range: $< \pm (0.025\% \text{ range} + 1 \text{ digit})$
Serial number 2211004

Manufacturer Furness
Type FCO432
Range ± 20 kPa
Accuracy 10% to 100% range: $< \pm (0.25\% \text{ reading} + 1 \text{ digit})$
0 to 10% range: $< \pm (0.025\% \text{ range} + 1 \text{ digit})$
Serial number 2211005

Atmospheric pressure and humidity

Manufacturer Vaisala
Type PTU303
Range 50...1100 hPa / 0...100 %RH / -40...+60 °C
Accuracy At +15... 25 °C ± 1 %RH (0...90 %RH)
 $\pm 1,7$ %RH (90...100 %RH)
At +20 °C $\pm 0,05$ hPa
At +20 °C $\pm 0,2$ °C
Serial number M4440048

Temperature

Manufacturer Agilent
Type 34970A
Range -100...450 °C
Accuracy $\pm 0,02$ °C
Serial number MY44066372

Instruments used:

Instrument	Type code	Serial number	Calibration date
Micromanometer	Furness FCO432	2211005	11.7.2024
	Furness FCO432	2211003	11.7.2024
	Furness FCO432	2211004	11.7.2024
Barometer	Vaisala PTU303	M4440048	12.7.2024
Hygrometer	Vaisala PTU303	M4440048	14.1.2025
Thermometer	Agilent 34970A	MY44066372	7.7.2024
Orifice plate	Φ 50 / Φ 1.2	-	-