

Adressee : *For the attention of Mr Hervé PRIGENT*
ANJOS VENTILATION
ROCHE BLANCHE
01230 TORCIEU

Villeurbanne, 05/04/2017

Person in charge: **Camille LEFEBVRE**

Function: Project Manager

Signature:

Test Report N° 1660221-4

Version: 00

**Characterization of a range of adjustable flow regulators
according to the draft standard NF E 51-776-1**

EQUIPMENT ID: Adjustable flow regulators for duct RDR Ø200 and Ø250

MANUFACTURER: ANJOS VENTILATION

REFERENCE DOCUMENT(S): pr NF E 51-776-1

TESTS MADE BY: Gilles COUDERC

DATE OF TESTS: October to November 2016

CENTRE TECHNIQUE DES INDUSTRIES AÉRAULIQUES ET THERMIQUES

Domaine Scientifique de la Doua - 25, avenue des Arts - BP 52042 - 69603 Villeurbanne Cedex - France

Tél. +33 (0)4 72 44 49 00 - Fax. +33 (0)4 72 44 49 49 - www.cetiat.fr - EMail : commercial@cetiat.fr

Livraisons : Domaine Scientifique de la Doua - 54, avenue Niels Bohr - 69100 Villeurbanne

Siret 775 686 967 00024 - Ape 7219 Z

The signed final report cancels all the draft documents distributed before.

Each new version of the report cancels and replaces the previous one.

All canceled copies or duplicates of the report must be destroyed. We draw your attention on risks of mistakes encountered by using a canceled version.

Version	Date	Nature of change	Modified pages
00	05/04/2017	First edition	

Results of reports are the exclusive property of the customer and CETIAT prohibits their distribution to third parties without prior written consent.

Any commercial use of the name CETIAT or of results is subject to CETIAT's prior consent.

This report may be reproduced only in its entirety.

The reports written by CETIAT are valid only for the equipment provided for the test in the specific conditions under which the test was run.

Information concerning the measurement equipment used for the tests is kept in CETIAT's archives.

The use of these results for designing equipments using this material must take into account manufacturing tolerances and real operating conditions. CETIAT cannot be held liable for such use of these results.

The formulas or codes used to predict either the operation of a device in conditions other than those used in the test or the characteristics of similar devices of different dimensions are based on the state of knowledge at the time the results were delivered and are subject to change. The results obtained through these formulas or codes are given as an indication only.

The report digitally signed is sent to the customer. A copy is kept at CETIAT.

<i>C O N T E N T S</i>

1. INTRODUCTION.....	4
2. SUMMARY OF RESULTS.....	4
2.1. Regulator RDR Ø200	4
2.2. Regulator RDR Ø250	5
3. RESULTS RDR Ø200	6
4. RESULTS RDR Ø250	11
APPENDIX 1 - TESTED PRODUCTS	19
APPENDIX 2 - DESCRIPTION OF THE TESTS	21
APPENDIX 3 - DETAILED RESULTS RDR Ø200.....	24
APPENDIX 4 - DETAILED RESULTS RDR Ø250.....	26
APPENDIX 5 - MEASUREMENT UNCERTAINTIES	28

1. INTRODUCTION

ANJOS Ventilation asked CETIAT to characterize the airflow/pressure curves for adjustable flow regulators, installed in duct and named RDR.

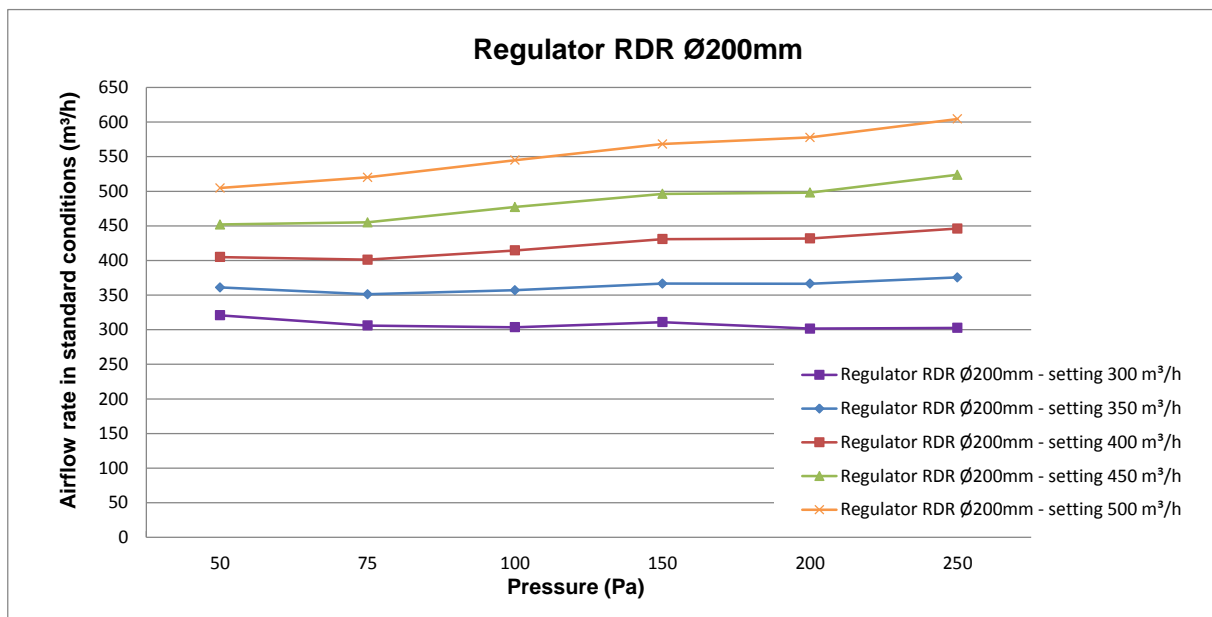
Two products are tested:

- RDR Ø200: regulator diameter 200 mm
- RDR Ø250: regulator diameter 250 mm

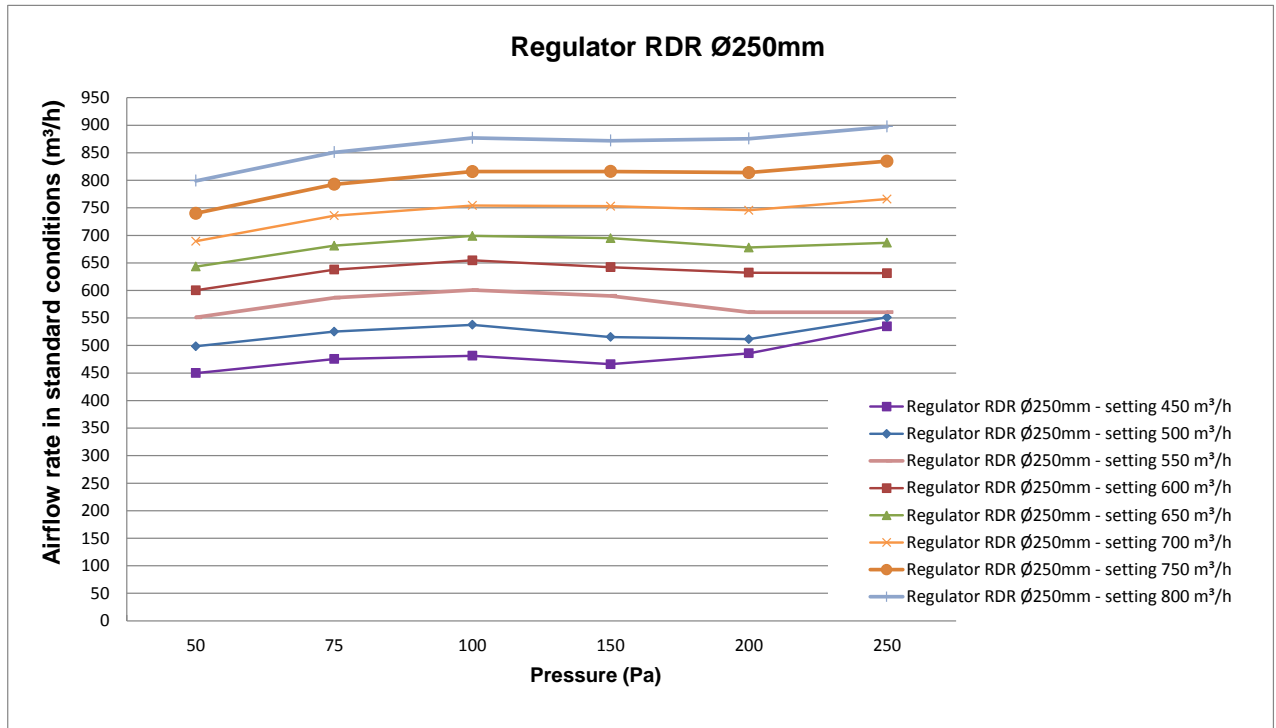
The tests are done according to the draft standard under formal vote pr NF E 51-776-1 " *Ventilation des bâtiments - Appareils de régulation de débit d'air en conduits – Partie 1 : Essais*".

2. SUMMARY OF RESULTS

2.1. *Regulator RDR Ø200*

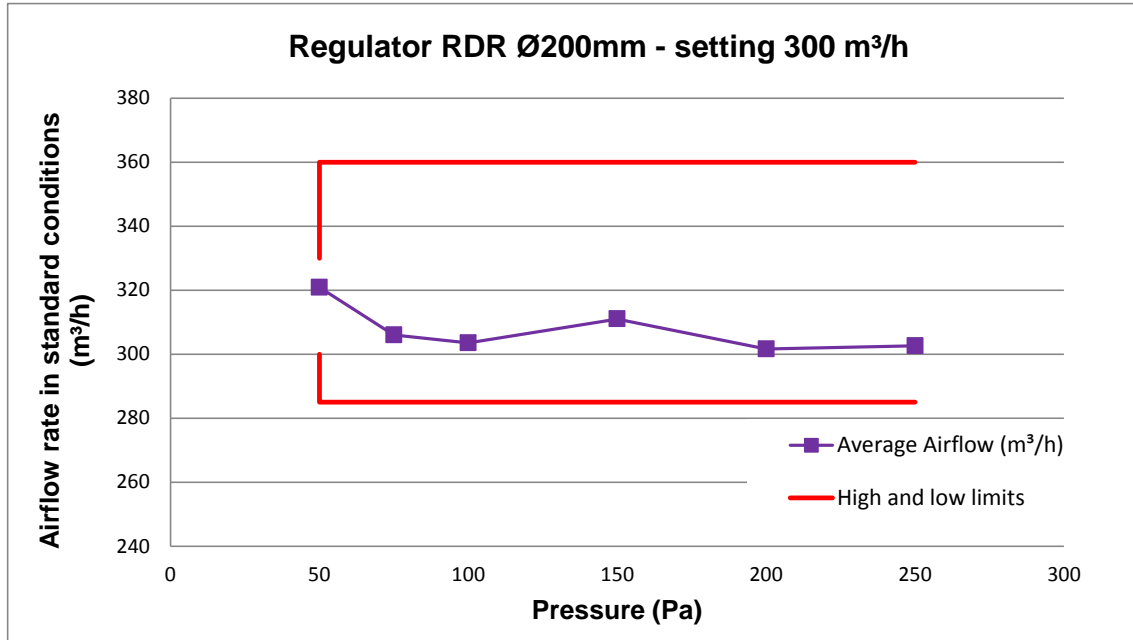


2.2. Regulator RDR Ø250



3. RESULTS RDR Ø200

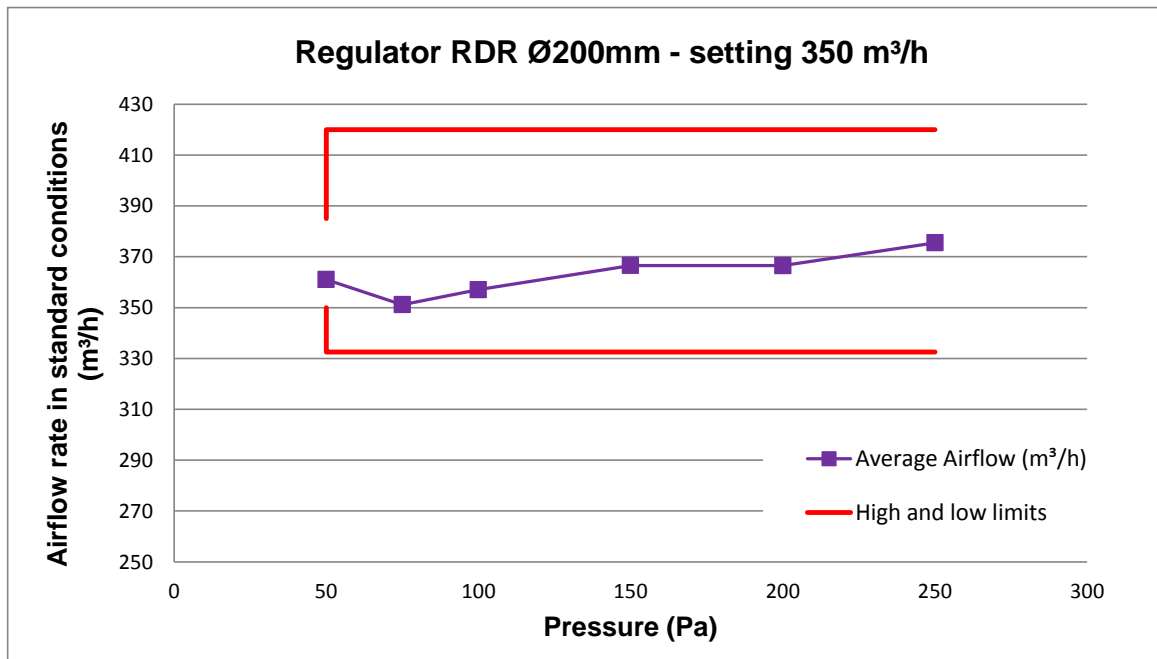
RDR Ø200 - Airflow 300 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	320.9
75	306.0
100	303.5
150	311.0
200	301.6
250	302.6

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	321.6
	75	319.7
	100	310.8
	150	321.8
	200	319.9
	250	303.1
<i>Decrease</i>	250	302.1
	200	283.3
	150	300.2
	100	296.2
	75	292.3
	50	320.1

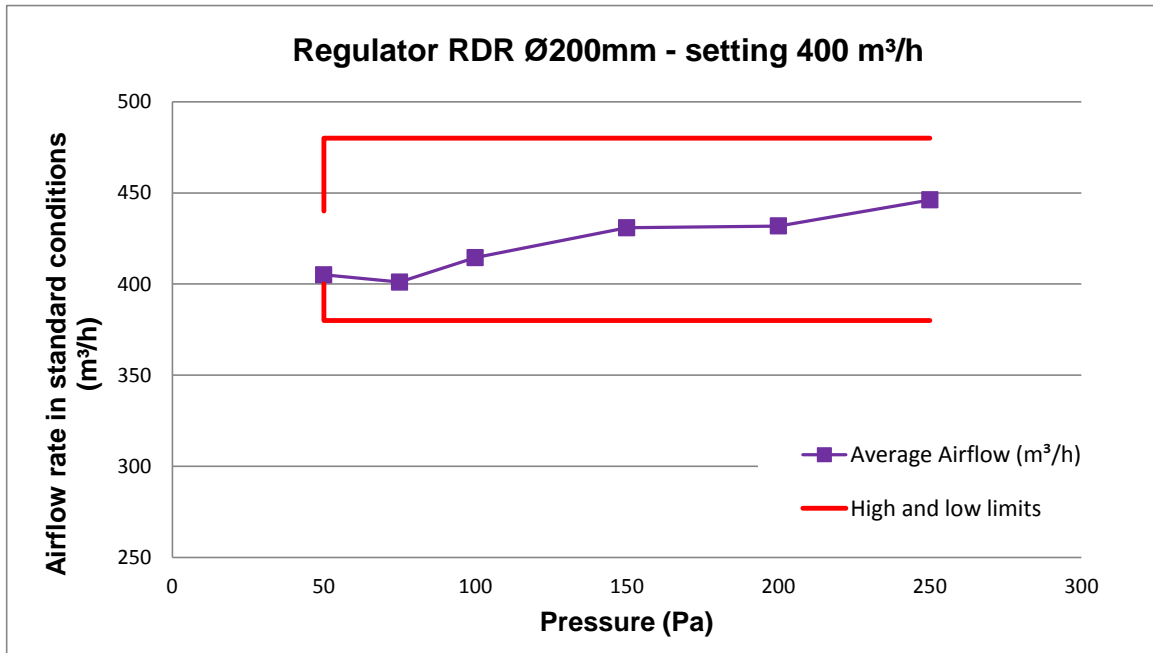
RDR Ø200 - Airflow 350 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	361.0
75	351.1
100	357.1
150	366.6
200	366.5
250	375.5

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	364.4
	75	363.4
	100	366.3
	150	380.3
	200	383.3
	250	376.5
<i>Decrease</i>	250	374.5
	200	349.7
	150	352.8
	100	347.8
	75	338.9
	50	357.7

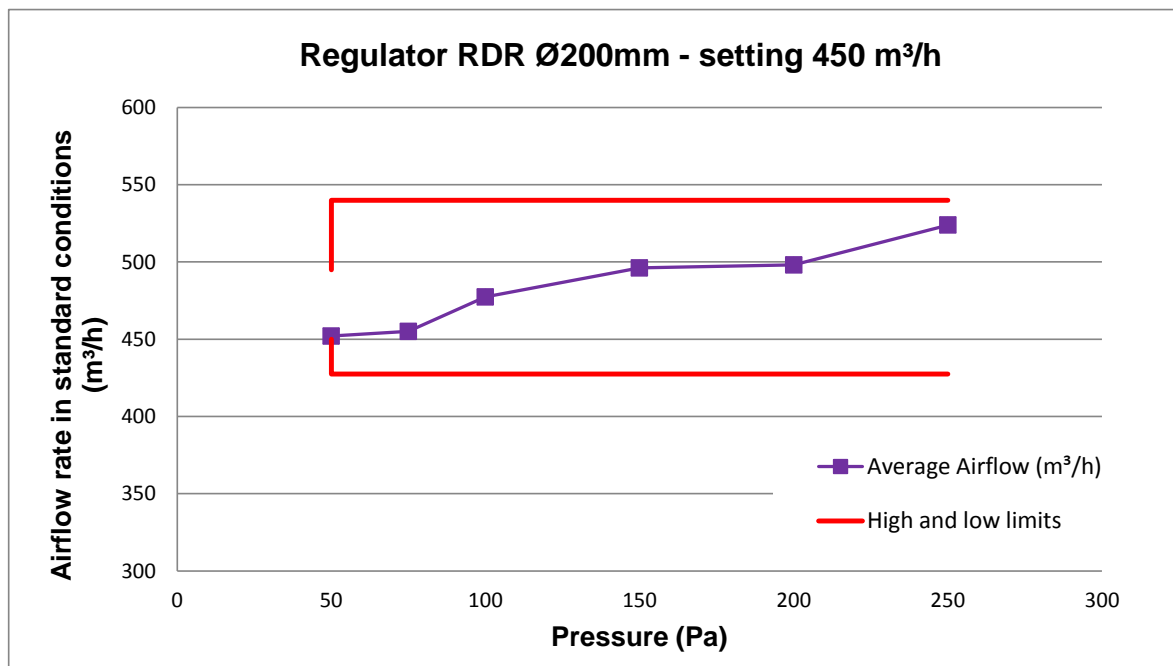
RDR Ø200 - Airflow 400 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	405.1
75	401.1
100	414.5
150	430.8
200	431.8
250	446.2

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	405.5
	75	412.4
	100	424.3
	150	449.2
	200	453.1
	250	448.1
<i>Decrease</i>	250	444.2
	200	410.5
	150	412.5
	100	404.7
	75	389.7
	50	404.7

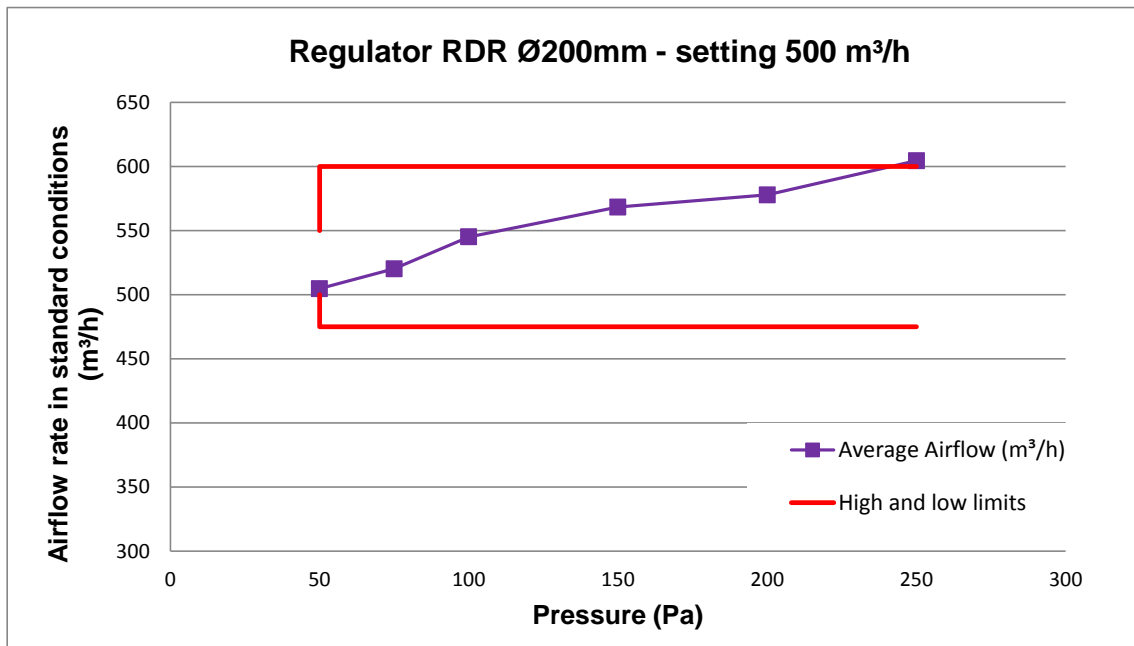
RDR Ø200 - Airflow 450 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	452.0
75	455.0
100	477.3
150	496.2
200	498.1
250	523.9

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	452.8
	75	464.7
	100	489.6
	150	517.4
	200	524.4
	250	525.3
<i>Decrease</i>	250	522.4
	200	471.8
	150	475.0
	100	465.1
	75	445.3
	50	451.2

RDR Ø200 - Airflow 500 m³/h

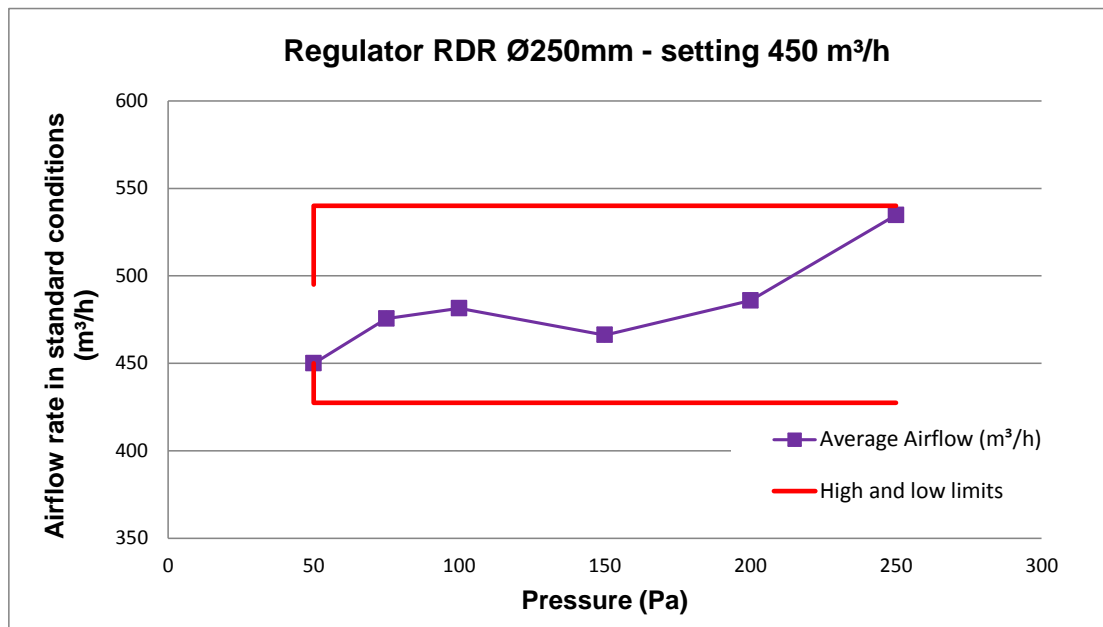


Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	504.7
75	520.1
100	545.0
150	568.2
200	577.8
250	604.4

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	507.1
	75	531.1
	100	560.1
	150	589.9
	200	601.4
	250	606.1
<i>Decrease</i>	250	602.8
	200	554.3
	150	546.6
	100	529.9
	75	509.2
	50	502.3

4. RESULTS RDR Ø250

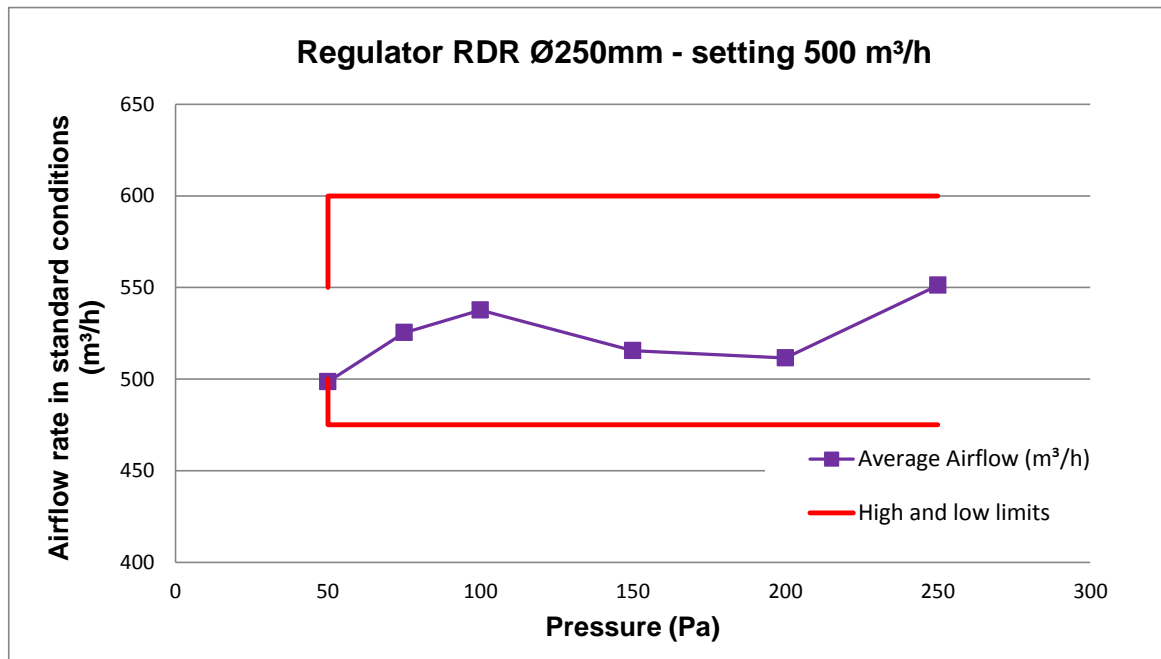
RDR Ø250 - Airflow 450 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	449.9
75	475.5
100	481.4
150	466.1
200	485.8
250	534.7

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	473.7
	75	499.3
	100	505.2
	150	494.2
	200	486.3
	250	536.7
<i>Decrease</i>	250	532.7
	200	485.3
	150	438.0
	100	457.6
	75	451.7
	50	426.1

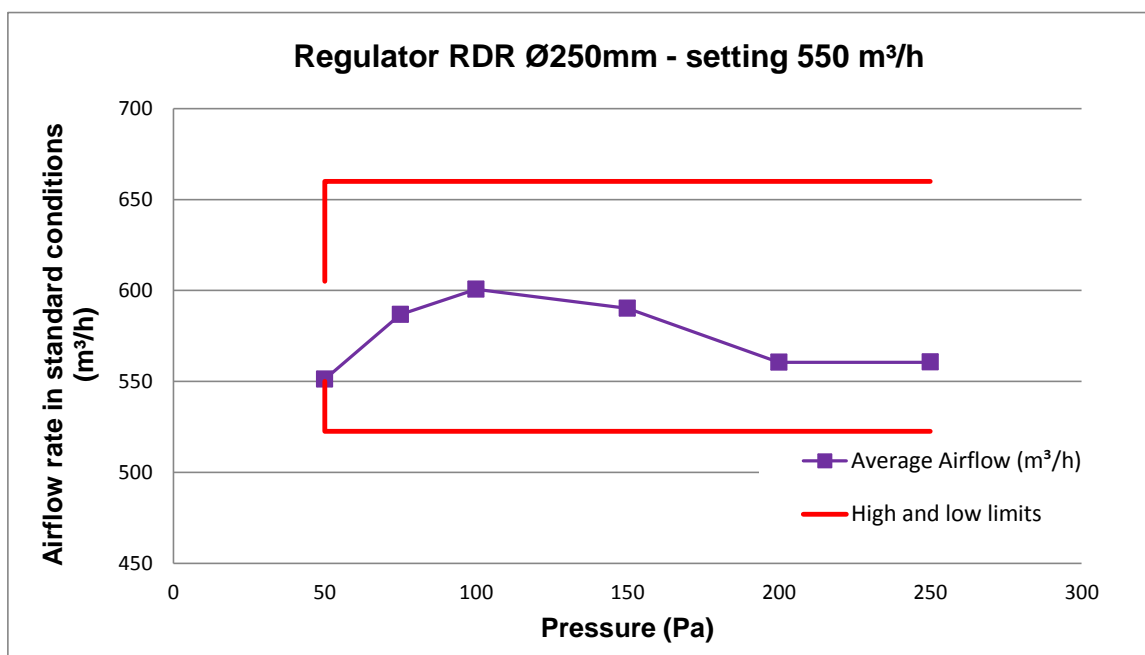
RDR Ø250 - Airflow 500 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	498.5
75	525.3
100	537.6
150	515.5
200	511.5
250	551.1

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	520.5
	75	551.2
	100	561.0
	150	550.2
	200	520.4
	250	554.1
<i>Decrease</i>	250	548.1
	200	502.6
	150	480.7
	100	514.2
	75	499.3
	50	476.5

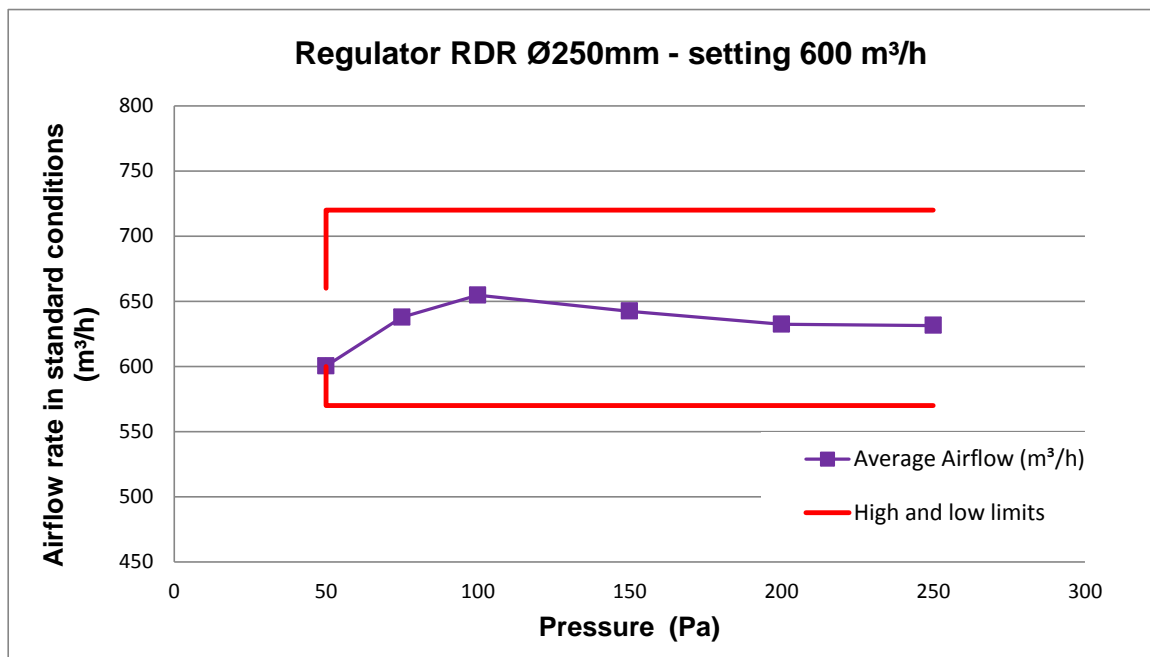
RDR Ø250 - Airflow 550 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	551.2
75	586.7
100	600.6
150	590.1
200	560.5
250	560.5

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	576.1
	75	614.6
	100	629.3
	150	634.2
	200	600.6
	250	564.0
<i>Decrease</i>	250	557.0
	200	520.4
	150	546.1
	100	571.8
	75	558.9
	50	526.3

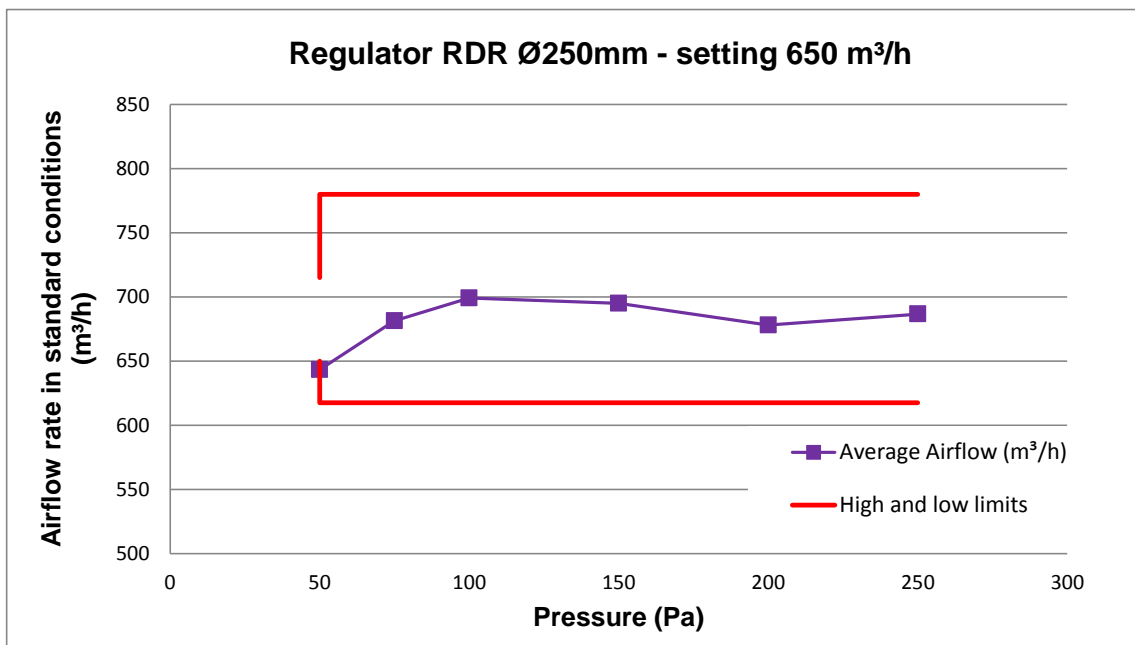
RDR Ø250 - Airflow 600 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	600.3
75	637.7
100	654.6
150	642.3
200	632.3
250	631.4

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	629.4
	75	667.8
	100	685.6
	150	687.5
	200	678.4
	250	634.9
<i>Decrease</i>	250	627.9
	200	586.3
	150	597.1
	100	623.6
	75	607.7
	50	571.1

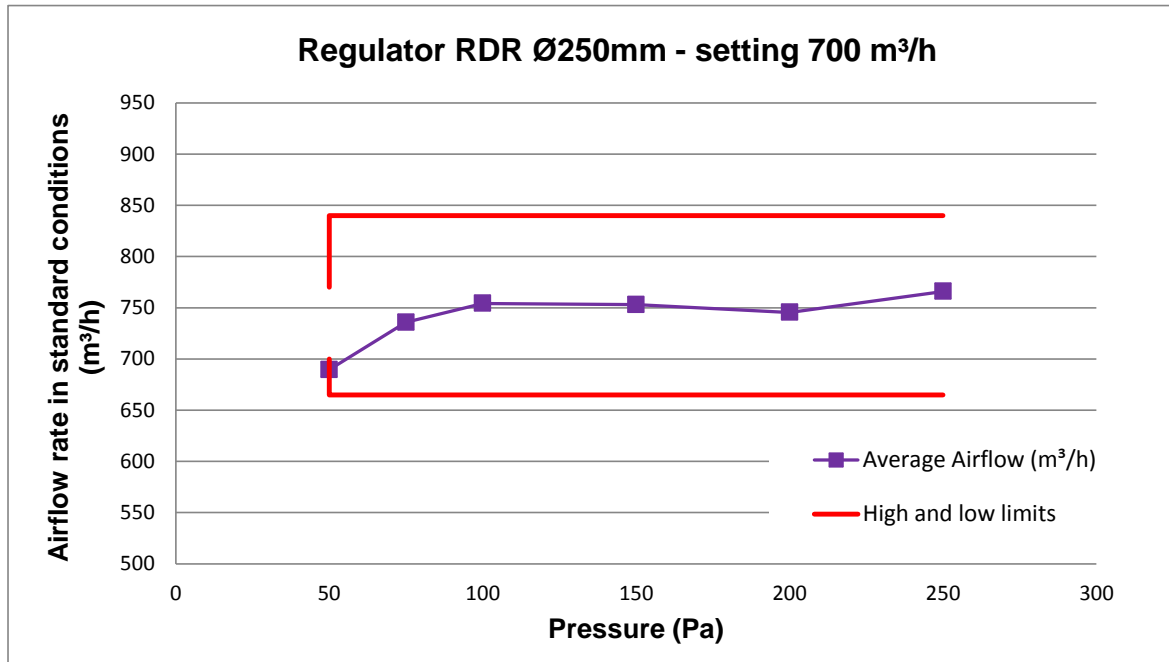
RDR Ø250 - Airflow 650 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	643.3
75	681.3
100	699.1
150	694.9
200	678.0
250	686.6

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	671.3
	75	713.9
	100	730.8
	150	741.5
	200	724.3
	250	690.6
<i>Decrease</i>	250	682.6
	200	631.6
	150	648.3
	100	667.3
	75	648.7
	50	615.2

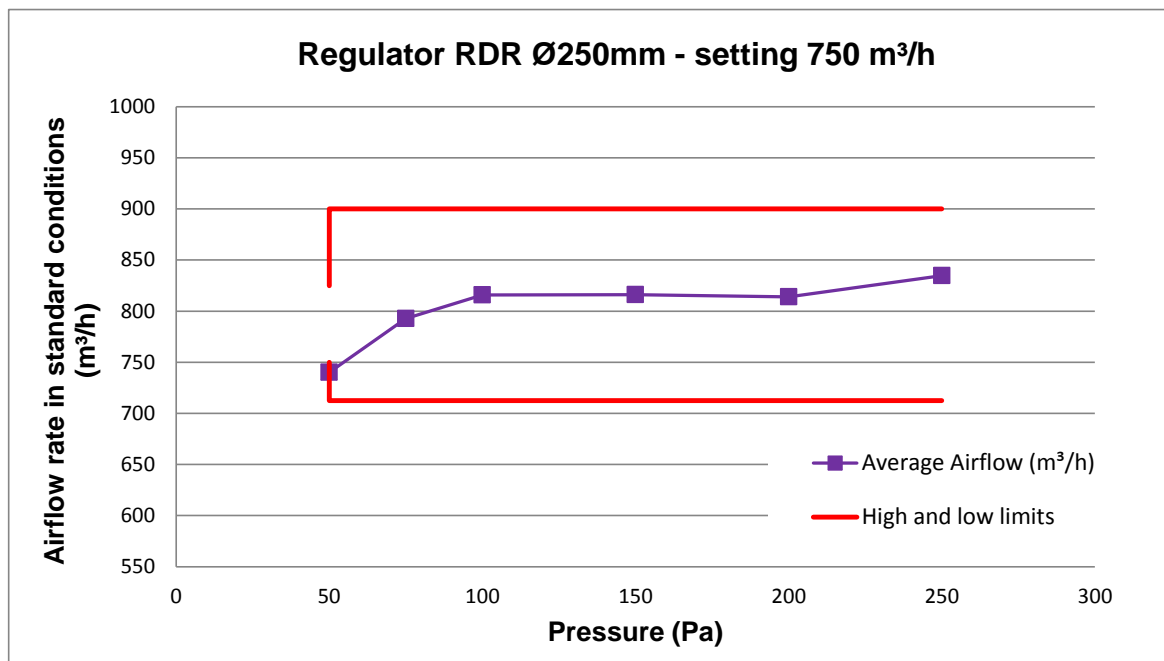
RDR Ø250 - Airflow 700 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	689.5
75	735.8
100	754.2
150	753.1
200	745.5
250	766.0

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	717.4
	75	768.8
	100	785.7
	150	802.9
	200	789.6
	250	768.2
<i>Decrease</i>	250	763.7
	200	701.4
	150	703.2
	100	722.7
	75	702.8
	50	661.5

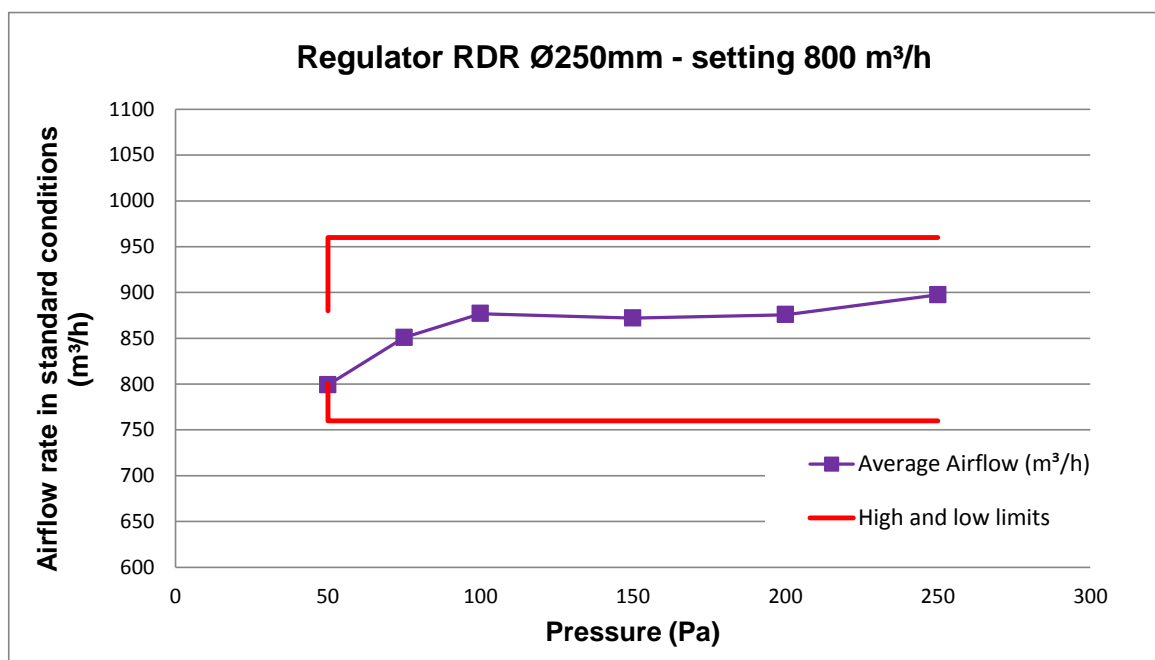
RDR Ø250 - Airflow 750 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	740.0
75	792.7
100	815.8
150	816.1
200	813.9
250	834.7

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	768.7
	75	824.8
	100	846.5
	150	869.1
	200	858.0
	250	837.1
<i>Decrease</i>	250	832.2
	200	769.8
	150	763.1
	100	785.1
	75	760.5
	50	711.3

RDR Ø250 - Airflow 800 m³/h



Static pressure difference (Pa)	Average airflow rate in standard conditions (m³/h)
50	799.1
75	850.7
100	876.9
150	871.9
200	875.6
250	897.3

	Static pressure difference (Pa)	Airflow rate in standard conditions (m³/h)
<i>Increase</i>	50	831.3
	75	885.4
	100	908.9
	150	924.2
	200	926.8
	250	901.3
<i>Decrease</i>	250	893.4
	200	824.4
	150	819.6
	100	844.9
	75	816.1
	50	766.8

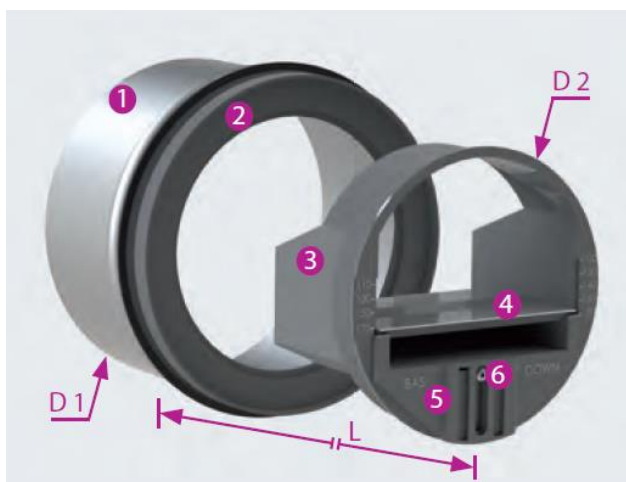
APPENDIX 1 - TESTED PRODUCTS

The products tested are adjustable flow regulators, installed in duct, named RDR. They work for pressure between 50 and 250 Pa.

Two products are tested:

- RDR Ø200: regulator diameter 200 mm
- RDR Ø250: regulator diameter 250 mm

Each regulator has several settings of airflow.



- ① Manchette avec joint d'étanchéité
- ② Entretoise (selon débit)
- ③ Corps
- ④ Élément régulateur
- ⑤ Module de réglage du débit
- ⑥ Vis de blocage du module de réglage



RDR Ø200



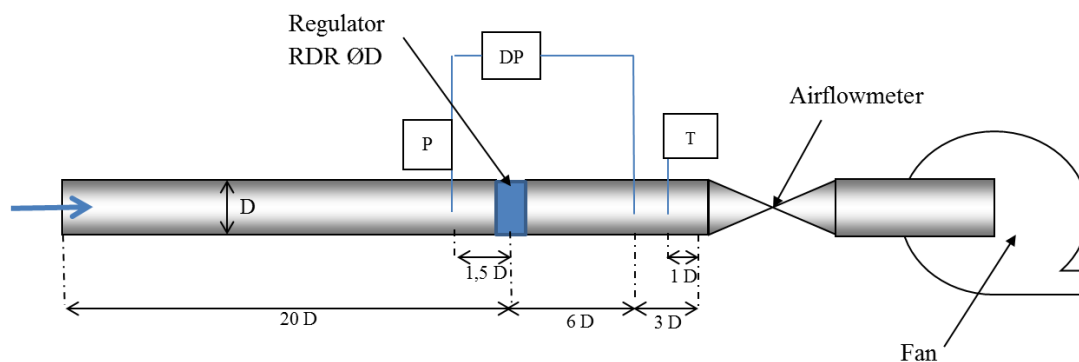
RDR Ø250

APPENDIX 2 - DESCRIPTION OF THE TESTS

According to ANJOS Ventilation's request, the tests are done according to the draft standard under formal vote pr NF E 51-776-1 " *Ventilation des bâtiments - Appareils de régulation de débit d'air en conduits – Partie 1 : Essais*".

The tests are done in extraction configuration.

The test facility is the following:



We measure:

- The static pressure difference
- The pressure before the regulator
- The volumetric airflow
- The air temperature in the duct
- The ambient humidity
- The atmospheric pressure

All the measurements are corrected according to the calibration certificates.

The test facility ducts are airtight and the leakages are controlled and limited as much as possible.

Before each test, the airflow is set on the product according to the ANJOS Ventilation guidelines.

The difference of pressure is set thanks to the fan. The levels of pressure difference set are: 50 Pa – 75 Pa – 100 Pa – 150 Pa – 200 Pa – 250 Pa. The tests are done in increasing pressure and in decreasing pressure.

The airflow is measured for each level of pressure.

Before measuring the values, a time of stabilization is respected.

The tests are done for each diameter and for the settings underlined in pink in the tables:

RDR	Marquage débit en m³/h
Ø 200	<u>300</u>
	320
	<u>350</u>
	370
	<u>400</u>
	420
	<u>450</u>
	470
	<u>500</u>
Ø 250	<u>450</u>
	475
	<u>500</u>
	525
	<u>550</u>
	575
	<u>600</u>
	625
	<u>650</u>
	675
	<u>700</u>
	725
	<u>750</u>
	775
<u>800</u>	

The measured airflows are corrected in order to be given in the standard conditions:

The following formula is used:

$$Qv_{s \text{ tan dard_conditons}} = Qv_{measured} \times \left(\frac{293.15}{273.15 + T} \right)^{1-n} \times \left(\frac{Pa}{101325} \right)^{1-n} \times \left(\frac{(17.1 + 0.048 \times T) \times 10^{-6}}{18.06 \times 10^{-6}} \right)^{2n-1}$$

Formula equivalent to the formula:

$$Qv_{s \text{ tan dard_conditons}} = Qv_{measured} \times \left(\frac{1.204}{Rho_{test}} \right)^{n-1} \times \left(\frac{(17.1 + 0.048 \times T) \times 10^{-6}}{18.06 \times 10^{-6}} \right)^{2n-1}$$

Rho_{test} : air density during test

n : coefficient equal to 0.5

The used formula is the formula validated by the European experts and will be implemented in the standards of the working groups WG2 and WG4, like the standard EN 13141-1. The draft standard under formal vote pr NF E 51-776-1 refers to the standard EN 13141-1.

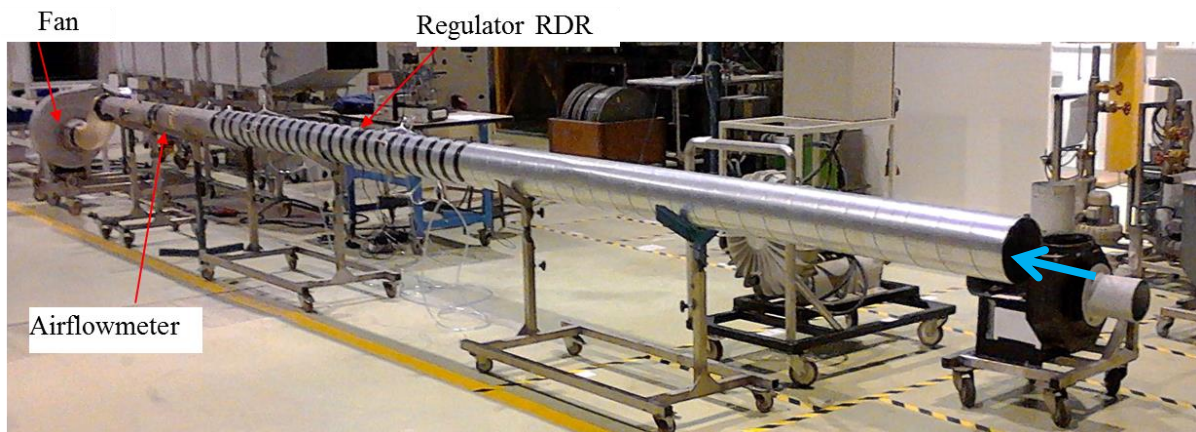
The average airflow is calculated at each pressure by doing the average of airflow in increasing pressure and airflow in decreasing pressure.

The airflow values are compared to the high and low limits fixed by the draft standard under formal vote, pr NF E 51-776-2:

Diamètre de raccordement de l'appareil de régulation de débit d'air passif ou actif	Exigences de valeur du débit volumique	
	sur toute la plage de fonctionnement	à p_{min}
inférieur ou égal à 125 mm	$q_{nominal} \leq q_{mesuré} \leq q_{nominal} \times 1,3$	$q_{nominal} \leq q_{mesuré} \leq q_{nominal} \times 1,1$
supérieur à 125 mm	$q_{nominal} \times 0,95 \leq q_{mesuré} \leq q_{nominal} \times 1,2$	$q_{nominal} \leq q_{mesuré} \leq q_{nominal} \times 1,1$

All measurements are in Appendixes.

During the tests, the air temperature is between 15 and 25°C and do not vary more than 2°C.



APPENDIX 3 - DETAILED RESULTS RDR Ø200

Regulator RDR Ø200mm - setting 300 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	100000	21.6	9.1	1.18	11	51	325.2	321.6
	100000	21.5	9.1	1.18	11	74	323.2	319.7
	100000	21.4	9.0	1.18	11	100	314.2	310.8
	100000	21.2	9.3	1.18	11	150	325.2	321.8
	100000	21.1	9.1	1.18	11	200	323.2	319.9
Decrease	100000	21.0	9.1	1.18	10	257	306.2	303.1
	100000	20.9	9.3	1.18	10	254	305.2	302.1
	100000	20.8	9.1	1.18	9	200	286.2	283.3
	100000	20.8	9.1	1.18	10	150	303.2	300.2
	100000	20.8	9.1	1.18	10	100	299.2	296.2
	100000	20.7	9.0	1.18	9	75	295.2	292.3
	100000	20.6	9.0	1.18	12	51	323.2	320.1

Regulator RDR Ø200mm - setting 350 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99950	21.4	5.6	1.18	14	50	368.3	364.4
	99950	21.4	5.7	1.18	14	76	367.3	363.4
	99950	21.4	5.8	1.18	15	100	370.3	366.3
	99950	21.2	5.7	1.18	16	150	384.3	380.3
	99950	21.2	5.5	1.18	16	200	387.3	383.3
	99950	21.1	5.2	1.18	16	251	380.3	376.5
Decrease	99950	21.1	4.9	1.18	15	248	378.3	374.5
	99950	21.0	6.0	1.18	13	199	353.3	349.7
	99950	20.9	4.9	1.18	14	150	356.3	352.8
	99950	20.9	5.4	1.18	13	100	351.3	347.8
	99950	20.9	5.4	1.18	12	74	342.3	338.9
	99950	20.9	5.4	1.18	14	50	361.3	357.7

Regulator RDR Ø200mm - setting 400 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99940	20.7	5.2	1.18	18	51	409.4	405.5
	99940	20.7	4.8	1.18	18	76	416.4	412.4
	99940	20.7	4.9	1.18	20	100	428.4	424.3
	99940	20.7	4.3	1.18	22	151	453.5	449.2
	99940	20.7	4.2	1.18	22	200	457.5	453.1
	99940	20.7	4.6	1.18	22	254	452.5	448.1
Decrease	99940	20.7	4.2	1.18	21	250	448.4	444.2
	99940	20.6	4.1	1.18	18	200	414.4	410.5
	99940	20.6	4.1	1.18	18	150	416.4	412.5
	99940	20.5	4.1	1.18	18	100	408.4	404.7
	99940	20.6	4.1	1.18	16	75	393.4	389.7
	99940	20.5	4.1	1.18	18	50	408.4	404.7

Regulator RDR Ø200mm - setting 450 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99950	21.2	4.0	1.18	22	49	457.5	452.8
	99950	21.1	4.0	1.18	23	75	469.5	464.7
	99950	21.0	4.0	1.18	26	100	494.5	489.6
	99950	21.0	4.0	1.18	29	151	522.6	517.4
	99950	20.9	4.1	1.18	30	200	529.6	524.4
	99950	21.0	4.1	1.18	30	251	530.6	525.3
Decrease	99950	20.9	4.1	1.18	29	249	527.6	522.4
	99950	20.9	4.0	1.18	24	200	476.5	471.8
	99950	20.7	4.0	1.18	24	150	479.5	475.0
	99950	20.7	4.1	1.18	23	100	469.5	465.1
	99950	20.6	4.1	1.18	21	75	449.4	445.3
	99950	20.6	4.1	1.18	21	50	455.5	451.2

Regulator RDR Ø200mm - setting 500 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	100100	20.6	6.0	1.18	27	50	511.5	507.1
	100100	20.4	5.7	1.18	30	75	535.6	531.1
	100100	20.2	5.8	1.18	34	101	564.6	560.1
	100100	20.2	5.8	1.18	37	150	594.7	589.9
	100100	20.6	5.5	1.18	39	203	606.7	601.4
	100100	20.9	5.4	1.18	40	254	611.7	606.1
Decrease	100100	21.2	5.7	1.18	38	250	608.7	602.8
	100100	21.1	5.6	1.18	33	199	559.6	554.3
	100100	20.8	5.5	1.18	32	150	551.6	546.6
	100100	20.6	5.4	1.18	30	100	534.6	529.9
	100100	20.5	5.7	1.18	28	74	513.6	509.2
	100100	20.4	5.5	1.18	27	49	506.5	502.3

APPENDIX 4 - DETAILED RESULTS RDR Ø250

Regulator RDR Ø250mm - setting 450 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	98800	20.2	2.1	1.17	9	49	480.5	473.7
	98800	20.3	2.1	1.17	11	75	506.5	499.3
	98800	20.4	2.1	1.17	11	100	512.5	505.2
	98800	20.5	2.1	1.17	10	151	501.5	494.2
	98800	20.5	2.1	1.17	10	199	493.5	486.3
Decrease	98800	20.5	2.1	1.17	13	250	544.6	536.7
	98800	20.5	2.1	1.17	12	246	540.6	532.7
	98800	20.5	2.1	1.17	10	200	492.5	485.3
	98800	20.5	2.2	1.17	8	150	444.4	438.0
	98800	20.6	2.2	1.17	9	100	464.5	457.6
	98800	20.6	2.2	1.17	9	75	458.5	451.7
	98800	20.6	2.1	1.17	8	49	432.4	426.1

Regulator RDR Ø250mm - setting 500 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	98800	19.8	2.0	1.17	12	50	527.6	520.5
	98800	19.7	2.0	1.17	13	75	558.6	551.2
	98800	19.8	2.0	1.17	14	101	568.6	561.0
	98800	19.8	2.0	1.17	13	150	557.6	550.2
	98800	19.9	2.0	1.17	12	201	527.6	520.4
	98800	19.8	2.0	1.17	14	250	561.6	554.1
Decrease	98800	19.9	2.0	1.17	13	246	555.6	548.1
	98800	20.0	2.1	1.17	11	200	509.5	502.6
	98800	20.1	2.2	1.17	10	150	487.5	480.7
	98800	20.2	2.0	1.17	11	99	521.6	514.2
	98800	20.3	2.1	1.17	11	74	506.5	499.3
	98800	20.4	2.1	1.17	10	50	483.5	476.5

Regulator RDR Ø250mm - setting 550 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	98800	19.6	1.8	1.17	14	49	583.7	576.1
	98800	19.6	1.8	1.17	16	75	622.7	614.6
	98800	19.7	1.8	1.17	17	100	637.8	629.3
	98800	19.8	1.8	1.17	17	150	642.8	634.2
	98800	19.8	1.8	1.17	16	200	608.7	600.6
	98800	19.8	1.9	1.17	14	253	571.6	564.0
	Decrease	98800	19.9	1.9	1.17	13	250	564.6
98800		19.9	2.7	1.17	12	200	527.6	520.4
98800		19.9	2.3	1.17	13	151	553.6	546.1
98800		19.9	2.0	1.17	14	100	579.7	571.8
98800		20.0	2.0	1.17	13	75	566.6	558.9
98800		20.0	2.0	1.17	12	50	533.6	526.3

Regulator RDR Ø250mm - setting 600 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	98800	18.8	0.4	1.18	17	50	636.8	629.4
	98800	19.0	0.5	1.18	20	75	675.8	667.8
	98800	19.0	0.5	1.18	21	100	693.8	685.6
	98800	19.0	0.6	1.18	21	152	695.9	687.5
	98800	19.2	0.8	1.17	20	200	686.8	678.4
	98800	19.2	0.8	1.17	17	251	642.8	634.9
	Decrease	98800	19.2	0.8	1.17	17	245	635.8
98800		19.3	1.1	1.17	15	200	593.7	586.3
98800		19.4	1.3	1.17	15	153	604.7	597.1
98800		19.5	1.3	1.17	17	100	631.7	623.6
98800		19.6	1.3	1.17	16	75	615.7	607.7
98800		19.6	1.5	1.17	14	50	578.7	571.1

Regulator RDR Ø250mm - setting 650 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99400	20.2	1.5	1.18	19	51	678.8	671.3
	99400	20.2	1.4	1.18	22	75	721.9	713.9
	99400	20.2	1.3	1.18	24	103	738.9	730.8
	99400	20.3	1.5	1.18	24	150	749.9	741.5
	99400	20.6	1.4	1.18	23	203	732.9	724.3
	99400	20.7	1.4	1.18	21	255	698.9	690.6
Decrease	99400	20.7	1.4	1.18	20	252	690.8	682.6
	99400	21.2	1.4	1.17	17	201	639.8	631.6
	99400	21.3	1.3	1.17	18	151	656.8	648.3
	99400	21.1	1.3	1.17	19	101	675.8	667.3
	99400	21.0	1.4	1.17	19	75	656.8	648.7
	99400	20.8	1.4	1.18	17	49	622.7	615.2

Regulator RDR Ø250mm - setting 700 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99300	21.1	1.5	1.17	23	50	726.9	717.4
	99300	21.1	1.5	1.17	25	76	779.0	768.8
	99300	21.0	1.5	1.17	27	100	796.0	785.7
	99300	20.7	1.5	1.17	30	150	813.0	802.9
	99300	20.3	2.0	1.18	28	200	799.0	789.6
	99300	20.0	1.6	1.18	27	253	777.0	768.2
Decrease	99300	19.7	1.6	1.18	26	251	772.0	763.7
	99300	20.4	1.7	1.18	22	200	709.9	701.4
	99300	20.6	1.5	1.17	22	150	711.9	703.2
	99300	20.8	1.4	1.17	23	100	731.9	722.7
	99300	20.9	1.5	1.17	22	75	711.9	702.8
	99300	20.7	1.4	1.17	19	50	669.8	661.5

Regulator RDR Ø250mm - setting 750 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99300	20.4	1.4	1.18	26	49	778.0	768.7
	99300	20.6	1.5	1.17	29	76	835.1	824.8
	99300	20.7	1.4	1.17	31	100	857.1	846.5
	99300	20.8	1.5	1.17	32	150	880.2	869.1
	99300	20.9	1.5	1.17	32	200	869.1	858.0
	99300	21.0	1.5	1.17	31	251	848.1	837.1
Decrease	99300	21.0	1.5	1.17	30	248	843.1	832.2
	99300	21.1	1.4	1.17	26	201	780.0	769.8
	99300	20.9	1.7	1.17	25	148	773.0	763.1
	99300	20.7	1.5	1.17	27	101	795.0	785.1
	99300	20.6	1.5	1.17	25	75	770.0	760.5
	99300	20.4	1.5	1.18	22	50	719.9	711.3

Regulator RDR Ø250mm - setting 800 m³/h

	Atmospheric Pressure (Pa)	Temperature in duct (°C)	Dew point temperature (°C)	Density (kg/m³)	Pressure before Regulator (Pa)	Static pressure difference (Pa)	Airflow rate (m³/h)	Airflow rate in standard conditions (m³/h)
Increase	99300	20.9	1.9	1.17	30	49	842.1	831.3
	99300	21.1	1.8	1.17	34	75	897.2	885.4
	99300	21.2	1.8	1.17	36	102	921.2	908.9
	99300	20.9	1.7	1.17	37	150	936.2	924.2
	99300	20.5	1.7	1.17	37	202	938.3	926.8
	99300	20.4	1.7	1.18	35	251	912.2	901.3
Decrease	99300	20.4	1.7	1.18	34	247	904.2	893.4
	99300	20.2	1.6	1.18	29	201	834.1	824.4
	99300	20.8	1.4	1.17	29	151	830.1	819.6
	99300	21.1	1.6	1.17	31	99	856.1	844.9
	99300	21.2	1.4	1.17	29	74	827.1	816.1
	99300	21.1	1.4	1.17	26	49	777.0	766.8

APPENDIX 5 - MEASUREMENT UNCERTAINTIES

The measurement uncertainties are the following:

		Instrument range	N° instrum	Maximum uncertainty
Uncertainty for airflow	Airflow measurement	5/1600 m3/h	11922	2.5%
	DP from 200 to 250 Pa	0/2000 Pa	5857	1.5%
Uncertainty for pressure	DP from 50 to 150 Pa	0/200 Pa	14979	2.3%

The uncertainty is the maximum uncertainty on the measurements.