QUALIFICATION TEST REPORT

FP-06-29
LOW TAKE-OFF ROTATION SPEED COMMUTER TYPE AIRCRAFT AERODYNAMIC TESTING OF THE CANDIDATE TYPE I FLUID

ARCTICA DG
LOT # 55

Produced at Nizhnekamsk, Tatarstan, Russia

for

ARCTON LTD
P.O.box 1079, GO-11
423570, Nizhnekamsk, Tatarstan, Russia.

by

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April 2006

QUALIFICATION

This report presents results of low speed ramp aerodynamic acceptance tests, using Boundary Layer Displacement Thickness (BLDT) values, performed on samples of the candidate Type I fluid **ARCTON LTD ARCTICA DG LOT # 55,** produced at **Nizhnekamsk, Tatarstan, Russia** evaluated, concentrated as received according to the latest revisions of the SAE AMS 1424G specification and AS 5900 standard. The tests were performed between 0°C and -27.8°C within a ± 2°C range, using the flat plate set-up in the Luan Phan refrigerated wind tunnel at the Anti-icing Materials International Laboratory (AMIL) research laboratory. AMIL is independent of fluid manufacturers and was found qualified on September 11, 1997 (reconfirmed October 25, 2002) by the Performance Review Institute according to PRI document AC 3001, "audit criteria for compliance to SAE AMS1424 and AMS1428".

On the basis of the acceptance criteria, the candidate Type I fluid ARCTON LTD ARCTICA DG LOT # 55 qualifies according to AMS 1424G specification for use on low take-off rotation speed commuter type aircraft in the following temperature ranges:

- **above -27.5°C in the case of the Fluid as received.**

This fluid is qualified from 2006 April 18, for a two year period.

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δ^*_{ave}	average Boundary Layer Displacement Thickness (BLDT) over the test section perimeter at cross-section 3 (Figure 5) evaluated by the equation 2 in Appendix B, Attachment 1, (mm)
δ^*	Boundary Layer Displacement Thickness (BLDT) over the test section perimeter at cross-section 3 (Figure 5) evaluated by the equation 3 in Appendix B, Attachment 1, (mm)
AIR	Aerospave Information Report
AMIL	Anti-icing Materials International Laboratory
AMS	Aerospace Material Specification
AS	Aerospace Standard
FE	Fluid Elimination during the test (%)
FP	Flat Plate elimination test identification number
FPC	Flat Plate Calibration test identification number
FPD	Flat Plate elimination test Dry (without fluid)
FPET	Flat Plate Elimination Test
P	Static Pressure as measured by gauges positioned at points # 1, 2 and 3 in the set-up (Figure 5) (mPa)
Rh	Relative humidity (%)
SAE	Society of Automotive Engineers
t	Thickness of the film fluid on the plate (μm)
T_a	Air Temperature as recorded at the top of the cross-section 2 in the set up (Figure 5) (°C)
T_f	Fluid Temperature as recorded in the fluid film at the bottom of the cross-section 3 (Figure 5) (°C)
UQAC	University of Quebec at Chicoutimi
V	Air Velocity derived from the measurement of the pressure difference $P_1 - P_2$ using the equation (1) in Appendix B, Attachment 1 (m/s)
WC	Water Change (% w/w)

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TEST RESULTS

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Table 1 - Fluid Identification

Company Name	Product	Color	Manuf. Location	Manuf. Date	AMIL Label	Recep. Date
ARCTON LTD	ARCTICA DG LOT # 55 NEAT	Colorless	Nizhnekamsk, Tatarstan, Russia	January 2006	G736	06-03-30
OCTAGON PROCESS INC	MIL-A-8243D LOT # F-21472-D 75/25 dilution	Colorless	Edgewater (NJ) USA	02-02-19	M038	04-10-05

Table 2 - Surface Tension, pH and Refractive Index

DEICING FLUID ARCTON LTD
ARCTICA DG, LOT # 55

	Surface Tension		pH		Refractive Index	
Fluid	T (°C)	dynes/cm	T (°C)	Value	T (°C)	Value
G736	20	41.8	20	9.62	20	1.4132
M038	22	43.2	23	8.95	20	1.4087

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Table 3 - Brookfield Viscosity (mPa·s)

DEICING FLUID ARCTON LTD
ARCTICA DG, LOT # 55

Fluid	Temp	0.3 RPM		6 RPM		30 RPM	
	(°C)	Viscosity	Accuracy	Viscosity	Accuracy	Viscosity	Accuracy
G736	20	< 20	200(1)	11	10(1)	11.2	2(1)
	0	40	200(1)	29	10(1)	29.0	2(1)
	-10	60	200(1)	54	10(1)	54.0	2(1)
	-20	120	200(1)	116	10(1)	116.0	2(1)
	-30	300	1000(2)	295	50(2)	296	10(2)
Sheared	20	< 20	200(1)	11	10(1)	11.0	2(1)

Fluid	Temp	0.3 RPM		6 RPM		30 RPM	
	(°C)	Viscosity	Accuracy	Viscosity	Accuracy	Viscosity	Accuracy
M038	20	< 20	200(1)	14	10(1)	14.0	2(1)
	0	60	200(1)	41	10(1)	41.0	2(1)
	-10	80	200(1)	87	10(1)	87.8	2(1)
	-20	300	1000(2)	210	50(2)	215	10(2)
	-30	700	1000(2)	660	50(2)	659	10(2)

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Table 4 - Aerodynamic Performance Test Data: Fluid as received

DEICING FLUID ARCTON LTD
ARCTICA DG, LOT # 55

LOW SPEED RAMP

TEST CODE	T_a °C	T_f °C	Rh %	t_o[(1)] µm	t_{end}[(2)] µm	FE[(3)] %	WC[(4)] %	V[(5)] m/s	δ* mm
G736A362	-0.1	-0.5	81.9	2067	152	92.6	2.92*	36.1	5.62
G736A363	-0.7	-0.6	78.3	2000	145	92.8	2.80*	36.4	5.52
G736A361	-0.7	-0.9	77.7	2067	152	92.6	2.92*	37.1	5.61
G736E373	-20.2	-20.4	57.0	2067	373	81.9	0.49	36.7	8.26
G736E374	-19.4	-20.5	60.7	2067	305	85.3	0.24	37.0	8.13
G736E375	-20.6	-20.7	55.6	2067	323	84.4	-0.24	36.8	8.40
G736F376	-27.7	-25.8	50.3	2000	356	82.2	0.61	37.4	9.50
G736F380	-27.5	-27.2	53.8	2000	338	83.1	-0.12	37.1	9.52
G736F381	-28.6	**-27.3**	51.4	2000	389	80.6	-0.24	36.8	**10.06**
G736F379	-28.5	**-27.4**	50.5	2000	389	80.6	-0.36	36.7	**9.79**
G736F377	-29.7	**-27.8**	50.1	2000	373	81.3	-0.36	36.4	**10.04**

*caution : value outside the ±2% range

Acceptance Criteria :

D_{-20} = 10.15 mm

(1) Thickness of the fluid measured at the beginning of the test.
(2) Thickness of the fluid measured at the end of the test.
(3) Fluid Elimination.
(4) Water Change.
(5) Air velocity 30 seconds after the beginning of the test.

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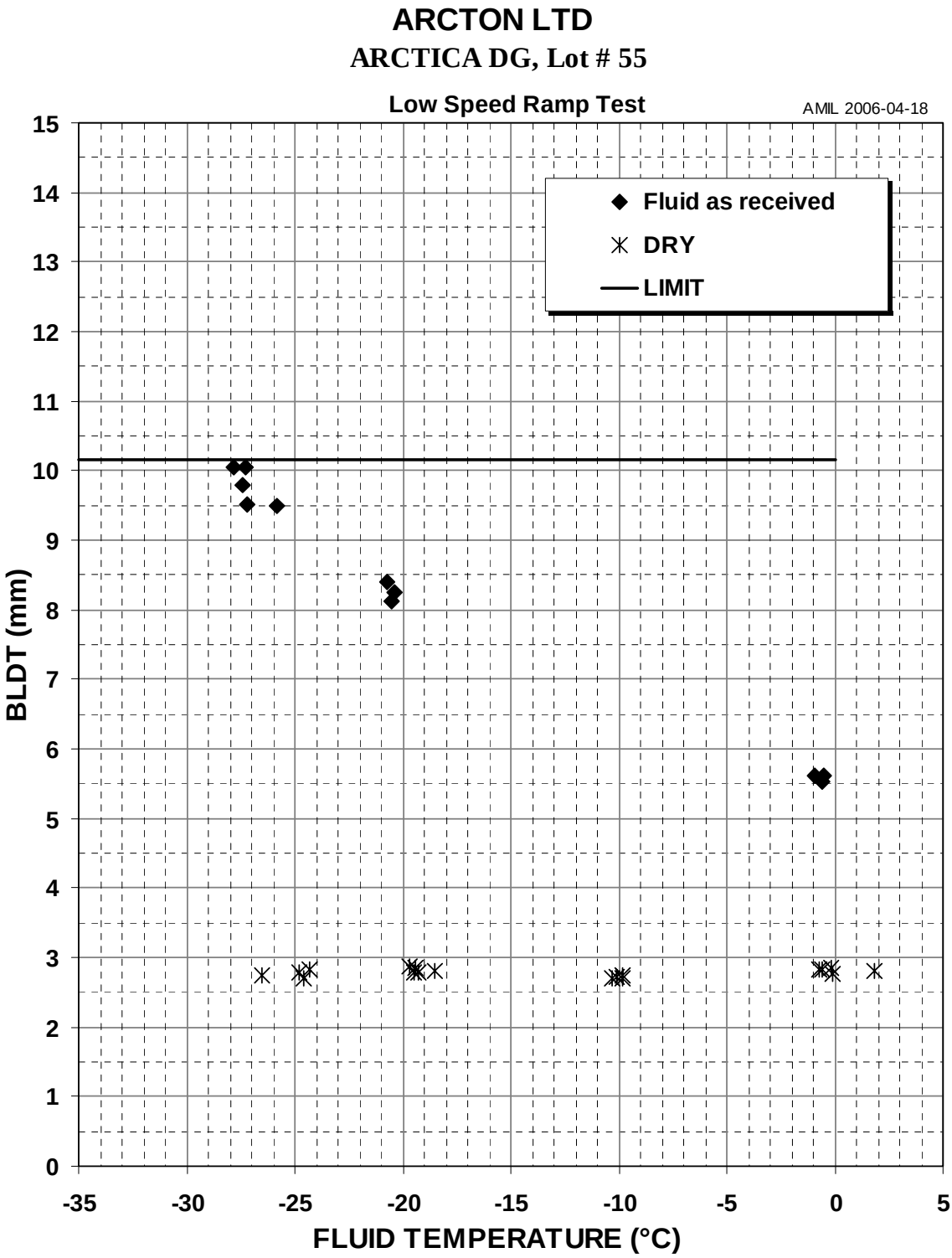

Figure 1 - Aerodynamic Test Results

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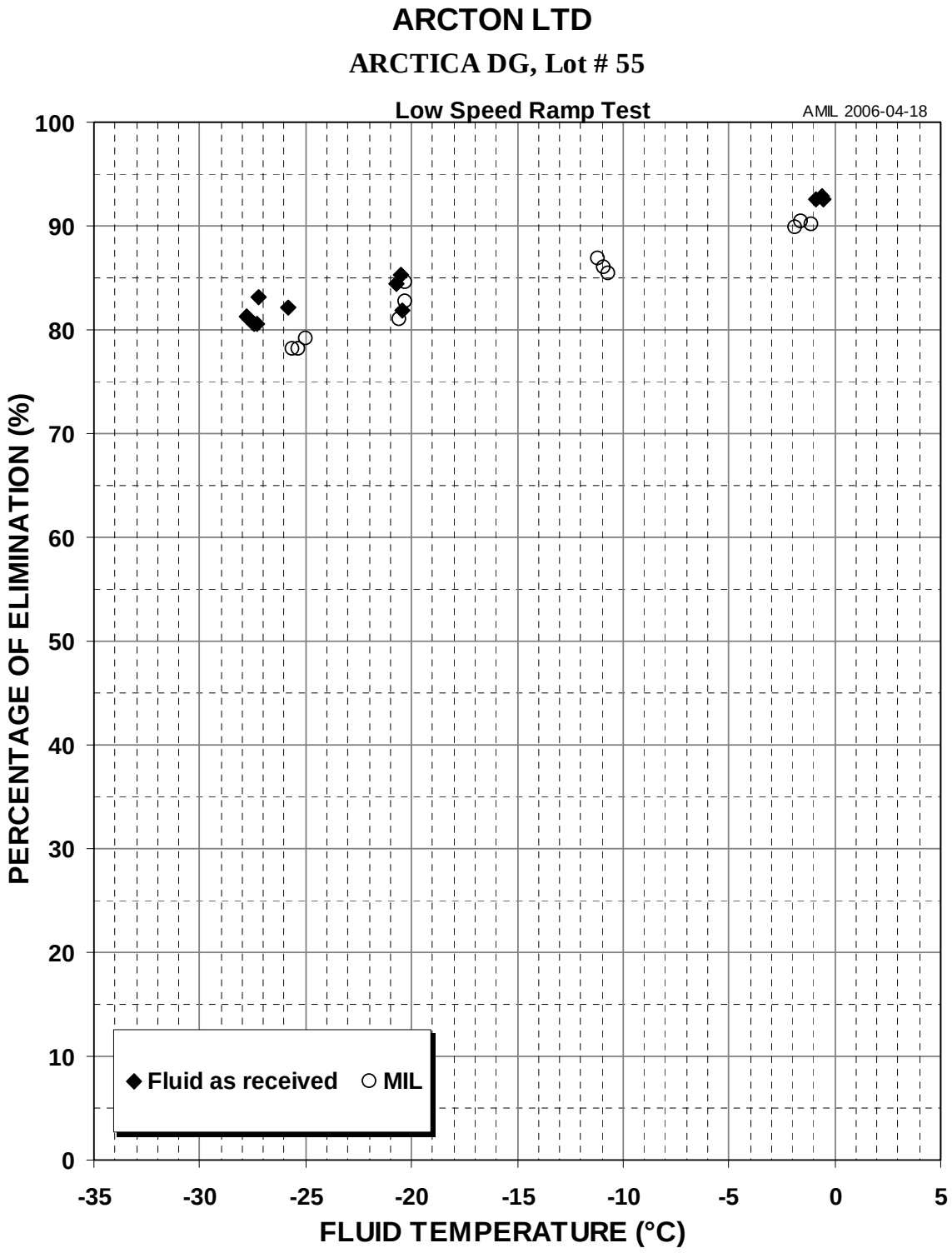

Figure 2 - Fluid Elimination

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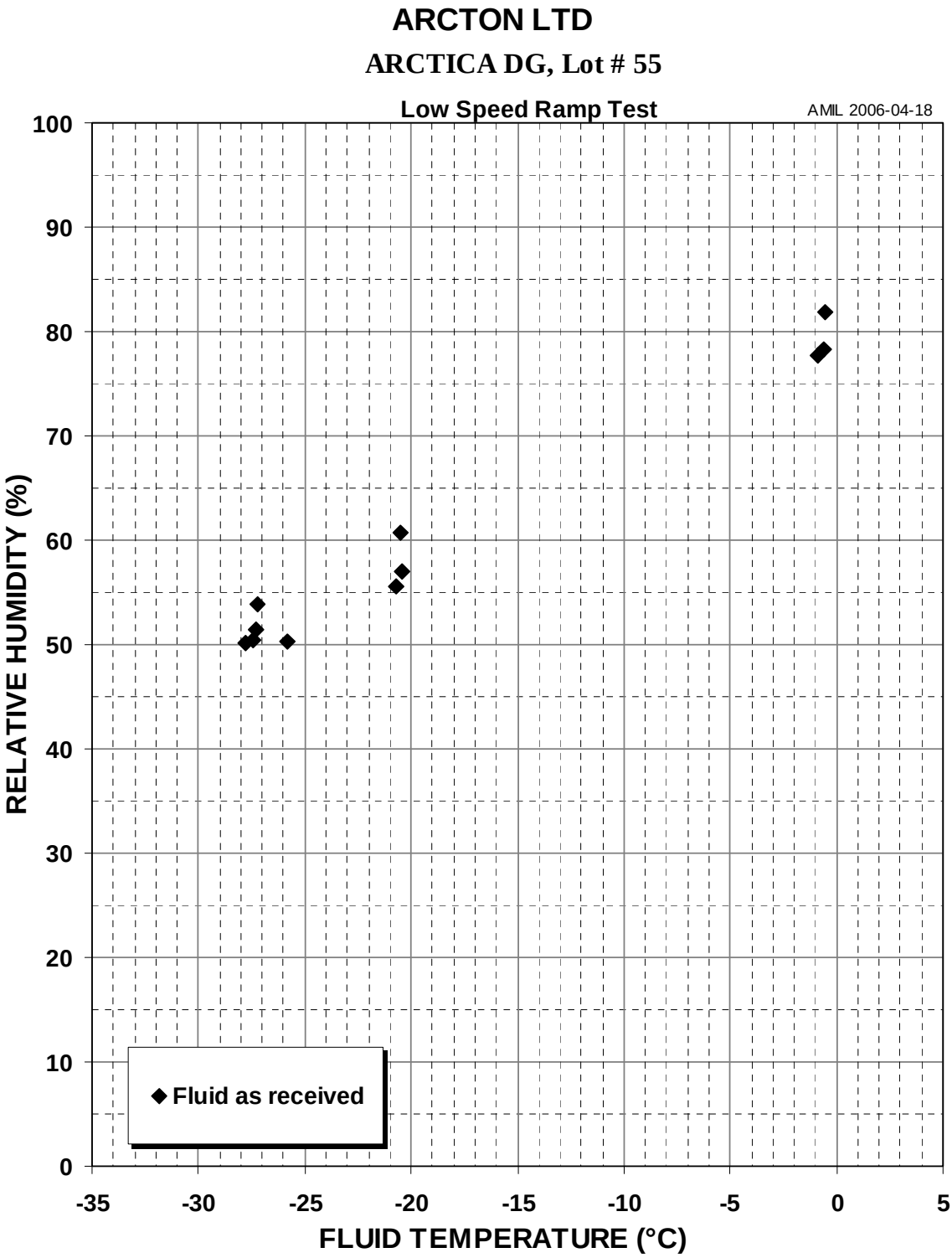

Figure 3 - Relative Humidity

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Table 5 - Refractive Index Data and Water Change: Fluid as received

DEICING FLUID ARCTON LTD
ARCTICA DG, LOT # 55

TEST CODE	RI Initial	RI Final	ΔRI	WC % W/W	Rh %
G736A362	1.4133	1.4109	-0.0024	2.92*	81.9
G736A363	1.4133	1.4110	-0.0023	2.80*	78.3
G736A361	1.4133	1.4109	-0.0024	2.92*	77.7
G736E373	1.4133	1.4129	-0.0004	0.49	57.0
G736E374	1.4132	1.4130	-0.0002	0.24	60.7
G736E375	1.4129	1.4131	0.0002	-0.24	55.6
G736F376	1.4128	1.4123	-0.0005	0.61	50.3
G736F380	1.4131	1.4132	0.0001	-0.12	53.8
G736F381	1.4130	1.4132	0.0002	-0.24	51.4
G736F379	1.4128	1.4131	0.0003	-0.36	50.5
G736F377	1.4128	1.4131	0.0003	-0.36	50.1

*caution : value outside the ±2% range

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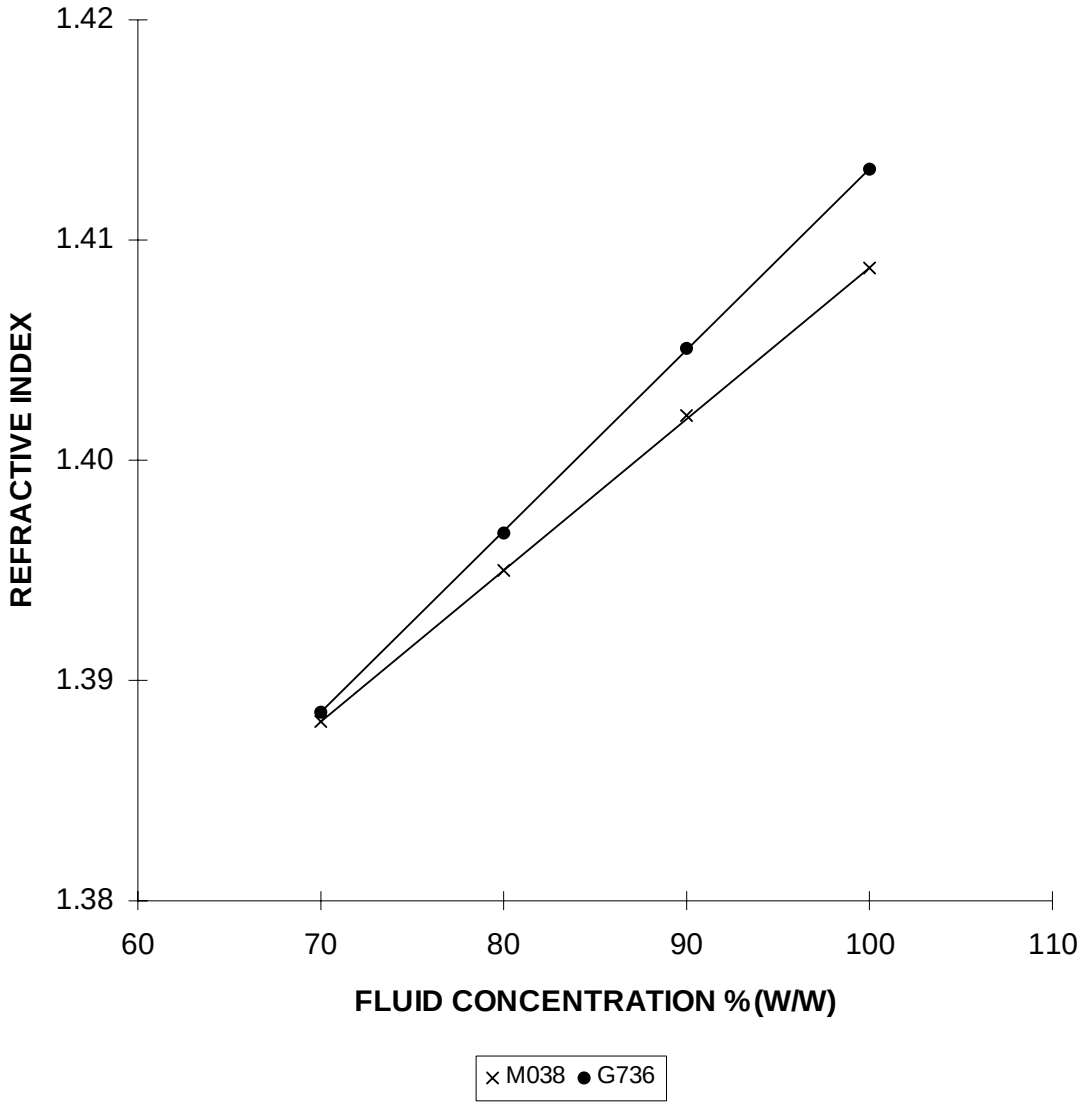

Figure 4 - Refractive Index versus Water Content

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TEST DESCRIPTION

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1. INTRODUCTION

This report details the performance of fluid samples, identified in Table 1, when subjected to the Flat Plate Elimination Test, denoted FPET hereafter. The FPET procedure follows the SAE Aerospace Material Specifications, AMS 1424G [1] and AS 5900 [2] for deicing fluid on the low-speed ramp. The tests were carried out in the Luan Phan refrigerated wind tunnel of the "Anti-icing Materials International Laboratory" (AMIL) at the "Université du Québec à Chicoutimi" (UQAC) [3]. UQAC facility is operated independently from fluid manufacturers and meets the requirements of the aerodynamic acceptance testing standards. It was found qualified on September 11, 1997 (reconfirmed October 25, 2002) by the Performance Review institute according to PRI document AC3001, “audit criteria for compliance to SAE AMS1424 and AMS1428”.

2. TEST DESCRIPTION

2.1 Flat Plate Elimination Test

This test is designed to measure the Boundary Layer Displacement Thickness, BLDT, which is related to lift loss [4]. The flat plate set-up consists of a duct inserted in the test section of AMIL cold wind tunnel. In this tunnel, the airflow and the fluid can be maintained at a constant temperature, between $5 \pm 1°C$ and $-45 \pm 2°C$. A set-up sketch is given in Figure 5.

The FPET procedure consists in submitting a 2 mm thick layer of deicing product covering the duct floor to an accelerating air flow of 2.1 m/s^2, simulating a low take-off rotation speed commuter type aircraft (Figure 6). The BLDT on the flat plate is measured at pressure tap location # 3 (Figure 5), twenty seconds after the beginning of the simulated take-off. A detailed description of this test is presented in AS 5900 [2].

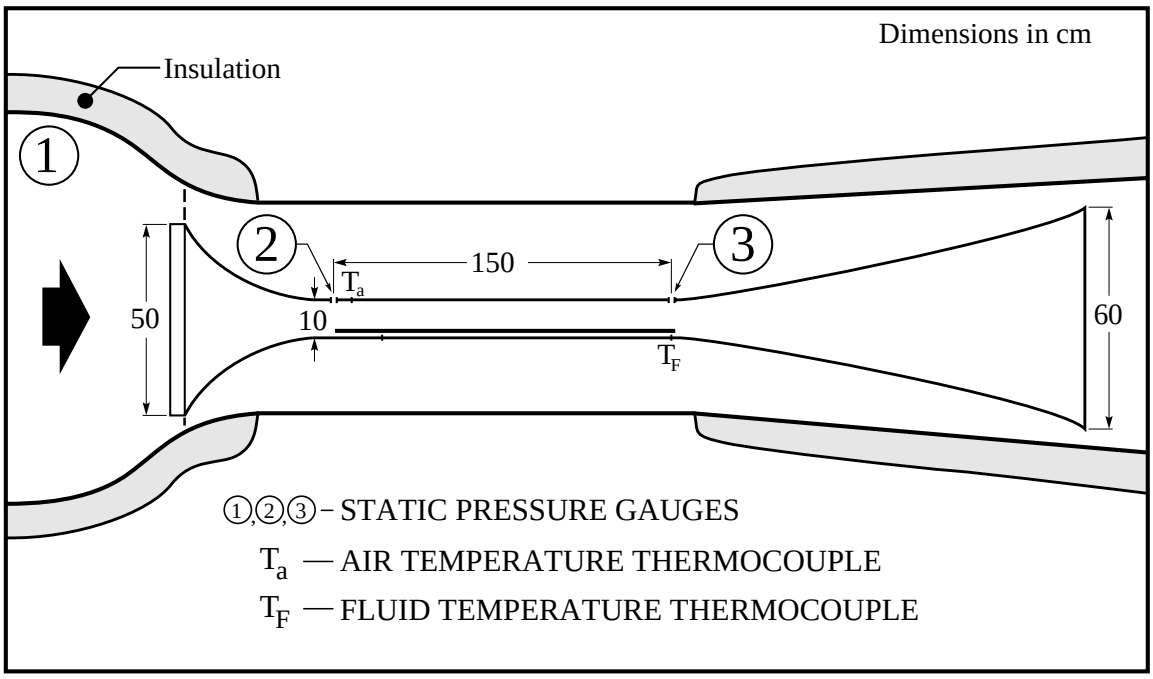

Figure 5 - FPET Set-up

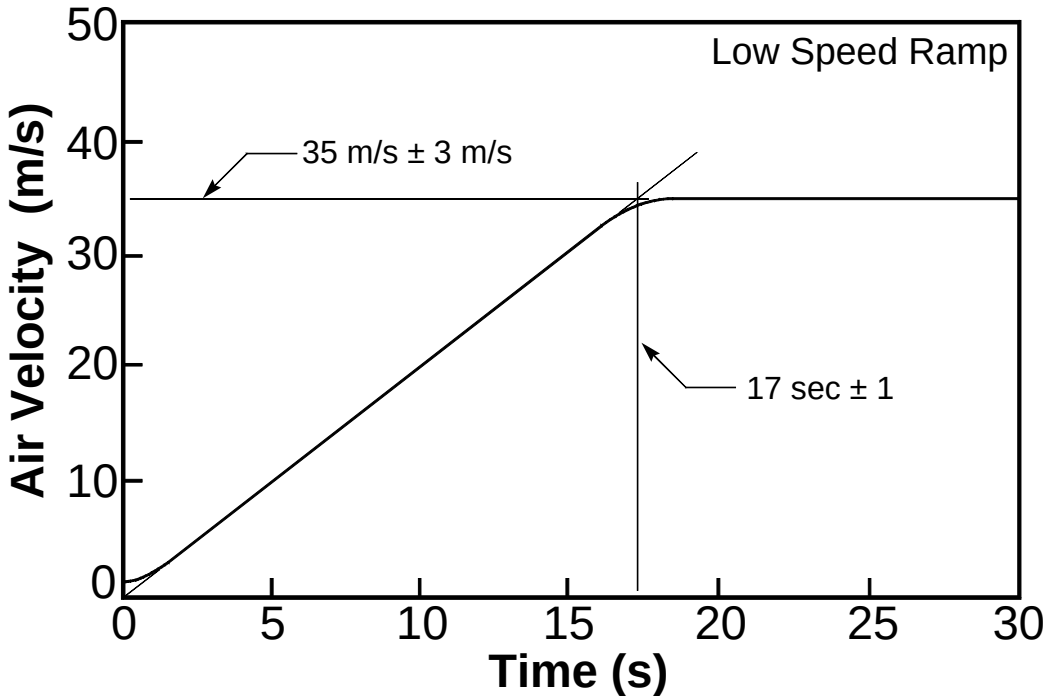

Figure 6 - Take-off Ground Acceleration Simulation

2.2 Measurements

In a FPET, the fluid performance is evaluated from BLDT measurements. The BLDT value used for the fluid evaluation is the average of the BLDT measured between the 19th and the 21st seconds after the beginning of the test. The starting time (t = 0) is evaluated by extrapolating the straight line of the acceleration ramp to the point where V = 0 m/s.

In addition, the following parameters are measured:

1. **surface tension at room temperature (dynes/cm)**
2. **pH at room temperature**
3. **refractive index which is used to determine the water change (%)**
4. **viscosity at room and test temperatures (mPa . s)**
5. **fluid film thickness (μm) at the beginning and at the end of the FPET to compute fluid elimination (%)**

2.3 Calibration and Acceptance Criteria

The calibration is obtained from dry tests, performed without fluid, and reference fluid tests, using the 75/25 dilution of the MIL-A-8243D deicing fluid, for which BLDT results are well documented. The BLDT values obtained from a dry test should be 2.8 ± 0.4 mm. For dry and calibration tests, the BLDT values are recorded at four temperatures: 0°C, -10°C, -20°C and -25°C.

Reference fluid BLDT values and dry BLDT values are used to calculate the acceptance criteria required for certification. A candidate fluid is acceptable at a test temperature if none of the independent BLDT measurements is greater than the acceptance criteria. This test temperature is the average of the three lowest temperatures of the acceptable data points.

3. TEST RESULTS

3.1 Test Presentation

The fluid identification is presented in Table 1 and the fluid physical properties in the following tables : Surface tension, pH and refractive index values are given in Table 2 and Brookfield viscosity values in Table 3. FPET results are presented in Table 4. Calibration data from dry tests and tests with the reference fluid are reproduced in Table 6 and Table 7 respectively. Finally, Table 5, presents refractive index data and water change calculations. Figure 4 shows the refractive index as a function of water change. Fluid elimination and relative humidity are presented as a function of test temperature in Figure 2 and Figure 3 respectively.

3.2 Calculation of the Calibration and Acceptance Criteria

Calibration tests, as defined in section 2.3, consist of dry tests and tests with the reference fluid. The dry test results are presented in Table 6. According to specifications [1], the AMIL system is considered adequately calibrated, since the dry test BLDT value(δ^*) varies within the standard range of 2.8 ± 0.4 mm. The reference fluid results are presented in Table 7. These results are also in agreement with known values. As mentioned in section 2.3, dry and reference fluid BLDT values are used to compute the criteria of acceptance, presented below and in Figure 7. The acceptance envelope is a constant straight line with a BLDT equal to the value D20. The D20 is calculated accordingly to the AS 5900 for the low take-off rotation speed ramp:

Calculation of acceptance level at -20°C:

$$D20 = (1.12 \times \delta^*_{ref}) - 0.19\left(\delta^*_{ref} - \delta^*_{dry}\right)_{-20}$$

$$D20 = (1.12 \times 10.34) - 0.19 \times (10.34 - 2.79) = 10.15 \text{ mm}$$

Table 6 - Dry Test Data

TEST CODE	T_a (°C)	T_f (°C)	Rh (%)	V[(1)] (m/s)	δ^*_{dry} (mm)
DRY_A427	-0.3	1.8	77.1	36.3	2.80
DRY_A435	-0.1	-0.1	81.3	35.9	2.77
DRY_A429	-0.1	-0.2	80.0	36.0	2.85
DRY_A430	0.0	-0.6	81.4	36.0	2.83
DRY_A428	-0.5	-0.7	74.5	36.1	2.83
DRY_C433	-10.0	-9.8	72.5	35.8	2.74
DRY_C434	-9.7	-9.8	75.0	36.2	2.69
DRY_C432	-10.4	-10.1	72.0	35.1	2.72
DRY_C431	-11.6	-10.3	75.3	36.4	2.69
DRY_E441	-19.6	-18.5	60.6	36.2	2.80
DRY_E440	-19.3	-19.3	61.4	34.8	2.79
DRY_E439	-19.6	-19.4	63.8	35.1	2.86
DRY_E438	-21.2	-19.5	63.3	35.2	2.78
DRY_E447	-19.6	-19.7	65.5	34.7	2.88
DRY_F444	-26.2	-24.3	58.6	34.7	2.83
DRY_F443	-25.5	-24.6	62.1	35.9	2.71
DRY_F442	-26.5	-24.8	62.1	35.2	2.78
DRY_F456	-27.9	-26.5	56.6	35.4	2.74

(1) Air velocity 30 seconds after the beginning of the test

Table 7 - Aerodynamic Performance Test Data : Reference Fluid

TEST CODE	T_a °C	T_f °C	Rh %	t_o[1] µm	t_{end}[2] µm	FE[3] %	WC[4] %	V[5] m/s	δ* mm
M038A387	-0.7	-1.1	76.8	1867	185	90.1	1.89	36.8	6.19
M038A389	-0.7	-1.6	78.6	1933	185	90.4	2.47*	36.7	6.17
M038A388	-0.2	-1.9	79.5	1933	196	89.9	2.18*	37.2	6.17
M038C392	-10.3	-10.7	69.3	1867	272	85.4	0.29	36.9	7.61
M038C391	-10.5	-10.9	73.1	1867	262	86.0	0.44	37.1	7.53
M038C390	-11.5	-11.2	69.4	1867	246	86.8	1.02	37.5	7.77
M038E395	-20.6	-20.3	60.7	1867	287	84.6	1.02	35.3	10.46
M038E397	-19.8	-20.3	63.7	1867	323	82.7	0.00	35.4	10.50
M038E396	-20.0	-20.6	58.9	1867	356	81.0	0.58	36.1	10.26
M038F399	-25.1	-25.0	60.9	1867	389	79.2	0.58	36.1	11.71
M038F398	-26.0	-25.3	59.1	1867	406	78.2	0.44	35.6	11.86
M038F400	-26.6	-25.6	54.5	1867	406	78.2	0.15	36.6	11.98

*caution : value outside the ±2% range

(1) Thickness of the fluid measured at the beginning of the test.
(2) Thickness of the fluid measured at the end of the test.
(3) Fluid Elimination.
(4) Water Change.
(5) Air velocity 30 seconds after the beginning of the test.

Table 8 - Refractive Index Data and Water Change: Reference Fluid

TEST CODE	RI Initial	RI Final	ΔRI	WC % W/W	Rh %
M038A387	1.4084	1.4071	-0.0013	1.89	76.8
M038A389	1.4086	1.4069	-0.0017	2.47*	78.6
M038A388	1.4084	1.4069	-0.0015	2.18*	79.5
M038C392	1.4084	1.4082	-0.0002	0.29	69.3
M038C391	1.4084	1.4081	-0.0003	0.44	73.1
M038C390	1.4086	1.4079	-0.0007	1.02	69.4
M038E395	1.4088	1.4081	-0.0007	1.02	60.7
M038E397	1.4083	1.4083	0.0000	0.00	57.6
M038E396	1.4083	1.4079	-0.0004	0.58	58.9
M038F399	1.4086	1.4082	-0.0004	0.58	60.9
M038F398	1.4083	1.4080	-0.0003	0.44	59.1
M038F400	1.4083	1.4082	-0.0001	0.15	54.5

*caution : value outside the ±2% range

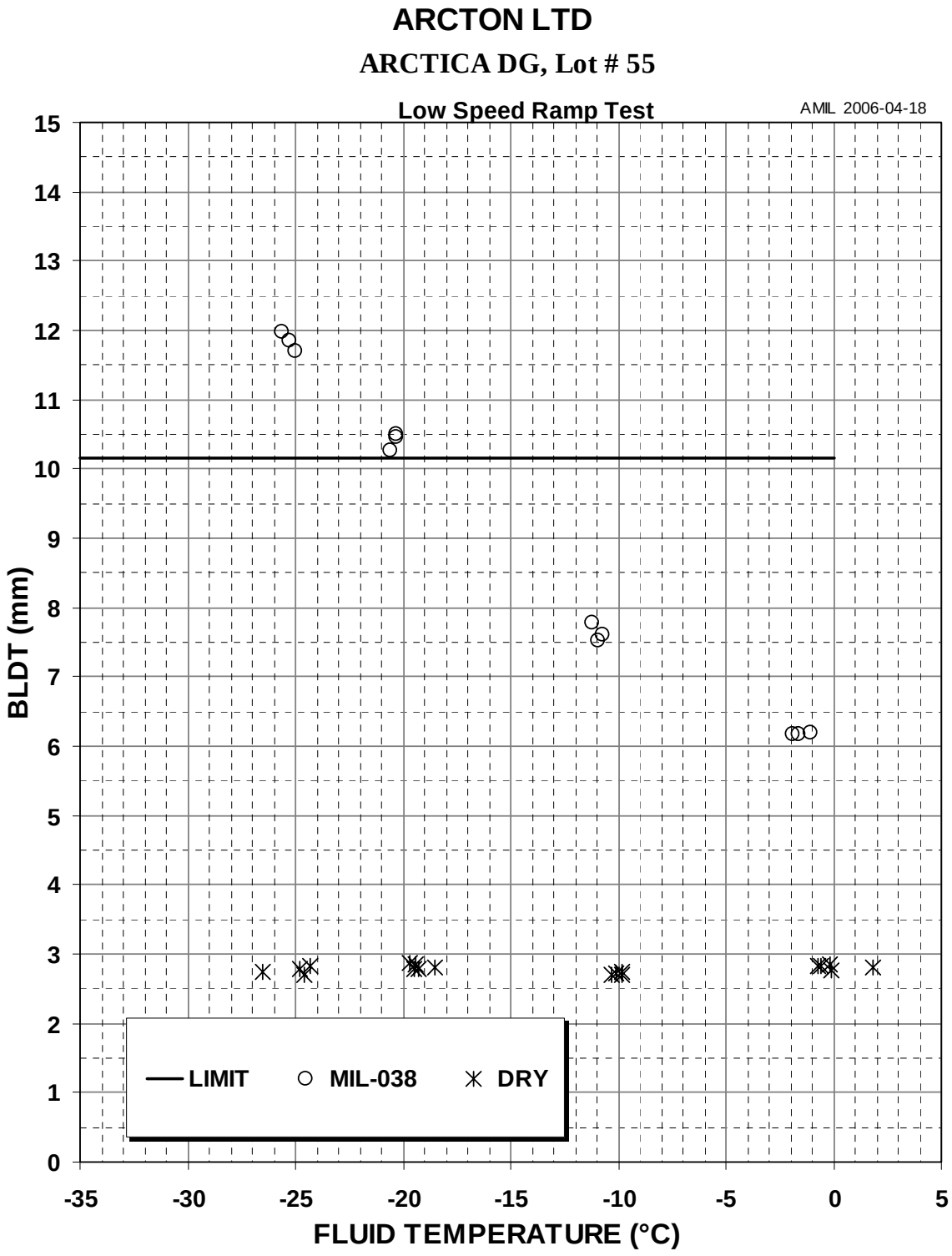

Figure 7 - Acceptance Criteria

3.3 Flat Plate Elimination Tests

BLDT, fluid elimination and water change values are listed in Table 4 for each test. In Figure 1, BLDT values are presented in comparison with the acceptance criteria. This figure shows that the candidate fluid **ARCTON LTD ARCTICA DG LOT # 55** is acceptable with the low speed ramp above -27.5°C in the case of the Fluid as received.

4. REFERENCES

[1] Aerospace Material Specifications: AMS 1424G Deicing/Anti-icing Fluid Aircraft, SAE Type I (January 2006) and AMS 1428D Non-Newtonian (Pseudoplastic) SAE Type II, III and IV (February 2002).

[2] Aerospace Standard AS 5900, Standard Test Method for Aerodynamic Acceptance of SAE AMS1424 and SAE AMS1428 Aircraft De/Anti-icing Fluids, (February 2003).

[3] Laforte, J.L., Louchez, P., Bouchard, G. and Ma, F. (1990) "A Facility to Evaluate Performance of Aircraft De/Anti-icing Fluids Subjected to Freezing Rain". Cold Regions Science and Technology 18, p. 161-171.

[4] Laforte, J.L., Louchez, P., Bouchard, G. (1993) "Experimental Evaluation of Flat Plate Boundary Layer Growth over an Anti-icing Fluids Film". Canadian Aeronautics and Space Journal,vol. 39, No. 2, June 1993, p.96- 104.

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ATTACHMENT 1

Measurement Principle*

The time varying velocity at the inlet of the test section will be derived from the measurement of the pressure difference $P_1 - P_2$, recorded as a function of time during all test runs. For such purpose, the following relation, obtained from application of Bernouilli and continuity equations according to usual wind tunnel practice, will be used:

$$V = \sqrt{\frac{2(P_1 - P_2)}{\rho} \Big/ \left(1 - \left[\frac{S_2}{S_1}\right]^2\right)} \qquad (1)$$

where ρ is the mass per unit volume of the test gas at the test conditions, and S1/S2 is the area ratio of the wind tunnel contraction.

The boundary layer displacement thickness (BLDT) on the bottom flat plate, at the location of the pressure tap P_3 (cross-section 3), will be evaluated from the measurement of the two pressure differences $P_1 - P_2$ and $P_1 - P_3$ recorded as functions of time during all the test runs.

Indeed, an increase in BLDT from inlet to outlet of the test section causes a restriction of the net cross-sectional area, thus producing an increase in the air velocity along the test section, which in turn causes a decrease of static pressure from cross-section 2 to 3.

* This text reproduces Appendix B of DOCUMENT NO D6-55573: "Aerodynamic Acceptance Test for Aircraft Ground Deicing/Anti-icing Fluids". BOEING Commercial Airplane Company.

More precisely, the average BLDT $\boldsymbol{\delta}^*_{ave}$ over the test section perimeter, at cross-section 3, will be evaluated using following relation, obtained from application of mass conservation and Bernouilli equations:

$$\delta^*_{ave} = \frac{1}{c}\left[S_3 - S_2 \sqrt{\frac{P_1 - P_2}{(P_1 - P_2) + (P_2 - P_3)}} \right] \qquad (2)$$

where c is the test section perimeter at cross-section 3, and S_2 and S_3 are the areas of cross-sections 2 and 3 respectively.

When no fluid is present on the bottom flat plate, all four test section walls are in the same dry state, and the previous expression (2) yields the value of the BLDT on a dry wall:

$\boldsymbol{\delta}^*_{dry} = \boldsymbol{\delta}^*_{ave}$ (with no fluid)

On the other hand, when the bottom plate of the test section is covered with a layer of de/anti-icing fluid, and the top and sides are not, the BLDT is not constant over the perimeter of the cross-section 3. Indeed, it assumes a value δ^* on the bottom plate and another value on the sides and top wall. Expressing the previously determined $\boldsymbol{\delta}^*_{ave}$ as a perimeter-weighted average of $\boldsymbol{\delta}^*_{dry}$ and δ^*, the following relation can be obtained:

$$\delta^* = \frac{c}{b}\left[\delta^*_{ave} - \frac{c-b}{c} \delta^*_{dry} \right] \qquad (3)$$

where b is the width of the bottom flat plate. This relation will be used to derive the BLDT over a wet surface, δ*, from the measurement of $\boldsymbol{\delta}^*_{ave}$ carried out as explained with fluid on the bottom test section wall, provided an expression for

δ^*_{dry} has been previously determined by a number of "dry" runs, carried out without any fluid in the test section. More precisely, these dry runs, to be made during the setting up and calibration of the facility, will yield the value of δ^*_{dry} and they will be used to determine the constant in the following empirical formula:

$$\delta^*_{dry} = const \times \left[\frac{V}{n}\right]^{-1/5} \qquad (4)$$

where V is the tunnel air velocity at cross-section 2 and n is the cinematic viscosity of the test gas at the test conditions. For data reduction of a test with fluid in the test section, this last expression (4) will be used to evaluate, as function of the instantaneous velocity determined by (1), the value of δ^*_{dry} to be used in expression (3).

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ATTACHMENT 2

TEST DATA SHEETS

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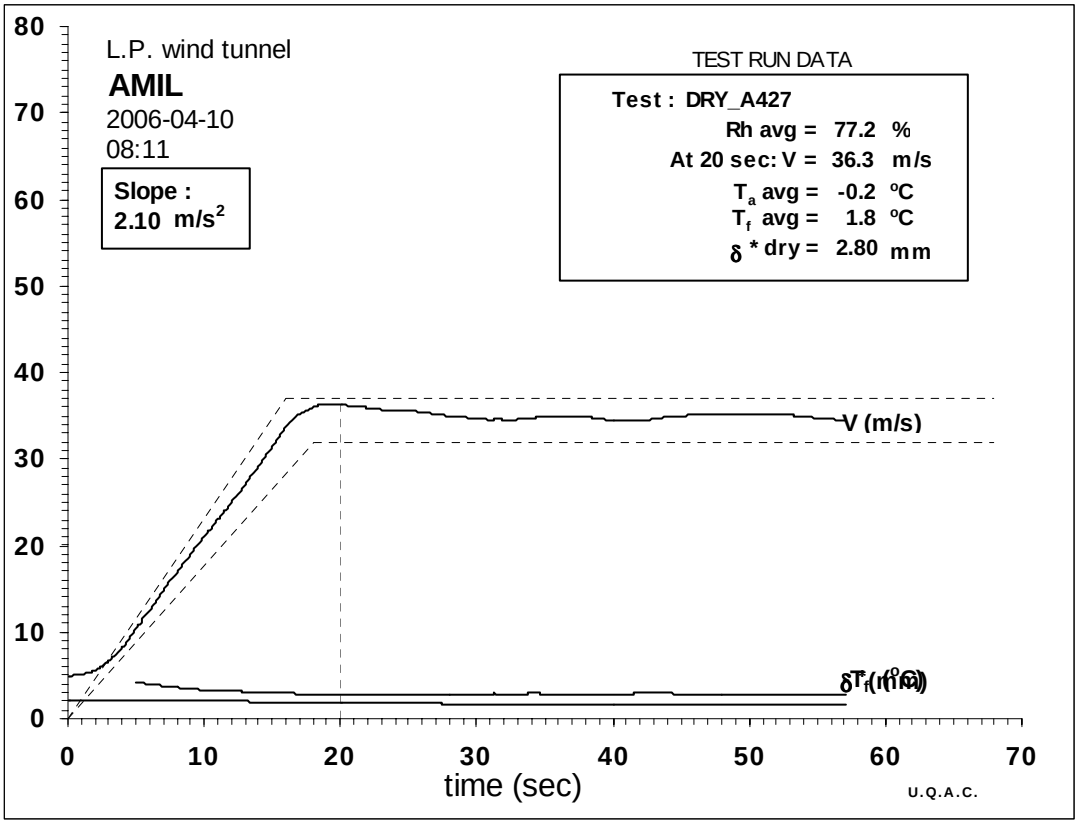
DRY RUNS

DRY_A427



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.2	1.8	77.2	3.28	35.7	-0.04	2.78
20	-0.3	1.8	77.0	3.40	36.4	-0.03	2.82
21	-0.3	1.8	77.1	3.44	36.6	-0.04	2.79

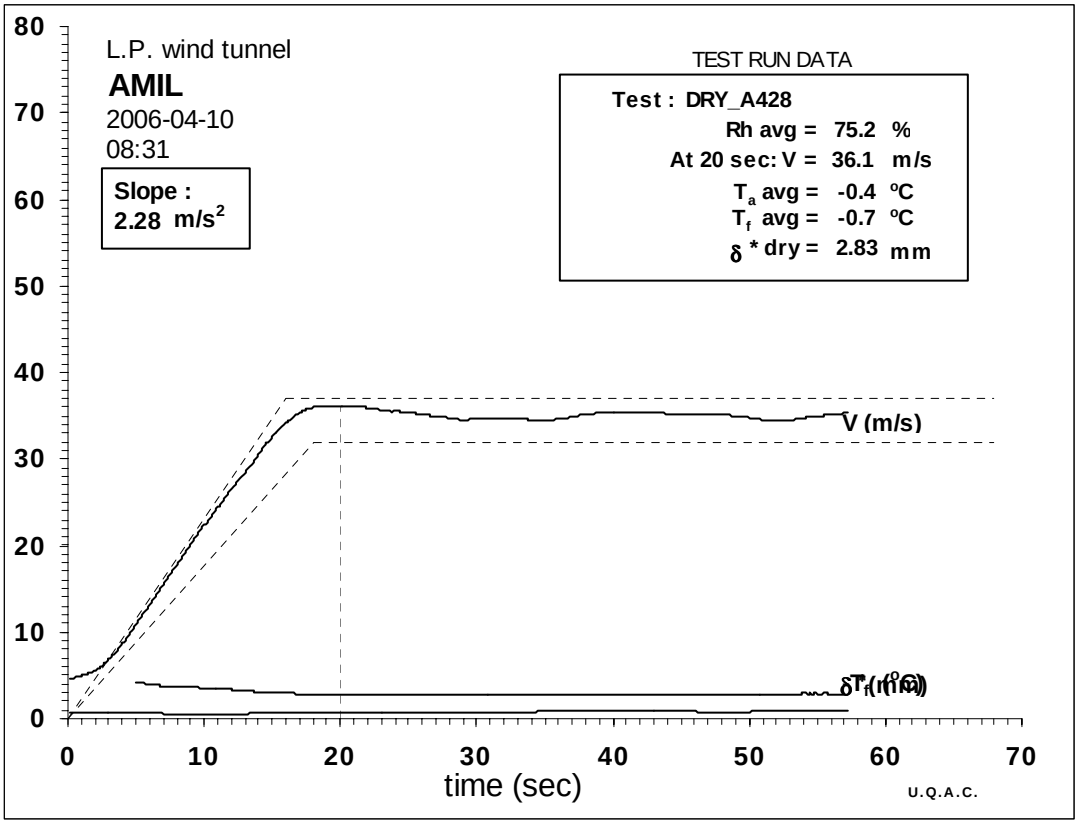
Averages:

20	-0.3	**1.8**	77.1	3.38	36.3	-0.03	**2.80**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_A428



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.4	-0.7	74.8	3.35	36.2	-0.04	2.77
20	-0.5	-0.8	74.7	3.37	36.2	-0.02	2.87
21	-0.5	-0.7	74.0	3.33	36.0	-0.03	2.82

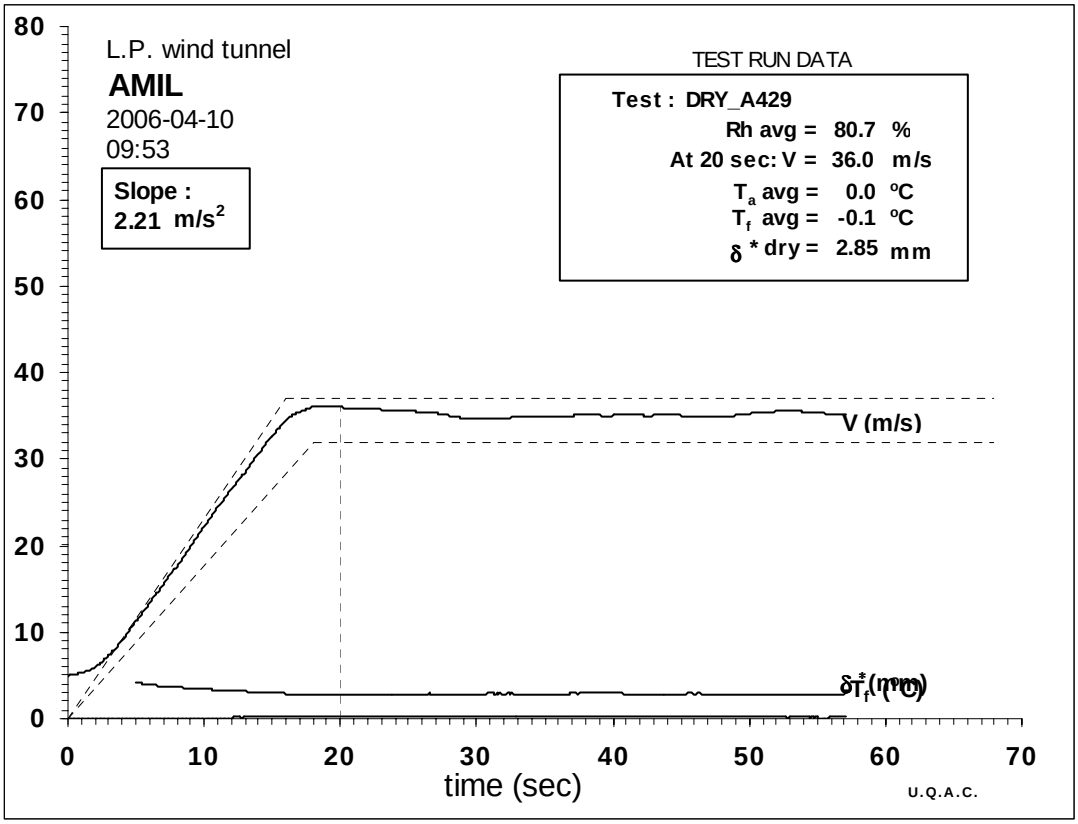
Averages:

20	-0.5	**-0.7**	74.5	3.35	36.1	-0.03	**2.83**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_A429



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.1	-0.1	80.0	3.23	35.5	-0.01	2.94
20	-0.1	-0.1	80.0	3.36	36.2	-0.03	2.83
21	-0.1	-0.2	80.0	3.35	36.2	-0.03	2.83

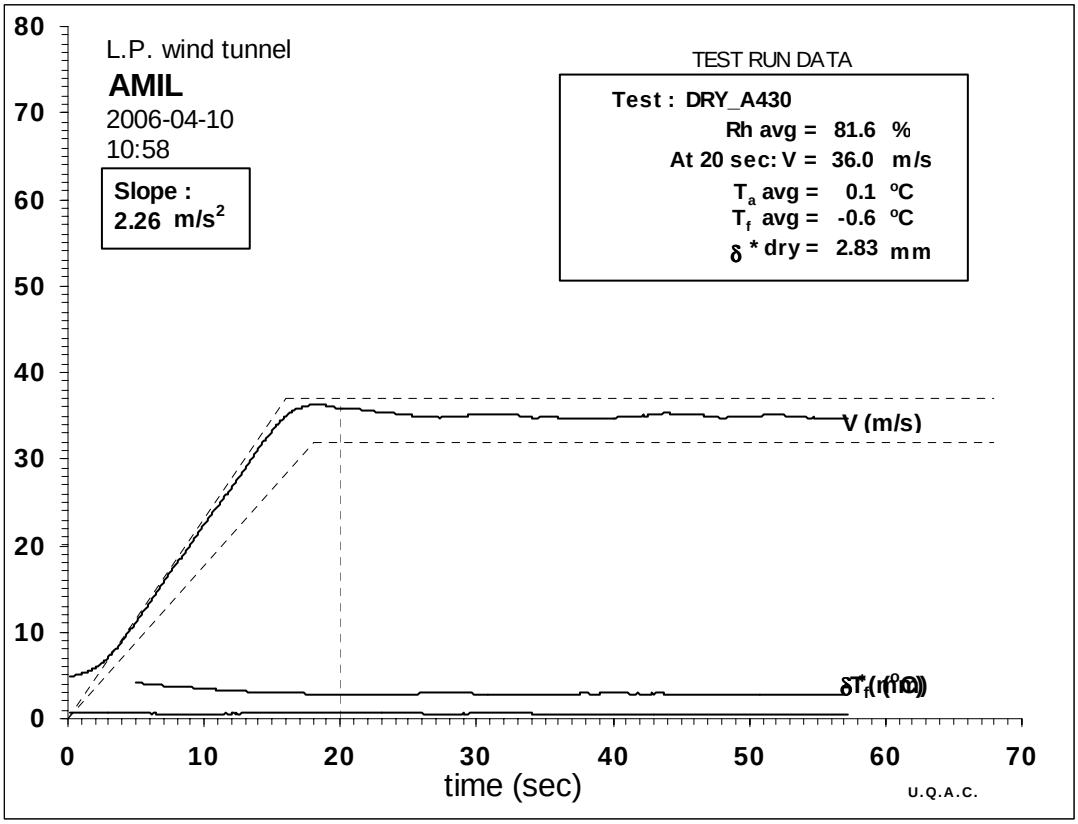
Averages:

20	-0.1	**-0.2**	80.0	3.33	36.0	-0.02	**2.85**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_A430



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	0.0	-0.6	81.5	3.32	36.0	-0.03	2.81
20	0.0	-0.6	81.3	3.30	35.9	-0.03	2.82
21	-0.1	-0.6	81.4	3.33	36.0	-0.03	2.84

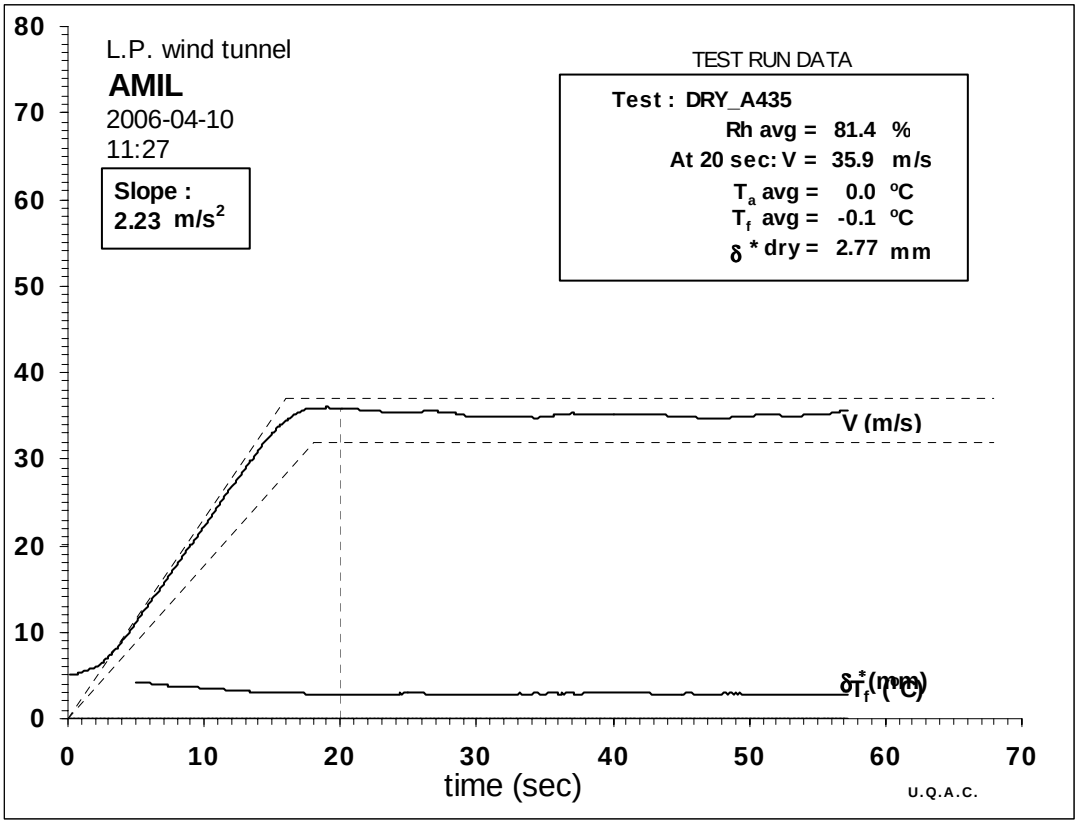
Averages:

20	0.0	**-0.6**	81.4	3.31	36.0	-0.03	**2.83**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_A435



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.1	-0.1	81.5	3.41	36.5	-0.03	2.82
20	-0.1	-0.1	81.1	3.24	35.6	-0.04	2.74
21	-0.1	-0.1	81.7	3.32	36.0	-0.04	2.79

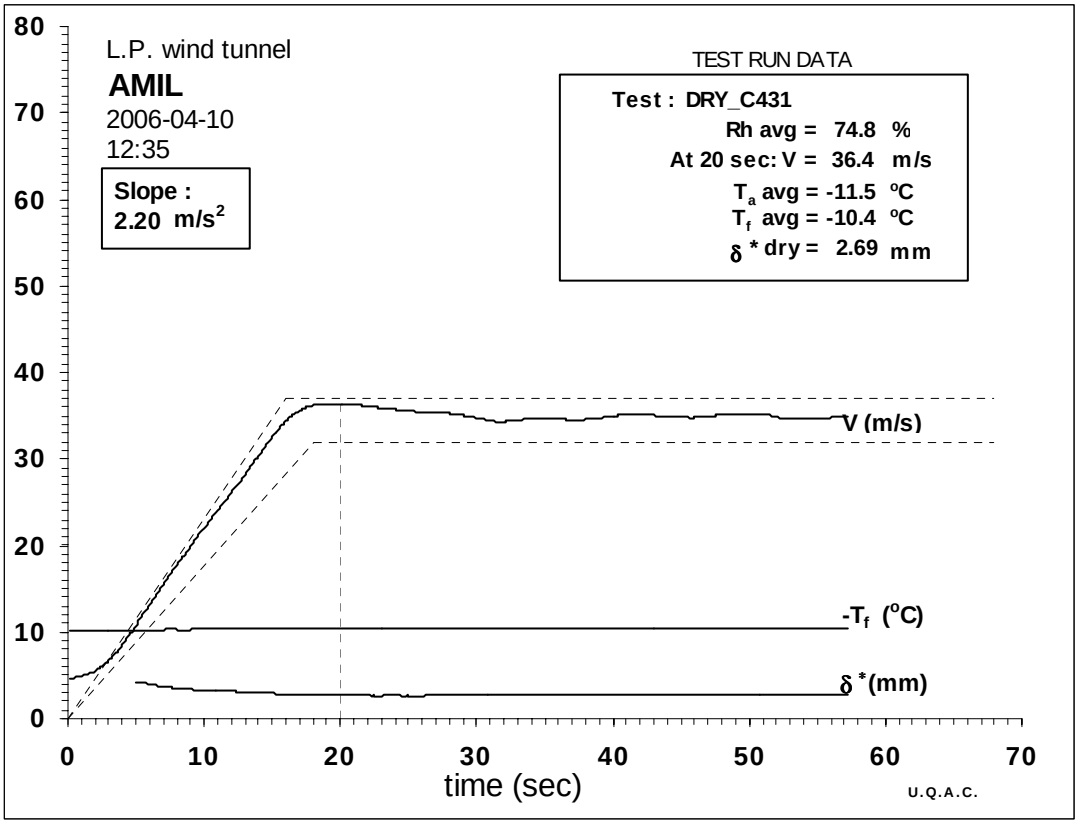
Averages:

20	-0.1	**-0.1**	81.3	3.31	35.9	-0.04	**2.77**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_C431



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-11.5	-10.3	75.7	3.54	36.4	-0.06	2.68
20	-11.6	-10.3	75.2	3.53	36.3	-0.05	2.75
21	-11.7	-10.3	75.1	3.55	36.4	-0.07	2.62

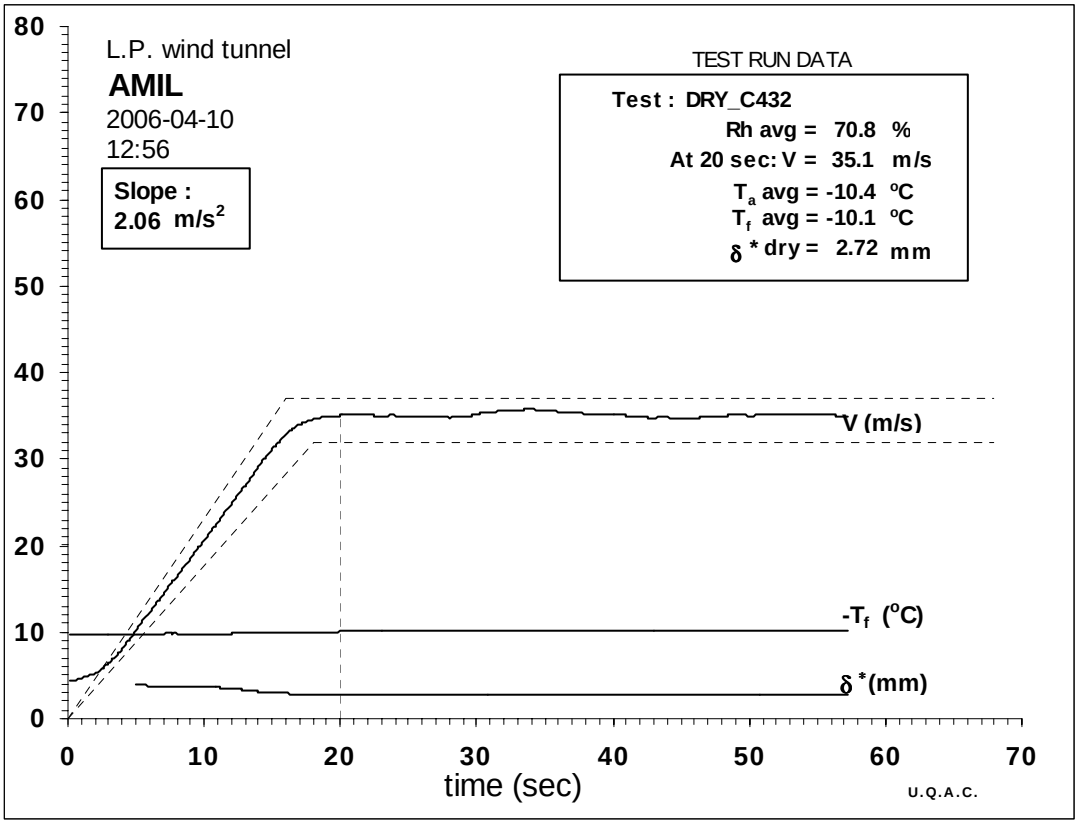
Averages:

20	-11.6	**-10.3**	75.3	3.54	36.4	-0.06	**2.69**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_C432



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-10.4	-10.0	72.3	3.26	35.0	-0.05	2.71
20	-10.4	-10.1	72.0	3.26	35.0	-0.05	2.72
21	-10.5	-10.1	71.8	3.33	35.4	-0.04	2.74

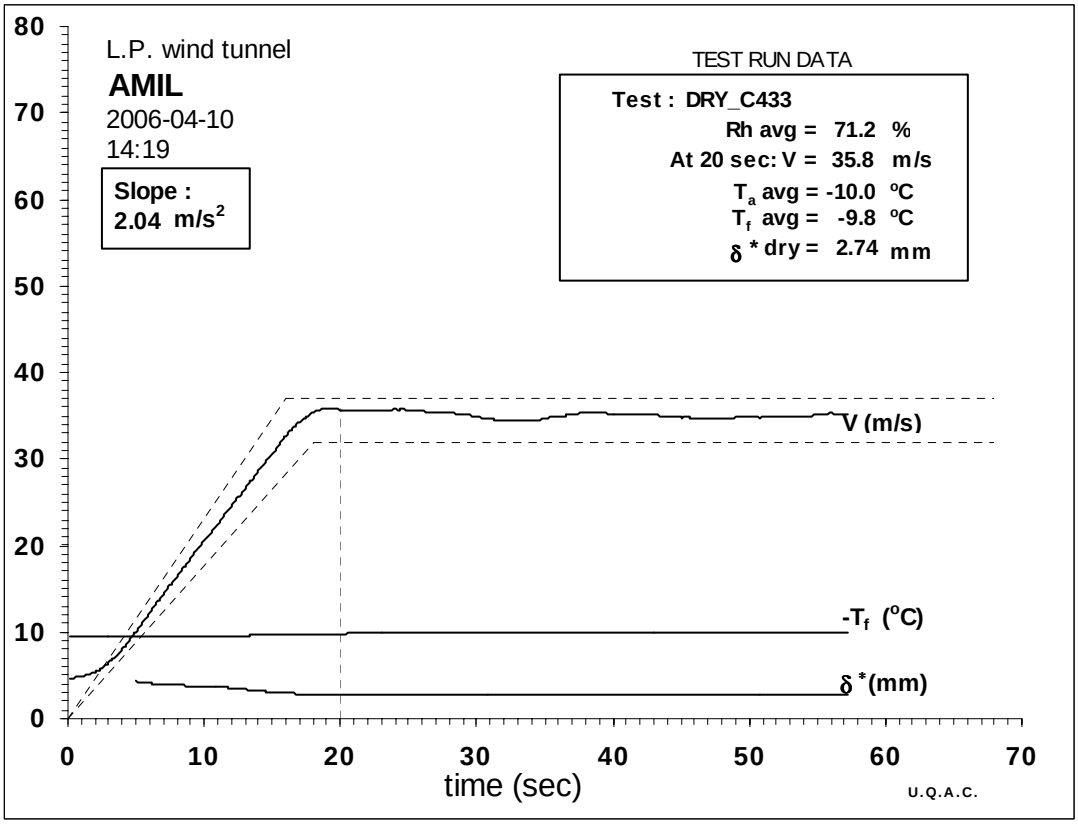
Averages:

20	-10.4	**-10.1**	72.0	3.28	35.1	-0.05	**2.72**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_C433



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-10.0	-9.8	73.2	3.55	36.5	-0.05	2.70
20	-10.0	-9.9	72.4	3.42	35.9	-0.05	2.69
21	-10.1	-9.8	72.0	3.29	35.2	-0.03	2.84

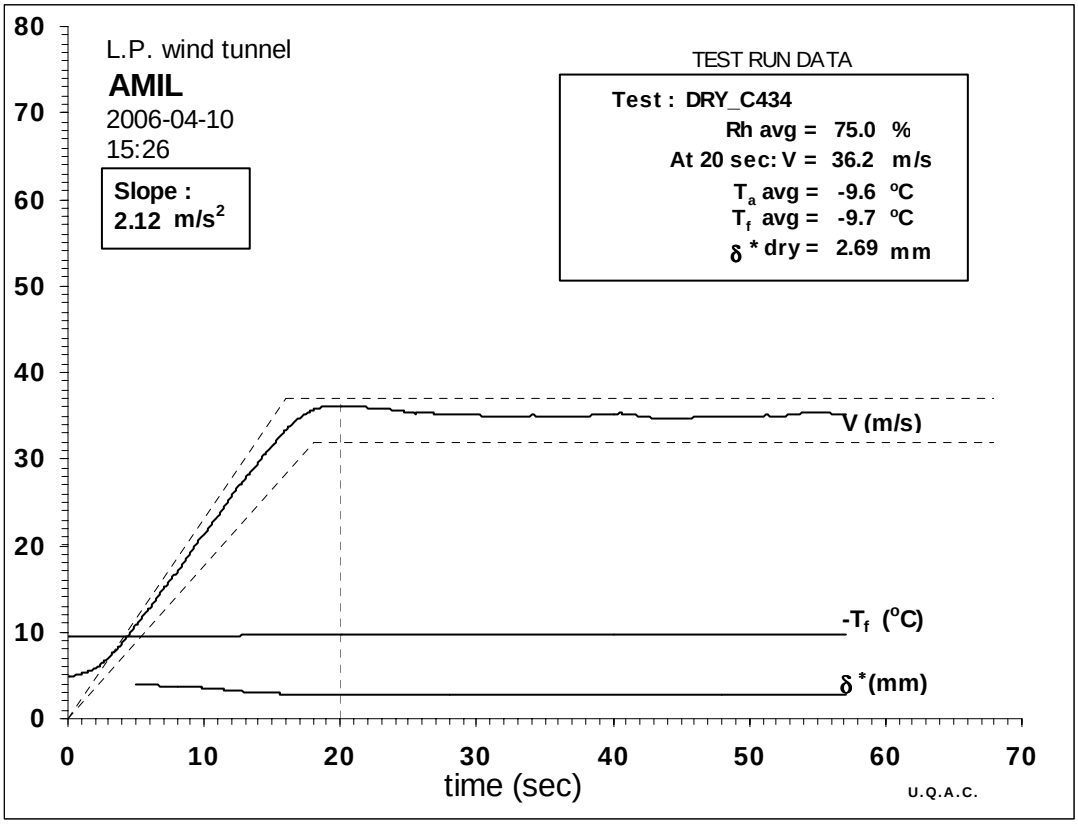
Averages:

20	-10.0	**-9.8**	72.5	3.42	35.8	-0.05	**2.74**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_C434



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-9.6	-9.8	75.0	3.50	36.3	-0.05	2.71
20	-9.7	-9.8	75.2	3.48	36.2	-0.06	2.67
21	-9.7	-9.8	74.8	3.44	36.0	-0.05	2.71

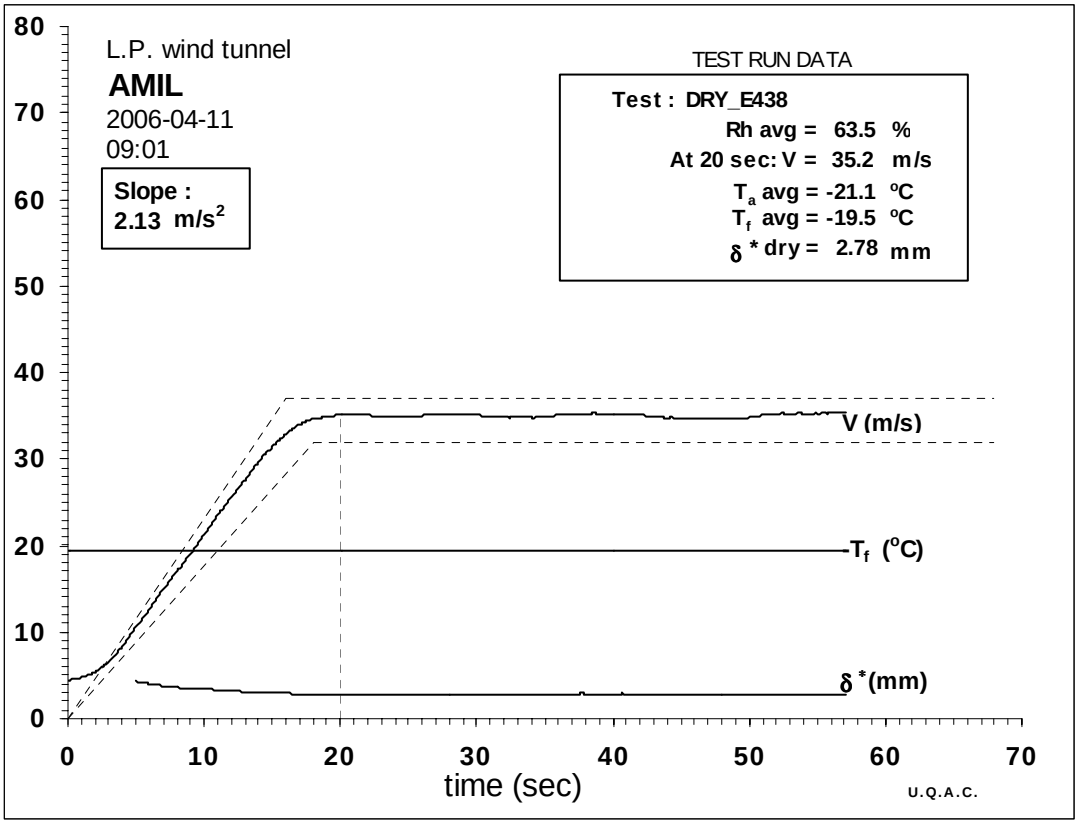
Averages:

20	-9.7	**-9.8**	75.0	3.47	36.2	-0.06	**2.69**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_E438



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-21.2	-19.5	63.2	3.43	35.1	-0.03	2.81
20	-21.2	-19.5	63.5	3.43	35.1	-0.04	2.78
21	-21.2	-19.5	63.3	3.46	35.3	-0.04	2.76

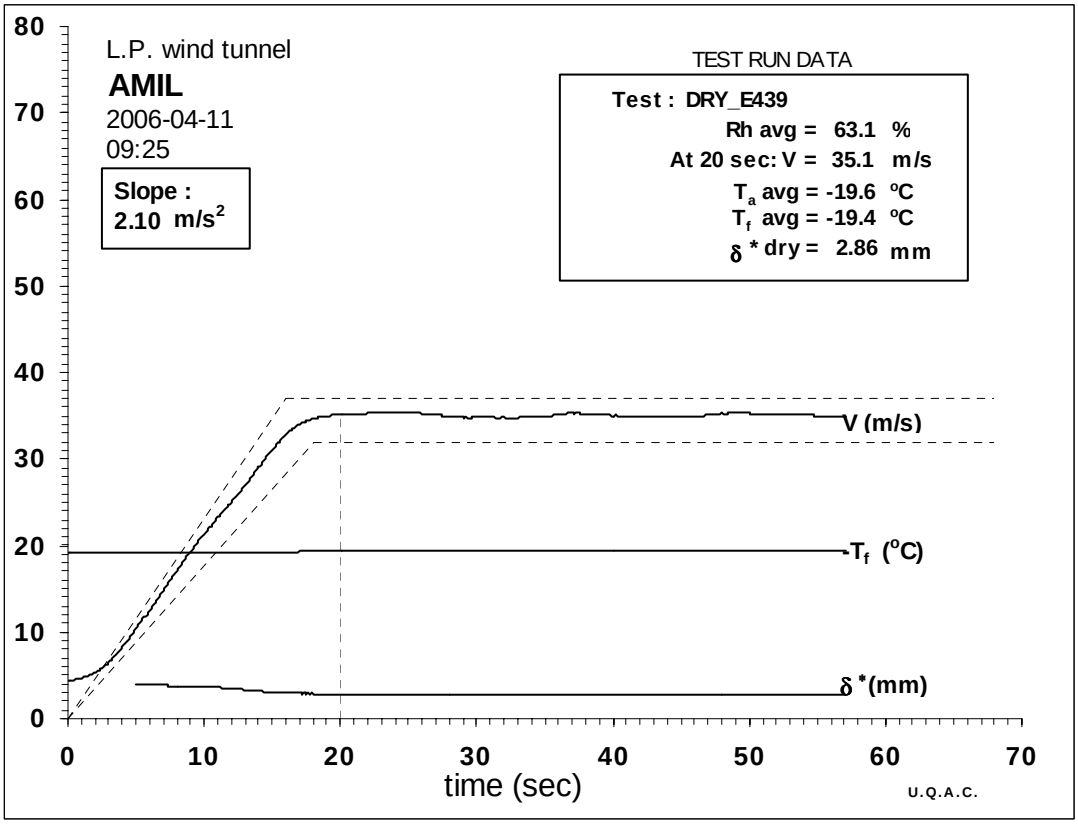
Averages:

20	-21.2	**-19.5**	63.3	3.44	35.2	-0.04	**2.78**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_E439



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.5	-19.3	64.0	3.34	34.8	-0.01	2.93
20	-19.6	-19.4	63.9	3.38	35.0	-0.03	2.85
21	-19.7	-19.3	63.5	3.47	35.4	-0.03	2.82

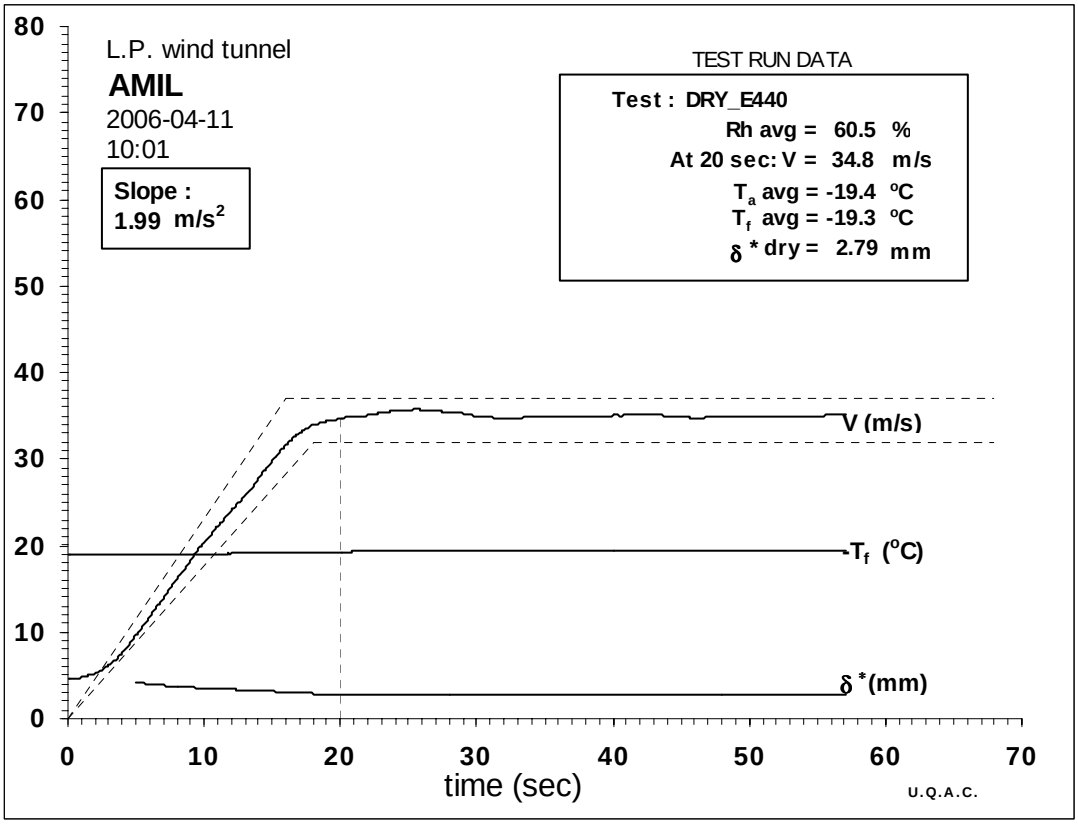
Averages:

20	-19.6	**-19.4**	63.8	3.40	35.1	-0.02	**2.86**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_E440



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.3	-19.3	61.4	3.32	34.7	-0.03	2.85
20	-19.3	-19.3	61.4	3.33	34.7	-0.04	2.77
21	-19.4	-19.3	61.2	3.35	34.8	-0.04	2.79

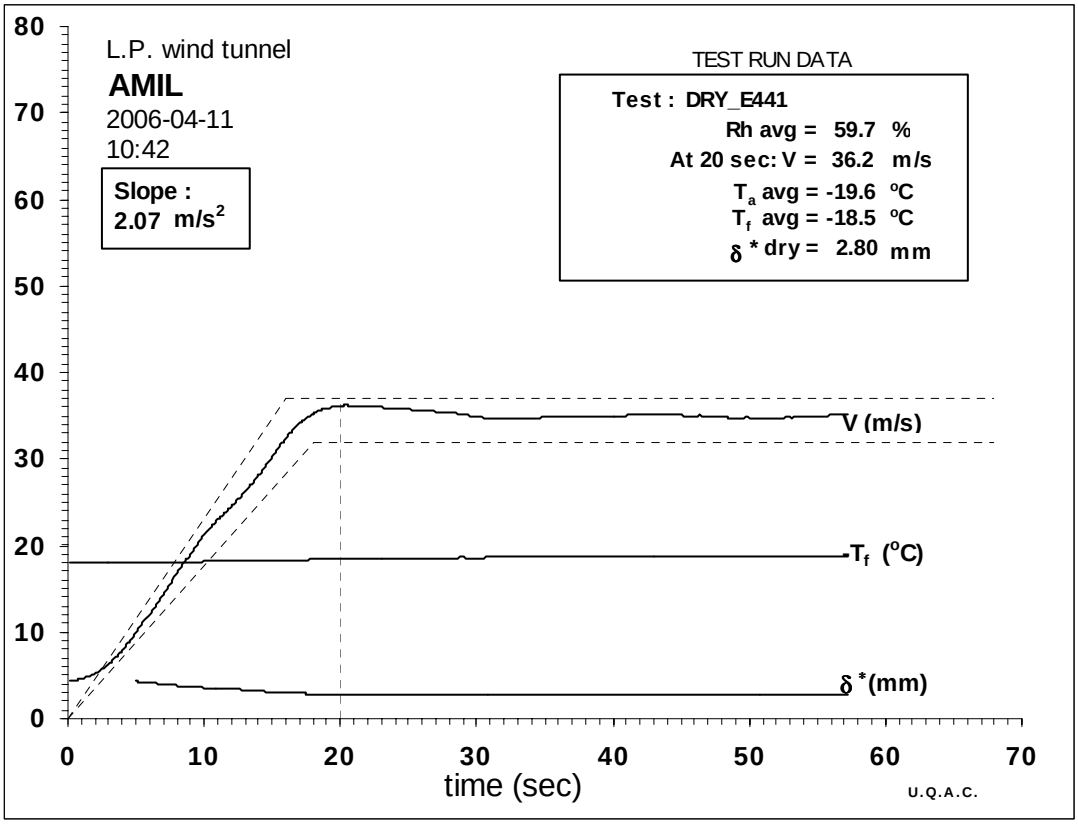
Averages:

20	-19.3	**-19.3**	61.4	3.33	34.8	-0.04	**2.79**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_E441



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.5	-18.4	60.5	3.60	36.1	-0.04	2.81
20	-19.6	-18.4	60.7	3.64	36.3	-0.04	2.80
21	-19.7	-18.5	60.5	3.61	36.2	-0.04	2.78

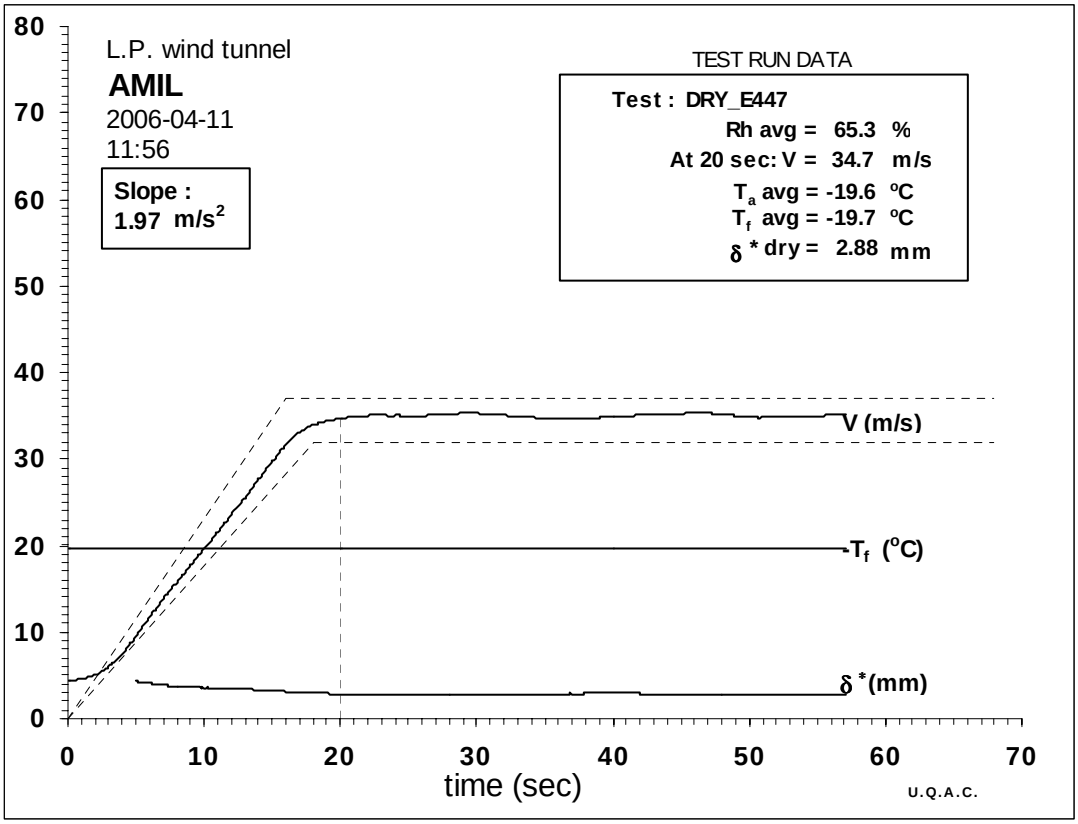
Averages:

20	-19.6	**-18.5**	60.6	3.62	36.2	-0.04	**2.80**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_E447



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.5	-19.9	65.7	3.31	34.6	-0.01	2.93
20	-19.7	-19.7	65.5	3.30	34.6	-0.02	2.87
21	-19.7	-19.7	65.4	3.35	34.8	-0.03	2.84

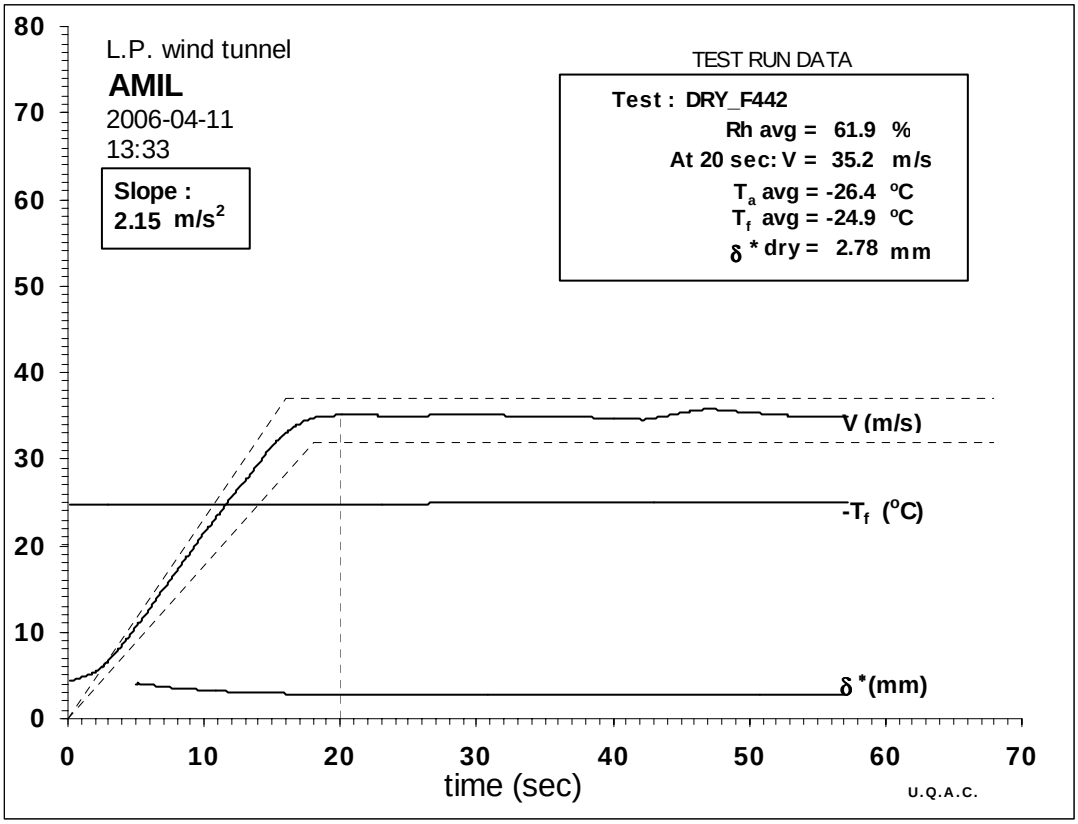
Averages:

20	-19.6	**-19.7**	65.5	3.31	34.7	-0.02	**2.88**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_F442



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-26.5	-24.8	62.0	3.47	35.0	-0.02	2.90
20	-26.5	-24.8	62.1	3.55	35.4	-0.05	2.72
21	-26.5	-24.8	62.1	3.53	35.3	-0.04	2.76

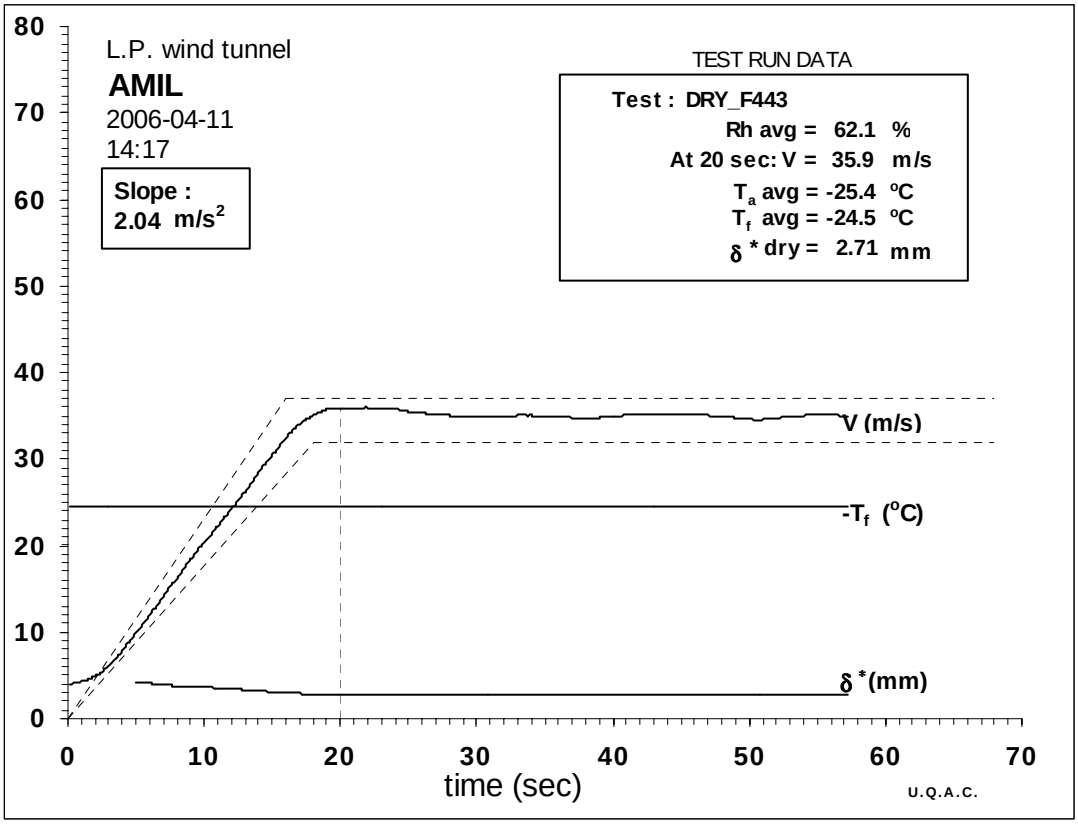
Averages:

20	-26.5	**-24.8**	62.1	3.52	35.2	-0.04	**2.78**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_F443



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-25.5	-24.6	62.1	3.65	35.9	-0.07	2.65
20	-25.5	-24.6	62.0	3.58	35.6	-0.04	2.76
21	-25.6	-24.6	62.2	3.73	36.3	-0.06	2.69

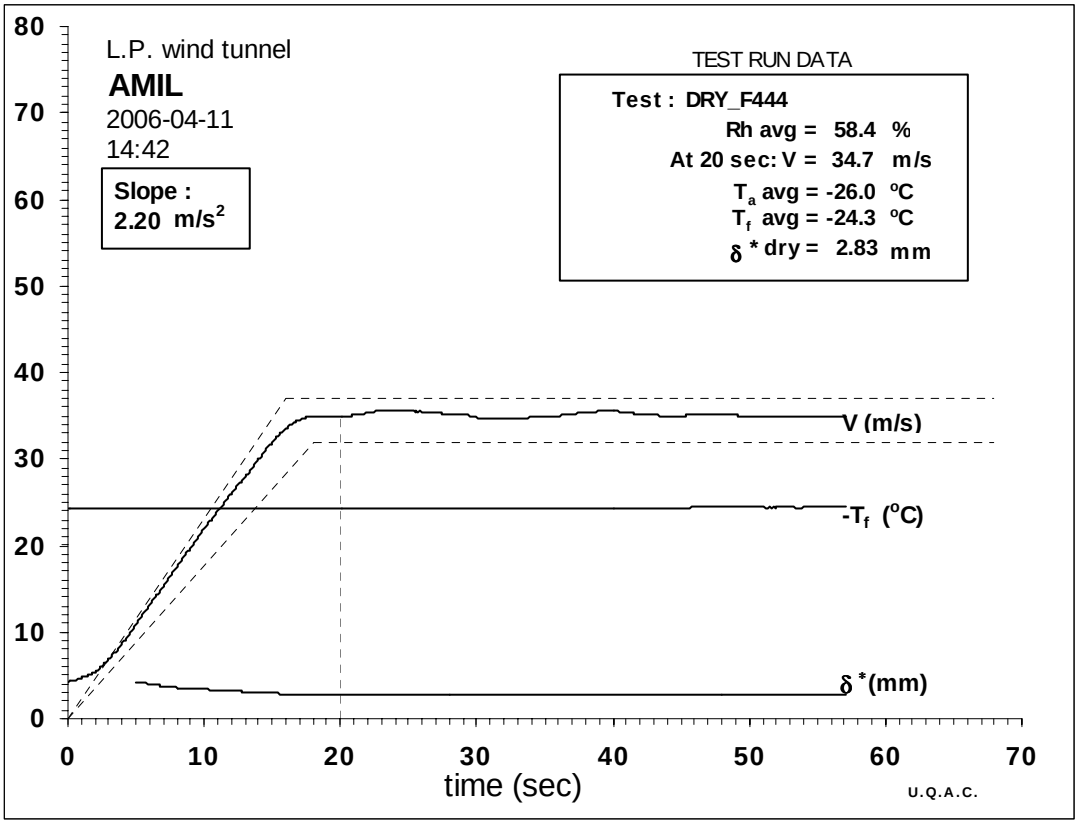
Averages:

20	-25.5	**-24.6**	62.1	3.64	35.9	-0.05	**2.71**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_F444



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-26.1	-24.3	58.6	3.43	34.8	-0.03	2.82
20	-26.2	-24.2	58.5	3.37	34.5	-0.04	2.79
21	-26.2	-24.4	58.7	3.45	34.9	-0.02	2.89

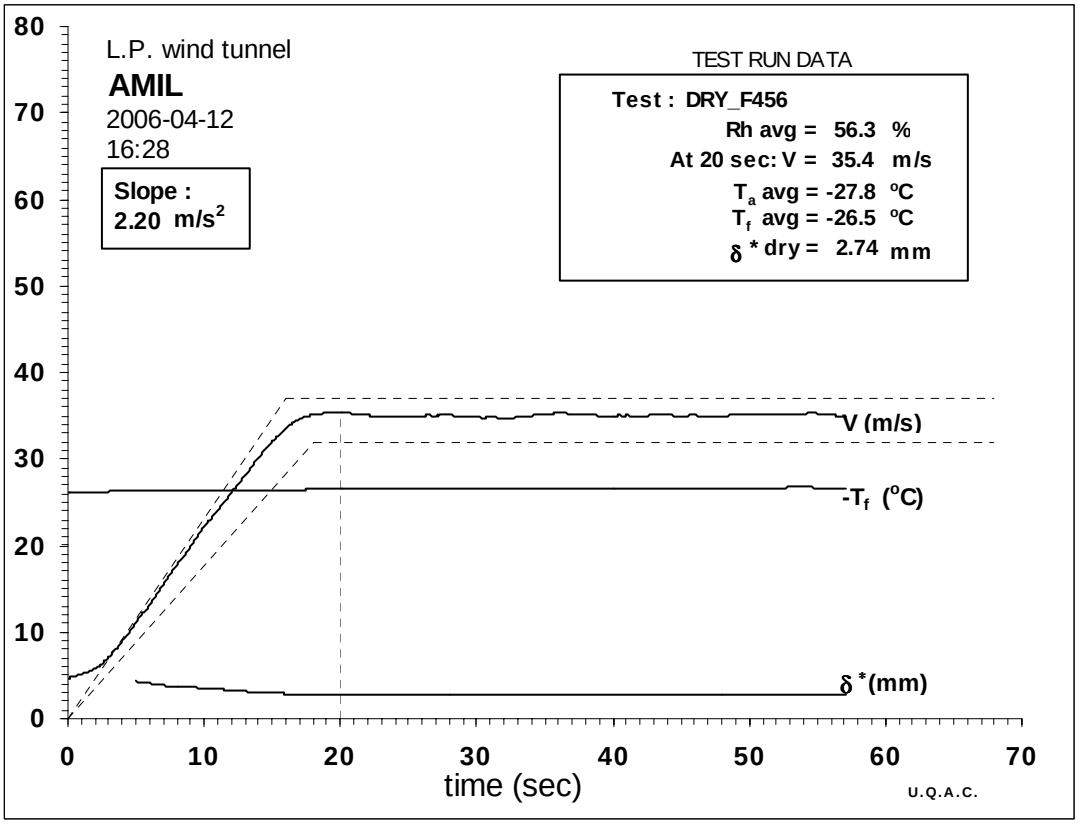
Averages:

20	-26.2	**-24.3**	58.6	3.41	34.7	-0.03	**2.83**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

DRY_F456



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-27.9	-26.5	56.6	3.54	35.2	-0.02	2.86
20	-27.9	-26.5	56.6	3.59	35.5	-0.06	2.69
21	-27.9	-26.5	56.5	3.61	35.6	-0.05	2.72

Averages:

20	-27.9	**-26.5**	56.6	3.58	35.4	-0.05	**2.74**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm

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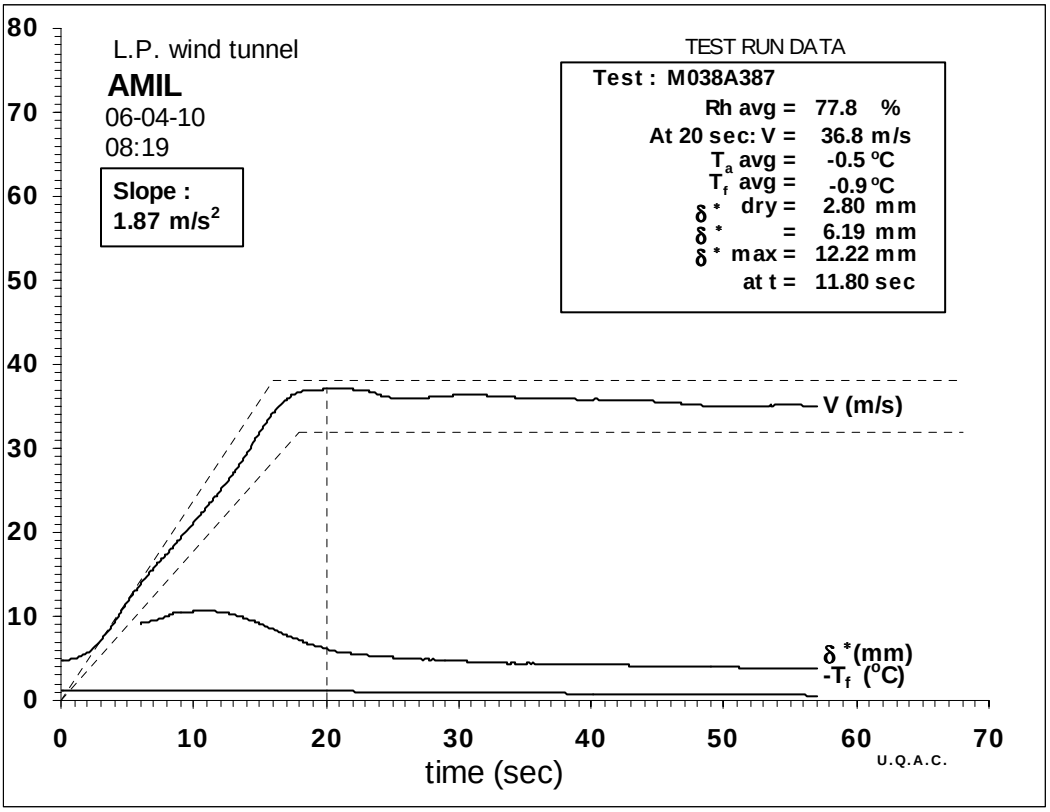
RUNS WITH REFERENCE FLUID M-038

M038A387



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.6	-1.1	76.7	3.49	36.9	0.23	6.57
20	-0.6	-1.1	76.9	3.43	36.6	0.21	6.29
21	-0.7	-1.1	76.8	3.51	37.0	0.17	5.70

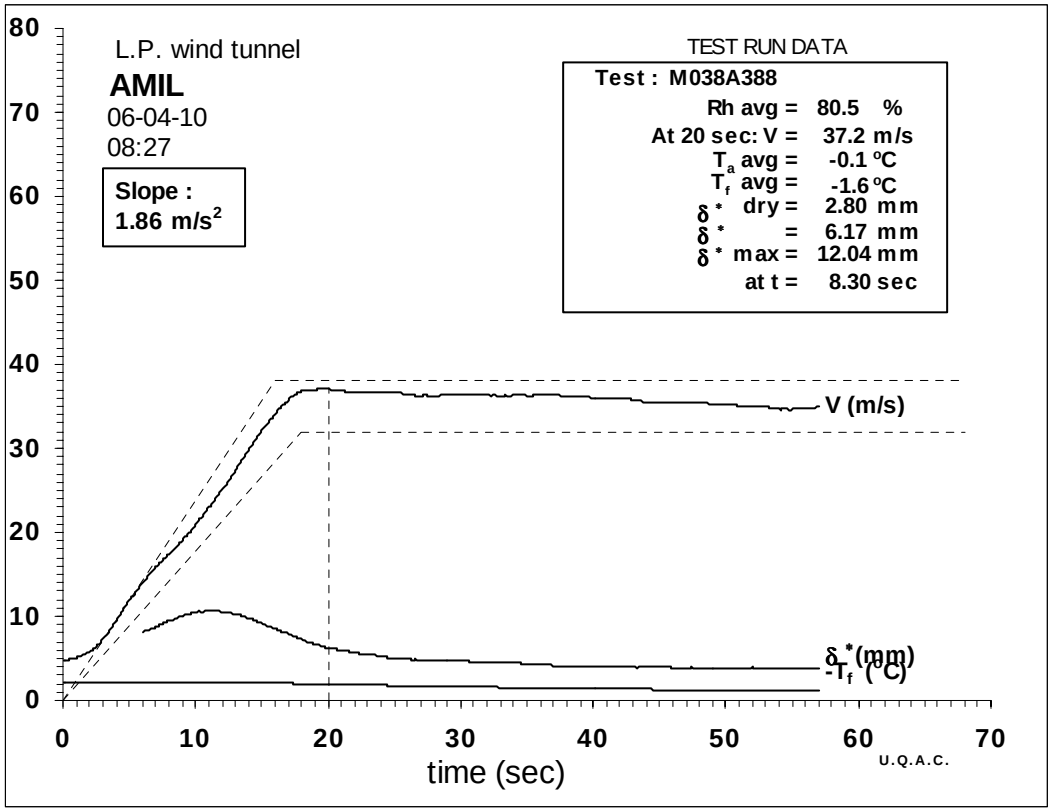
Averages :

20	-0.7	**-1.1**	76.8	3.47	36.8	0.20	**6.19**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

M038A388



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.1	-2.0	79.3	3.69	37.9	0.22	6.25
20	-0.2	-1.9	79.5	3.55	37.2	0.22	6.29
21	-0.2	-1.9	79.7	3.45	36.7	0.18	5.90

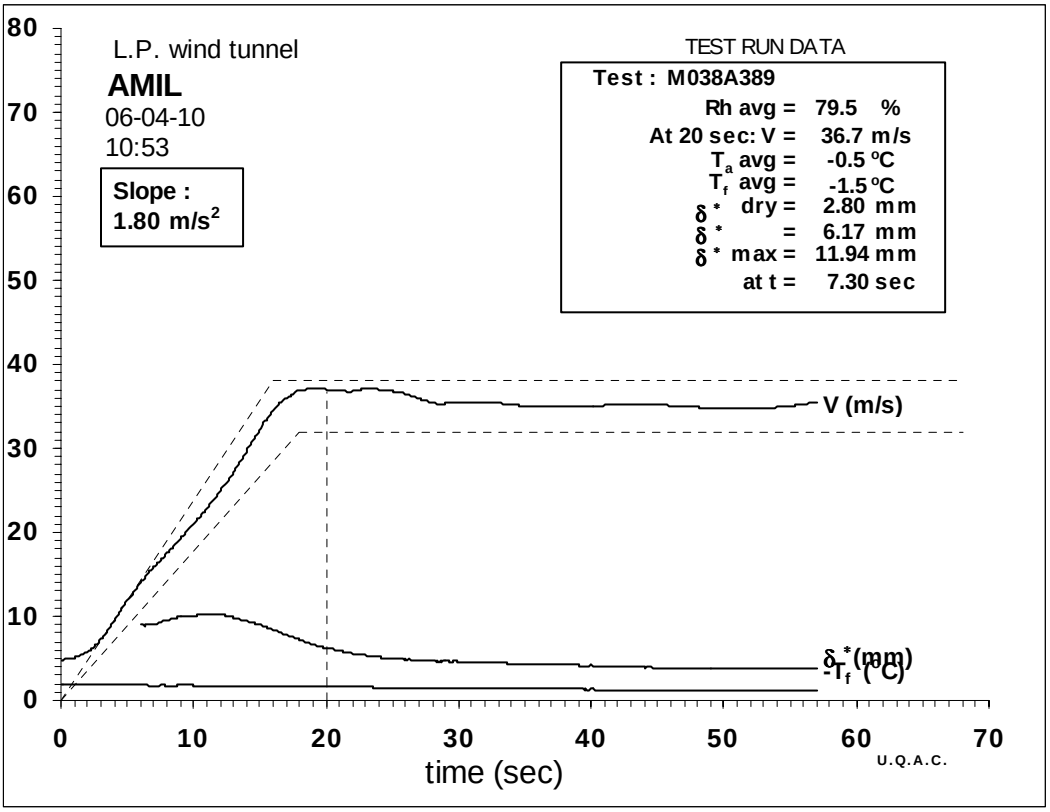
Averages :

20	-0.2	**-1.9**	79.5	3.56	37.2	0.21	**6.17**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

M038A389



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.7	-1.6	78.5	3.45	36.6	0.22	6.40
20	-0.7	-1.6	78.6	3.44	36.6	0.21	6.34
21	-0.6	-1.6	78.9	3.50	36.9	0.17	5.68

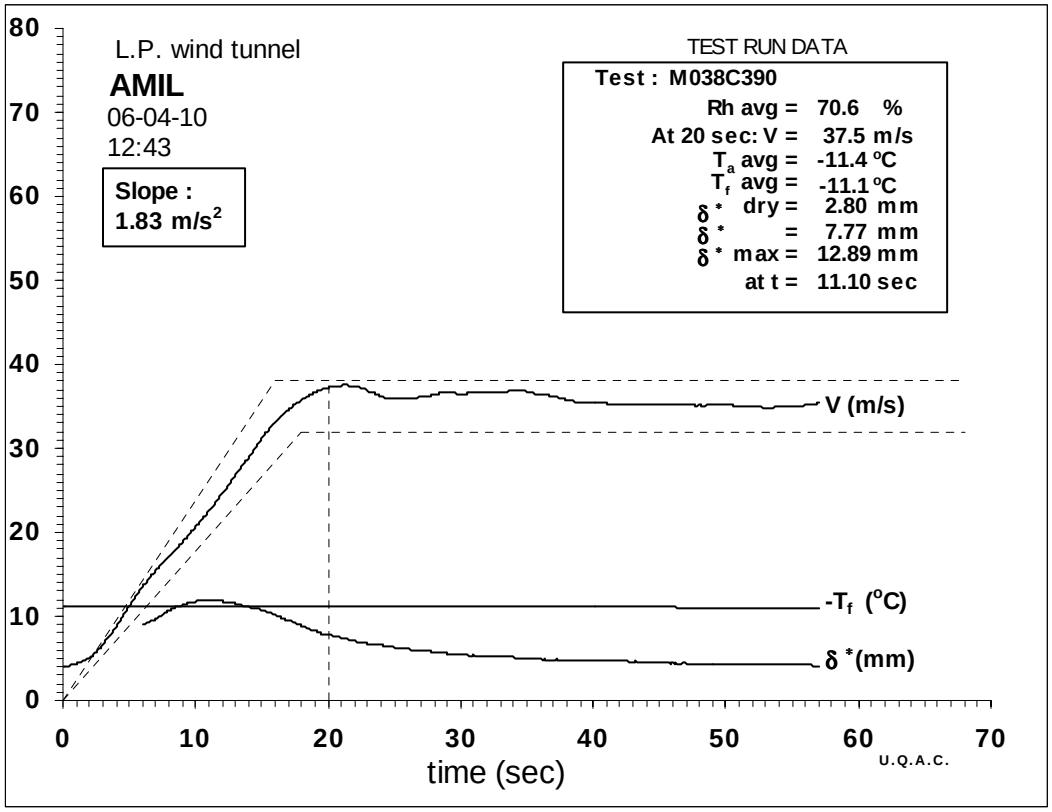
Averages :

20	-0.7	**-1.6**	78.6	3.46	36.7	0.20	**6.17**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

M038C390



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-11.6	-11.2	69.6	3.66	37.0	0.39	8.34
20	-11.6	-11.2	69.3	3.68	37.1	0.35	7.79
21	-11.5	-11.1	69.5	3.96	38.5	0.33	7.28

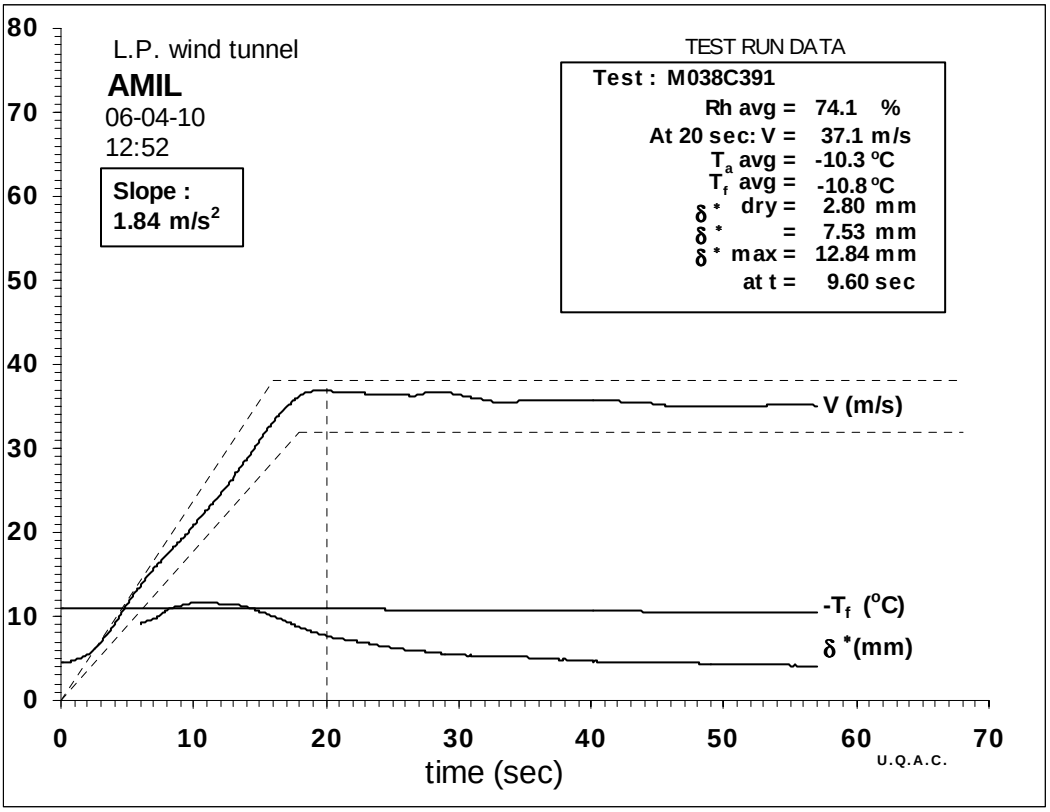
Averages :

20	-11.5	**-11.2**	69.4	3.75	37.5	0.35	**7.77**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

M038C391



CRITICAL TIME TEST DATA

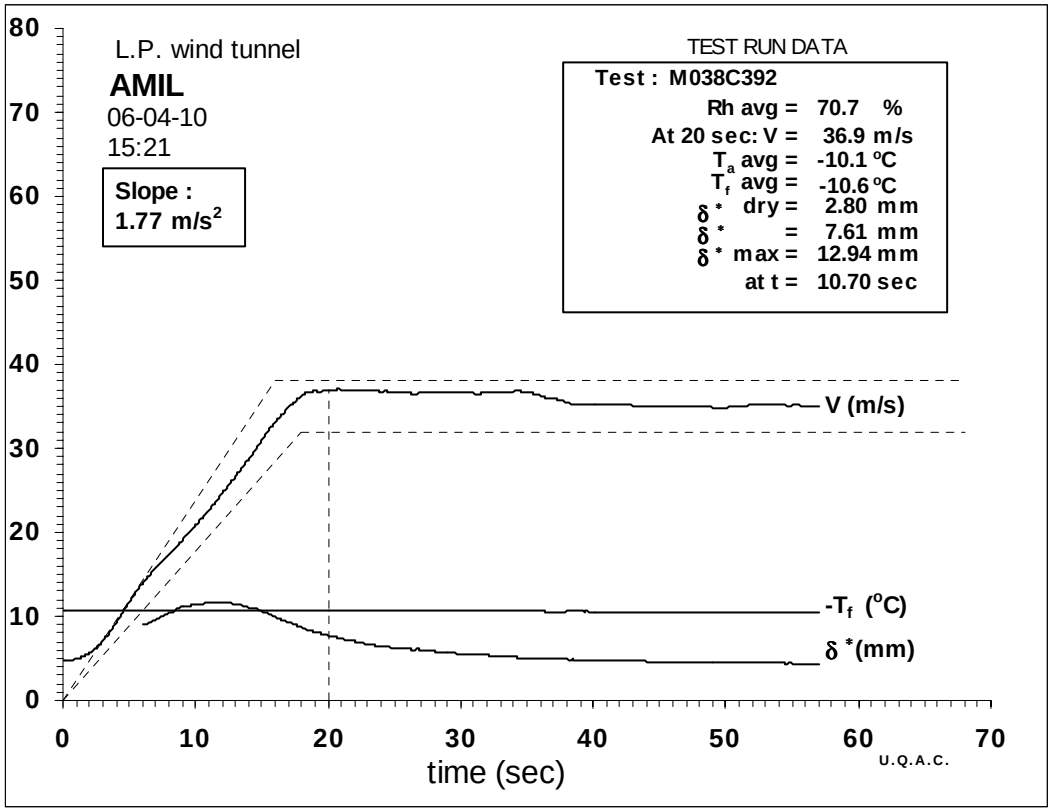
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ * mm
19	-10.5	-10.9	73.0	3.72	37.4	0.36	7.97
20	-10.4	-10.9	73.0	3.68	37.1	0.32	7.44
21	-10.4	-10.9	73.2	3.62	36.8	0.30	7.31

Averages :

20	-10.5	**-10.9**	73.1	3.67	37.1	0.32	**7.53**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-10.3	-10.7	69.1	3.61	36.8	0.37	8.14
20	-10.3	-10.7	69.5	3.75	37.6	0.33	7.54
21	-10.3	-10.7	69.2	3.45	36.0	0.28	7.29

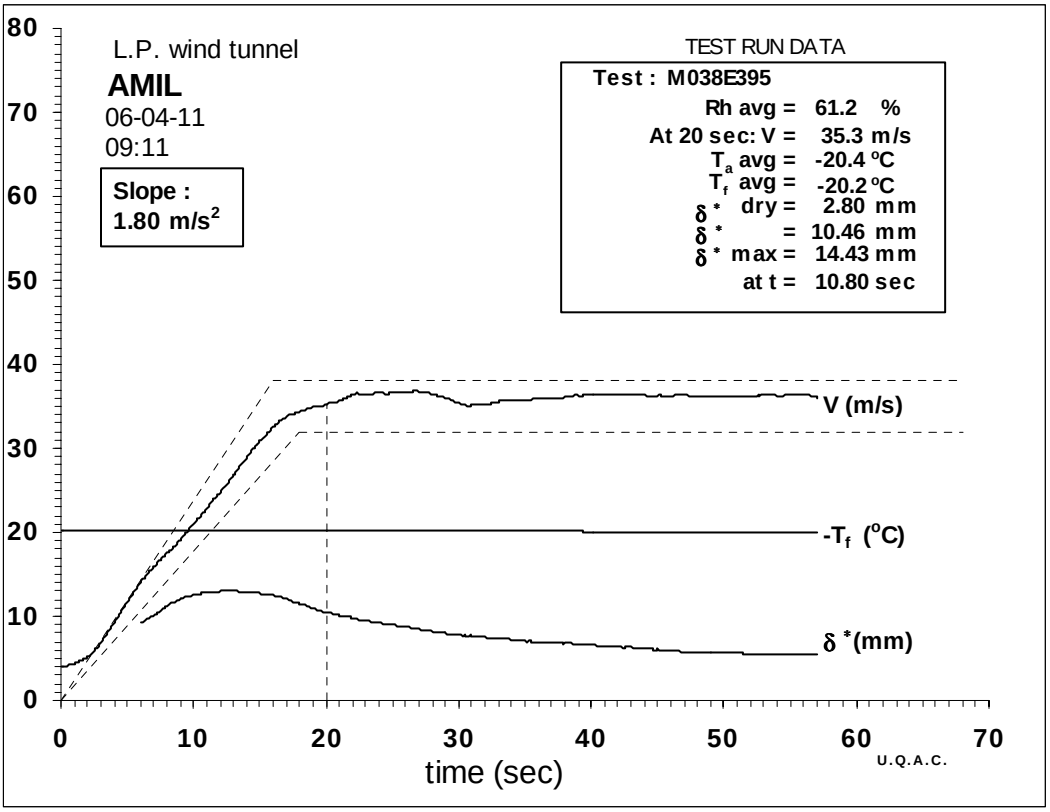
Averages :

20	-10.3	**-10.7**	69.3	3.63	36.9	0.33	**7.61**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

M038E395



CRITICAL TIME TEST DATA

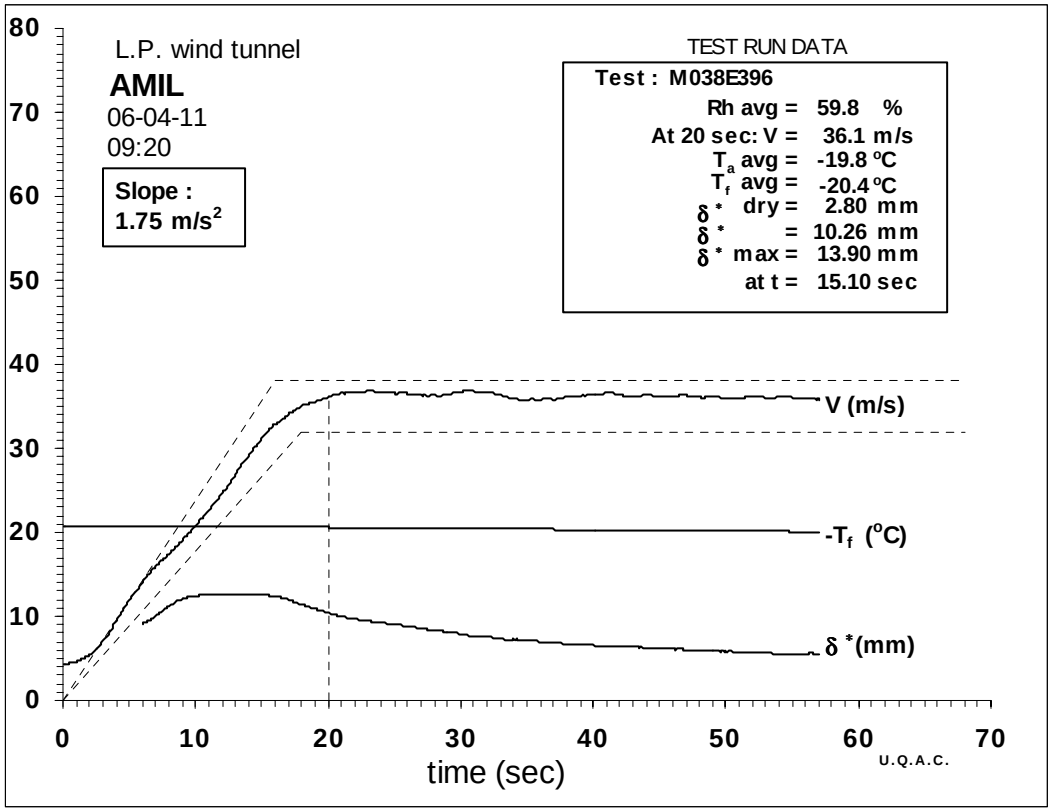
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ * mm
19	-20.6	-20.2	60.7	3.28	34.4	0.53	10.71
20	-20.6	-20.3	60.7	3.45	35.3	0.54	10.48
21	-20.5	-20.3	60.9	3.56	35.9	0.54	10.20

Averages :

20	-20.6	**-20.3**	60.7	3.44	35.3	0.54	**10.46**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.9	-20.6	58.8	3.55	35.8	0.57	10.63
20	-20.0	-20.6	59.0	3.68	36.5	0.57	10.35
21	-19.9	-20.6	58.8	3.55	35.9	0.50	9.82

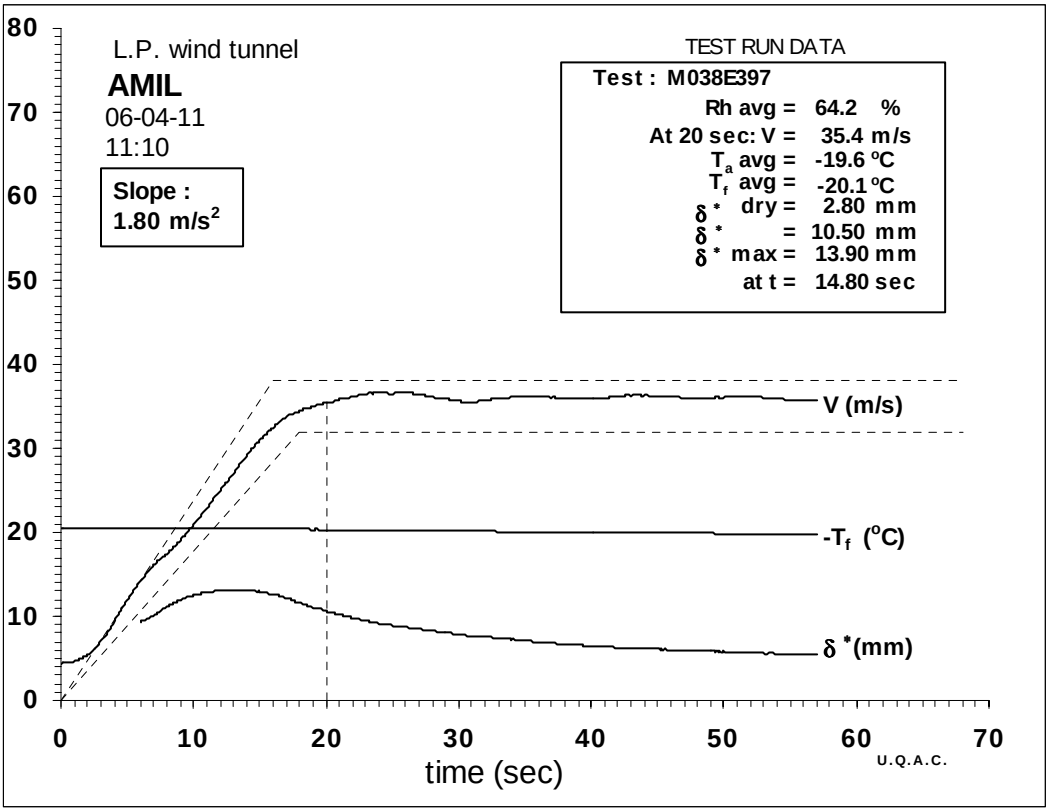
Averages :

20	-20.0	**-20.6**	58.9	3.61	36.1	0.55	**10.26**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

M038E397



CRITICAL TIME TEST DATA

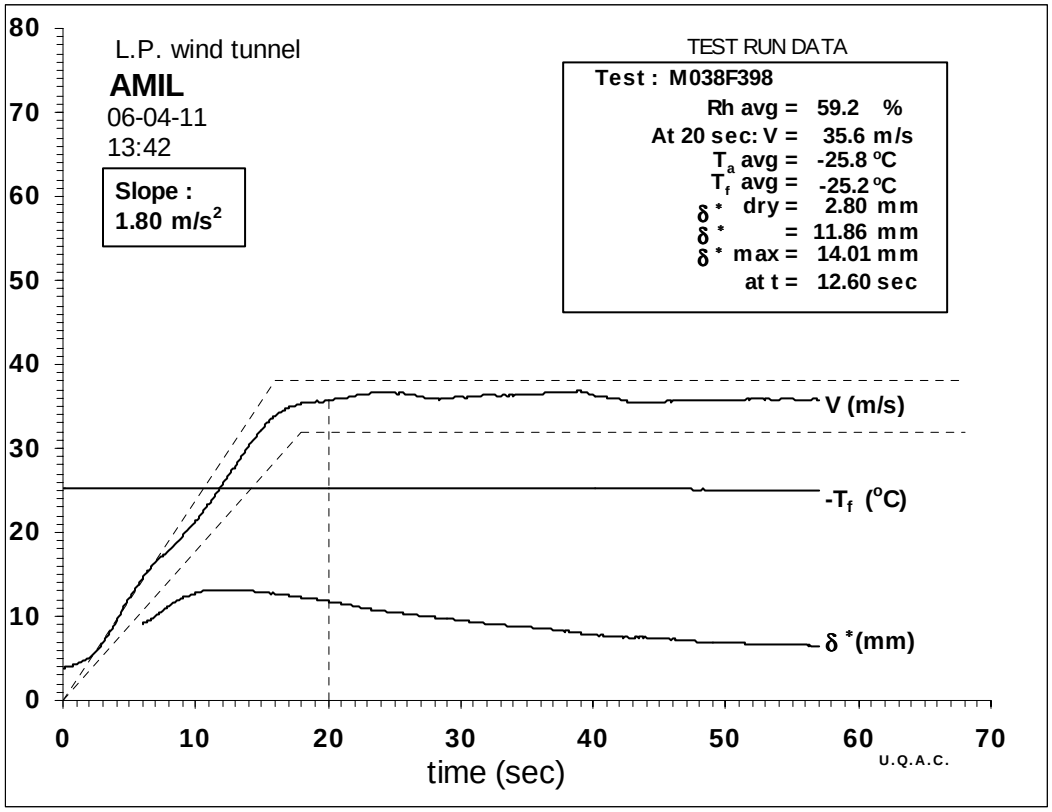
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.8	-20.3	63.9	3.39	35.0	0.56	10.88
20	-19.7	-20.3	63.6	3.47	35.4	0.54	10.42
21	-19.8	-20.3	63.6	3.52	35.7	0.54	10.33

Averages :

20	-19.8	**-20.3**	63.7	3.46	35.4	0.54	**10.50**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-26.0	-25.3	59.1	3.45	34.9	0.67	11.98
20	-26.0	-25.3	59.1	3.58	35.5	0.69	11.92
21	-26.0	-25.3	59.0	3.75	36.4	0.70	11.67

Averages :

20	-26.0	**-25.3**	59.1	3.60	35.6	0.69	**11.86**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

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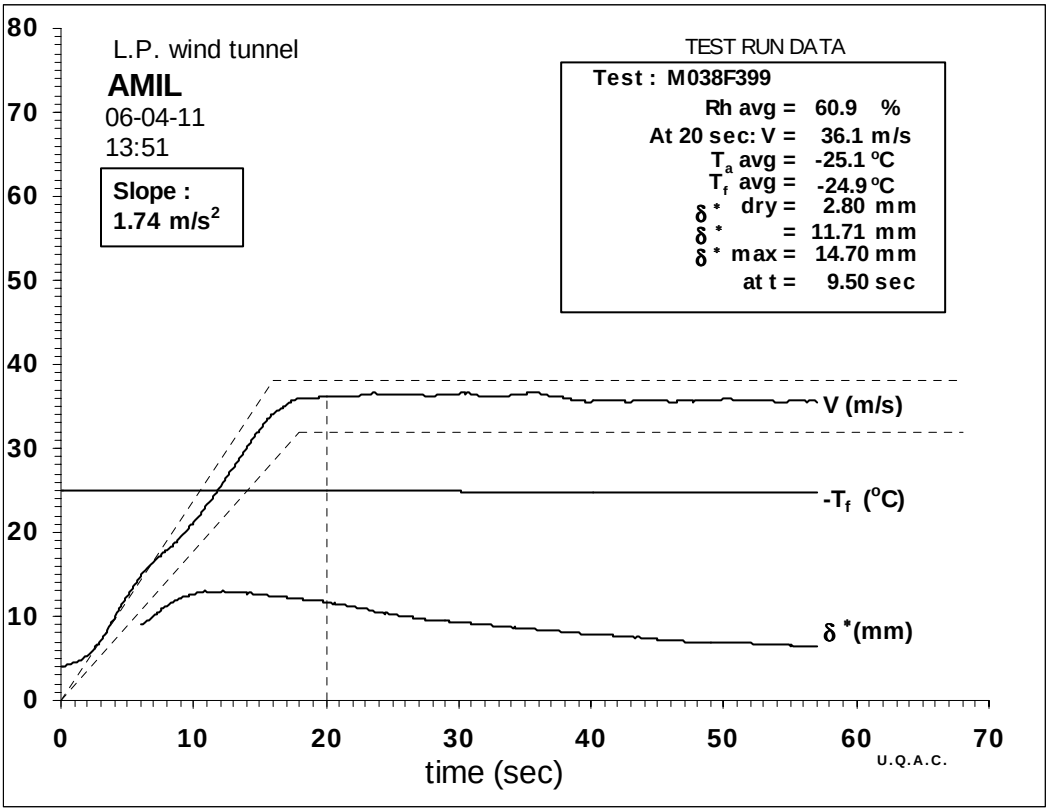


CRITICAL TIME TEST DATA

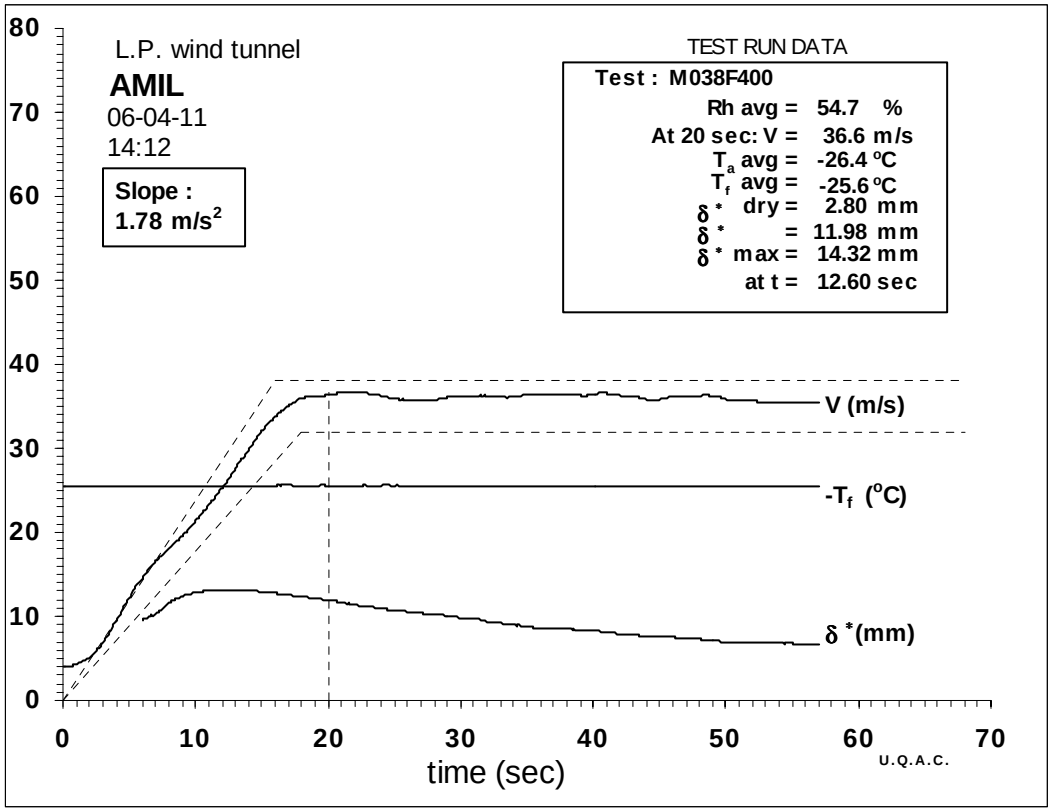
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ * mm
19	-25.1	-25.0	60.8	3.79	36.7	0.73	11.90
20	-25.1	-25.0	60.9	3.66	36.0	0.68	11.58
21	-25.1	-24.9	61.0	3.61	35.7	0.68	11.77

Averages :

20	-25.1	**-25.0**	60.9	3.68	36.1	0.69	**11.71**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-26.6	-25.6	54.6	3.89	37.0	0.78	12.25
20	-26.7	-25.6	54.5	3.78	36.5	0.74	12.07
21	-26.6	-25.6	54.4	3.78	36.5	0.70	11.61

Averages :

20	-26.6	**-25.6**	54.5	3.81	36.6	0.74	**11.98**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

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ARCTICA DG LOT # 55,
FLUID AS RECEIVED G-736

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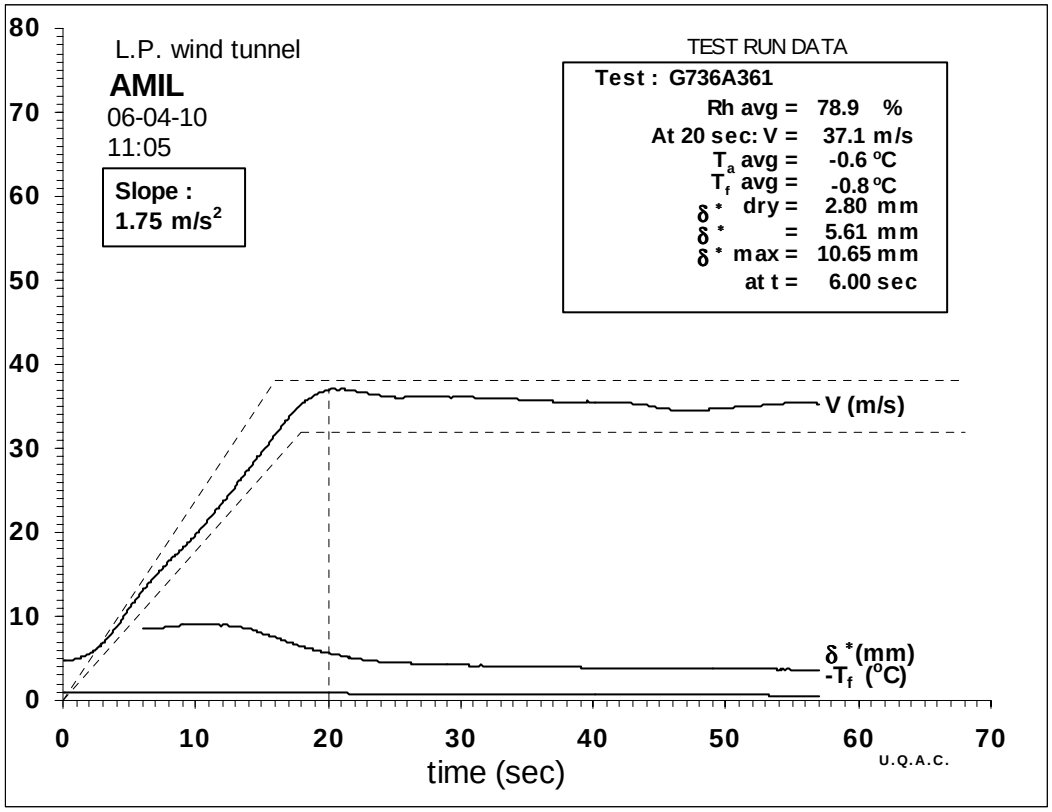


CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.7	-0.9	77.8	3.62	37.5	0.20	6.05
20	-0.6	-0.9	77.7	3.50	36.9	0.15	5.47
21	-0.7	-0.8	77.8	3.54	37.1	0.15	5.46

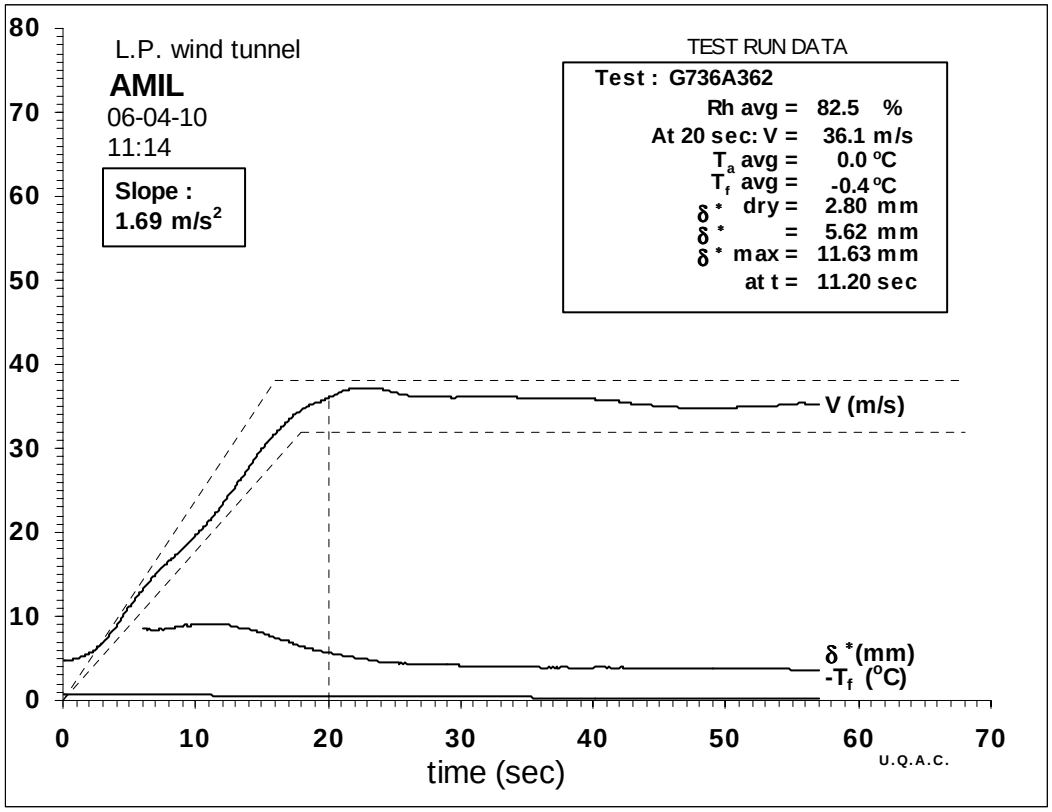
Averages :

20	-0.7	**-0.9**	77.7	3.54	37.1	0.16	**5.61**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

G736A362



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.1	-0.5	81.7	3.26	35.7	0.16	5.67
20	-0.1	-0.5	81.8	3.38	36.3	0.17	5.85
21	-0.1	-0.5	82.1	3.34	36.1	0.13	5.19

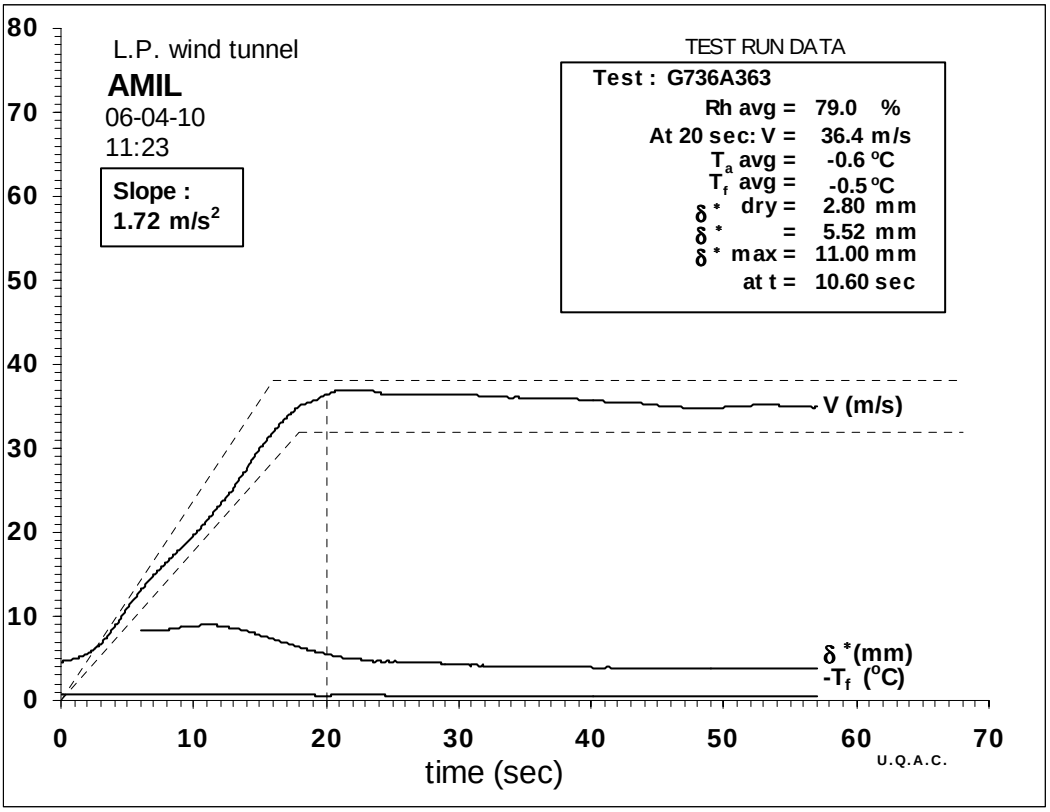
Averages :

20	-0.1	**-0.5**	81.9	3.34	36.1	0.16	**5.62**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

G736A363



CRITICAL TIME TEST DATA

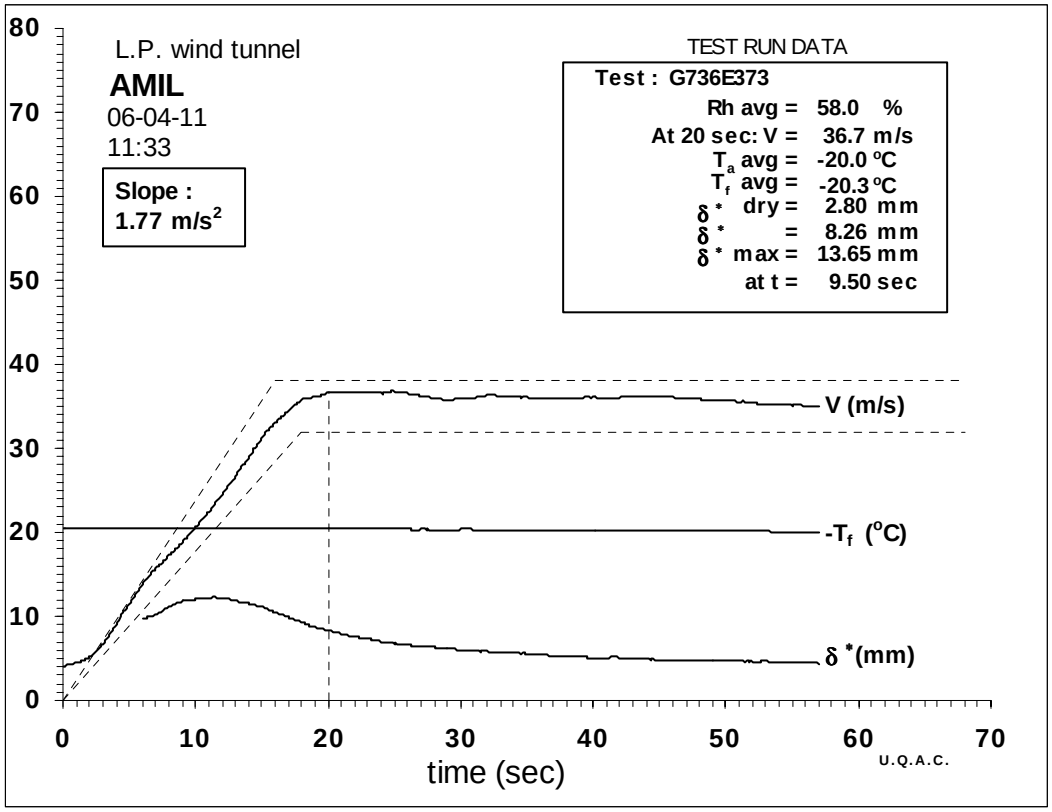
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-0.7	-0.6	78.2	3.38	36.3	0.16	5.72
20	-0.7	-0.6	78.2	3.38	36.3	0.14	5.40
21	-0.7	-0.6	78.3	3.44	36.6	0.15	5.54

Averages :

20	-0.7	**-0.6**	78.3	3.39	36.4	0.15	**5.52**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-20.2	-20.4	56.9	3.75	36.8	0.40	8.42
20	-20.2	-20.4	57.0	3.81	37.1	0.40	8.26
21	-20.1	-20.4	57.1	3.56	35.9	0.36	8.14

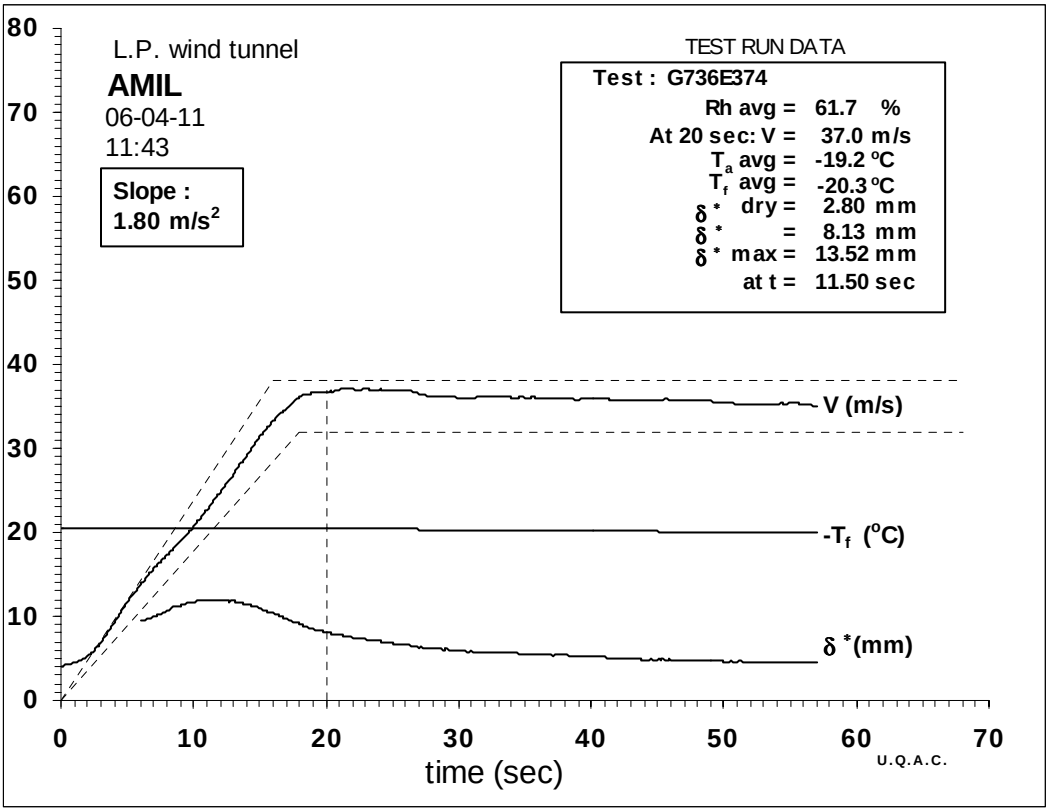
Averages :

20	-20.2	**-20.4**	57.0	3.73	36.7	0.39	**8.26**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

G736E374



CRITICAL TIME TEST DATA

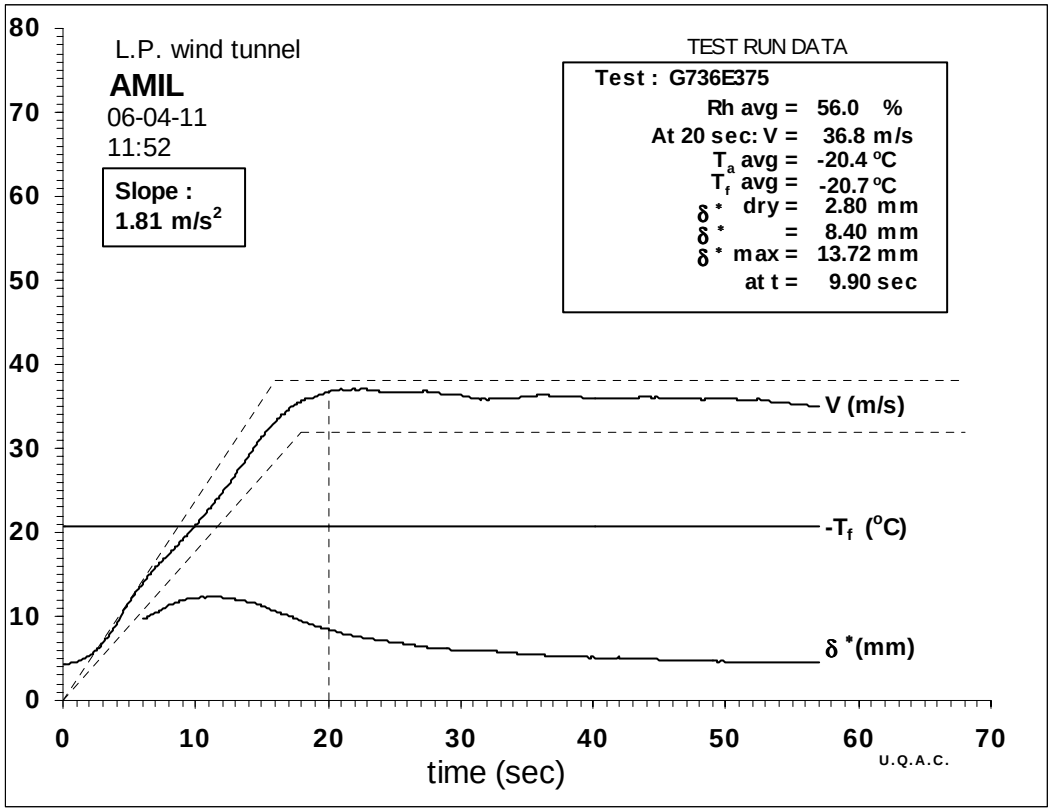
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-19.4	-20.5	60.7	3.72	36.7	0.44	8.91
20	-19.4	-20.5	60.8	3.89	37.6	0.38	7.99
21	-19.4	-20.4	60.6	3.65	36.4	0.34	7.73

Averages :

20	-19.4	**-20.5**	60.7	3.78	37.0	0.38	**8.13**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-20.6	-20.7	55.7	3.79	37.0	0.46	8.98
20	-20.6	-20.7	55.6	3.67	36.4	0.38	8.21
21	-20.6	-20.7	55.7	3.87	37.4	0.40	8.22

Averages :

20	-20.6	**-20.7**	55.6	3.75	36.8	0.40	**8.40**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

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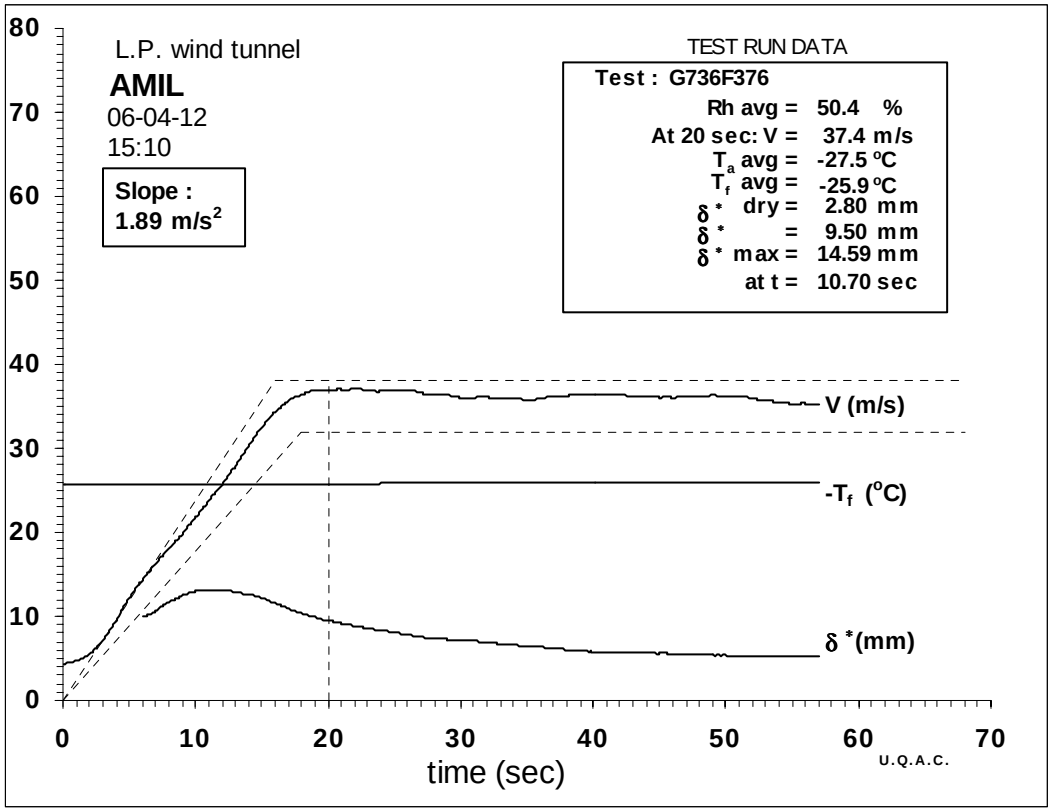


CRITICAL TIME TEST DATA

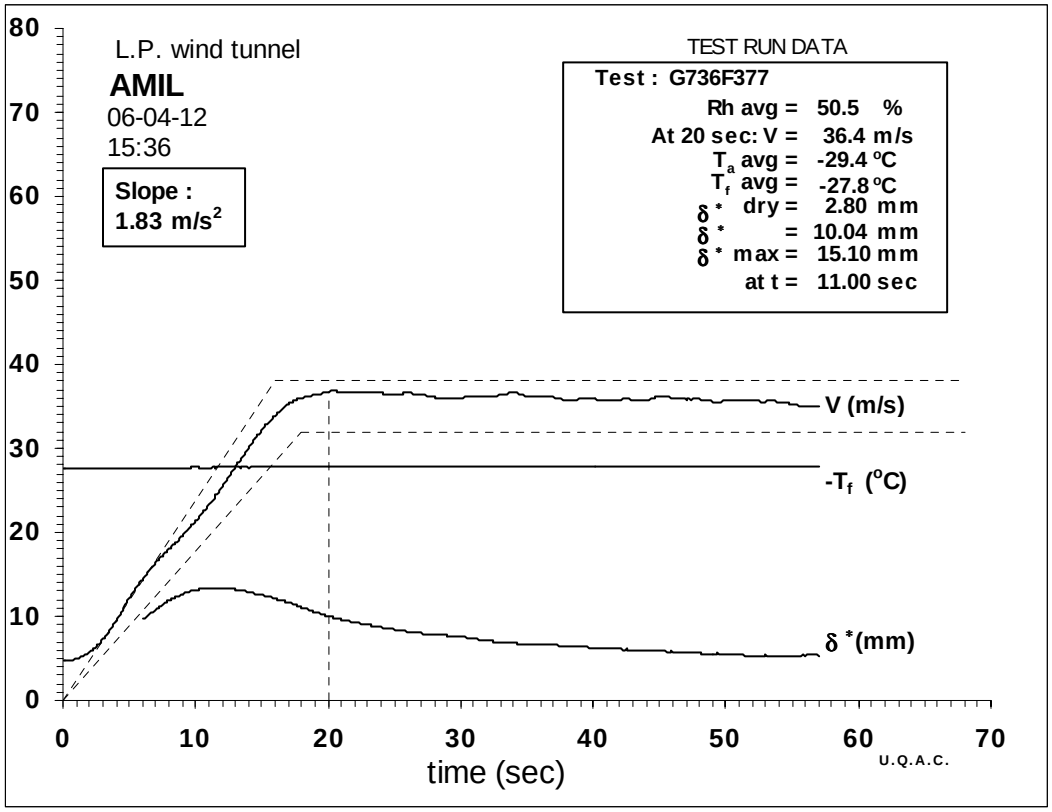
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ * mm
19	-27.8	-25.8	50.2	3.92	37.1	0.51	9.38
20	-27.7	-25.8	50.3	3.93	37.1	0.54	9.70
21	-27.7	-25.9	50.4	4.15	38.1	0.53	9.25

Averages :

20	-27.7	**-25.8**	50.3	3.99	37.4	0.53	**9.50**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-29.6	-27.9	50.2	3.76	36.2	0.57	10.29
20	-29.6	-27.8	50.2	3.75	36.1	0.55	10.10
21	-29.7	-27.8	50.0	3.98	37.2	0.55	9.74

Averages :

20	-29.7	**-27.8**	50.1	3.82	36.4	0.56	**10.04**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

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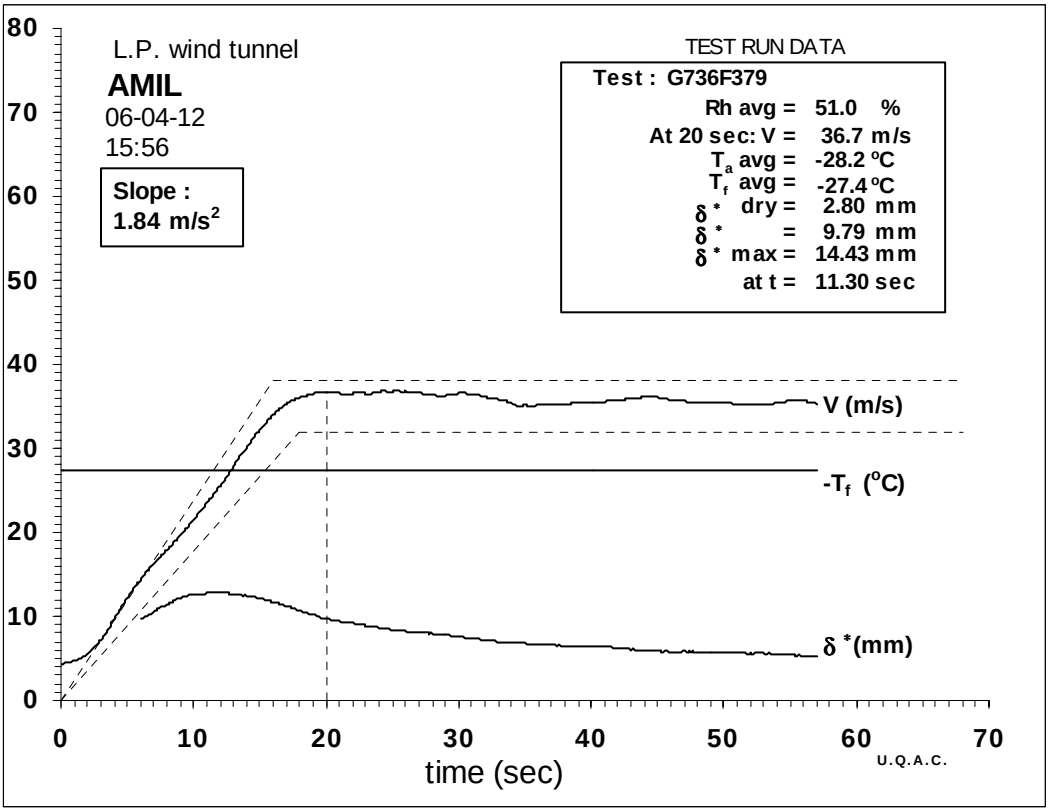


CRITICAL TIME TEST DATA

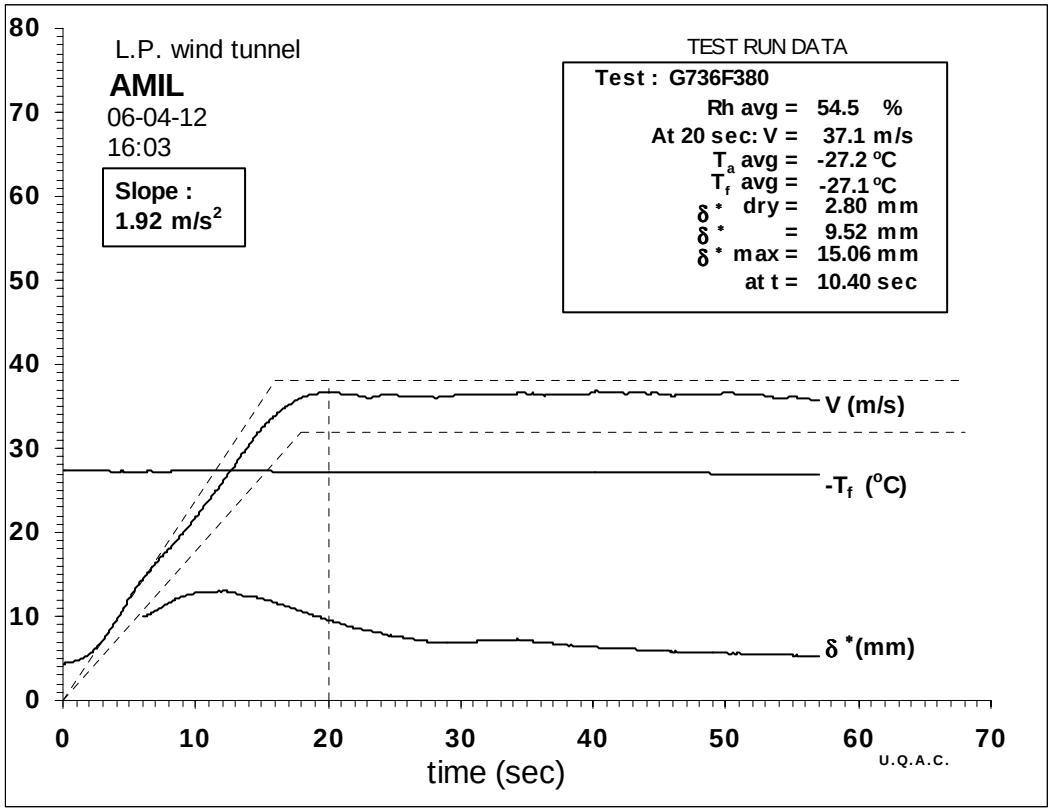
time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ * mm
19	-28.5	-27.4	50.5	3.76	36.3	0.55	10.03
20	-28.5	-27.4	50.5	3.79	36.4	0.51	9.58
21	-28.5	-27.3	50.5	4.01	37.5	0.58	9.94

Averages :

20	-28.5	**-27.4**	50.5	3.85	36.7	0.54	**9.79**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²



CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ^* mm
19	-27.5	-27.2	53.7	3.81	36.6	0.55	9.95
20	-27.5	-27.2	53.8	3.93	37.1	0.53	9.59
21	-27.5	-27.2	53.8	3.97	37.3	0.49	9.06

Averages :

20	-27.5	**-27.2**	53.8	3.91	37.1	0.52	**9.52**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

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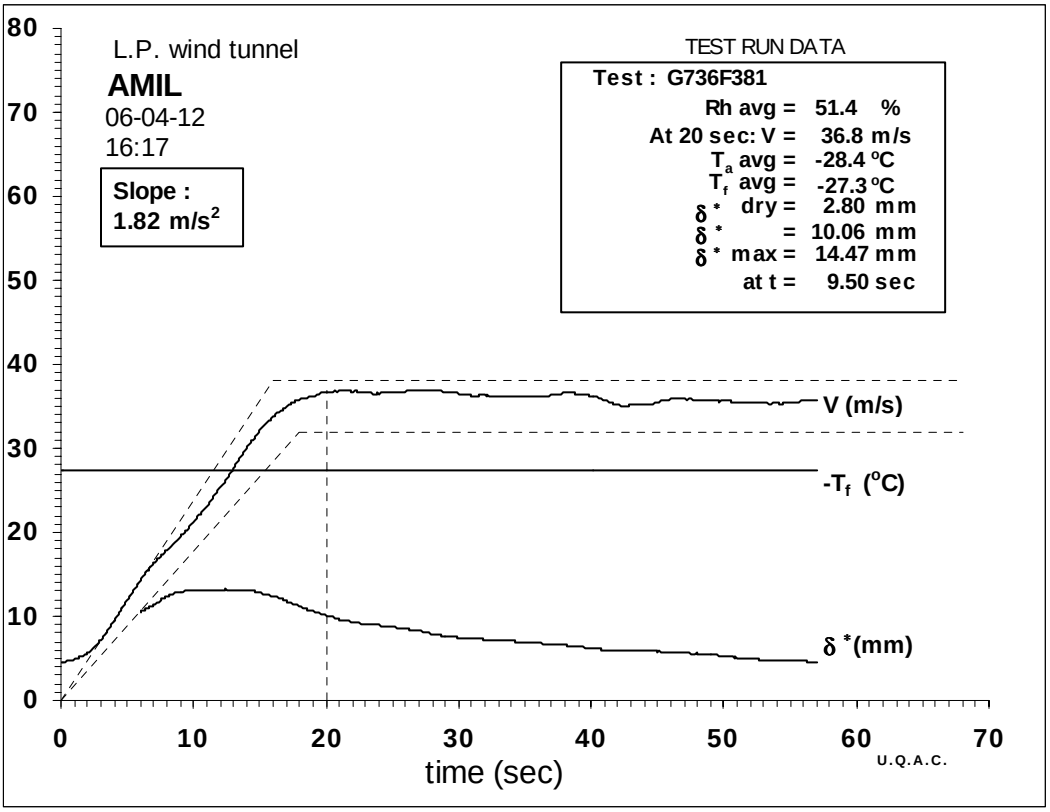

CRITICAL TIME TEST DATA

time Sec	T_a °C	T_f °C	Rh %	P_1-P_2 "H_2O	V m/s	P_2-P_3 "H_2O	δ * mm
19	-28.6	-27.3	51.4	3.84	36.6	0.60	10.47
20	-28.6	-27.3	51.6	3.88	36.8	0.57	10.10
21	-28.5	-27.3	51.3	3.94	37.1	0.54	9.65

Averages :

20	-28.6	**-27.3**	51.4	3.88	36.8	0.57	**10.06**

Test Duct Dimensions :

S2 = 30830.909 mm² S3 = 33298.898 mm² B3 = 302.209 mm C3 = 824.788 mm²

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MANAGING DIRECTOR

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