TEST REPORT

Report no.:
300-ELAB-2490-DEFRA

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Requested by:	Company:	Schiedel Skorstene ApS
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	Postcode/town:	7470 Karup J
	Country:	DK
	Email:	salg.dk@schiedel.com
	Telephone:	+45 7010 2011
Product:	Local space heater appliance	Type: Celsius 470 HF Small
Sample:	Receipt at DTI, Aarhus:	23.01.2020, sampled by Schiedel
Test period:	Date of testing:	27.01.2020 - 10.02.2020

Procedure Testing of solid fuel appliance in accordance with NS 3058-1, 1st edition (test facility and heating pattern), NS 3058-2, 1st edition (determination of particulate emission). The uncertainty of the measurements meets the requirements in NS 3058-1, paragraph 3 and NS 3058-2, paragraph 5.

Result: All passed. Please find further details in paragraph 5, Main results.

Remarks: See paragraph 2 - Remarks.

Terms: Accredited testing was carried out in compliance with the current guidelines laid down by DANAK (The Danish Accreditation), cf. www.danak.dk, and the general terms and conditions of The Danish Technological Institute. The test results apply to the tested products only. This test report may be reproduced in extract only if the laboratory has approved the extract in writing. Danish Technological Institute is Notified Body with identification number 1235 and DIN Certco test laboratory, PL 168.

Issued: Date 06.03.2020, Danish Technological Institute, Aarhus, Energy Laboratory

Signature:

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Quality Assurance

ilac-MRA DANAK
Test reg. no. 300

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1. Documentation

- Additional Drawings

The additional documentation material for Celsius 470 HF Small is enclosed as a digitally signed PDF file.

Else see Report 300-ELAB-2329-EN safety.

2. Remarks

Only DEFRA testing, else see Report 300-ELAB-2329-EN safety.

3. The basis of the test

This report concerns testing of a solid fuel appliance, type Celsius 470 HF Small. The appliance has been subject to random sampling and is representative for appliances from the production. The manufacturer must be in possession of a written declaration of the above-mentioned.

Testing was carried out by Danish Technological Institute, Kongsvang Allé 29, DK-8000 Aarhus C, Denmark.

In order to calculate the total particulate mass dissipated, a default value for the acetone rinse of 0.28 mg was applied according to "G1-16 particle mass regulation NS 3058-2."

4. Product description

4.1. Test specimen

The appliance is an insert appliance and weighs 86 kg.

The appliance is not equipped with a catalyst.

The dimensions of the combustion chamber are:

Height:	140	mm (to max load limit)
Breadth:	263	mm
Depth:	250	mm
Volume:	0.0092	m³ (effective combustion chamber volume)

The flue spigot has a diameter of 150 mm. The flue socket is attached on the top.

Accessories:
- Assembly manual and user's instructions.
- Glove.

The appliance is equipped with a fire door with a glass pane.

The appliance is a plate iron appliance for wood burning.

The inner sides of the combustion chamber are lined with vermiculite. Combustion air is supplied as secondary air and tertiary air.

Secondary air is supplied via a crevice above the fire door (air wash), and tertiary air is supplied via holes in the backside of the combustion chamber.

The amount and the distribution of the Secondary/combustion air are controlled by an operating handle at the front of the appliance.

The secondary will be blocked at the lowest valve setting used during testing to Smoke Control Area, see below.

Effective valve area	Ignition (mm^2)	Secondary (mm^2)	Tertiary (mm^2)
Closed position	-	24mm on valve button 6 mm open (Blocked here)	4xØ6mm/113mm^2
Fully open position	-	31mm on valve button 13 mm open (Maximum)	4xØ6mm/113mm^2

4.2. Variants

Danish Technological Institute has not assessed any variants.

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5. Main results

Nominal and low output according to NS3058

Burn rate	Fuel consumption (m_i) [kg (dry matter)/h]	Adjusted particulate emission rate (E_{ad}) [g/h]	Heat output delivered to the room [kW]	Remarks
Low output	1.26	2.51	5.2	First pass
Low output	1.20	3.34	4.9	Second pass
Low output	129	2.39	5.3	Third pass
Low output	1.22	2.04	5.0	Fourth pass
Low output	1.23	2.14	5.0	Fifth pass
Rated output	1.41	2.42	5.8	First pass
Rated output	1.53	2.61	6.3	Second pass
Rated output	1.50	4.73	6.2	Third pass
Rated output	1.40	3.75	5.7	Fourth pass
Rated output	1.44	2.42	5.9	Fifth pass

Burn rate category	Air settings
Low output	- The secondary valve 6 mm open (App. 50% open) - Door ajar for app. 30 sec. - Final position.
Rated output	- The secondary valve 13 mm open (100% open) - Door ajar for app. 30 sec. - Final position.

6. Requirements in accordance with BS/PD 6334:1969

Clause 4.2: 5.0 g/h + 0.1 g/h for each 0.3 kW.

Heat output
The actual heat output was calculated using an efficiency of 83% established during the EN 13240 testing.

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7. Test results

7.1. Low output, first pass

Parameter	Value	Unit
Date of testing	30-01-2020	date
Test start time	12:37:20	hh:mm:ss
Test finish time	13:13:55	hh:mm:ss
Fuel consumption (m_i)	1.26	kg (dry matter)/h
Particulate emission rate (E)	1.47	g/h
Adjusted particulate emission rate (E_{ad})	2.51	g/h
Adjusted particulate emission rate	1.99	g/kg (dry matter)
Test duration	0.61	H
Sampled gas volume (V_m(norm))	668	Nl
Sampled quantity of particulates (m_n)	2.2	mg
Velocity in flue at probe	4.62	m/s
Mean velocity in flue	4.41	m/s
Test fuel charge	0.93	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	245	°C
Flue draught (mean)	12	Pa
Ambient temperature (mean)	25	°C
Difference in mean surface temperature from start to finish	1	°C
Filter temperature (mean)	25	°C
Time for measurements mentioned below	13:00	hh:mm
Barometric reading	994	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0.15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	101
10-20	100
20-30	99
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.2. Low output, second pass

Parameter	Value	Unit
Date of testing	30-01-2020	date
Test start time	13:56:35	hh:mm:ss
Test finish time	14:35:20	hh:mm:ss
Fuel consumption (m_i)	1.20	kg (dry matter)/h
Particulate emission rate (E)	2.08	g/h
Adjusted particulate emission rate (E_{ad})	3.34	g/h
Adjusted particulate emission rate	2.78	g/kg (dry matter)
Test duration	0.65	H
Sampled gas volume (V_m(norm))	707	Nl
Sampled quantity of particulates (m_n)	3.3	mg
Velocity in flue at probe	4.63	m/s
Mean velocity in flue	4.41	m/s
Test fuel charge	0.95	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	245	°C
Flue draught (mean)	12	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	0	°C
Filter temperature (mean)	26	°C
Time for measurements mentioned below	14:15	hh:mm
Barometric reading	994	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	98
10-20	101
20-30	100
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.3. Low output, third pass

Parameter	Value	Unit
Date of testing	31-01-2020	date
Test start time	11:39:55	hh:mm:ss
Test finish time	12:16:18	hh:mm:ss
Fuel consumption (m_i)	1.29	kg (dry matter)/h
Particulate emission rate (E)	1.39	g/h
Adjusted particulate emission rate (E_{ad})	2.39	g/h
Adjusted particulate emission rate	1.86	g/kg (dry matter)
Test duration	0.61	H
Sampled gas volume (V_m(norm))	663	Nl
Sampled quantity of particulates (m_n)	2.1	mg
Velocity in flue at probe	4.53	m/s
Mean velocity in flue	4.32	m/s
Test fuel charge	0.95	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	252	°C
Flue draught (mean)	12	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	0	°C
Filter temperature (mean)	26	°C
Time for measurements mentioned below	11:50	hh:mm
Barometric reading	995	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	99
10-20	101
20-30	101
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.4. Low output, fourth pass

Parameter	Value	Unit
Date of testing	31-01-2020	date
Test start time	13:00:10	hh:mm:ss
Test finish time	13:38:10	hh:mm:ss
Fuel consumption (m_i)	1.22	kg (dry matter)/h
Particulate emission rate (E)	1.14	g/h
Adjusted particulate emission rate (E_{ad})	2.04	g/h
Adjusted particulate emission rate	1.67	g/kg (dry matter)
Test duration	0.63	H
Sampled gas volume (V_m(norm))	694	Nl
Sampled quantity of particulates (m_n)	1.8	mg
Velocity in flue at probe	4.56	m/s
Mean velocity in flue	4.35	m/s
Test fuel charge	0.94	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	252	°C
Flue draught (mean)	12	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	0	°C
Filter temperature (mean)	27	°C
Time for measurements mentioned below	13:20	hh:mm
Barometric reading	995	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	98
10-20	100
20-30	102
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.5. Low output, fifth pass

Parameter	Value	Unit
Date of testing	03-02-2020	date
Test start time	12:50:20	hh:mm:ss
Test finish time	13:33:45	hh:mm:ss
Fuel consumption (m_i)	1.23	kg (dry matter)/h
Particulate emission rate (E)	1.22	g/h
Adjusted particulate emission rate (E_{ad})	2.14	g/h
Adjusted particulate emission rate	1.75	g/kg (dry matter)
Test duration	0.72	H
Sampled gas volume (V_m(norm))	800	Nl
Sampled quantity of particulates (m_n)	2.2	mg
Velocity in flue at probe	4.52	m/s
Mean velocity in flue	4.32	m/s
Test fuel charge	1.08	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	260	°C
Flue draught (mean)	13	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	-1	°C
Filter temperature (mean)	26	°C
Time for measurements mentioned below	13:10	hh:mm
Barometric reading	1005	mBar
Atmospheric humidity	34	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	100
10-20	100
20-30	102
30-40	99
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.6. Rated output, first pass

Parameter	Value	Unit
Date of testing	03-02-2020	date
Test start time	11:18:10	hh:mm:ss
Test finish time	11:52:15	hh:mm:ss
Fuel consumption (m_i)	1.41	kg (dry matter)/h
Particulate emission rate (E)	1.41	g/h
Adjusted particulate emission rate (E_{ad})	2.42	g/h
Adjusted particulate emission rate	1.71	g/kg (dry matter)
Test duration	0.57	H
Sampled gas volume (V_m(norm))	630	Nl
Sampled quantity of particulates (m_n)	2.0	mg
Velocity in flue at probe	4.55	m/s
Mean velocity in flue	4.34	m/s
Test fuel charge	0.97	kg
Fuel moisture	17	% (integer)
Calorific value (at actual fuel moisture)	14.8	MJ/kg
Flue gas temperature (mean)	272	°C
Flue draught (mean)	13	Pa
Ambient temperature (mean)	25	°C
Difference in mean surface temperature from start to finish	0	°C
Filter temperature (mean)	25	°C
Time for measurements mentioned below	11:35	hh:mm
Barometric reading	1005	mBar
Atmospheric humidity	34	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	98
10-20	101
20-30	101
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.7. Rated output, second pass

Parameter	Value	Unit
Date of testing	10-02-2020	date
Test start time	09:56:35	hh:mm:ss
Test finish time	10:27:50	hh:mm:ss
Fuel consumption (m_i)	1.53	kg (dry matter)/h
Particulate emission rate (E)	1.54	g/h
Adjusted particulate emission rate (E_{ad})	2.61	g/h
Adjusted particulate emission rate	1.71	g/kg (dry matter)
Test duration	0.52	H
Sampled gas volume (V_m(norm))	566	Nl
Sampled quantity of particulates (m_n)	2.0	mg
Velocity in flue at probe	4.63	m/s
Mean velocity in flue	4.41	m/s
Test fuel charge	0.97	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	282	°C
Flue draught (mean)	13	Pa
Ambient temperature (mean)	25	°C
Difference in mean surface temperature from start to finish	1	°C
Filter temperature (mean)	25	°C
Time for measurements mentioned below	10:15	hh:mm
Barometric reading	973	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	98
10-20	101
20-30	101
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.8. Rated output, third pass

Parameter	Value	Unit
Date of testing	10-02-2020	date
Test start time	11:08:20	hh:mm:ss
Test finish time	11:40:00	hh:mm:ss
Fuel consumption (m_i)	1.50	kg (dry matter)/h
Particulate emission rate (E)	3.16	g/h
Adjusted particulate emission rate (E_{ad})	4.73	g/h
Adjusted particulate emission rate	3.15	g/kg (dry matter)
Test duration	0.53	H
Sampled gas volume (V_m(norm))	581	Nl
Sampled quantity of particulates (m_n)	4.2	mg
Velocity in flue at probe	4.67	m/s
Mean velocity in flue	4.46	m/s
Test fuel charge	0.97	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	273	°C
Flue draught (mean)	13	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	-1	°C
Filter temperature (mean)	26	°C
Time for measurements mentioned below	11:20	hh:mm
Barometric reading	973	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	101
10-20	100
20-30	99
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.9. Rated output, fourth pass

Parameter	Value	Unit
Date of testing	10-02-2020	date
Test start time	12:24:00	hh:mm:ss
Test finish time	12:58:15	hh:mm:ss
Fuel consumption (m_i)	1.40	kg (dry matter)/h
Particulate emission rate (E)	2.39	g/h
Adjusted particulate emission rate (E_{ad})	3.75	g/h
Adjusted particulate emission rate	2.68	g/kg (dry matter)
Test duration	0.57	H
Sampled gas volume (V_m(norm))	626	Nl
Sampled quantity of particulates (m_n)	3.4	mg
Velocity in flue at probe	4.67	m/s
Mean velocity in flue	4.46	m/s
Test fuel charge	0.97	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.7	MJ/kg
Flue gas temperature (mean)	265	°C
Flue draught (mean)	13	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	0	°C
Filter temperature (mean)	26	°C
Time for measurements mentioned below	12:40	hh:mm
Barometric reading	973	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	100
10-20	101
20-30	100
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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7.10. Rated output, fifth pass

Parameter	Value	Unit
Date of testing	10-02-2020	date
Test start time	13:44:30	hh:mm:ss
Test finish time	14:16:30	hh:mm:ss
Fuel consumption (m_i)	1.44	kg (dry matter)/h
Particulate emission rate (E)	1.41	g/h
Adjusted particulate emission rate (E_{ad})	2.42	g/h
Adjusted particulate emission rate	1.68	g/kg (dry matter)
Test duration	0.53	H
Sampled gas volume (V_m(norm))	589	Nl
Sampled quantity of particulates (m_n)	1.9	mg
Velocity in flue at probe	4.61	m/s
Mean velocity in flue	4.40	m/s
Test fuel charge	0.93	kg
Fuel moisture	18	% (integer)
Calorific value (at actual fuel moisture)	14.6	MJ/kg
Flue gas temperature (mean)	263	°C
Flue draught (mean)	13	Pa
Ambient temperature (mean)	26	°C
Difference in mean surface temperature from start to finish	-1	°C
Filter temperature (mean)	26	°C
Time for measurements mentioned below	14:00	hh:mm
Barometric reading	973	mBar
Atmospheric humidity	35	%RH
Atmospheric velocity 600 mm from the appliance	<0,15	m/s

Proportional rate variation	
Interval [min.]	**PR [%]**
0-10	100
10-20	99
20-30	101
30-40	#
40-50	#
50-60	#

Proportional rate variation	
Interval [min.]	**PR [%]**
60-70	#
70-80	#
80-90	#
90-100	#
100-110	#
110-120	#

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8. Other measurements

Subject	Measured	Unit
Leakage before testing (valves closed) [1)]	9.3	m³/h
Leakage before testing (air inlet closed and valves closed) [1)]	4.0	m³/h

[1)] Leakage was measured at a test pressure of 25 Pa.

9. Test conditions

Weight of test fuel charge: 0.930 – 1.132 kg, according to NS 3058/59.

External dimensions of the fire: 110 x 220 x 110 mm (breadth x depth x height).

The fuel moisture was determined according to the weigh/dry method SS 187170. Sample from each charge were taken.

10. Cross reference – Filters used

Low output	First pass	Second pass	Third pass	Fourth pass	Fifth pass
Primary filter	911219-9	911219-11	911219-15	911219-17	911219-21
Backup filter	911219-10	911219-12	911219-16	911219-18	911219-22

Rated output	First pass	Second pass	Third pass	Fourth pass	Fifth pass
Primary filter	911219-19	911219-23	911219-25	911219-27	911219-29
Backup filter	911219-20	911219-24	911219-26	911219-28	911219-30

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11. Test equipment

Testing was carried out at test rig B.

Instrument	Traceability	Instrument No.		
		Test rig B	Test rig C	Test rig D
Scale, Mettler, 600 kg, KC 600	ELAB	270-A-1790	270-A-1638	Id no. 81593
Surface temperature, walls Thermo couples, type T	ELAB	Id no. 134392	Id no. 134395	Id no. 134397
Thermo couples, others, type T and type K	ELAB	Id no. 134394	Id no. 134396	Id no. 134398
DOP version II	-	-	-	-
Data acquisition unit, HP 34970A	DANAK 200	270-A-2498	270-A-1630	Id no. 94128
Surface temperature, Technoterm 5500	DANAK 200	270-A-0976		
Surface temperature, Dan 1200	DANAK 200	270-A-0876		
Pressure gauge, Autotran 700 (flue draught)	ELAB	270-A-1166	270-A-1632	Id no. 81592
Pressure gauge, Autotran 700 (Pd)	ELAB	Id no. 106900	270-A-1633	Id no. 81589
Pressure gauge, Autotran 700 (Ps)	ELAB	Id no. 106901	270-A-1634	Id no. 81591
Calibrator, Jofra 650 SE	DANAK 200	270-A-0912		
Scale, Mettler Toledo (15kg/1g)	ELAB	Id no. 5822		
Scale, Mettler Toledo XS4002S (4,1kg/10mg)	ELAB	Id no. 135794		
Scale, Mettler Toledo XS204 (220g/0,1mg)	ELAB	Id no. 7084		
Disa Dantec flow analyser (air velocity)	DANAK 200	270-A-0486		
Flowmaster, Dantec	DANAK 200	270-A-0750		
Hygrometer (air humidity) Thermoguard	DANAK 200	Id no. 142357		
Barometric reading (atmospheric pressure) Thermoguard/(Ahlborn)	DANAK 200	Id no. 7102		
Pitot tube (air velocity in flue)	ELAB	270-A-1796-14	270-A-1631-14	Id no. 81588
Dust measuring equipment (particle measuring equipment)	-	270-A-1798	270-A-1637	Id no. 85122
Gas meter, Gallus (with impulse outlet)	DANAK 207	Id no. 87470	Id no. 88252	Id no. 87469
Flow meter	ELAB	270-A-1793	270-A-1636	Id no. 85121
Thermo sensor, filter, Pt 100	DANAK 200	270-A-1787	270-A-1626	Id no. 81587
Thermo sensor, top flue, Pt 100	DANAK 200	270-A-1784	270-A-1627	Id no. 81584
Thermo sensor, middle flue, Pt 100	DANAK 200	270-A-1785	270-A-1628	Id no. 81585
Thermo sensor, bottom flue, Pt 100	DANAK 200	270-A-1786	270-A-1629	Id no. 81586
PST leakage meter (Brooks glass tube)	ELAB	Id no. 83013		

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12. List of appendices

Appendix 1: Graphs of measurements during low output, first pass (3 pages)
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Appendix 8: Graphs of measurements during rated output, third pass (3 pages)
Appendix 9: Graphs of measurements during rated output, fourth pass (3 pages)
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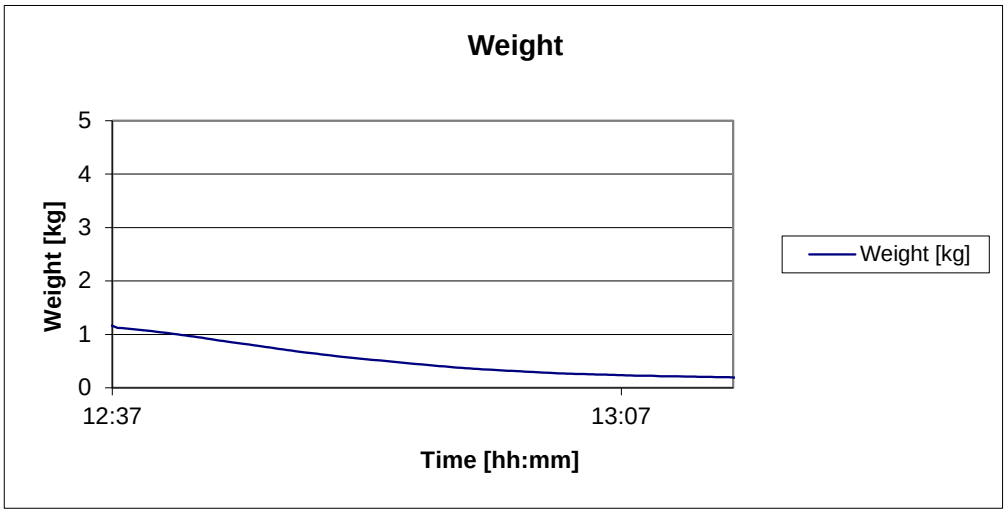
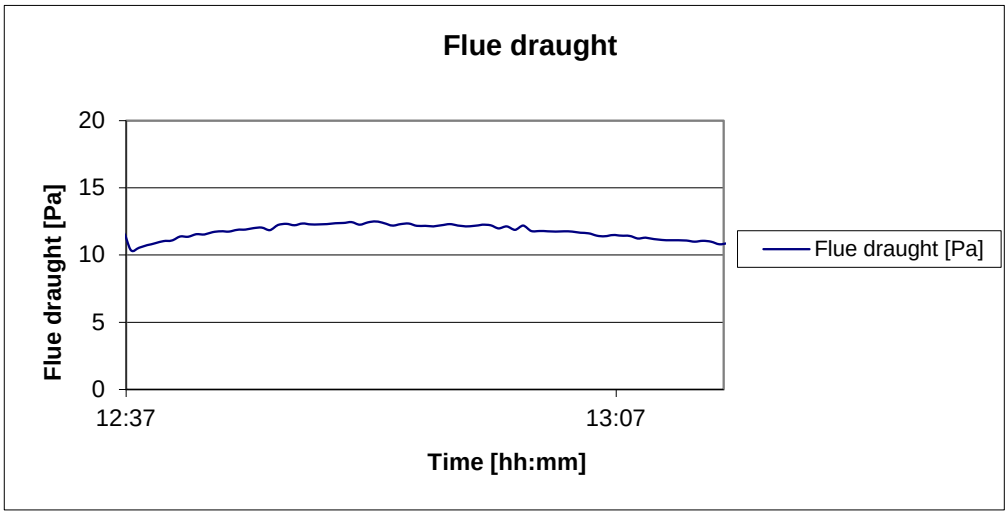
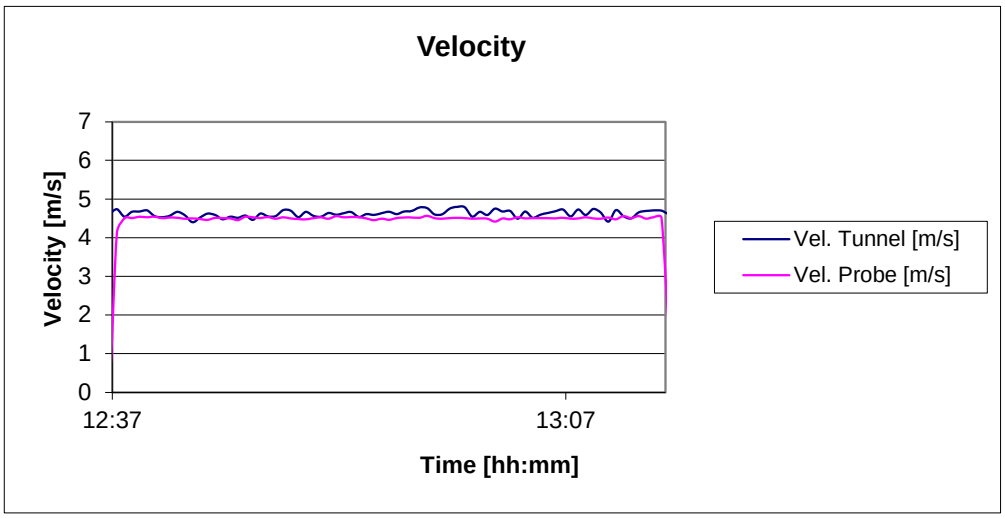
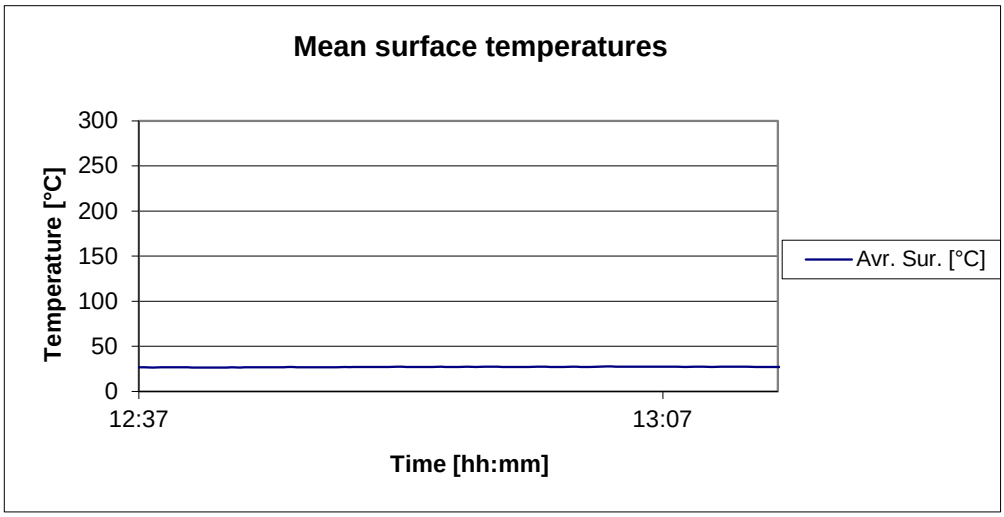
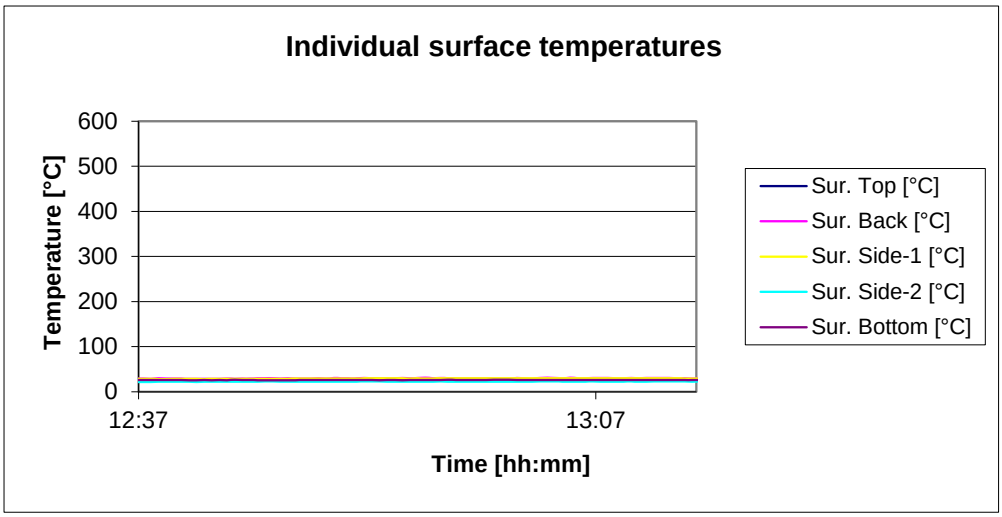
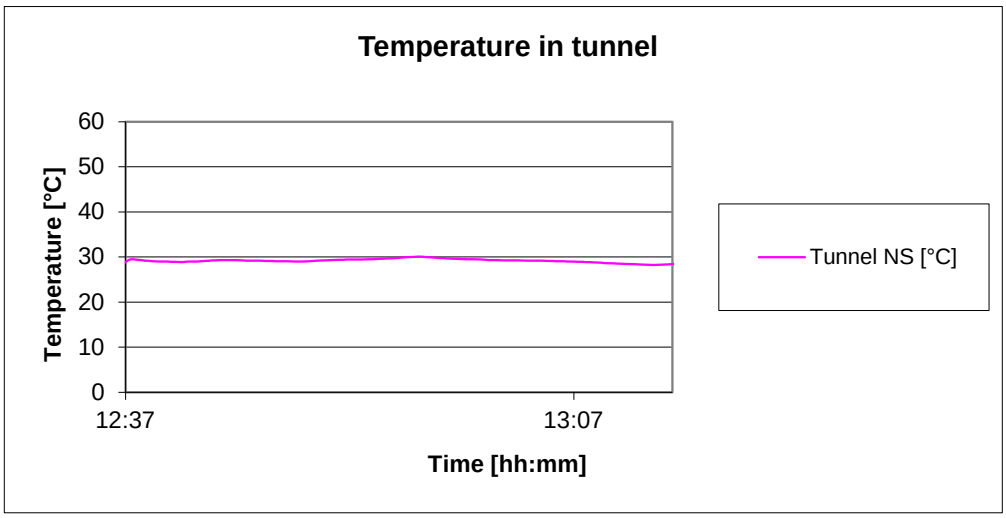

Weight
Weight [kg]
5
4
3
2
1
0
12:37
13:07
Time [hh:mm]
Weight [kg]

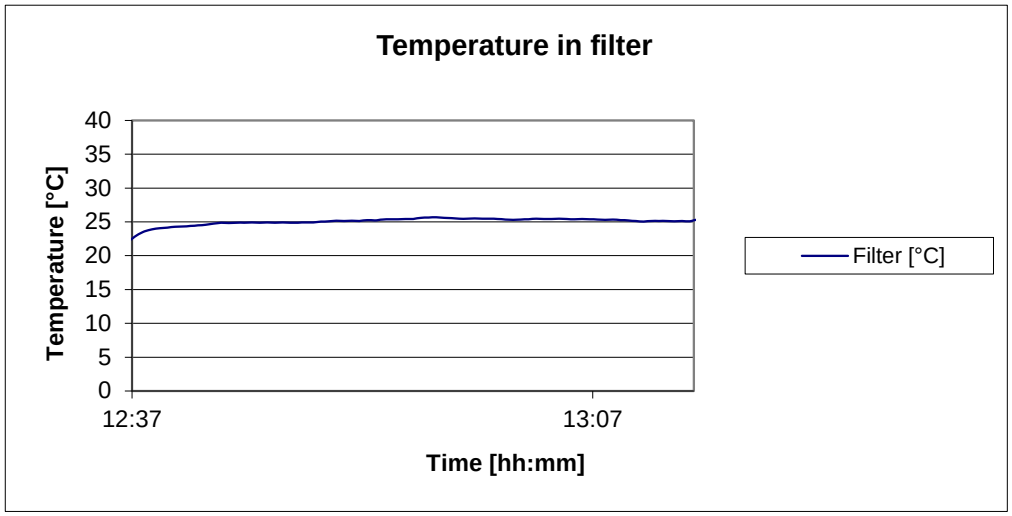

Flue draught
Flue draught [Pa]
20
15
10
5
0
12:37
13:07
Time [hh:mm]
Flue draught [Pa]

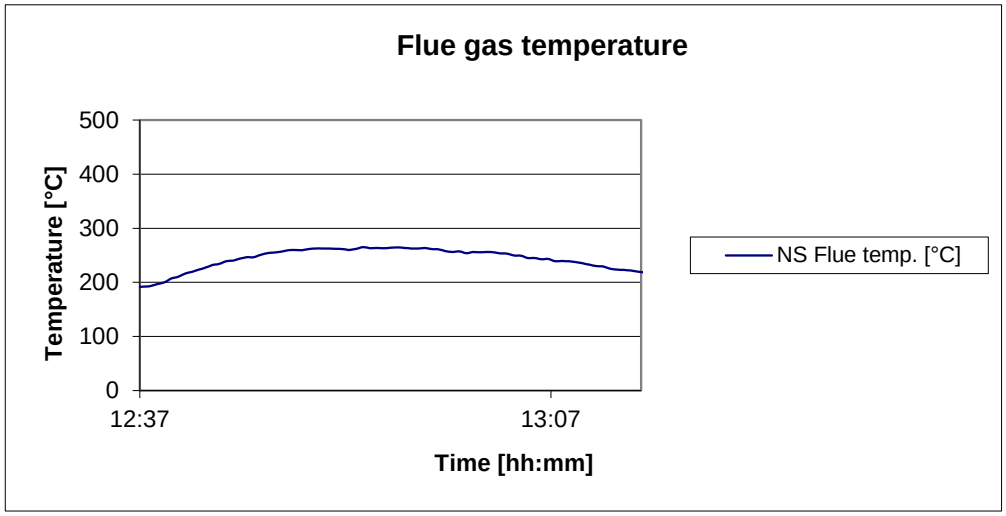

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
12:37
13:07
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

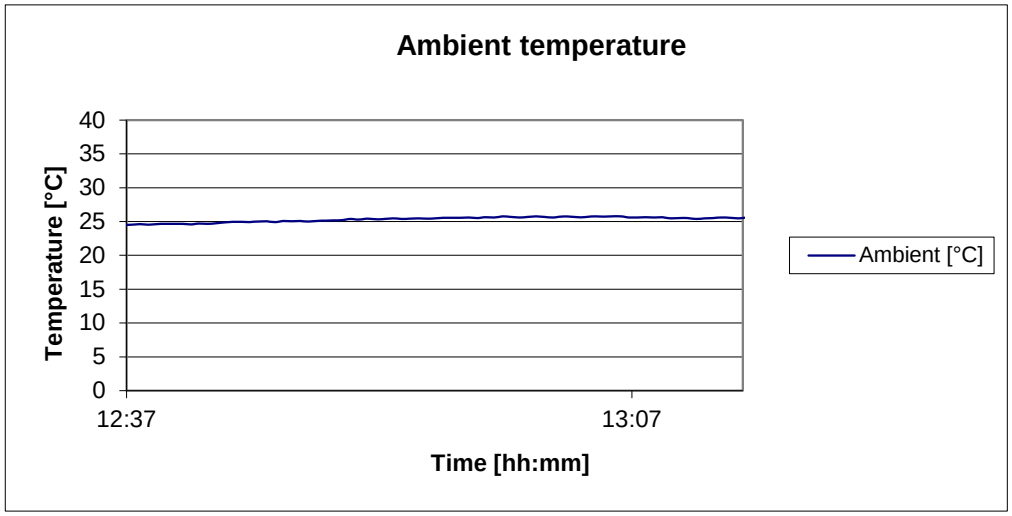

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
12:37
13:07
Time [hh:mm]
Avr. Sur. [°C]

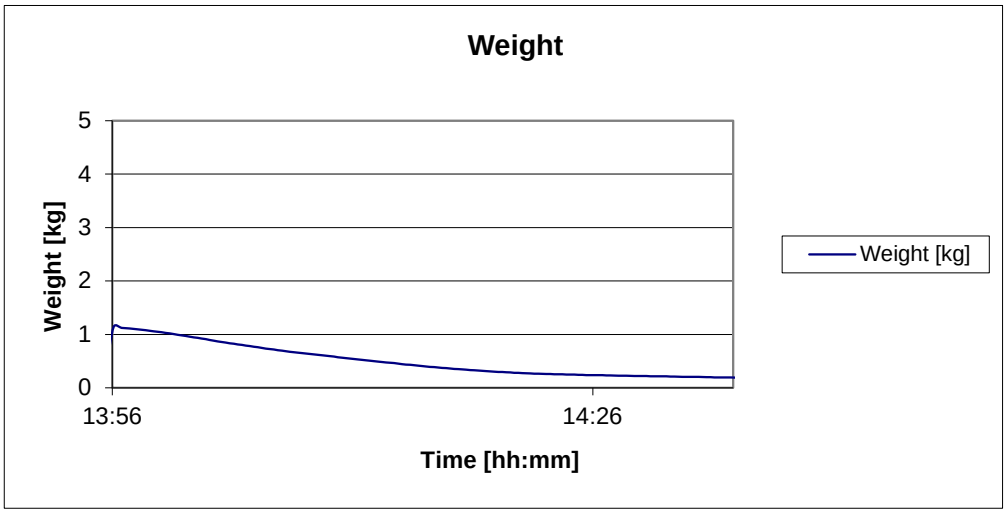

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
12:37
13:07
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

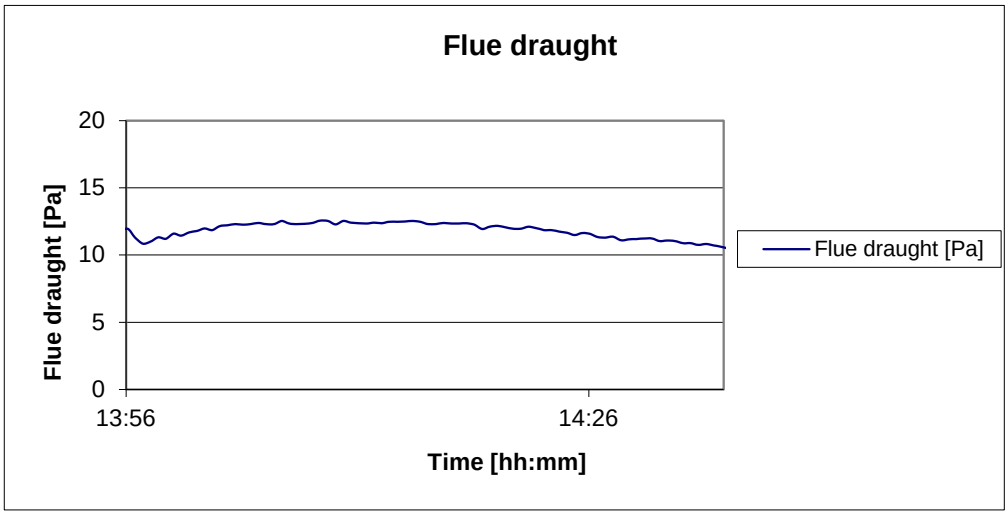

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
12:37
13:07
Time [hh:mm]
Tunnel NS [°C]

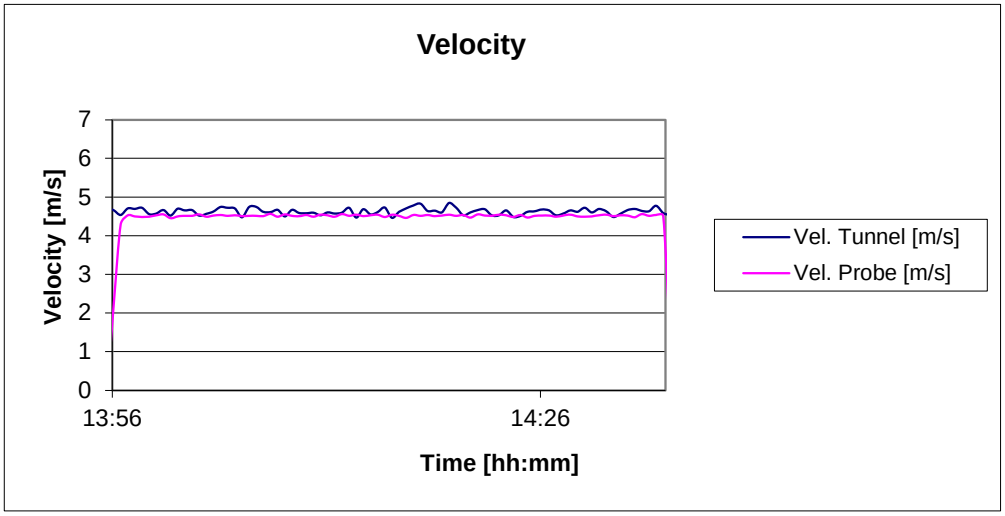

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
12:37
13:07
Time [hh:mm]
Filter [°C]

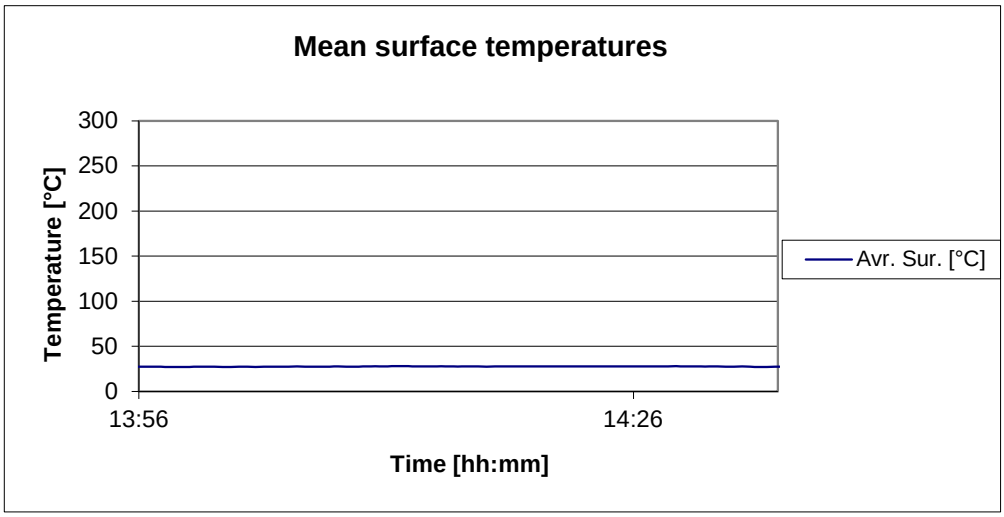

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
12:37
13:07
Time [hh:mm]
NS Flue temp. [°C]

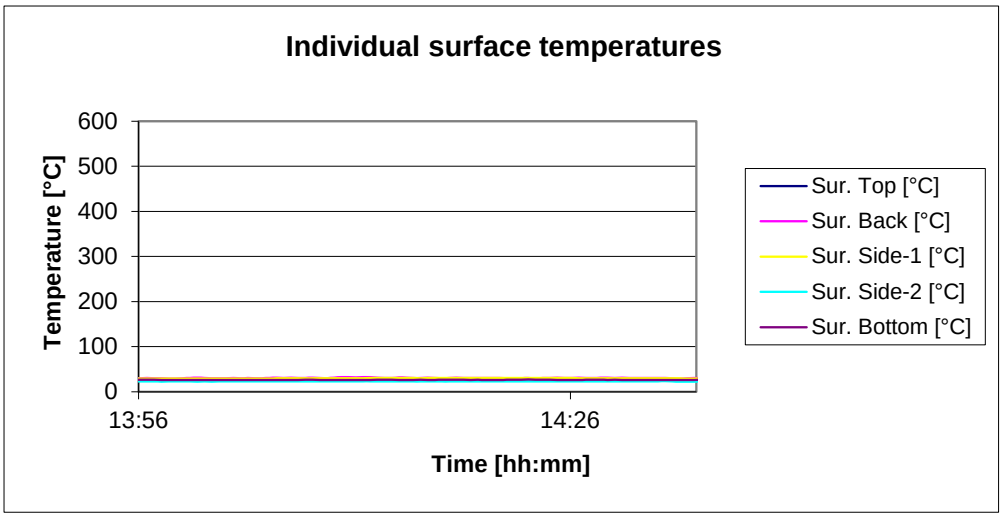

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
12:37
13:07
Time [hh:mm]
Ambient [°C]

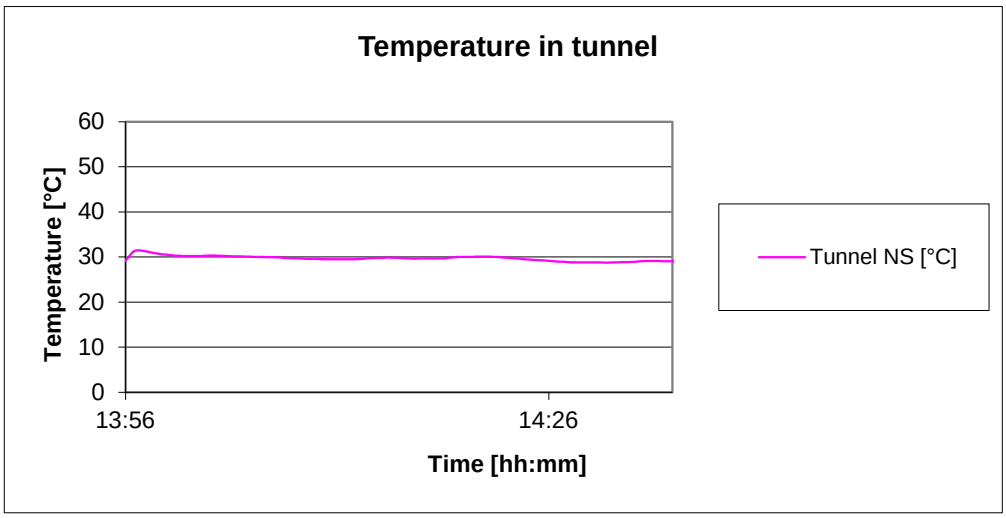

Weight
Weight [kg]
5
4
3
2
1
0
13:56
14:26
Time [hh:mm]
Weight [kg]

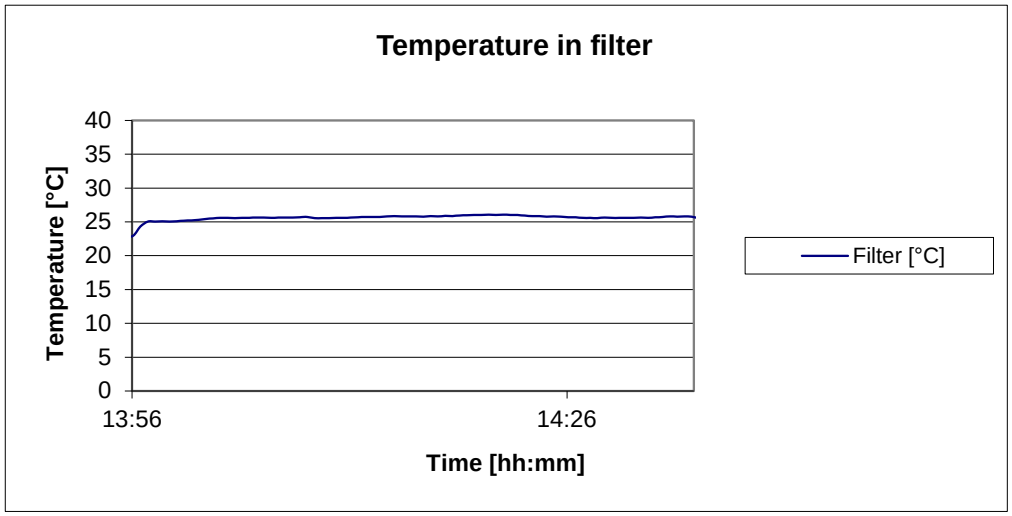

Flue draught
Flue draught [Pa]
20
15
10
5
0
13:56
14:26
Time [hh:mm]
Flue draught [Pa]

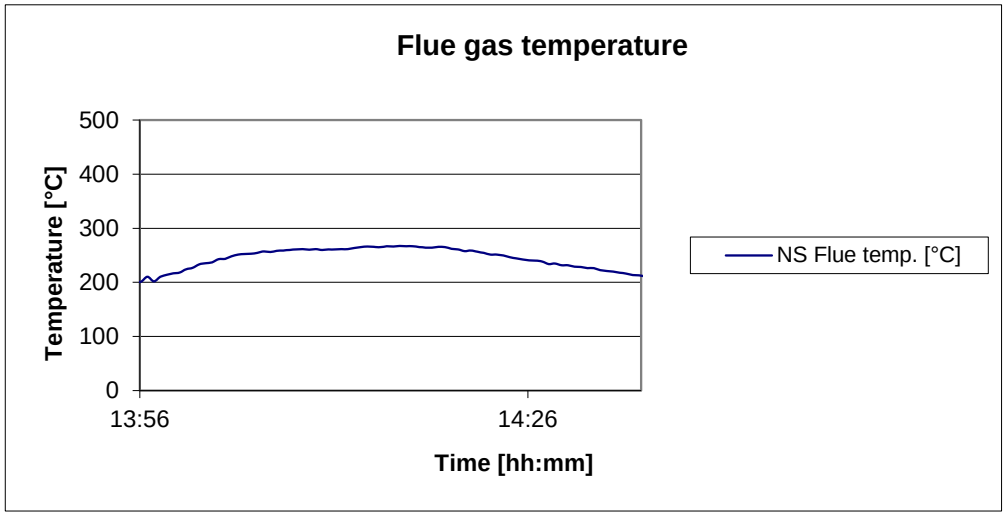

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
13:56
14:26
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

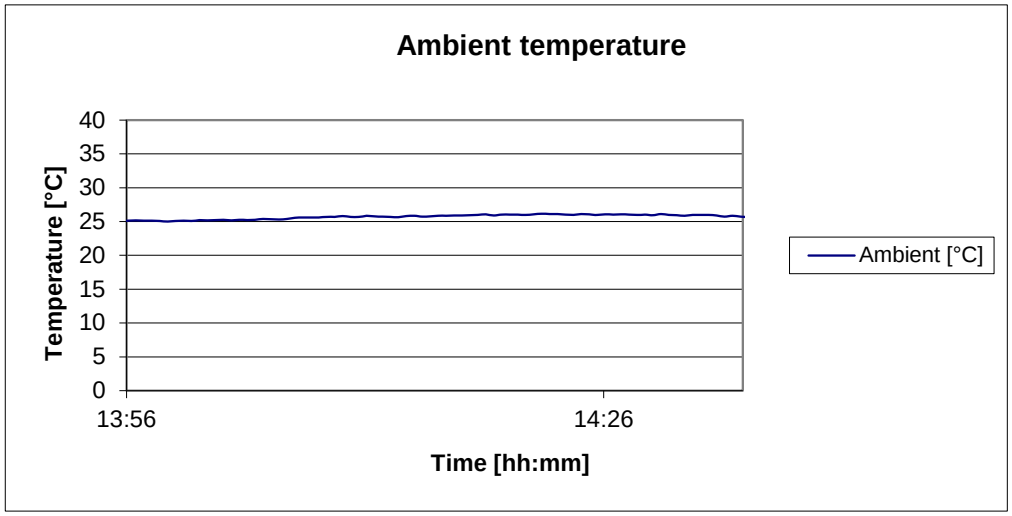

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
13:56
14:26
Time [hh:mm]
Avr. Sur. [°C]

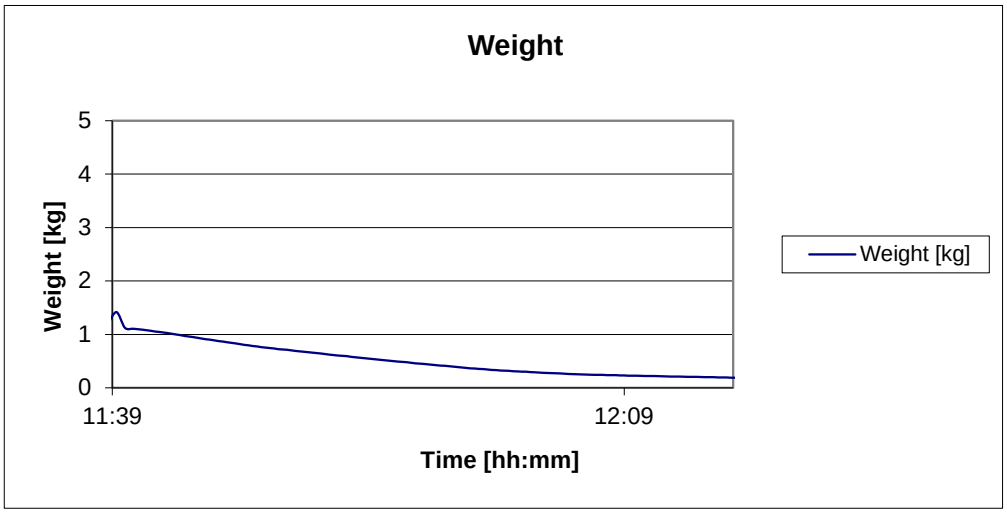

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
13:56
14:26
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

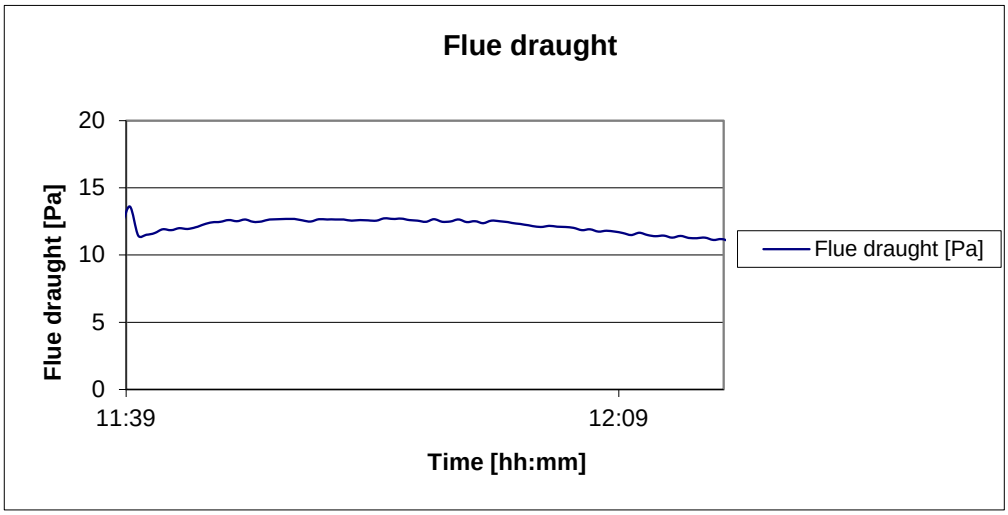

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
13:56
14:26
Time [hh:mm]
Tunnel NS [°C]

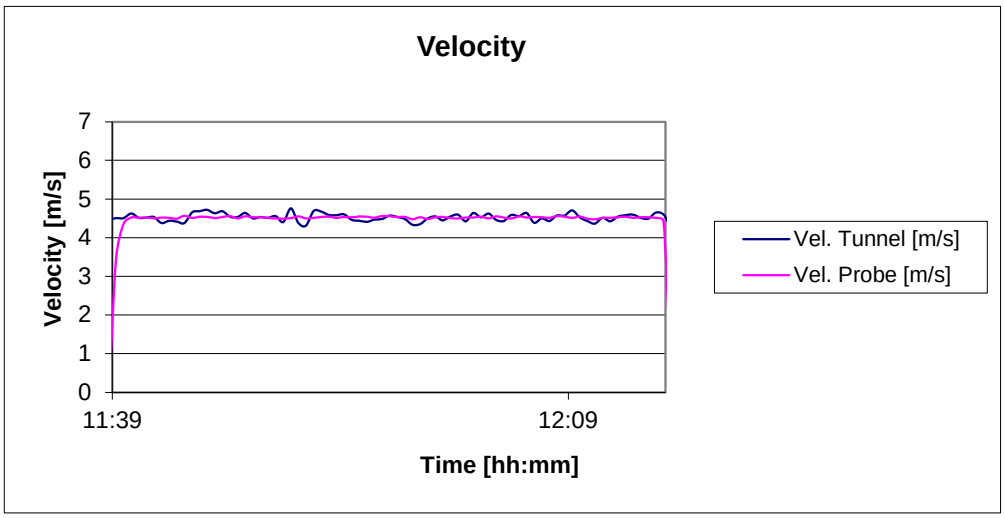

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
13:56
14:26
Time [hh:mm]
Filter [°C]

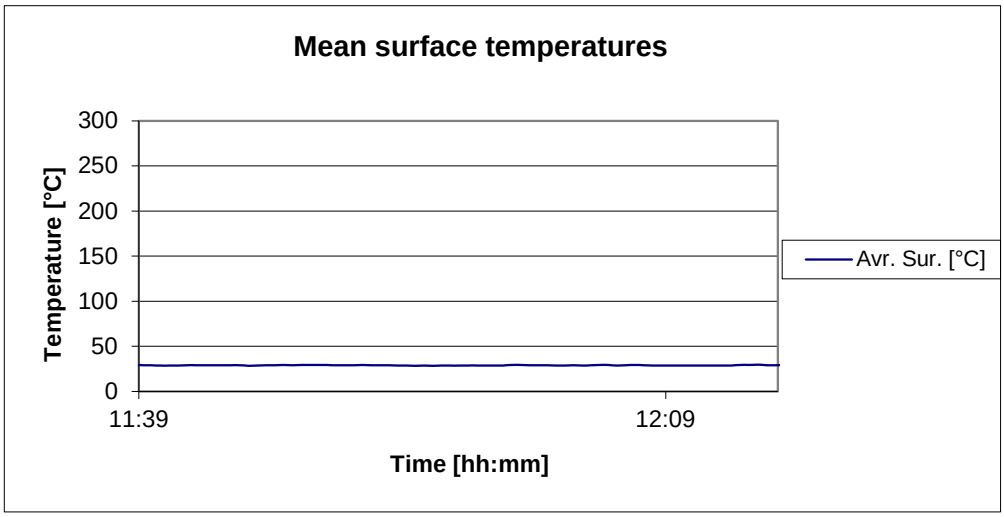

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
13:56
14:26
Time [hh:mm]
NS Flue temp. [°C]

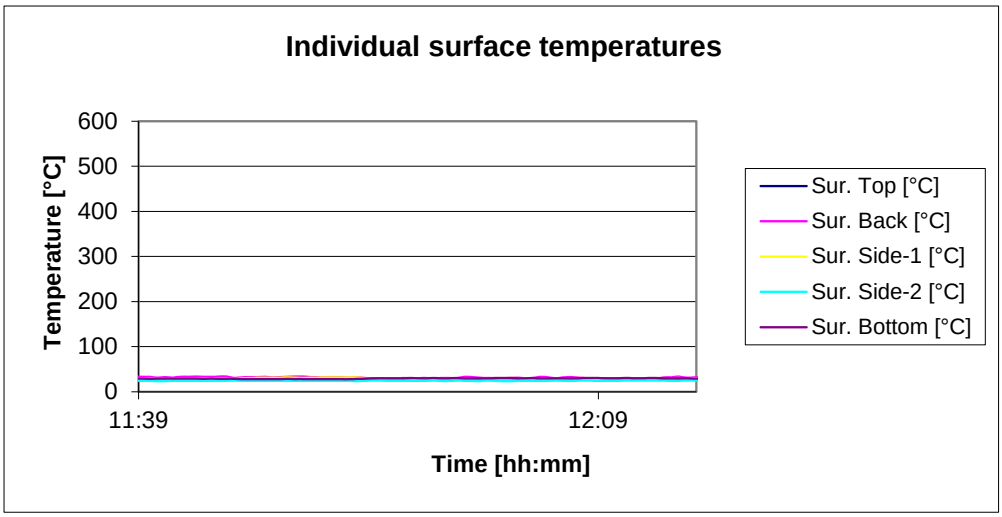

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
13:56
14:26
Time [hh:mm]
Ambient [°C]

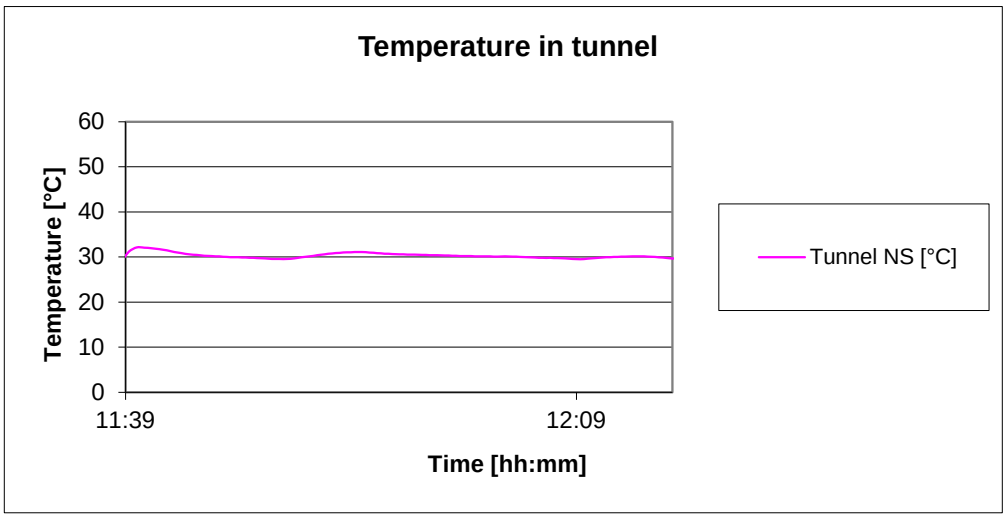

Weight
Weight [kg]
5
4
3
2
1
0
11:39
12:09
Time [hh:mm]
Weight [kg]

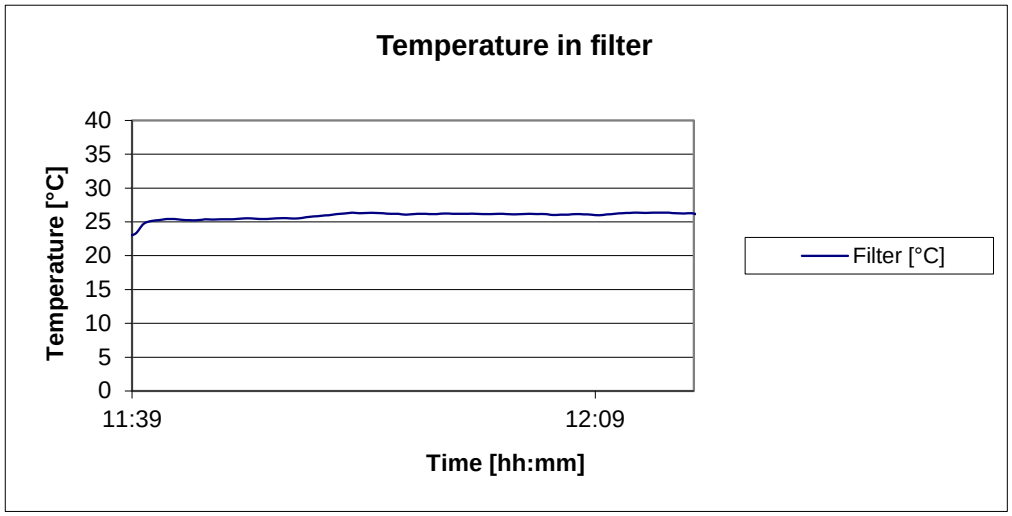

Flue draught
Flue draught [Pa]
20
15
10
5
0
11:39
12:09
Time [hh:mm]
Flue draught [Pa]

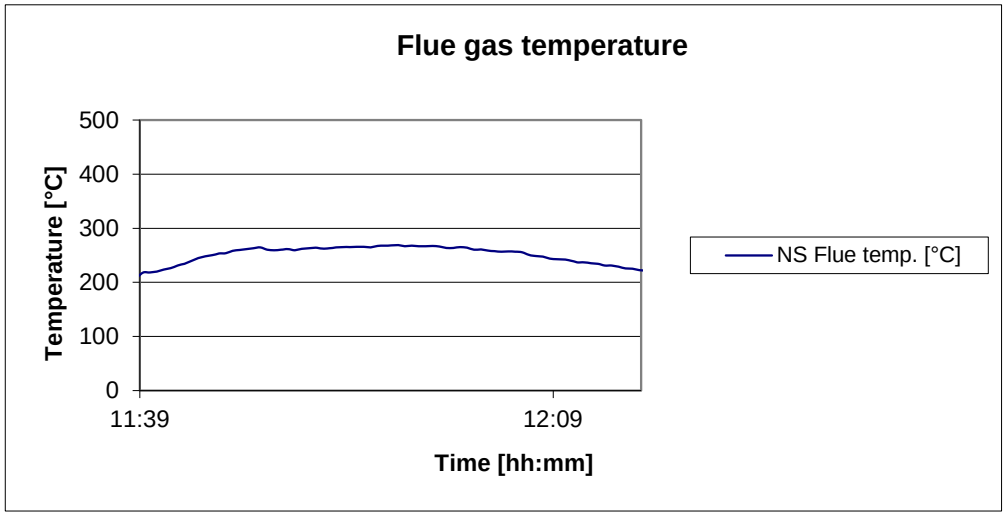

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
11:39
12:09
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

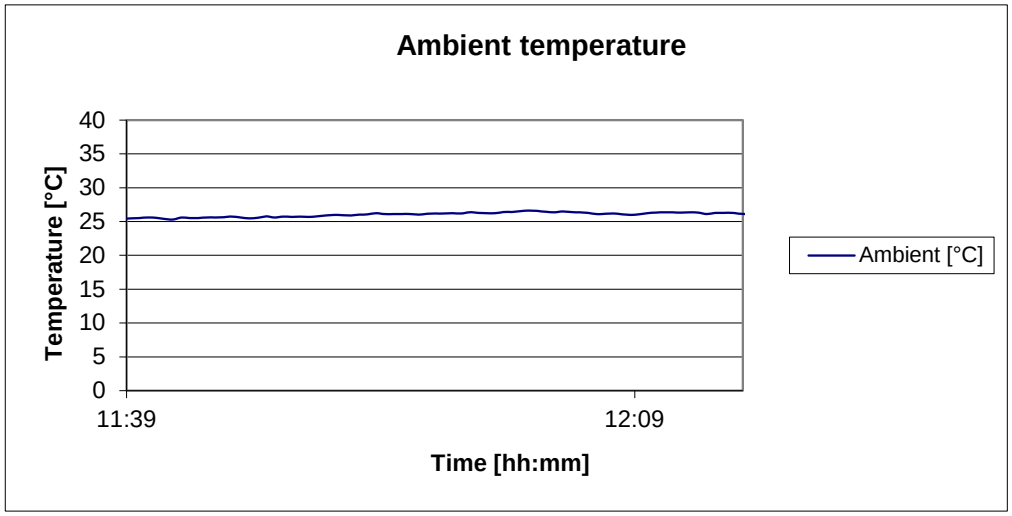

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
11:39
12:09
Time [hh:mm]
Avr. Sur. [°C]

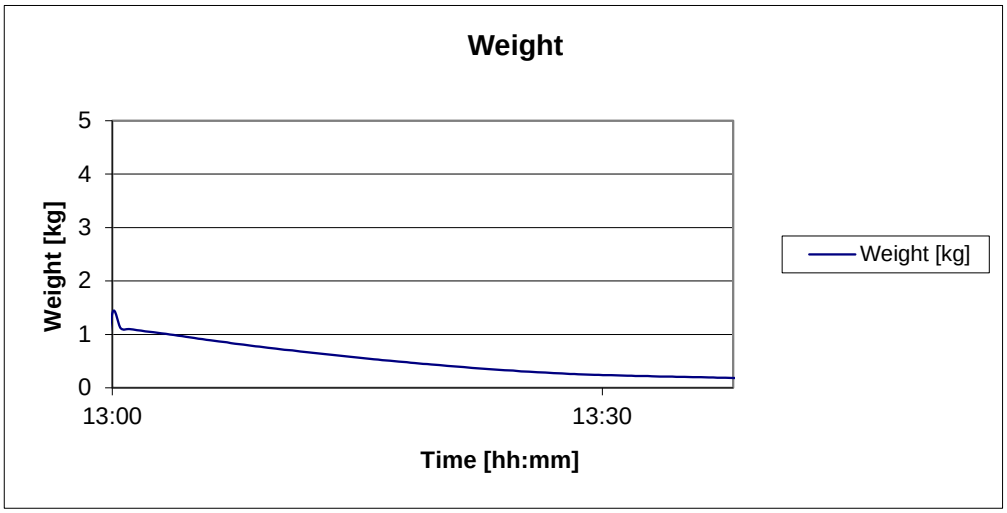

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
11:39
12:09
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

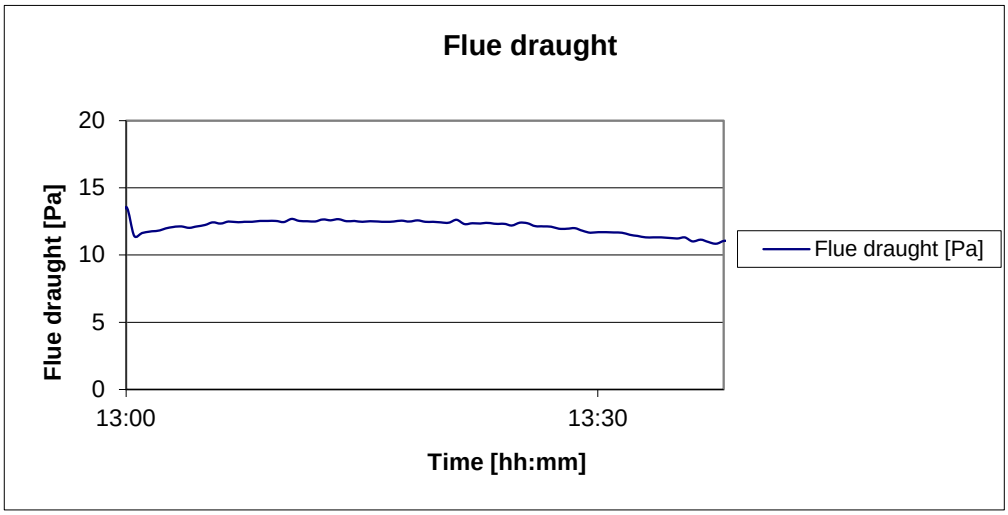

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
11:39
12:09
Time [hh:mm]
Tunnel NS [°C]

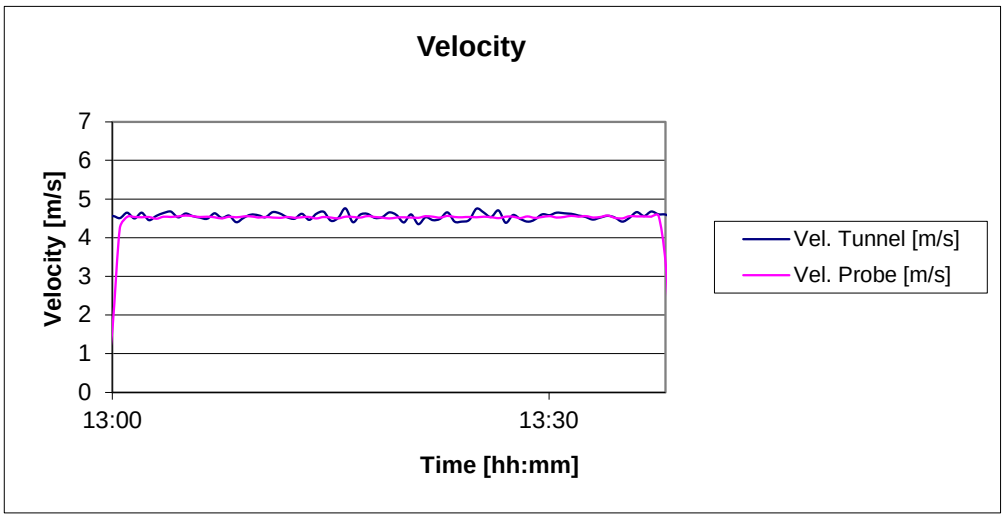

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
11:39
12:09
Time [hh:mm]
Filter [°C]

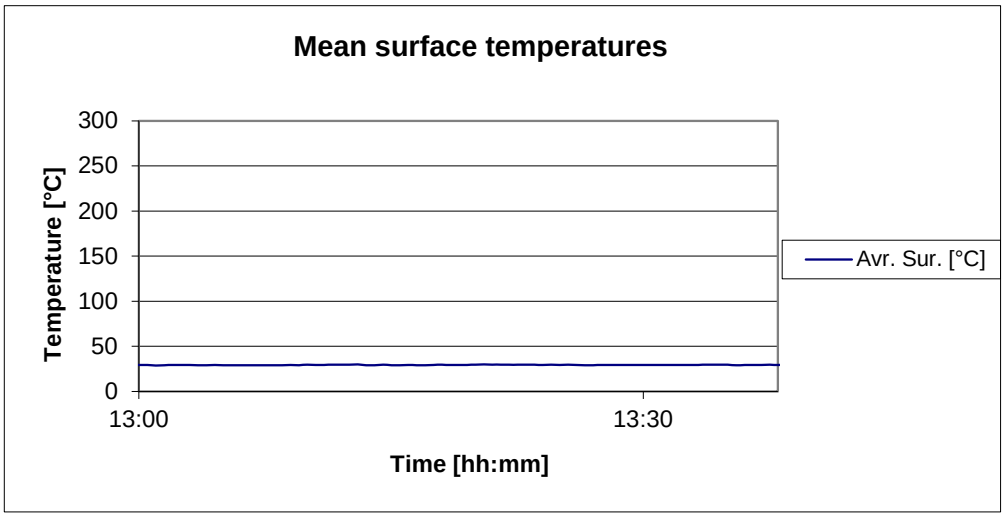

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
11:39
12:09
Time [hh:mm]
NS Flue temp. [°C]

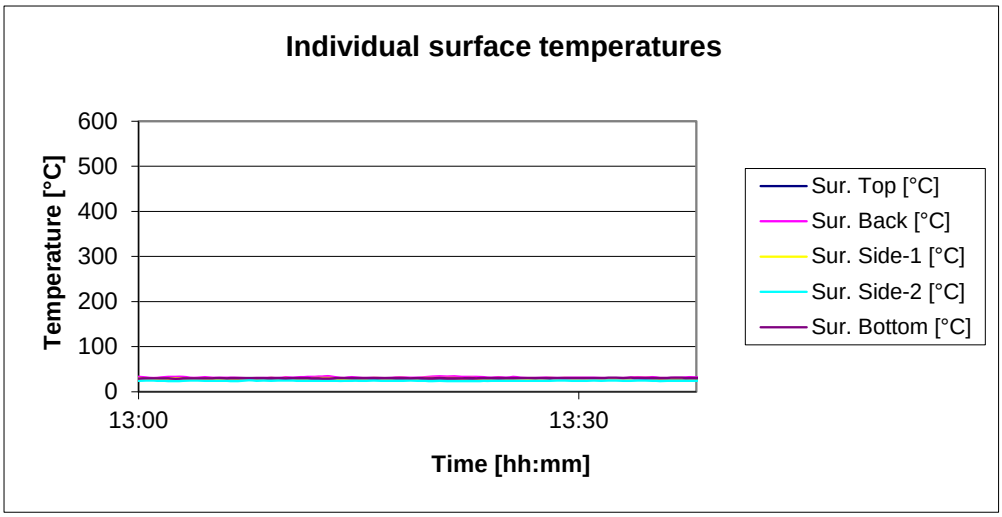

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
11:39
12:09
Time [hh:mm]
Ambient [°C]

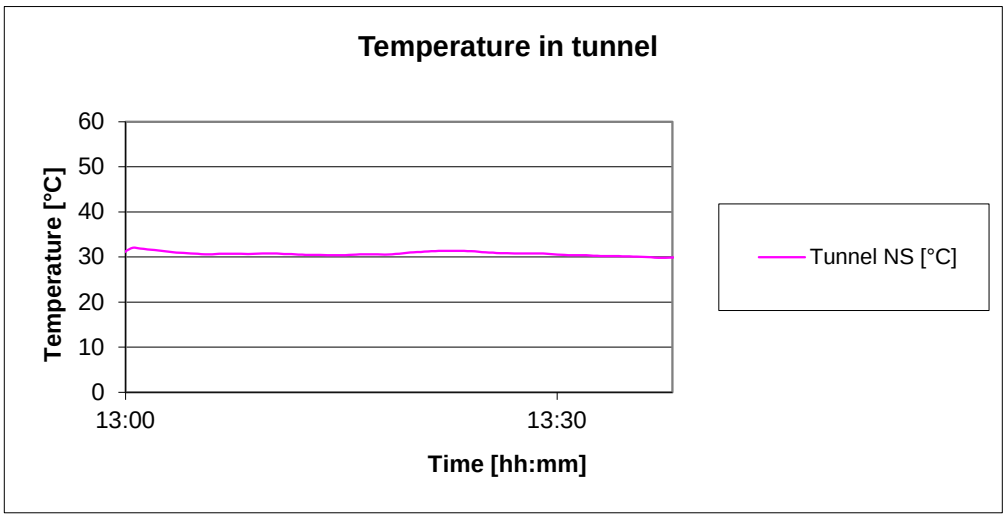

Weight
Weight [kg]
5
4
3
2
1
0
13:00
13:30
Time [hh:mm]
Weight [kg]

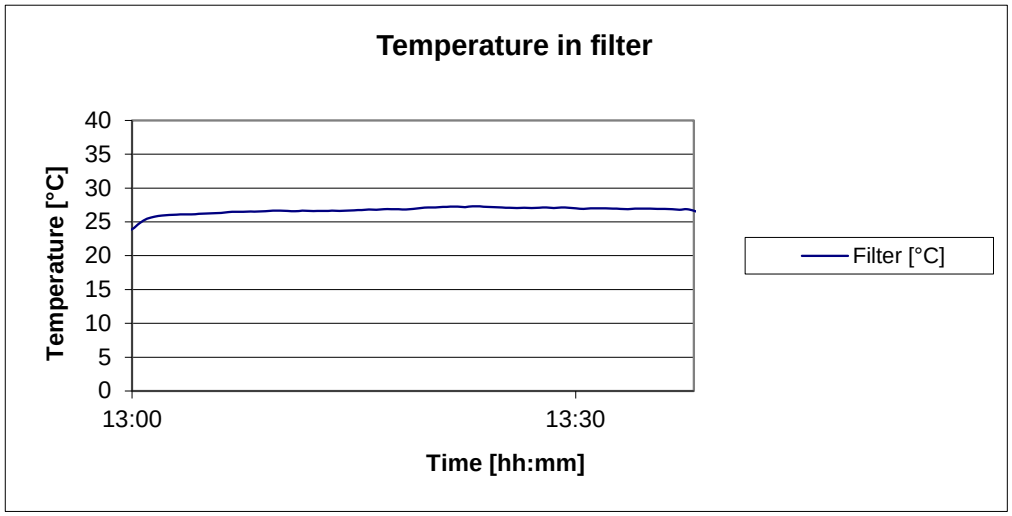

Flue draught
Flue draught [Pa]
20
15
10
5
0
13:00
13:30
Time [hh:mm]
Flue draught [Pa]

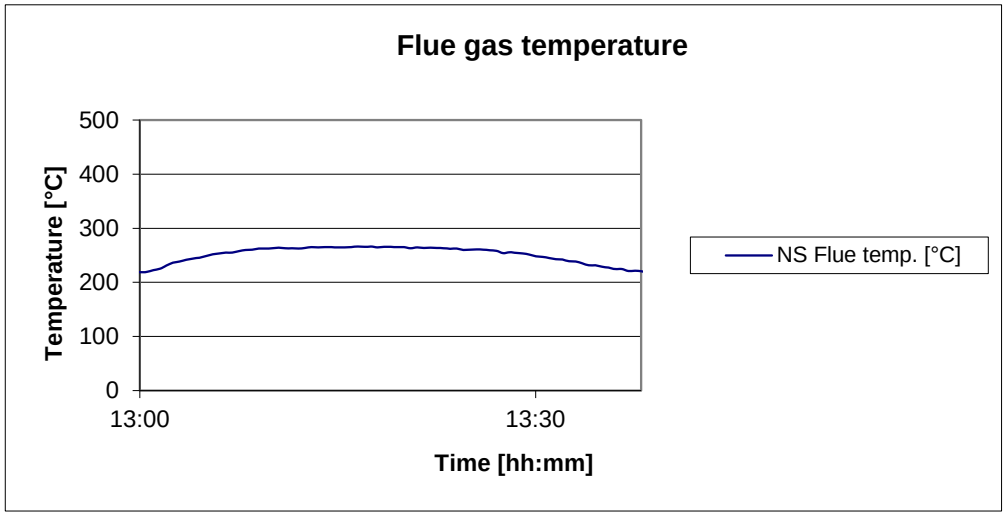

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
13:00
13:30
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

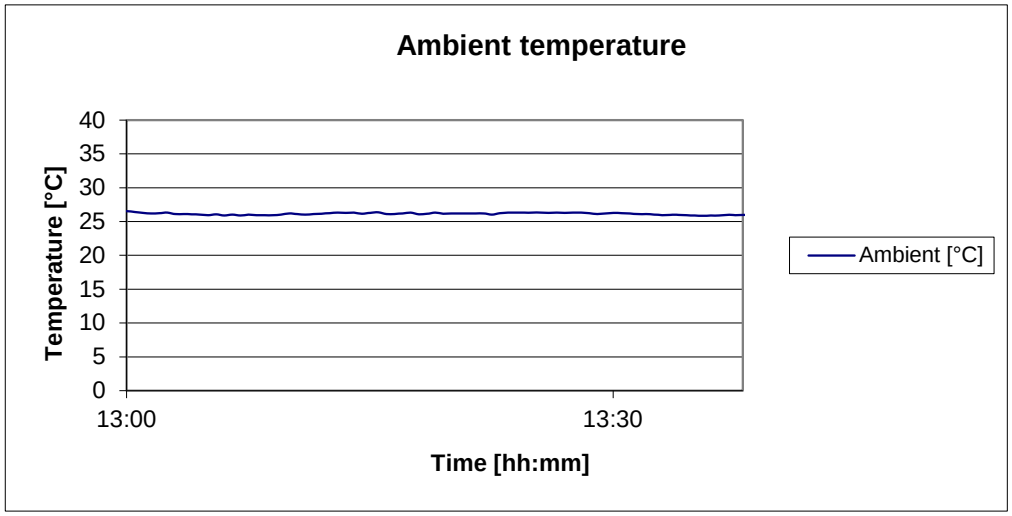

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
13:00
13:30
Time [hh:mm]
Avr. Sur. [°C]

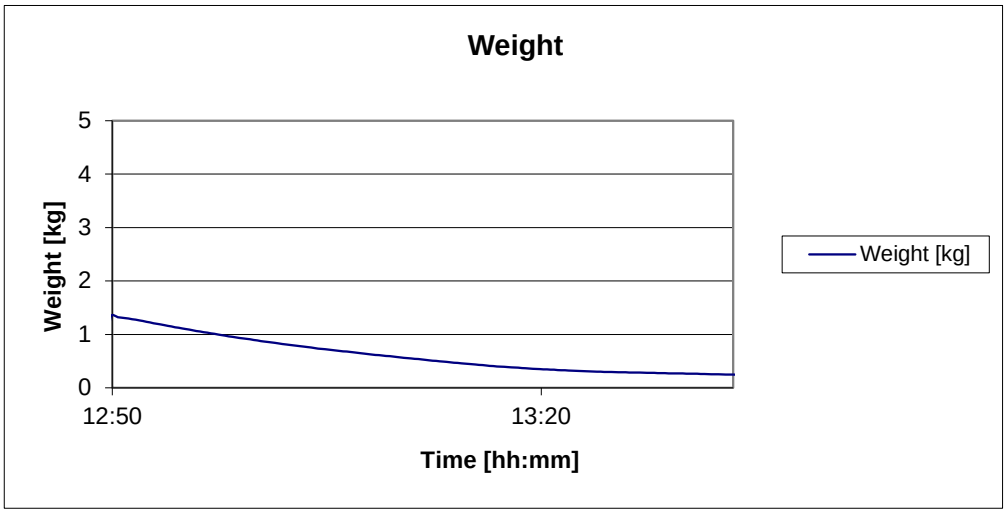

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
13:00
13:30
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

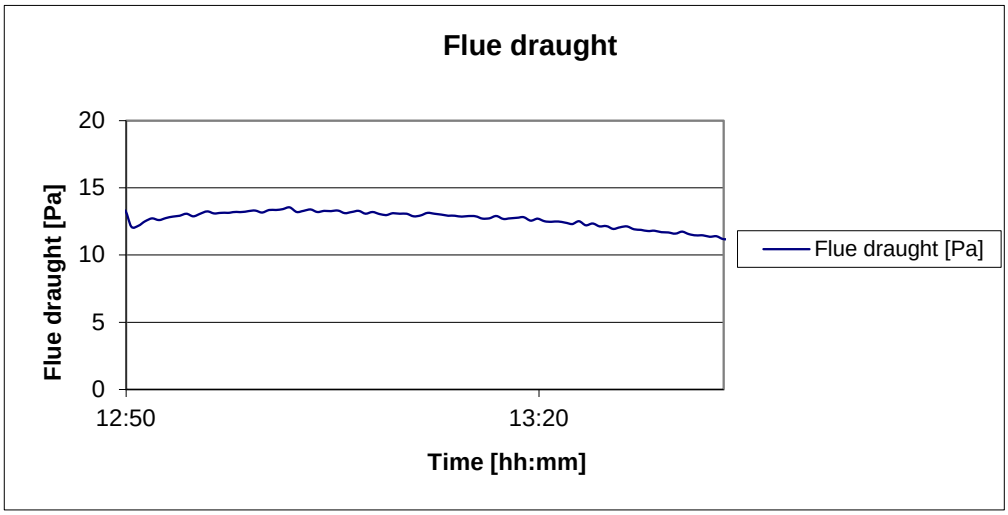

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
13:00
13:30
Time [hh:mm]
Tunnel NS [°C]

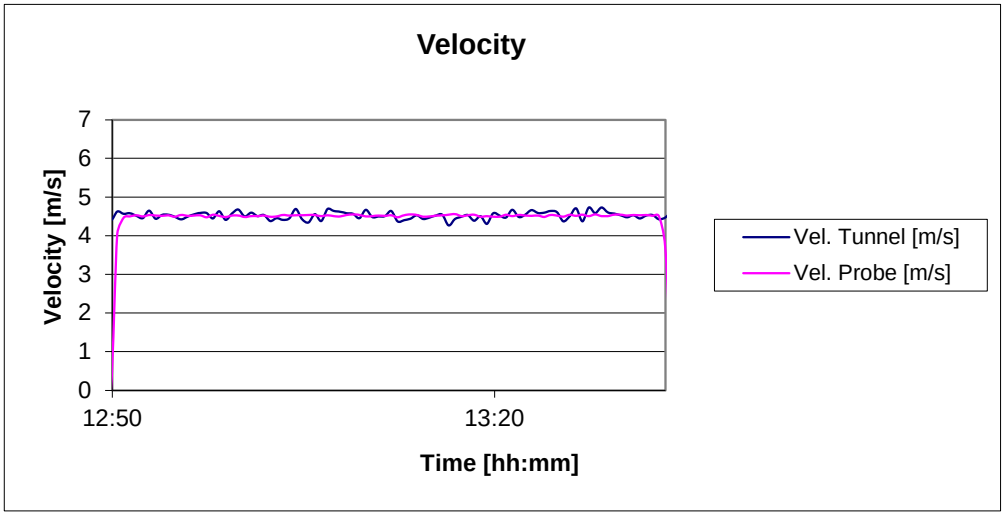

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
13:00
13:30
Time [hh:mm]
Filter [°C]

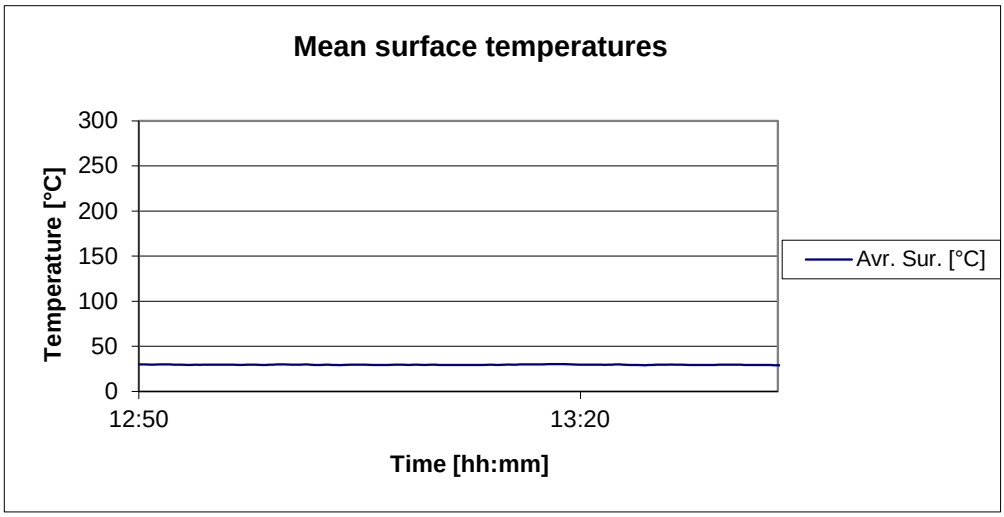

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
13:00
13:30
Time [hh:mm]
NS Flue temp. [°C]

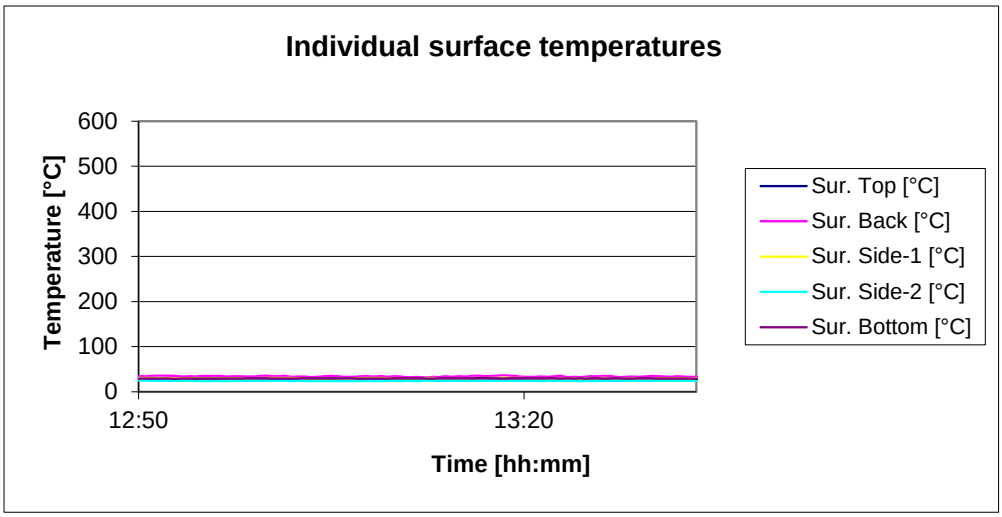

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
13:00
13:30
Time [hh:mm]
Ambient [°C]

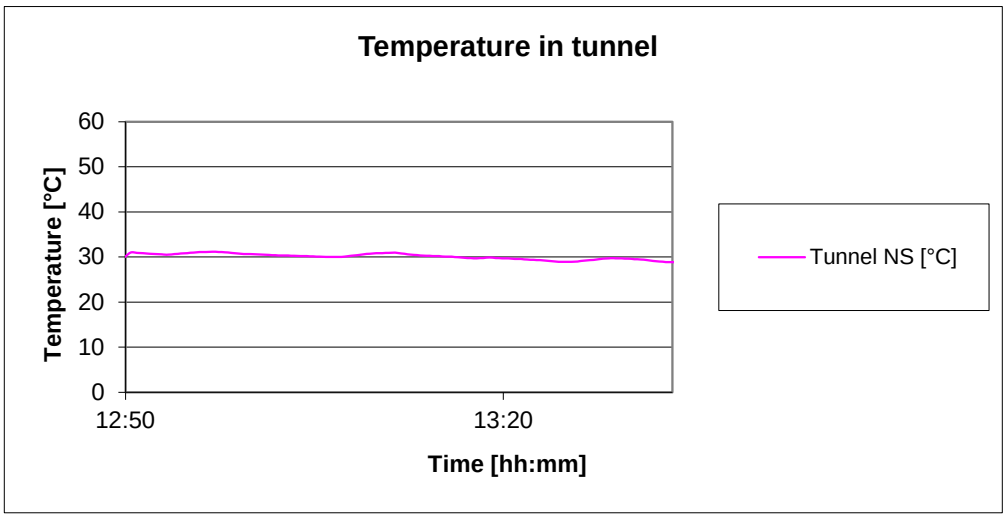

Weight
Weight [kg]
5
4
3
2
1
0
12:50
13:20
Time [hh:mm]
Weight [kg]

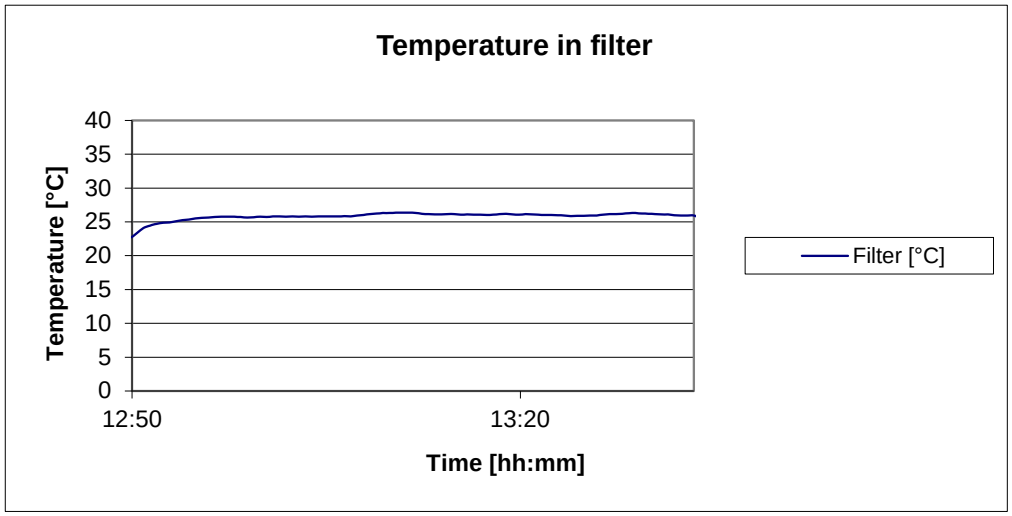

Flue draught
Flue draught [Pa]
20
15
10
5
0
12:50
13:20
Time [hh:mm]
Flue draught [Pa]

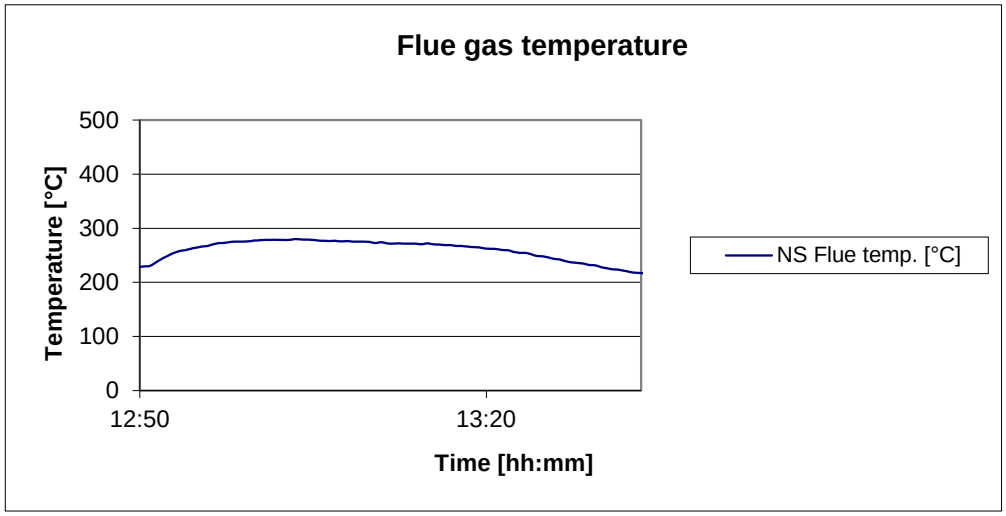

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
12:50
13:20
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

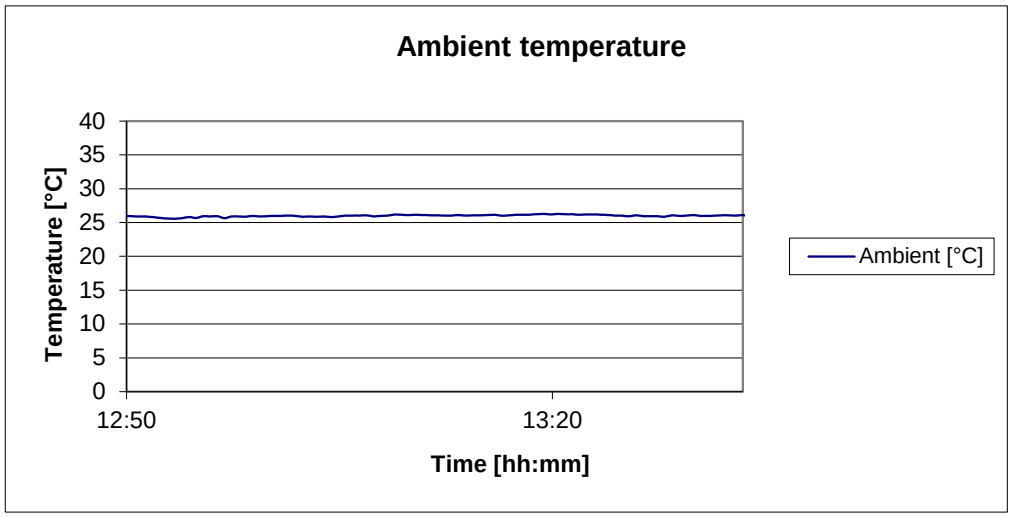

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
12:50
13:20
Time [hh:mm]
Avr. Sur. [°C]

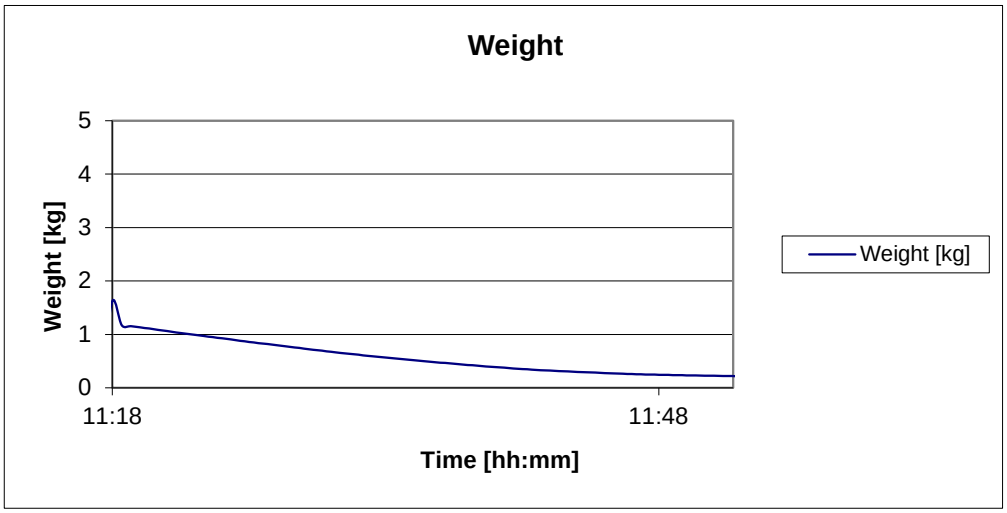

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
12:50
13:20
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

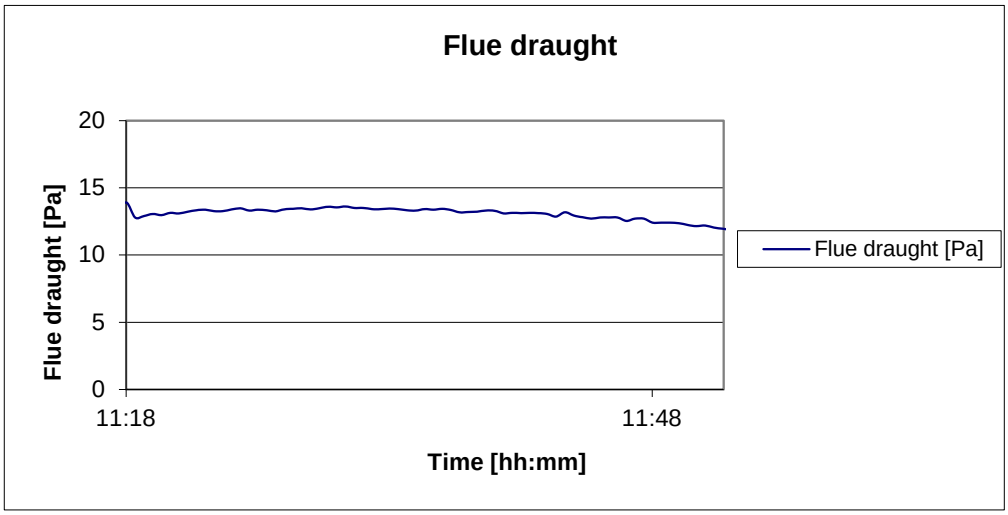

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
12:50
13:20
Time [hh:mm]
Tunnel NS [°C]

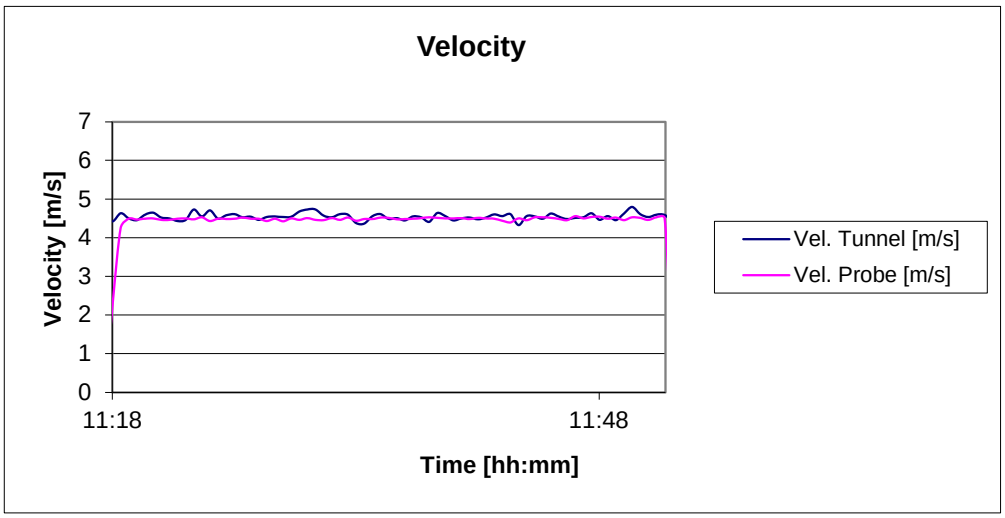

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
12:50
13:20
Time [hh:mm]
Filter [°C]

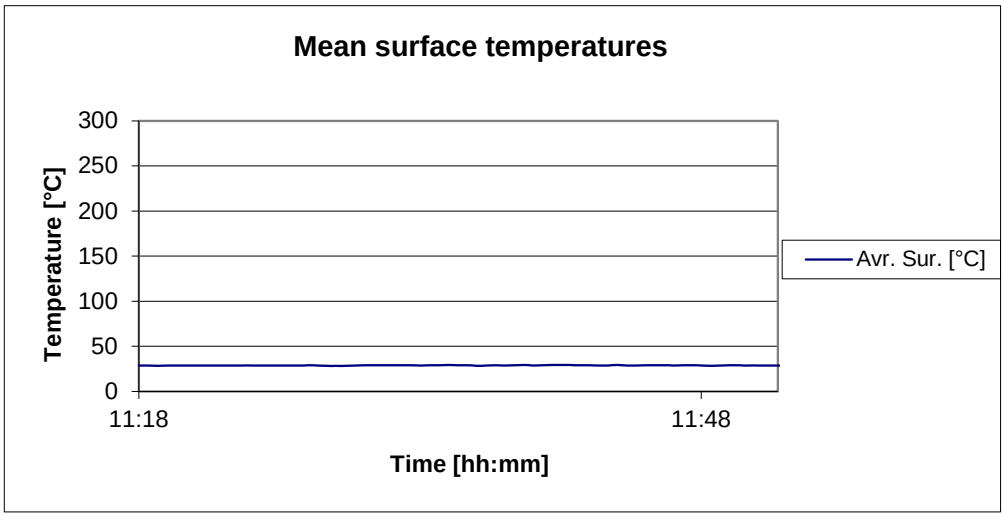

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
12:50
13:20
Time [hh:mm]
NS Flue temp. [°C]

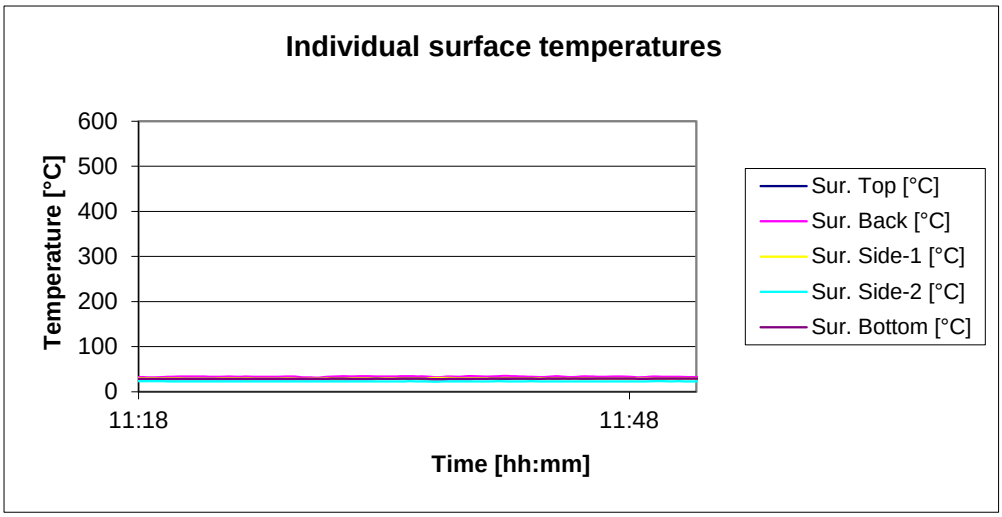

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
12:50
13:20
Time [hh:mm]
Ambient [°C]

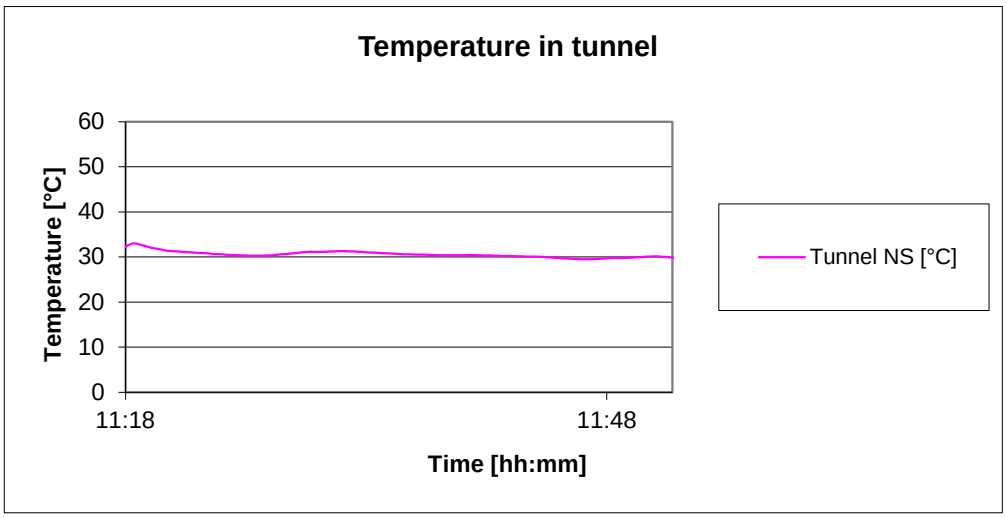

Weight
Weight [kg]
5
4
3
2
1
0
11:18
11:48
Time [hh:mm]
Weight [kg]

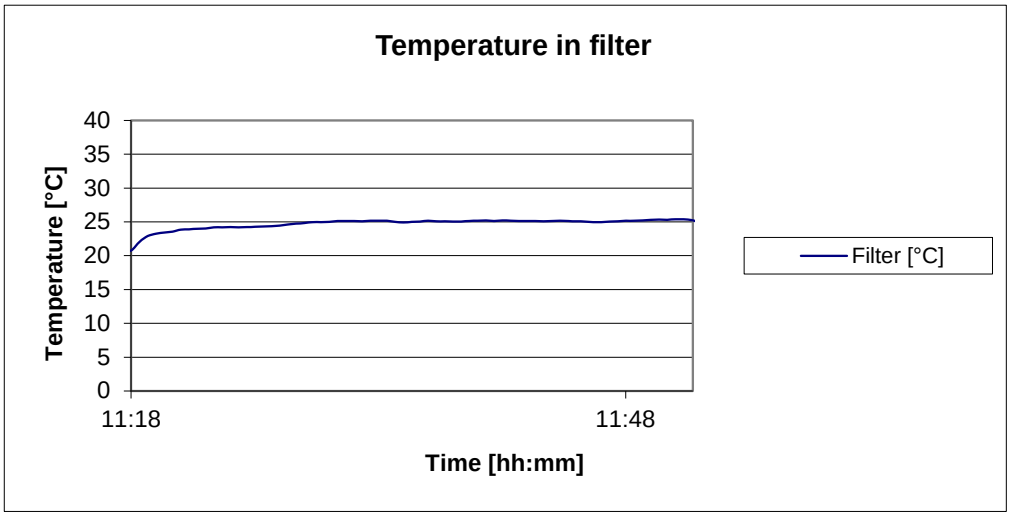

Flue draught
Flue draught [Pa]
20
15
10
5
0
11:18
11:48
Time [hh:mm]
Flue draught [Pa]

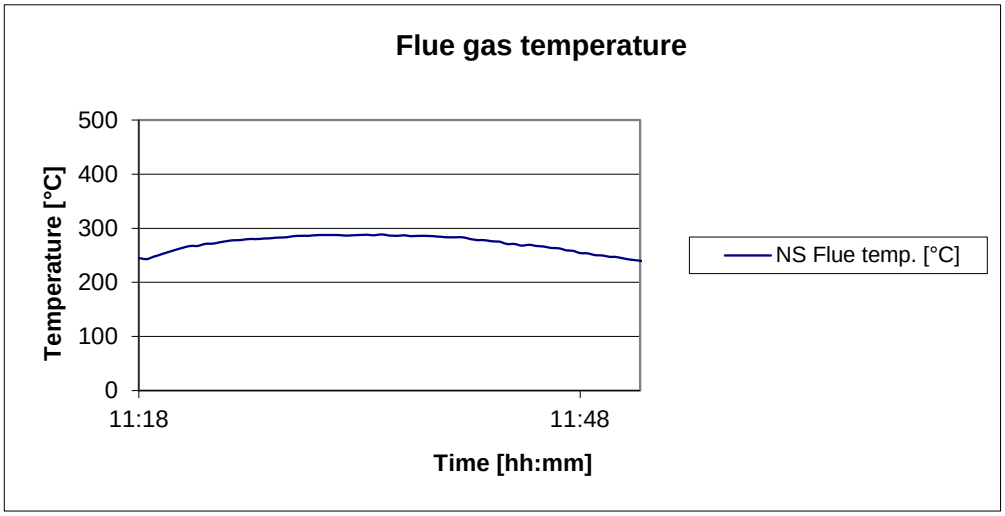

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
11:18
11:48
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

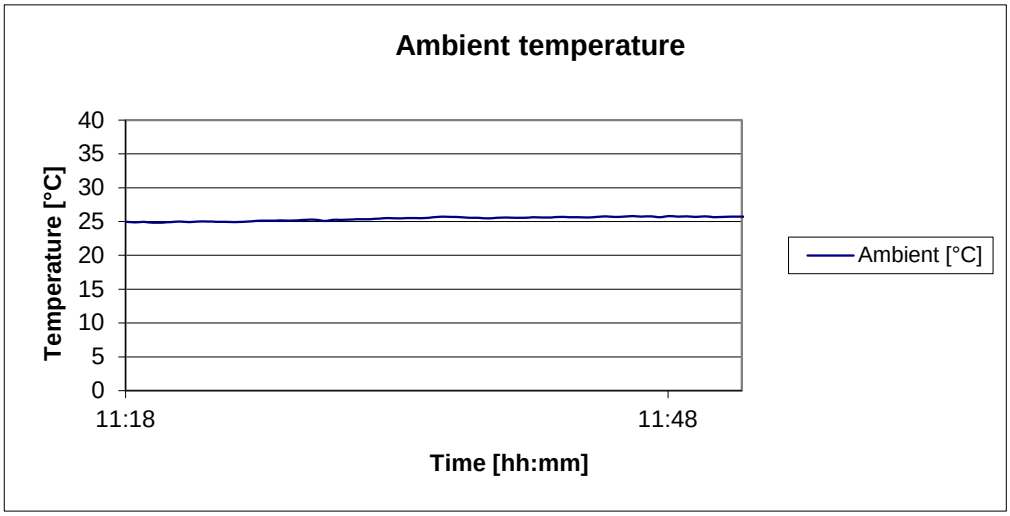

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
11:18
11:48
Time [hh:mm]
Avr. Sur. [°C]

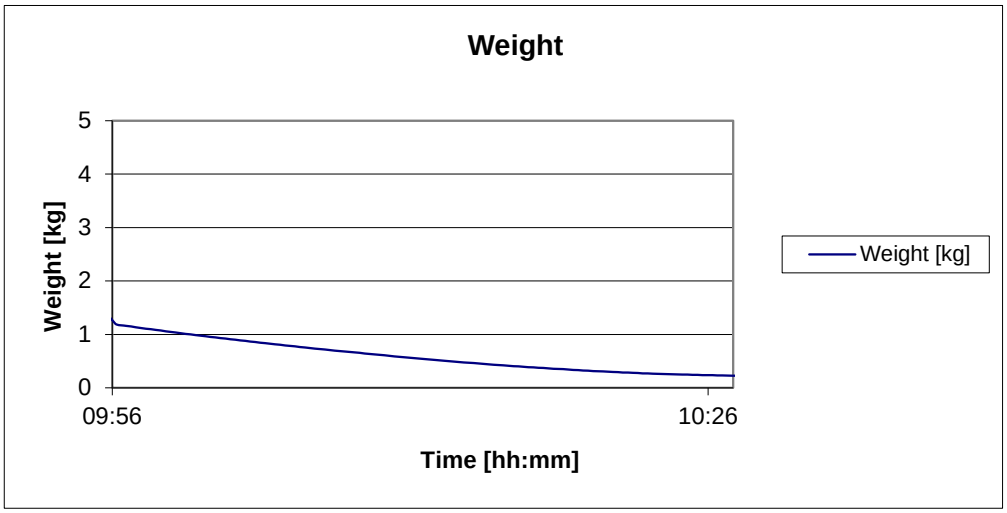

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
11:18
11:48
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

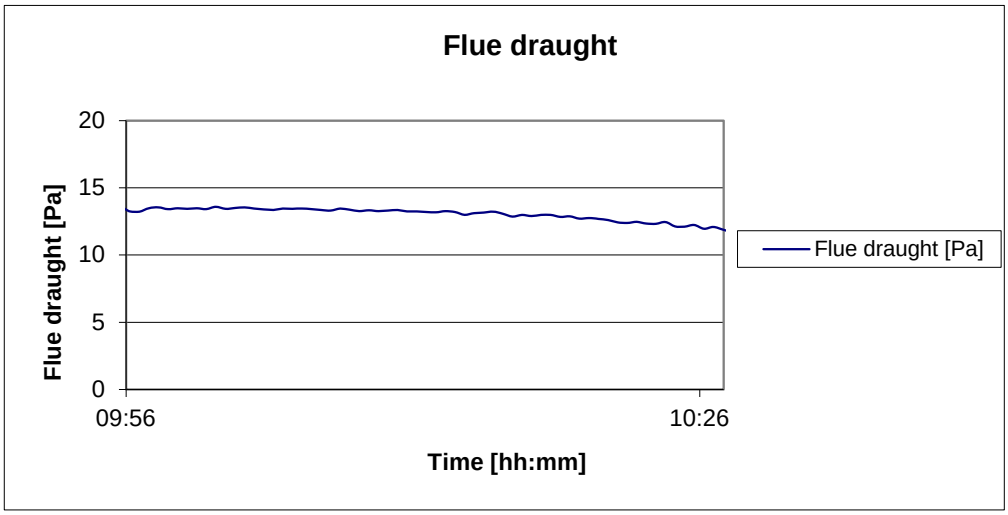

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
11:18
11:48
Time [hh:mm]
Tunnel NS [°C]

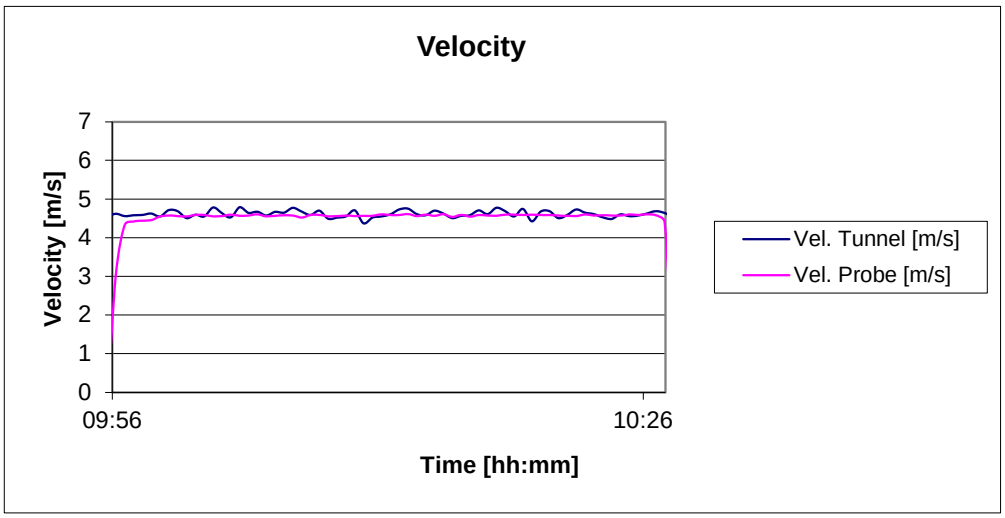

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
11:18
11:48
Time [hh:mm]
Filter [°C]

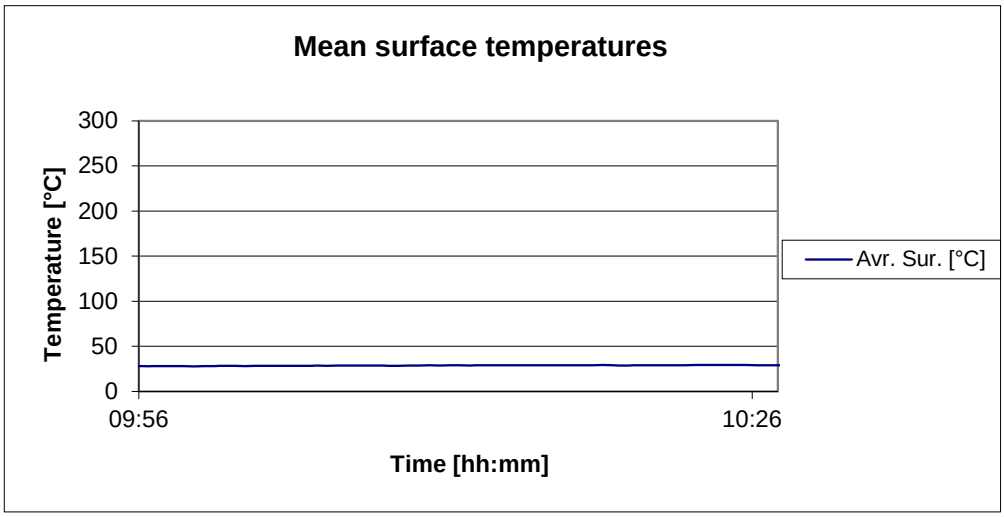

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
11:18
11:48
Time [hh:mm]
NS Flue temp. [°C]

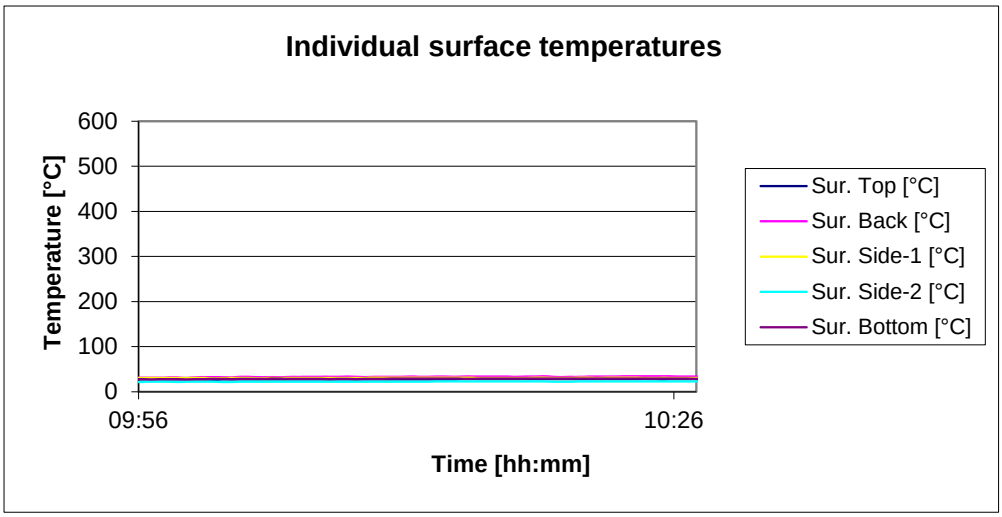

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
11:18
11:48
Time [hh:mm]
Ambient [°C]

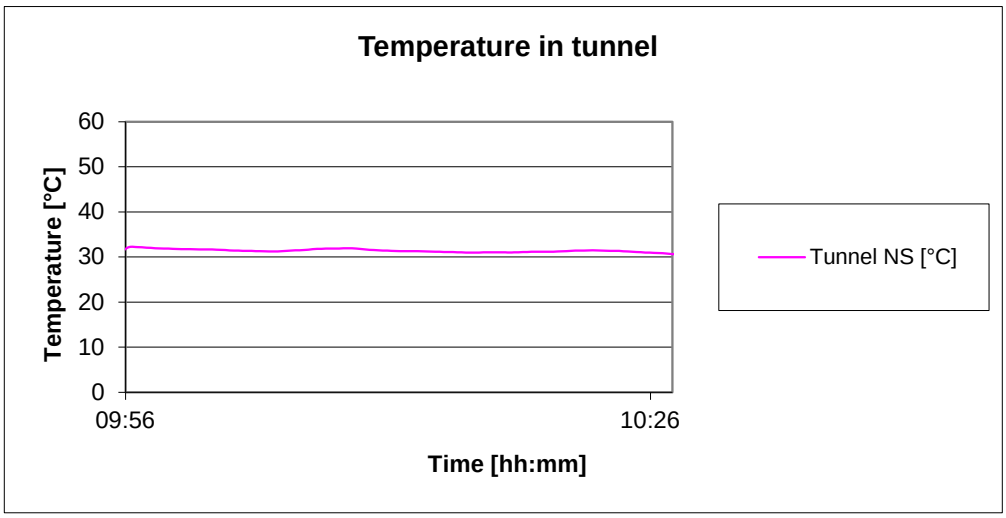

Weight
Weight [kg]
5
4
3
2
1
0
09:56
10:26
Time [hh:mm]
Weight [kg]

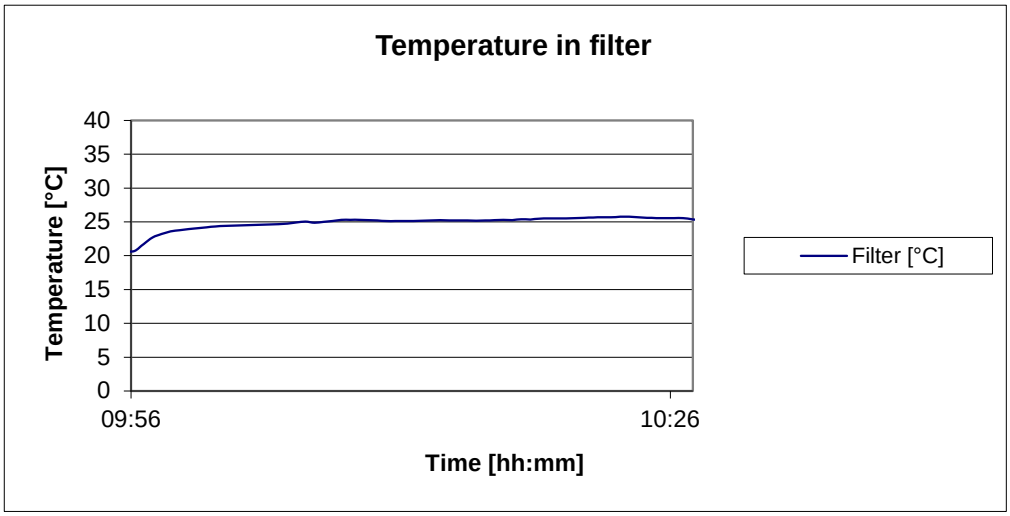

Flue draught
Flue draught [Pa]
20
15
10
5
0
09:56
10:26
Time [hh:mm]
Flue draught [Pa]

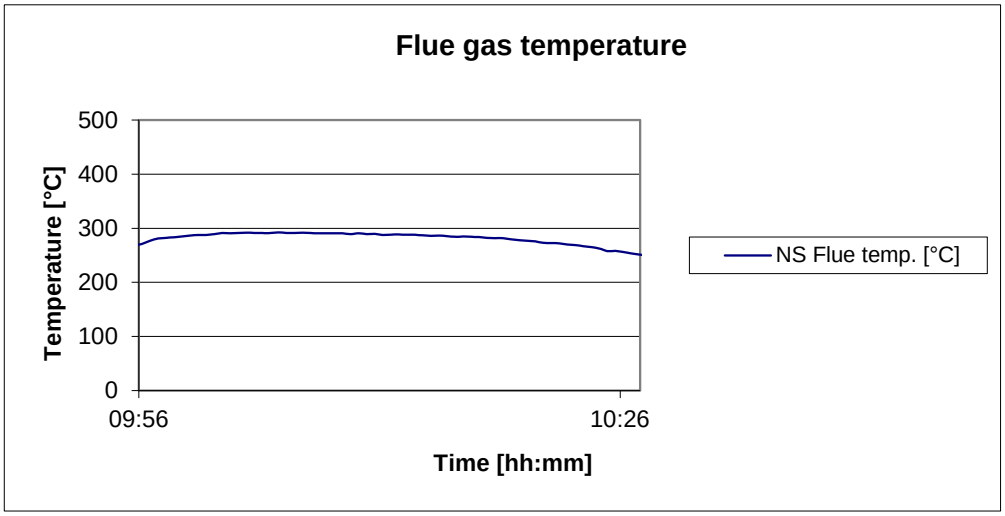

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
09:56
10:26
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

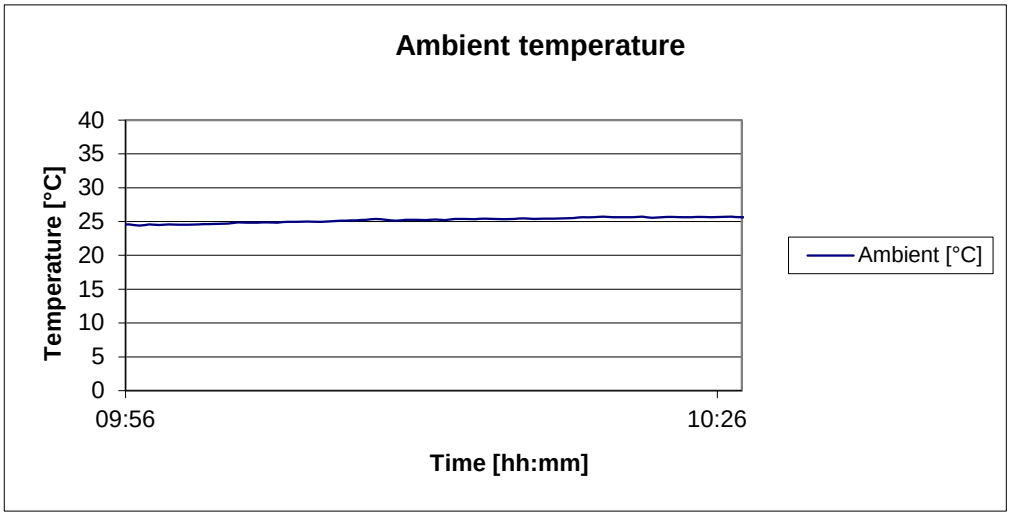

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
09:56
10:26
Time [hh:mm]
Avr. Sur. [°C]

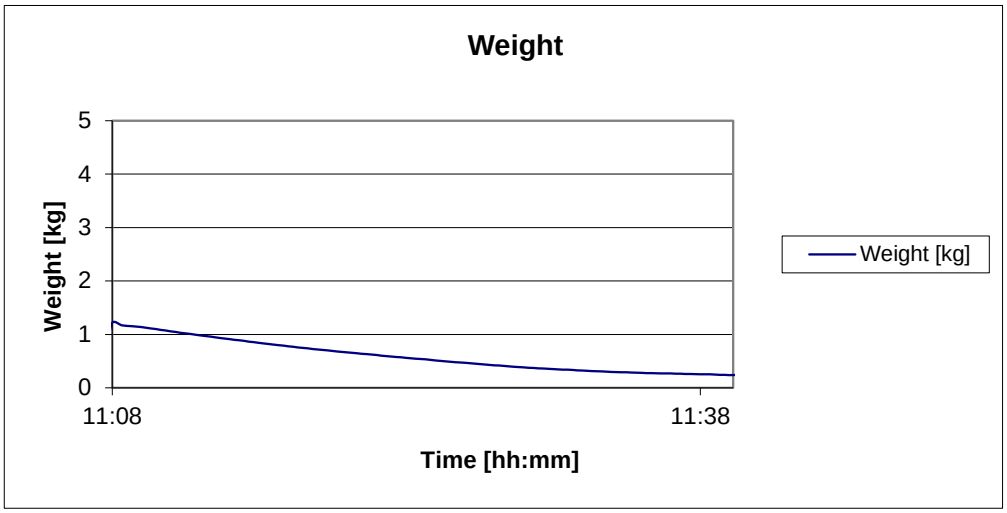

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
09:56
10:26
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

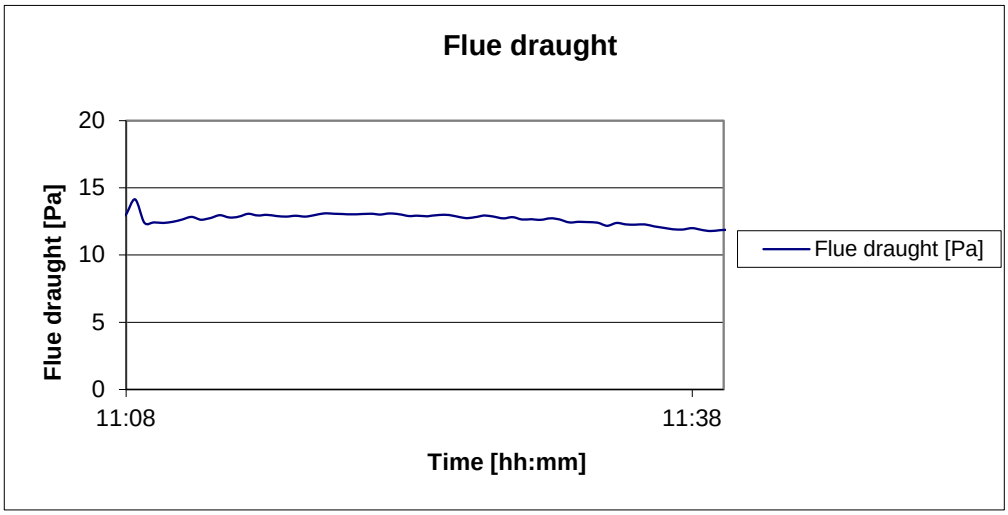

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
09:56
10:26
Time [hh:mm]
Tunnel NS [°C]

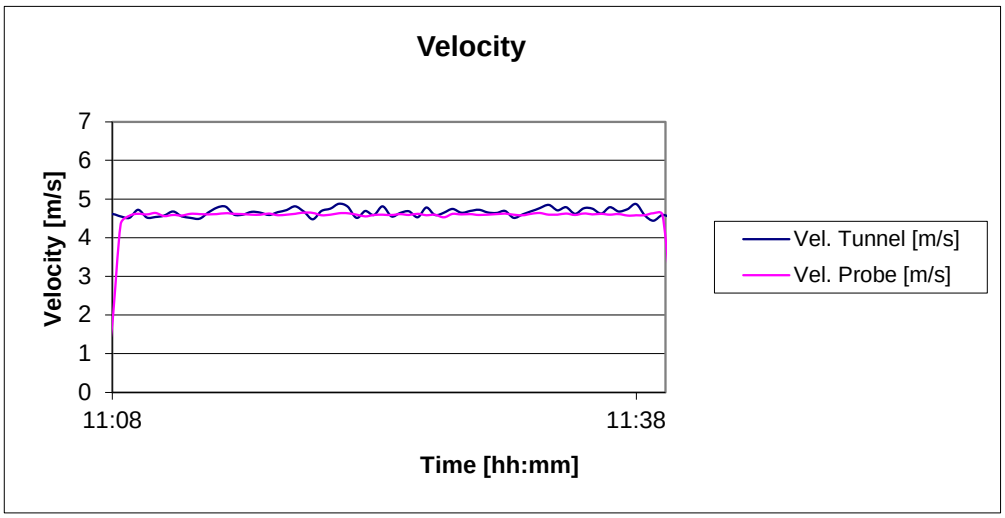

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
09:56
10:26
Time [hh:mm]
Filter [°C]

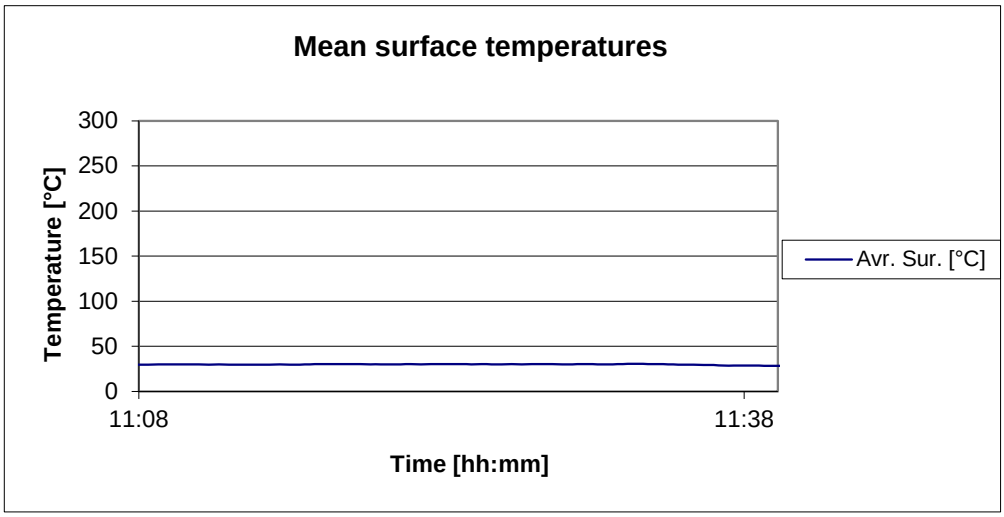

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
09:56
10:26
Time [hh:mm]
NS Flue temp. [°C]

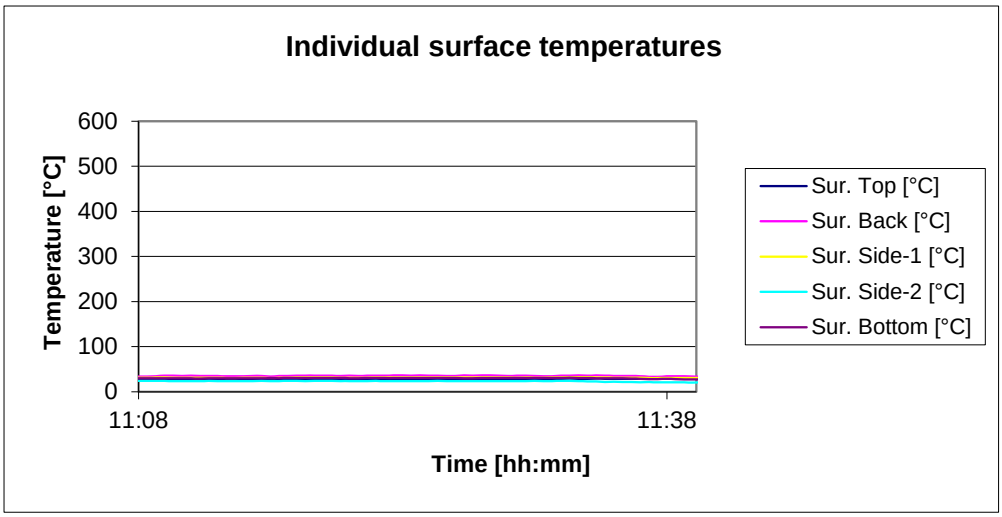

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
09:56
10:26
Time [hh:mm]
Ambient [°C]

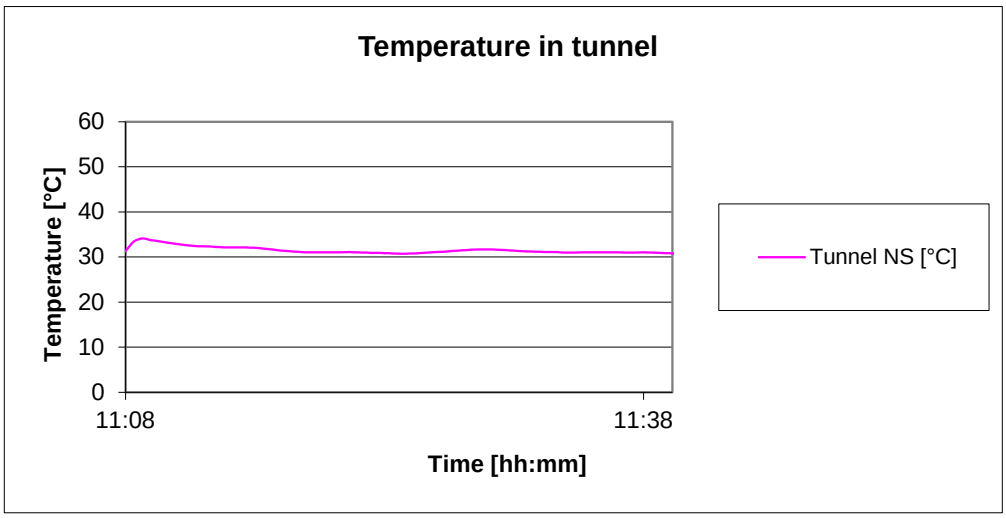

Weight
Weight [kg]
5
4
3
2
1
0
11:08
11:38
Time [hh:mm]
Weight [kg]

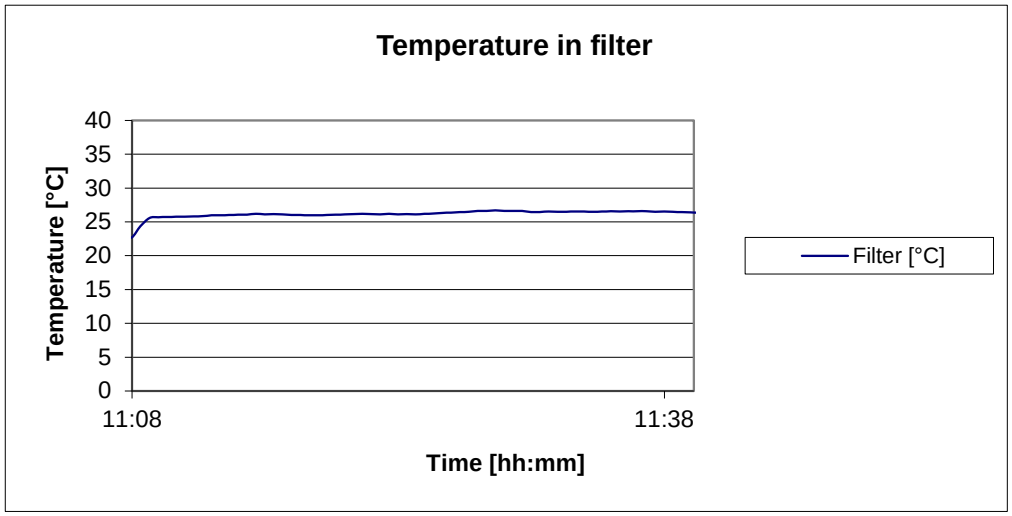

Flue draught
Flue draught [Pa]
20
15
10
5
0
11:08
11:38
Time [hh:mm]
Flue draught [Pa]

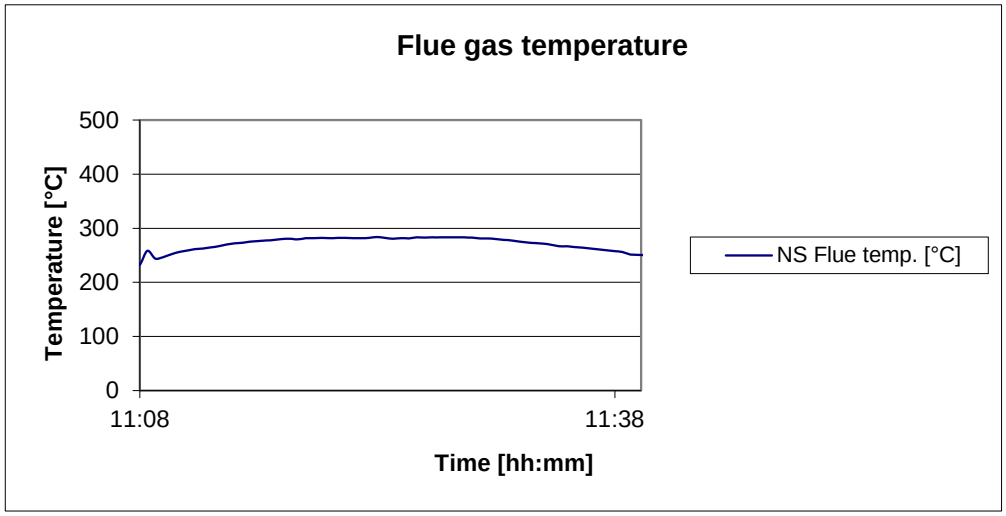

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
11:08
11:38
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

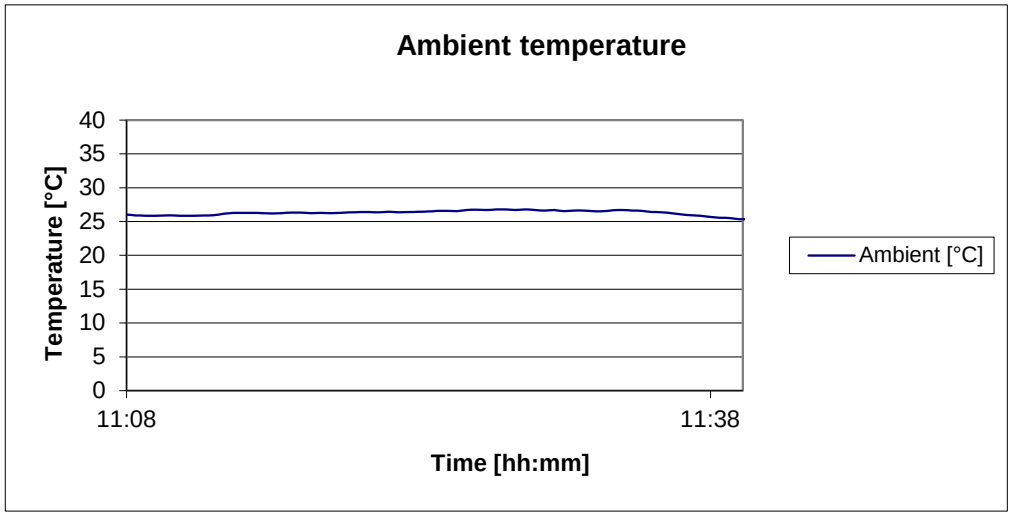

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
11:08
11:38
Time [hh:mm]
Avr. Sur. [°C]

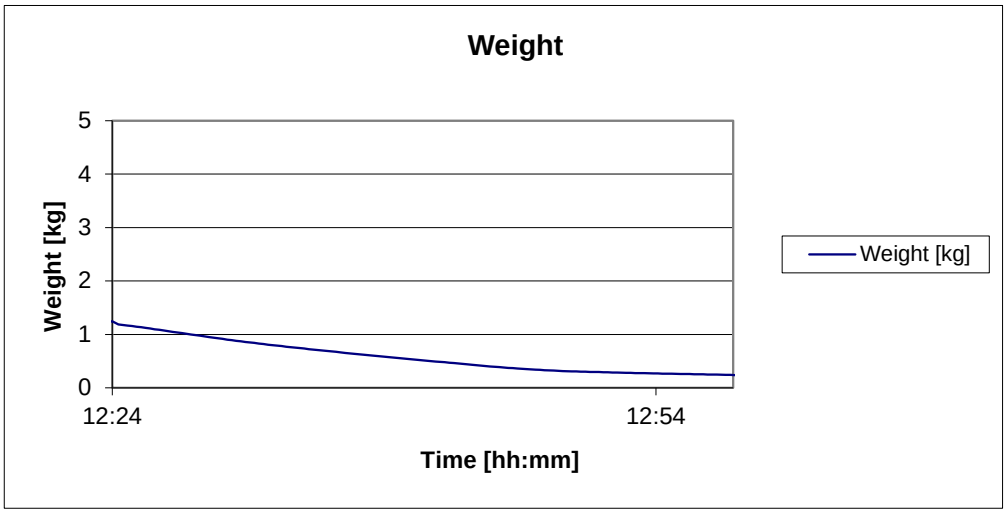

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
11:08
11:38
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

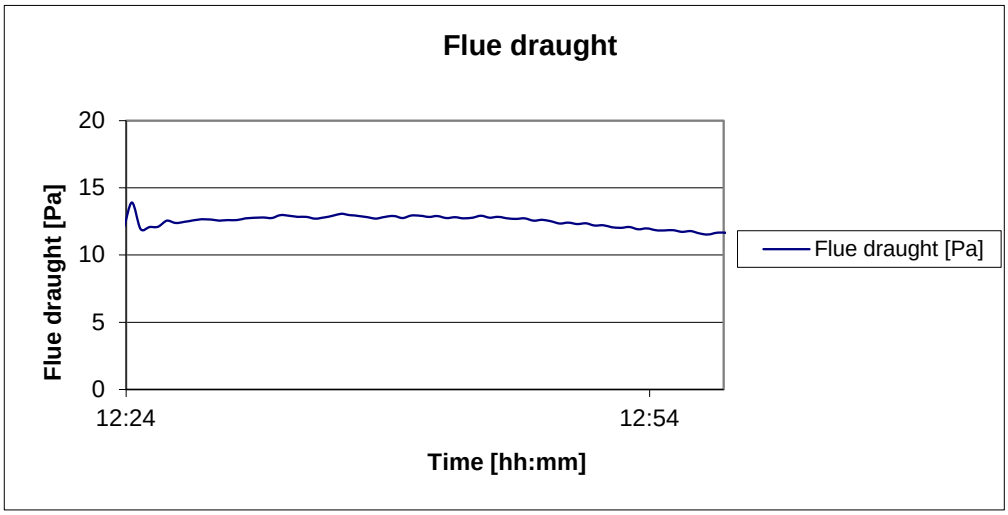

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
11:08
11:38
Time [hh:mm]
Tunnel NS [°C]

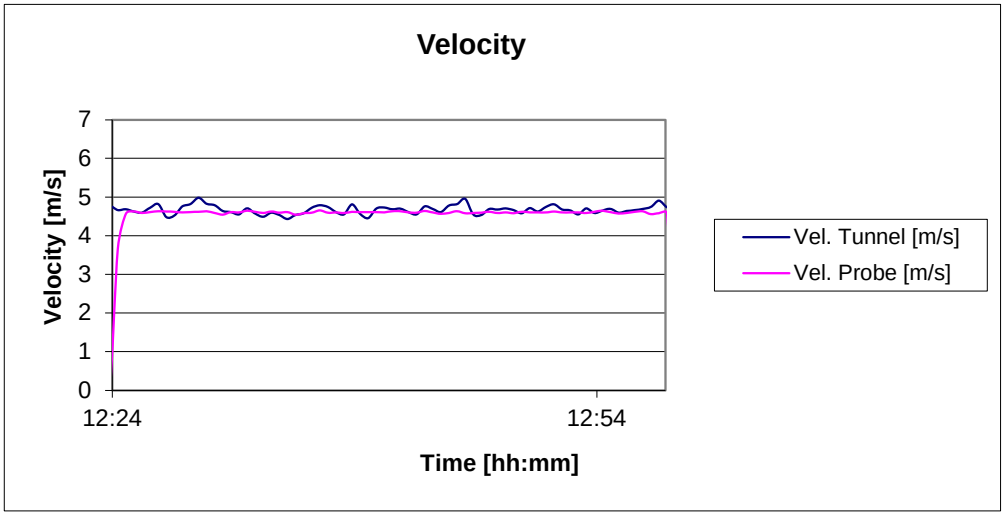

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
11:08
11:38
Time [hh:mm]
Filter [°C]

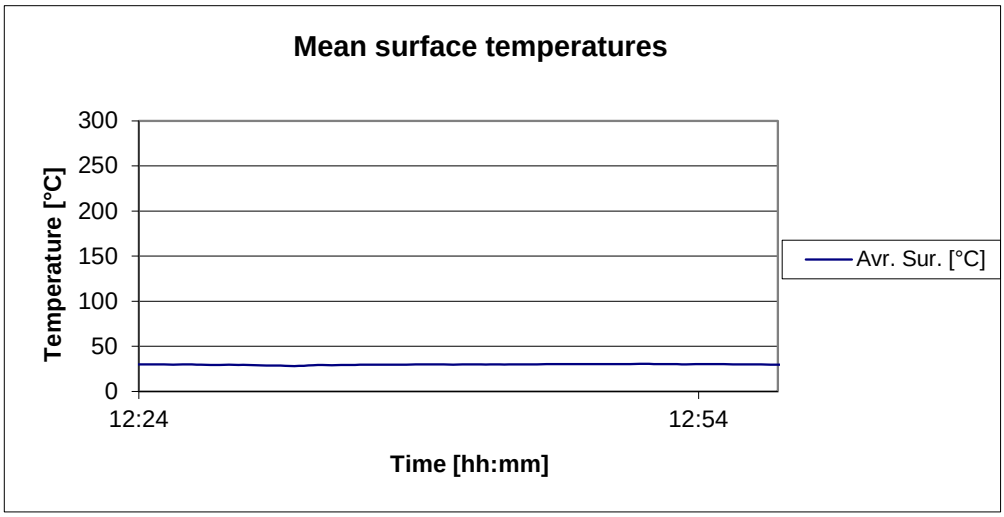

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
11:08
11:38
Time [hh:mm]
NS Flue temp. [°C]

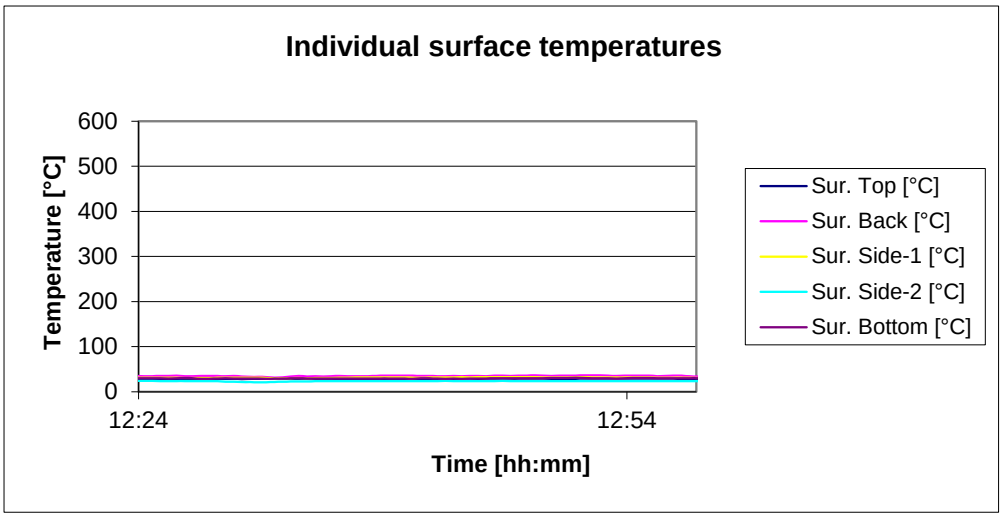

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
11:08
11:38
Time [hh:mm]
Ambient [°C]

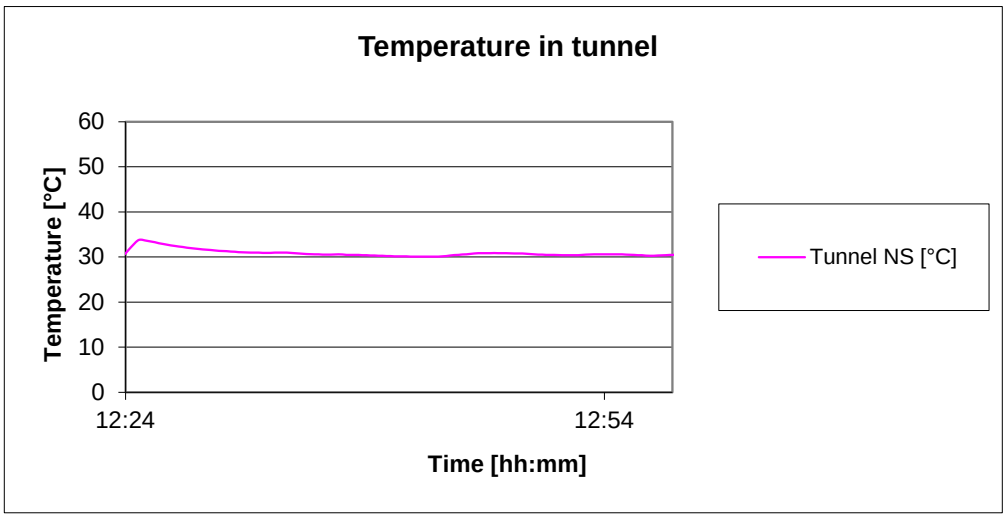

Weight
Weight [kg]
5
4
3
2
1
0
12:24
12:54
Time [hh:mm]
Weight [kg]

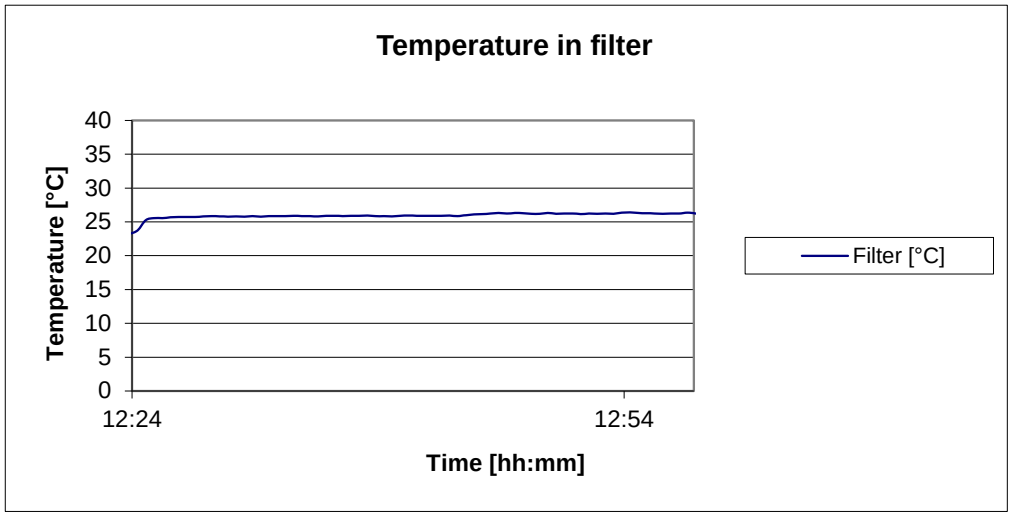

Flue draught
Flue draught [Pa]
20
15
10
5
0
12:24
12:54
Time [hh:mm]
Flue draught [Pa]

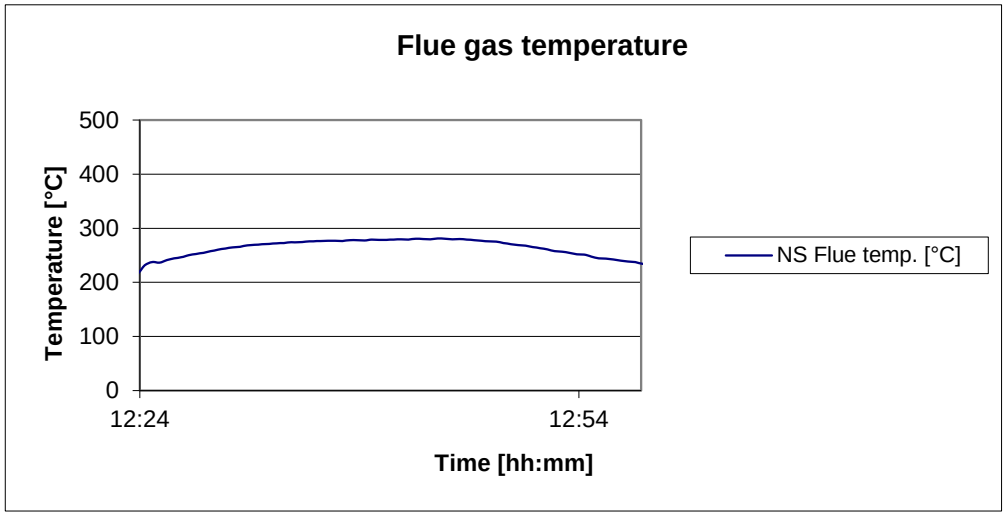

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
12:24
12:54
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

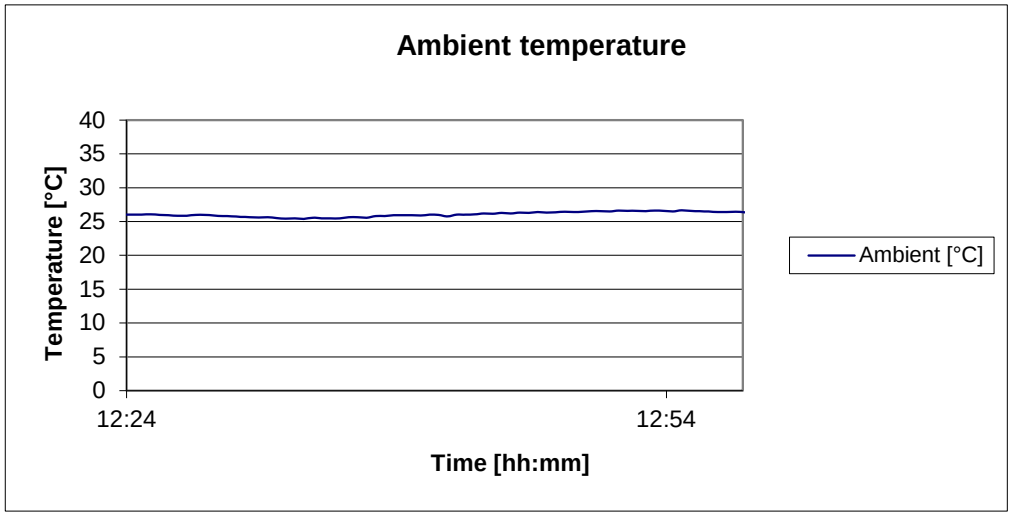

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
12:24
12:54
Time [hh:mm]
Avr. Sur. [°C]

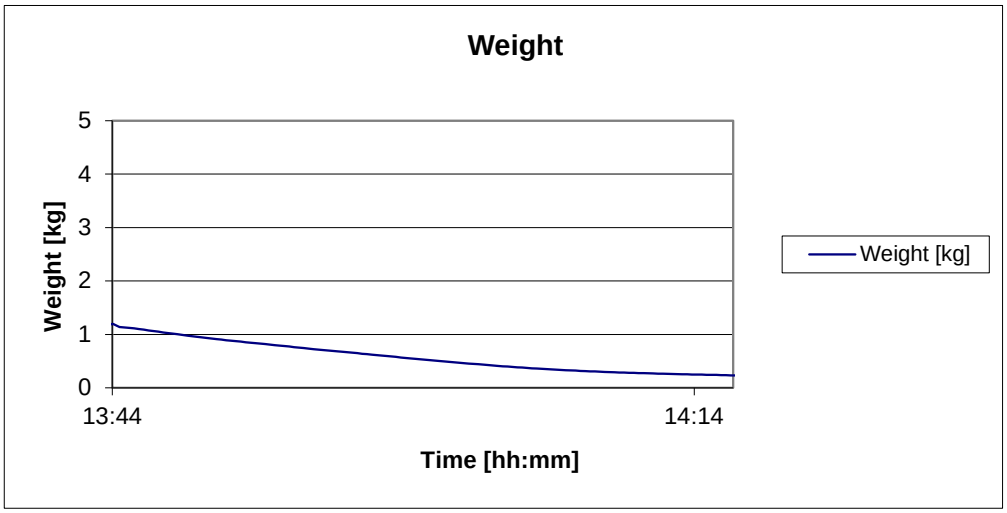

Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
12:24
12:54
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]

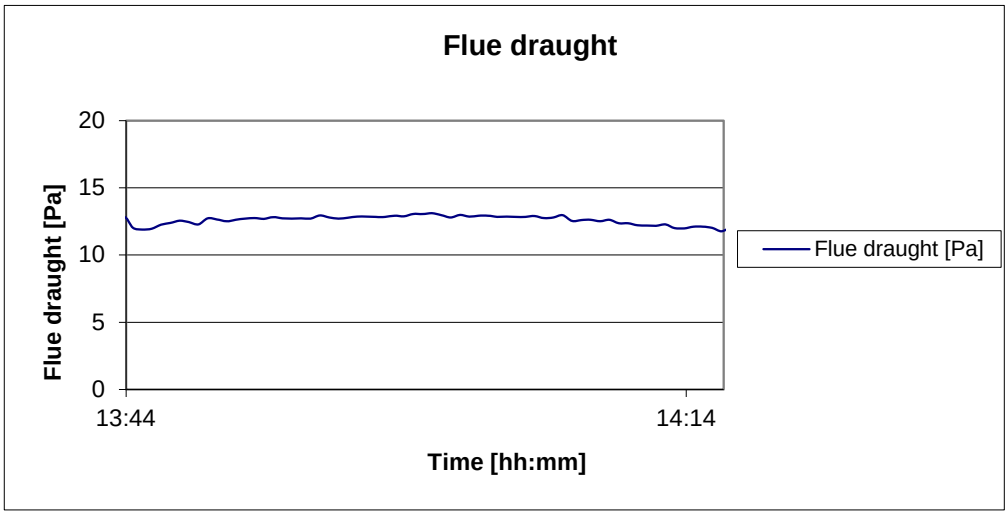

Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
12:24
12:54
Time [hh:mm]
Tunnel NS [°C]

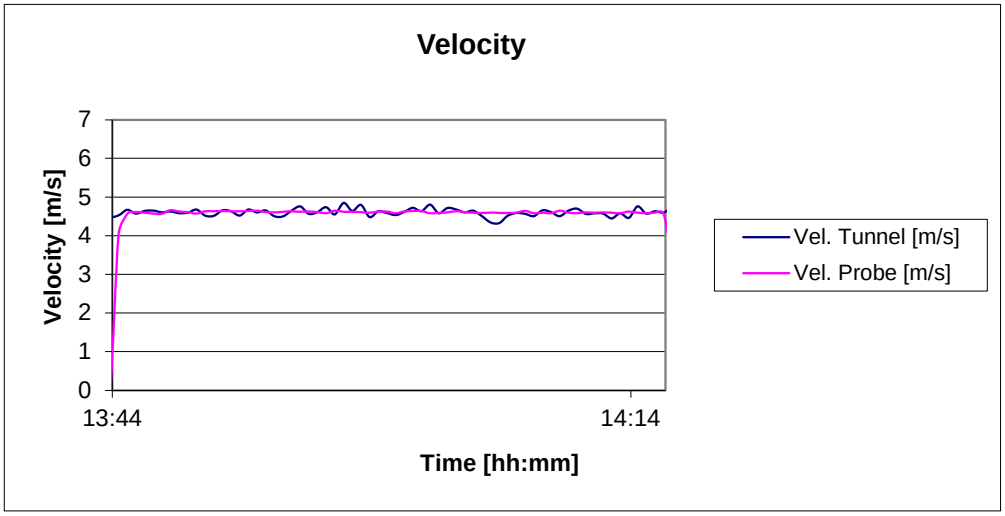

Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
12:24
12:54
Time [hh:mm]
Filter [°C]

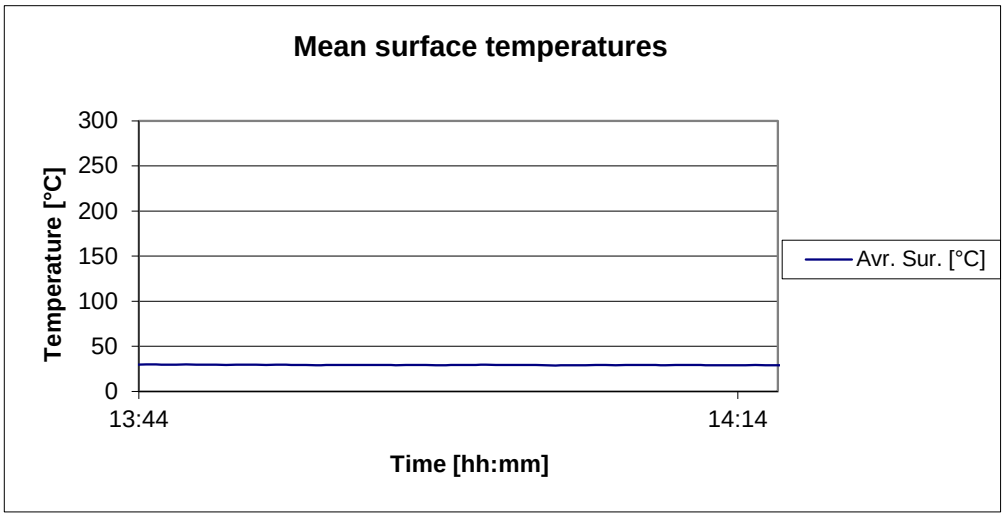

Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
12:24
12:54
Time [hh:mm]
NS Flue temp. [°C]

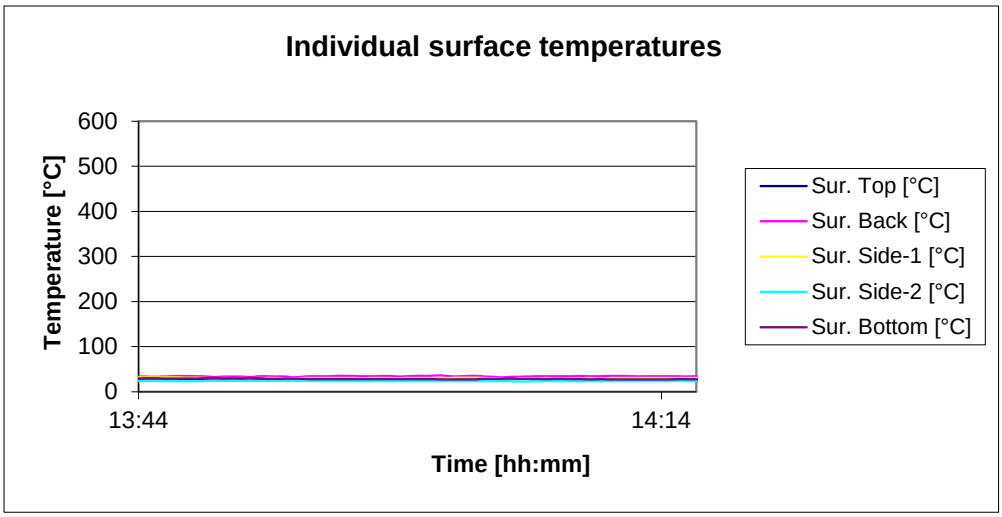

Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
12:24
12:54
Time [hh:mm]
Ambient [°C]

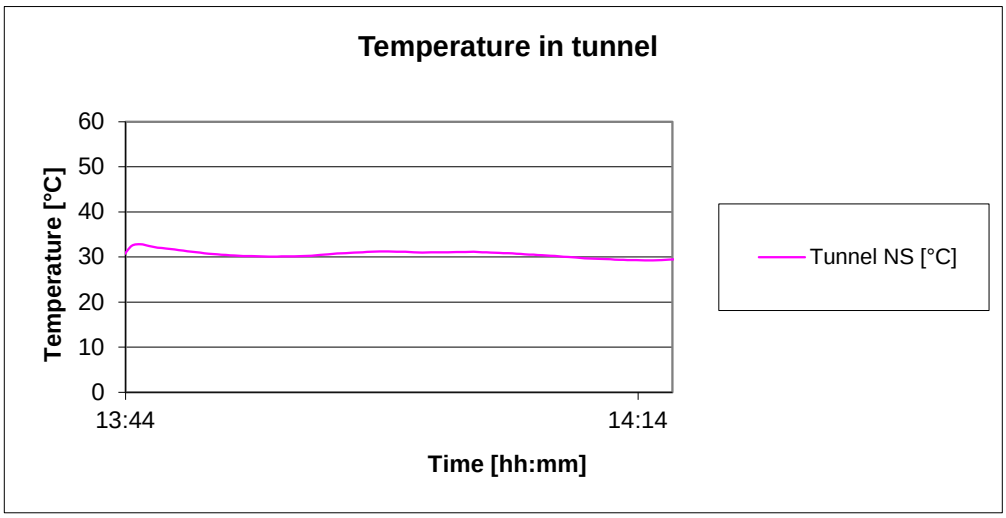

Weight
Weight [kg]
5
4
3
2
1
0
13:44
14:14
Time [hh:mm]
Weight [kg]

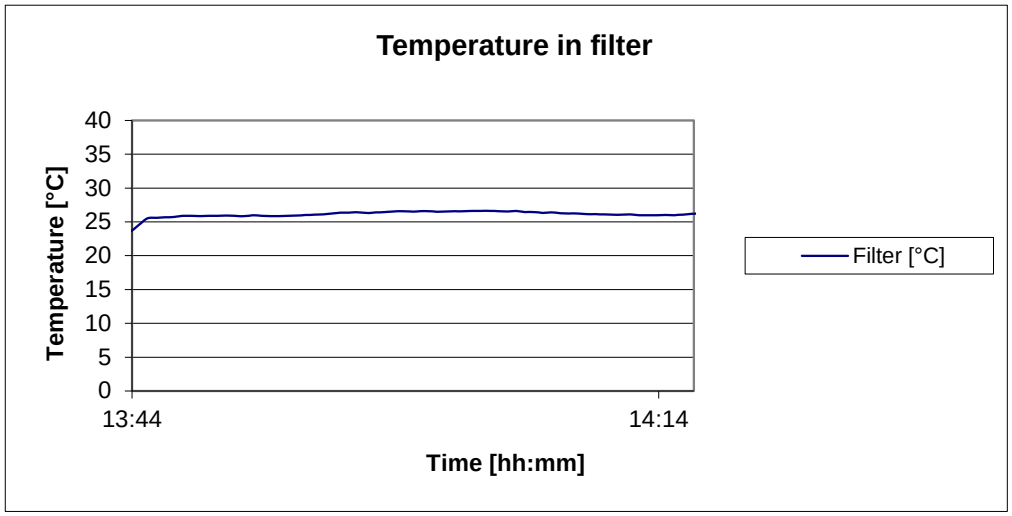

Flue draught
Flue draught [Pa]
20
15
10
5
0
13:44
14:14
Time [hh:mm]
Flue draught [Pa]

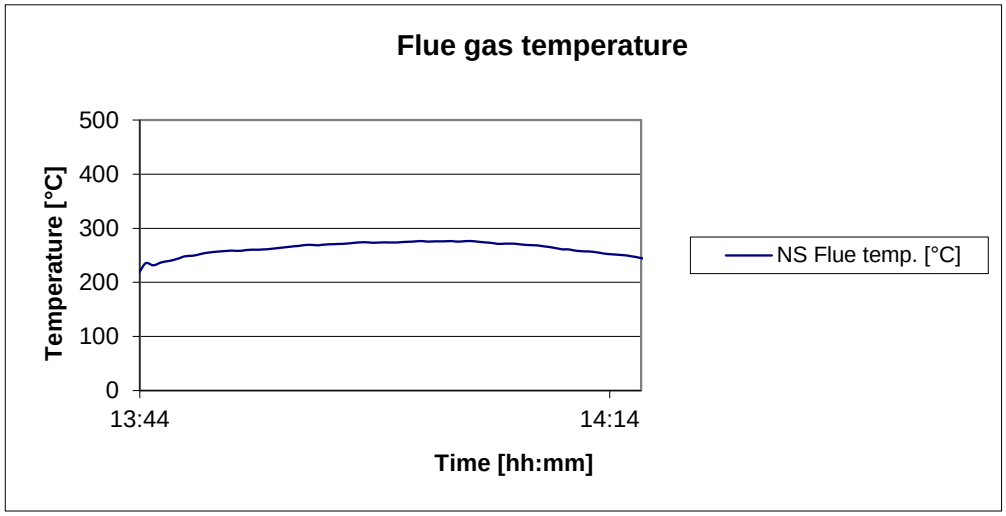

Velocity
Velocity [m/s]
7
6
5
4
3
2
1
0
13:44
14:14
Time [hh:mm]
Vel. Tunnel [m/s]
Vel. Probe [m/s]

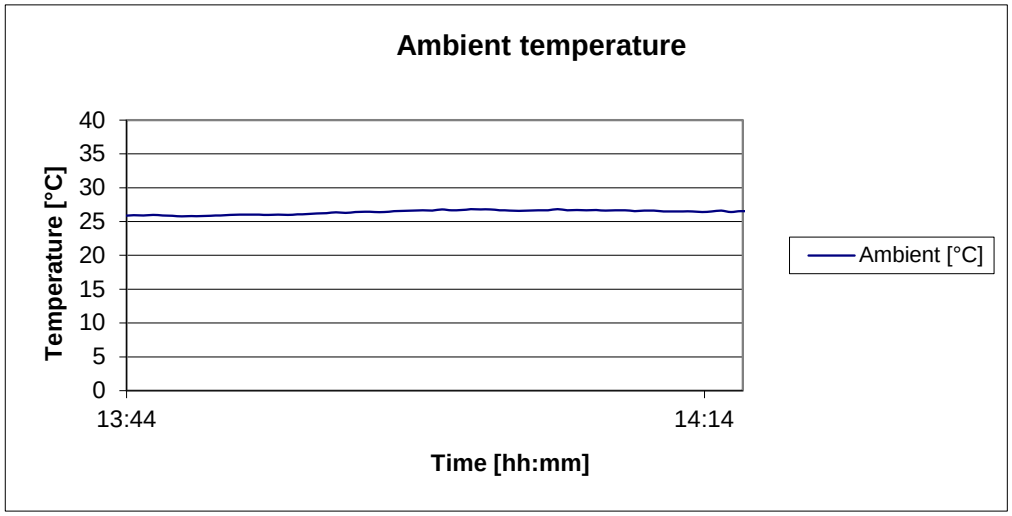

Mean surface temperatures
Temperature [°C]
300
250
200
150
100
50
0
13:44
14:14
Time [hh:mm]
Avr. Sur. [°C]


Individual surface temperatures
Temperature [°C]
600
500
400
300
200
100
0
13:44
14:14
Time [hh:mm]
Sur. Top [°C]
Sur. Back [°C]
Sur. Side-1 [°C]
Sur. Side-2 [°C]
Sur. Bottom [°C]


Temperature in tunnel
Temperature [°C]
60
50
40
30
20
10
0
13:44
14:14
Time [hh:mm]
Tunnel NS [°C]


Temperature in filter
Temperature [°C]
40
35
30
25
20
15
10
5
0
13:44
14:14
Time [hh:mm]
Filter [°C]


Flue gas temperature
Temperature [°C]
500
400
300
200
100
0
13:44
14:14
Time [hh:mm]
NS Flue temp. [°C]


Ambient temperature
Temperature [°C]
40
35
30
25
20
15
10
5
0
13:44
14:14
Time [hh:mm]
Ambient [°C]

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Test Reg. nr. 90

Analysis Report No.: 915695

Assignor: Danish Technological Institute
Energy and Climate
Attn.: Max Bjerrum
Kongsvang Allé 29
DK-8000 Aarhus C

Assignment: **Weighing of filters concerning: ELAB 2490**

Sampling by: The client
Sample(s) received: 11 February 2020
Test performed: 11 - 12 February 2019

Results from weighing of filters

Filter label	mg substance		Filter label	mg substance
911219-1	-		911219-21	1.8
911219-2	-		911219-22	< 0.3
911219-3	-		911219-23	1.6
911219-4	-		911219-24	< 0.3
911219-5	-		911219-25	3.8
911219-6	-		911219-26	< 0.3
911219-7	-		911219-27	3.0
911219-8	-		911219-28	< 0.3
911219-9	1.8		911219-29	1.5
911219-10	< 0.3		911219-30	< 0.3
911219-11	2.9		911219-31	-
911219-12	< 0.3		911219-32	-
911219-13	-		911219-33	-
911219-14	-		911219-34	-
911219-15	1.7		911219-35	-
911219-16	< 0.3		911219-36	-
911219-17	1.4		911219-37	-
911219-18	< 0.3		911219-38	-
911219-19	1.6		911219-39	-
911219-20	< 0.3		911219-40	-

- not analyzed in this Analysis Report

Analysis method	UA 206-11	(weighing)
Detection limit	0.3	mg substance calculated from blanks
Expanded uncertainty (k=2)	0.11%	

Terms:

Accredited analyses performed by the Laboratory for Chemistry and Microbiology are accredited in accordance with the Danish Accreditation Scheme (DANAK), Reg. No. 90. Accredited testing was carried out in compliance with international requirements (EN/ISO/IEC 17025:2005) and in compliance with Danish Technological Institute's General Terms and Conditions regarding Commissioned Work accepted by Danish Technological Institute. The test results apply to the tested products only. This report may be quoted in extract only if the Laboratory for Chemistry and Microbiology has granted its written consent.

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