Recoheat Airflow Heat Recovery Unit

EN 1856-2:2009 Testing

Carried out for

Recoheat Ltd

Report 102428/1

Compiled by Dave Butler

29 April 2021

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Recoheat Airflow Heat Recovery Unit

EN 1856-2:2009 Testing

Carried out for: Recoheat Ltd
2 Exning Road
Newmarket
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Contract: Report 102428/1

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QUALITY ASSURANCE

Issue	Date	Compiled by:	Approved by:	Signature
Final	*29-Apr-2021*	*David Butler*	*Mark Roper*	
		Test Engineer	*Principal Test Engineer*	

CONTENTS

TABLES

APPENDICES

1 INTRODUCTION

This report covers the testing of a custom chimney incorporating a Recoheat airflow recovery product, to assess its performance as a connecting flue pipe. No assessment of the heat recovery performance was made during this testing.

The lower section incorporates the airflow heat recovery product plus connecting flue pipe components. The bottom sections were a 0.25 m length of connecting flue pipe, the Recoheat Airflow Heat Recovery unit and 0.5 m length of connecting flue pipe. The connecting flue pipe components were painted with PlastiKote industrial high heat. The lower wall in Zone A was situated 450 mm from the connecting flue pipe components i.e., 3 times the diameter.

This was then connected to the twin wall flue using a transformation component 0.45 m below the ceiling in Zone A. The twin wall components were installed to form a chimney that extends to the extract hood in Zone C.

The Recoheat Airflow Heat Recovery unit was tested to a T450 and G rated designation using a custom-built structure to ensure the unit was safe to operate at the temperature and sootfire designation. This was tested using the BS EN 1856-1:2009 test configuration.

As the unit is a connecting flue pipe and fits directly to the stove outlet the designation will be stated against BS EN 1856-2.

The testing was carried out between the 22/03/21 and 06/04/21.

2 DESCRIPTION OF SAMPLES

The test samples were received in good condition.

Table 1 Test items

Date of Receipt	Test Engineer Initials	Full Description of Test Items	Reference Number
29/01/21	DB	1 off Recoheat airflow heat recovery component	102428A1DB
29/01/21	DB	1 of V-60 air pump	102428A2DB
18/02/21	DB	4 off 150 mm (6 inch) x 1.0 m twin wall Shieldmaster	102428A3DB to 102428A6DB
18/02/21	DB	1 off 150 mm (6 inch) x 0.5 m twin wall Shieldmaster	102428A7DB
18/02/21	DB	3 off 150 mm (6 inch) wall bracket support	102428A8DB to 102428A10DB
18/02/21	DB	1 off 150 mm (6 inch) adapter 150 mm connecting flue pipe to twin wall	102428A11DB
03/03/21	DB	1 off 125 mm x 0.25 m connecting flue pipe	102428A12DB
03/03/21	DB	1 off 125 mm x 0.5 m connecting flue pipe	102428A13DB
03/03/21	DB	1 off KOS fire cement 500g - Black	102428A14DB
08/03/21	DB	1 off 150 mm (6 inch) x 1.0 m twin wall Shieldmaster	102428A15DB & 102428A16DB
15/03/21	DB	1 off 150 mm x 0.25 m connecting flue pipe	102428A17DB
15/03/21	DB	1 off 150 mm x 0.5 m connecting flue pipe	102428A18DB
21/03/21	DB	1 off 150 mm (6 inch) x 0.5 m twin wall Shieldmaster	102428A19DB
21/03/21	DB	1 off 150 mm (6 inch) x 0.2 m twin wall Shieldmaster	102428A20DB

3 INSTRUMENTATION

Table 2 Instrument list

Instrument description	BSRIA Number	Calibration expiry date
Barometric pressure unit (BIS, calibration lab.)	ZZ/BAR/05	21/05/21
1000 mm steel rule	286	01/08/21
5 m retractable steel rule	1855	14/08/21
Digital stopwatch	2957	02/02/22
TSI airflow hot wire anemometer	1291	06/06/21
Humidity unit 175/H2 Testo logger	1142	03/02/22
Testo 922 logger	7006	19/08/21
Flue gas probe	1770	18/08/21
Testo 922 logger	1765	19/08/21
Kimo S tube pressure/temperature device	1647	03/02/22
Testo 922 logger	1765	19/08/21
Surface probe	1775	19/08/21
FCO510 micromanometer	5	25/02/22
Testo gas analyser	1766	06/11/21
LFE FC096B	410	Not used
Rotameter flow meter	74	Not used
Rotameter flow meter	73	Not used
Rotameter flow meter	72	09/04/21

Note:- All tests were carried out within the calibration expiry dates.

4 TEST RESULTS

Table 3 Findings of examination to relevant clauses from BS EN 1856-2:2009

BS EN 1856-1:2009 clauses	BS EN 1856-2:2009 clauses	BS EN 1443:2019 clauses	Description	Complies? Yes/No	
-	-	-	Manufacturer's declaration of type test	Yes	4.1
-	-	4.1 - 4.7	Classification	Yes	4.2
5	5	-	Dimensions & tolerances	NT	-
6.2.1.1	6.1.1	4.4.1	Compressive strength of fittings	NT	-
6.2.1.2	6.1.1	4.4.1	Compressive strength of chimney support	NT	-
6.2.2	6.1.1	4.4.1	Tensile strength	NT	-
6.2.3.1	6.1.1	4.4.1	Lateral strength for non-vertical installation	NT	-
6.2.3.2	6.1.1	4.4.1	Lateral strength for components subject to wind load	NT	-
6.3	6.2	-	Resistance to fire (Internal to external)	Yes	-
6.4	6.2.2	-	Sootfire resistance	Yes	4.3
6.5	6.3	-	Gas tightness	Yes	4.4
6.6	6.4	-	Safety in use	Yes	4.5
6.6.1	6.4.1.2	-	Thermal performance at normal operating conditions	Yes	4.6
6.6.2	6.4.2	4.4.2.1	Accidental human contact	N/A	-
6.6.3	6.4.3	-	Thermal resistance	N/A	-
6.6.4	6.4.4	-	Water vapour diffusion resistance	N/A	-
6.6.5	6.4.5	-	Condensate penetration resistance	NT	-
6.6.6	-	-	Rainwater penetration resistance	N/A	-
6.6.7.1	6.4.6.1	-	Flow resistance of sections	NT	-
6.6.7.2	6.4.4.1	-	Flow resistance of fittings	NT	-
6.6.7.3	-	-	Terminals	NT	-
6.7	6.5	-	Durability	Yes	4.7
6.7.3	6.5.2	4.3.5	Freeze/thaw	NT	-
7	7	8.4	Product information	NT	-
8.2	8.8	8	Marking of flue t	NT	-
8.4	8.3	8	Marking of packaging	NT	-
8.3	8.2	8.3	Marking of chimney plate	NT	-
9	9	-	Designation	Yes	4.8

Note:- NT means not tested and N/A means not applicable.

4.1 MANUFACTURER'S DECLARATION FOR TYPE TEST

Inner wall material type	Stainless steel 316

Nominal wall thickness	1.00	mm

4.2 CLASSIFICATION FOR TEST

Testing will be carried out against the classifications below.

Temperature class	T450
Pressure class	N1
Condensate class	D
Corrosion resistance class	Vm
Flue liner material specification	L40100
Sootfire resistance class	G
Distance to combustibles	-

4.3 SOOTFIRE RESISTANCE

The results of the sootfire resistance are given in Appendix A on pages 11, 13 & 15.

4.4 GAS TIGHTNESS

The results of the gas tightness are given in Appendix A on page 11.

4.5 SAFETY IN USE

Test 1

Ambient temperature	19.8	°C
Maximum surface temperature of combustible material	27.0	°C
Temperature limit	84.8	°C

Test 3

Ambient temperature	21.0	°C
Maximum surface temperature of combustible material	31.9	°C
Temperature limit	86.0	°C

4.6 THERMAL PERFORMANCE AT NORMAL OPERATING CONDITIONS

The thermal performance test results are given in Appendix A on pages 11, 13, 14 & 16.

4.7 DURABILITY

Material type	Stainless steel 316
Material thickness	1.00 mm
Material Number	1.4401

The 316 stainless steel connecting flue pipe is painted with a PLASTI-KOTE 2301 Industrial high heat black 6UC 100 ML.

4.8 PRODUCT DESIGNATION

The designations achieved were as follows:

Standard	Temperature level	Pressure level	Condensate resistance	Corrosion resistance & material specification	Sootfire resistance
EN 1856-2	T450	N1	D	VmL40100	G

APPENDIX A: TEST RESULTS

Test arrangements

The product was tested as a custom chimney installation incorporating connecting flue pipe components in Zone A provided by the client which includes the airflow heat recovery unit. These were connected to the firing tube using the BSRIA connecting flue pipe components.

The connecting flue pipe components were connected to a system chimney of the same diameter 450 mm below the ceiling in Zone A provided by the client.

The chimney then continues in a twin wall system chimney to the extract hood in Zone C. The twin wall system chimney was installed in corner/non-enclosed configuration in Zone B and Zone C.

Components

The components used for the tests were 102428A15DB, 102428A1DB, 102428A16DB, 102428A11DB, 102428A8DB, 102428A3DB, 102428A4DB, 102428A9DB, 102428A7DB, 102428A5DB, 102428A10DB, 102428A6DB, 102428A18DB, 102428A17DB.

Gas tightness

Pressure class	N1	
Pressure required	40	Pa
Leakage rate	0.286	l/s/m^2

During the initial thermal test, the pump was connected to the coil and was operational for the first 2 hours from start of test. Pump operation was then stopped for 10 minutes to assess the affect on the temperature of the hose and structure under these conditions.

The temperature of the rubber connecting tube was recorded at 1 minute intervals and the period lasted for 10 minutes.

The pump was then turned on and the temperature of the rubber connecting tube was recorded for a further 2 minutes, the results are given below.

Pump operation

Temperatures during operation with the pump on.

Hose	33.4	°C
Clip	47.6	**°C**

The pump stopped at 11:53, temperatures for hose only were taken for a 10 minute period.

Time	Temperature	
11:54	47.4	°C
11:55	56.1	°C
11:56	60.7	°C
11:57	66.9	°C
11:58	73.7	°C
11:59	74.2	°C
12:00	86.8	°C
12:01	91.2	°C
12:02	88.2	°C
12:03	90.7	**°C**

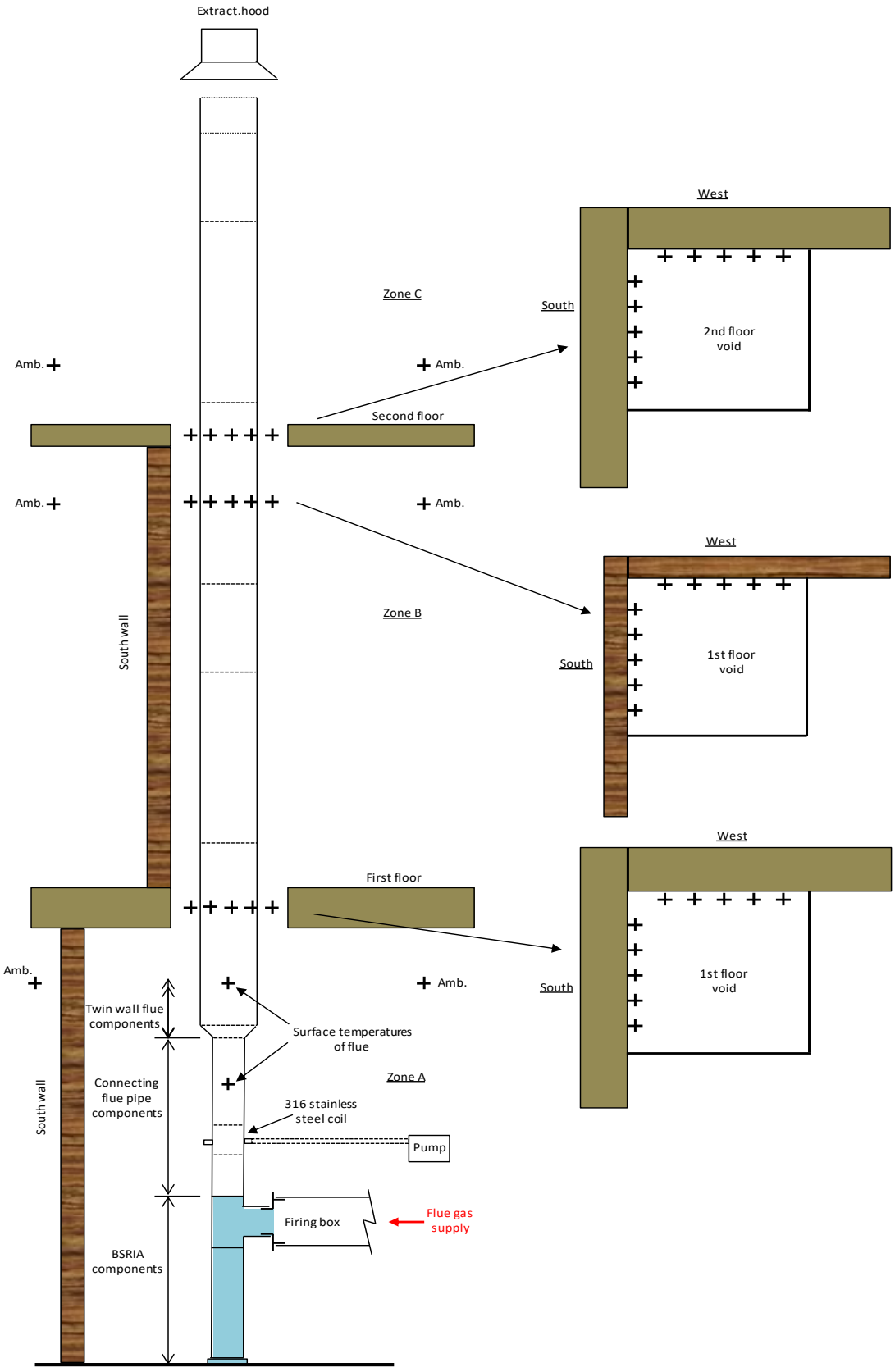
Pump started at 12:03, temperatures for hose only.

Time	Temperature	
12:04	33.4	°C
12:05	47.6	°C

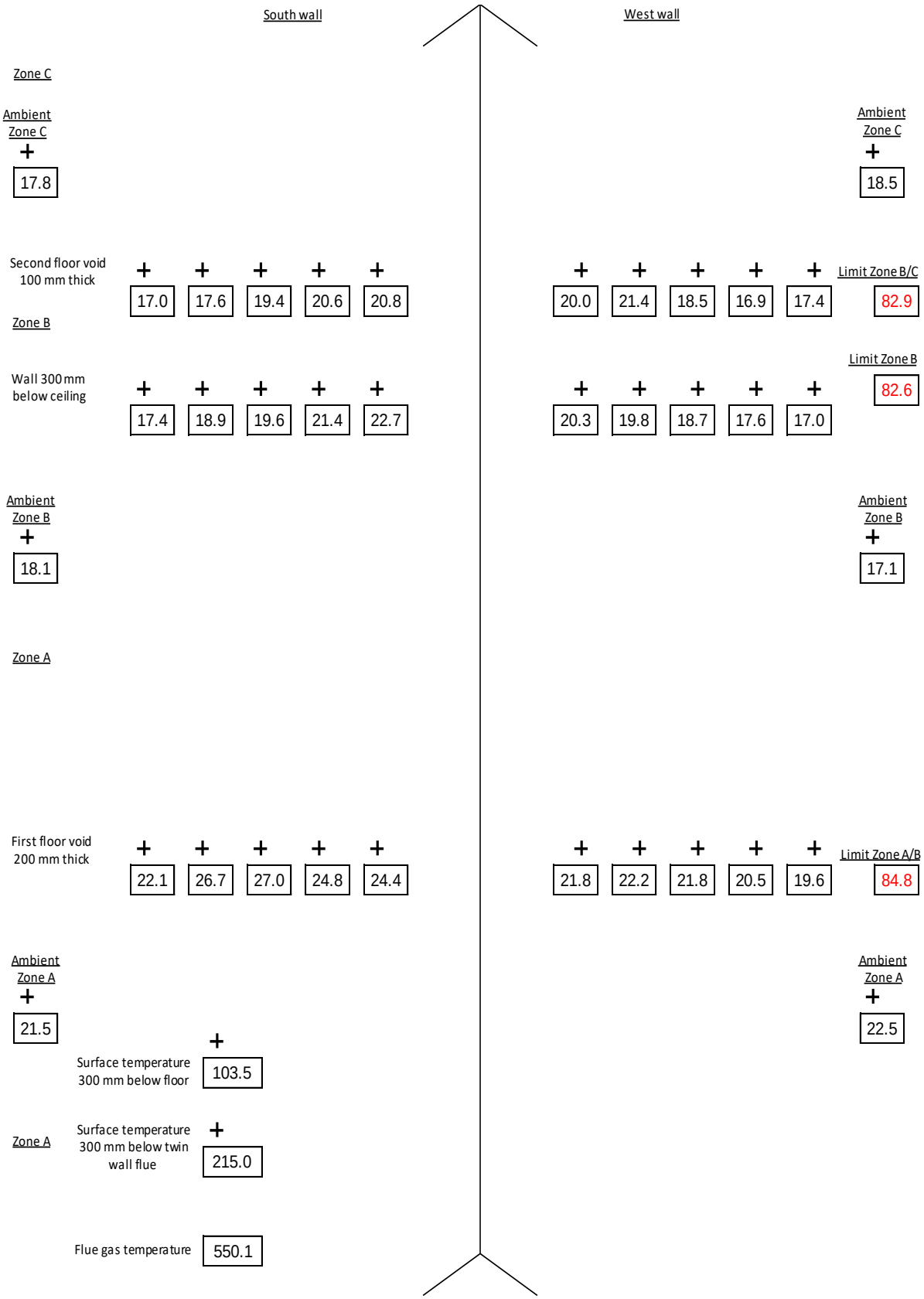
Burner stopped at 12:07.

For the thermal shock test and the final thermal performance test, the pump was operational for the duration of the testing.

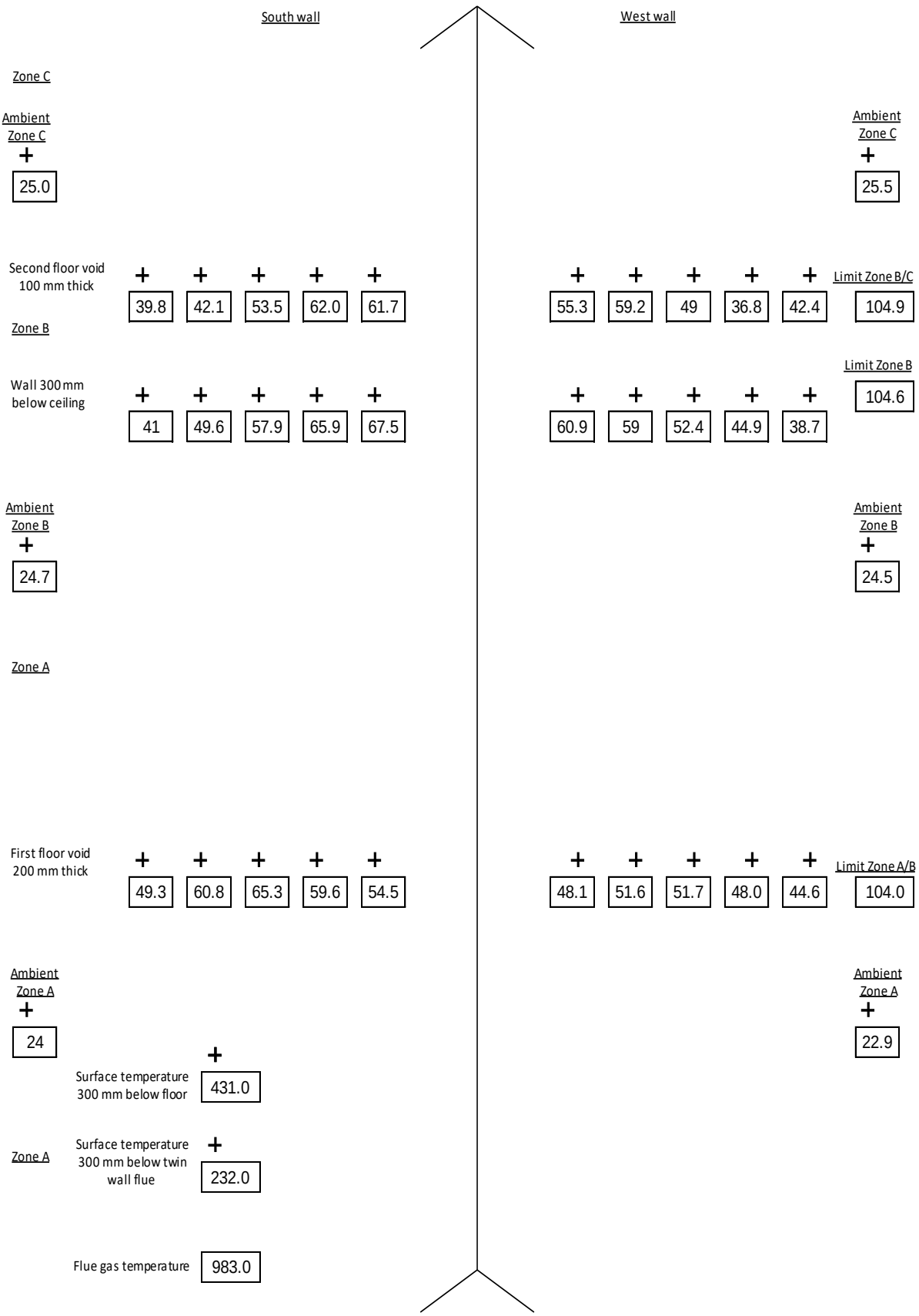
Installation drawing



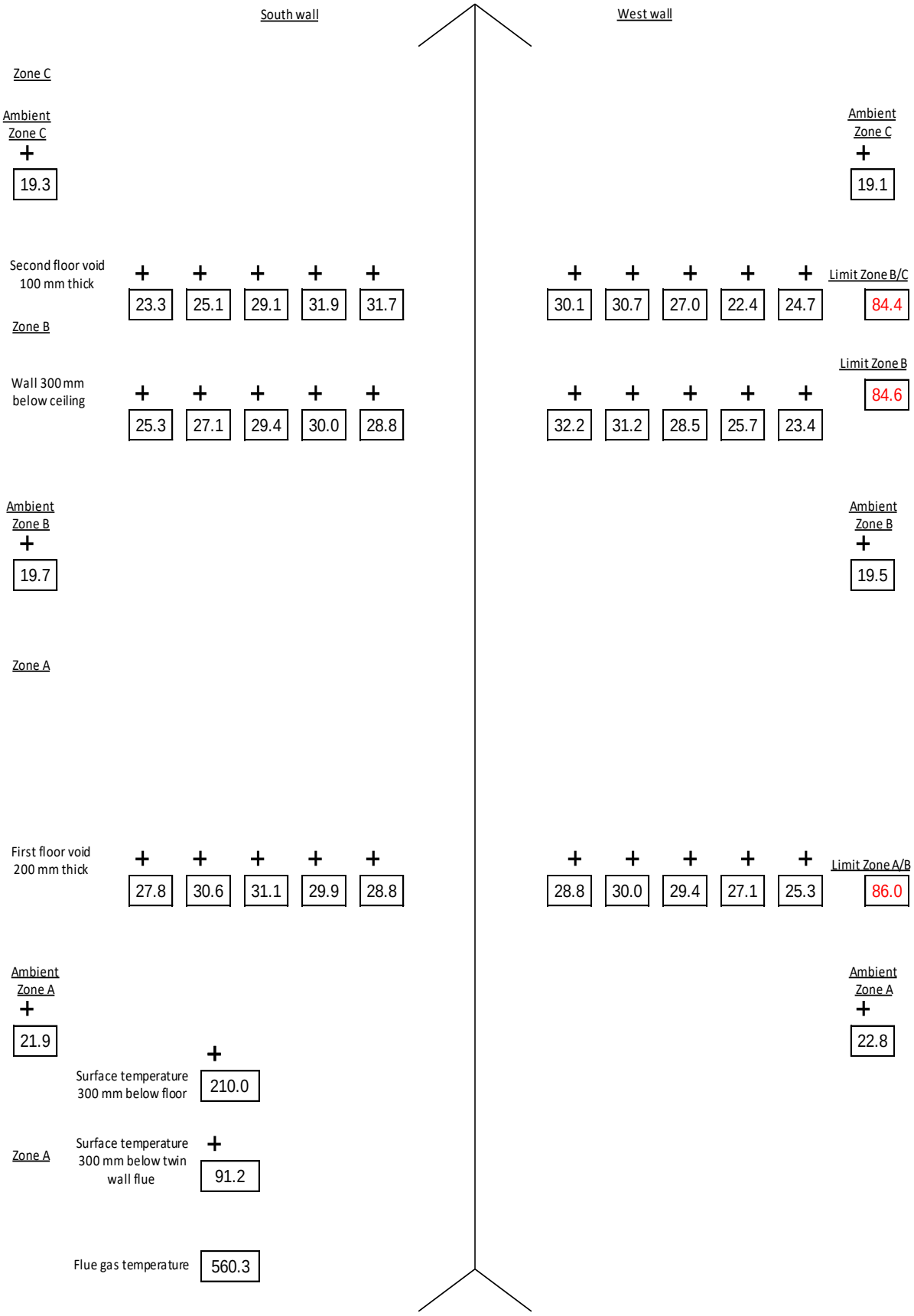
Initial thermal performance test results



Thermal shock test results



Final thermal performance test results



APPENDIX B: PHOTOGRAPHS

Figure 1 - V-60 air pump

Figure 2 - Airflow heat recovery product

Figure 3 – Connection to twin wall chimney

Figure 4 – Twin wall system chimney through Zone B

Figure 5 – Twin wall system chimney through Zone B ceiling