CONFIDENTIAL

Report: Chilt/IF10004

A fire resistance test performed on an air pressure vent within a blockwork wall

Test conducted to the temperature and pressure conditions of BSEN 1363-1: 1999

Test date: 25th March 2010

committed to excellence

www.chilternfire.co.uk

www.chilterndynamics.co.uk

www.qmark.info

Prepared for: AFP Air Technologies LLP
48 London Road
Sevenoaks
Kent
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UKAS TESTING
1762

Contents

1 Introduction

An air pressure vent was installed into an aerated autoclaved concrete blockwork construction for evaluation.

2 Specimen verification

The specimen was delivered to Chiltern International Fire Ltd (CIFL) during March 2010. CIFL constructed a 150mm thick blockwork wall within a 1m x 1m refractory lined steel restraint frame. The client then subsequently installed the air transfer grill into the wall, with assistance from CIFL as required.

3 Description of supporting construction

The supporting construction comprised of an aerated autoclaved concrete blockwork wall built in accordance with EN1363-1.

4 Description of specimen

Details of the specimen are shown in Appendix 1. All measurements are in mm and the descriptions are written viewing the specimen from the unexposed face unless stated otherwise.

Air pressure vent (referenced AFP Air Technologies SHX-DuFlow DUX500) (see Appendix 1, and clients drawing SHX500 Main Assembly)

The aperture measured 560mm wide x 580mm high x 150mm deep.
The air pressure vent comprised a wall liner fitted into the aperture from the unexposed face, and the vent assembly fitted inside the wall liner from the exposed face.

The wall liner comprised 1mm thick profiled galvanised steel, and measured 630mm high x 630mm wide x 121.5mm deep including a 37mm wide x 20 deep flange, fixed to unexposed face of the wall with 70mm long masonry fixings at each corner. The wall liner flange was sealed to the wall with intumescent mastic.

The air pressure vent was fitted inside the wall liner, and comprised 1.5mm thick profiled galvanised steel and measured 630mm high x 630mm wide x 134.5mm deep, with a 40mm wide x 20 deep flange fixed to the exposed face of the wall with 70mm long masonry fixings at each corner. The vent flange was sealed to the wall with intumescent mastic.

The air pressure vent comprised 5No 120mm high x 17mm thick galvanised steel, pivoting, interlocking blades running horizontally across the vent. (see photograph). Each blade was constructed from two 1mm thick profiled galvanised steel sections fixed together with stainless steel 'pop' rivets.

The air pressure vent side framing comprised a 133mm wide x 26mm deep profiled galvanised steel box section containing the blade pivots and stops for the four upper blades. The top and bottom framing comprised 133mm wide x 21mm deep profiled galvanised steel box section. A 1mm thick profiled galvanised steel 'Z' section strip was riveted to the top and bottom framing to provide stops for the top and bottom vent blades.

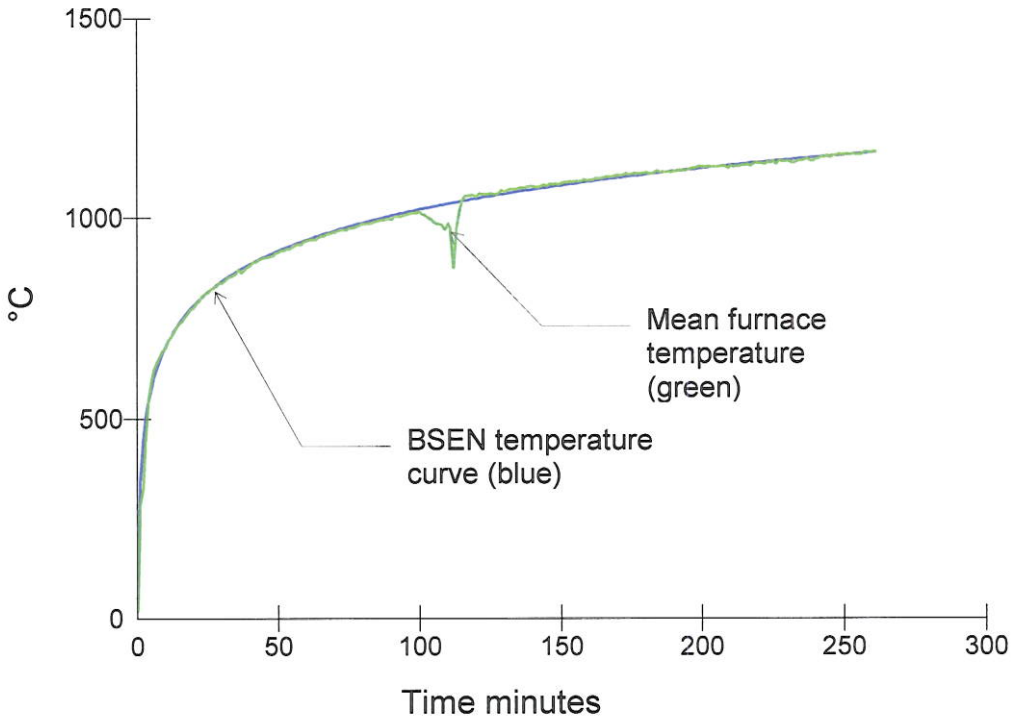
The vent was installed with the blades opening in towards the furnace.

Unexposed face showing vent blades in open position

5 Test conditions

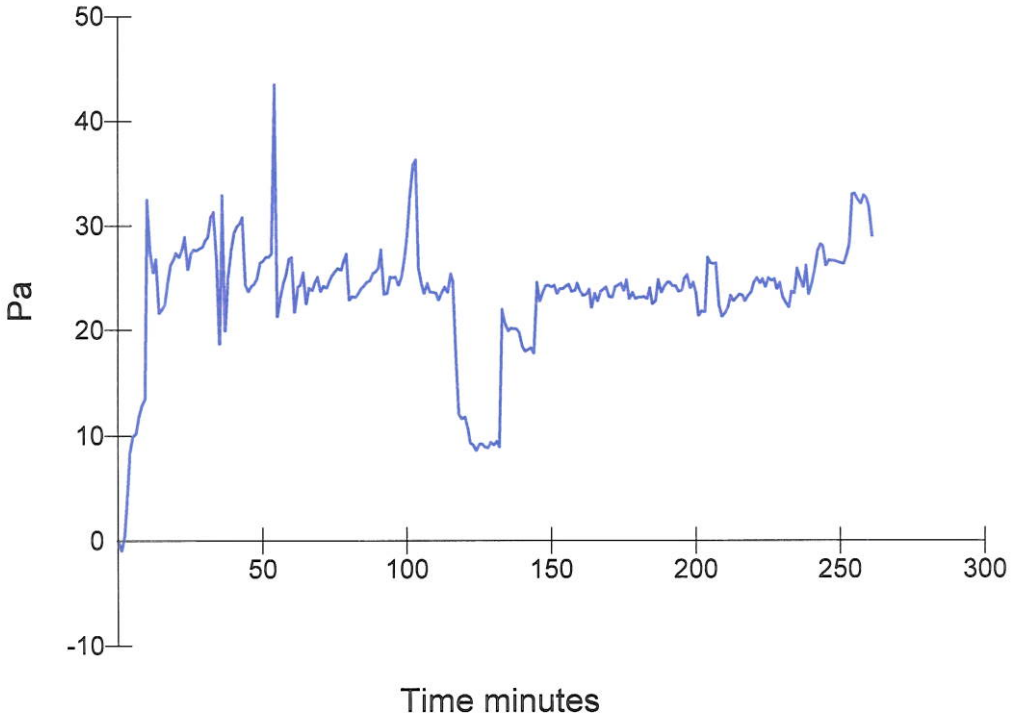
5.1 Furnace temperature

The furnace was controlled to follow the temperature/time relationship specified in BSEN 1363: Part 1: 1999 Section 5.1.1 as closely as possible, using the average of four plate thermometers suitably distributed within the furnace. The temperatures recorded have been tabulated in Appendix 2 and are shown graphically below:



5.2 Pressure readings

After the first 5 minutes of the test, the furnace pressure was maintained at 24 ± 5 Pa and after 10 minutes was maintained at 24 ± 3 Pa with respect to atmosphere, at a point 1.2m from the notional floor level, equating to 20 Pa at the head of the pressure vent. The pressure readings have been tabulated in Appendix 2 and are shown graphically below:



5.3 Ambient temperature

The ambient temperature of the test area at commencement of test was 11° C. The ambient temperature for the duration of the test has been tabulated in Appendix 2.

5.4 Thermocouple positions

Due to the nature of the tested specimen, no thermocouples were fitted

6 Observations

All comments relate to the unexposed face unless otherwise specified, (reference to Appendix 1 - figure 1).

Time (minutes)	Comments
05.00	There is smoke issuing from all areas, slight distortion of blades.
30.00	The blades are glowing orange.
46.00	Radiometer introduced in place of ambient channel 5.
60.00	No change.
120.00	No change.
180.00	No change.
210.00	No change.
240.00	No change.
261.30	Test terminated. No recorded integrity failure.

7 Expression of results

Overall performance

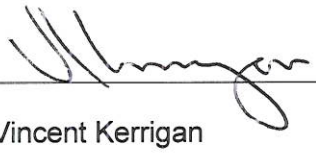
Integrity Cotton pad Continuous flaming Gap gauges	 NA * minutes * minutes
Insulation Discrete area - steel	 NA
Radiation	 * minutes to 15kW/m²

*** Failure criteria was not achieved upon termination of the test at 261 minutes**

8 Limitations

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. CIFL will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Signature:		
Name:	Ross Newman	Vincent Kerrigan
Title:	Principal Test Engineer	Technical Manager
Date of issue:		21-05-2010

Photographs

Exposed face prior to testing

Unexposed face showing air pressure vent installed into the wall aperture

Unexposed face at start of test

After 33 minutes

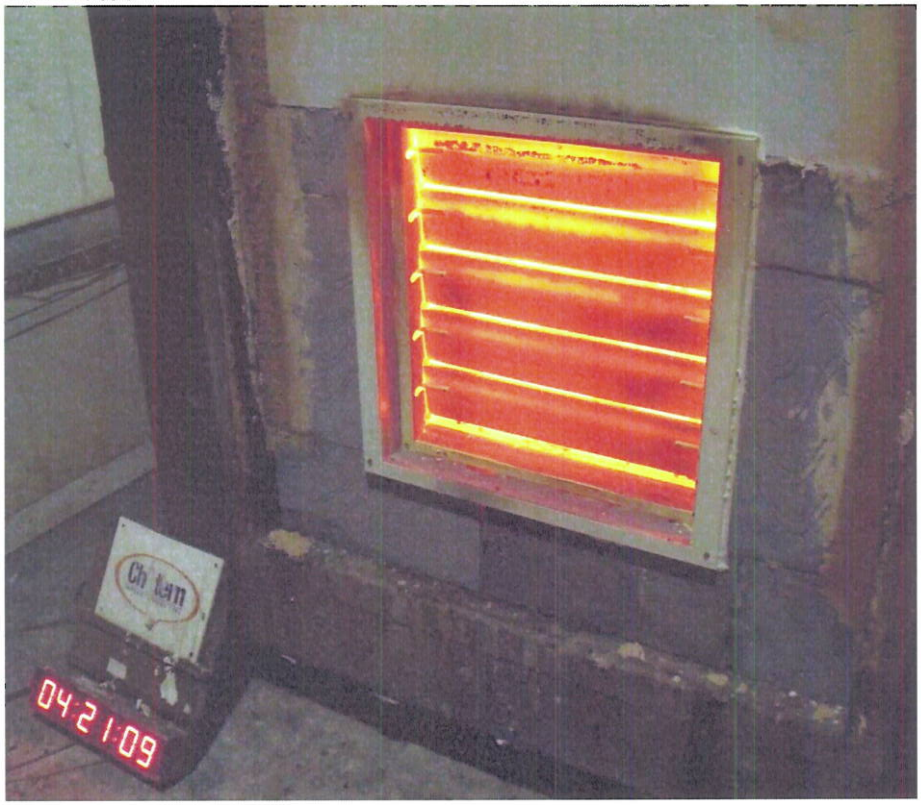
After 60 minutes

After 124 minutes

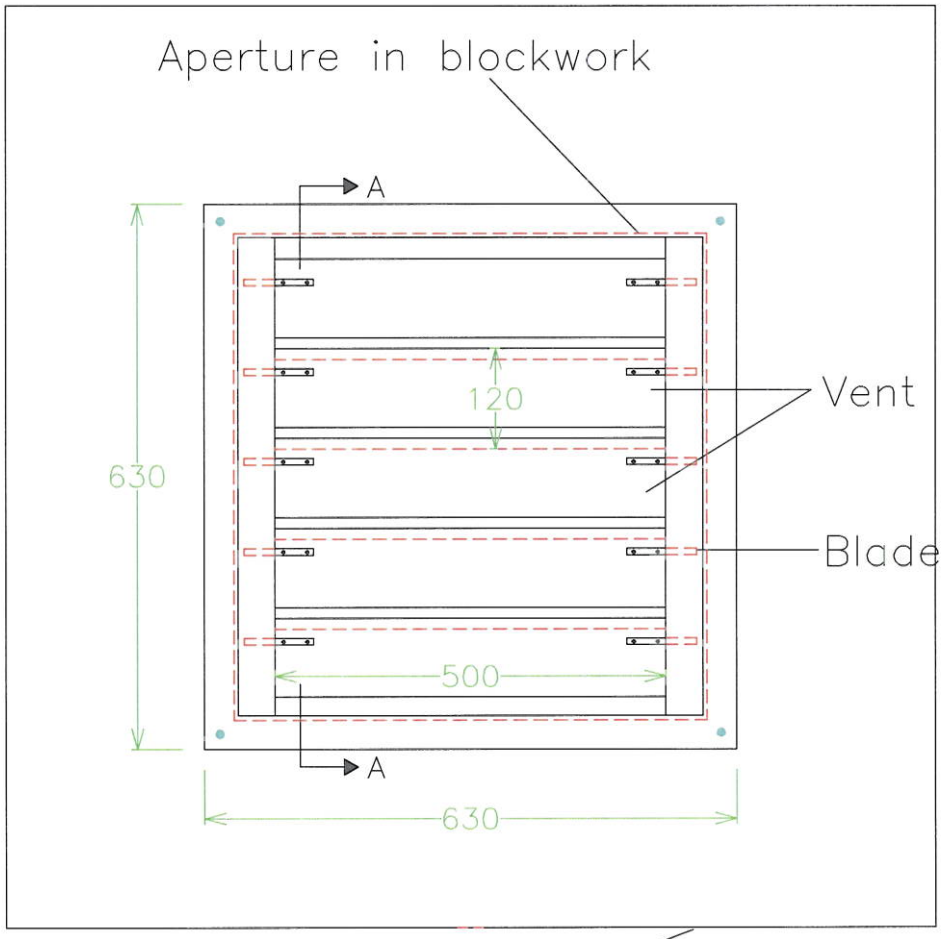
After 180 minutes

After 240 minutes

After 241 minutes



Appendix 1 – figures 1 – 3 and clients drawing 'SHX500 main assembly'



Viewed from unexposed face

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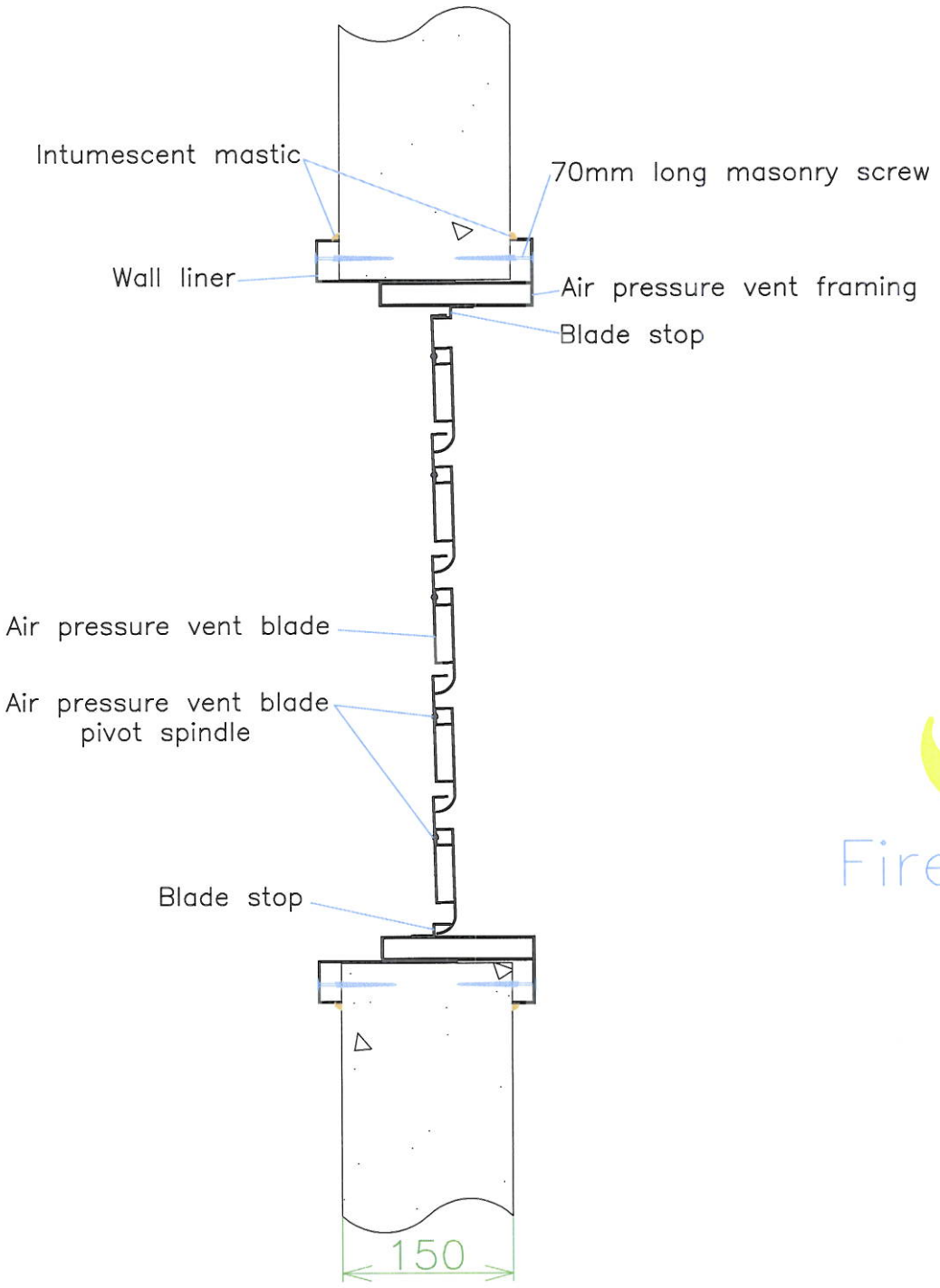
Title		
Unexposed face elevation of the wall construction (All dimensions in mm)		
Date Drawn 19/04/10	Drawn By ARD	Scale NTS
Project No. Chilt/IF10004		Appendix 1

Section A–A



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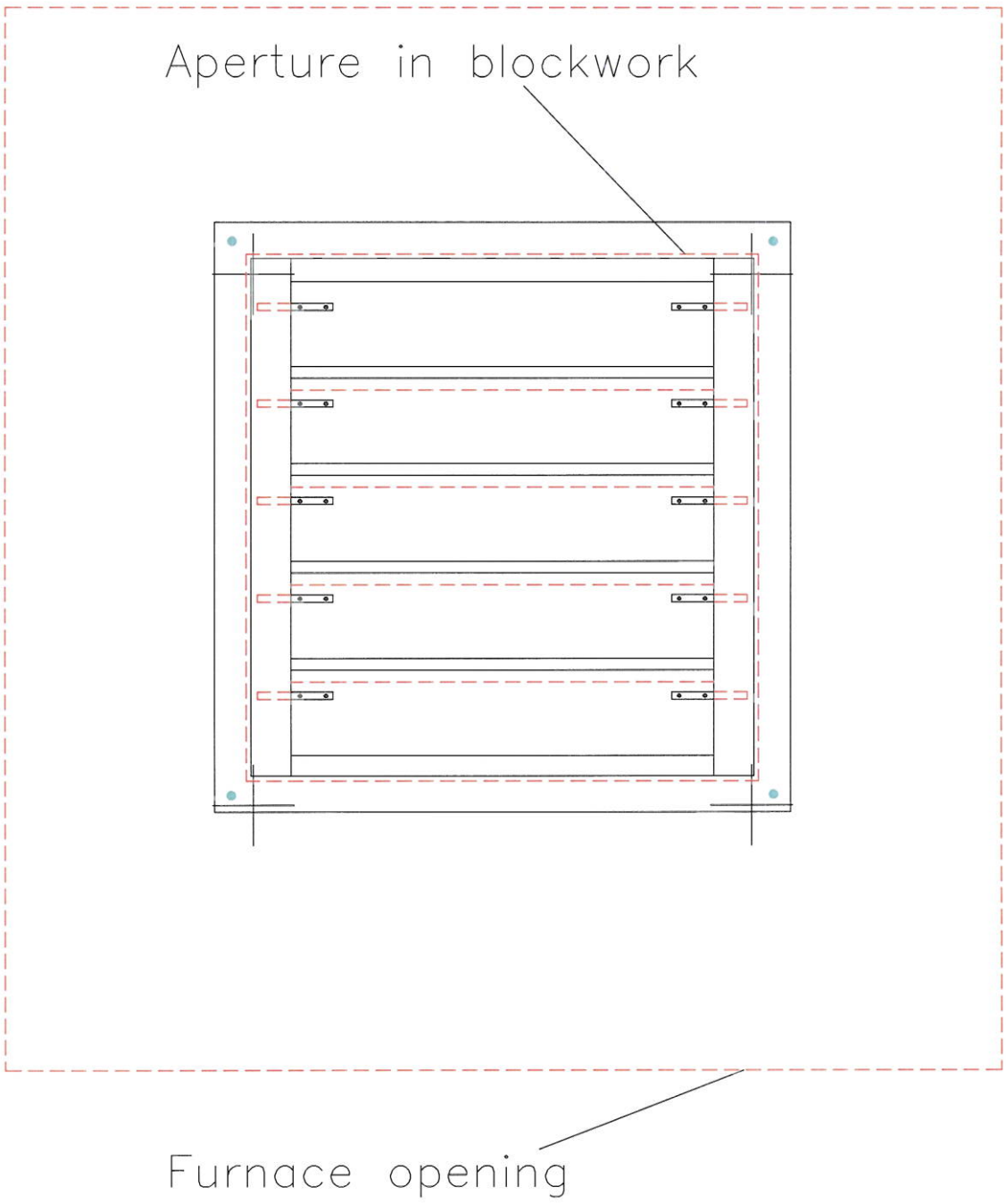
Title		
Cross sections (All dimensions in mm)		
Date Drawn 20/04/10	Drawn By ARD	Scale NTS
Project No. Chilt/IF10004		Appendix 1



Viewed from unexposed face

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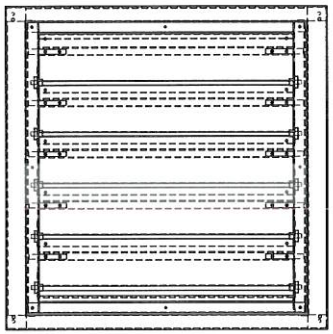
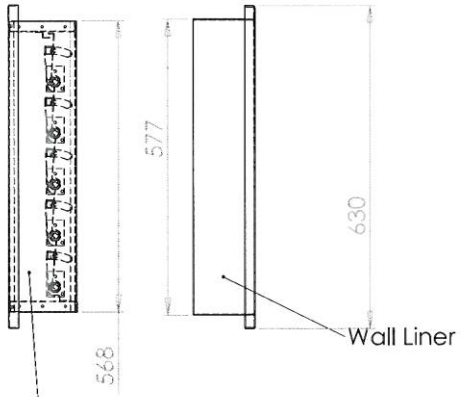
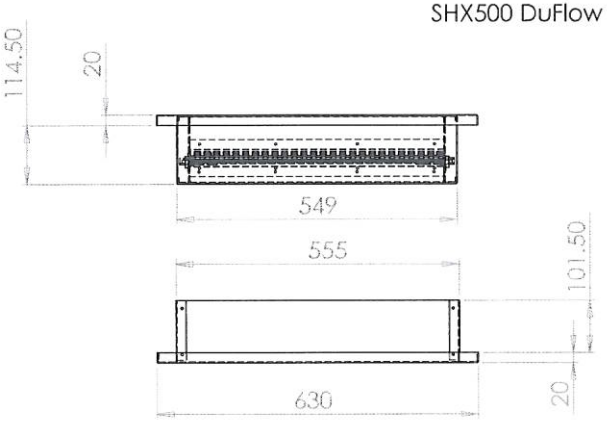
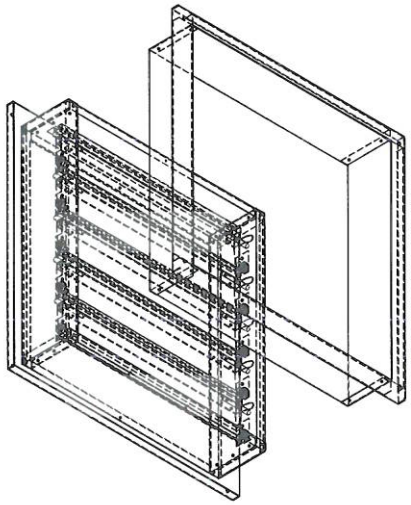
Title: Unexposed face elevations showing thermocouple positions (All dimensions in mm)		
Date Drawn: 20/04/10	Drawn By: ARD	Scale: NTS
Project No.: Chilt/IF10004		Appendix 1





SHX500 DuFlow Pressure Vent.





UNLESS OTHERWISE SPECIFIED: FINISH:
DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH:
TOLERANCES:
LINEAR:
ANGULAR:

DEBUR AND BREAK SHARP EDGES

DO NOT SCALE DRAWING REVISION

All Holes 4.5mm Dia unless Dimmed.
All Dimensions +/- 0.2mm

Quantity Per Unit.

	NAME	SIGNATURE	DATE
DRAWN	C J Coxon		
CHK'D			
APPV'D			
MFG			
Q.A			

MATERIAL:

DWG NO. SHX500 DuFlow

A3

WEIGHT: SCALE:1:10 SHEET 1 OF 1

Appendix 2 - raw test data (5 pages)

(see drawing for channel locations)

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
0	0	14	15	14	14	11.7
1	-0.9	548	88	239	86	11.4
2	0.4	531	132	304	141	11.5
3	4.3	663	210	443	235	11.7
4	8.4	726	313	565	352	11.6
5	9.9	754	378	613	429	12
6	10.2	761	420	634	473	12.1
7	11.8	775	448	648	500	11.9
8	12.8	784	467	660	521	11.8
9	13.5	795	487	672	538	11.7
10	32.5	794	504	680	548	11.5
11	27.5	818	524	698	562	11.6
12	25.5	826	540	710	580	11.5
13	26.8	831	552	717	591	11.8
14	21.6	844	563	732	609	11.8
15	21.9	850	574	740	621	11.8
16	22.4	850	585	747	630	11.5
17	24.5	864	595	754	641	11.3
18	26.2	869	607	764	651	11.7
19	26.8	879	617	773	661	11.6
20	27.4	883	625	777	667	11.1
21	27	893	634	788	680	11.1
22	27.7	891	645	795	690	10.8

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
23	28.9	914	654	802	698	11.6
24	25.8	911	661	808	708	11.3
25	27.3	907	670	814	718	11.6
26	27.7	918	679	819	725	11.4
27	27.6	921	684	824	733	11.2
28	27.8	920	693	829	740	11.3
29	27.9	931	696	833	745	11.1
30	28.6	924	703	836	748	11.3
31	28.9	937	708	839	754	11.1
32	30.8	942	714	846	759	11
33	31.3	941	722	852	766	11
34	26.8	940	726	854	772	11
35	18.7	943	732	859	780	10.9
36	32.9	958	738	868	787	10.8
37	19.9	941	739	861	784	11
38	25.1	951	745	869	789	10.6
39	27.7	959	750	873	796	10.4
40	29.3	957	758	880	805	10.3
41	29.9	974	762	883	808	-2.6
42	30.2	964	768	887	814	-2.7
43	30.8	976	770	890	816	-2.6
44	24.3	979	774	893	822	-1.4
45	23.7	973	779	897	828	0.8
46	24.2	974	780	900	829	1.2

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
47	24.4	975	783	902	832	1.1
48	24.9	974	787	903	836	1
49	26.4	987	790	908	841	1.1
50	26.6	988	794	911	844	1.1
51	27	998	800	914	847	1.1
52	27	988	802	917	850	1.2
53	27.3	994	805	918	852	1.2
54	43.5	994	807	920	854	1.2
55	21.3	996	809	925	859	1.3
56	23.1	1005	811	926	862	0.8
57	24.6	1004	816	931	867	1.3
58	25.2	1004	817	931	866	1.3
59	26.8	1015	822	934	872	1.3
60	27	1014	823	939	873	1.4
61	21.7	1017	827	940	879	1.3
62	24.1	1015	829	941	880	1.4
63	24.3	1010	831	944	882	1.3
64	25.5	1018	834	947	887	1.6
65	22.5	1021	836	949	889	1.7
66	24	1017	840	953	893	1.4
67	23.8	1031	842	954	894	1.6
68	24.5	1029	844	956	896	1.2
69	25.1	1033	847	957	899	1.6
70	23.7	1031	849	960	902	1.3
71	24.2	1036	851	963	905	1.6
72	24	1038	854	966	908	2
73	24.7	1038	858	965	909	1.7
74	25.2	1028	859	968	911	1.8
75	25.6	1040	860	970	912	1.7

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
76	25.9	1037	863	972	914	2
77	25.7	1040	865	973	917	1.9
78	26.7	1047	867	975	919	1.7
79	27.3	1046	870	979	922	1.8
80	22.9	1051	872	980	925	1.8
81	23.2	1045	873	982	927	2
82	23.1	1046	874	983	926	1.8
83	23.5	1047	878	985	931	1.8
84	23.9	1055	880	987	932	2.2
85	24.2	1053	882	989	936	2
86	24.6	1056	883	991	937	2.1
87	24.7	1051	885	992	939	2.1
88	25.4	1054	886	993	940	2.1
89	25.6	1056	889	996	942	2.4
90	25.9	1048	889	997	943	2.3
91	27.7	1065	891	1000	946	1.9
92	23.4	1067	892	1000	946	2.4
93	23.5	1057	895	1002	950	2.5
94	25.1	1063	896	1003	950	2.6
95	25	1061	896	1006	952	2.5
96	25.1	1071	900	1006	955	2.4
97	24.3	1069	901	1009	955	2.7
98	25.1	1072	902	1009	958	2.2
99	26.8	1070	902	1010	957	2.5
100	28.9	1079	902	1011	958	2.2
101	32.7	1065	901	1007	957	2.1
102	35.8	1060	898	1003	955	2.5
103	36.3	1052	896	997	954	2.3
104	25.9	1051	891	993	949	2.7

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
105	24.3	1043	886	989	943	2.1
106	23.5	1039	880	980	939	2.6
107	24.5	1042	876	977	934	2.2
108	23.6	1036	876	978	933	1.9
109	23.6	1027	863	965	922	1.9
110	23.5	1050	867	976	929	1.4
111	22.9	1026	869	974	924	0.9
112	23.6	884	831	883	858	-0.8
113	24.1	1043	859	977	913	-0.4
114	23.6	1064	899	1024	961	0.1
115	25.4	1091	928	1050	989	1.9
116	24.7	1104	940	1060	1002	2.6
117	17.4	1094	952	1063	1012	2.6
118	12	1096	954	1062	1013	2.8
119	11.6	1098	956	1061	1013	2.5
120	11.8	1085	956	1062	1013	2.3
121	10.7	1104	961	1064	1017	2.4
122	9.3	1097	962	1064	1018	2.3
123	9.1	1099	963	1065	1018	2.3
124	8.6	1097	961	1064	1019	1.8
125	9.2	1102	964	1066	1019	2
126	9.2	1097	964	1065	1020	1.9
127	8.9	1092	965	1067	1021	1.9
128	8.8	1096	968	1069	1024	2.1
129	9.4	1110	971	1071	1026	2.5
130	9.1	1100	972	1073	1027	2.3
131	9.5	1104	976	1075	1028	2
132	8.9	1110	975	1075	1031	2.1
133	22	1107	981	1077	1032	2.9

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
134	20.7	1104	982	1079	1034	3.2
135	19.9	1112	986	1079	1034	3
136	20.2	1115	984	1077	1035	3.3
137	20.1	1110	986	1079	1039	3.5
138	20.1	1116	987	1080	1038	3.6
139	19.8	1116	991	1082	1040	3.1
140	18.4	1118	989	1080	1039	3.4
141	18	1115	990	1081	1040	3.8
142	18.2	1111	990	1081	1041	3.4
143	18.3	1119	991	1083	1043	3.7
144	17.8	1122	994	1083	1044	3.3
145	24.6	1115	995	1085	1044	3.6
146	22.8	1124	997	1086	1045	3.6
147	23.6	1118	999	1086	1048	3.6
148	24.2	1127	1000	1086	1048	3.7
149	24.3	1113	999	1087	1049	3.7
150	24.1	1126	1001	1089	1050	3.9
151	24.3	1127	1003	1090	1051	3.6
152	23.5	1124	1004	1091	1052	3.9
153	23.9	1129	1005	1093	1053	3.6
154	23.9	1123	1006	1093	1054	3.8
155	24.2	1125	1008	1094	1056	3.6
156	24.4	1126	1007	1095	1056	3.9
157	23.7	1122	1009	1097	1058	3.8
158	23.8	1134	1011	1098	1058	4.5
159	24.5	1123	1012	1099	1060	3.8
160	23.7	1127	1014	1100	1060	3.7
161	23.3	1125	1014	1101	1060	4.2
162	23.4	1138	1015	1101	1063	4.3

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
163	23.9	1132	1015	1102	1063	4.1
164	22.2	1134	1016	1103	1063	4.2
165	23.5	1135	1018	1105	1064	3.9
166	22.8	1141	1018	1105	1066	4.1
167	23.7	1136	1020	1107	1066	4.2
168	23.9	1137	1020	1109	1068	4
169	24.1	1144	1023	1110	1069	3.5
170	23.2	1146	1021	1111	1069	4.3
171	23.1	1141	1023	1112	1069	4.3
172	24.1	1142	1025	1114	1071	3.9
173	24.3	1147	1026	1115	1074	3.8
174	24.5	1139	1027	1116	1074	4
175	23.8	1140	1027	1116	1074	4.1
176	24.8	1146	1029	1119	1076	4.5
177	23	1141	1030	1118	1075	4.4
178	23.6	1142	1028	1117	1076	4.5
179	23	1144	1031	1119	1075	4.2
180	23.1	1148	1032	1119	1077	3.5
181	23.1	1143	1032	1120	1077	4.4
182	23.2	1138	1031	1120	1077	4
183	23	1145	1033	1123	1078	4.4
184	24	1154	1034	1123	1081	4.5
185	22.5	1145	1033	1120	1080	4.1
186	22.8	1148	1036	1122	1080	4.6
187	24.8	1145	1035	1121	1079	4.1
188	23.6	1147	1036	1121	1080	4.5
189	24.2	1144	1037	1121	1080	4.3
190	24.6	1148	1036	1124	1081	4.3
191	24.6	1146	1036	1124	1082	4.3

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
192	24.2	1154	1037	1127	1082	4.5
193	24.2	1151	1038	1128	1083	4.4
194	23.7	1148	1038	1128	1083	4.6
195	23.8	1150	1041	1135	1084	4.4
196	24.9	1151	1041	1138	1086	4.4
197	25.3	1150	1040	1140	1085	4.8
198	24	1151	1042	1146	1086	4.5
199	24.6	1157	1042	1148	1087	4.7
200	23.6	1152	1042	1149	1087	4.7
201	21.4	1152	1042	1150	1087	4.7
202	21.8	1158	1042	1147	1085	4.9
203	21.7	1158	1042	1145	1086	4.7
204	27	1155	1044	1146	1086	4
205	26.4	1154	1042	1145	1085	4.8
206	26.3	1160	1042	1146	1086	4.6
207	26.4	1157	1043	1146	1087	4.6
208	22.3	1151	1044	1149	1090	5
209	21.3	1144	1043	1146	1087	4.9
210	21.6	1160	1042	1150	1087	5
211	22.2	1155	1043	1148	1086	4.7
212	23.3	1156	1044	1150	1089	3.9
213	22.8	1156	1044	1146	1088	4.7
214	23.1	1158	1046	1153	1090	4.4
215	23.4	1157	1045	1151	1089	4.1
216	23.3	1166	1046	1152	1091	4.2
217	22.8	1154	1046	1151	1090	3.4
218	23.3	1168	1047	1153	1092	4.5
219	23.6	1167	1047	1156	1092	3.6
220	24.6	1163	1049	1154	1095	4

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
221	25	1163	1049	1154	1094	3.9
222	24.5	1161	1052	1154	1094	4.5
223	24.9	1167	1050	1160	1096	4.5
224	24.1	1163	1051	1156	1096	4.6
225	25	1170	1053	1163	1097	5
226	24.7	1158	1052	1154	1097	4.4
227	24.9	1173	1054	1161	1099	4.8
228	23.9	1171	1053	1157	1100	4.6
229	24.6	1167	1056	1159	1100	4.7
230	23.2	1168	1056	1162	1100	4.6
231	22.6	1164	1055	1160	1100	4.4
232	22.2	1163	1055	1157	1099	4.4
233	23.7	1168	1055	1157	1100	4.7
234	23.5	1175	1055	1160	1102	3.7
235	25.9	1171	1057	1162	1103	4.8
236	24.9	1176	1059	1162	1104	5
237	24.1	1176	1061	1166	1106	4.4
238	26.2	1167	1059	1163	1105	5.2
239	23.4	1163	1060	1159	1107	4.6
240	24.4	1175	1062	1163	1107	5.2
241	25.9	1174	1062	1165	1109	4.1
242	27.6	1178	1066	1174	1111	3.9
243	28.2	1179	1065	1170	1112	5.2
244	28	1189	1067	1172	1113	4.8
245	26.2	1176	1068	1169	1113	5.4
246	26.7	1183	1068	1175	1113	4.5
247	26.6	1185	1069	1175	1114	4.7
248	26.6	1190	1070	1177	1116	4.8
249	26.5	1187	1071	1175	1115	5.6

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5
min	Pa	°C	°C	°C	°C	kw/m²
250	26.4	1182	1072	1177	1118	5.2
251	26.3	1188	1070	1177	1118	5.3
252	27.1	1183	1073	1178	1118	5.3
253	28.2	1189	1075	1175	1119	5.2
254	33	1186	1074	1175	1119	5
255	33.1	1185	1076	1176	1119	5.2
256	32.5	1183	1075	1178	1121	4.7
257	32.1	1192	1076	1181	1124	5.1
258	32.9	1195	1079	1183	1123	5.5
259	32.6	1189	1079	1181	1124	5.2
260	31.8	1196	1079	1182	1123	5.2
261	29	1192	1079	1183	1126	5.2