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**RHS Edge Beams with Wall
Openings (Fire Performance)
Part 2 Full Scale Loaded Test**

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SUMMARY

RHS EDGE BEAMS WITH WALL OPENINGS (FIRE PERFORMANCE) PART 2 FULL SCALE LOADED TEST

L.N. Tomlinson

As part of developing an understanding of the performance of SLIMDEK edge beams in fire, a fire resistance test to BS 476: Part 21 carried out on a loaded assembly achieved 65 min. This report provides details of the construction of the test assembly, instrumentation and data recorded during the test. Numerical finite element analysis carried out on the construction and based upon these data is reported separately.

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INITIAL CIRCULATION

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RHS EDGE BEAMS WITH WALL OPENINGS (FIRE PERFORMANCE) PART 2 FULL SCALE LOADED TEST

1. INTRODUCTION

This project commenced in 1998 with the overall objective of extending the use of hollow sections in multi-storey SLIMDEK structures by developing an understanding of the performance of edge beams in fire. By virtue of their position within a building edge beams occur adjacent to openings in the building envelope (windows, doors, etc.). This means that in the event of fire not only is the lower face of the edge beam heated but the face on the outward side of the building is also exposed. The purpose of this particular project is to establish the thermal and mechanical performance of loaded RHS edge beams, associated with openings, in fire so as to be able to predict the fire resistance behaviour and fire protection requirements necessary for these types of members. In November 1998 a fire test was carried out on a pair of unloaded indicative specimens to obtain thermal data relating to differing section sizes and to investigate the effect of the wall openings⁽¹⁾. Based on the information obtained from this test a suitable floor arrangement was designed on which to carry out a loaded standard fire resistance test. This report gives details of the test assembly construction, instrumentation and fire test together with the information collected en route. Finite element modelling of the test assembly is reported elsewhere⁽²⁾.

2. EXPERIMENTAL PROGRAMME

2.1 Specimen Preparation

The main construction details of the test piece is shown in Fig. 1. Galvanised metal decking, reference SD225, was used as shuttering to the in situ concrete slab which spanned the gap between the two lengths of RHS. The concrete was supplied to grade 35 and had 28 day and 90 day strengths of 61.0 N/mm² and 64.5 N/mm² respectively. Figure 2 provides further detail of the construction, showing the positions of the 12 mm diameter reinforcing bar and the A142 reinforcing mesh used in the concrete slab. Figure 3 shows how the test specimen was positioned on the top of the furnace. A cover slab 600 mm wide was placed on each side of the test piece in order to complete the furnace roof. As indicated in Fig. 2(c) all the openings in the RHS webs were blocked with flexible ceramic blanket. Normally automatic fire dampers would be used but it was important to ensure that the test reflected these products in the closed position whatever deflection or movement took place. Details of the loading arrangement are shown in Figs. 3 and 4.

Two sets of instrumentation were fitted to the specimen during its construction. One set consisted of twenty strain gauges, half of which were distributed around the area in the RHS members containing a hole in both webs. Table 1 gives the details of the identity, type and purpose of the various gauges. Figures 5, 6 and 7 show in detail where each of the gauges was placed on the steel work. This instrumentation was only used during the cold loading phase of the test.

The second set of instrumentation was made up of one hundred k type mineral insulated thermocouples. Table 2 provides details of where 82 of the thermocouples were placed in the two RHS members. Figure 2(a and b) indicate where the remaining 18 were installed in the concrete around the reinforcing bars in the floor slab between the two RHS members. The information in Table 2 should be viewed in conjunction with Fig. 8 which shows where the grid lines are on the RHS members. For reference purposes grid line A was farthest from the door end of the furnace.

Selected locations within the test assembly were chosen to provide a full temperature profile. Figure 9 shows where the 17 thermocouples, which make up a 'full profile', are positioned within a given member at a particular grid line. Figures 10 and 11 show how this full profile is modified by having a hole in either the inner web or both webs of the section respectively.

2.2 Cold Loading Test

Prior to the fire test a cold loading test was carried out on the RHS assembly in order to measure the strains induced in the sections, in and around the areas with holes in both webs. A load of 80 kN was applied through each of four hydraulic rams, see Figs. 3 and 4, in increments of 10 kN and then unloading in a similar manner. At each step in load both the deflection of the test assembly and the output from the twenty strain gauges were recorded. At the end of the first loading and unloading run a residual permanent deflection of 1 mm was observed. After resetting the deflection transducer to zero the loading and unloading procedure was repeated on two further occasions. The deflection measurements recorded during each of the three runs are presented in Table 3.

2.3 Fire Test

To determine the fire resistance of the RHS Edge Beam the assembly was subjected to a furnace test in accordance with BS 476: Parts 20⁽³⁾ and 21⁽⁴⁾. The assembly was simply supported over a span of 4500 mm and loaded on the upper surface at two positions, 700 mm either side of the centre line, on each member. A load of 60 kN was applied through each of the hydraulic rams resulting in a total load of 240 kN being applied to the test assembly. Throughout the duration of the fire test the furnace temperature was monitored continuously and recorded at one min intervals. Similarly, the central vertical deflections of the assembly were recorded by the linear deflection transducer. As the test proceeded cracks appeared in the surface of the concrete running longitudinally down the specimen. In particular cracks appeared at the junction of the concrete and the hollow section. Steam was released from the cracks and also from the vent holes in the plates attached to the ends of the hollow sections. This was due to the free water in the concrete being driven up to the surface where it formed pools before eventually evaporating or being converted to steam. After 60 min the deflection in the assembly had reached 113 mm and the rate of deflection was 6 mm/min. After a further 5 min the deflection had reached 153 mm and the deflection rate was then 10 mm/min. At this point the assembly no longer satisfied the load bearing capacity criteria defined in BS 476: Part 20 (i.e. once the deflection has exceeded span/30, 150 mm, the rate of deflection cannot exceed 7 mm/min). However, in order to obtain additional thermal data the loads were removed and the test continued. The test was finally terminated after 90 min.

3. RESULTS AND DISCUSSION

The mean furnace air temperature as recorded during the fire test is listed in Table 4 and shown graphically in Fig. 12. It is clear that for the greater part of the duration of the test the furnace temperature was cooler than that prescribed by the standard curve. On average this discrepancy was 15°C but was well within the permitted range of deviation. The central vertical deflection measurements recorded can be seen in Table 5 and Fig. 13. They show that for the first 30 min of the test the rate of deflection was virtually constant at 2 mm/min. For the next 20 min the rate of deflection was only averaging 0.7 mm/min. From this point onward the rate of deflection accelerated until the load was removed during the 66th min. Over the next 10 min the assembly recovered 20 mm of this deflection and then remained constant for the rest of the

heating period. The temperature measurements for a full profile at grid line G on member 1B, shown in Fig. 9, are listed in Table 6 and presented graphically in Figs. 14 to 17.

Examination of the temperatures in the RHS members, Fig. 14, it is perhaps interesting to note the temperature responses of thermocouples S32 and S40 located on the top corners of the RHS. Both exhibited an unexpected 'hump' which began just before the load was removed and a 'dip' which started when the furnace heating was turned off. This was observed to a lesser extent elsewhere, on grid lines H and I on RHS member 1A and grid line I on RHS member 1B. However, there is no obvious explanation for this phenomenon.

As expected the highest temperatures were recorded on the lower face of the RHS, where it was in contact with the plate. For the webs the surfaces in contact with the concrete were cooler. Figure 15 shows little variation in the temperature measurements across the width of the plate. The two thermocouples located under the RHS were approximately 50° cooler than the two thermocouples located under the decking at the end of the test.

The concrete temperatures adjacent to the RHS are shown in Fig. 16. As might be expected the thermocouple just above the plate recorded a significantly higher temperature than the two located further up through the assembly. These also showed less evidence of the moisture plateau at around 100°C. Similarly, temperatures recorded at a position with a hole in the inner face only, at Grid line I on member 1A, are presented in Table 7 and illustrated in Figs. 18 to 20. It is worth noting from the steel work temperatures in Fig. 18 that, the temperature measured in the web immediately below the hole was higher than the corresponding location in Fig. 14 and also higher than any other temperature measured in the RHS at that grid line. Conversely, the temperature measured in the top corner of the RHS above the hole was lower than the corresponding one in Fig. 14. The effect of the hole was clearly to reduce the net heat transfer process up the web of the RHS. These temperatures measured at Grid line C on member 1A, are given in Table 8 and presented graphically in Figs. 21 to 23.

Temperatures distributions measured in the concrete around the rebar in the troughs/ribs of the decking, are presented in Table 9 and plotted in Fig. 24. In the adjacent ribs the lower outer thermocouples recorded higher temperatures than those above as might be expected. In all cases the concrete in the centre of the rib remained cooler than the rest.

4. CONCLUSIONS

A successful fire resistance test has been carried out on an RHS SLIMDEK assembly and achieved 65 min. This has provided reliable thermal and mechanical data for detailed numerical analyses.

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REFERENCES

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3. BS 476: 'Fire Tests on Building Materials and Structures, Part 20: 1987 Method for Determination of the Fire Resistance of Elements of Construction (General Principles)'. British Standards Institution, 1987.
4. BS 476: 'Fire Tests on Building Materials and Structures, Part 21: 1987 Methods for Determination of the Fire Resistance of Load-Bearing Elements of Construction'. British Standards Institution, 1987.

**TABLE 1
DETAILS OF THE STRAIN GAUGES INSTALLED ON BOTH
RHS MEMBERS AROUND THE AREA CONTAINING
A HOLE IN BOTH WEBS**

Strain Gauge Identity	Gauge Type	Purpose
A	Single	Flange Bending Strain
B	Single	Flange Bending Strain
C	3 Gauge Rosette	Strain Pattern Around Opening
D	3 Gauge Rosette	Strain Pattern Around Opening
E	3 Gauge Rosette	Strain Pattern Around Opening
F	3 Gauge Rosette	Strain Pattern Around Opening
G	Single	Shearing – Strains from Bending
H	Single	Shearing – Strains from Bending
I	Single	Shearing – Strains from Bending
J	Single	Shearing – Strains from Bending

**TABLE 2
DETAILS OF THERMOCOUPLES INSTALLED
IN THE TEST ASSEMBLY**

Member ID	Grid Line	Positions from Full Profile	Identity in the Test
1A	C	S1,S3,S4,S5,S9,P1,P2,P3,P4,A	S1,S2,S3,S4,S5,P1,P2,P3,P4,A1
1A	G	S1,S2,S5,S7,S8,P1,P3,C1,C2,C3	S6,S7,S8,S9,S9,S10,P5,P6,C1,C2,C3
1A	H	S1,S5,S7,S8,P1,P3	S11,S12,S13,S14,P7,P8
1A	H/I	S4,S5,S6,S7,S8,P1,P3	S15,S16,S17,S18,S19,P9,P10
1A	I	S1,S2,S3,S4,S5,S9,P1,P2,P3,P4,A	S20,S21,S22,S23,S24,S25,P11,P12,P13,P14,A2
1B	C	S1,S2,S3,S4,S5,S9,P1,P2,P3,P4,A	S26,S27,S28,S29,S30,S31,P15,P16,P17,P18,A3
1B	G	S1,S2,S3,S4,S5,S6,S7,S8,S9,P1,P2,P3,P4,C1,C2,C3,A	S32,S33,S34,S35,S36,S37,S38,S39,S40,P19,P20,P21,P22,C4,C5,C6,A4
1B	I	S1,S3,S4,S5,S9,P1,P2,P3,P4,A	S41,S42,S43,S45,P23,P24,P25,P26,A5
Rebar at	F	Not Applicable	C7,C8,C9,C10,C11,C12
Rebar at	H	Not Applicable	C13,C14,C15,C16,C17,C18
Rebar at	J	Not Applicable	C19,C20,C21,C22,C23,C24

TABLE 3
DEFLECTIONS MEASURED DURING COLD LOAD TEST

Load (kN)	Measured Deflection (mm)		
	Run 1	Run 2	Run 3
0	0	0	0
10	0	1	1
20	1	1	2
30	2	2	2
40	3	3	3
50	4	4	4
60	5	5	5
70	6	5	6
80	7	6	6
70	6	5	6
60	5	5	5
50	4	4	4
40	3	3	3
30	2	2	2
20	1	1	2
10	1	1	1
0	1	0	0

TABLE 4
FURNACE AIR TEMPERATURE MEASURED DURING THE FIRE TEST

Time (min)	Standard Furnace Temperature (°C)	Actual Furnace Temperature (°C)
0	20	19
1	349	470
2	445	469
3	502	455
4	544	544
5	576	570
6	603	584
7	626	602
8	645	636
9	663	655
10	678	670
11	693	679
12	705	698
13	717	708
14	728	715
15	739	722
16	748	736
17	757	747
18	766	755
19	774	762
20	781	775
21	789	764
22	796	771
23	802	772
24	809	782
25	815	788
26	820	791
27	826	794
28	832	799
29	837	805
30	842	798
31	847	808
32	851	821
33	856	822
34	860	829
35	865	835
36	869	830
37	873	851
38	877	844
39	881	852
40	885	856
41	888	861
42	892	865
43	896	868
44	899	873
45	902	872

Time (min)	Standard Furnace Temperature (°C)	Actual Furnace Temperature (°C)
46	906	879
47	909	885
48	912	888
49	915	892
50	918	894
51	921	898
52	924	903
53	927	906
54	930	916
55	932	915
56	935	920
57	938	931
58	940	926
59	943	932
60	945	932
61	948	934
62	950	937
63	953	941
64	955	945
65	957	948
66	960	949
67	962	955
68	964	960
69	966	961
70	968	963
71	971	968
72	973	972
73	975	971
74	977	975
75	979	981
76	981	983
77	983	987
78	985	989
79	986	985
80	988	986
81	990	979
82	992	990
83	994	990
84	996	997
85	997	998
86	999	999
87	1001	1000
88	1003	997
89	1004	998
90	1006	1001

TABLE 5
DEFLECTION MEASURED DURING THE FIRE TEST

Time (min)	Central Vertical Deflection (mm)	Rate of Deflection (mm/min)
0	0	0
1	1	1
2	3	2
3	4	1
4	5	1
5	7	2
6	9	2
7	11	2
8	13	2
9	15	2
10	17	2
11	20	3
12	22	2
13	24	2
14	27	3
15	29	2
16	31	2
17	33	2
18	35	2
19	37	2
20	39	2
21	41	2
22	43	2
23	45	2
24	47	2
25	50	3
26	51	1
27	53	2
28	55	2
29	56	1
30	58	2
31	59	1
32	60	1
33	61	1
34	62	1
35	63	1
36	64	1
37	65	1
38	65	0
39	66	1
40	67	1
41	67	0
42	67	0
43	68	1
44	68	0
45	68	0

Time (min)	Central Vertical Deflection (mm)	Rate of Deflection (mm/min)
46	69	1
47	69	0
48	70	1
49	71	1
50	72	1
51	74	2
52	76	2
53	79	3
54	82	3
55	86	4
56	91	5
57	96	5
58	101	5
59	107	6
60	113	6
61	119	6
62	126	7
63	134	8
64	143	9
65	153	10
66	145	*
67	142	
68	140	
69	139	
70	137	
71	136	
72	136	
73	135	
74	134	
75	134	
76	133	
77	133	
78	133	
79	133	
80	133	
81	133	
82	133	
83	133	
84	133	
85	133	
86	133	
87	133	
88	133	
89	134	
90	134	

* Load Removed

TABLE 6
TEMPERATURES MEASURED IN MEMBER 1B AT GRIDLINE G

Time (min)	Temperatures (°C) Recorded in Member 1B at Gridline G																
	Air A4	C4	Concrete		Plate				Steelwork								
			C5	C6	P19	P20	P21	P22	S32	S33	S34	S35	S36	S37	S38	S39	S40
0	19	20	19	20	20	19	20	20	19	19	19	20	19	19	20	19	19
1	19	20	19	20	35	31	37	49	19	19	23	27	23	20	20	19	19
2	20	21	19	20	48	42	51	66	19	19	30	35	29	23	20	20	19
3	22	23	19	20	57	51	62	77	19	19	36	43	36	26	22	20	19
4	24	27	20	20	72	65	78	96	19	20	43	53	43	30	23	20	19
5	28	31	20	20	89	80	95	115	19	20	53	64	53	36	26	20	19
6	31	36	20	21	107	97	114	138	20	22	64	78	64	42	29	21	20
7	35	43	21	22	126	114	134	161	20	24	76	96	76	50	34	22	20
8	41	50	22	22	148	134	157	185	20	26	89	116	89	59	39	24	21
9	45	58	23	23	173	155	182	211	21	28	103	135	103	68	44	25	21
10	51	66	24	24	197	177	207	237	22	31	117	154	117	77	51	28	22
11	54	72	25	25	220	199	231	261	23	35	132	174	133	88	57	30	23
12	59	78	27	25	242	221	255	285	25	39	146	195	148	99	65	33	24
13	66	83	29	26	266	244	279	310	26	46	161	217	162	104	76	37	26
14	81	89	31	27	289	264	302	333	30	56	179	238	174	106	86	44	30
15	102	93	35	29	310	283	324	356	36	66	195	259	187	110	96	54	36
16	112	98	38	30	331	302	346	379	45	75	213	279	198	112	97	64	44
17	123	102	43	32	353	322	368	402	54	80	230	300	209	115	99	76	54
18	134	106	47	34	373	338	387	422	63	87	244	318	219	116	99	89	65
19	145	110	52	37	393	355	407	443	72	93	258	336	230	118	100	96	75
20	159	113	56	40	408	368	421	456	82	99	272	353	241	134	101	100	91
21	176	117	61	44	422	381	434	470	90	100	290	369	261	165	108	100	96
22	174	121	68	48	436	397	448	484	92	100	307	386	281	187	126	101	98
23	181	125	67	52	449	412	463	499	93	101	323	401	298	207	147	104	99
24	193	130	80	55	462	427	478	512	94	110	338	416	314	224	163	109	100
25	205	135	84	59	474	442	492	525	96	118	353	431	329	240	177	115	101
26	215	140	87	63	486	457	505	538	99	126	367	445	344	253	189	123	105
27	227	147	89	69	498	471	519	552	102	134	382	460	358	266	200	132	109
28	239	153	91	77	510	484	532	564	107	142	396	473	371	278	211	141	113
29	249	160	93	83	521	497	543	575	111	151	409	486	383	289	221	150	119
30	255	167	95	86	531	508	555	585	116	161	421	497	395	300	231	159	125
31	264	173	97	89	541	520	566	596	120	170	434	509	405	310	239	166	131
32	275	178	99	91	550	531	576	606	127	180	445	519	417	320	249	175	138
33	288	181	100	93	559	542	587	617	133	191	456	530	427	330	259	183	145
34	293	186	102	95	568	553	598	628	141	202	468	540	438	340	268	191	152
35	304	195	104	96	578	563	608	638	149	214	479	551	448	350	277	200	159
36	314	207	105	97	588	573	619	648	158	226	490	561	458	359	285	207	167
37	322	219	107	99	598	584	628	657	167	240	500	571	467	368	294	215	174
38	332	232	109	100	606	593	637	666	177	253	511	580	477	376	302	223	182
39	341	245	111	101	615	602	647	675	186	266	520	589	485	385	309	231	190
40	353	257	113	101	622	611	656	684	196	278	530	596	494	393	317	239	198
41	362	270	115	102	629	619	664	692	206	291	539	603	503	401	325	246	206
42	373	282	116	102	637	628	672	700	216	303	548	612	511	410	332	255	214
43	380	293	119	102	645	636	680	707	227	315	557	620	519	417	339	263	221
44	386	304	118	102	652	645	688	716	237	326	566	627	527	425	347	271	229
45	395	315	117	104	659	652	696	721	247	337	575	634	534	433	356	279	238
46	404	324	115	105	665	659	703	727	258	348	584	639	541	441	363	286	247
47	405	335	117	107	672	666	709	734	269	360	592	647	549	449	371	295	255
48	417	345	118	108	678	673	716	740	279	370	601	651	556	456	379	302	264
49	423	354	121	110	684	680	722	747	289	381	610	657	563	464	386	310	272
50	431	363	123	112	690	687	727	753	299	391	618	664	570	471	393	318	280
51	442	373	126	113	696	693	733	761	309	401	626	670	577	478	401	325	289
52	449	382	127	115	702	700	740	768	319	411	633	675	583	485	409	333	297
53	467	391	129	117	709	706	746	775	329	421	641	681	590	492	416	341	305
54	471	400	130	118	714	712	753	782	339	430	649	686	597	500	423	349	313

(Cont...)

TABLE 6
TEMPERATURES MEASURED IN MEMBER 1B AT GRIDLINE G
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1B at Gridline G																
	Air A4	C4	Concrete		Plate				Steelwork								
			C5	C6	P19	P20	P21	P22	S32	S33	S34	S35	S36	S37	S38	S39	S40
55	487	408	132	120	720	718	760	790	349	439	657	692	603	507	431	356	322
56	500	416	133	122	723	723	768	797	357	448	663	697	609	514	438	364	330
57	494	426	135	124	727	729	775	804	367	457	668	700	615	521	446	372	338
58	503	434	136	126	731	734	782	810	376	465	672	703	621	527	452	379	345
59	502	443	138	128	736	740	789	816	385	473	676	707	626	533	458	386	353
60	517	452	140	130	740	745	796	823	395	480	680	711	631	539	465	393	361
61	507	461	142	133	746	751	802	829	409	487	686	715	636	544	471	400	368
62	516	469	146	136	751	757	808	836	435	493	693	720	641	550	476	406	377
63	530	478	153	138	756	763	816	844	476	500	700	725	647	556	482	414	391
64	546	486	161	141	761	770	823	852	514	508	708	730	653	562	489	421	421
65	566	495	170	143	768	777	830	860	544	516	715	735	659	569	496	429	458
66	574	503	180	146	774	782	838	868	567	525	720	742	666	576	503	439	485
67	583	511	190	148	780	790	846	875	585	534	724	748	673	584	511	448	503
68	585	519	200	151	786	798	854	887	601	543	728	753	679	591	519	458	519
69	593	526	211	155	792	806	862	896	614	553	734	757	686	597	526	468	533
70	602	534	221	159	798	813	868	900	625	562	740	762	692	604	533	477	544
71	608	541	230	163	803	818	874	908	636	571	746	767	698	610	540	486	553
72	616	548	238	167	808	826	881	914	646	579	752	772	704	617	548	495	559
73	621	556	247	172	815	833	887	922	654	587	758	778	710	624	555	504	564
74	627	563	255	178	821	839	893	926	662	595	764	783	715	630	563	512	569
75	632	570	264	184	828	846	899	931	669	602	770	789	721	637	570	520	574
76	640	579	272	190	835	853	904	937	677	610	774	794	727	643	578	528	579
77	640	586	280	198	841	858	909	940	683	616	778	800	733	649	585	535	584
78	648	594	289	205	848	864	914	945	690	623	782	806	739	655	592	542	590
79	652	602	296	213	855	870	917	946	696	629	786	811	745	662	598	549	595
80	659	610	305	221	862	875	921	948	701	636	790	817	751	668	605	556	601
81	656	618	313	228	866	878	923	949	704	641	796	823	757	674	612	563	604
82	670	625	320	236	870	881	926	951	709	647	802	829	762	680	619	570	609
83	675	633	328	244	875	887	929	954	714	653	808	835	768	685	625	577	615
84	678	640	336	251	881	891	933	956	720	659	814	840	773	691	632	584	621
85	685	648	343	259	886	896	934	962	725	664	820	845	778	696	638	591	627
86	690	655	351	267	891	899	942	966	729	670	824	850	784	701	644	598	632
87	694	662	359	275	895	904	944	968	732	675	828	854	789	707	650	604	637
88	701	669	366	283	899	907	947	969	736	680	832	857	794	712	656	611	642
89	703	676	374	290	902	910	950	973	740	686	834	861	799	717	661	618	648
90	710	682	382	298	906	915	953	976	745	691	836	864	804	722	667	624	653
91	708	690	389	306	883	889	926	941	723	694	835	855	806	727	673	629	644
92	712	697	398	314	855	864	893	900	689	699	820	837	802	730	678	637	622
93	707	702	406	322	832	842	863	867	673	701	806	819	794	731	681	641	604
94	699	706	413	329	811	822	838	839	656	702	795	802	785	730	683	642	590
95	693	709	420	337	794	804	816	815	642	702	786	788	776	727	683	641	579
96	691	710	427	344	788	795	800	799	649	701	778	781	768	724	681	641	583
97	690	711	434	351	778	784	794	793	657	700	770	772	761	720	679	640	594
98	689	711	441	358	767	774	786	784	661	698	762	763	755	717	678	639	603
99	687	711	448	365	758	765	776	774	664	697	754	755	749	714	676	639	608
100	683	710	454	372	749	755	766	764	664	694	747	748	743	710	674	638	612
101	681	710	461	379	741	748	756	754	664	693	741	740	737	707	673	637	615
102	677	709	467	385	733	740	747	744	663	690	735	733	732	704	671	637	616
103	674	708	474	392	724	733	738	735	661	688	729	726	726	701	669	636	617
104	670	706	479	398	716	724	730	726	659	686	723	718	720	697	667	635	617
105	666	705	485	404	709	716	721	716	656	683	717	711	715	693	665	634	616
106	662	703	490	409	701	708	712	707	654	681	711	704	709	690	662	633	614

(Cont...)

TABLE 6
TEMPERATURES MEASURED IN MEMBER 1B AT GRIDLINE G
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1B at Gridline G																
	Air A4	C4	Concrete		Plate				Steelwork								
			C5	C6	P19	P20	P21	P22	S32	S33	S34	S35	S36	S37	S38	S39	S40
107	662	701	495	415	693	701	703	698	651	678	705	697	703	687	660	632	613
108	659	699	500	420	685	693	695	689	649	676	699	690	698	683	658	631	611
109	655	697	504	425	678	686	686	680	646	673	693	683	692	680	656	629	609
110	651	694	508	430	670	678	679	672	642	670	687	676	687	676	653	627	606
111	647	691	512	434	664	671	671	666	639	667	681	669	681	672	650	626	604
112	644	689	516	439	659	665	664	661	636	664	676	665	677	668	648	624	602
113	641	686	520	444	658	661	661	656	633	661	674	665	674	665	645	622	599
114	636	683	523	448	655	660	656	649	630	658	670	662	670	661	643	620	597
115	632	680	526	452	649	656	650	641	626	655	666	656	665	658	640	618	595
116	630	677	528	455	643	649	643	635	623	652	660	649	659	654	637	616	592
117	626	674	531	459	636	642	635	628	620	649	654	642	653	649	634	614	589
118	623	671	533	462	629	634	628	621	616	646	648	635	647	645	631	612	587
119	620	668	536	466	623	628	621	615	613	642	644	629	642	641	628	609	584
120	616	665	537	469	616	621	615	608	610	639	640	623	636	636	625	607	581
121	611	662	539	472	610	615	609	602	606	635	634	616	630	631	621	604	578
122	607	659	541	475	604	609	602	596	603	631	628	611	625	627	618	602	576
123	603	656	542	477	599	603	597	590	599	628	622	605	619	622	614	599	572
124	599	652	543	480	593	598	591	585	596	624	617	599	614	618	610	596	569
125	595	649	544	482	588	592	586	579	593	620	613	594	609	614	607	594	566
126	591	645	545	484	583	587	580	574	589	617	608	589	604	609	604	591	563
127	588	642	547	486	578	582	575	569	586	613	604	584	599	606	600	588	561
128	584	639	548	488	573	578	570	564	583	609	600	579	595	601	597	585	557
129	580	635	549	490	568	573	566	560	579	605	595	574	590	597	594	582	554
130	576	632	550	492	563	568	561	555	575	601	591	570	585	593	590	580	552
131	572	629	551	493	559	564	557	551	572	597	587	565	581	589	587	577	549
132	568	625	552	495	555	559	552	546	568	593	582	561	577	585	583	574	546
133	564	622	553	496	550	555	548	542	564	589	578	556	572	581	580	571	542
134	561	618	554	498	546	551	544	538	561	586	574	552	568	577	576	568	540
135	557	614	554	499	542	546	540	534	558	582	570	548	564	574	573	565	536
136	554	611	555	500	538	543	536	531	554	578	566	544	560	570	570	563	533
137	549	608	556	501	534	539	532	527	551	574	562	540	556	566	567	560	531
138	546	605	556	502	530	535	529	524	547	571	558	536	553	563	563	557	528
139	543	602	557	502	527	532	525	520	544	567	554	532	549	559	560	554	525
140	540	598	557	503	523	528	521	516	541	563	550	529	545	556	557	552	522
141	536	596	557	504	520	524	518	513	538	560	544	525	541	552	554	549	519
142	533	592	557	505	516	521	514	510	535	556	538	522	538	549	551	546	516
143	529	589	557	505	512	517	511	506	531	553	533	518	535	546	548	544	514
144	525	586	557	505	509	514	508	503	528	550	529	515	531	543	545	541	511
145	522	584	558	506	506	511	505	500	525	546	525	511	528	539	542	538	508
146	519	581	557	506	503	508	501	497	522	543	521	508	525	536	539	535	506
147	515	578	557	507	500	505	498	494	519	540	517	505	522	533	537	533	503
148	513	576	557	507	496	502	495	491	516	536	514	502	518	530	534	530	500
149	509	573	557	507	493	499	492	488	513	533	509	499	515	527	531	528	498
150	507	570	556	507	490	495	490	485	510	530	506	495	512	524	528	525	495
151	503	567	555	507	487	493	487	482	507	527	503	492	509	521	525	523	492
152	500	565	555	507	485	490	483	479	505	524	500	489	506	518	523	520	490
153	497	562	554	507	482	487	481	477	502	521	497	487	503	515	520	518	487
154	494	559	554	507	479	484	478	474	499	518	494	484	500	512	517	515	485
155	491	557	553	507	476	481	475	471	496	515	491	481	497	510	515	513	483
156	488	554	552	507	473	479	472	469	494	512	489	478	495	507	512	510	480
157	486	551	551	506	470	476	470	466	491	509	485	476	492	504	510	508	478
158	483	549	550	506	468	474	468	464	488	506	483	473	489	501	507	506	475
159	480	546	549	506	465	471	465	461	486	504	479	470	486	499	504	503	473
160	477	544	549	506	463	468	463	459	483	501	476	467	484	496	502	501	471

(Cont...)

TABLE 6
TEMPERATURES MEASURED IN MEMBER 1B AT GRIDLINE G
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1B at Gridline G																
	Air A4	C4	Concrete		Plate				Steelwork								
			C5	C6	P19	P20	P21	P22	S32	S33	S34	S35	S36	S37	S38	S39	S40
161	475	541	548	505	460	466	460	456	481	498	474	465	481	494	499	499	469
162	472	539	547	505	458	463	457	453	478	496	472	463	479	491	497	497	467
163	470	536	546	504	455	461	455	451	476	493	469	460	476	489	495	494	464
164	468	534	545	504	453	458	452	449	474	490	467	458	474	486	492	492	462
165	464	532	544	504	451	456	450	446	471	488	465	455	472	484	490	490	460
166	462	529	543	503	448	453	447	444	469	485	462	453	469	481	488	488	458
167	460	527	541	503	446	451	445	442	467	483	459	450	467	479	485	486	456
168	457	524	540	502	444	449	443	439	464	480	457	448	464	477	483	484	454
169	454	522	539	501	441	446	441	437	462	478	455	446	462	474	481	482	452
170	453	520	538	501	439	444	439	435	460	475	453	443	460	472	478	479	449
171	450	517	536	500	437	442	436	433	457	473	450	441	457	470	476	477	447
172	448	515	535	500	435	440	434	431	455	471	448	439	455	468	474	475	446
173	446	513	534	499	432	438	432	429	453	468	445	437	453	465	472	473	444
174	443	510	533	498	430	436	431	427	451	466	443	435	451	463	470	472	442
175	440	508	531	497	428	433	429	425	448	463	441	432	448	461	468	469	439
176	438	506	530	497	426	432	426	423	446	461	439	430	446	459	466	467	438
177	436	503	529	496	424	430	424	421	444	459	436	428	444	457	464	465	436
178	434	501	527	495	422	427	423	419	442	457	434	426	442	455	461	464	434
179	431	499	526	494	420	425	420	417	440	454	432	424	440	452	459	462	432
180	430	497	524	494	418	423	419	416	438	452	430	422	438	450	457	460	430
181	427	494	523	493	416	421	417	414	436	450	427	420	436	448	455	458	428
182	425	492	521	492	414	419	415	412	434	448	424	418	434	446	454	457	426
183	423	490	520	491	412	418	413	410	432	446	423	416	432	444	452	455	424
184	421	488	518	490	410	416	412	408	430	444	421	414	430	442	450	453	423
185	419	486	517	489	408	414	409	406	428	441	419	412	428	440	448	451	421
186	417	484	516	488	407	412	407	405	426	440	417	410	426	438	446	449	419
187	415	482	515	487	405	410	406	403	424	438	416	409	424	437	444	447	418
188	413	480	513	487	403	409	404	401	422	436	414	407	422	435	442	445	416
189	411	478	512	486	401	407	402	399	420	434	412	405	421	433	440	443	414
190	409	476	510	485	400	405	400	397	419	432	411	403	419	431	439	441	413
191	407	474	509	484	398	403	398	396	417	430	409	402	417	429	437	440	411
192	405	472	508	483	396	401	396	394	415	428	407	400	415	427	435	438	409
193	403	470	506	482	394	400	395	392	413	426	405	398	413	425	433	436	408
194	401	468	504	481	392	398	393	391	412	424	403	396	412	424	431	435	406
195	399	465	502	479	391	396	392	389	409	422	401	394	409	422	429	433	404
196	398	464	502	479	389	395	391	388	408	420	400	393	408	420	428	431	403
197	395	462	500	478	388	394	389	386	406	418	398	391	406	418	426	430	401
198	394	460	499	477	386	392	388	385	405	417	396	390	405	417	425	428	400
199	393	458	497	476	385	391	386	384	403	415	*	388	403	415	423	427	398
200	392	456	496	475	384	389	385	382	402	413	*	387	402	413	421	425	397
201	391	454	494	474	382	388	384	381	400	411	*	385	400	412	419	424	395
202	389	452	493	473	381	386	382	380	399	409	*	384	399	410	418	422	394
203	388	451	491	472	380	385	381	379	397	408	*	383	397	408	416	420	392
204	385	449	490	471	378	384	380	377	395	406	*	381	396	407	415	419	391
205	384	447	489	470	377	382	379	376	394	404	*	380	394	405	413	417	390
206	383	445	487	468	376	381	378	375	392	403	*	379	393	404	412	416	388
207	381	443	486	467	374	380	376	374	391	401	*	377	392	402	410	414	387
208	379	442	484	466	373	379	375	373	389	400	*	376	390	401	409	413	386
209	379	440	483	465	372	378	374	372	388	398	*	375	389	400	407	411	384
210	377	439	482	464	371	376	372	370	387	397	*	374	388	398	406	410	383
211	376	437	480	463	369	375	371	369	385	395	*	372	386	397	404	408	382
212	374	435	479	462	368	374	370	368	384	394	*	371	385	395	403	407	381
213	373	434	477	461	367	373	369	367	382	392	*	370	384	394	402	406	379

(Cont...)

TABLE 6
TEMPERATURES MEASURED IN MEMBER 1B AT GRIDLINE G
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1B at Gridline G																
	Air A4	C4	Concrete		Plate				Steelwork								
			C5	C6	P19	P20	P21	P22	S32	S33	S34	S35	S36	S37	S38	S39	S40
214	371	432	475	460	366	371	368	366	381	391	*	368	382	393	400	404	378
215	370	430	474	459	364	370	366	365	380	389	*	367	381	391	399	403	377
216	369	429	472	458	363	369	365	363	378	388	*	366	380	390	397	402	376
217	367	427	471	457	362	368	364	362	377	386	*	365	378	388	396	400	374
218	365	426	469	456	361	366	363	361	376	385	*	364	377	387	395	399	373
219	364	424	468	454	360	365	362	360	374	384	*	362	376	386	393	398	372
220	363	422	466	453	358	364	361	359	373	382	*	361	374	384	392	396	371
221	361	421	465	452	357	363	360	358	372	381	*	360	373	383	390	395	369
222	360	419	463	451	356	362	358	357	370	380	*	359	372	382	389	394	368
223	359	418	462	450	355	360	357	356	369	378	*	358	371	381	388	393	367
224	358	416	460	449	354	359	356	354	368	377	*	356	370	379	387	391	366
225	356	415	459	448	353	358	355	353	367	375	*	355	368	378	385	390	365
226	355	413	457	447	351	357	354	352	365	374	*	354	367	377	384	389	363
227	354	412	456	446	350	356	353	351	364	373	*	353	366	376	383	388	362
228	353	410	454	445	349	355	352	350	363	372	*	352	365	374	381	386	361
229	352	409	453	443	348	354	351	349	362	370	*	351	364	373	380	385	360
230	350	408	451	442	347	353	350	348	361	369	*	350	362	372	379	384	359
231	349	406	450	441	346	352	349	347	359	368	*	349	361	371	378	383	358
232	348	405	449	440	345	350	347	346	358	367	*	347	360	369	377	381	357
233	346	403	447	439	344	349	346	345	357	366	*	346	359	368	375	380	356
234	346	402	446	438	343	348	345	344	356	364	*	345	358	367	374	379	355
235	344	401	444	437	342	347	344	343	355	363	*	344	357	366	373	378	354
236	343	399	443	436	341	346	343	342	354	362	*	343	356	365	372	377	353
237	342	398	441	435	340	345	342	341	353	361	*	342	355	364	371	376	351
238	341	397	440	434	339	344	341	340	352	360	*	341	353	362	370	374	351
239	339	395	438	432	338	343	340	339	350	358	*	340	352	361	368	373	349
240	339	394	437	431	336	342	339	338	349	357	*	339	351	360	367	372	348
241	338	393	435	430	335	341	338	337	348	356	*	338	350	359	366	371	347
242	337	391	434	429	334	340	337	336	347	355	*	337	349	358	365	370	346

* Indicates value deemed unreliable

TABLE 7
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE I

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline I										
	Air	Plate				Steelwork					
	A2	P11	P12	P13	P14	S20	S21	S22	S23	S24	S25
0	19	20	20	20	20	19	19	19	19	19	19
1	19	33	33	38	44	19	19	23	27	25	19
2	20	43	45	52	62	19	19	31	37	35	19
3	22	53	55	66	77	19	19	38	47	45	19
4	25	67	71	84	98	19	20	46	58	56	19
5	30	83	88	104	121	20	21	57	73	71	19
6	36	100	107	126	144	21	23	70	90	87	20
7	42	118	126	148	168	22	26	83	105	105	20
8	46	146	148	172	193	23	29	96	121	122	21
9	52	172	171	197	219	24	33	103	140	140	22
10	56	196	194	220	244	26	38	106	160	160	23
11	62	221	217	245	269	28	46	109	181	180	24
12	71	245	241	269	294	30	60	115	203	201	26
13	86	268	263	292	319	34	76	134	225	218	30
14	96	291	276	314	343	39	86	162	246	215	34
15	102	314	281	331	365	45	89	190	262	203	40
16	109	333	284	346	385	51	91	208	274	196	47
17	118	350	289	359	403	58	94	223	284	194	55
18	130	366	300	373	421	64	97	229	297	204	62
19	145	382	318	389	439	71	99	233	317	227	68
20	158	398	344	408	457	78	99	251	340	261	76
21	169	415	373	429	475	85	99	299	362	306	87
22	173	433	404	453	496	88	101	320	384	344	91
23	181	450	432	476	516	91	110	338	406	374	94
24	190	467	456	497	536	93	120	354	426	401	95
25	198	485	478	518	555	95	129	370	446	424	96
26	202	502	500	539	574	97	138	386	464	446	99
27	210	517	518	556	590	100	148	400	480	466	99
28	217	532	536	572	605	104	159	414	495	483	100
29	227	546	553	588	620	108	169	427	510	501	100
30	238	559	567	602	633	114	181	440	523	517	101
31	254	571	582	616	646	120	192	452	535	532	104
32	264	582	595	629	659	128	204	465	548	545	108
33	282	593	608	642	670	136	217	477	559	558	115
34	294	603	620	654	682	145	229	489	572	571	122
35	305	614	632	666	693	155	242	501	583	584	130
36	324	624	643	676	704	165	255	512	594	595	139
37	364	634	654	687	714	177	269	523	605	606	148
38	341	643	664	698	723	188	281	534	614	616	157
39	389	652	674	707	730	200	295	544	624	625	166
40	361	661	683	715	737	212	308	554	632	635	176
41	387	669	691	723	745	224	321	564	640	643	185
42	418	677	700	729	752	237	335	574	649	652	195
43	419	685	707	736	760	249	347	582	656	660	203
44	403	692	714	743	768	261	359	590	663	667	212
45	425	699	720	751	776	273	372	599	670	674	221
46	443	706	726	758	785	285	383	607	676	681	229
47	455	712	732	766	792	296	394	614	682	687	238
48	445	719	738	774	800	308	405	621	688	693	247
49	446	724	744	782	807	320	417	628	693	699	256
50	475	729	752	790	815	331	428	635	699	706	265
51	502	733	758	797	821	343	439	642	703	712	274
52	506	739	766	805	829	354	449	648	708	718	282
53	508	744	772	811	835	365	458	653	712	724	291

(Cont...)

TABLE 7
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE I
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline I										
	Air	Plate				Steelwork					
	A2	P11	P12	P13	P14	S20	S21	S22	S23	S24	S25
54	504	750	779	818	842	376	467	658	716	729	299
55	502	756	785	825	850	387	476	663	721	734	305
56	525	762	792	832	857	398	485	668	726	740	314
57	511	768	798	838	865	409	492	672	732	747	320
58	529	775	804	845	872	419	500	677	737	755	328
59	521	781	810	852	879	431	507	682	742	762	335
60	524	788	816	858	886	445	514	686	747	770	342
61	530	795	822	864	891	463	521	690	752	777	351
62	538	801	828	869	901	492	527	694	757	784	357
63	549	807	834	874	908	499	535	700	761	792	366
64	560	813	841	880	911	500	543	705	766	800	373
65	583	820	848	886	915	506	550	710	772	806	380
66	583	827	855	893	919	513	558	715	777	813	388
67	593	834	862	899	924	519	566	720	784	819	396
68	601	840	868	904	929	526	574	725	790	825	403
69	611	845	873	908	932	533	581	730	795	831	410
70	617	851	878	912	936	540	588	735	801	836	418
71	623	858	883	916	941	547	596	740	808	842	424
72	629	863	888	920	944	553	603	746	814	847	434
73	637	869	893	924	948	560	610	751	821	852	441
74	644	874	898	928	951	567	617	757	827	857	451
75	652	880	902	933	956	574	624	763	836	862	461
76	661	886	906	936	959	581	631	769	843	867	470
77	665	890	910	939	962	588	638	774	848	871	480
78	668	895	913	941	965	595	645	781	853	875	489
79	676	898	916	943	967	602	651	786	858	879	498
80	680	902	919	945	969	608	658	792	862	883	506
81	684	903	920	945	969	615	664	797	865	886	513
82	687	905	921	944	969	621	669	801	867	888	521
83	689	909	924	947	972	627	675	805	871	891	528
84	697	913	927	950	975	633	681	810	875	894	536
85	700	918	931	954	978	639	686	815	879	897	543
86	707	921	934	957	981	645	692	819	882	900	550
87	709	923	936	958	982	650	697	824	885	903	556
88	724	925	937	959	982	656	702	828	887	905	560
89	726	928	938	960	984	661	707	831	889	907	566
90	726	930	940	961	986	667	711	835	892	910	572
91	718	904	916	934	953	671	714	835	882	905	567
92	702	875	890	902	913	673	714	824	862	890	556
93	688	848	865	873	879	673	712	810	840	870	545
94	673	825	841	845	851	672	708	795	819	849	534
95	664	804	820	822	826	670	703	783	802	828	525
96	686	794	800	802	805	668	699	774	791	811	528
97	686	785	788	785	787	666	696	766	783	798	538
98	684	774	781	777	775	664	693	758	773	789	544
99	680	764	772	767	766	662	689	750	765	782	549
100	676	755	763	758	758	660	686	743	756	775	552
101	671	747	753	748	751	657	683	736	748	768	555
102	664	738	745	740	744	655	679	728	741	761	555
103	657	730	737	733	737	652	675	721	733	754	555
104	652	721	729	725	728	649	671	714	725	746	554
105	649	713	721	716	720	646	668	707	718	738	553
106	646	705	712	707	711	643	664	700	710	731	552

(Cont...)

TABLE 7
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE I
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline I										
	Air	Plate					Steelwork				
	A2	P11	P12	P13	P14	S20	S21	S22	S23	S24	S25
107	642	697	704	697	702	640	660	693	703	723	550
108	639	688	695	687	693	636	656	686	695	715	547
109	635	681	687	678	684	633	653	680	688	707	545
110	631	673	679	669	676	629	649	675	680	698	542
111	628	665	671	661	667	626	645	673	673	690	539
112	624	660	663	652	660	622	641	670	671	682	536
113	620	658	656	646	656	618	637	662	668	676	533
114	616	654	652	643	651	615	633	655	663	674	530
115	611	648	651	639	644	611	629	647	656	669	527
116	607	640	646	632	637	607	625	641	648	662	524
117	602	633	639	625	629	603	620	634	641	655	521
118	597	625	631	617	622	599	616	627	634	647	518
119	593	618	623	609	615	595	611	621	626	639	515
120	588	611	615	602	608	591	607	614	619	631	511
121	583	605	608	595	601	587	603	608	613	623	508
122	579	598	601	588	595	583	598	602	606	616	505
123	574	592	594	582	589	578	594	596	600	609	502
124	570	586	588	576	583	574	589	591	594	602	499
125	565	580	581	570	577	570	585	585	588	596	495
126	561	574	576	564	571	566	581	580	582	590	492
127	557	569	570	560	566	562	576	575	577	584	489
128	553	563	564	554	560	558	572	569	571	577	485
129	549	558	559	549	555	554	568	564	566	572	482
130	544	553	553	543	550	549	563	559	561	566	479
131	540	548	549	539	545	546	559	555	556	561	476
132	536	543	543	534	540	542	555	550	551	556	472
133	532	539	539	529	535	538	551	546	546	551	469
134	528	534	534	524	531	534	547	541	542	546	466
135	524	530	529	520	527	530	543	537	537	541	463
136	521	525	525	516	523	526	539	533	533	537	461
137	517	521	520	511	518	522	535	528	528	532	457
138	513	517	516	507	514	519	532	524	524	528	454
139	510	513	512	504	510	515	528	520	520	524	452
140	506	509	508	499	506	511	524	516	516	519	449
141	502	505	505	496	502	507	520	512	512	515	446
142	499	501	501	492	499	504	517	509	508	511	443
143	496	498	497	488	495	501	513	505	504	507	441
144	492	494	493	485	492	497	510	501	501	504	438
145	489	491	490	481	488	494	506	498	497	500	435
146	485	487	486	478	485	490	503	494	494	496	433
147	482	484	483	474	481	487	500	491	490	492	430
148	480	480	480	471	478	484	496	487	487	489	428
149	476	477	476	468	475	481	493	484	483	486	425
150	473	474	473	465	472	477	490	481	480	482	423
151	470	471	470	462	469	474	487	478	477	479	420
152	467	468	467	459	465	471	484	475	474	476	418
153	465	465	464	456	462	468	481	472	471	472	416
154	461	462	461	453	460	465	478	469	468	469	414
155	459	459	458	450	457	462	475	466	465	466	411
156	456	456	455	447	454	459	472	463	462	463	409
157	453	453	452	444	451	457	469	460	459	460	406
158	451	450	449	442	448	454	466	457	456	457	404
159	448	448	447	439	445	451	463	454	453	454	402
160	445	445	444	437	443	448	461	451	450	452	400

(Cont...)

TABLE 7
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE I
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline I										
	Air	Plate				Steelwork					
	A2	P11	P12	P13	P14	S20	S21	S22	S23	S24	S25
161	443	442	441	434	440	446	458	449	448	449	398
162	440	439	439	432	437	443	455	446	445	446	396
163	438	437	436	429	435	440	453	443	442	443	394
164	435	434	434	427	432	438	450	441	440	441	392
165	433	432	431	424	430	435	448	438	437	438	390
166	430	429	429	421	428	433	445	436	435	436	388
167	428	427	426	419	425	430	443	433	432	433	386
168	426	425	424	417	423	428	440	431	430	431	384
169	423	422	422	415	420	425	438	429	427	428	382
170	421	420	419	413	418	423	435	426	425	426	380
171	419	418	417	410	416	421	433	424	423	423	378
172	416	415	415	408	414	418	430	422	420	421	376
173	414	413	413	406	412	416	428	419	418	419	375
174	412	411	410	404	409	414	426	417	416	416	373
175	410	409	408	402	407	412	424	415	414	414	371
176	408	407	406	400	405	409	421	413	411	412	369
177	406	405	404	398	403	407	419	411	409	410	367
178	404	402	402	396	401	405	417	408	407	408	366
179	402	401	400	394	399	403	415	406	405	406	364
180	400	399	398	392	397	401	413	404	403	404	362
181	398	396	397	391	395	399	411	402	401	401	361
182	396	394	395	390	393	397	409	400	399	400	359
183	394	392	393	388	391	395	407	398	397	397	358
184	392	390	390	386	389	393	405	396	395	395	356
185	390	388	388	383	387	390	402	394	393	393	354
186	388	387	387	382	385	389	401	392	391	392	353
187	386	385	385	380	383	387	399	390	389	390	351
188	385	383	383	378	382	385	397	388	387	388	349
189	383	381	381	376	380	383	395	387	386	386	348
190	381	379	379	374	378	381	393	385	384	384	346
191	379	378	377	372	376	379	391	383	382	382	345
192	377	376	375	370	374	378	389	381	380	380	343
193	376	374	374	368	373	376	387	379	378	378	342
194	374	372	372	367	371	374	385	378	377	377	340
195	372	370	370	365	369	372	384	376	375	375	339
196	371	369	369	364	368	370	382	374	373	373	338
197	369	367	367	363	366	369	380	373	372	372	336
198	367	366	366	361	365	367	378	371	370	370	335
199	366	365	365	360	364	365	377	370	369	369	334
200	364	363	363	359	363	364	375	368	367	367	332
201	363	362	362	358	361	362	373	367	366	366	331
202	361	361	361	357	360	360	372	365	364	364	330
203	360	359	359	356	359	359	370	364	363	363	328
204	359	358	358	354	358	357	369	362	362	362	327
205	357	357	357	354	356	356	367	361	360	360	326
206	356	355	356	353	355	354	365	360	359	359	324
207	354	354	354	351	354	353	364	358	358	358	323
208	353	353	353	349	353	351	362	357	356	356	322
209	352	351	352	348	351	350	361	355	355	355	321
210	350	350	351	347	350	348	359	354	354	354	320
211	349	349	350	346	349	347	358	353	352	353	318
212	348	348	348	344	348	346	357	352	351	351	317
213	346	347	347	343	346	344	355	350	350	350	316
214	345	345	346	342	345	343	354	349	349	349	315

(Cont...)

**TABLE 7
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE I
(Continued)**

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline I										
	Air	Plate				Steelwork					
	A2	P11	P12	P13	P14	S20	S21	S22	S23	S24	S25
215	344	344	344	341	344	341	352	348	347	348	313
216	343	343	343	339	343	340	351	346	346	347	312
217	341	342	342	338	342	339	350	345	345	345	311
218	340	340	341	337	341	337	348	344	344	344	310
219	339	339	340	336	340	336	347	343	343	343	309
220	337	338	338	335	338	335	346	342	341	342	308
221	336	337	337	334	337	333	344	340	340	341	307
222	335	336	336	333	336	332	343	339	339	340	306
223	334	335	335	332	335	331	342	338	338	338	305
224	333	334	334	331	334	330	341	337	337	337	304
225	331	332	333	330	333	328	339	336	336	336	303
226	330	331	332	329	332	327	338	333	334	335	302
227	329	330	331	328	331	326	337	333	333	334	301
228	328	329	330	327	329	325	336	332	332	333	299
229	327	328	329	326	328	324	335	331	331	332	298
230	326	327	327	325	327	323	333	330	330	331	297
231	325	326	326	323	326	321	332	329	329	330	296
232	323	325	325	322	325	320	331	328	328	328	295
233	322	324	324	321	324	319	330	327	327	327	294
234	321	323	323	320	323	318	329	326	326	326	293
235	320	322	322	319	322	317	328	325	325	325	293
236	319	321	321	319	321	316	326	324	324	324	292
237	318	320	320	318	320	315	325	323	322	323	291
238	317	319	319	317	319	314	324	321	322	322	290
239	316	317	318	315	318	312	323	320	320	321	289
240	315	316	317	314	317	311	322	319	319	320	288
241	314	315	316	314	316	310	321	318	318	319	287
242	313	314	315	312	315	309	320	317	317	318	286

TABLE 8
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE C

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline C									
	Air	Plate				Section				
	A1	P1	P2	P3	P4	S1	S2	S3	S4	S5
0	19	20	20	20	20	19	19	19	19	19
1	19	34	33	38	43	19	29	31	24	19
2	20	42	42	48	56	19	36	39	33	19
3	21	50	50	58	66	19	45	47	41	19
4	23	59	59	70	80	20	57	56	49	19
5	27	71	71	79	95	21	70	67	58	19
6	31	83	83	99	112	22	83	79	69	20
7	36	96	96	114	128	24	98	92	81	21
8	41	113	110	131	148	26	112	106	95	22
9	44	136	128	151	170	28	129	124	106	23
10	46	157	146	171	190	30	147	142	119	24
11	49	177	166	192	212	32	165	160	135	25
12	54	198	185	213	234	34	184	180	152	27
13	59	218	206	234	256	36	204	200	169	28
14	64	240	227	257	279	38	224	220	186	30
15	69	261	248	278	301	40	244	241	201	32
16	76	282	268	300	323	42	265	262	221	34
17	84	303	289	321	345	45	285	285	241	37
18	90	325	310	343	368	49	305	308	261	41
19	98	345	329	364	389	53	327	330	281	46
20	105	365	348	384	409	57	347	352	298	52
21	114	384	366	403	427	61	367	374	317	57
22	124	404	384	421	446	64	387	395	334	63
23	135	423	402	440	464	68	406	415	352	68
24	145	441	420	458	482	71	425	434	370	72
25	157	458	437	475	499	75	442	452	386	76
26	168	475	454	491	515	79	458	470	404	79
27	179	492	470	507	531	82	474	488	419	82
28	190	508	487	522	545	85	489	504	435	84
29	202	523	502	538	560	87	504	520	451	85
30	216	537	517	551	574	89	518	533	465	86
31	229	551	532	564	587	91	531	547	480	87
32	243	564	545	576	599	92	544	560	494	87
33	256	577	559	590	611	94	557	573	508	88
34	268	590	572	602	623	95	570	585	521	88
35	281	602	585	615	635	97	582	598	534	88
36	291	614	598	626	647	99	595	609	546	89
37	305	626	609	638	657	103	606	620	558	91
38	318	636	620	649	668	107	617	631	569	94
39	334	647	630	658	677	111	628	641	579	96
40	352	657	640	668	686	116	637	649	589	100
41	370	666	649	678	695	121	647	657	599	104
42	385	674	658	686	704	126	656	666	609	108
43	398	682	666	695	712	132	664	674	618	112
44	411	691	675	703	719	139	672	681	626	117
45	422	699	682	711	725	145	680	688	634	120
46	432	707	690	718	731	152	688	695	643	126
47	442	714	697	724	737	159	695	702	651	132
48	452	720	703	729	743	167	702	708	659	138
49	460	727	710	735	751	173	708	715	666	143
50	466	734	717	741	757	181	714	721	672	149
51	475	739	722	749	765	188	720	726	679	154
52	481	743	725	755	772	196	725	731	685	160
53	488	748	731	763	781	203	730	736	691	167
54	495	753	737	769	787	210	732	740	695	172

(Cont..)

TABLE 8
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE C
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline C									
	Air	Plate				Section				
	A1	P1	P2	P3	P4	S1	S2	S3	S4	S5
55	502	758	743	777	794	218	738	745	701	179
56	508	764	748	784	801	226	744	751	707	185
57	514	770	755	791	808	234	750	755	713	191
58	518	774	759	796	813	242	756	760	720	198
59	524	779	765	805	820	249	763	765	723	204
60	528	786	771	812	825	257	769	770	729	210
61	531	791	776	818	831	266	775	776	733	217
62	535	798	782	826	838	276	781	782	739	226
63	540	804	788	832	844	288	786	789	745	232
64	541	810	795	837	850	299	792	794	750	238
65	538	816	801	844	857	308	797	800	756	247
66	538	822	808	850	864	318	803	806	762	256
67	542	828	814	856	871	327	808	811	767	264
68	538	834	820	863	877	338	813	817	773	272
69	543	838	826	869	883	346	818	822	778	280
70	548	844	832	875	888	355	824	827	784	289
71	552	849	838	881	894	363	829	832	789	296
72	555	854	843	886	899	373	835	838	794	303
73	560	859	849	892	904	381	840	843	799	310
74	564	864	854	896	908	390	846	848	804	318
75	568	870	860	902	913	398	851	854	810	325
76	572	877	866	906	917	404	857	859	815	332
77	574	881	870	911	921	413	862	865	819	338
78	577	886	875	915	925	421	867	870	825	345
79	582	891	879	919	927	428	872	874	830	352
80	586	895	884	922	931	435	875	879	834	359
81	591	897	886	924	932	443	879	882	838	365
82	596	901	889	926	933	449	881	885	842	372
83	600	905	893	929	936	455	885	889	845	378
84	605	908	896	933	939	462	888	893	848	384
85	610	912	899	936	942	468	891	896	852	390
86	614	915	902	939	945	474	894	899	855	396
87	619	919	905	943	947	480	898	902	859	402
88	623	921	908	945	950	486	900	904	862	408
89	628	922	910	947	951	492	903	907	865	413
90	632	926	913	949	953	498	905	910	868	419
91	631	901	896	929	931	503	902	899	867	423
92	631	878	875	902	898	510	888	881	857	427
93	632	856	854	877	868	517	864	861	841	431
94	629	834	834	854	843	522	839	840	825	434
95	622	813	815	833	821	526	816	819	808	436
96	617	800	798	815	803	527	799	805	794	441
97	620	793	790	803	793	529	790	799	785	447
98	618	784	782	797	784	530	784	791	778	451
99	615	774	772	788	774	531	775	781	770	455
100	612	765	763	778	764	532	765	772	762	458
101	608	756	755	769	755	533	756	763	754	460
102	604	747	746	761	745	533	748	755	746	462
103	601	739	738	753	737	532	739	747	739	463
104	597	730	730	744	728	532	730	738	731	463
105	593	722	722	736	719	531	722	730	724	464
106	588	713	714	728	710	529	713	721	716	464
107	583	705	706	719	701	527	705	712	708	463
108	579	696	698	710	693	526	696	704	700	463

(Cont...)

TABLE 8
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE C
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline C									
	Air	Plate				Section				
	A1	P1	P2	P3	P4	S1	S2	S3	S4	S5
109	575	688	689	701	684	524	688	695	692	462
110	572	679	681	692	675	522	680	686	684	461
111	569	671	673	684	667	519	672	678	676	459
112	565	665	665	676	661	517	670	674	669	457
113	563	662	660	669	657	515	666	670	668	455
114	559	659	657	667	651	513	658	665	662	454
115	555	652	654	662	645	510	650	658	654	452
116	551	644	646	654	637	507	642	650	648	451
117	547	635	638	646	630	505	634	641	640	449
118	543	627	630	637	622	502	626	633	632	447
119	539	619	622	630	615	500	618	625	625	446
120	535	612	613	622	608	497	610	617	617	443
121	531	604	606	615	601	494	603	610	609	441
122	527	597	599	608	595	492	596	603	602	440
123	524	590	592	601	588	489	589	596	595	438
124	520	584	585	594	582	486	582	589	588	436
125	516	577	579	588	576	483	575	582	582	434
126	512	571	573	582	570	481	569	576	575	432
127	508	565	566	576	564	478	563	570	569	429
128	504	559	561	571	559	475	557	564	564	428
129	501	554	555	565	554	473	551	558	558	425
130	497	548	550	560	549	470	546	553	553	424
131	494	543	545	554	544	467	540	547	547	422
132	491	538	540	549	539	464	535	542	542	420
133	487	533	535	544	534	462	530	537	537	418
134	483	528	530	539	529	459	525	532	532	416
135	480	524	525	534	525	456	520	528	528	414
136	477	519	521	530	520	453	516	523	523	412
137	474	515	516	525	516	451	511	519	518	410
138	471	511	512	520	512	448	507	514	514	408
139	468	506	508	516	508	445	503	510	510	406
140	465	502	504	512	504	443	498	506	506	404
141	462	498	499	508	500	440	494	501	502	402
142	459	494	495	504	496	438	490	497	498	400
143	456	490	492	500	492	435	486	494	494	398
144	453	487	488	496	489	433	483	490	490	396
145	451	483	484	492	485	430	479	486	486	394
146	448	480	481	489	482	428	475	483	483	392
147	445	476	477	485	478	425	472	479	479	391
148	443	472	474	481	475	423	468	475	476	388
149	440	469	471	478	472	421	465	472	472	387
150	437	466	467	474	468	419	461	468	469	385
151	435	462	464	471	465	416	458	465	466	383
152	432	459	461	468	462	414	455	462	462	381
153	429	456	458	465	459	412	452	459	459	379
154	427	453	454	462	456	409	449	456	456	377
155	424	450	452	458	453	407	446	453	453	376
156	422	447	449	455	450	405	443	450	450	374
157	420	444	446	452	447	403	439	447	447	372
158	417	441	443	450	444	401	437	444	444	370
159	415	438	440	447	442	398	434	441	441	369
160	412	436	437	444	439	396	431	438	439	367
161	410	433	435	441	436	394	429	435	436	366
162	408	430	432	438	434	392	426	433	433	364

(Cont...)

TABLE 8
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE C
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline C									
	Air	Plate				Section				
	A1	P1	P2	P3	P4	S1	S2	S3	S4	S5
163	405	428	429	436	431	390	423	430	431	362
164	403	425	427	433	429	388	421	427	428	360
165	401	423	424	430	426	386	418	425	425	359
166	399	420	422	428	424	384	416	422	423	358
167	397	418	419	425	421	382	413	420	420	356
168	394	415	417	423	419	380	411	417	418	354
169	393	413	415	421	417	378	409	415	416	353
170	390	411	412	418	414	376	406	413	413	351
171	388	408	410	416	412	374	404	411	411	350
172	387	406	408	413	410	373	402	408	409	348
173	385	404	406	411	408	371	400	406	406	347
174	383	402	403	409	405	369	397	404	404	345
175	380	399	401	407	403	367	395	401	402	344
176	379	397	399	405	401	366	393	399	400	343
177	377	395	397	402	399	364	391	397	398	341
178	375	393	395	400	397	362	389	395	396	340
179	374	391	393	398	395	360	387	393	394	339
180	372	389	391	396	393	359	385	391	391	337
181	370	387	388	393	390	357	383	389	389	336
182	369	385	387	392	389	355	381	387	388	334
183	367	383	385	390	387	354	379	385	386	333
184	366	381	382	388	385	352	377	383	384	331
185	364	379	381	386	383	351	375	381	382	330
186	363	377	379	384	381	349	373	379	380	329
187	361	375	377	382	379	348	371	377	378	328
188	360	373	375	380	377	346	370	375	376	326
189	358	372	373	378	376	344	368	373	374	325
190	357	370	372	377	374	343	366	372	372	324
191	355	368	370	375	372	341	364	370	370	322
192	354	366	368	373	370	340	362	368	369	321
193	352	364	366	371	368	338	361	366	367	320
194	351	363	365	369	367	337	359	365	365	319
195	349	361	363	367	365	336	357	363	363	318
196	348	359	361	366	363	334	356	361	362	316
197	347	358	360	364	362	333	354	360	360	315
198	346	356	358	363	361	331	353	358	359	314
199	344	355	357	362	360	330	351	357	357	313
200	343	353	356	360	358	329	350	355	356	312
201	341	352	354	359	357	327	349	354	354	311
202	340	351	353	358	356	326	347	352	353	310
203	339	349	352	356	355	325	346	351	352	309
204	338	348	351	355	354	323	345	350	351	308
205	336	347	349	354	352	322	344	348	349	307
206	335	345	348	352	351	321	342	347	348	306
207	334	344	347	351	350	319	341	346	347	305
208	332	343	346	350	349	318	340	344	345	304
209	331	342	344	349	348	317	339	343	344	303
210	330	340	343	348	346	315	337	342	343	302
211	329	339	342	346	345	314	336	341	342	301
212	328	338	341	345	344	313	335	340	340	300
213	327	337	340	344	343	312	334	338	339	299
214	325	336	338	343	342	311	333	337	338	298
215	324	334	337	342	341	309	332	336	337	297
216	323	333	336	340	339	308	330	335	336	296

(Cont...)

TABLE 8
TEMPERATURES MEASURED IN MEMBER 1A AT GRIDLINE C
(Continued)

Time (min)	Temperatures (°C) Recorded in Member 1A at Gridline C									
	Air	Plate				Section				
	A1	P1	P2	P3	P4	S1	S2	S3	S4	S5
217	322	332	335	339	338	307	329	334	335	295
218	321	331	334	338	337	306	328	333	333	294
219	320	330	333	337	336	305	327	332	332	293
220	319	329	332	336	335	304	326	330	331	292
221	318	328	331	335	334	303	325	329	330	291
222	317	327	329	334	333	302	324	328	329	290
223	316	325	328	332	332	301	323	327	328	290
224	315	324	327	331	331	300	322	326	327	289
225	314	323	326	330	329	299	321	325	326	288
226	313	322	325	329	328	297	320	324	325	287
227	312	321	324	328	327	296	318	323	324	286
228	311	320	323	327	326	295	317	322	323	285
229	310	319	322	326	325	294	316	321	321	285
230	309	318	321	325	324	294	315	320	320	284
231	308	317	320	324	323	293	314	319	319	283
232	307	316	319	323	322	292	313	317	318	282
233	305	315	318	322	321	291	312	316	317	281
234	304	314	317	321	320	290	311	315	316	280
235	303	313	316	320	319	289	310	315	315	280
236	302	312	315	319	318	288	309	314	314	279
237	301	311	314	318	317	287	308	312	313	278
238	300	310	313	317	316	286	307	311	312	277
239	299	309	312	316	315	285	306	310	311	276
240	299	308	311	315	314	284	305	309	310	276
241	298	307	310	314	313	283	304	308	309	275
242	297	306	309	313	312	282	304	308	308	274

TABLE 9
TEMPERATURES MEASURED IN CONCRETE AROUND THE REBAR

Time (min)	Concrete Around Rebar at Gridline H					
	Temperature (°C)					
	C13	C14	C15	C16	C17	C18
0	20	20	20	20	20	20
1	20	20	20	20	20	21
2	22	20	22	23	20	24
3	24	20	24	26	20	27
4	27	21	26	29	20	31
5	30	21	29	32	20	34
6	35	22	32	36	20	38
7	43	24	40	42	21	43
8	100	25	76	49	22	49
9	102	28	87	56	24	55
10	102	35	91	64	40	62
11	102	44	94	71	56	69
12	102	53	95	77	66	75
13	102	62	96	82	72	81
14	101	72	98	87	77	86
15	101	78	99	92	80	93
16	101	82	100	97	82	99
17	101	85	101	102	85	102
18	101	87	101	106	86	103
19	101	88	102	109	88	103
20	101	91	102	110	90	104
21	101	94	104	113	93	107
22	103	96	107	114	97	110
23	108	97	111	117	99	114
24	113	99	114	121	100	118
25	117	100	118	124	100	122
26	123	101	122	128	100	126
27	128	101	126	132	101	131
28	134	101	129	138	101	136
29	139	101	133	144	101	142
30	145	100	137	150	101	149
31	151	101	141	158	101	155
32	158	101	146	167	101	162
33	165	101	150	177	101	168
34	172	101	154	188	101	176
35	180	101	158	199	101	183
36	189	101	162	211	101	191
37	197	101	158	223	101	199
38	206	101	160	233	101	207
39	215	101	162	244	101	215
40	223	101	163	254	101	223
41	232	102	166	264	101	231
42	241	101	172	274	101	239
43	250	101	176	283	101	246
44	259	101	182	292	101	254
45	268	101	192	302	101	261
46	278	102	200	311	101	269
47	288	107	208	320	101	276
48	297	113	215	329	101	284
49	307	119	224	338	101	291
50	316	126	231	347	101	299
51	326	134	240	356	101	307
52	335	141	248	364	101	314
53	345	149	256	373	101	322
54	354	156	265	382	102	331

(Cont...)

TABLE 9
TEMPERATURES MEASURED IN CONCRETE AROUND THE REBAR
(Continued)

Time (min)	Concrete Around Rebar at Gridline H					
	Temperature (°C)					
	C13	C14	C15	C16	C17	C18
55	363	164	273	390	102	339
56	372	171	281	399	103	347
57	381	179	289	407	107	355
58	390	188	297	415	111	363
59	399	195	305	424	116	371
60	408	203	313	431	122	379
61	416	212	321	440	129	388
62	425	219	329	446	136	396
63	433	226	337	454	143	403
64	442	234	345	461	150	411
65	450	241	353	469	157	419
66	458	249	361	477	163	426
67	466	256	368	484	170	434
68	474	262	375	491	177	441
69	482	270	383	499	183	449
70	489	276	390	505	190	456
71	496	283	398	513	196	463
72	504	291	405	520	202	470
73	511	298	412	526	207	477
74	517	304	418	532	213	483
75	524	311	426	538	220	490
76	531	317	432	544	225	496
77	537	324	439	551	231	503
78	544	331	446	557	237	509
79	551	336	452	562	243	515
80	557	343	458	569	249	520
81	564	350	464	576	255	526
82	571	356	470	582	262	532
83	577	363	476	588	268	537
84	583	369	482	593	273	543
85	589	375	488	599	280	548
86	594	382	493	605	285	553
87	601	387	499	611	291	559
88	607	393	504	616	297	564
89	613	399	510	622	303	570
90	618	405	515	627	309	575
91	624	411	520	633	314	580
92	629	417	525	638	320	585
93	634	422	529	642	325	588
94	638	427	532	645	331	589
95	641	433	535	646	337	588
96	643	439	536	647	342	587
97	643	444	537	647	347	585
98	644	449	538	645	353	582
99	643	454	538	644	358	580
100	642	459	538	642	363	577
101	641	463	537	640	367	574
102	639	467	537	637	372	571
103	637	471	536	635	377	568
104	635	475	535	632	381	566
105	633	479	534	630	385	563
106	631	482	533	627	389	560
107	628	486	532	624	393	557
108	626	489	531	621	397	554

(Cont...)

TABLE 9
TEMPERATURES MEASURED IN CONCRETE AROUND THE REBAR
(Continued)

Time (min)	Concrete Around Rebar at Gridline H					
	Temperature (°C)					
	C13	C14	C15	C16	C17	C18
109	623	491	530	618	401	552
110	620	494	528	614	405	549
111	617	497	527	611	408	546
112	614	499	526	608	411	544
113	612	501	524	605	414	541
114	609	503	523	601	417	538
115	606	505	521	598	420	536
116	603	506	520	595	423	533
117	600	508	518	592	425	531
118	597	509	517	589	428	528
119	594	510	515	585	430	526
120	591	511	514	582	432	524
121	588	512	512	579	434	521
122	585	513	511	576	436	519
123	582	513	509	573	438	517
124	579	514	508	570	440	515
125	576	514	506	568	441	513
126	573	515	505	565	443	511
127	570	515	503	562	444	509
128	568	515	502	559	445	507
129	565	515	501	556	447	505
130	562	515	499	553	448	503
131	559	515	498	550	449	501
132	557	514	496	548	450	499
133	554	514	495	545	450	497
134	551	514	494	542	451	496
135	548	513	492	540	452	494
136	546	513	491	537	452	493
137	543	512	490	534	453	491
138	541	512	488	532	453	490
139	538	511	487	529	454	488
140	535	510	486	527	454	487
141	533	510	485	525	454	486
142	530	509	484	522	454	484
143	528	508	482	520	455	483
144	525	507	481	517	455	481
145	523	506	480	515	455	479
146	521	505	479	513	455	478
147	519	504	477	511	455	476
148	516	503	476	509	455	474
149	514	502	475	507	454	472
150	512	501	473	504	454	470
151	510	499	472	502	454	469
152	508	498	470	500	454	467
153	506	497	469	498	453	465
154	504	496	468	496	453	464
155	502	495	466	494	452	462
156	500	493	465	493	452	460
157	498	492	463	491	452	459
158	496	491	462	489	451	457
159	493	490	460	487	451	455
160	492	488	459	485	450	454
161	490	487	457	483	449	452
162	488	486	456	481	449	451

(Cont...)

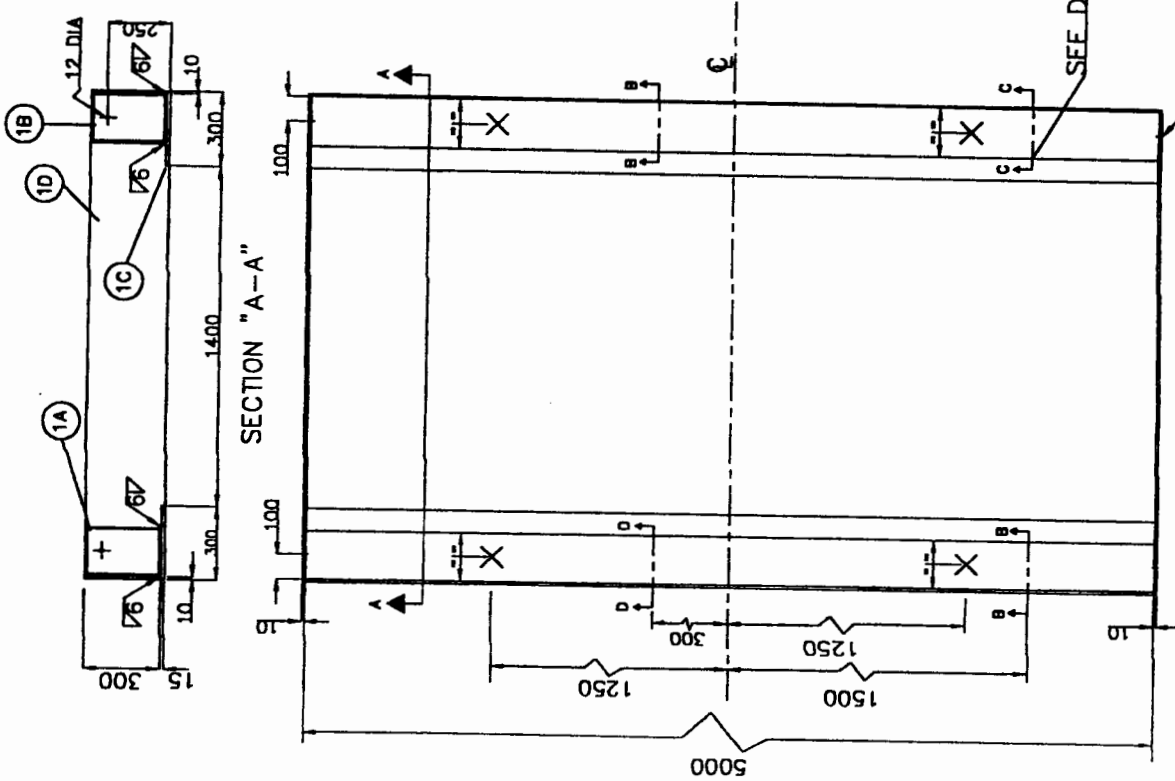
TABLE 9
TEMPERATURES MEASURED IN CONCRETE AROUND THE REBAR
(Continued)

Time (min)	Concrete Around Rebar at Gridline H					
	Temperature (°C)					
	C13	C14	C15	C16	C17	C18
163	486	484	454	479	448	449
164	485	483	453	477	447	448
165	483	482	451	476	447	446
166	481	481	450	474	446	445
167	479	479	449	472	445	443
168	478	478	447	470	445	442
169	476	477	446	468	444	440
170	474	475	444	467	443	439
171	472	474	443	465	442	437
172	471	473	441	463	441	436
173	469	471	440	461	441	435
174	467	470	439	460	440	433
175	465	469	437	458	439	432
176	464	467	436	456	438	430
177	462	466	435	455	437	429
178	460	465	433	453	436	428
179	459	463	432	451	435	426
180	457	462	431	450	434	425
181	455	461	429	448	433	423
182	454	459	428	446	433	422
183	452	458	427	445	432	421
184	450	456	425	443	431	420
185	448	455	424	441	430	418
186	447	454	423	440	429	417
187	445	452	421	438	428	416
188	443	451	420	437	427	414
189	442	450	419	435	426	413
190	440	448	417	433	425	412
191	439	447	416	432	424	411
192	437	446	415	430	423	409
193	435	444	414	429	422	408
194	434	443	412	427	421	407
195	432	442	411	426	420	406
196	431	440	410	424	419	404
197	429	439	409	423	418	403
198	427	438	408	422	417	402
199	426	436	406	420	416	401
200	424	435	405	419	415	399
201	423	434	404	417	414	398
202	421	432	403	416	413	397
203	420	431	402	414	412	396
204	418	430	401	413	411	395
205	417	428	400	412	410	394
206	415	427	398	410	408	392
207	414	426	397	409	407	391
208	412	424	396	408	406	390
209	411	423	395	406	405	389
210	410	422	394	405	404	388
211	408	420	393	404	403	387
212	407	419	392	402	402	386
213	406	418	391	401	401	385
214	404	417	390	400	400	384
215	403	415	388	398	399	383
216	402	414	387	397	398	382

(Cont...)

TABLE 9
TEMPERATURES MEASURED IN CONCRETE AROUND THE REBAR
(Continued)

Time (min)	Concrete Around Rebar at Gridline H					
	Temperature (°C)					
	C13	C14	C15	C16	C17	C18
217	400	413	386	396	397	381
218	399	412	385	395	396	380
219	398	410	384	393	395	379
220	397	409	383	392	394	378
221	395	408	382	391	393	377
222	394	407	381	390	392	376
223	393	406	380	389	391	375
224	392	404	379	387	390	374
225	390	403	378	386	389	373
226	389	402	377	385	388	372
227	388	401	377	384	387	371
228	387	400	375	383	386	370
229	385	399	375	382	385	369
230	384	397	373	380	384	368
231	383	396	372	379	383	367
232	382	395	371	378	382	366
233	381	394	371	377	381	365
234	380	393	370	376	380	364
235	378	392	369	375	379	363
236	377	391	368	374	378	362
237	376	389	367	373	377	361
238	375	388	366	371	376	360
239	374	387	365	370	375	359
240	373	386	364	369	374	358
241	372	385	363	368	374	358
242	371	384	362	367	373	357

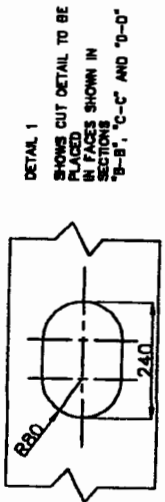


- NOTES:
1. ALL DIMENSIONS IN mm
 2. ALL WELDS TO BE 8mm CONTINUOUS FILLET WELDS ON ALL CONTACT FACES
 3. CROSS HATCHING NOT SHOWN ON SECTION "A-A"
 4. X INDICATES POSITION OF LIFTING LUGS (TO BE SUPPLIED BY WTRC TO FABRICATOR)

SECTION "B-B"
CUT TWO HOLES THRO' ITEMS 1A & 1B AT CENTRES SPECIFIED

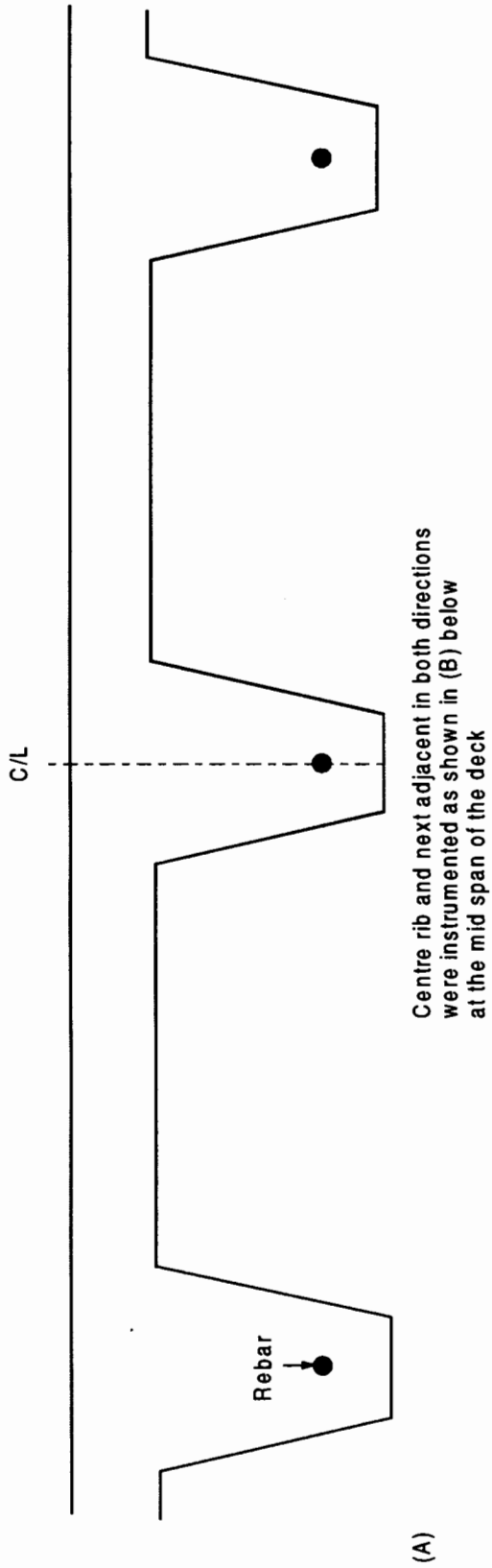
SECTION "C-C"
CUT ONE HOLE THRO' ITEM 1B AT CENTRES SPECIFIED
NOTE HOLE ON INNER FACE

SECTION "D-D"
AS SECTION "C-C" BUT FOR ITEM 1A HOLE ON INNER FACE

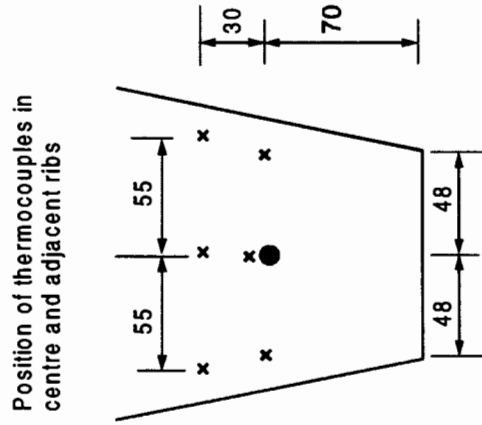


ITEM	TITLE	NO. REQD.
1A	300 X 200 X 8 RHS GRADE EN 10210 S275J2H 5000 LONG	1
1B	300 X 200 X 8 RHS GRADE EN 10210 S275J2H 5000 LONG	1
1C	5000 X 300 X 15 THK. PLATE GRADE EN 10025 S275J0	2
1D	315 X 2000 X 10 THK PLATE GRADE EN10025 S275J0	2

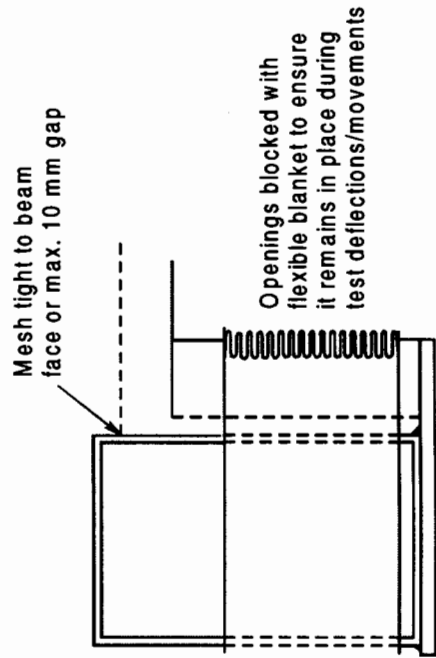
FIG. 1
RHS EDGE BEAM TEST ASSEMBLY



(A)



(B)

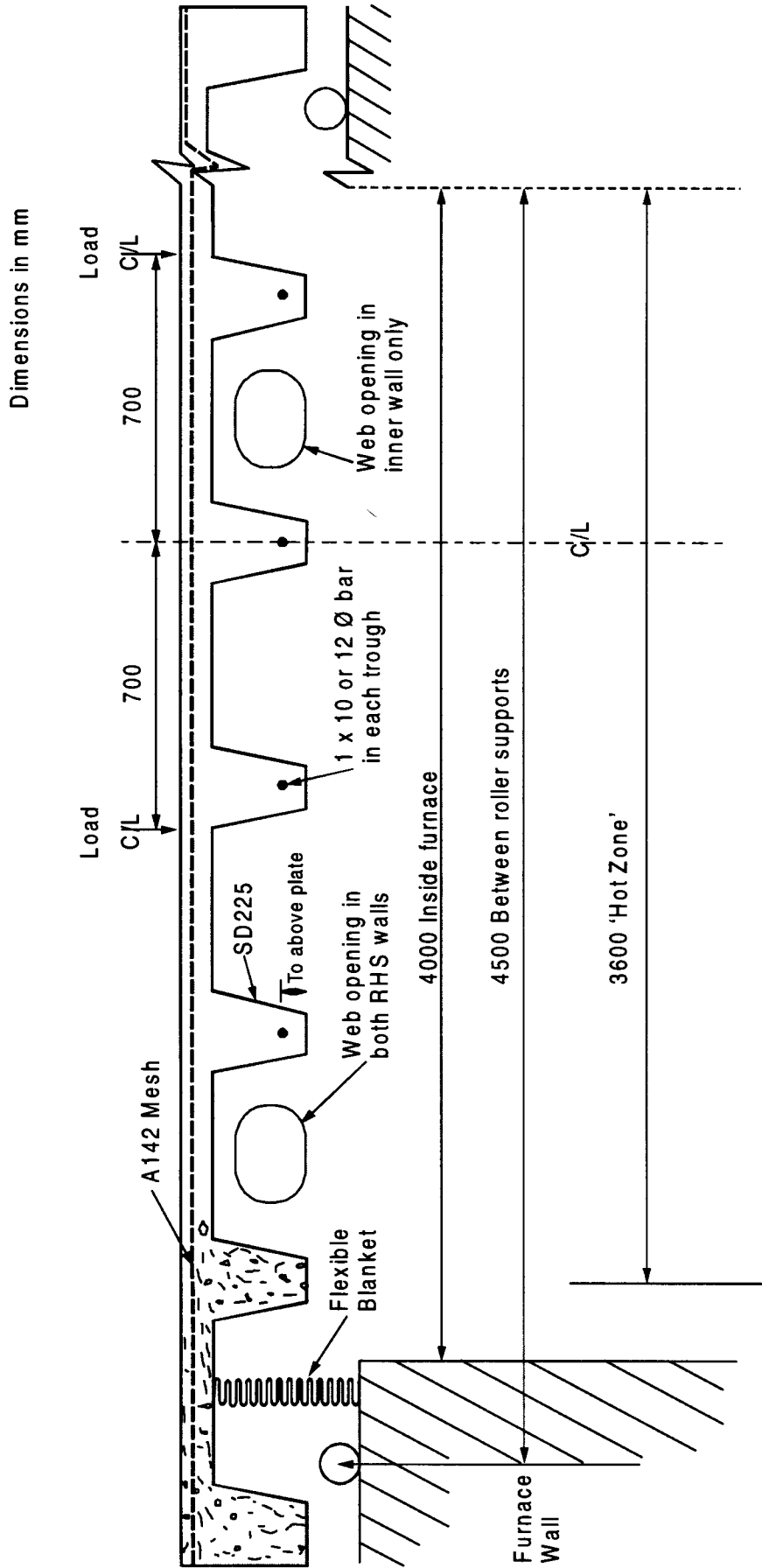


(C)

FIG. 2

CONSTRUCTION AND INSTRUMENTATION DETAIL

(D0393G10)



F3

FIG. 3

RHS EDGE BEAM WITH WEB OPENINGS -
POSITION ON FURNACE

(D0393G10)

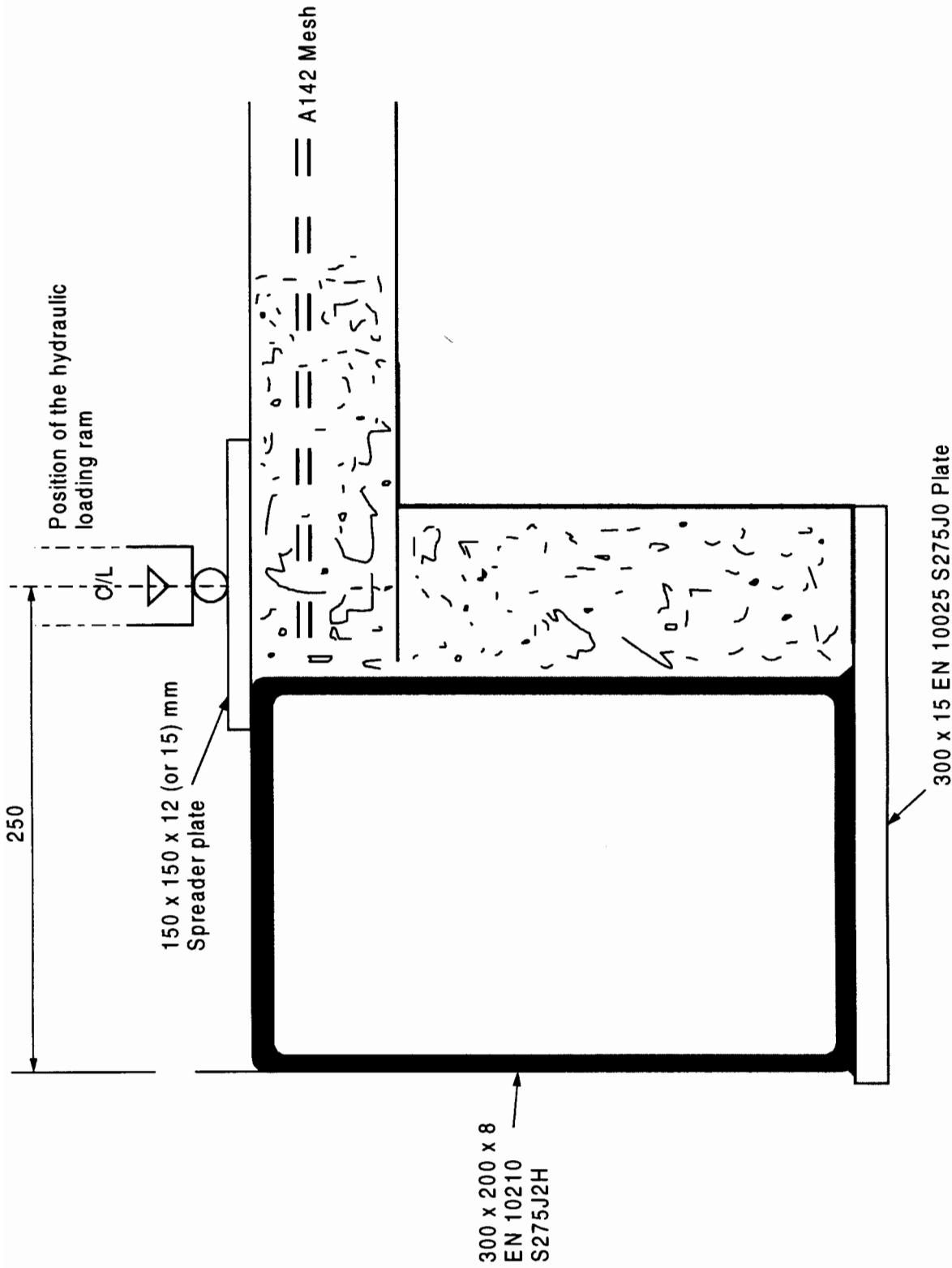


FIG. 4

DETAIL OF LOADING ARRANGEMENT

(D0393G10)

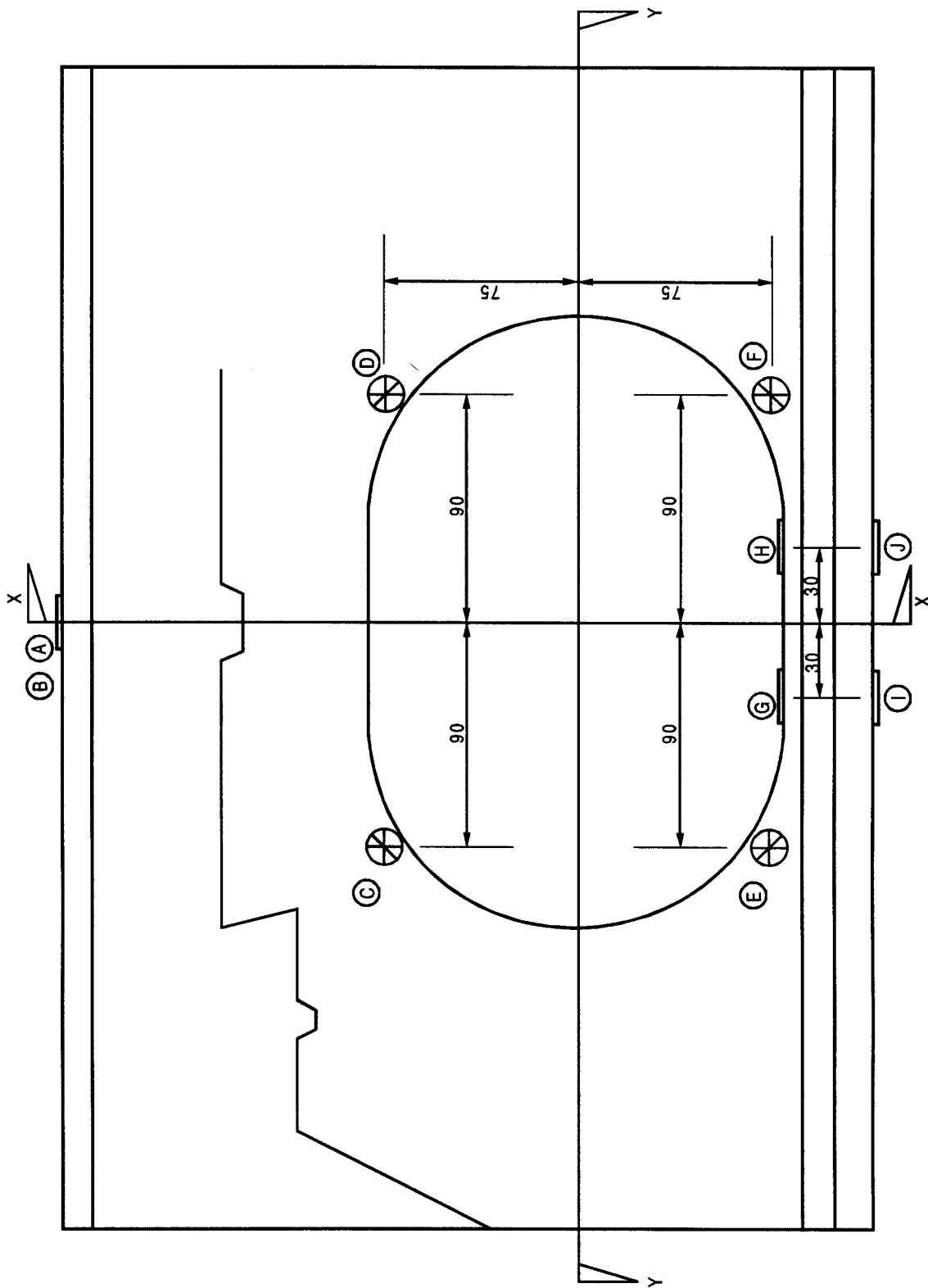
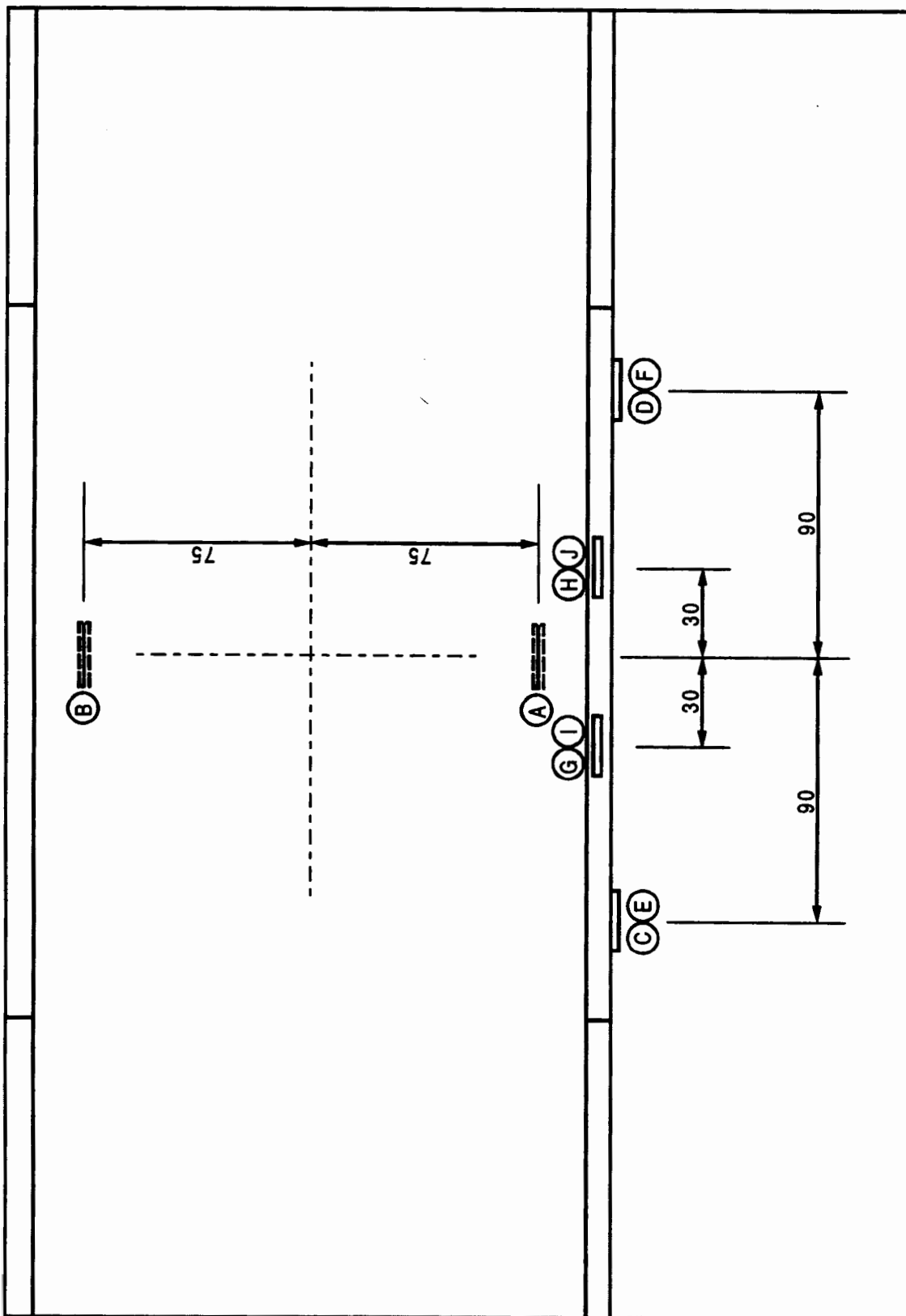


FIG. 5

POSITION OF THE STRAIN GAUGES ON RHS

(D03993G10)



(D0393G10)

SECTION Y-Y FROM FIG. 5

FIG. 6

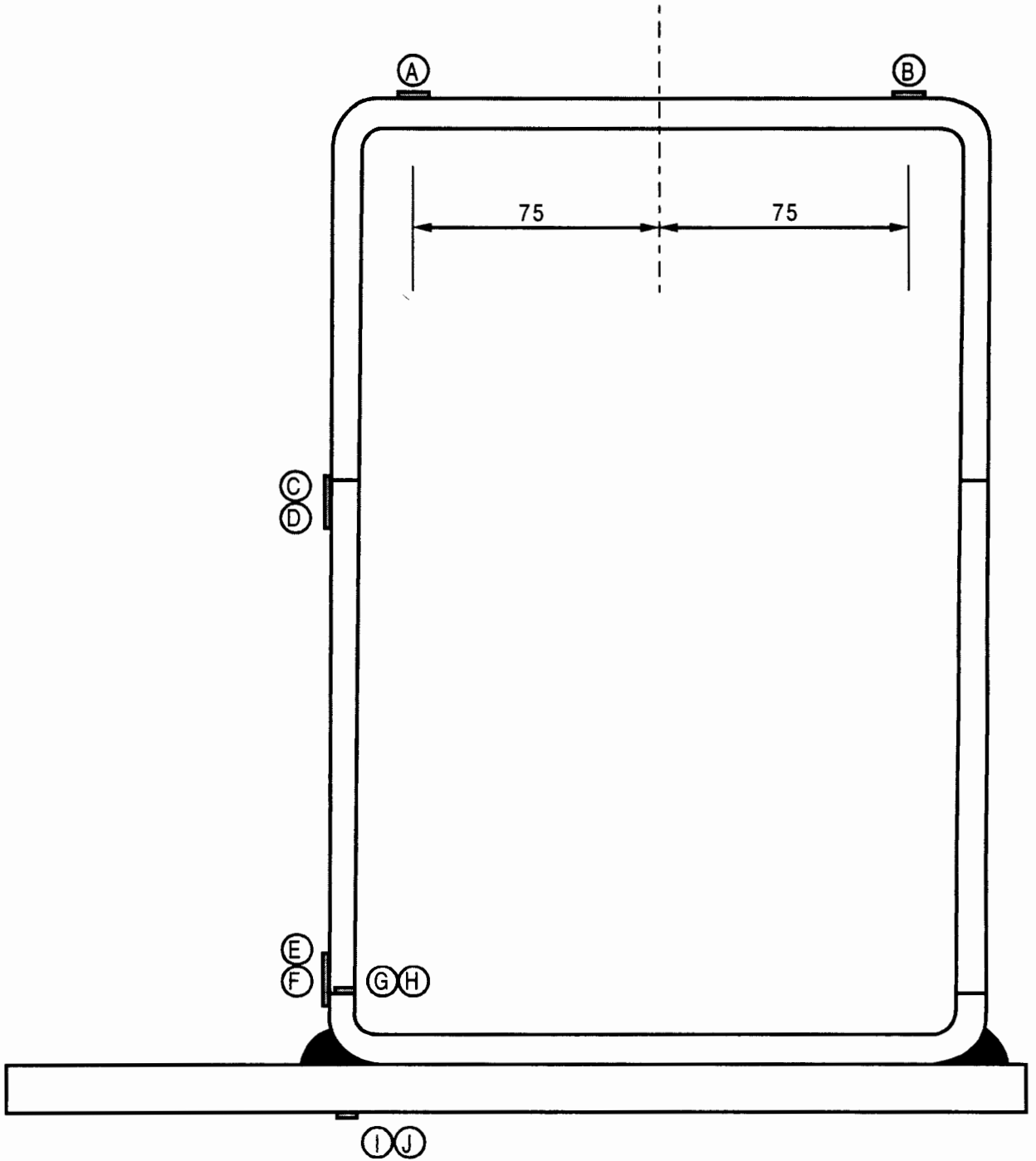
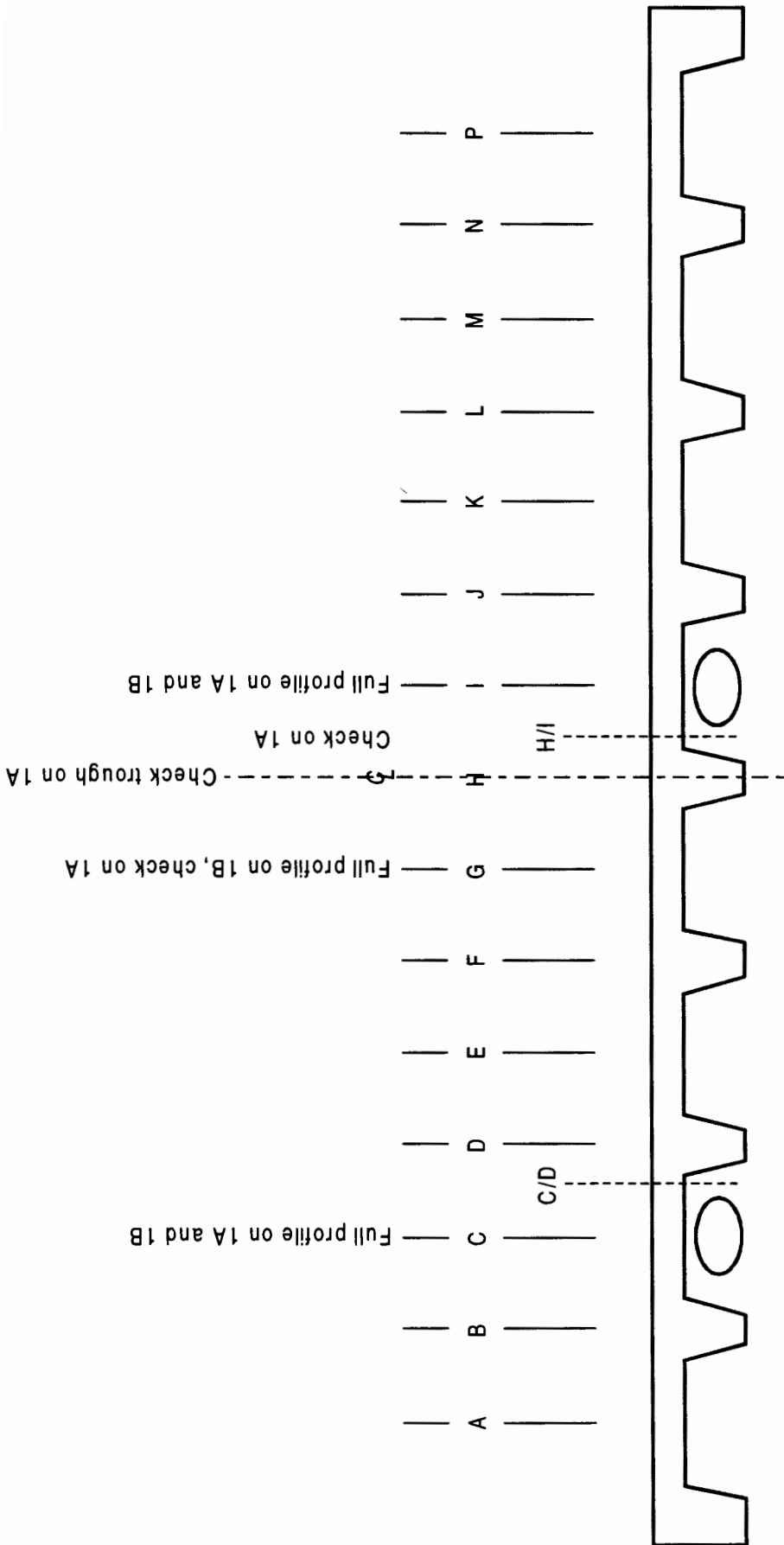


FIG. 7

SECTION X-X FROM FIG. 5

(D0393G11)



F8

(D0393G12)

POSITIONS ON THE SECTION WHICH WERE INSTRUMENTED

FIG. 8

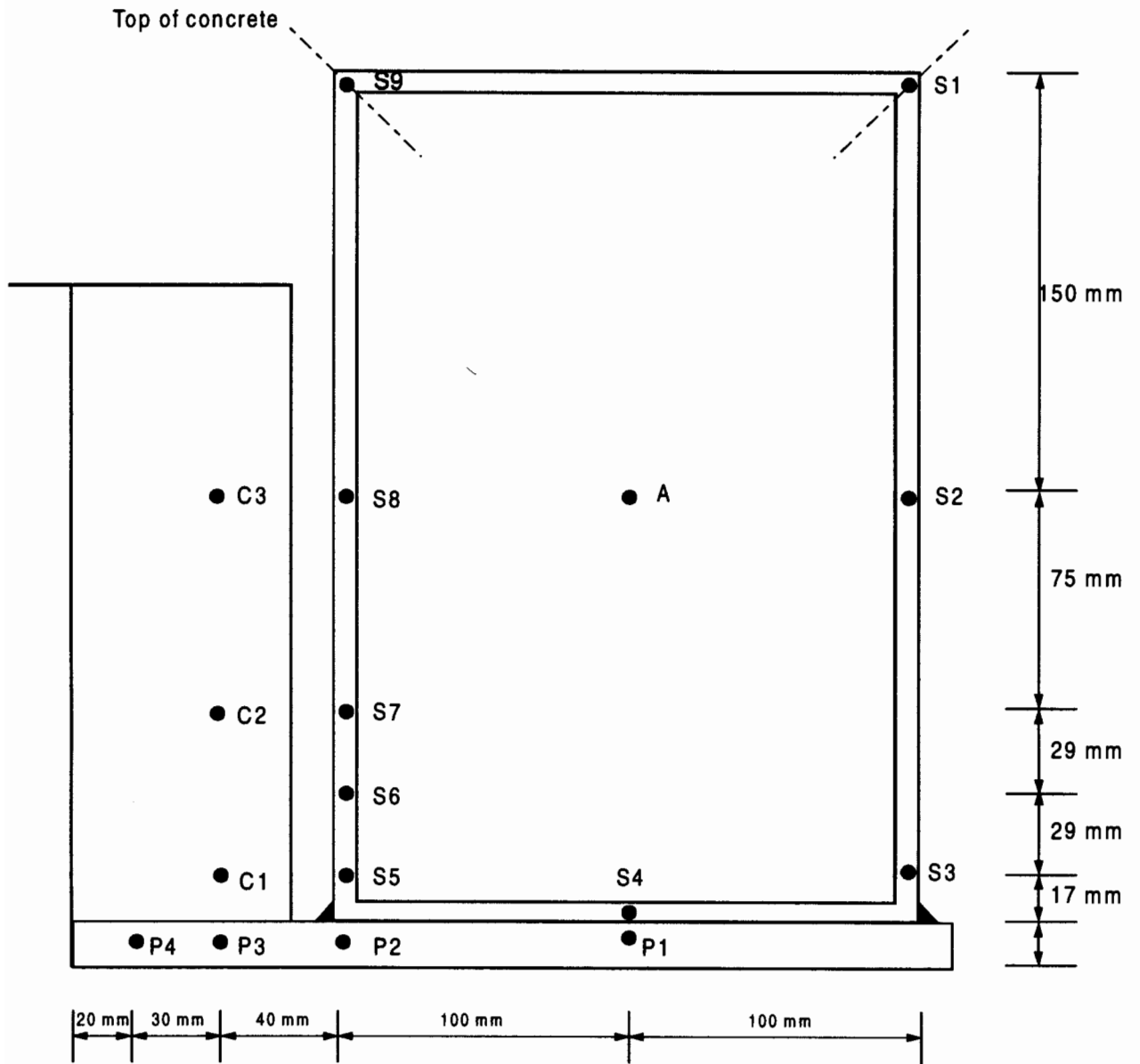


FIG. 9

**INSTRUMENTATION AT GRIDLINE G ON ITEM 1B
SHOWING A FULL PROFILE OF 17 THERMOCOUPLES**

(D0393G13)

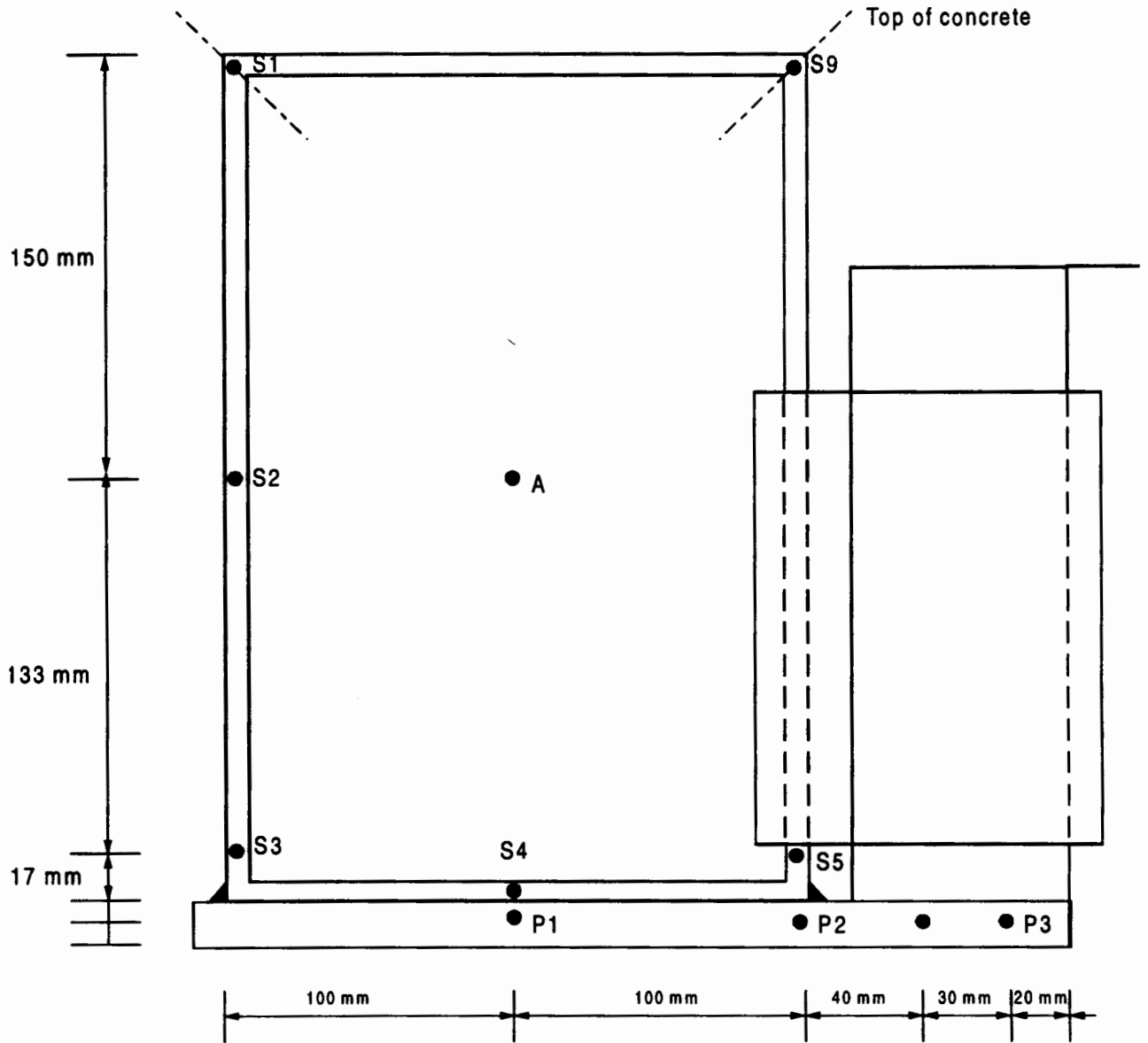


FIG. 10

**INSTRUMENTATION AT GRIDLINE I ON ITEM 1A
SHOWING REMAINS OF FULL PROFILE WITH A HOLE
IN INNER FACE OF THE SECTION**

(D0393G13)

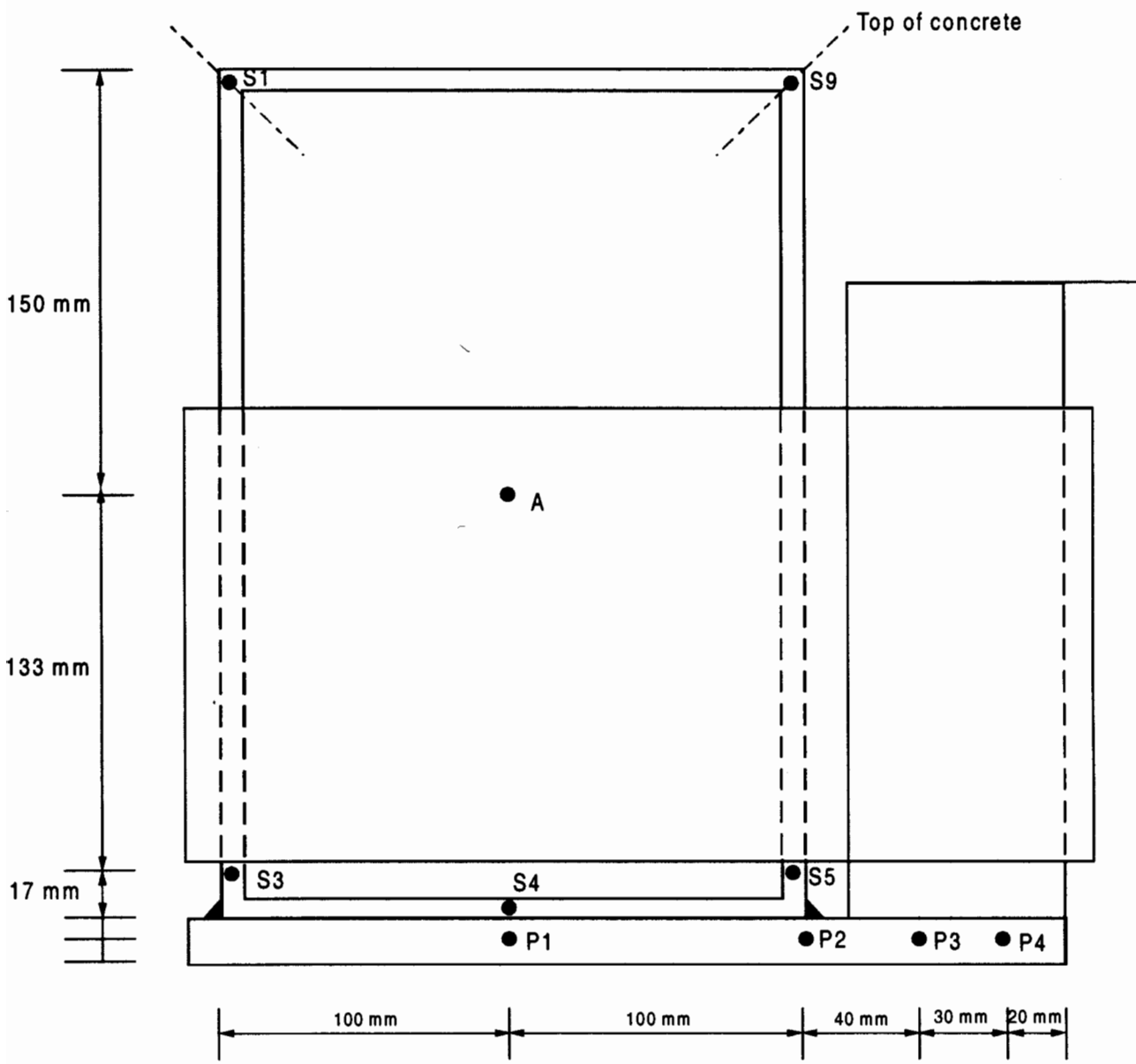


FIG. 11

**INSTRUMENTATION AT GRIDLINE C ON ITEM 1A
SHOWING REMAINS OF FULL PROFILE WITH A HOLE
IN BOTH SIDES OF THE SECTION**

(D0393G13)

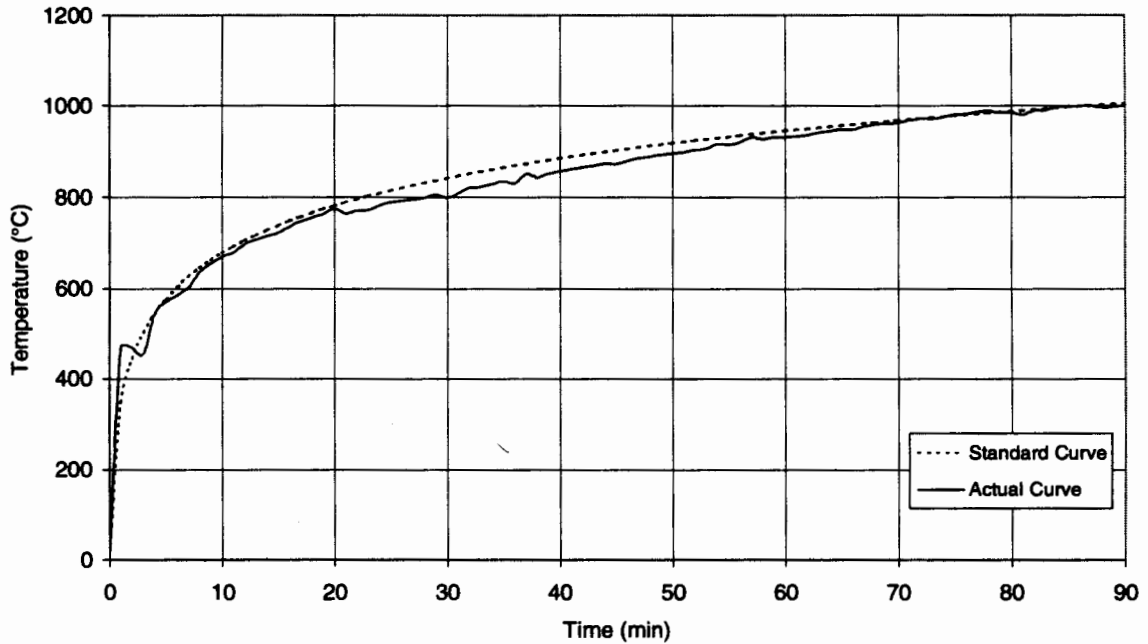


FIG. 12

FURNACE AIR TEMPERATURE

(D0393G13)

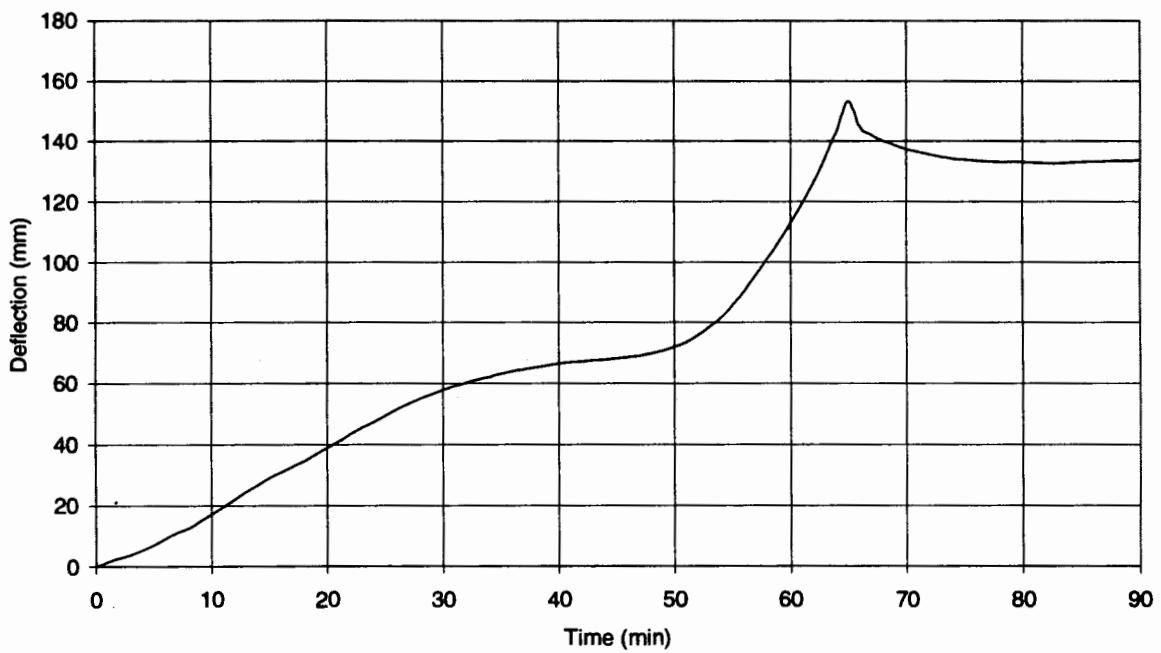


FIG. 13

VERTICAL DEFLECTION OF THE
TEST ASSEMBLY

(D0393G13)

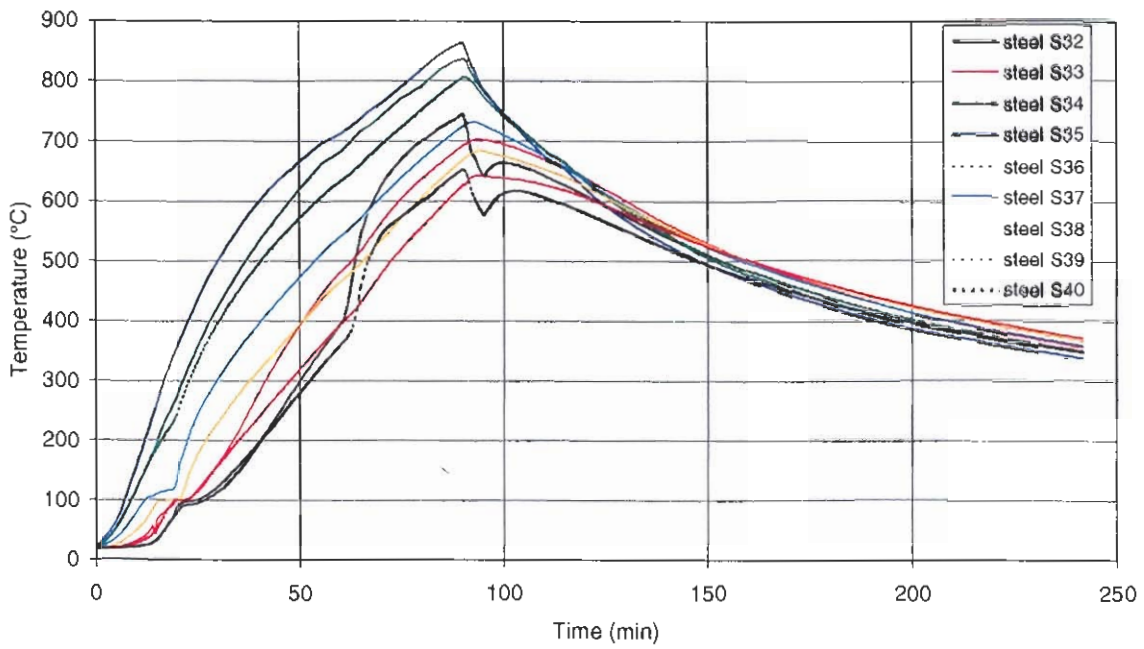


FIG. 14

STEELWORK OF MEMBER 1B
AT GRIDLINE G

(D0393G13)

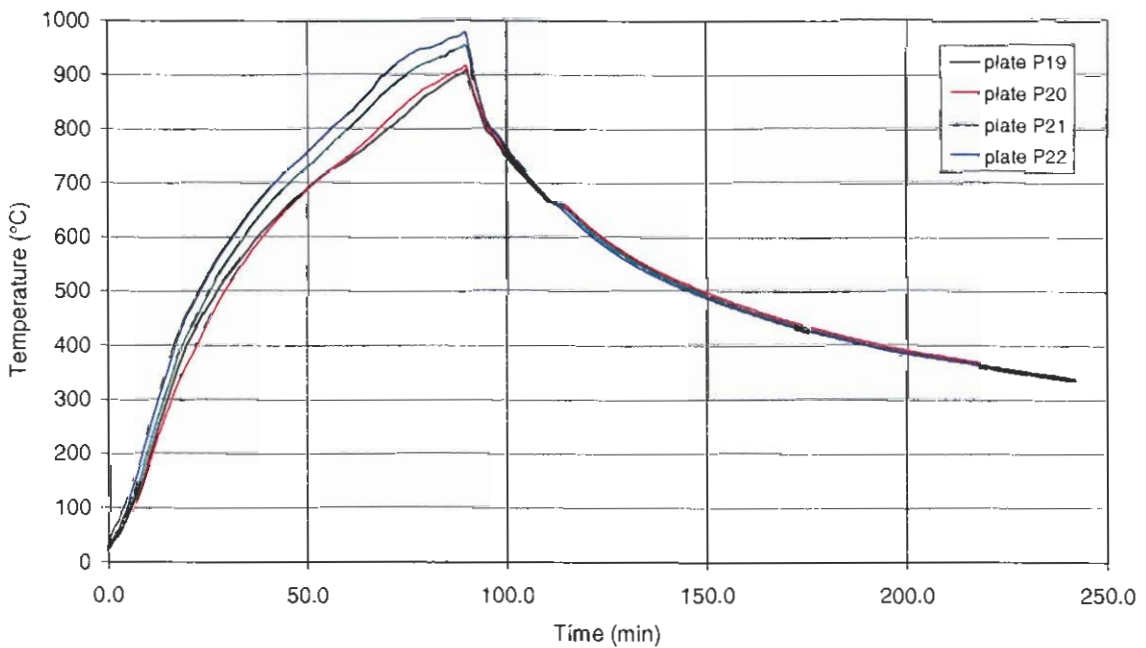


FIG. 15

PLATE UNDER MEMBER 1B
AT GRIDLINE G

(D0393G13)

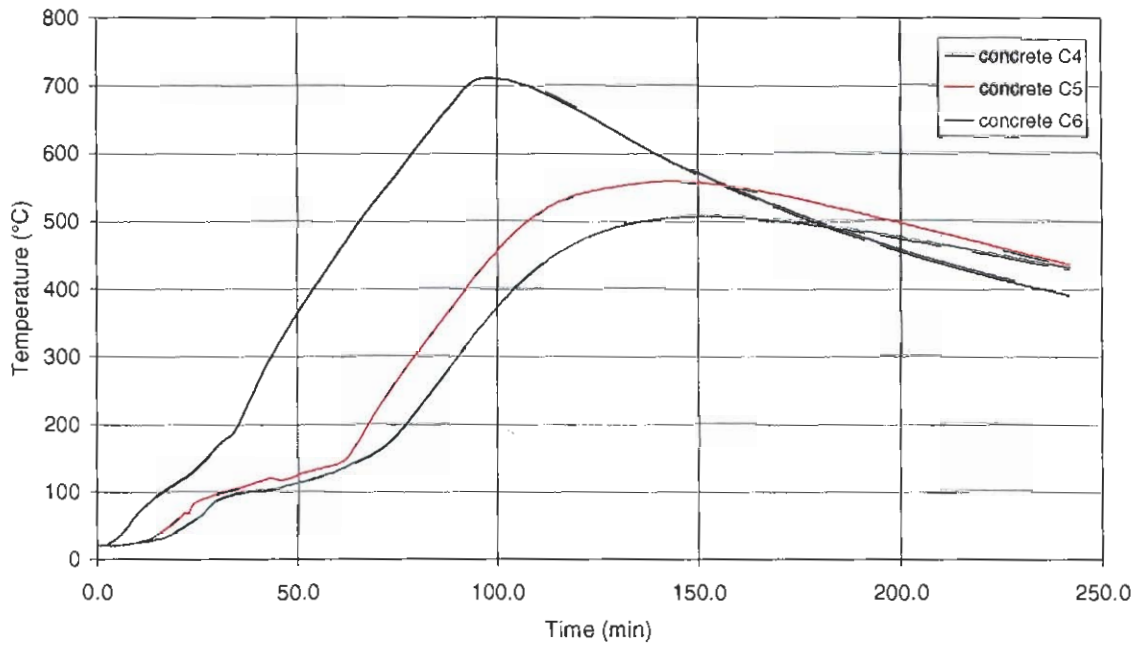


FIG. 16

CONCRETE BESIDE MEMEBER 1B
AT GRIDLINE G

(D0393G13)

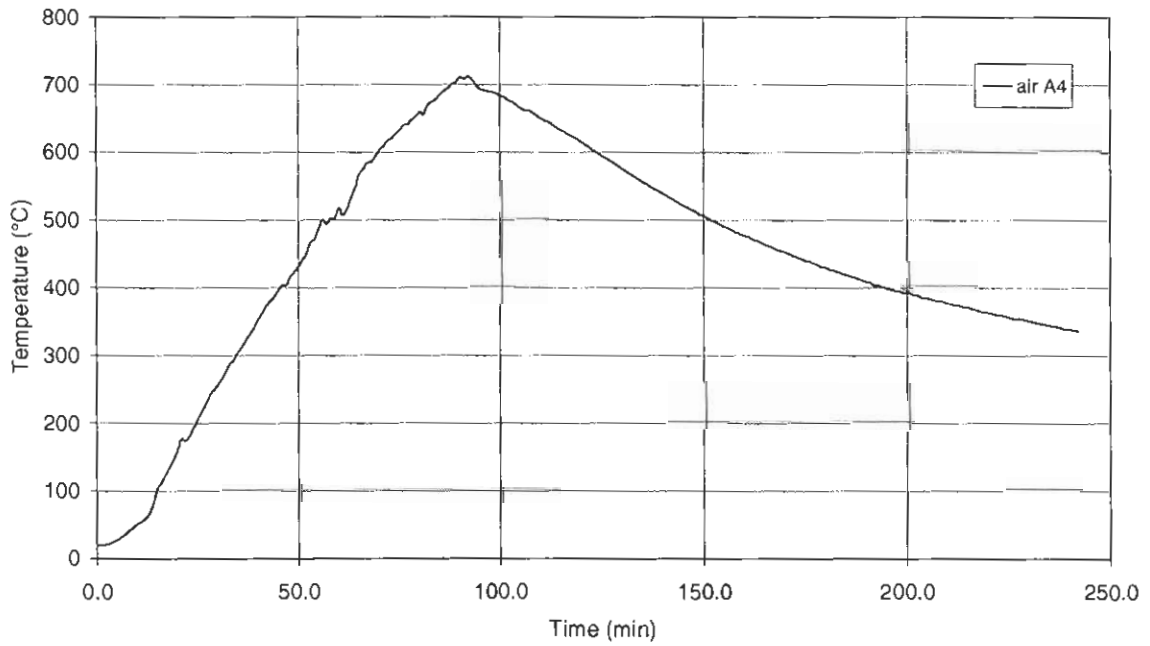


FIG. 17

AIR INSIDE MEMBER 1B
AT GRIDLINE G

(D0393G13)

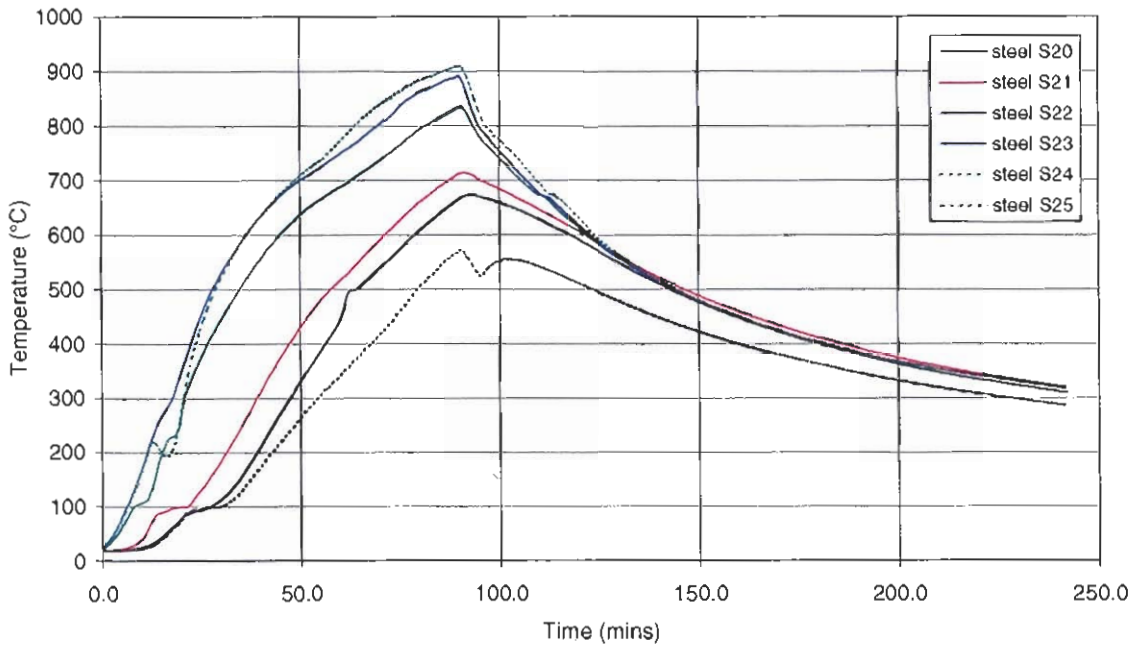


FIG. 18

STEELWORK OF MEMBER 1A
AT GRIDLINE I

(D0393G13)

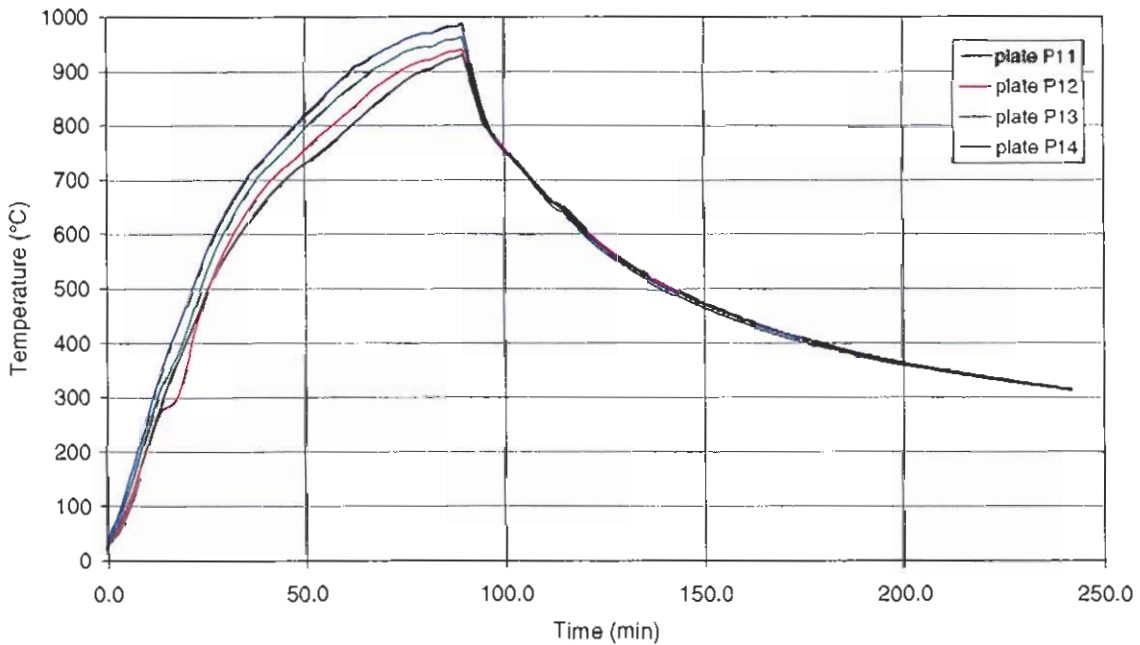


FIG. 19

PLATE UNDER MEMBER 1A
AT GRIDLINE I

(D0393G13)

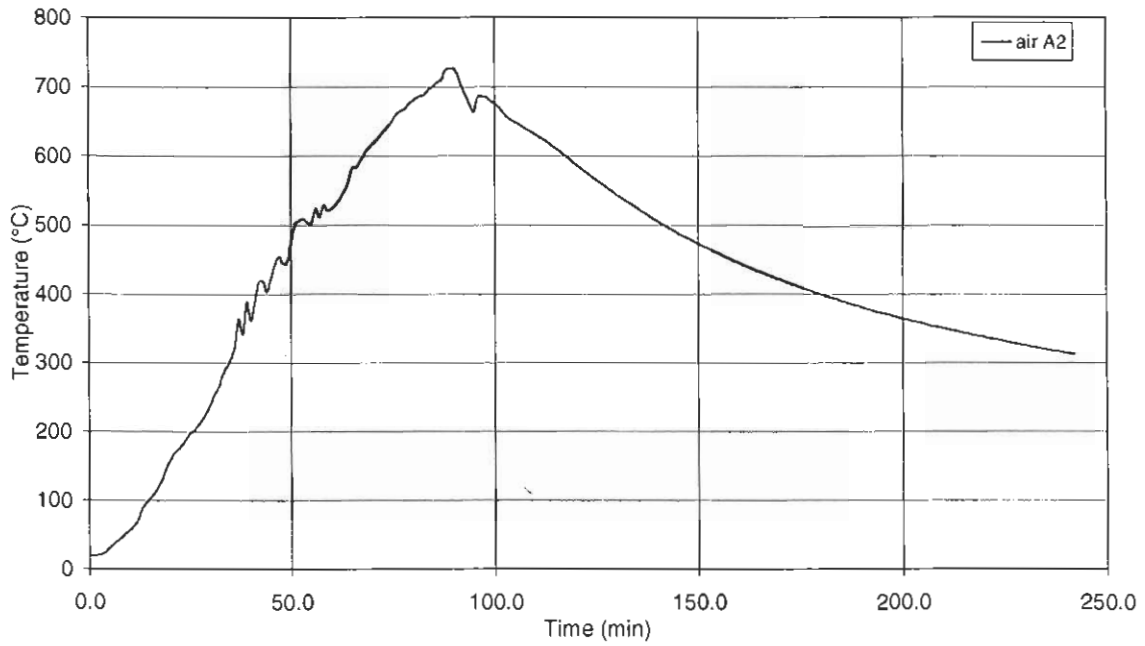


FIG. 20

AIR INSIDE MEMBER 1A
AT GRIDLINE I

(D0393G13)

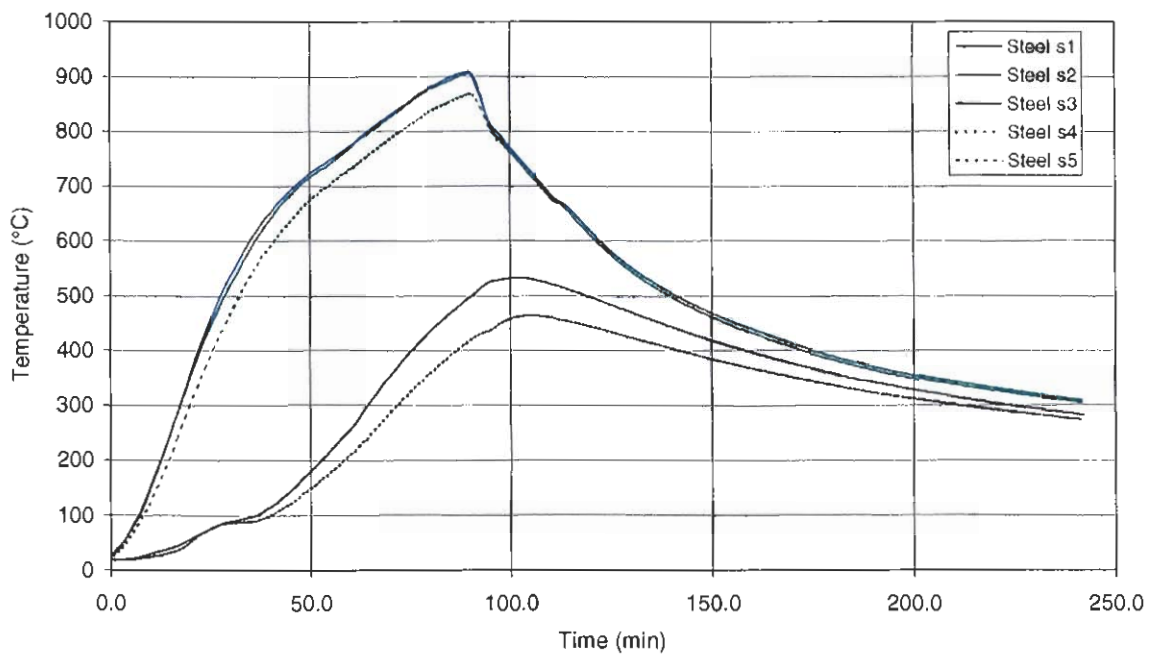


FIG. 21

STEELWORK OF MEMBER 1A
AT GRIDLINE C

(D0393G13)

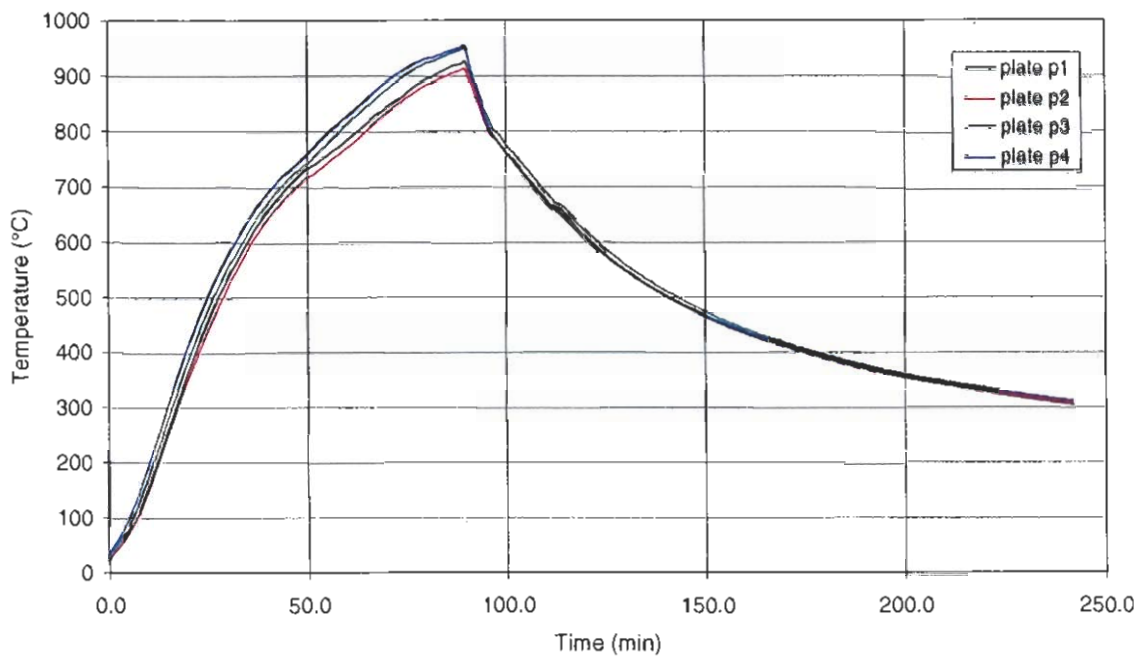


FIG. 22

PLATE UNDER MEMBER 1A
AT GRIDLINE C

(D0393G13)

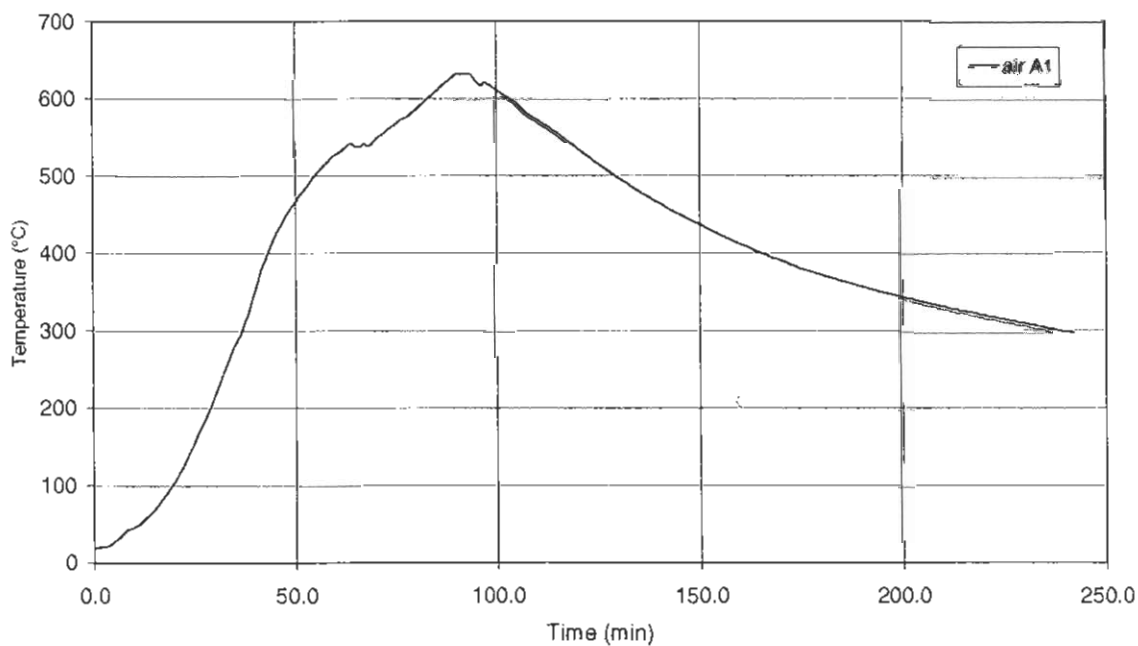


FIG. 23

AIR INSIDE MEMBER 1A
AT GRIDLINE C

(D0393G13)

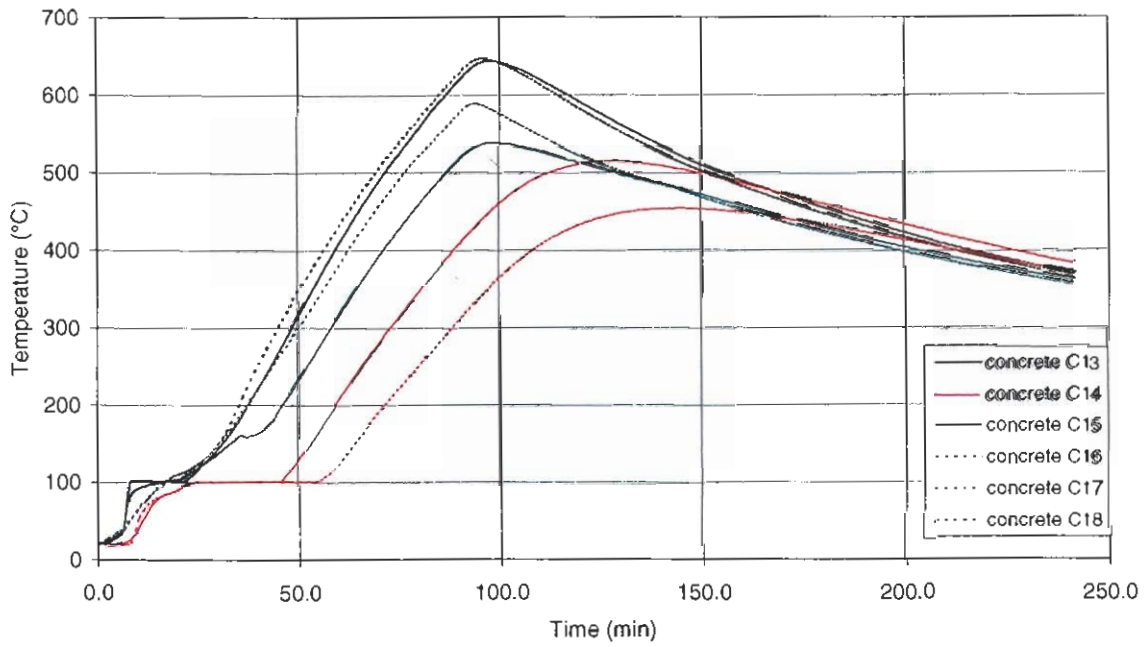


FIG. 24

CONCRETE AROUND THE REBAR
AT GRIDLINE H

(D0393G13)