

11-4

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### TRIP REPORT

Destination: Schenectady Works, Buildings 8 and 17  
Dates of Contacts: January 5th and January 18, 1955  
Contacts made by: Robert Bryant  
Elliott Krackhardt  
Persons Contacted: Mr. H. F. Zaiss  
Mr. Davidson  
Mr. Pickney  
Purpose of Trip: To determine physical changes brought about by hydrogen firing 21" frames.

GFC	MCY	JCN	LES
MJC	WJO	WJW	
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NOTE FILE DISCUSS			
ANSWER RETURN LOG			

Results: Flatness of frames was distorted by 20 - 30 mils when hydrogen fired at 700, 900 and 1100°C.

#### General:

Six 21" frames made in Building 17, Schenectady, were measured in their inspection area for flatness and size before and after hydrogen firing. From the initial measurements it was discovered that the flatness is destroyed by prestressing - the ends of the frames turn up 3 - 5 mils about its minor axis. One frame was also prestressed, then released, finding that the frame sprung back to its original dimensions. This was done to be assured that all deformation would be caused by hydrogen firing. However, after firing there was no tensioning from the prestress rods.

The hydrogen firing schedules were as recommended by Mr. Davidson:

1. Place frames in furnace 400°C, let soak for one hour, raise to 700°C and soak for two hours, let cool in furnace.
2. Place frames in furnace at 600°C, raise to 900°C, soak for four hours, let cool in furnace to 600°C.
3. Place frames in furnace at 600°C, raise 200°C/hr. to 1100°C, soak for four hours then cool in furnace to 600°C.

Each frame was placed on a flat molybdenum plate. One frame with prestress rod and one without was fired at each temperature.

After firing, the prestress rods were cut and the dimension AE was found to be unchanged. Again the spring back of the frames was tested by prestressing and releasing the rod, but it was found that the frames returned to their original dimensions. This was done to frames fired at 900 and 1100°C to see if they had lost their temper.

Conclusion:

Since the frames distorted by 20 mils even at the lowest temperature (which is too low to effectively out-gas the frames), other techniques will have to be used if hydrogen firing is to be employed as the means of out-gassing.

In the past similar structures have been clamped to prevent warping. Therefore, it may be possible to retain the frame flatness by placing the frame on a flat molybdenum plate with another sufficiently heavy molybdenum plate on top of the frame. In this way the normal thermal expansions will not be suppressed.

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CATHODE-RAY TUBE SUB-DEPT.

/fmi  
1-27-55

# DATA

Furnace Temp*	Frame No. #	Condition of frame	AE**	GC	A	B	C	D	E	F	G	H
700°C	1	before prestressing	13.745	18.620								
		after prestressing	13.715	18.640	0	2	3	3	1	0	2	3
		after regrounding			0	1	2	1	0	1	1	1
		after firing	13.733	18.627	14	0	7	10	18	10	0	6
	4	not prestressed	13.749	18.618	1 1/2	0	0	0	0	1	0	0
		after firing	13.747	18.613	13	0	6	10	19	12	0	5
900°C	3	before prestressing	13.752	18.613								
		after prestressing	13.722	18.630	0	3	3	3	1	0	3	4
		after firing	13.678	18.628	5	0	1	2	11	18	1	4 1/2
	5	not prestressed	13.740	18.621	2	1	0	0	0	2	0	1
		after firing	13.711	18.615	5	1 1/2	1	3	10	9	6	1
1000°C	2	before prestressing	13.745	18.620								
		after prestressing	13.710	18.637								
		prestress removed	13.747	18.616								
		prestressed again	13.715	18.631	0	5	5	5	2	2	4	5
		after regrounding			1 1/2	0	1	1	0	0	0	1
		after firing	13.684	18.608	17	0	0	8	30	24	5	3
	6	not prestressed	13.746	18.620	1	0	1 1/2	1 1/2	0	2	0	1
		after firing	13.750	18.588	16	0	1	1	2	11	3	1

Notes: \* Firing schedule given in General portion of this report  
 \*\* The lettering in the table is as follows.

