

CORHART

1600 WEST LEE STREET

REFRACTORIES COMPANY

Subsidiary of Corning Glass Works

LOUISVILLE, KENTUCKY 40210
(502) 778-3311

bcc: J.
J. h.
P. Papa
R. E. Sch

March 15, 1973

**PLAINTIFF'S
EXHIBIT**

COR-6

Mr. Kurt A. Elkan
Central Maintenance
Fairless Works
United States Steel Corp.
Fairless, Pennsylvania 19030

Dear Kurt:

In reference to my letter of February 20, 1973, Neil thought that it might be helpful to review how we came to recommend the 3/64"/block radial and 1/64"/block longitudinal expansion allowance.

You will recall that about two years ago we were experiencing cases where some of the C-104 blocks slipped during the early stages of the campaign. In order to correct this, the expansion allowance was gradually reduced in progressive steps. This helped to eliminate the block slippage but it is believed that the recent series of shorter runs suggests that we have gone too far in reducing the expansion allowance (1/8"/5 blocks radial, 1/8"/4½'-6' longitudinal. Therefore, we are proposing an increase in the expansion allowance for the future.

It might be of interest to outline the changes in expansion allowance at Fairless during the last two years:

<u>Approx.</u> <u>Dates</u>	<u>Radial Exp. Allow.</u> <u>Asbestos</u>	<u>%</u>	<u>Average*</u> <u>No. Hts.</u>	<u>Longitudinal Exp. Allow.</u> <u>"/'</u>	<u>%</u>
- 6/71	1/8"/2 blks. (+ cork tabs)	2.3	642	3/8" wood/3'	1.0
9/71-3/72	1/8"/3 blks.	1.0	613	0-3/8" wood/ 4.5'	0.0-0.7
4/72-7/72	1/8"/5 blks.	0.6	556(5)	1/8" asb/4½'-6'	0.3-0.2
11/72 -	1/8"/3 blks.	1.0	?	1/8" asb/3'	0.4

*No correction for differences in amount of patching.

Mr. K. Elkan
March 15, 1973
Page 2

Sample Calculation: for 1/8" asbestos/3 blocks;

Ratio in ring is 5 blocks #1 (4.25" at hot face) to
1 block #3 (3.75" at hot face); six bricks at hot
face amount to $5 \times 4.25" + 1 \times 3.75" = 25.00"$;
 $2 \times 1/8" \text{ asbestos}/25" = .25" \text{ asbestos}/25" = 1.0\%$.

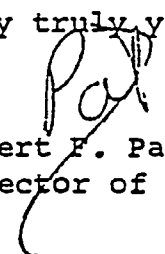
It should be pointed out that our work over the years, both in the field and in the laboratory, indicates that many of the C-104 blocks are cracked (parallel to the hot face) and some are even cracked all the way through during, or shortly after, the burn-in. Thus, we did not want to go all the way back to the "original", large expansion allowance (1/8" asbestos/2 blocks + cork tabs = 2.3%), since we might lose some of the spalled blocks. That is, if a whole block could slip with this expansion allowance, the shorter "spalls" would also be expected to drop in. Therefore, we recommended going to the 3/64"/block, which works out to a 1.1% expansion allowance. After we get a reading at this level, and if everything looks satisfactory, we can consider increasing the allowance in small steps, with the idea of eventually obtaining the optimum allowance.

Neil also mentioned that "pinging" of the roofs on burn-in has been reported at Fairless. This is not uncommon and has been observed in open-hearths and the Kaldos and even in the laboratory. We are reasonably certain that the noise is caused by cracking of the C-104 from thermal and mechanical stress as it is heated up. Conventional refractories undoubtedly undergo similar cracking but the stronger, more brittle structure of the C-104 makes it a little more audible.

If there are any further questions, we will be happy to try and answer them.

With best regards.

Very truly yours,


Robert F. Patrick
Director of Technical Services

RFP:ha
Enclosure
cc: N. J. Worden