

**JOHNS-MANVILLE RESEARCH
AND ENGINEERING CENTER**

MVA R + B 1990

Memorandum No. M43I-60

Date July 25, 1968

"SUPEREX"/"SPIN-GLAS" LAMINATE FOR INSULATION OF BLAST FURNACE STOVES

Requested by: SSR 895 (Incomplete)

RECEIVED
JUL 30 1968

H. E. Konrad, G. E. Grimshaw, S. Evans and S. E. Wooley visited the U.S. Steel Corp. in Pittsburgh on July 17, 1968, to discuss the use of "SUPEREX"/1000° "SPIN-GLAS" composite block for insulation of blast furnace stoves. U.S. Steel Corp. was represented by W. S. Debenham, Chief Ceramic Engineer; J. A. Lamont from the Applied Research Laboratory; John Topping, Assistant Ceramic Engineer and W. Whiting, Blast Furnace Engineer.

The purpose of the composite block is to provide a compressible insulation for use between the refractory lining and the shell and thus minimize the forces resulting from thermal expansion of the lining which tend to cause bending of the bed plate and failure of the shell at the higher operating temperatures. The proposed product will be named "SUPEREX SG".

Tests at U.S. Steel Applied Research Laboratory consisted of heating one face of 6 x 6 x 3-in. blocks in a panel and application of loads varying from 10 to 50 psi on a steel plate in contact with either the 1000° "SPIN-GLAS" or the "SUPEREX". The plate moved up 1/4 in. in 3 min and down 1/4 in. in 3 min.

Bending of the fibers with movement of the steel plate was noted and there was a question concerning whether the fibers would break eventually as a result of flexing continually.

When clean steel plates were used in the test, the plates slid over the "SUPEREX" and over the "SPIN-GLAS". These results suggested that a lubricant such as graphite could be applied to the "SUPEREX". However, the steel shell normally would be rusted when the insulation is installed. Therefore, the tests are to be repeated using rusty steel plates and pressures up to 150 psi. (The compressive strength of "SUPEREX" is 85 psi to produce 1/8 in. compression in 2 in.).

Results of tests from Research Report No. 432-295 (to issue) were discussed. After the "SUPEREX" had been heated on one face in the temperature range of 1600F to 2000F, the 5 pcf "SPIN-GLAS" on the cool face provided very mild resistance to compression until the 1-in. felt was compressed 50 per cent. With the possible exception of the effect of compression on the thermal resistance of the insulation, Mr. Debenham expressed a preference for 1 in. of "SPIN-GLAS" instead of 1/2 in. as proposed by Koppers Co.

With the exception of similar tests on "SUPEREX" SG with 1/2 in. felts, no additional tests were requested.

Since U.S. Steel personnel were not concerned about the possibility of channeling of hot gases through the insulation, it was agreed that the next step would be for J-M to issue a report with recommendations.

The stoves are being designed for a maximum temperature of 2400F and are expected to operate at 2300F.

PLAINTIFF'S
EXHIBIT
K-1540

DEFENDANT'S
EXHIBIT

01-111

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Memorandum No. M431-60

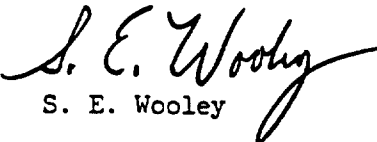
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The problem was discussed with Jack Hyde at Koppers Co. during the afternoon. He was very interested in the possibility of using "SUPEREX" SG. The "SUPEREX" would be 2-1/2 or 2-3/8 in. in thickness and the "SPIN-GLAS" would be either 1/2 or 5/8 in. Mr. Hyde requested that we test the 6 pcf, 1/2 in. felts (laminated to the "SUPEREX") by the same procedure and at the same hot face temperatures which we used for testing the 1-in. felts.

Mr. Hyde stated that these stoves are pressure vessels and that they design for 40 to 50 psi on the shell. A dome temperature of 2780F has been reached in a stove in Chile as a result of failure of the control instruments to "read" the correct temperature.

The thickness of the composite could vary as much as 1/16 in. The total thickness would be 3-in. +1/16 or 3 in. -1/16, but a variation of ±1/16 in. over all within a run was not considered to be acceptable.

Since both the "SUPEREX" and "SPIN-GLAS" would be trimmed to size, it was felt that these tolerances could be maintained. No other production problems were anticipated.


S. E. Wooley

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711/ MVJ R + D 1990
Report No. 432-270

Date July 18, 1968

Title: "SUPEREX" MADE AT ST. MARCELLIN USING GERMAN MC-12 DIATOMITE: PROPERTIES

Requested by: SSR INT R-14 (complete)

SUMMARY

Specimens of "SUPEREX" insulation made at St. Marcellin using German MC-12 diatomite were submitted for determination of physical properties.

The properties of the test material were generally better than for the previously tested samples except for a very weak modulus of rupture.

The test material did not conform to the J-M Finished Product Specification for "SUPEREX" 1900 because of a 40 per cent low modulus of rupture and a 17 per cent high linear shrinkage under soaking heat.

Contents: Summary, Discussion and Appendix

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