

FILE COPY

O T T A W A

June 19th, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1241.

Experimental Tests on Fisch Carburizing Compound  
and Isolating Paste.

REPRODUCED FROM THE ORIGINAL DOCUMENT BY THE NATIONAL ARCHIVES OF CANADA



CANADA

BUREAU OF MINES  
DIVISION OF METALLIC MINERALS  
—  
ORE DRESSING AND  
METALLURGICAL LABORATORIES

DEPARTMENT  
OF  
MINES AND RESOURCES  
MINES AND GEOLOGY BRANCH

O T T A W A

June 19th, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1241.

Experimental Tests on Fisch Carburizing Compound  
and Isolating Paste.

\*\*\*\*\*

Source of Material:

On May 11th, 1942, two bags of pack case-hardening compound and a sample of isolating paste for selective case-hardening of steel were received from Mr. J. Fisch, an internee in a camp at Sherbrooke, Quebec.

This material constituted a second shipment of carburizing compound made by Mr. Fisch. Further tests were desired in addition to those which have been given in Investigation No. 1102, "Report on Fisch Case-Hardening Compound and Isolating Paste," September 30th, 1941.

Steel Used:

An SAE 1010 steel and an SAE 1020 steel, of the following compositions, were used in testing these products:

Steel	Per cent	
	C	Mn
SAE 1010	0.15	0.53
SAE 1020	0.21	0.37

Nature of Tests:

A series of tests were carried out to determine the rates of penetration in carburizing samples of  $\frac{1}{8}$ -inch discs cut from 1-inch round bars of SAE 1020 steel packed in Fisch's and Houghton's Pearlite case-hardening compounds. The samples were heated to 1700° F. and quenched from the box at intervals of 1 hour up to 8 hours. The depth of case was measured with a Brinell microscope. The following results were obtained:

Table I.

Compound	Depth of Case, in Inches (Temperature, 1700° F.).							
	1 hr.	2 hrs.	3 hrs.	4 hrs.	5 hrs.	6 hrs.	7 hrs.	8 hrs.
Fisch	0.023	0.028	0.042	0.046	0.052	0.062	0.066	0.070
Houghton's Pearlite	0.023	0.035	0.040	0.042	0.047	0.054	0.071	0.075

The following tests, carried out simultaneously at 1700° F. on an SAE 1020 steel for eight hours and cooled in the box, gave these results:

Table II.

Compound	Depth of case, in inches
Fisch	0.066
Houghton's Bone Black	0.063
" Pearlite	0.070

Shrinkage Tests:

The following tests were carried out to determine the approximate shrinkage by weight and by volume of Fisch's and Houghton's Pearlite compounds. These tests were carried out in a 6" x 6" steel pipe. A new piece of cold rolled SAE 1010 steel was used in each test and the case and shrinkage were determined after carburizing at 1700° F. for 8 hours and cooling in the box. The material used was kept constant for each test. The results obtained are given in the following tables.

Table III.

Tests on Fisch's Compound							
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
New charge (parts)	28½	10	4	2	2	2	2
Old charge "	-	18½	24½	26½	26½	26½	26½
% Wt. shrinkage	35.0	14.5	7.3	7.3	7.3	7.3	7.3
% Vol. "	33.3	16.5	12.5	8.3	8.3	8.3	8.2
Depth of case, in inches	0.040	0.044	0.040	0.047	0.047	0.047	0.044

Table IV.

Tests on Houghton's Pearlite Compound					
	No. 1	No. 2	No. 3	No. 4	No. 5
New charge (parts)	48	15	4	2	2
Old charge "	-	35	44	46	46
% Wt. shrinkage	27.0	8.3	4.2	4.2	4.2
% Vol. "	29.2	16.3	8.3	8.3	8.3
Depth of case, in inches	0.047	0.044	0.040	0.047	0.047

Isolating Paste:

The material set quite firmly after baking. The coating did not spall from the steel on specimens quenched from the carburizing box. Microscopic examinations and hardness tests of the protected zone showed that the parts had given the

(Isolating Paste, cont'd) -

desired protection against the carburizing media.

Microscopic Examination:

Specimens from all tests carried out on these materials were mounted in bakelite. After polishing they were etched in a solution of 2 per cent nital and examined under the microscope. No free carbides were observed in any of the cased specimens.

Discussion of Results:

The depth of case obtained with the Fisch carburizing compound was found to be very similar to the cases obtained with Houghton's Pearlite, which is an activated charcoal compound similar to Mr. Fisch's material.

Both materials had high initial shrinkage. After several tests this condition improved and uniform cases were obtained with relatively small additions of new carburizing materials. These shrinkage test results can be taken as an indication of what could be expected on a larger scale.

Conclusion:

The Fisch material was found to give cases comparable with those obtained with Houghton's Pearlite. Published charts on the rate of penetration in carburizing SAE 1020 coarse-grained steels are very similar to the results obtained in these tests (Table I). It is therefore concluded that the Fisch carburizing material is a satisfactory carburizing medium.

The material can be used over again by adding a small amount of new carburizer to the used material.

(Continued on next page)

(Conclusion, cont'd) -

The use of the isolating paste in carrying out selective carburization gave satisfactory results.

oooooooooooooooooooo  
oooooooooooo  
oo

NBB:GHB.