

O T T A W A

November 28th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1125.

Examination of Surface Defects
on Brass Primer Bodies.

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


CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Origin and Nature of Problem:

On November 11th, 1941, Mr. J. M. Gilmartin, of the Inspection Board of the United Kingdom and Canada, 58 Lyon Street, Ottawa, Ontario, submitted for examination (per Analysis Requisition No. J.M.G. 1178) eight brass primer bodies which showed circumferential lines running around the curved turnover. These primers represented

(Origin and Nature of Problem, cont'd) -

two lots:

Lot No. 1 - 4 primers - (bases coloured violet).

Lot No. 2 - 4 primers - (bases coloured blue).

Further information was given on the requisition, to the effect that it was felt that the circumferential lines are cracks. These are plainly seen in the "violet" primers and not so evident in the "blue" primers. It was also noticed that the latter have a fuller radius at this point than the violet-marked primers, which have a more angular profile. Both types were made from material of the same composition and were machined by the same machinist. The turning over was done by the same method (hand press, 2 dies) but by different operators at different plants. Die contours might be slightly different.

It was requested that the following be determined:

1. Are suspected markings really cracks, and do they exist in only one or both lots?
2. If cracks exist, what is the probable cause?
3. Is there a marked difference in turnover contour between the two types?

Description of Parts Received:

For the examination, four of the eight samples received were used. These four show the most marked defects and are designated:

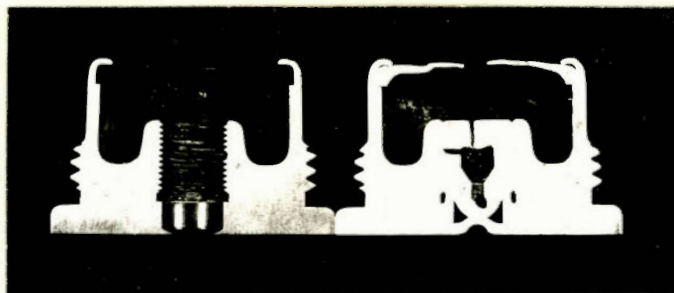
Nos. 1 and 2 - Lot No. 1 (violet); and

Nos. 3 and 4 - Lot No. 2 (blue).

Figure 1 shows cross-sections of Primer Bodies Nos. 1 and 3.

(Description of Parts Received, cont'd) -

Figure 1.



Cross-sections of Primer Bodies
Nos. 1 and 3, showing the turnover contour.

Left - Primer Body No. 1,
(Lot No. 1, marked violet).

Right - Primer Body No. 3,
(Lot No. 2, marked blue).

(Approximately natural size)

Hardness Tests:

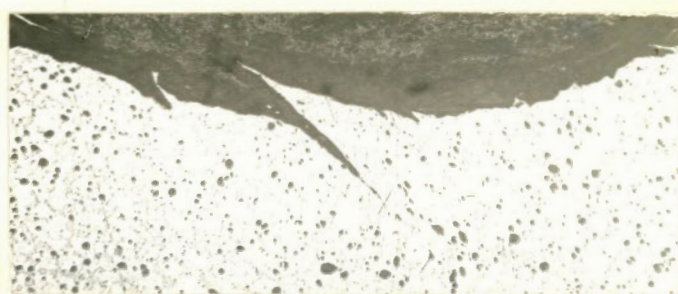
Hardness tests as performed by means of the Vickers hardness testing machine show no appreciable difference in the hardnesses of the main body and the turnover section.

Micro-Examination:

Figures 2 to 9 show the turnover contours of the examined primer bodies, at X100 magnification:

Figure 2.

Figure 3.



X100.
PRIMER NO. 1.
Outside contour of
the turnover.

X100.
PRIMER NO. 1.
Inside contour of
the turnover.

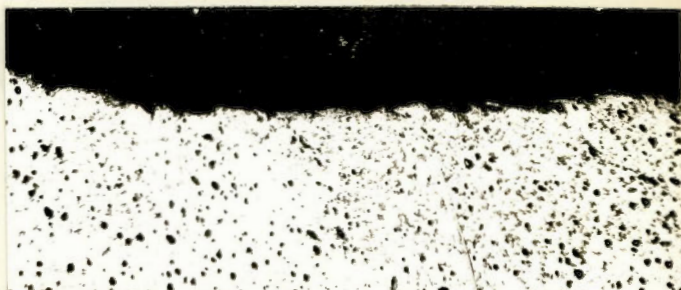
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(Micro-Examination, cont'd) -

Figure 4.



Figure 5.

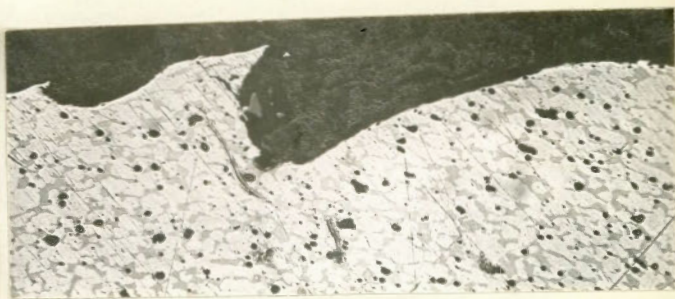


X100.
PRIMER NO. 2.
Outside contour.

X100.
PRIMER NO. 2.
Inside contour.

Figure 6.

Figure 7.

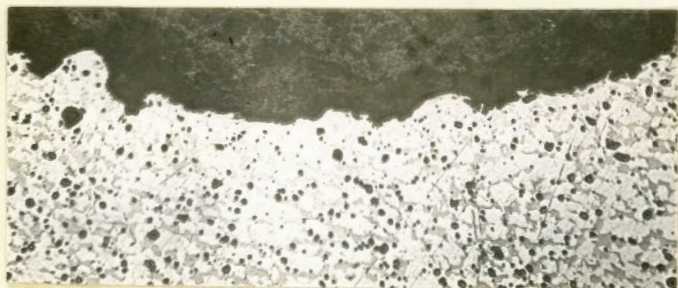


X100.
PRIMER NO. 3.
Outside contour.

X100.
PRIMER NO. 3.
Outside contour.

Figure 8.

Figure 9.



X100.
PRIMER NO. 3.
Inside contour.

X100.
PRIMER NO. 4.
Outside contour.

Discussion of Results:

The hardness tests show no apparent effect from cold working.

The micro-examination shows that the circumferential lines around the outside of the curved turnover are very shallow (close to the surface) and the shape of these defects is not of the "v" type notch but rather of the "u" type. The only specimen which exhibited a variation of this defect is shown in Figure 7 (Primer No. 3, Lot No. 2, marked blue) and this also is not a true "v" type, only slightly deeper.

The insides of the turnover contours show worse surface condition than the outer sides. Figure 3 shows an especially bad flaw. This would seem to have been caused by the machining, as in only one instance is any corrosion effect shown (Figure 5) which might possibly have been caused by the explosive material.

The hardness tests and the micro-examination establish positive confirmation that these defects are not caused by "season cracking".

In addition to the possibility that these defects may have been due to faulty machining operations, there is the probability that the method of pressing the turnover was too drastic, having been performed either too quickly or at too high a pressure.

Conclusions:

1. The suspected markings are not of the order of "cracks" but rather are surface defects. Examined primers from Lot No. 1 (violet) show a great number of these lines but all these are very minor imperfections. Primers from Lot No. 2 (blue) show only one instance of

(Conclusions, cont'd) -

a defect, but this is the worst shown in the examination (Figure 7).

2. These defects are not due to any characteristics of the materials but are believed to be caused mechanically. The elimination of these defects might probably be obtained by improving the machining conditions or by modifying the turnover method (e.g., by rolling).

3. Figure 1 shows the turnover contour of primers from both lots. There is no appreciable difference in contour shape.

4. There was no evidence of "season cracking" observed in these primers. It is recommended, however, that should these primers be stored for any considerable length of time they should be re-examined before being used.

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JWM:PES.

