File.

FILE COPY

O T T A W A April 26, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1848.

Adherence of a Thick Rubber Coating to Magnesium Alloys Containing Zinc.

(Copy No. 10.)

Bureau of Mines
Division of Metallic
Minerals
-
Physical Metallurgy
Research Laboratories

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
Mines and Geology Branch

O T T A W A April 26, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1848.

Adherence of a Thick Rubber Coating to Magnesium Alloys Containing Zinc.

Background:

A verbal inquiry was recently received from Sergeant-Major J.K.Woollam, of the Directorate of Development of Vehicles and Small Arms, Department of National Defence (Army), Ottawa, Ontario, as to whether a thick rubber coating could be made to adhere to magnesium alloys containing zinc.

An investigation has been under way in co-operation with Mr. R. J. Reaney, of 21 Monkland Avenue, Ottawa, with regard to the application of thin rubber coatings to various metals, including magnesium.

Accordingly, Mr. Reaney was consulted on this particular problem.

Work Performed:

At our request, Mr. Reaney prepared samples in which rubber coatings varying from 1/16 to 3/16 inch in thickness were applied to pieces of 4X magnesium alloy having approximately the following composition:

		Per Cent
Aluminium	=	6.0
Manganese	=	0.2
Zinc	=	3.0

The type of rubber applied and the temperature and pressure used during the application in each case are as follows:

Type of Rubber	Temperature, ° C.	Pressure, (lb./sq.in.)	Curing time, hours
(1) Grade III (natural). This actually is scrap rubber but is the best grade available at the present time.	100 (212° F.)	25	½
(2) Grade III (natural).	80 (176° F.)	25	½
(3) GRS (synthetic)	Room temperature.	No pressure.	24

Up to the present time Grade I and Grade II rubbers have not been available for these tests, due to the acute shortage of crude rubber. However, Mr. Reaney states that he now has the assurance of the Rubber Controller that sufficient Grade I rubber for these tests will be made available to him immediately.

It seems apparent, from an examination of these samples, that:

(Continued on next page)

(Work Performed, cont'd) -

(1) A bond definitely can be obtained between rubber and magnesium alloy containing zinc. In none of the cases mentioned above did the adhesive pull away from the metal.

(2) The strength of the bond depends upon the type of rubber used.

The samples are available for inspection in these Laboratories.

Chrysler 55-6 Adhesive:

A letter was received on April 5, 1945, from the Magnesium Division of the Dow Chemical Company, Midland, Michigan, on the subject of applying adherent coatings of rubber to magnesium alloys. This letter contained the following information:

(1) Dow Chemical Company tests would indicate that the cement which gives best adhesion and strength is Chrysler 55-6 Adhesive.

Note: Mr. Reaney is of the opinion that his kind of cement has not been tested by Dow.

(2) In using the Chrysler 55-6 Adhesive,

(a) the rubber is treated with concentrated sulphuric acid to improve the bonding surface;

(b) the treated rubber and the magnesium alloy are coated with the adhesive, air dried, and then bonded at low pressure and a temperature of 250 to 300° F.; and

(c) the strength of the bond depends upon the type of rubber used.

Comments:

1. Rubber which has been treated with sulphuric acid can be expected to cause corrosion of the magnesium. The rate of corrosion may be slow but eventually the bond between rubber and metal will be affected.

2. At temperatures much above 220° F., a change in characteristics of the magnesium alloy may be produced.

oooooooooo
ooooo
o

RRR:GHB.