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February 20, 1945.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1797.

Corrosion Resistance of Anti-Corrosion Oils for Aircraft Engines.

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Origin of Request and Object of Investigation:

On December 11, 1944, a request (File No. 832-33C-11 (AMSO/S.4-0-1) was received from the Ohief of the Air Staff, Department of National Defence for Air, Ottawa, Ontario, for testing of two samples of anti-corresion oil in accordance with Specification C-27-587 with the exception of paragraph 2(E) and Appendix IV. Later, a third sample of oil was submitted to be tested along with the first two.

Unfortunately, there was considerable delay in making the test, due to the fact that the construction of the humidity cabinet was not completed at the time the request was received; also, it was difficult to obtain speedily some of the materials required for the test.

Tests Performed:

A sample of diluent lubricating cil (3-GP-4 Class 4B) was supplied by the Department of National Defence for Air along with the samples of anti-corresion oil. These were mixed in these Laboratories in the proportion of three parts diluent lubricating oil to one part of anti-corrosion oil. The solubility, pour point, viscosity, precipitation number, carbon residue, corresion, ash, viscosity index and volatility tests were performed in the Fuel Research Laboratories of the Bureau of Mines. The test involving the use of silica gel impregnated. with cobalt chloride is still to be completed by the Fuel Research Laboratories and the results will be included in a supplementary report. The protection and hydrobromic-acid neutralization tests were performed in these Laboratories. A humidity cabinet of the design described by Todd (Analytical Edition, Industrial and Engineering Chemistry, Vol. 16, June 1944, page 394) was used in these tests.

Results of Tests:

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		C-27-587 REQUIREMENTS	NO. 1	NO. 2 (Intava)	NO. 3 (Shell)
(a)	Separation after 24 hours at 210° F.	None.	None .	None .	None .
(c)	Pour point, oF.	20 (max.)	10	20	10
(d)	Viscosity, seconds: Saybolt Univ. at 100° F. Saybolt Univ. at 210° F. (after elimination of the volatile content)		1618	1621 118 ₂ 9	1618
(0)	Flash point, °F. (Cleveland open cup)		485	440	485
(2)	Precipitation number	0.1 (max.)	Trace.	Trace.	Trace.
(g)	Carbon residue, per cont by weight (Conradson)	2.5 (max.)	1.7	1.5	1.8

(Continued on next page)

- Page 5 -

(Results of Tests, cont'd) -

		SPECIFICATION	ANTI		
		C-27-587 REQUIREMENTS	NC. 1	NO. 2 (Intava)	NO: 3 (Shell)
(h)	Corrosion (copper strip, 3 hrs. at 212° F.)	Negative.	Negative.	Negativo.	Negative.
(1)	Ash, per cent by weight	1.0 (max.)	0.39	0.78	0.40
(j)	Viscosity index	95 (min.)	98	99	98
(k)	Volatile content, per cent by weight (24 hours at 221° F.)	5 max.	0.5	0.5	0,6
(m)	Protection	No evidence of corresion, pitting, or other attack.	sion, pit-	Corrosion as shown in Figures la and lb.	No evidence of corro- sion, pit- ting, pr other attack.
(n)	Hydrobromic-acid neutralization®	No evidence of pitting, corrosion, or discoloration	Corrosion es shown in Figure 2.	Corresion as shown in Figure 3.	Corrosion as shown in Figure 4.

Note. In the instructions for performing this test, it is not stipulated whether the emulsion shall be 10 per cent by volume or 10 per cent by weight. In the above tests. a 10 per cent emulsion by volume was used.

Conclusions:

All of the oil mixtures fulfilled the specifications,

with the following exceptions:

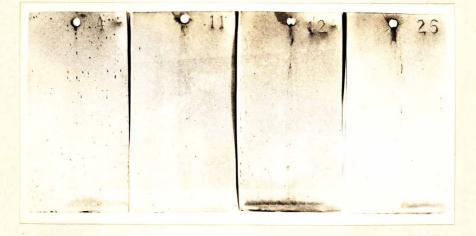
- 1. All of the mixtures produced corresion in the hydrobromic-acid neutralization test.
- 2. The mixture containing No. 2 anti-corresion oil (Intava) produced corresion in the protection test.

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Figure 1.

(a)



(b) - Reverse side.



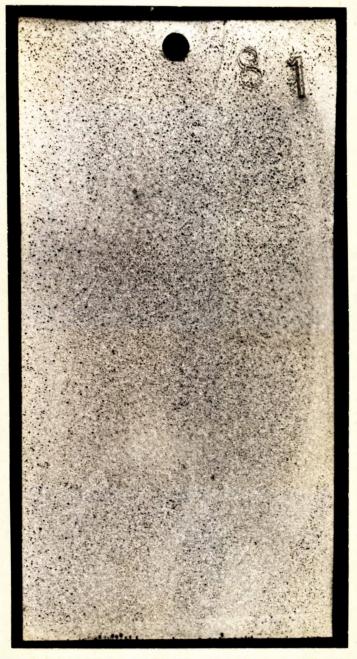
CORROSION PRODUCED BY THE OIL MIXTURE CONTAINING NO. 2 ANTI-CORROSION OIL (INTAVA) IN THE PROTECTION TEST.

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Figure 2.



CORROSION PRODUCED DURING THE HYDROBROMIC-ACID NEUTRALIZATION TEST USING AN OIL MIXTURE CONTAINING NO., 1 ANTI-CORROSION OIL.

The appearance of this panel is typical of the four panels used in testing this material.



CORROSION PRODUCED DURING THE HYDROBROMIC-ACID NEUTRALIZATION TEST USING AN OIL MIXTURE CONTAINING NO., 2 (Intava) ANTI-CORROSION OIL.

The appearance of this panel is typical of the four panels used in testing this material.

3

Figure 4.



CORROSION PRODUCED DURING THE HYDROBROMIC-ACID NEUTRALIZATION TEST USING AN OIL MIXTURE CONTAINING NO. 3 (Shall) ANTI-CORROSION OIL.

The appearance of this panel is typical of the four panels used in testing this material.

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