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O T T A W A April 17, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1840.

Corrosion Resistance of Identity Discs and Chains.

(Copy No. 10.)

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Background:

On March 15, 1945, several monel metal identity discs and accompanying stainless steel chains were received for corrosion testing, along with a covering request letter dated March 14, 1945, File No. DIRD(P)-105-7, from Wing Cmdr. P. W. Webb, Director of Inter-Service Research and Development (Clothing and Equipment), Department of National Defence, 299 Bank Street, Ottawa, Ontario.

TESTS PERFORMED:

I. - Corrosion Resistance of Discs and Chains.

(a) Two assemblies, each consisting of a disc hanging from a chain, were tested for corrosion resistance in the 20 per cent salt spray test at 95° F.

Results:

After 1 day - 63 links on Chain No. 1 were corroded.
27 links on Chain No. 2 were corroded.

After 4 days - ¾ of the links on both Chains Nos. 1 and 2 were corroded.

After 6 days - Both chains broke.

Monel discs showed distinct signs of corrosion.

Test ended.

Figure 1 (b) and (c) shows the condition of the chains and discs at the end of the test.

(b) One chain was passivated in nitric acid by the method outlined in Specification AN-WW-T-855, i.e., it was heated at 120 to 140° F. for 20 minutes in an aqueous solution of which 20 parts by volume was concentrated nitric acid. It was then tested in the 20 per cent salt spray at 95° F.

Results -

After 18 hours - 82 links on chain corroded.

After 3 days - All links corroded.

After 5 days - Test ended.

Figure 1(a) shows the condition of the chain at the end of the test.

(Tests Performed, cont'd) -

II. - Analysis of Chain.

Samples of the chain were analysed. The results are compared with the specification composition as follows:

Constituent		Specification composition, per cent	Found on analysis, per cent
Carbon	-	0.06 to 0.15	0.08
Manganese	-	0.20 to 0.60	0.48
Silicon	-	0.75 max.	0.44
Nickel	-	0.50 min.	0.72
Chromium	-	17.0 min.	13.41
Copper	-	1.50 max.	0.04

III. - Analysis of Disc.

Discs were analysed. The results are compared with the specification composition as follows:

Constituent		Specification composition, per cent	Found on analysis, per cent
Copper	-	Remainder.	30.05
Nickel	-	63 to 70	67.24
Iron	-	2.5 max.	1.96
Manganese	-	2.0 max.	0.82
Aluminium, carbon, silicon, and sulphur	-	Small amounts.	Not determined.

CONCLUSIONS:

1. Neither the chains nor the discs offer very great resistance to the action of salt (sodium chloride) solution.

2. The chains contain about 3.6 per cent less chromium than stipulated in the specification.

3. The discs appear to conform to the specification

(Conclusions, cont'd) -

with regard to composition.

4. Passivating the chains does not improve their resistance to the action of salt solution.

Recommendation:

It is suggested that chains and discs of the type submitted for this investigation should not be used for the Armed Forces, especially under warm humid conditions.

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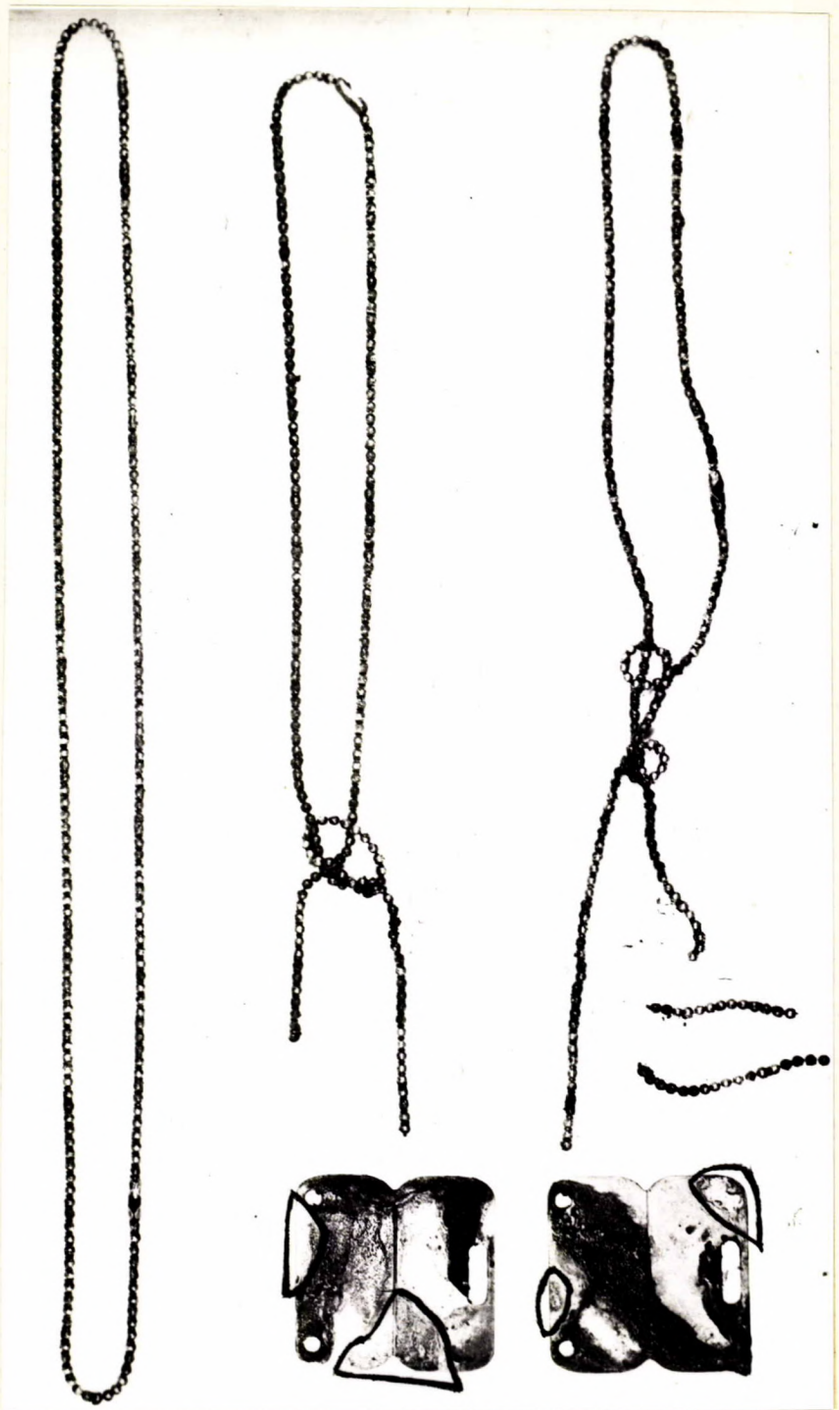
Figure 1.



(a) (b) (c)

IDENTITY CHAINS AND DISCS AFTER TESTING
IN THE 20 PER CENT SALT SPRAY.

(a) Passivated chain.
(b) and (c) Unpassivated chains and the discs which were tested with them.
Encircled areas on discs are covered with corrosion product from the monel metal. Very dark areas on the discs are covered with brown corrosion product from the chains.

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