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SONAR DOME COATINGS DEVELOPED UNDER NAVY CONTRACT WITH NEW YORK--ETC(U)
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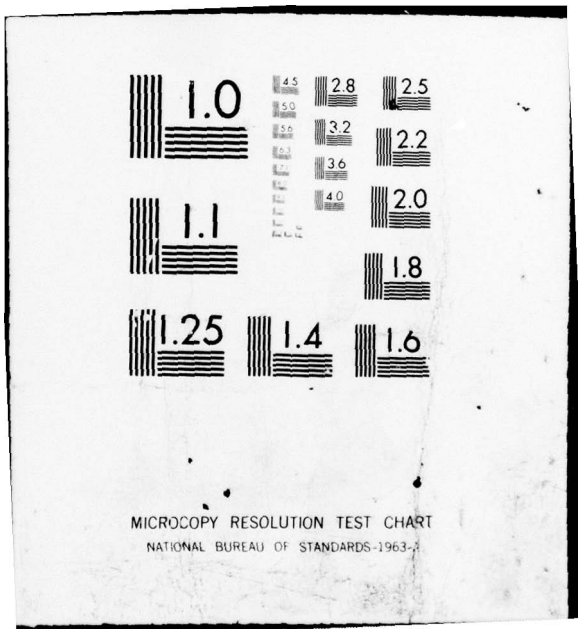
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Material Sciences Division

U. S. NAVAL APPLIED SCIENCE LABORATORY
BROOKLYN, NEW YORK

SONAR DOME COATINGS
DEVELOPED UNDER NAVY CONTRACT
WITH NEW YORK UNIVERSITY

Lab. Project 930-59, Technical Memorandum 2

SF 101-03-17, Task 8213

29 MAR 1968

MATERIAL SCIENCES DIVISION

Approved: S. H. Kallas
D. H. KALLAS
Associate Technical Director

U.S. NAVAL APPLIED SCIENCE LABORATORY
FLUSHING AND WASHINGTON AVENUES
BROOKLYN, NEW YORK 11251

Lab. Project 930-59
Technical Memorandum 2

Ref: (a) NASL Contract N00140-67-C-0107 of 17 Oct 1967
(b) NASL Program Summary for Sub-project S-2202, Task 8213, Improved Protective Coatings for Sonar Domes of 1 Nov 1967
(c) Fonecon btwn A. Cizek Jr. (NASL, Code 937) and R. Kramer (NAVSEC, Code 6101C01) on 21 Feb 1966
(d) NASL Program Summary for SF 101-03-17, Task 8213 on Sonar Dome Materials Development of 1 Nov 1967
(e) N.Y.U. ltr (NASL Contract N00140-67-C-0107) to A.W. Cizek Jr. (NASL) of 5 Dec 1967
(f) Lab. Project 9300-43, Tech. Memo #9, Improved Protective Coatings for Sonar Domes of 30 Oct 1967
(g) Lab. Project 9300-43, Progress Report #1, Improved Protective Coatings for Sonar Domes of 25 Mar 1966

Encl: (1) Copy of Reference (e)
(2) Table 1 - Results of Sonic Erosion Test
(3) Photo - 21495, View Showing Degree of Erosion of Experimental Sonar Dome Coatings

1. The U.S. Naval Applied Science Laboratory is monitoring the reference (a) contract with New York University, currently funded by NAVSEC under Sub-project SF013-13-01, Task Sub-project SF013-13-01, Task 12415, for the development of sonar dome coating systems which have good erosion resistance, good antifouling properties, and are able to remain adhered when exposed to high level sonic pulses generated by high power sonar transducers.

2. Under a similar development program at NASL, described in reference (b), a high sonic pulse facility was constructed which permitted evaluation of sonar dome coatings in service simulating conditions. This development program was not funded in FY1968.

3. A request was made by NAVSEC, under reference (c), that monitoring of the NYU contract include evaluation of the more promising NYU coatings, using the NASL high sonic pulse facility. Accordingly, this evaluation is being conducted in FY1968 under reference (d).

4. This report presents data on four coating systems prepared by Prof. Kronstein under the above contract (reference a) and submitted with descriptions of the formulations, under reference (e), for screening in the NASL high sonic pulse facility.

5. The coating systems submitted for evaluation were applied to sandblasted steel panels provide by NASL and are described in enclosure (1). The facility and test procedure, described in reference (g), used for screening of the

coating systems, consists of a test tank and a single SQS-26 sonar transducer as the high pulse generator.

6. The results of tests on the four coating systems are tabulated in Table 1, enclosure (2), with the resulting erosion patterns shown in enclosure (3).

7. The results of tests indicate that the experimental coating system applied to Panel I and submitted by New York University, is the most promising of the latest four coating systems submitted. However, although this coating system is an improvement over the three systems previously reported in reference (f), complete erosion down to the metal base still occurs, and the coating is, therefore, not considered suitable for use on sonar domes.

8. In discussing the results of tests with Prof. Kronstein of New York University, he has advised the Laboratory that further improvement will be made of the Panel I formulation. In this respect, Prof. Kronstein's attention was further directed to the possible reduction of the high film thickness (26.0 mils) of coating on Panel I.

NEW YORK UNIVERSITY
School of Engineering and Science
UNIVERSITY HEIGHTS, NEW YORK, N.Y. 10453
AREA 212 584-0700

Research Division

Enclosure (1)

Lab. Project 930-159
Technical Memorandum 2

5 December 1967

U. S. Naval Applied Science Laboratory
Flushing and Washington Avenues
Brooklyn, New York 11251

Attention: Mr. A. W. Cizek, Code 937
Technical Director

Reference: Contract N00140-67-C-0107.

Dear Mr. Cizek:

In continuing our development work we would appreciate your exposing the accompanying panels in your test device to guide us in the further development. They are:

A. PANEL I.
V-5-61 MODIFICATION OF TEST PAINT V-4-152 BY INCREASING THE POLYAMIDE RESIN CONTENT ACCORDING TO TABLE 28 of REPORT No. 4.

PANEL PREPARATION:

1) SANDBLASTED AT THE BROOKLYN NASL.
2) WASHPRIMER MIL-P-15328 B (FORMULA 117) .....0.35 mil
3) RED LEAD VINYL PRIMER MIL-P-15929 B (FORMULA 119) ..... 2.85 mil
4) NINE COATS OF PAINT V-5-61 .....14.80 mil

TOTAL .....18.00 mil.

PANEL II.
V-5-57 MODIFICATION OF TEST PAINT V-4-152 BY INCREASING THE CONTENT OF STYRENE BUTADIENE ELASTOMER AND POLYAMIDE RESIN BUT DECREASING THE RATIO OF POLYISOPRENE IN THE TEST PAINT (ACCORDING TO TABLE 27 of REPORT No. 4.)

PANEL PREPARATION:

1) SANDBLASTED AT THE BROOKLYN NASL.
2) WASHPRIMER MIL-P-15328 B (FORMULA 117) ..... 0.35 mil
3) RED LEAD VINYL PRIMER MIL-P-15929 B (FORMULA 119) ..... 2.65 mil
4) EIGHT COATS OF THE TOP COAT V-5-57 ..... 17.00 mil

TOTAL ..... 20.00 mil

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B. PANEL III.
MODIFICATION OF TEST PAINT V-5-38, MAINTAINING THE GRADE OF POLYURETHANE (ADIPRENE L 167) BUT INCREASING THE AMOUNT OF POLYAMIDE RESIN IN THE NEW TEST PAINT V-5-53 OF TABLE 23 IN REPORT No. 4.

PANEL PREPARATION:

1) SANDBLASTED AT BROOKLYN NASL.
2) WASHPRIMER MIL-P-15328 B (FORMULA 117) ..... 0.35 mil
3) RED LEAD VINYL PRIMER MIL-P-15929 B (FORMULA 119) ..... 2.95 mil
4) EIGHT COATS OF TEST PAINT V-5-53 .....16.70 mil

TOTAL .... 20.00 mil

PANEL IV.
MODIFICATION OF THE TEST PAINT V-5-38 BY FURTHER INCREASING THE CONTENT OF FREE ISOCYANATE IN THE POLYURETHANE COMPONENT, BY USING THE ADIPRENE L-200 MATERIAL.

NEW TEST PAINT: V-5-60 OF TABLE 13 IN REPORT No. 4.

PANEL PREPARATION:

1) SANDBLASTED AT THE BROOKLYN NASL.
2) Washprimer MIL-P-15328 B (FORMULA 117) ..... 0.45 mil
3) RED LEAD VINYL PRIMER MIL-P-15929 B (FORMULA 119) ..... 4.05 mil
4) SEVEN COATS OF TOP COAT V-5-60 .....15.50 mil

TOTAL .... 20.00 mil .

Yours very truly,

Max Kronstein

Max Kronstein
Senior Research Scientist

Enclosure (1)

U.S. NAVAL APPLIED SCIENCE LABORATORY

TABLE 1

TEST RESULTS OF SONIC EROSION OF EXPER
(USING NASL HIGH SONIC PULSE FACILITY-POWER L

Panel No.(1)	Paint Coating System(2)	Dry Film(3) Thickness Total - MILS)	Test Period Hours
I	Wash Primer F117 - 0.35 MIL Vinyl Red Lead F119 - 2.85 MILS 9 Coats Paint V-5-61 -14.80 MILS	26.0	4 1/2 23
II	Wash Primer F117 - 0.35 MIL Vinyl Red Lead F119 - 2.65 MILS 8 Coats Topcoat V-5-57 - 17.0 MILS	27.0	4 1/2 23
III	Wash Primer F117 - 0.35 MIL Vinyl Red Lead F119 - 2.95 MILS 8 Coats Paint V-5-53 - 16.7 MILS	25.0	4 1/2 23
IV	Wash Primer F117 - 0.45 MIL Vinyl Red Lead F119 - 4.05 MILS 7 Coats Topcoat V-5-6- - 15.50 MILS	27.0	4 1/2 23

NOTE: (1) and (2) Panel No. designation and coating system description were supplied
(3) Dry Film Thickness Measured by NASL

RIMENTAL COATING SYSTEMS
LEVEL 235 VOLT-AMPERES AVERAGE)

Eroded Area, Sq. In.		
Topcoat Paint Removed	Paint Removed To Bare Metal	Remarks
0.020	0.006	
0.027	0.009	After 23 hours, erosion of outercoats in 3 small areas in approx. center of panel. Eroded to metal base in one of these areas.
0.097	0.025	
0.188	0.079	After 23 hours, substantial scattered erosion of outercoats. Severe erosion to metal base in 3 areas.
0.231	0.152	
0.333	0.205	After 23 hours, substantial erosion of outercoats. Severe erosion to metal base in 3 areas.
0.080	0.071	
0.110	0.088	After 23 hours, severe erosion to metal base in 12 scattered areas.

ed by Prof. Kronstein as per reference (e)

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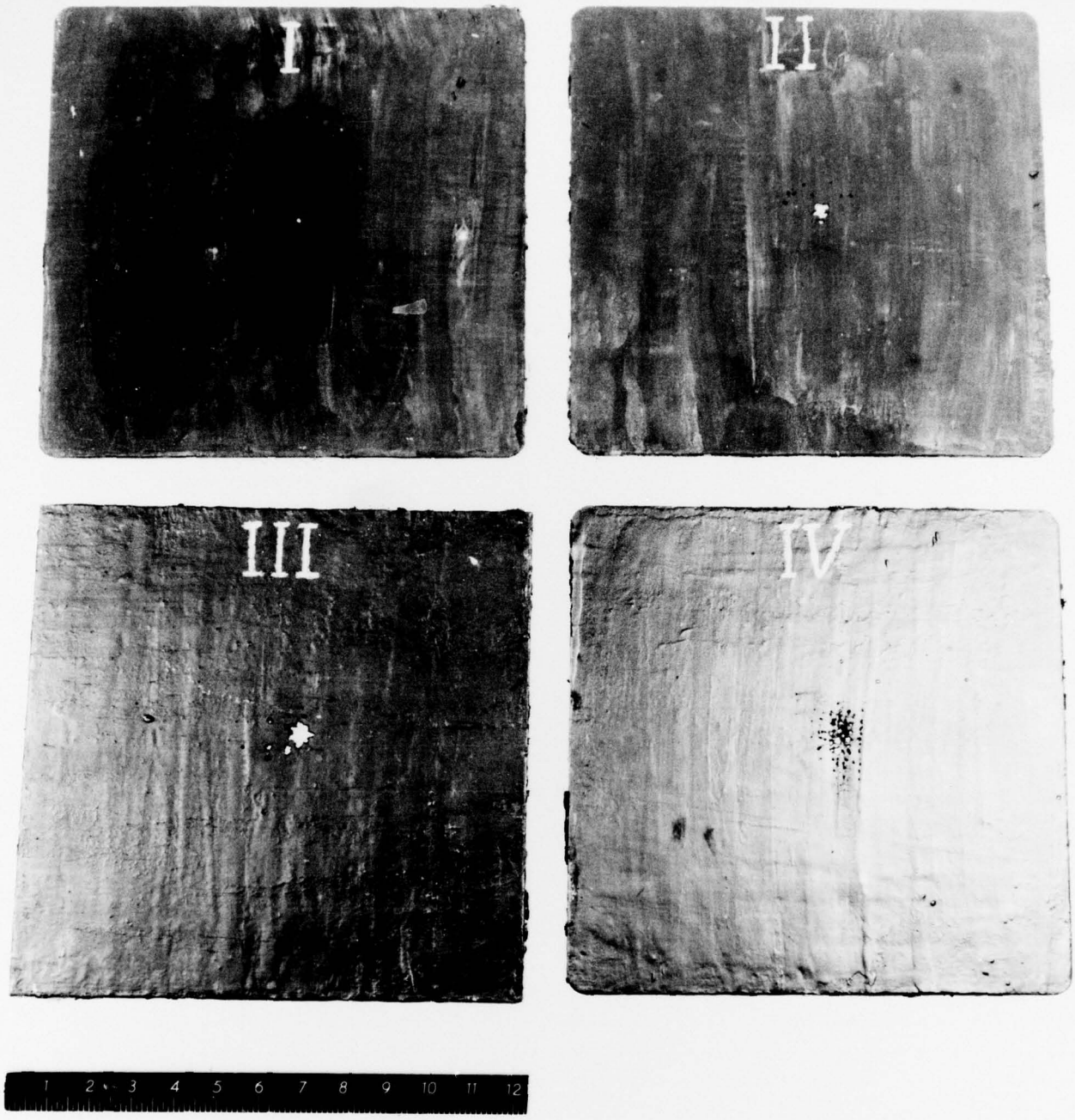

PHOTO 21495

ENCLOSURE 3 - VIEW SHOWING DEGREE OF EROSION OF N.Y.U. EXPERIMENTAL SONAR DOME COATING SYSTEMS

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Technical Memorandum 2