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LIFE OF NON-FERROUS SCREEN WIRE CLOTH

This is a brief digest of Research Paper RP803, (June 1935) "Atmospheric Exposure Tests on Non-Ferrous Screen Wire Cloth", by G. Willard Quick,<sup>1</sup> covering tests conducted by the National Bureau of Standards in cooperation with the American Society for Testing Materials.

The data presented cover atmospheric-exposure tests on non-ferrous screen wire cloth of seven different materials mounted in three types of frames--copper 30" x 36", wood 30" x 36", wood 12" x 12"--exposed for a period of approximately nine years (November 1925 to January 1935) to atmospheric conditions representing heavy industrial contamination, temperate seacoast with some industrial contamination, tropical seacoast with some industrial contamination, and normal inland, at the locations indicated in the table shown on page 2.

Laboratory accelerated-corrosion tests, consisting of exposure of material to salt spray, and intermittent immersion in salt solutions and in dilute sulphuric acid, were also conducted to determine whether or not such tests could be used as a means of determining the expected life of the material in actual service. As the results of these accelerated-corrosion tests were not consistent with the results of the atmospheric-exposure tests at any of the locations, they could not be used to predict the behavior of the material in service and for that reason are not included here.

In both series of tests, specimens were judged by appearance and tensile strength.

A summary of results of the atmospheric corrosion tests appears on the following page.

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<sup>1</sup>Available from Superintendent of Documents, Government Printing Office, Washington, D. C. (Price 10¢)



CONDITION OF NON-FERROUS SCREEN WIRE CLOTH AND LOSS IN TENSILE STRENGTH  
AFTER EXPOSURE TO VARIOUS ATMOSPHERIC CONDITIONS  
(16-MESH INSECT SCREEN CLOTH WOVEN FROM 0.0113" DIAMETER WIRE)

| R E S U L T S                                                             |                                    |               |                  |                                                                                             |              |                  |                                                 |                                                                                            |                  |                                                 |              |                                                   |                                                 |
|---------------------------------------------------------------------------|------------------------------------|---------------|------------------|---------------------------------------------------------------------------------------------|--------------|------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------|------------------|-------------------------------------------------|--------------|---------------------------------------------------|-------------------------------------------------|
| ATMOSPHERE WITH<br>HEAVY-INDUSTRIAL<br>CONTAMINATION<br>(PITTSBURGH, PA.) |                                    |               |                  | TEMPERATE SEACOAST<br>ATMOSPHERE WITH<br>SOME INDUSTRIAL CONTAMINATION<br>(PORTSMOUTH, VA.) |              |                  |                                                 | TROPICAL SEACOAST<br>ATMOSPHERE WITH<br>SOME INDUSTRIAL CONTAMINATION<br>(CRISTOBAL, C.Z.) |                  |                                                 |              | NORMAL INLAND<br>ATMOSPHERE<br>(WASHINGTON, D.C.) |                                                 |
| ALLOY<br>NO.*                                                             | NOMINAL<br>COMPOSITIONS<br>PERCENT | TIME          | CONDI-<br>TION** | PERCENTAGE<br>LOSS IN<br>TENSILE<br>STRENGTH***                                             | TIME         | CONDI-<br>TION** | PERCENTAGE<br>LOSS IN<br>TENSILE<br>STRENGTH*** | TIME                                                                                       | CONDI-<br>TION** | PERCENTAGE<br>LOSS IN<br>TENSILE<br>STRENGTH*** | TIME         | CONDI-<br>TION**                                  | PERCENTAGE<br>LOSS IN<br>TENSILE<br>STRENGTH*** |
| 5                                                                         | COPPER<br>UNALLOYED                | 7 YR<br>6 MO  | FAILURE          | 51                                                                                          | 8 YR<br>6 MO | NO<br>FAILURE    | 29                                              | 9 YR<br>2 MO                                                                               | NO<br>FAILURE    | 34                                              | 9 YR<br>2 MO | NO<br>FAILURE                                     | 21                                              |
| 6                                                                         | COPPER 98<br>TIN 2                 | 7 YR<br>6 MO  | FAILURE          | 47                                                                                          | 8 YR<br>6 MO | NO<br>FAILURE    | 29                                              | 9 YR<br>2 MO                                                                               | NO<br>FAILURE    | 32                                              | 9 YR<br>2 MO | NO<br>FAILURE                                     | 13                                              |
| 7                                                                         | COPPER 95<br>ALUMINUM 5            | 4 YR<br>10 MO | FAILURE          | 100                                                                                         | 8 YR<br>6 MO | NO<br>FAILURE    | 54                                              | 9 YR<br>2 MO                                                                               | NO<br>FAILURE    | 48                                              | 9 YR<br>2 MO | NO<br>FAILURE                                     | 22                                              |
| 1                                                                         | COPPER 90<br>ZINC 10               | 7 YR<br>6 MO  | FAILURE          | 75                                                                                          | 8 YR<br>6 MO | NO<br>FAILURE    | 37                                              | 9 YR<br>2 MO                                                                               | NO<br>FAILURE    | 39                                              | 9 YR<br>2 MO | NO<br>FAILURE                                     | 15                                              |
| 2                                                                         | COPPER 80<br>ZINC 20               | 6 YR<br>4 MO  | FAILURE          | 100                                                                                         | 4 YR         | FAILURE          | 100                                             | 4 YR<br>6 MO                                                                               | FAILURE          | 100                                             | 9 YR<br>2 MO | NO<br>FAILURE                                     | 33                                              |
| 3                                                                         | COPPER 75<br>NICKEL 20<br>ZINC 5   | 6 YR<br>11 MO | FAILURE          | 92                                                                                          | 8 YR<br>6 MO | NO<br>FAILURE    | 47                                              | 9 YR<br>2 MO                                                                               | NO<br>FAILURE    | 47                                              | 9 YR<br>2 MO | NO<br>FAILURE                                     | 20                                              |
| 4                                                                         | COPPER 30<br>NICKEL 70             | 4 YR<br>8 MO  | FAILURE          | 100                                                                                         | 8 YR<br>6 MO | NO<br>FAILURE    | 59                                              | 9 YR<br>2 MO                                                                               | NO<br>FAILURE    | 59                                              | 9 YR<br>2 MO | NO<br>FAILURE                                     | 43                                              |

\* NOS. 1, 4, 5, AND 6 ARE FOUR OF THE SIX TYPES OF NON-FERROUS SCREEN WIRE CLOTH RECOGNIZED IN FEDERAL SPECIFICATION RR-C-451A, PROMULGATED ON NOVEMBER 6, 1934. THIS SPECIFICATION ALSO RECOGNIZES TWO ADDITIONAL NON-FERROUS AND THREE FERROUS TYPES AS FOLLOWS: ALUMINUM ALLOY, NICKEL-CHROMIUM-MANGANESE ALLOY, IRON OR STEEL-ZINC COATED CORROSION-RESISTING STEEL, IRON OR STEEL-PAINTED OR JAPANNED. DATA UPON WHICH TO BASE A WORTHWHILE ESTIMATE OF THE PROBABLE SERVICE LIFE OF THE LAST MENTIONED, FIVE TYPES ARE NOT AVAILABLE.

\*\* CONDITION: FAILURE IN EXPOSED SCREEN CLOTH OCCURRED WHEN THERE WAS A BREAK IN WIRE FROM CORROSION IN AT LEAST ONE PLACE.

\*\*\* TENSILE STRENGTH TESTS: AT CONCLUSION OF ATMOSPHERIC-EXPOSURE TESTS, SPECIMENS WERE CLIPPED FROM EXTRA MATERIALS EXPOSED FOR THIS PURPOSE AT WASHINGTON, D. C.; AND FROM FRAMES AT PITTSBURGH, PA., PORTSMOUTH, VA., AND CRISTOBAL, C. Z., TO ASCERTAIN LOSS IN STRENGTH PARALLEL TO (LONGITUDINAL) AND PERPENDICULAR TO (TRANSVERSE) DIRECTION OF WEAVE OF CLOTH. MATERIALS NO. 2, 4, AND 7 AT PITTSBURGH, PA.; NO. 2 AT PORTSMOUTH, VA. AND CRISTOBAL, C. Z., WERE EITHER ENTIRELY GONE OR SO BADLY CORRODED THAT STRENGTH COULD NOT BE MEASURED. WHERE MATERIALS FAILED AND LOSS IN STRENGTH OF LESS THAN 100% ARE INDICATED, IT SHOULD BE NOTED THAT FAILURE OCCURRED WHEN THERE WAS A BREAK IN WIRE FROM CORROSION IN AT LEAST ONE PLACE, YET MATERIAL SHOWED VARYING DEGREES OF STRENGTH.

