Introduction

As part of its on-going program for "collection of engineer-data and the development of methods of test," Committee G-1 on Corrosion of Metals sponsored three symposia in 1973. These symposia included papers on atmospheric corrosion, seawater corrosion, and statistical planning and analysis of corrosion experiments.

The papers in this book have been arranged into three groups to permit easier reference. These groupings are:

Part 1—Testing in Natural Atmospheres
Part 2—Seawater Environments
Part 3—Laboratory and Statistical Techniques

The papers concerned with atmospheric corrosion in this volume were part of the Symposium on Atmospheric Corrosion, which was organized to update the existing knowledge in the field. The impetus for this effort was twofold. The efforts of governments and industries to reduce atmospheric pollution, especially in urban areas, have changed the nature of atmospheric corrosion in these areas. Also, many agencies are now collecting a range of atmospheric data, and this information is now available to correlate with atmospheric corrosion results. Furthermore, a variety of new materials has been developed since the last ASTM symposium on this subject in 1967,[1] and it was of interest to have at least early performance data on these materials.

Papers on atmospheric corrosion have been assembled covering a wide range of subjects. Five of the papers are concerned with the effects of various weather factors on atmospheric corrosion. These cover a range of topics, including estimating the effects of various weather factors in quantitative terms and selecting sites to give an accurate assessment of the performance of materials. Other subjects of interest include the effects of various alloying elements in steel on its atmospheric corrosion resistance and a new electrochemical technique for measuring instantaneous atmospheric corrosion rates.

Four papers deal with the performance of specific materials in atmospheric sites. These include some early results on new copper-base alloys and data on the exfoliation of aluminum alloys containing zinc, magnesium, and copper. One paper is concerned with the correlation of

[1] *Metal Corrosion in the Atmosphere, ASTM STP 435*, American Society for Testing and Materials, 1968.

atmospheric corrosion with the performance of aluminum alloys in accelerated tests.

ASTM Committee G-1 is now responsible for the 20-year test program initiated in 1957 by its predecessor, Committee B-3. Many of the original seven-year exposure panels from Point Reyes, California were lost through vandalism, making it necessary to prepare a second set of panels for a seven-year exposure. These panels have now been retrieved, and the results are given in this volume.

The Symposium on Seawater Corrosion represented a timely mix of several alloys and metal coatings exposed at surface seawater, deep ocean, and sea-floor locations. Some galvanic corrosion data for ferritic stainless steels in seawater were also presented.

The Symposium on Statistical Planning and Analysis of Corrosion Experiments was organized to stimulate greater use of a valuable mathematical tool by corrosion researchers. For this reason, two basic statistics educational lectures were presented during the symposium that were not appropriate for inclusion in this volume. The remaining presentations represented examples of how some researchers are presently using statistics to plan their corrosion experiments and analyze their data. Two of these papers dealt with corrosion in natural environments and are included in this volume.

The information in this book should be useful to engineers interested in the performance of materials in natural environments; to environmentalists interested in obtaining information on the effects of pollution factors on material performance; and to research workers who are developing new materials intended for service in natural environments.

Statistically designed experiments provide the researcher with a maximum amount of desired information from a set amount of work. Decisions based on statistically analyzed data can be accepted with a measurable degree of confidence. These papers should suggest to the reader how he may be able to enhance the results through statistical design and analysis of corrosion experiments.

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