Introduction

The corrosion resistance of a product or material is evaluated by service history, field testing, or laboratory corrosion testing. The most reliable predictor of performance is, of course, service experience followed closely by field testing since they are based upon the actual environment. When service history is lacking and time or budget constraints prohibit field testing, laboratory corrosion tests are used to predict corrosion performance. They are particularly useful for quality control, specification, materials selection, and materials development.

Laboratory corrosion tests fall into the following categories: immersion tests, simulated atmosphere tests, electrochemical tests, and environmentally aggressive tests. All of these are accelerated tests by design and therefore must be used carefully. The problems associated with laboratory corrosion tests include inappropriate test selection or evaluation, and incorrect or misleading results. The need for standardization of laboratory testing procedures and for determining the applicability of the results is obvious. Therefore, ASTM Committee G-1 on Corrosion of Metals, through Subcommittee G01.05 on Laboratory Corrosion Tests, sponsored the International Symposium on Laboratory Corrosion Tests and Standards from which the papers from the basis of this STP. The intent of this symposium was to provide a forum for discussion of existing standardized tests as well as the design and interpretation of new tests. It was truly international in scope with authors from eight countries.

The topics discussed in the STP include (1) the design and interpretation of laboratory tests, (2) laboratory tests for specific environments, and (3) laboratory tests for specific types of corrosion. An Appendix containing the standards most often referred to in the papers is included in the STP.

The papers on design and interpretation of laboratory tests deal with the engineering aspects of development of relevant tests as well as the newest electrochemical laboratory tests. New accelerated tests for salt-sulfur dioxide environments, high-temperature acidic environments, crevice corrosion, corrosion of cans, and atmospheric corrosion are described. Electrochemical techniques that are addressed include AC impedance, linear polarization, potentiodynamic polarization, current versus voltage hysteresis, and computer data acquisition. The papers on tests for specific environments address laboratory tests for potable waters, seawater, hydrogen sulfide environments, steel in concrete, inhibitors, and coinage environments. Results from these tests are correlated with field tests

and service performance. The topics of papers on tests for specific types of corrosion include crevice corrosion, erosion corrosion, stress corrosion cracking, and intergranular corrosion.

The information in this STP is useful for experienced as well as new investigators involved with conducting, specifying, or evaluating laboratory corrosion tests. It defines the state of the art in laboratory corrosion testing, describes limitations of accelerated tests, provides significant information on relevance of existing tests as well as information useful for the development of new tests, and includes the standards most often used for laboratory corrosion testing.

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