External Corrosion—
Introduction to Chemistry and Control

AWWA MANUAL M27
Second Edition

American Water Works Association

Science and Technology

AWWA unites the drinking water community by developing and distributing authoritative scientific and technological knowledge. Through its members, AWWA develops industry standards for products and processes that advance public health and safety. AWWA also provides quality improvement programs for water and wastewater utilities.
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Introduction

Corrosion prevention and control is a practical science that allows relatively reliable predictions of corrosive conditions and, more important, effective prevention or mitigation of corrosion where economically appropriate. Faced with how best to install and protect a distribution system to minimize corrosion, today's water utility manager must evaluate the cost of corrosion protection compared with the extended life of the pipelines and appurtenances.

Both the technology and the economics involved in external corrosion control are complex, requiring a logical and well-considered approach by utility managers, operators, and consulting engineers, all of whom must be familiar with local conditions and available options. Not all environments are corrosive, not all materials corrode, and there is no single answer to all corrosion problems. In any given situation, the corrective measure selected must be both the most appropriate for the material and environment involved and economically feasible.

This manual is addressed primarily to the professional water utility operator, whose objective is to provide safe drinking water to the public. The text is intended to give the reader an understanding of how and why corrosion occurs, how the corrosion potential of an environment is evaluated, and how many of the proven corrosion prevention and control measures operate. For readers who believe a review of theoretical concepts of basic chemistry and basic electrical circuit theory is necessary, the relevant sections of *Basic Science Concepts and Applications* are recommended.

The general principles and examples presented in this manual are not intended to replace the services of a knowledgeable corrosion engineer. However, methodical application of the principles introduced—i.e., determining the cause of corrosion, analyzing its extent, and considering appropriate procedures for prevention or mitigation—will lay the foundation for an effective corrosion-control program that will benefit the public and the utility alike.

In the selection and application of corrosion monitoring/protection/mitigation materials, it is the responsibility of the operator to ensure that materials in contact with the water supply have been properly tested and certified in accordance with the standards and regulations relevant to the water utility involved.

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Acknowledgments

This is the second edition of AWWA Manual M27, *External Corrosion—Introduction to Chemistry and Control*. Members of the Corrosion Control Committee involved in its development and approval included the following:

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