

# Cathodic Protection of Metallic Structures Submerged in Fresh Water

©2023 Association for Materials Protection and Performance (AMPP). All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of AMPP.

# Cathodic Protection of Metallic Structures Submerged in Fresh Water

This AMPP standard represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone, whether he or she has adopted the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in conformance with this standard. Nothing contained in this AMPP standard is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by Letters Patent, or as indemnifying or protecting anyone against liability for infringement of Letters Patent. This standard represents minimum requirements and should in no way be interpreted as a restriction on the use of better procedures or materials. Neither is this standard intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this standard in specific instances. AMPP assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official AMPP interpretations issued by AMPP in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

Users of this AMPP standard are responsible for reviewing appropriate health, safety, environmental, and regulatory documents and for determining their applicability in relation to this standard prior to its use. This AMPP standard may not necessarily address all potential health and safety problems or environmental hazards associated with the use of materials, equipment, and/or operations detailed or referred to within this standard. Users of this AMPP standard are also responsible for establishing appropriate health, safety, and environmental protection practices, in consultation with appropriate regulatory authorities if necessary, to achieve compliance with any existing applicable regulatory requirements prior to the use of this standard.

CAUTIONARY NOTICE: AMPP standards are subject to periodic review and may be revised or withdrawn at any time in accordance with AMPP technical committee procedures. AMPP requires that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of initial publication and subsequently from the date of each reaffirmation or revision. The user is cautioned to obtain the latest edition. Purchasers of AMPP standards may receive current information on all standards and other NACE/SSPC publications by contacting AMPP Customer Support, 15835 Park Ten Place, Houston, Texas 77060-5145 (Tel: +1-281-228-6200, email: [customersupport@ampp.org](mailto:customersupport@ampp.org)).

## Document History:

2023-1-01 Approved by AMPP Standards Committee (SC) 01, Cathodic/Anodic Protection

AMPP values your input. To provide feedback on this standard, please contact: [standards@ampp.org](mailto:standards@ampp.org)

AMPP SP21438-2023

©2023 Association for Materials Protection and Performance (AMPP). All rights reserved.

# Cathodic Protection of Metallic Structures Submerged in Fresh Water

Foreword, Scope, Rationale .....	5
Referenced Standards and Other Consensus Documents .....	6
Section 1 General .....	7
Section 2 Definitions .....	8
Section 3 Determination of Need for Cathodic Protection.....	10
3.1 Introduction .....	10
3.2 Coated and Uncoated Structures.....	10
3.3 Economic Considerations .....	10
3.4 Operational Considerations.....	10
Section 4 Structure Design for Corrosion Control.....	11
Section 5 Design of Cathodic Protection Systems.....	12
5.1 General .....	12
5.2 Major Objectives of CP System Design .....	13
5.3 Information Necessary or Useful for Fresh Water Structure CP System Design.....	13
5.4 Types of CP Systems.....	14
5.5 Considerations that Influence Selection of the Type of CP System .....	17
5.6 Factors Determining Total Current Requirements for CP.....	18
5.7 Factors Determining Anode Current Output, Operating Life, and Utilization Factor .....	20
5.8 Special Mechanical and Electrical Considerations.....	21
5.9 Design Drawings and Specifications.....	23
Section 6 Installation of Cathodic Protection Systems.....	23
6.1 Introduction .....	23
6.2 Construction Specifications.....	23
6.3 Construction Supervision.....	23
6.4 Inspection and Handling.....	23
6.5 Installation.....	24
6.6 Commissioning.....	25
Section 7 Criteria for Cathodic Protection.....	25
7.1 Introduction .....	25
7.2 General .....	25
7.3 Criteria for Cathodic Protection of Metallic Structures .....	26
7.4 Measurement Procedures.....	28
7.5 Reference Electrodes.....	28
7.6 Special Considerations .....	29
Section 8 Safety.....	29

8.1	Public Safety .....	29
8.2	Environmental Safety .....	29
8.3	Personnel Safety .....	30
8.4	Structure Safety .....	30
Section 9	Operation and Maintenance .....	30
9.2	Operation .....	30
9.3	Maintenance .....	30
9.4	Component Replacement .....	31
9.5	Records .....	32
	Other Referenced Documents .....	33

Currently in preview, click buy full version

## Foreword

This standard practice presents procedures and practices for achieving effective control of external corrosion on metallic structures submerged in fresh water.

## Scope

This standard presents acceptable methods and practices for the control of external corrosion on non-mobile structures constructed of steel, stainless steel, cast iron, or aluminum immersed in fresh water through the use of cathodic protection (CP). Such structures may include, but are not limited to trash racks, dams, gates, dock pilings, sheet pilings, and other similar structures located in lakes, rivers, streams, canals, or other similar bodies of fresh water.

These recommendations are not intended for pipelines or structures submerged in waters with elevated salinity. Neither is it intended for mobile structures such as boats, barges, or similar conveyances. However, under some circumstances, these recommendations may be applicable to these situations. It is intended for use by corrosion control personnel concerned with the corrosion of structures submerged in fresh water, including dams, docks, gates, piers, pilings, and similar structures. This standard describes the use of electrically insulating coating, electrical isolation, and cathodic protection (CP) as external corrosion control methods. It contains specific provisions for the application of CP to existing bare, existing coated, and new structures. The procedures in this standard may best be applied by persons with experience in the design and operation of corrosion control on submerged structures.

## Rationale

This standard fills a gap in the protection of structures by cathodic protection. Standards for the protection of buried or submerged pipelines or offshore structures have existed for many years. While all or portions of these standards may be applicable to structures submerged in fresh water, they do not address the unique features of these structures. Fresh water structures are commonly more structurally complex than pipelines. Many are subject to continual significant variation in electrolyte resistivity. By their very nature, many are intended to have close interaction with the public, which may expose the public to the CP system. The CP systems of some of these structures may also negatively impact local wildlife. This standard attempts to address the unique characteristics of protection of structures submerged in fresh water.

This standard should be used in conjunction with the practices described in the following AMPP standards, when appropriate:

SP0108 SP0169 SP0176 SP0196 SP0368 SP0408 TM0101 TM0113 TM0204 TM0497 SP0104

For accurate and correct application of this standard, the standard must be used in its entirety. Using or citing only specific paragraphs or sections can lead to misinterpretation and misapplication of the requirements, recommendations, and practices contained in this standard.

This standard does not designate practices for every specific situation because of the complexity of conditions that exist on submerged structures.