



SSPC: The Society for Protective Coatings Technology Guide 15

Field Methods for Extraction and Analysis of Soluble Salts on Steel and Other Nonporous Substrates

1. Scope

1.1 This Guide describes the most commonly used field methods for the extraction and analysis of soluble salts on steel and other nonporous substrates. Laboratory methods are only included for situations where more complete salt extractions are desired through rigorous laboratory retrieval and analysis protocols.

2. Description and Use

2.1 INTRODUCTION: Coatings applied on surfaces contaminated with soluble salts exceeding a certain concentration exhibit diminished performance. Likewise, self-passivating metals (not intended for coating such as stainless steel, aluminum and copper) can be compromised from elevated concentrations of residual soluble salts in corrosive environments. Soluble salt testing involves two basic steps: 1) extraction of salts from the surface into a solution and 2) the analysis of the solution. This Guide is intended to assist the user in selecting specific procedures for extracting and performing qualitative and/or quantitative soluble salts from steel and nonporous surfaces. It includes field methods for measuring total conductivity (fully automated or multi-step) and specific ions. It also offers guidance for destructive laboratory soluble salt extraction and testing. An overview of available field and laboratory techniques, methods of salt extraction and surface concentration calculations are provided in Tables 1 and 2 respectively. A discussion and sources on the efficiency of salt removal (also called extraction) from the metal surfaces of interest are provided in Appendix C.

2.1.1 Abbreviations:

Cl ⁻	chloride ion
cm ³	cubic centimeters
cm ²	square centimeters
Fe ⁺⁺	ferrous ion
μS	microSiemens
μS/cm	microSiemens per centimeter
mg	milligram
ml	milliliter
ppm	parts per million
NaCl	sodium chloride
NO ₃ ⁻	nitrate ion
SO ₄ ⁻²	sulfate ion

2.2 SALT EXTRACTION SOLUTIONS

All of the reagents used to extract salts from metal surfaces in this document fall into two categories: reagent water and proprietary aqueous solutions. They will be designated herein as reagent water or proprietary extraction solution.

2.2.1 Reagent Water: Reagent water used for salt extraction should have a maximum conductivity of 5 μS/cm. Distilled water may be purchased at grocery stores but verification of the conductivity is recommended. Alternatively, a portable demineralizer may be used to make reagent water on site. Pour tap water into the plastic bottle, attach the demineralizer cartridge in the direction indicated, invert, and squeeze out the desired amount of water (for many of the tests described below, at least 25 ml will be required). The cartridge can be used until the blue color turns brown, as indicated on the side of the cartridge. Once this occurs, replace the cartridge. Each cartridge should demineralize approximately 3000 ml of water.

2.2.2 Proprietary Solutions: Proprietary extraction solutions may be included with some commercial test kits. These solutions should only be used for the soluble salts described in the kit instructions. Proprietary solutions are not suitable for measuring conductivity of extracted solutions.

3. Referenced Standards

The standards listed below are updated on a periodic basis. The user of this guide should consult the most recent revision.

3.1 SSPC STANDARDS AND JOINT STANDARDS:

SP 5/NACE No. 1 White Metal Blast Cleaning

3.2 ASTM INTERNATIONAL STANDARDS¹

ASTM D4327	Standard Test Method for Anions in Water by Chemically Suppressed Ion Chromatography
ASTM D512	Standard Test Methods for Chloride Ion in Water

¹ ASTM International, 100 Bar Harbor Drive, West Conshohocken, PA 19380-2999. For referenced ASTM standards, visit the ASTM website, <http://www.astm.org/>, or contact ASTM Customer Service at customer@astm.org. For Annual Book of ASTM Standards volume information, refer to the standard's Document Summary page on the ASTM website.

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Katrin Zwirgmaier



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Index of Specifications and Standards ,2005 Handbook of Engineering Practice of Materials and Corrosion Jung-Chul (Thomas) Eun,2020-09-04 This handbook is an in depth guide to the practical aspects of materials and corrosion engineering in the energy and chemical industries The book covers materials corrosion welding heat treatment coating test and inspection and mechanical design and integrity A central focus is placed on industrial requirements including codes standards regulations and specifications that practicing material and corrosion engineers and technicians face in all roles and in all areas of responsibility The comprehensive resource provides expert guidance on general corrosion mechanisms and recommends materials for the control and prevention of corrosion damage and offers readers industry tested best practices rationales and case studies **Metallurgy and Corrosion Control in Oil and Gas Production** Robert

Heidersbach,2018-09-17 Details the proper methods to assess prevent and reduce corrosion in the oil industry using today s most advanced technologies This book discusses upstream operations with an emphasis on production and pipelines which are closely tied to upstream operations It also examines protective coatings alloy selection chemical treatments and cathodic protection the main means of corrosion control The strength and hardness levels of metals is also discussed as this affects the resistance of metals to hydrogen embrittlement a major concern for high strength steels and some other alloys It is intended for use by personnel with limited backgrounds in chemistry metallurgy and corrosion and will give them a general understanding of how and why corrosion occurs and the practical approaches to how the effects of corrosion can be mitigated **Metallurgy and Corrosion Control in Oil and Gas Production** Second Edition updates the original chapters while including a new case studies chapter Beginning with an introduction to oilfield metallurgy and corrosion control the book provides in depth coverage of the field with chapters on chemistry of corrosion corrosive environments materials forms of corrosion corrosion control inspection monitoring and testing and oilfield equipment Covers all aspects of upstream oil and gas production from downhole drilling to pipelines and tanker terminal operations Offers an introduction to corrosion for entry level corrosion control specialists Contains detailed photographs to illustrate descriptions in the text **Metallurgy and Corrosion Control in Oil and Gas Production** Second Edition is an excellent book for engineers and related professionals in the oil and gas production industries It will also be an asset to the entry level corrosion control professional who may have a theoretical background in metallurgy chemistry or a related field but who needs to understand the practical limitations of large scale industrial operations associated with oil and gas production **Department Of Defense Index of**

Specifications and Standards Federal Supply Class Listing (FSC) Part III July 2005 , Department Of Defense Index of Specifications and Standards Numerical Listing Part II November 2005 , **Index to Publications Referenced in Guide Specifications for Civil Works and Military Construction** United States. Army. Corps of Engineers,1977

Steel Structures Painting Manual: Systems and specifications Steel Structures Painting Council,1955

Department Of Defense Index of Specifications and Standards Numerical Canceled Listing (APPENDIX) Part IV
November 2005 , **Coating Application for Piping, Valves and Actuators in Offshore Oil and Gas Industry** Karan Sotoodeh,2022-09-14 This book looks at the applications of coating in piping valves and actuators in the offshore oil and gas industry Providing a key guide for professionals and students alike it highlights specific coating standards within the industry including ISO NORSOK SSPC and NACE In the corrosive environment of a seawater setting coatings to protect pipes valves and actuators are essential This book provides both the theory behind these coatings and practical applications including case studies from multinational companies It covers different offshore zones and their corrosivity level alongside the different types of external corrosion such as stress cracking and hydrogen induced stress cracking The key coatings discussed are zinc rich coatings thermal spray zinc or aluminum phenolic epoxy and passive fire protection with a review of their defects and potential failures The book also details the role of coating inspectors and explains how to diagnose faults Case studies from companies such as Aker Solutions Baker Hughes Equinor and British Petroleum illustrate the wide range of industrial applications of coating technologies This book is of interest to engineers and students in materials coating mechanical piping or petroleum engineering Expanding Metropolitan Highways National Research Council (U.S.). Transportation Research Board. Committee for Study of Impacts of Highway Capacity Improvements on Air Quality and Energy Consumption,Bernard R. Appleman,National Research Council (U.S.). Transportation Research Board,1995-02 This synthesis will be of interest to state DOT bridge maintenance and construction engineers regulators consultants and contractors involved with the removal of lead paint from bridges and structures and structural coatings specialists chemists and researchers This synthesis describes the current state of the practice for the removal of lead based paint from existing highway steel bridges Avant propos **Department Of Defense Index of Specifications and Standards Alphabetical Listing Part I July 2005 ,**
Lead Exposure Risks During Construction Activities United States. Congress. House. Committee on Energy and Commerce. Subcommittee on Health and the Environment,1993 **Methods for Removal of Lead Paint From Steel Structures ,** *Journal of Protective Coatings & Linings* ,2008 *An Introduction to Application of Coating Systems for Buildings and Infrastructure* J. Paul Guyer, P.E., R.A.,2018-01-20 Introductory technical guidance for professional engineers architects and facility managers interested in coatings and paints for buildings and infrastructure Here is what is discussed 1 INTRODUCTION 2 PAINT STORAGE PRIOR TO APPLICATION 3 PREPARING PAINT FOR APPLICATION 4 WEATHER CONDITIONS AFFECTING APPLICATION OF PAINTS 5 METHODS OF APPLICATION Engineering and Design ,1986
2007 Standard Catalog of Baseball Cards Bob Lemke,2006 Appeals to passionate and casual collectors alike including the 33 000 readers of Sports Collector s Digest and people participating in the more than 185 000 continuous online auctions **Thermally Sprayed Metal Coatings to Protect Steel Pilings** James A. Ellor,Walter T. Young,John Repp,National Cooperative Highway Research Program,2004 Research sponsored by the American Association of State

Highway and Transportation Officials in cooperation with the Federal Highway Administration **PassPorter's Field**
Guide to the Disney Cruise Line and Its Ports of Call Jennifer Watson, Dave Marx, Mickey Morgan, 2004-04 Book passage
on the only guidebook dedicated to the magic and wonder of the Disney Cruise Line This handbook has everything needed to
know including maps deck plans photos and worksheets Fully updated second edition Guide to Design Criteria for Bolted
and Riveted Joints Geoffrey L. Kulak, John W. Fisher, John H. A. Struik, 1987-04-14 This updated version of the first edition
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