

PRACTICAL

# B I L E R

WATER TREATMENT  
HANDBOOK



N. MANIVASAKAM



# Practical Boiler Water Treatment

**Paresh Haribhakti,P.B. Joshi,Rajendra  
Kumar**



## **Practical Boiler Water Treatment:**

**Practical Boiler Water Treatment Handbook** Natarajan Manivasakam, 2011 PARTIAL CONTENTS PART I BOILER BASICS Chapter 1 Boiler An Introduction Chapter 2 Classification of Boilers Chapter 3 Common Terms and Explanation PART II BOILER WATER TROUBLES Chapter 4 Impurities in Water and Their Effects Chapter 5 Boiler Water Troubles A Prelude Chapter 6 Scale Formation Chapter 7 Silica Carryover Chapter 8 Scale Formation in Economizers Chapter 9 Super Heater and Turbine Deposits Chapter 10 Corrosion Basic Information Chapter 11 General Corrosion Overall Corrosion Acidic Corrosion Chapter 12 Dissolved Oxygen Corrosion Pitting Corrosion Chapter 13 Carbondioxide Corrosion Chapter 14 Corrosion caused by Unstable Salts Chapter 15 Corrosion caused by Other Substances Chapter 16 Corrosion caused by Chelants Chelant Corrosion Chapter 17 Caustic Embrittlement and Caustic Gouging Chapter 18 Hydrogen Embrittlement Chapter 19 Condensate Corrosion Chapter 20 Preboiler Corrosion Chapter 21 Economizer Corrosion Chapter 22 Super Heater and Turbine Corrosion Chapter 23 Foaming Priming Carryover PART III WATER QUALITY REQUIREMENTS AND TREATMENT PROGRAMS Chapter 24 Quality Requirements for Feed Water and Boiler Water Chapter 25 Objectives of Boiler Water Treatment Chapter 26 External Treatment and Internal Treatment Chapter 27 Water Treatment programs Guidelines PART IV EXTERNAL TREATMENT Chapter 28 External Treatment A Prelude Chapter 29 Coagulation Removal of Color Turbidity and Suspended Matter Chapter 30 Filtration Chapter 31 Softening by Chemical Method Lime Soda Softening Chapter 32 Ion Exchange Resins and Treatment Methods Chapter 33 Softening by Ion Exchange Method Chapter 34 Dealkalization Chapter 35 Demineralization Deionization Chapter 36 Mixed Bed Deionization Chapter 37 Reverse Osmosis Chapter 38 Evaporation Chapter 39 Silica Removal Chapter 40 Oil Removal Chapter 41 Condensate Treatment Condensate Polishing Chapter 42 Deaeration Mechanical Removal of Oxygen PART V INTERNAL TREATMENT Chapter 43 Internal Boiler Water Treatment A Prelude Chapter 44 Organic Polymers and Their Role as Scale Inhibitors Dispersants and Sludge Conditioners in Boiler Water Treatment Chapter 45 Internal Treatment Chemical Feeding Chapter 46 Prevention of Scale Formation Chapter 47 Sludge Conditioning Chapter 48 Prevention of Corrosion An Introduction Chapter 49 Prevention of Corrosion Due to Low pH Chapter 50 Prevention of Pitting Corrosion Using Oxygen Scavengers Chemical Removal of Oxygen Chapter 51 Prevention of Caustic Embrittlement and Caustic Gouging Chapter 52 Prevention of Chelant Corrosion Chapter 53 Prevention of Condensate Corrosion Chapter 54 Prevention of Pre Boiler Corrosion Chapter 55 Prevention of Economizer Corrosion Chapter 56 Prevention of Foaming Priming Carryover Chapter 57 Prevention of Silica Carryover Chapter 58 Boiler Blow Down PART VI BOILER WATER TREATMENT IMPORTANT CALCULATIONS Chapter 59 Basic Conversion Factors Chapter 60 Water Softening Calculations Chapter 61 Cycles of Concentration Blowdown Feed Water and Makeup Water Calculations Chapter 62 Determination of Dosage of Chemicals PART VII BOILER START UP CLEANING LAY UP AND MAINTENANCE Chapter 63 Boiler Startup Pre operational Cleaning Chapter 64 Descaling and Boiler Cleaning Chapter 65

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BOILER WATER TREATMENT PRINCIPLES AND PRACTICE VOLUME 1 of Two Volumes by COLIN FRAYNE Vol I Boiler Basics and Steam Water Chemistry ISBN 0 8206 0371 6 This comprehensive reference is the most practical field guide ever written on steam and boiler water treatment In this two volume handbook Colin Frayne Cooling Water Treatment Principles and Practice also by Chemical Publishing analyzes the whole spectrum of boiler systems including those used in residential complexes commercial and institutional buildings and industrial facilities The breadth of the book covers All types of boilers plants from small cast iron units to large utility and nuclear power plants Boiler subsystems appurtenances and auxiliaries Boiler maintenance and troubleshooting fuel treatments combustion gas analysis pre treatment processes chemicals and operational management Historical and modern program design and control in accordance with international standards Introduction The Function of Boiler Water Treatment and Its Marketing Steam Generation Boiler Types and Applications Boiler Plant Subsystems Appurtenances and Auxiliaries Waterside and Steamside Problems The Basics Waterside and Steamside Problems Hot Water Heating and Low Pressure Steam Boiler Waterside and Steamside Problems Pre Boiler Section Specifics Waterside and Steamside Problems Boiler Section Specifics Waterside and Steamside Problems Post Boiler Section Specifics Pre Boiler and Post Boiler Treatment Processes Internal Treatment Programs Adjuncts and Conjunctional Treatments Control of Boiler Water Chemistry Operational Control of Waterside Surfaces Control of Fireside Conditions and Surfaces Appendix I Useful Data Appendix II Glossary Bibliography Index This book is Volume 1 of a 2 Volume set Other titles by author Colin Frayne Cooling Water Treatment Principles and Practice ISBN 978 0 8206 0370 4 Cooling Water Treatment Principles and Practices Charts and Notes For Field Use ISBN 978 0 8206 0003 1

**Practical Guide to Thermal Power Station Chemistry** Soumitra Banerjee, 2020-11-25 This book deals with the entire gamut of work which chemistry department of a power plant does The book covers water chemistry steam water cycle chemistry cooling water cycle chemistry condensate polishing stator water conditioning coal analysis water analysis procedures in great details It is for all kinds of intake water and all types of boilers like Drum Once through for subcritical and supercritical technologies in different operating conditions including layup It has also covered nuances of different cycle chemistry treatments like All Volatile Oxygenated One of the major reasons of generation loss in a thermal plant is because of boiler tube leakage There is illustration and elucidation on this which will definitely make people more aware of the importance of adherence to strict quality parameters required for the adopted technology prescribed by well researched organization like EPRI The other important coverage in this book is determination of quality of primary and secondary fuel which is very important to understand combustion in Boiler apart from its commercial implication The health analysis of Lubricants and hydraulic oil have also been adequately covered I am very much impressed with the detailing of each and every issue Though Soumitra refers the book as Practical Guide the reader will find complete theoretical background of suggested action and the rational of monitoring each parameter He has detailed out the process parameters sampling points sample frequency collection

methods measurement techniques laboratory set up and record keeping very meticulously and there is adequate emphasis on trouble shooting too There is a nice blending of theory and practice in such a way that the reader at the end will not only learn what to do and how to do he will also know why to do I hope this book will be invaluable and a primer to every power plant chemist and the station management shall find it a bankable document to ensure best chemistry practices

**Process Steam Systems: A Practical Guide for Operators, Maintainers, Designers, and Educators** Carey Merritt, 2022-10-11

Process Steam Systems A comprehensive and accessible handbook for process steam systems The revised second edition of Process Steam Systems A Practical Guide for Operators Maintainers Designers and Educators delivers a practical guide to ensuring steam systems are properly and efficiently designed operated and maintained The book provides comprehensive information designed to improve process steam system knowledge reliability and integration into current manufacturing processes The most up to date version of this volume includes brand new coverage of current codes sustainability measures and updated applications Heat transfer theory and thermodynamics are tied into practical applications with new practice problems ideal for both professionals seeking to improve their skills and engineers in training Readers will also find Thorough design criteria for process steam systems complete with detailed illustrations for piping and controls An entirely new chapter on the history of steam systems including the evolution of the ASME code and boiler accidents Revised coverage of current NFPA ASME CSD 1 FM and building codes as well as new insurance requirements relevant to practitioners in the industry Expansive design guidance for steam system efficiency upgrades Perfect for operations and maintenance staff at manufacturing healthcare and commercial laundries Process Steam Systems A Practical Guide for Operators Maintainers Designers and Educators will also earn a place in the libraries of consulting engineers and engineering students with an interest in process manufacturing

**Journal of the American Water Works Association** American Water Works Association, 1928 Vols for 2012 contain only executive summaries of articles

**Merchant Marine Examination Questions**, 1992-06

*Energy Efficiency Guide for Industry in Asia*, 2006 This guide has been developed for Asian companies who want to improve energy efficiency through Cleaner Production and for stakeholders who want to help them It includes a methodology case studies for more than 40 Asian companies in 5 industry sectors technical information for 25 energy equipments training materials a contact and information database Publisher's description

*Failure Investigation of Boiler Tubes: A Comprehensive Approach* Paresh Haribhakti, P.B. Joshi, Rajendra Kumar, 2018-01-01 Failures or forced shutdowns in power plants are often due to boilers and particularly failure of boiler tubes This comprehensive resource deals with the subject of failure investigation of boiler tubes from basic fundamentals to practical applications Coverage includes properties and selection of materials for boiler tubes from a metallurgical view point damage mechanisms responsible for failure of boiler tubes and characterization techniques employed for investigating failures of boiler tubes in thermal power plants and utility boilers of industrial commercial institutional ICI boilers A large number of case studies based on the actual

failures from the field are described along with photographs and microstructures to allow for easy comprehension of the theory behind the failures This book is geared to practicing engineers and for studies in the major area of power plant engineering For non metallurgists a chapter has been devoted to the basics of material science metallurgy of steels heat treatment and structure property correlation A chapter on materials for boiler tubes covers composition and application of different grades of steels and high temperature alloys currently in use as boiler tubes and future materials to be used in supercritical ultra supercritical and advanced ultra supercritical thermal power plants A comprehensive discussion on different mechanisms of boiler tube failure is the heart of the book Additional chapters detailing the role of advanced material characterization techniques in failure investigation and the role of water chemistry in tube failures are key contributions to the book The authors have long standing experience in the field of metallurgy and materials technology failure investigation remaining life assessment RLA and fitness for service FFS for industrial plant and equipment including power plants They have conducted a large number of failure investigations of boiler tubes and have recommended effective remedial measures in problem solving for power and utility boilers

**Locomotive Cyclopedia of American Practice**  
,1938 Technical Report Abstracts ManTech International Corporation. CADCOM.,1980 Power ,1929 *Boilerman 3*  
& 2 United States. Bureau of Naval Personnel,1968 **Corrosion, Causes and Prevention** Frank Newman Speller,1926  
Locomotive Cyclopedia of American Practice, 1950-52 ,1950 **Locomotive Cyclopedia of American Practice**  
American Railway Master Mechanics' Association,1947

The book delves into Practical Boiler Water Treatment. Practical Boiler Water Treatment is a vital topic that needs to be grasped by everyone, from students and scholars to the general public. This book will furnish comprehensive and in-depth insights into Practical Boiler Water Treatment, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
  - Chapter 1: Introduction to Practical Boiler Water Treatment
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  - Chapter 4: Practical Boiler Water Treatment in Specific Contexts
  - Chapter 5: Conclusion
2. In chapter 1, this book will provide an overview of Practical Boiler Water Treatment. This chapter will explore what Practical Boiler Water Treatment is, why Practical Boiler Water Treatment is vital, and how to effectively learn about Practical Boiler Water Treatment.
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4. In chapter 3, this book will examine the practical applications of Practical Boiler Water Treatment in daily life. This chapter will showcase real-world examples of how Practical Boiler Water Treatment can be effectively utilized in everyday scenarios.
5. In chapter 4, the author will scrutinize the relevance of Practical Boiler Water Treatment in specific contexts. The fourth chapter will explore how Practical Boiler Water Treatment is applied in specialized fields, such as education, business, and technology.
6. In chapter 5, this book will draw a conclusion about Practical Boiler Water Treatment. This chapter will summarize the key points that have been discussed throughout the book.

The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Practical Boiler Water Treatment.

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