



**boiler  
water  
treatment**

Principles and Practice

Colin Frayne

**CHARTS AND NOTES  
FOR FIELD USE**



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# Boiler Water Treatment Principles And Practice Charts And

**Brendan G. Carr**



## **Boiler Water Treatment Principles And Practice Charts And:**

**Boiler Water Treatment: Principles and Practice** Colin Frayne, 2002 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

**Cooling Water Treatment: Principles and Practice** Colin Frayne, 2010-03-30 Cooling Water Treatment Principles and Practices Charts and Notes For Field Use Is the companion field guide handbook to Cooling Water Treatment Principles and Practices by Colin Frayne In this handbook you will find many helpful formulas for use in the field such as formulas for Refrigeration in cooling towers Conductive heat flow General industrial and cooling water makeup contents Coagulants and flocculants Filter types Water softeners Commonly found corrosion types Mineral and silica deposit types Equations for solving pH Common bacteria and Fungi types Inhibitor components A suggested biocide selection chart for comfort cooling systems A cleaning and disinfection program for cooling systems and Cooling water control parameters The charts and formulas contained in this field handbook provide an overview of many situations encountered in the field and will aid in the diagnosis and solution of many water issues you will encounter on the job Also provided are two separate sections for keeping notes on specific issues Other titles by author Colin Frayne 0 8206 0371 6 Boiler Water Treatment Principles and Practice Vol I 0 8206 0400 3 Boiler Water Treatment Principles and Practice Vol II *Boiler Water Treatment Principles and Practice* Colin Frayne, 2013 Table of Contents About the Author

Saturated steam temperatures at various boiler pressures Boiler Energy and Power Units Typical gross heating values of common fuels based on approximately 80% fuel to steam efficiency Typical energy consumption and output ratings for a fire tube boiler Steam tables suitable for pressure deaerators Calculating Blowdown Coefficients of thermal conductivity for some heat exchanger metals and boiler deposits Types of water or steam commonly employed in most HW heating and steam generating plants Commonly occurring minerals in natural MU water sources Specific waterside steamside problems affecting MPHW and HPHW boiler plants Salt concentration indicators Summary of waterside steamside problems affecting LPHW and LP steam heating boiler plants FW contamination from MU water FW contamination from returned condensate Problems associated with the final FW blend Deposition of boiler section waterside surfaces by alkaline earth metal salts other inorganic salts and organics Silica and silicate crystalline scales and deposits affecting boiler section waterside surfaces Iron oxide and other boiler section corrosion debris deposits Boiler section corrosion problems involving oxygen concentration cells and low pH Stress and high temperature related corrosion Steam purity quality and other operational problems Specification for grades of high quality water suitable for higher pressure WT boilers Practical considerations for a RW ion exchange softener Types of Internal Treatment Program Carbonate Cycle Requirement Calculations Phosphate Cycle Requirement Calculations A Guide to Tannin Residuals in BW Carbonate Cycle Program BW Carbonate Reserve Requirements by Pressure and Sulfate Concentration Carbonate Cycle Coagulation and Precipitation Program Recommended BW Control Limits for Non Highly Rated FT Boilers Employing Hard or Partially Softened FW Phosphate Cycle Coagulation and Precipitation Program Recommended BW Control Limits for Non Highly Rated FT Boilers Employing Hard Partially Softened or Fully Softened FW Phosphate Cycle Coagulation and Precipitation Program Recommended BW Control Limits for Non Highly Rated WT Boilers Employing Hard Partially Softened or Fully Softened FW Chelant demand ppm product per 1ppm substrate EDTA Chelant or All Polymer All Organic Program Recommended BW Control Limits for Fired WT Boilers Employing Demineralized or Similar Quality FW Oxygen Solubility at Atmospheric Pressure Properties of Oxygen Scavengers Carbon Dioxide Evolution from FW Alkalinity Amine Requirement to Reach a Stable Condensate pH Amine Basicity Dissociation Constants Neutralizing Amine Summary Notes Some DR values for CO<sub>2</sub> NH<sub>3</sub> and neutralizing amines at various pressures Calculating Alkalinity Feed Rate Requirements ASME Consensus table 1 Suggested water chemistry limits Industrial watertube high duty primary fuel fired drum type Makeup water percentage Up to 100% of feedwater Conditions Includes superheater turbine drives or process restriction on steam purity ASME Consensus table 2 Suggested chemistry limits Industrial watertube high duty primary fuel fired drum type ASME Consensus table 3 Suggested chemistry limits Industrial firetube high duty primary fuel fired ASME Consensus table 4 Suggested water chemistry limits Industrial coil type watertube high duty primary fuel fired rapid steam generators ASME Consensus table 5 Suggested water chemistry limits Marine propulsion watertube oil fired drum type ASME Consensus table 6 Suggested water chemistry limits Electrode high

voltage forced circulation jet type Notes      Boiler Water Treatment: Principles and Practice Colin Frayne, 2002-07-30 This is an instructional guide to boiler water equipment maintenance principles and practice Technology Industrial      **Library Bulletin [of The] Consolidated Gas Company of New York and Affiliated Gas and Electric Companies** ,1934  
**Engineering Index Annual** ,1930      **Mechanical World and Metal Trades Journal** ,1928      **The Mechanical World** ,1920      Mining and Metallurgy ,1927      **Power** ,1927      *Journal of the American Water Works Association* American Water Works Association, 1927 Vols for 2012 contain only executive summaries of articles      Mechanical World ,1929      **The Plumbers Trade Journal** ,1903      Steam ,1922      *The Journal of Plumbing, Heating, Air Conditioning Contractors* ,1903      *Engineering Index* ,1925      *Science Abstracts. Physics and Electrical Engineering* ,1921      *Science Abstracts* ,1921      **Mechanical Handling and Works Equipment** ,1919      Power Plant Engineering ,1929

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