

# TROUBLESHOOTING PROCESS OPERATIONS

| FOURTH EDITION |



NORMAN P. LIEBERMAN

# Troubleshooting Process Operations

**B Lingard**



## **Troubleshooting Process Operations:**

*Troubleshooting Process Operations* Norman P. Lieberman, 2024 The definitive bestselling guide for refinery operations and maintenance delivers unparalleled information to engineers and technicians Drawing on his training and experience author Norman Lieberman presents problems and troubleshooting techniques that are associated with specific processes systems and equipment leading novice and practiced troubleshooters alike to the crux of malfunctions and failures This new edition updates maintenance and design techniques and adds seven new chapters with the latest information on turbines motors heat exchangers and environmentally friendly operations

*Troubleshooting Process Operations* Norman P. Lieberman, 2009 Drawing on his passion training and experience Lieberman presents problems and troubleshooting techniques that are associated with specific processes systems and equipment leading novice and practiced troubleshooters alike to the crux of malfunctions and failures The fourth edition updates troubleshooting and design techniques and adds seven new chapters with information on turbines motors heat exchangers and environmentally friendly operations Norm Lieberman sprinkles his troubleshooting guide with insightful and humorous anecdotes from 45 years in the petrochemical and refining industry Features Nitty gritty descriptions of common refinery and chemical plant problems and the diagnostic field observations experiments and calculations that reveal their origin Troubleshooting checklists and references following each chapter Practical advice for optimizing interactions with key plant operations personnel

*Troubleshooting Process Plant Control* Norman P. Lieberman, 2011-09-20 The book focuses on process control in the petroleum and refinery industries with an emphasis on problem solving The author explores various real life examples and relays the lessons learned from his career in this area He explains many new yet straightforward concepts without the use of complex mathematics This handy go to emphasizes single and well established process engineering principles that will help working engineers and operators switch manual control loops to automatic control

***Troubleshooting Process Operations*** Norman P. Lieberman, 1985

*Troubleshooting Process Plant Control* Norman P. Lieberman, 2017-03-14 Examines real life problems and solutions for operators and engineers running process controls Expands on the first book with the addition of five new chapters as well as new troubleshooting examples Written for the working operator and engineer with straightforward instruction not hinged on complex math Includes real life examples of control problems that commonly arise and how to fix them Emphasizes single and well established process engineering principles that will help working engineers and operators switch manual control loops to automatic control

*Process Equipment Malfunctions: Techniques to Identify and Correct Plant Problems* Norman P. Lieberman, 2011-12-02 A PRACTICAL GUIDE TO TROUBLESHOOTING PROCESS EQUIPMENT MALFUNCTIONS Process Equipment Malfunctions offers proven techniques for finding and fixing process plant problems and contains details on failure identification Diagnostic tips examples and illustrations help to pinpoint and correct faults in chemical process and petroleum refining equipment Complex math has been omitted An essential resource for plant operators and process

engineers this book is based on the author's long career in field troubleshooting process problems

**COVERAGE INCLUDES**

Distillation tray malfunctions Packed tower problems Distillation tower pressure and composition control Fractionator product stripping Pumps and steam side strippers Inspecting tower internals Process reboilers thermosiphon circulation Heat exchangers Condenser limitations Air coolers Cooling water systems Steam condensate collection systems Steam quality problems Level control problems Process plant corrosion and fouling Vapor liquid separation vessels Hydrocarbon water separation and desalters Fired heaters draft and excess O<sub>2</sub> Disabling safety systems Vacuum systems and steam jets Vacuum surface condensers Centrifugal pump limitations Steam turbine drivers Centrifugal compressors Reciprocating compressors

**Working Guide to Process Equipment** Norman P. Lieberman, Elizabeth T. Lieberman, 2003 Working Guide to Process Equipment 2nd Ed carefully and clearly explains all the basic technical issues that you need to know to trouble shoot most process equipment problems This guide contains a wealth of useful diagnostic tips worked out calculations practical examples and informative illustrations to help you quickly pinpoint trouble and repair typical malfunctions in Trayed and packed distillation towers Natural and forced reboilers Partial and total condensers Steam systems and deaerators Vacuum systems Fired heaters Shell and tube heat exchangers Centrifugal compressors Gas turbines and reciprocating engines Centrifugal pumps and motor drivers In no time at all this essential problem solving manual will become your most trusted on the job tool for dealing effectively with costly equipment malfunctions

**Working Guide to Process Equipment, Third Edition** Norman Lieberman, Elizabeth Lieberman, 2008-05-18 Diagnose and Troubleshoot Problems in Chemical Process Equipment with This Updated Classic Chemical engineers and plant operators can rely on the Third Edition of A Working Guide to Process Equipment for the latest diagnostic tips practical examples and detailed illustrations for pinpointing trouble and correcting problems in chemical process equipment This updated classic contains new chapters on Control Valves Cooling Towers Waste Heat Boilers Catalytic Effects Fundamental Concepts of Process Equipment and Process Safety Filled with worked out calculations the book examines everything from trays reboilers instruments air coolers and steam turbines to fired heaters refrigeration systems centrifugal pumps separators and compressors The authors simplify complex issues and explain the technical issues needed to solve all kinds of equipment problems Comprehensive and clear the Third Edition of A Working Guide to Process Equipment features Guidance on diagnosing and troubleshooting process equipment problems Explanations of how theory applies to real world equipment operations Many useful tips examples illustrations and worked out calculations New to this edition Control Valves Cooling Towers Waste Heat Boilers Catalytic Effects and Process Safety Inside this Renowned Guide to Solving Process Equipment Problems Trays Tower Pressure Distillation Towers Reboilers Instruments Packed Towers Steam and Condensate Systems Bubble Point and Dew Point Steam Strippers Draw Off Nozzle Hydraulics Pumps and Tower Heat Flows Condensers and Tower Pressure Control Air Coolers Deaerators and Steam Systems Vacuum Systems Steam Turbines Surface

Condensers Shell and Tube Heat Exchangers Fired Heaters Refrigeration Systems Centrifugal Pumps Separators Compressors Safety Corrosion Fluid Flow Computer Modeling and Control Field Troubleshooting Process Problems **Troubleshooting Process Plant Control** Norman P. Lieberman, 2017-03-21 Examines real life problems and solutions for operators and engineers running process controls Expands on the first book with the addition of five new chapters as well as new troubleshooting examples Written for the working operator and engineer with straightforward instruction not hinged on complex math Includes real life examples of control problems that commonly arise and how to fix them Emphasizes single and well established process engineering principles that will help working engineers and operators switch manual control loops to automatic control [A Working Guide to Process Equipment, Fourth Edition](#) Norman P. Lieberman, Elizabeth T. Lieberman, 2014-03-14 The latest methods for troubleshooting and maintaining process equipment Applicable to a broad range of technicians and industries and fully updated throughout A Working Guide to Process Equipment Fourth Edition explains how to diagnose troubleshoot and correct problems with chemical and petroleum refining process equipment Nine new chapters cover Tray design details Shell and tube heat exchanger design details Relief valve system design Vapor lock and exchanger flooding in steam systems Steam generation operating and design details Wastewater strippers Thermodynamics how it applies to process equipment Centrifugal pumps reducing seal and bearing failures Hand calculations for distillation towers Vapor liquid equilibrium absorption and stripping calculations Filled with examples and illustrations this practical resource demonstrates how theory applies to solving real world plant operation problems Selected hand calculation methods are also provided Comprehensive coverage includes Distillation Tower Trays Tower Pressure Control Distillation Towers Reboilers Tower Internals Instruments Packed Towers Steam and Condensate Systems Bubble Point and Dew Point Steam Strippers Draw Off Nozzle Hydraulics Pumparounds and Tower Heat Flows Condensers and Tower Pressure Control Air Coolers Deaerators and Steam Systems Steam Generation Wastewater Strippers Vacuum Systems Steam Turbines Surface Condensers Shell and Tube Heat Exchangers Fired Heaters Refrigeration Systems Cooling Water Systems Catalytic Effects Centrifugal Pumps Control Valves Separators Centrifugal Compressors and Surge Reciprocating Compressors Corrosion Fluid Flow in Pipes Super Fractionation Stage Computer Control Field Troubleshooting [A Working Guide to Process Equipment, Fifth Edition](#) Norman P. Lieberman, Elizabeth T. Lieberman, 2022-06-01 The latest methods for troubleshooting and maintaining process equipment This extensively revised and updated practical resource fully explains how to diagnose troubleshoot and correct problems across a broad range of industries all without complex equations and without ever losing sight of the importance of direct field measurements and observations This fifth edition features new and expanded coverage of Causes and Effects of Wet Steam on Turbines and Strippers Distillation Design Errors and Inspecting Tower Internals Setting Pressure Relief Valves on Vessels and Heat Exchangers Reduction of Flare Losses Safer Procedures for Sampling Hazardous Material Taking Field Measurements Safely

and Effectively Filled with real world examples and illustrations A Working Guide to Process Equipment Fifth Edition clearly demonstrates how theory applies to solving real world plant operation problems Selected hand calculation methods are also provided Comprehensive Coverage of Distillation Towers Tower Internals Trays and Packing Pumparounds Draw Off Nozzle Hydraulics Tower Pressure Control Cooling Water Systems Instruments Bubble Point and Dew Point Vacuum Systems Surface Condensers Shell and Tube Heat Exchangers Natural and Forced Circulation Reboilers Steam Strippers Steam and Condensate Systems Condensers and Air Coolers Fired Heaters Steam Generation Deaerators and Steam Systems Wastewater Strippers Steam Turbines Refrigeration Systems Catalytic Effects Centrifugal Pumps Control Valves Separators Centrifugal Compressors and Surge Reciprocating Compressors Corrosion Fluid Flow in Pipes Super Fractionation Stage Computer Control Field Troubleshooting Commentary on need for Suppression of CO<sub>2</sub> Emissions

### **Distillation**

**Troubleshooting** Henry Z. Kister, 2006-04-07 THE FIRST BOOK OF ITS KIND ON DISTILLATION TECHNOLOGY The last half century of research on distillation has tremendously improved our understanding and design of industrial distillation equipment and systems High speed computers have taken over the design control and operation of towers Invention and innovation in tower internals have greatly enhanced tower capacity and efficiency With all these advances one would expect the failure rate in distillation towers to be on the decline In fact the opposite is the case the tower failure rate is on the rise and accelerating Distillation Troubleshooting collects invaluable hands on experiences acquired in dealing with distillation and absorption malfunctions making them readily accessible for those engaged in solving today s problems and avoiding tomorrow s The first book of its kind on the distillation industry the practical lessons it offers are a must for those seeking the elusive path to trouble free distillation Distillation Troubleshooting covers over 1 200 case histories of problems diagnoses solutions and key lessons Coverage includes Successful and unsuccessful struggles with plugging fouling and coking Histories and prevention of tray packing and internals damage Lessons taught by incidents and accidents during shutdowns commissioning and abnormal operation Troubleshooting distillation simulations to match the real world Making packing liquid distributors work Plant bottlenecks from intermediate draws chimney trays and feed points Histories of and key lessons from explosions and fires in distillation towers Prevention of flaws that impair reboiler and condenser performance Destabilization of tower control systems and how to correct it Discoveries from shutdown inspections Suppression of foam and accumulation incidents A unique resource for improving the foremost industrial separation process Distillation Troubleshooting transforms decades of hands on experiences into a handy reference for professionals and students involved in the operation design study improvement and management of large scale distillation

### **Handbook of Water and Wastewater Treatment Plant Operations**

Frank R. Spellman, 2003-06-24 Water and wastewater treatment plant operators must have a breadth of knowledge that encompasses more than scientific theory They need to be generalists with knowledge bridging several scientific academic and engineering disciplines Unfortunately until now many of the existing texts in the

field were too limited in scope and narrow in focus

**Working Guide to Process Equipment** Norman Lieberman, Elizabeth Lieberman, 2008-04-17 Diagnose and Troubleshoot Problems in Chemical Process Equipment with This Updated Classic Chemical engineers and plant operators can rely on the Third Edition of A Working Guide to Process Equipment for the latest diagnostic tips practical examples and detailed illustrations for pinpointing trouble and correcting problems in chemical process equipment This updated classic contains new chapters on Control Valves Cooling Towers Waste Heat Boilers Catalytic Effects Fundamental Concepts of Process Equipment and Process Safety Filled with worked out calculations the book examines everything from trays reboilers instruments air coolers and steam turbines to fired heaters refrigeration systems centrifugal pumps separators and compressors The authors simplify complex issues and explain the technical issues needed to solve all kinds of equipment problems Comprehensive and clear the Third Edition of A Working Guide to Process Equipment features Guidance on diagnosing and troubleshooting process equipment problems Explanations of how theory applies to real world equipment operations Many useful tips examples illustrations and worked out calculations New to this edition Control Valves Cooling Towers Waste Heat Boilers Catalytic Effects and Process Safety Inside this Renowned Guide to Solving Process Equipment Problems Trays Tower Pressure Distillation Towers Reboilers Instruments Packed Towers Steam and Condensate Systems Bubble Point and Dew Point Steam Strippers Draw Off Nozzle Hydraulics Pumparounds and Tower Heat Flows Condensers and Tower Pressure Control Air Coolers Deaerators and Steam Systems Vacuum Systems Steam Turbines Surface Condensers Shell and Tube Heat Exchangers Fire Heaters Refrigeration Systems Centrifugal Pumps Separators Compressors Safety Corrosion Fluid Flow Computer Modeling and Control Field Troubleshooting Process Problems

**Distillation Operation** Henry Z. Kister, 1990 Discussing distillation this book gives readers guidelines for operation troubleshooting and control It offers a compendium of Do s and Don ts good practices and guidelines for trouble free design operation and troubleshooting for inlets and outlets avoiding tray damage installation commissioning and startup techniques and more

**Understanding Process Equipment for Operators and Engineers** Norman Lieberman, 2019-05-08 Understanding Process Equipment for Operators and Engineers explains how process equipment functions As problems often arise in plants that must be solved by unit engineers this book offers successful solutions and methods for their implementation The concepts explained are based on Norm Lieberman s personal hands on experience Like you Norm attended a university and was exposed to technical seminars which did not always provide the needed solutions In this text you will learn the functioning of a variety of equipment types including Fired Heater Draft Centrifugal Pump Head Distillation Tray Efficiency Vacuum Jets Recip Compressors Steam Turbines Thermosyphon Circulation Reboilers and Air Cooler Includes methods and procedures on how to make field measurements Outlines fire heater principles and operation and how they develop draft Describes distillation column operation and methods to increase their efficiency Includes computer modeling and provides use case examples *Oil & Gas Journal* ,1988 [Chemical](#)

Engineering Progress ,2003      *Hydrocarbon Processing* ,2009 September 1 2021 Since 1922 management and technical professionals from petroleum refining gas processing petrochemical chemical and engineer constructor companies throughout the world have turned to Hydrocarbon Processing for high quality technical and operating information Through its monthly magazine website and e newsletters Hydrocarbon Processing covers technological advances processes and optimization developments from throughout the global Hydrocarbon Processing Industry HPI Hydrocarbon Processing editors and writers provide real world case studies and practical information that readers can use to improve their companies operations and their own professional job skills taken from publisher web site      **InTech** ,1986

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