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Types of Pumps; Liquid Properties; Energy of a Flowing Liquid and Bernoulli's Equation; Pump Head and Capacity; Summary; Problems; Chapter 2 Pump Performance; Manufacturers' Pump Performance Curves; Power Required by a Pump: Hydraulic and Brake Horsepower; Pump Driver and Power Required; Multistage Pumps; Specific Speed; Summary; Problems; Chapter 3 Liquid Properties versus Pump Performance; Temperature Rise of Liquid Due to Pump Inefficiency Starting Pump against a Closed Discharge Valve System Head Curve; Pipe Diameters and Designations; Summary; Problems; Chapter 4 Pressure Loss through Piping Systems; Velocity of Flow; Types of Flow; Pressure Drop Due to Friction; Determining the Friction Factor from the Moody Diagram; Calculating the Friction Factor: the Colebrook Equation; Explicit Equations for the Friction Factor; Hazen-Williams Equation for Pressure Drop; Pressure Loss through Fittings and Valves; Entrance and Exit Losses, and Losses Due to Enlargement and Contraction; Pipes in Series and Parallel Head Loss in Series Piping Head Loss in Parallel Piping; Summary; Problems; Chapter 5 System Head Curves; Pump Throttling and Power Loss; Types of System Head Curves; Summary; Problems; Chapter 6 Pump Performance at Different Impeller Sizes and Speeds; Calculating the Impeller Diameter or Speed for a Specific Operating Point; Summary; Problems; Chapter 7 NPSH and Pump Cavitation; Summary; Problems; Chapter 8 Pump Applications and Economics; Pumps in Series and Parallel; Economics of Pumping Systems; Summary; Problems; Chapter 9 Pump Simulation Using PUMPCALC Software; Single Pump Simulation Simulating Impeller Diameter and Speed Change Simulating Impeller Trim for a Design Point; Viscosity Correction Example; Summary; Appendices; Appendix A: Summary of Formulas; Chapter 1; Chapter 2; Chapter 3; Chapter 4; Chapter 6; Chapter 7; Chapter 8; Appendix B: Units and Conversion Factors; Appendix C: Properties of Water - USCS Units; Appendix D: Properties of Common Liquids; Appendix E: Properties of Circular Pipes - USCS Units; Appendix F: Properties of Circular Pipes - SI Units; Appendix G: Head Loss in Water Pipes - USCS Units; Appendix H: Darcy Friction Factors Appendix I: Least Squares Method References; Index; A; B; C; D; E; F; H; I; L; M; N; P; R; S; T; V

Sommario/riassunto

A plain language guide to the tools and techniques needed to ensure efficiency, Working Guide to Pump and Pumping Stations provides practicing engineer and senior field personnel with a quick but rigorous exposition of pumps, including applications. In this book, readers find expert advice for determining TDH, NPSH, BHP and driver power requirements, discharge temperature, parallel/series operation and their impact on the operating conditions; developing system-head curves and performance considerations; pump selection for multi-product operations. The book also emphasizes the understanding