
CONTENTS

List of Contributors / ix
Preface to the Third Edition / xvii
Preface to the Second Edition / xix
Preface to the First Edition / xxi
SI Units—A Commentary / xxiii

Chapter 1 Introduction: Classification and Selection of Pumps 1.1

Chapter 2 Centrifugal Pumps 2.1

2.1 Centrifugal Pump Theory / 2.3
2.2 Centrifugal Pump Construction / 2.97
 2.2.1 Centrifugal Pumps: Major Components / 2.97
 2.2.2 Centrifugal Pump Packing / 2.183
 2.2.3 Centrifugal Pump Mechanical Seals / 2.197
 2.2.4 Centrifugal Pump Injection-Type Shaft Seals / 2.239
 2.2.5 Centrifugal Pump Oil Film Journal Bearings / 2.247

- 2.2.6 Centrifugal Pump Magnetic Bearings / 2.277
- 2.2.7 Sealless Pumps / 2.295
 - 2.2.7.1 Magnetic Drive Pumps / 2.297
 - 2.2.7.2 Canned Motor Pumps / 2.315
- 2.3 Centrifugal Pump Performance / 2.327
 - 2.3.1 Centrifugal Pumps: General Performance Characteristics / 2.327
 - 2.3.2 Centrifugal Pump Hydraulic Performance and Diagnostics / 2.397
 - 2.3.3 Centrifugal Pump Mechanical Performance, Instrumentation, and Diagnostics / 2.405
 - 2.3.4 Centrifugal Pump Minimum Flow Control Systems / 2.437
- 2.4 Centrifugal Pump Priming / 2.453

Chapter 3 Displacement Pumps

3.1

-
- 3.1 Power Pump Theory / 3.3
 - 3.2 Power Pump Design and Construction / 3.21
 - 3.3 Steam Pumps / 3.37
 - 3.4 Displacement Pump Performance Instrumentation and Diagnostics / 3.63
 - 3.5 Displacement Pump Flow Control / 3.75
 - 3.6 Diaphragm Pumps / 3.85
 - 3.7 Screw Pumps / 3.99
 - 3.8 Vane, Gear, and Lobe Pumps / 3.123

Chapter 4 Jet Pumps

4.1

-
- 4.1 Jet Pump Theory / 4.3
 - 4.2 Jet Pump Applications / 4.23

Chapter 5 Materials of Construction

5.1

-
- 5.1 Metallic Materials of Pump Construction (and Their Damage Mechanisms) / 5.3
 - 5.2 Materials of Construction for Nonmetallic (Composite) Pumps / 5.49

Chapter 6 Pump Drivers

6.1

-
- 6.1 Prime Movers / 6.3
 - 6.1.1 Electric Motors and Motor Controls / 6.3
 - 6.1.2 Steam Turbines / 6.37
 - 6.1.3 Engines / 6.57
 - 6.1.4 Hydraulic Turbines / 6.77
 - 6.1.5 Gas Turbines / 6.89
 - 6.2 Speed-Varying Devices / 6.99
 - 6.2.1 Eddy-Current Couplings / 6.99

- 6.2.2 Single-Unit Adjustable-Speed Electric Drives / 6.109
- 6.2.3 Fluid Couplings / 6.127
- 6.2.4 Gears / 6.143
- 6.2.5 Adjustable-Speed Belt Drives / 6.167
- 6.3 Power Transmission Devices / 6.175
 - 6.3.1 Pump Couplings and Intermediate Shafting / 6.175
 - 6.3.2 Hydraulic Pump and Motor Power Transmission Systems / 6.191

Chapter 7 Pump Controls and Valves

7.1

Chapter 8 Pump Systems

8.1

- 8.1 General Characteristics of Pumping Systems and System-Head Curves / 8.3
- 8.2 Branch-Line Pumping Systems / 8.83
- 8.3 Waterhammer / 8.91
- 8.4 Pump Noise / 8.109

Chapter 9 Pump Services

9.1

- 9.1 Water Supply / 9.3
- 9.2 Sewage Treatment / 9.25
- 9.3 Drainage and Irrigation / 9.45
- 9.4 Fire Pumps / 9.57
- 9.5 Steam Power Plants / 9.73
- 9.6 Chemical Industry / 9.113
- 9.7 Petroleum Industry / 9.133
- 9.8 Pulp and Paper Mills / 9.157
- 9.9 Food and Beverage Pumping / 9.187
- 9.10 Mining / 9.197
- 9.11 Marine Pumps / 9.215
- 9.12 Refrigeration, Heating, and Air Conditioning / 9.253
- 9.13 Pumped Storage / 9.261
- 9.14 Nuclear / 9.279
 - 9.14.1 Nuclear Electric Generation / 9.279
 - 9.14.2 Nuclear Pump Seismic Qualifications / 9.301
- 9.15 Metering / 9.313
- 9.16 Solids Pumping / 9.321
 - 9.16.1 Hydraulic Transport of Solids / 9.321
 - 9.16.2 Application and Construction of Centrifugal Solids Handling Pumps / 9.351
 - 9.16.3 Construction of Solids-Handling Displacement Pumps / 9.369
- 9.17 Oil Wells / 9.377
- 9.18 Cryogenic Liquefied Gas Service / 9.399

- 9.19 Aerospace / 9.409
 - 9.19.1 Aircraft Fuel Pumps / 9.409
 - 9.19.2 Liquid Rocket Propellant Pumps / 9.431
- 9.20 Portable Transfer of Hazardous Liquids / 9.441
- 9.21 Water Pressure Booster Systems / 9.447
- 9.22 Hydraulic Presses / 9.463

Chapter 10 Intakes and Suction Piping **10.1**

- 10.1 Intakes, Suction Piping, and Strainers / 10.3
- 10.2 Intake Modeling / 10.39

Chapter 11 Selecting and Purchasing Pumps **11.1**

Chapter 12 Installation, Operation, and Maintenance **12.1**

Chapter 13 Pump Testing **13.1**

Appendix Technical Data **A.1**

Index **I.1**
