1. Record Nr. UNINA9910841218203321

Autore	O'Hanlon John F
Titolo	A Users Guide to Vacuum Technology
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2023 ©2024
ISBN	1-394-17423-3 1-394-17414-4
Edizione	[4th ed.]
Descrizione fisica	1 online resource (579 pages)
Altri autori (Persone)	GessertTimothy A
Disciplina	621.5/5
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Dedication Page -- Contents -- Preface -- Symbols -- Part I Its Basis -- Chapter 1 Vacuum Technology -- 1.1 Units of Measurement -- References -- Chapter 2 Gas Properties -- 2.1 Kinetic Picture of a Gas -- 2.1.1 Velocity Distribution -- 2.1.2 Energy Distribution -- 2.1.3 Mean Free Path -- 2.1.4 Particle Flux -- 2.1.5 Monolayer Formation Time -- 2.1.6 Pressure -- 2.2 Gas Laws -- 2.2.1 Boyle's Law -- 2.2.2 Amontons' Law -- 2.2.3 Charles' Law -- 2.2.4 Dalton's Law -- 2.2.5 Avogadro's Law -- 2.2.6 Graham's Law -- 2.3 Elementary Gas Transport Phenomena -- 2.3.1 Viscosity -- 2.3.2 Thermal Conductivity -- 2.3.3 Diffusion -- 2.3.4 Thermal Transpiration -- References -- Chapter 3 Gas Flow -- 3.1 Flow Regimes -- 3.2 Flow Concepts -- 3.3 Continuum Flow -- 3.3.1 Orifice -- 3.3.2 Long Round Tube -- 3.3.3 Short Round Tube -- 3.4 Molecular Flow -- 3.4.1 Orifice -- 3.4.2 Long Round Tube -- 3.4.3 Short Round Tube -- 3.4.4 Irregular Structures -- 3.4.5 Components in Parallel and Series -- 3.5 Models Spanning Molecular and Viscous Flow -- References -- Chapter 4 Gas Release from Solids -- 4.1 Vaporization -- 4.2 Diffusion -- 4.2.1 Reduction of Outdiffusion by Vacuum Baking -- 4.3 Thermal Desorption -- 4.3.1 Zero Order -- 4.3.2 First Order -- 4.3.3 Second Order -- 4.3.4 Desorption from Real Surfaces -- 4.3.5 Outgassing Measurements -- 4.3.6 Outgassing Models -- 4.3.7 Reduction by Baking -- 4.4 Stimulated Desorption --

References -- Part V Systems -- Chapter 18 Rough Vacuum Pumping -- 18.1 Exhaust Rate -- 18.1.1 Pump Size -- 18.1.2 Aerosol Formation -- 18.2 Crossover -- 18.2.1 Minimum Crossover Pressure -- 18.2.2 Maximum Crossover Pressure -- References -- Chapter 19 High Vacuum Systems -- 19.1 Diffusion-Pumped Systems -- 19.1.1 Operating Modes -- 19.1.2 Operating Issues -- 19.2 Turbo-Pumped Systems -- 19.2.1 Operating Modes.
19.2.2 Operating Issues -- 19.3 Sputter-Ion-Pumped Systems -- 19.3.1 Operating Modes -- 19.3.2 Operating Issues -- 19.4 Cryo-Pumped Systems -- 19.4.1 Operating Modes -- 19.4.2 Regeneration -- 19.4.3 Operating Issues -- 19.5 High Vacuum Chambers -- 19.5.1 Managing Water Vapor -- References -- Chapter 20 Ultraclean Vacuum Systems -- 20.1 Ultraclean Pumps -- 20.1.1 Dry Roughing Pumps -- 20.1.2 Turbopumps -- 20.1.3 Cryopumps -- 20.1.4 Sputter-Ion, TSP, and NEG Pumps -- 20.2 Ultraclean Chamber Materials and Components -- 20.3 Ultraclean System Pumping and Pressure Measurement -- References -- Chapter 21 Controlling Contamination in Vacuum Systems -- 21.1 Defining Contamination in a Vacuum Environment -- 21.1.1 Establishing Control of Vacuum Contamination -- 21.1.2 Types of Vacuum Contamination -- 21.2 Pump Contamination -- 21.2.1 Low/Rough and Medium Vacuum Pump Contamination -- 21.2.2 High and UHV Vacuum Pump Contamination -- 21.3 Evacuation Contamination -- 21.3.1 Particle Sources -- 21.3.2 Remediation Methods -- 21.4 Venting Contamination -- 21.5 Internal Components, Mechanisms, and Bearings -- 21.6 Machining Contamination -- 21.6.1 Cutting, Milling, and Turning -- 21.6.2 Grinding and Polishing -- 21.6.3 Welding -- 21.7 Process-Related Sources -- 21.7.1 Deposition Sources -- 21.7.2 Leak Detection -- 21.8 Lubrication Contamination -- 21.8.1 Liquid Lubricants -- 21.8.2 Solid Lubricants -- 21.8.3 Lamellar, Polymer, and Suspension Lubricants -- 21.9 Vacuum System and Component Cleaning -- 21.9.1 Designing a Cleaning Process -- 21.10 Review of Clean Room Environments for Vacuum Systems -- 21.10.1 The Cleanroom Environment -- 21.10.2 Using Vacuum Systems in a Cleanroom Environment -- References -- Chapter 22 High Flow Systems -- 22.1 Mechanically Pumped Systems -- 22.2 Throttled High Vacuum Systems -- 22.2.1 Chamber Designs -- 22.2.2 Turbo Pumped.
22.2.3 Cryo Pumped -- References -- Chapter 23 Multichambered Systems -- 23.1 Flexible Substrates -- 23.2 Rigid Substrates -- 23.2.1 Inline Systems -- 23.2.2 Cluster Systems -- 23.3 Analytical Instruments -- References -- Chapter 24 Leak Detection -- 24.1 Mass Spectrometer Leak Detectors -- 24.1.1 Forward Flow -- 24.1.2 Counter flow -- 24.2 Performance -- 24.2.1 Sensitivity -- 24.2.2 Response Time -- 24.2.3 Testing Pressurized Chambers -- 24.2.4 Calibration -- 24.3 Leak Hunting Techniques -- 24.4 Leak Detecting with Hydrogen Tracer Gas -- References -- Part VI Appendices -- Appendix A Units and Constants -- A.1 Physical Constants -- A.2 SI Base Units -- A.3 Conversion Factors -- Appendix B Gas Properties -- B.1 Mean Free Paths of Gasses as a Function of Pressure at T = 25°C -- B.2 Physical Properties of Gasses and Vapors at T = 0°C -- B.3 Cryogenic Properties of Gases -- B.4 Gas Conductance and Flow Formulas -- B.5 Vapor Pressure Curves of Common Gases -- B.6 Appearance of Discharges in Gases and Vapors at Low Pressures -- B.7 DC Breakdown Voltages for Air and Helium Between Flat Parallel Plates -- B.8 Particle Settling Velocities in Air -- Appendix C Material Properties -- C.1 Outgassing Rates of Vacuum-Baked Metals -- C.2 Outgassing Rates of Unbaked Metals -- C.3 Outgassing Rates of Ceramics and Glasses -- C.4 Outgassing Rates of Elastomers -- C.5 Permeability of Polymeric

Materials -- C.6 Vapor Pressure Curves of the Solid and Liquid Elements (Sheet A) -- C.7 Outgassing Rates of Polymers -- C.8 Austenitic Stainless Steels -- Appendix D Isotopes -- D.1 Natural Abundances -- Appendix E Cracking Patterns -- E.1 Cracking Patterns of Pump Fluids -- E.2 Cracking Patterns of Gases -- E.3 Cracking Patterns of Common Vapors -- E.4 Cracking Patterns of Common Solvents -- E.5 Cracking Patterns of Semiconductor Dopants -- Appendix F Pump Fluid Properties.
F.1 Compatibility of Elastomers and Pump Fluids.