

Entrapment Type Vacuum Pumps

Course Overview

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MATEC



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Entrapment Type Vacuum Pumps: Course Overview

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Courses in This Series

- Vacuum Fundamentals
- Gas Sources and Conductance
- Gas Transfer Type Vacuum Pumps
- **Entrapment Type Vacuum Pumps**
- Vacuum Gauges
- Leak Detection in Vacuum Technology
- Mass Flow Controllers



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About This Course

- The purpose of a vacuum pump is to remove gas molecules from the process chamber and to achieve and maintain a desired vacuum.
- Two categories of pumps used to do this are gas transfer and gas entrapment pumps.
- This course focuses on entrapment-type vacuum pumps, covering applications, theory of operation, operating range, and preventative maintenance requirements.



About This Course (cont.)

- The course develops the vacuum system as a whole and discusses how these types of pumps are used to achieve and maintain certain levels of vacuum.
- This course provides a brief discussion on the pumpdown and the general use of vacuum pumps in achieving a desired level of vacuum.
- Different categories of entrapment type pumps are discussed and include cryosorption, cryogenic, sublimation and sputter-ion pumps. The operating range (vacuum range) for each type of pump and pump specifications are described in detail.



About This Course (cont.)

- This course develops the learner's ability to identify a variety of entrapment pumps and to know how each pump is used in developing and maintaining a vacuum.
- The learner will develop the ability to discuss *how* each type of pump achieves a vacuum and in what range the pump is used. The learner will also identify the preventative maintenance necessary to verify and maintain efficient pump operations.



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Knowledge On Demand™

About This Course (cont.)

- Through this course, the learner will:
 1. Develop behaviors that demonstrate precision, care and safety in operating manufacturing equipment
 2. Accurately read and interpret technical manuals
 3. Apply behavior of gases and gas laws to vacuum pump operation
 4. Apply basic principles of electronics, pneumatics, vacuum and electromechanical systems.



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Knowledge On Demand™

Course Outline

- Introduction Module 0
- Study of a Vacuum System Module 1
- Cryosorption Pumps Module 2
- Cryo Pumps Module 3
- Sputter-ion Pumps Module 4
- Research Equipment Manufacturers Module 5
- Entrapment Pumps Questor Module 6
- Performance Assessment (Multiple-Choice Test)

High Vacuum

- At crossover pressure:
 - Hi vac valve opens
 - Cryo-pump pumps the chamber down to base pressure (4×10^{-6} Torr)



Learning Objectives

- Identify vacuum system components.
- Define crossover pressure, base pressure and ultimate pressure (pump).
- Outline the pumpdown sequence.
- Describe 2 methods to reduce backstreaming in the rough line.
- Identify the entrapment-type pumps used in the rough, high, and ultra-high vacuum ranges.

Learning Objectives (cont.)

- Relate the function and spec's of entrapment-type pumps to the pressure range & intended application.
- Describe the theory and mechanism of action of entrapment of molecules with a pump.
- Describe the processes of saturation & regeneration.
- Interpret vacuum equipment instruction manuals.
- Interpret specification data for a vacuum system.
- Interpret a vacuum system schematic.

Learning Objectives (cont.)

- Use the Internet to research technical aspects, facts, and information on vacuum pumps and suppliers.
- Compare and contrast gas transfer pumps and entrapment type pumps for specific applications.
- Define a sequence for a pump regeneration.
- Develop the behaviors necessary to maintain the integrity of a vacuum system.
- Demonstrate behavior necessary to verify and maintain efficient pump operation.

Additional Course Information

- Instructional Area: Vacuum Technology
- Participant Level: A.A. or A.A.S. degree or equivalent (Technician Training)
- Target Competency: Learners will apply knowledge gained in this course to perform regeneration on a high-vacuum cryogenic pump
- Prerequisites: Vacuum Fundamentals

Course Developers

- **MATEC:**
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- **Content Repurposing, Expert Review, and Updates:**
 - ❑ MATEC and Semizone



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Who Should Take the Course

- **Semiconductor wafer fab personnel:**
 - ❑ Equipment technicians and operators
 - ❑ Process technicians
 - ❑ Repair and maintenance technicians
- **Semiconductor wafer fab new hires**
- **Semiconductor equipment industry personnel**
- **Field service personnel**
- **Anybody working with vacuum equipment**
- **Course designed to fulfill employment-ready competency needs for fab technicians**



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Course Organization and Delivery

- Self-paced online modules comprising HTML-based lessons and animations
- Course available for access on demand, anytime and anywhere
- One-year course access upon enrollment
- Final performance assessment:
 - Multiple-choice quiz (required for certificate)
- Course certificate by Semizone and MATEC



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