

## VACUUM FURNACE TECHNICIAN (Manufacturing Only)

### APPENDIX A

O\*NET CODE 49-9041.00

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

### WORK PROCESSES

	<b>Approximate Hours</b>
<b>A. Orientation</b>	<b>100</b>
1. Familiarization with shop operations and procedures.	
2. Familiarization with tool and supply rooms (if applicable).	
3. Observing the operation of the various furnaces as they perform their various functions.	
4. Performing basic furnace operation to familiarize self with this task (at option of sponsor).	
<b>B. Performing Preventive Maintenance</b>	<b>1,500</b>
1. Maintaining furnaces in peak operating condition.	
2. Following established preventive maintenance schedules, and correctly performing all prescribed tasks.	
3. Performing accurate calibrations at appropriate times.	
4. Cleaning furnaces and related equipment.	
5. Keeping appropriate records in clear, accurate, prescribed manner.	
<b>C. Monitoring Furnaces in Operation</b>	<b>1,500</b>
1. Making rounds of operating furnaces at required intervals.	
2. Checking oil levels, reading gauges, checking valve positions and temperatures.	
3. Using senses of sight, hearing, smell and touch to identify possible malfunctions.	
4. Listening carefully to Operator reports of problem	
5. Using leak detector and other test equipment to check effectiveness/efficiency of furnace operation.	
6. Monitoring process chart recorder	

7. Performing heat survey.

**D. Maintenance/Troubleshooting**

**2,500**

1. Accurately reading work orders, blueprints, specifications, manufacturers' manuals, drawings (as required).
2. Analyzing/diagnosing problems; determining probable cause(s).
3. Disassembling sections of furnace as needed to remove defective parts.
4. Repairing and/or rebuilding parts.
5. Replacing parts.
6. Reassembling furnace.
7. Operating, or observing operation of, furnace after completion of work to ensure proper operation.
8. Performing basic electrical/electronic repairs (at option of sponsor).

**E. Operating Machine Tools to Fabricate Parts**

**500**

1. Safely and accurately operating machine tools such as:
  - a. lather
  - b. milling machine
  - c. drill press
  - d. grinder
  - e. band saw
  - f. shear
  - g. hand brake

**F. Rebuilding Hot Zones**

**1,500**

1. Disassembling hot zone.
2. Replacing such elements as: ceramics, heater support, rails, and heating elements.
3. Sandblasting parts and frame structures.
4. Re-assembling sheets and all other parts in proper sequence.
5. Checking for leaks.
6. Heat shield assembly.

**G. Miscellaneous (as applicable)**

**400**

1. Ordering/requisitioning parts, using computerized maintenance program if available
2. Soldering and brazing
3. Cutting and joining pipe
4. Demonstrating familiarization with chillers and ability to troubleshoot them in an emergency.
5. Safely operating fork truck.
6. Preparing and painting surfaces of furnaces/equipment.
7. Recording all work done accurately, in timely manner, in prescribed format.

**Approximate Total Hours      8,000**

*Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <https://dol.ny.gov/public-work-and-prevailing-wage>*

## **VACUUM FURNACE TECHNICIAN (Manufacturing Only)**

### **APPENDIX B**

#### **RELATED INSTRUCTION**

##### **Safety and Health**

1. OSHA 10-Hour General Industry Safety Training
2. Proper Use of Personal Protective Equipment (PPE)
3. Fall Prevention and Fall Protection
4. Proper Lifting Techniques
5. Working Safely Around Machinery
6. Right-to-Know/ Material Safety Data Sheets (MSDS)
7. Lock Out/Tag Out
8. Confined Space Safety
9. Fork Truck Safety – And Any Required Certifications (if apprentice will operate fork truck on-the-job)
10. First Aid – minimum 6.5 hours every 3 years
11. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

##### **Blueprints**

1. Reading Mechanical Blueprints

##### **Mathematics**

1. Review of Basic Math, or Pre-Algebra
2. Introductory Algebra

##### **Trade Theory and Science**

1. Fundamentals of Mechanics
2. Fundamentals of Hydraulics
3. Fundamentals of Pneumatics
4. Fundamentals of Electrical Theory
5. Industrial Electronics
6. Introduction to the Vacuum Furnace
7. Introduction to Machining Skills

**Other Workplace Skills**

1. Fundamentals of Computer Literacy

**Other Related Courses as Required**

A minimum of 144 hours of Related Instruction is required for each apprentice for each year.

Appendix B topics are approved by New York State Education Department.