

## **TRADE SCHEDULE FOR: HEATING AND AIR-CONDITIONING INSTALLER-SERVICER**

### **ALTERNATE TITLES: AIR-CONDITIONING MECHANIC, ENVIRONMENTAL-CONTROL SYSTEM INSTALLER-SERVICER, HEATING AND AIR-CONDITIONING MECHANIC, HEATING MECHANIC, REFRIGERATION MECHANIC, HVAC**

This trade schedule is attached to and a part of the Apprenticeship Standards for the above identified occupation. This sequence of Related Classroom Instruction is competency based and will be offered as traditional classroom training or independent study, which may include: Internet-learning, video telecast and CD-ROM.

#### **1. TERM OF APPRENTICESHIP**

The term of the occupation shall be 4 years with an OJT attainment of 8000 hours supplemented by the required hours of related technical instruction.

#### **2. RATIO OF APPRENTICES TO JOURNEYPERSONS**

The Ratio of Apprentices to Journeypersons will be 1:1 for the first 3 apprentices and 1 apprentice to 3 Journeypersons thereafter.

#### **3. APPRENTICE WAGE SCHEDULE**

Apprentices shall be paid a progressively increasing schedule of wages based on a percentage of the current journeyperson wage rate.

##### **Term: 8000 Hours**

1 <sup>st</sup> 1000 hours – 50%	of Journeyperson's rate
2nd 1000 hours – 55%	of Journeyperson's rate
3rd 1000 hours - 60%	of Journeyperson's rate
4th 1000 hours- 70%	of Journeyperson's rate
5th 1000 hours - 75%	of Journeyperson's rate
6 <sup>th</sup> 1000 hours – 80%	of Journeyperson's rate
7 <sup>th</sup> 1000 hours – 85%	of Journeyperson's rate
8 <sup>th</sup> 1000 hours – 90%	of Journeyperson's rate

The Journeyworker wage rate on \_\_\_\_\_ \$ \_\_\_\_\_

#### **4. SCHEDULE OF WORK EXPERIENCE** (See attached Work Processes/Work Experience Schedule)

Apprenticeship Committees may add to the work processes prior to submitting these Standards to the appropriate Registration Agency for approval.

#### **5. SCHEDULE OF RELATED INSTRUCTION** (See attached Related Classroom Instruction Outline)

Curriculum is based on Industry Standardized applications of current construction practices in the referenced craft and is skill-based including a system for assessment. The assessment will include task

objectives, procedures, review materials, and competency-based performance tests. Curriculum is designed to be completed in levels of instruction as indicated in the outline. The levels of instruction are designed to reflect a commonly accepted progression of instruction consistent with a continuous growth and understanding of the craft and attainment of the related craft skills. Levels comprise successive tiers of instruction and meet the minimum Apprenticeship, Training, Employer, and Labor Services requirement for classroom-related training.

**A4.1- WORK PROCESSES/WORK EXPERIENCE SCHEDULE** **HOURS**

This instruction and experience shall include the following operations but not necessarily in the listed sequence. Time spent on specific operations need not be continuous.

- |  |      |
|--|------|
| 1. General Trade Orientation                               | 350  |
| a. Care and use of tools                                   |      |
| b. Test and measurement devices                            |      |
| c. Types and sizes of fittings, piping, and tubing         |      |
| d. Safety procedures                                       |      |
| e. Equipment records and reports                           |      |
| f. Environmental safety, CFC handling                      |      |
| 2. Fabrication of Systems Components                       | 550  |
| a. Cut, thread, flare, bend, shape piping and tubing       |      |
| b. Install fittings  |      |
| c. Solder and braze tin fittings and components            |      |
| d. Care and use of torches                                 |      |
| e. Silver and soft soldering                               |      |
| 3. System Installation and connection                      | 1600 |
| a. Electrical supply lines and cables                      |      |
| b. Electrical connections                                  |      |
| c. Water service lines                                     |      |
| d. Air supply lines  |      |
| e. Steam lines and steam return lines                      |      |
| f. Steam traps and strainers                               |      |
| g. Pressure reduction, expansion, evaporators, stop valves |      |
| h. Suction and discharge lines                             |      |
| i. Gauges  |      |
| j. Dehydrators   |      |
| k. Filters and strainers                                   |      |
| l. Controls  |      |
| 4. Equipment Installation                                  | 950  |
| a. Install condensers                                      |      |

b.	Prepare compressor and motor bases	
c.	Install and align compressors and motors	
d.	Install evaporators and other cooling coils	
e.	Install and align centrifugal pumps and bases	
f.	Use slings, lines, blocks and falls, chain hoists, rollers, dollies and skids	
5.	System Maintenance	1050
a.	Troubleshoot field systems	
b.	Test pressure and flow	
c.	Check liquid levels	
d.	Check and repair leaks	
e.	Purge, dehydrate, and recharge systems	
f.	Repair, align, adjust fans and blowers	
g.	Align pulleys, bearing blocks, and belt tension	
6.	Equipment Repair	2900
a.	Disassemble and clean, repair, renew, and test compressors	
b.	Repair, pressure test, dehydrate evaporators	
c.	Repair condensers, roll condensor tubes	
d.	Remove, replace, disassemble, test, clean, calibrate, and renew parts on controls of all types	
	pneumatic	
	electrical	
	electro-pneumatic	
	thermostatic	
	humidity	
	pressure	
	vacuum	
7.	Machine Shop Practice	300
a.	Use of grinders, drill presses, lathes	
b.	Tool and drill sharpening	
8.	Miscellaneous	300
a.	Housekeeping	
b.	Safety	
	<b>TOTAL HOURS</b>	<b>8000</b>

## **A5.1- HEATING AND AIR-CONDITIONING INSTALLER-SERVICER RELATED CLASSROOM**

<b>Modules</b>	<b>Hours</b>
Safety	200
Introduction to Construction Math	10
Introduction to Hand Tools	10
Introduction to Power Tools	5
Introduction to Blueprints	7.5
Basic Rigging	10
Introduction to HVAC	2.5
Copper and Plastic Piping Practices	5
Soldering and Brazing	7.5
Basic Electricity	7.5
Introduction to Cooling	20
Introduction to Heating	15
Air Distribution Systems	10
Chimneys, Vents, and Flues	5
Maintenance Skills for the Service Technician	17.5
Alternating Current	7.5
Basic Electronics	5
Electric Heating	5
Introduction to Control Circuit Troubleshooting	20
Accessories and Optional Equipment	7.5
Metering Devices	7.5
Compressors	15
Heat Pumps	15
Leak Detection, Evacuation, Recovery, and Charging	15
Planned Maintenance	15
Troubleshooting Gas Heating	10
Troubleshooting Electric Heating	5
Troubleshooting Oil Heating	10
Troubleshooting Cooling	15
Troubleshooting Heat Pumps	10
Troubleshooting Accessories	10
Troubleshooting Electronic Controls	7.5
Hydronic Heating and Cooling Systems	20
Airside Systems	15
Air Properties and Balancing	15
Advanced Blueprint Reading	15
Indoor Air Quality	15
Energy Conservation Equipment	10
Building Management Systems	15
Water Treatment	10
System Start-Up and Shut-Down	15
Heating and Cooling System Design	15
Commercial and Industrial Refrigeration	15
<b>TOTAL HOURS</b>	<b>672.5</b>