| Unit/Standard Number | High School Graduation years 2016, 2017, 2018  Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/Technician CIP 47.0201 Task Grid | 2  | Lev | el 1<br>පු | 04  | 2 | Lev | rel 2 | Ω4  | 2        | Leve          | el 3              | 04 |
|----------------------|---|----|-----|------------|-----|---|-----|-------|-----|----------|---------------|-------------------|----|
|                      | Secondary Competency Task List  |    |     |            |     |   |     |       |     |          |               |                   |    |
| 100                  | INTRODUCTION TO HVAC  |    |     |            | l I |   | ı   | 1     | T 1 | <u> </u> |               |                   |    |
| 101                  | Identify HVAC systems.  | 15 |     |            |     |   |     |       |     |          | $\vdash$      |                   |    |
| 102                  | Describe career opportunities in the HVAC profession.   | 15 |     |            |     |   |     |       |     |          |               |                   |    |
| 103                  | Demonstrate awareness of the occupational requirements.   | 15 |     |            |     |   |     |       |     |          |               |                   |    |
| 104                  | Explain the class rules and the rational behind them.   | 15 |     |            |     |   |     |       |     |          |               |                   |    |
| 200                  | BASIC SAFETY  |    |     |            | l   |   | T . | I     | 1 1 | Г        | П             |                   |    |
| 201                  | Identify causes of job site accidents and measures to prevent them.   | 15 |     |            |     |   |     |       |     |          |               |                   |    |
| 202                  | Identify job site hazards and describe measures to prevent them from occurring.   | 15 |     |            |     |   |     |       |     |          |               |                   |    |
| 203                  | Identify and demonstrate the use of personal protection equipment.  |    | 15  |            |     |   |     |       |     |          | $\longmapsto$ |                   |    |
| 204                  | Demonstrate the knowledge of OSHA regulations.  |    | 15  |            |     |   |     |       |     |          | igsquare      |                   |    |
| 300                  | TOOLS FOR HVAC/R  |    | ı   | ı          | T I |   | ı   | г -   | T I | <u> </u> |               |                   |    |
| 301                  | Identify and Safely Use Basic Hand Tools Used in the Trade.   |    | 15  |            |     |   |     |       |     |          | igwdown       |                   |    |
| 302                  | Identify and Safely Use Basic Power Tools Used in the Trade.  |    | 15  |            |     |   |     |       |     |          | Ш             |                   |    |
| 400                  | BLUEPRINT READING   |    |     |            | T 1 |   | T   | ı     | 1 1 |          |               |                   |    |
| 401                  | Identify types of blueprint plans.  |    | 15  |            |     |   |     |       |     |          |               |                   |    |
|                      | Read and Interpret blueprint plans.   |    | 15  |            |     |   |     |       |     |          | Ш             |                   |    |
| 500                  | PIPING PRACTICES  |    | 1   | 1          | ı - |   | ı   |       | i i |          |               |                   |    |
| 501                  | Identify Piping Materials.  |    |     | 15         |     |   |     |       |     |          | $\sqcup$      |                   |    |
| 502                  | Select, Measure, Cut, and Ream Piping and Tubing.   |    |     | 15         |     |   |     |       |     |          | $\sqcup$      | $\longrightarrow$ |    |
| 503                  | Assemble Piping Projects and Pressure Test According to Trade Standards.  |    |     | 15         |     |   |     |       |     |          | $\bigsqcup$   |                   |    |
| 504                  | Identify and assemble PVC pipe and fittings.  |    |     | 15         |     |   |     |       |     |          | $\bigsqcup$   |                   |    |
| 505                  | Assemble copper tubing projects and pressure test according to trade standards.   |    |     | 15         |     |   |     |       |     |          | $\bigsqcup$   |                   |    |
| 506                  | Solder copper tubing.   |    |     | 15         |     |   |     |       |     |          |               |                   |    |
| 507                  | Braze ACR Tubing.   |    |     |            | 18  |   |     |       |     |          |               |                   |    |



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|----------------------|--|-----|-----|------|----|----|-----|------|----|----|------|------|----|
|                      | Secondary Competency Task List   |     |     |      |    |    |     |      |    |    |      |      |    |
| 508                  | Identify and demonstrate proper use of fittings and tools for steel (black) pipe.  |     |     |      | 18 |    |     |      |    |    |      |      |    |
| 509                  | Cut, ream, thread and assemble steel (black) pipe.   |     |     |      | 18 |    |     |      |    |    |      |      |    |
| 510                  | Assemble Corrugated Stainless Steel Gas Tubing (CSST) Projects.  |     |     |      | 18 |    |     |      |    |    |      |      |    |
| 511                  | Identify piping material such as PVC, ABS, copper, black iron  |     |     |      | 18 |    |     |      |    |    |      |      |    |
| 600                  | BASIC ELECTRICITY  |     |     |      |    |    |     |      |    |    |      |      |    |
| 601                  | Describe methods of producing electricity using appropriate terms.   |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 602                  | Calculate basic electrical quantities using Ohm's law.   |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 603                  | Explain how magnetism is used in different HVAC components.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 604                  | Identify Safe Electrical Practices.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 605                  | Identify and draw various types of electrical schematics and symbols.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 606                  | Demonstrate proper wiring techniques.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 607                  | Demonstrate electrical testing to include mechanical/electronic relays.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 608                  | Wire series circuit, parallel circuit, and series / parallel circuit.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 609                  | Install electric disconnects, circuit breakers and fuses.  |     |     |      |    | 10 |     |      |    |    |      |      |    |
| 610                  | Identify and test capacitors.  |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 611                  | Identify electrical motors and their applications.   |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 612                  | Identify motor control protection and start devices.   |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 613                  | Identify Electrical Codes.   |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 614                  | Demonstrate knowledge of transformers and their applications.  |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 700                  | INTRODUCTION TO COOLING  |     |     |      |    |    |     |      |    |    |      |      |    |
| 701                  | Measure temperature and pressure of a cooling system.  |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 702                  | Calculate Superheat and Subcooling.  |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 703                  | Locate and describe components of the basic refrigeration cycle.   |     |     |      |    |    | 10  |      |    |    |      |      |    |
| 704                  | Apply Pressure Temperature Charts for various refrigerants.  |     |     |      |    |    | 10  |      |    |    |      |      |    |



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|----------------------|--|----|-----|-------|----|---|-----|------|----|----|------|--------------|----|
|                      | Secondary Competency Task List   |    |     |       |    |   |     |      |    |    |      |              |    |
| 705                  | Describe the functions of compressors.   |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 706                  | Describe the functions of condensers.  |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 707                  | Describe the functions of evaporators.   |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 708                  | Describe the functions of metering devices.  |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 709                  | Identify secondary components used in the air conditioning and refrigeration industry.   |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 710                  | Evaluate effects of airflow on system performance.   |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 800                  | INTRODUCTION TO HEATING  |    |     |       |    |   |     |      |    |    | _    |              |    |
| 801                  | Describe the principles of combustion.   |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 802                  | Identify temperatures and pressures of a heating system.   |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 803                  | Identify components of various heating systems.  |    |     |       |    |   |     | 10   |    |    |      |              |    |
| 804                  | Perform maintenance on a gas furnace.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 805                  | Troubleshoot conventional / condensing gas heating equipment.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 806                  | Identify oil heating equipment.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 807                  | Install and adjust oil fired equipment.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 808                  | Perform annual preventive maintenance on oil fired equipment.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 809                  | Troubleshoot oil fired equipment.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 810                  | Identify electric heating equipment.   |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 811                  | Install heating/air conditioning thermostats according to manufacturer's standards.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 813                  | Perform Combustion Analysis on oil and gas fired equipment.  |    |     |       |    |   |     |      | 10 |    |      |              |    |
| 900                  | AIR DISTRIBUTION SYSTEMS   |    |     |       |    |   |     |      |    |    |      |              |    |
| 901                  | Identify and sketch different types of duct systems.   |    |     |       |    |   |     |      |    | 18 |      |              |    |
| 902                  | Identify and describe the different types of duct system components.   |    |     |       |    |   |     |      |    | 18 |      |              |    |
| 903                  | Test velocity, temperature, humidity, and volume in a duct system.   |    |     |       |    |   |     |      |    | 18 |      | <del> </del> |    |
| 906                  | Perform basic duct fabrication functions.  |    |     |       |    |   |     |      |    | 18 |      |              |    |



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|----------------------|--|---|-----|-------|----|---|-----|-----------|----|----|-------------------|-------|----|
|                      | Secondary Competency Task List   |   |     |       |    |   |     |           |    |    |                   |       |    |
| 1000                 | INTRODUCTION TO HYDRONIC SYSTEMS   |   |     | ,     | •  | _ |     |           |    |    |                   |       |    |
| 1001                 | Describe hot water heating system components.  |   |     |       |    |   |     |           |    | 18 |                   |       |    |
|                      | Install and service hydronic systems.  |   |     |       |    |   |     |           |    |    | 11                |       |    |
| 1100                 | LEAK DETECTION, EVACUATION, RECOVERY AND CHARGING  |   |     |       |    |   |     |           |    | ,  |                   |       |    |
|                      | Locate refrigerant leaks using common types of leak detectors.   |   |     |       |    |   |     |           |    |    | 11                |       |    |
|                      | Perform refrigerant recovery.  |   |     |       |    |   |     |           |    |    | 11                |       |    |
| 1103                 | Perform system evacuation and dehydration.   |   |     |       |    |   |     |           |    |    | 11                |       |    |
|                      | Determine when to charge with liquid versus vapor.   |   |     |       |    |   |     |           |    |    | 11                |       |    |
| 1105                 | Weigh in correct system charge (when appropriate).   |   |     |       |    |   |     |           |    |    | 11                |       |    |
|                      | Charge systems using superheat method when appropriate (e.g., fixed restriction).  |   |     |       |    |   |     |           |    |    | 11                |       |    |
| 1107                 | Charge systems using subcooling method when appropriate (e.g., TXV, AXV).  |   |     |       |    |   |     |           |    |    | 13                |       |    |
| 1108                 | Demonstrate knowledge of EPA Section 608.  |   |     |       |    |   |     |           |    |    | $\underline{}$    | 11    |    |
| 1200                 | TROUBLESHOOTING GAS HEATING  |   |     |       |    | = | •   |           |    |    |                   |       |    |
|                      | Perform gas burner flame proving tests according to trade standards.   |   |     |       |    |   |     |           |    |    | $\longrightarrow$ | 11    |    |
|                      | Demonstrate how to install, trouble shoot, and service gas heating equipment.  | _ | L   | L     |    |   |     |           |    |    |                   | 11    |    |
|                      | TROUBLESHOOTING COOLING  |   |     | -     |    | • |     |           |    |    |                   |       |    |
|                      | Identify control system components.  |   |     |       |    |   |     |           |    |    |                   | 11    |    |
|                      | Demonstrate, install, trouble shoot, and service cooling equipment.  | 1 |     |       |    |   |     |           |    |    |                   | 11    |    |
| 1303                 | Demonstrate how to install electrical components.  |   |     |       |    |   |     |           |    |    |                   | 11    |    |



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|----------------------|---|----|-----------|----|----|----|-----|-----------|----|----|------|------|-----|
|                      | Secondary Competency Task List  |    |           |    |    |    |     |           |    |    |      |      |     |
| 1400                 | HEAT PUMPS  |    |           |    |    |    |     |           |    |    |      |      |     |
| 1401                 | Explain heat pump modes of operation.   |    |           |    |    |    |     |           |    |    |      | 11   |     |
| 1402                 | Identify and describe heat pump components.   |    |           |    |    |    |     |           |    |    |      | 13   |     |
| 1403                 | Demonstrate how to install heat pumps.  |    |           |    |    |    |     |           |    |    |      |      | 11  |
| 1500                 | COMPUTER FUNDAMENTALS   |    |           |    |    |    |     |           |    |    |      |      |     |
|                      | Utilize the Internet for research.  |    |           |    |    |    |     |           |    |    |      | П    | 11  |
|                      | Identify and demonstrate skills with computer software relating to HVAC.  |    |           |    |    |    |     |           |    |    |      |      | 11  |
|                      | CONSTRUCTION MATH   |    |           |    |    |    |     |           |    |    |      |      |     |
| L1601                | Demonstrate Proficiency in Math as it relates to HVAC/R.  |    |           |    |    |    |     |           |    |    |      |      | 11  |
|                      | BASIC COMMUNICATION   |    |           |    |    |    |     |           |    |    |      |      |     |
|                      | Demonstrate Reading, Writing, Listening, and Speaking Skills.   |    |           |    |    |    |     |           |    |    |      |      | 11  |
|                      | Complete a Resume and Mock Interview.   |    |           |    |    |    |     |           |    |    |      |      | 11  |
|                      | BASIC EMPLOYABILITY   |    |           |    |    |    |     |           |    |    |      |      | 4.4 |
| L1901                | Demonstrate Employability Skills.  Demonstrate Interpersonal Skills.  |    |           |    |    |    |     |           |    |    |      |      | 11  |
| L1902                | Demonstrate interpersorial Skills.  |    |           |    |    |    |     |           |    |    |      |      |     |
|                      | Total (Hours)   | 90 | 90        | 90 | 90 | 90 | 90  | 90        | 90 | 90 | 90   | 90   | 90  |

