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| Title | **Install heating, ventilation and air conditioning (HVAC) units** |
| Level | **2** | **Credits** | **14** |

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| Purpose | This Competency Standard focuses on the skills required to identify job specification verify field location and measurements, obtain specified equipment deliver material on job site, position HVAC equipment, install duct system(verify duct system), flues/ smoke pipes(verify pipes installation), install control wiring, refrigerant piping. Perform evacuation and dehydration of refrigeration system, install primary wiring, fuel piping, condensate drain piping, mount supply return air(duct) terminals, seal structural penetration, mount control system, and refrigerant charging, in install HVAC units, in accordance with the organization’s approved guidelines and procedures. Your knowledge regarding installation of HVAC units procedures, criteria, requirement of tools, calculation, foundation structure, interpret drawings, codes, refrigerant system, standards, sealing process, control application, and charging system will be sufficient to provide you the basis for installation of HVAC units work. |

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| Classification ISCED | 0714 Electronics and automation |

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| Available grade | Competent / Not yet competent |

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| Modification history | N/A |

| **Competency Unit** | **Performance Criteria** | **Knowledge and Understanding** |
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| **B-1 Identify job specifications** | ***Trainee must be able to***1. List tools and equipment according to job
2. Prepare toolkit according to job
3. Arrange proper handling of equipment
4. Prepare list of manpower

  | *You need to know and understand*1. Understand installation criteria
2. Understand the requirement of tools and equipment
3. Describe manpower according to job
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| **B-2 Verify field locations and measurements**  | ***Trainee must be able to***1. Visit the field location
2. Select the proper location

Take measurement  | *You need to know and understand*1. Analyze the field location
2. Understand shop drawing

Calculate the measurement  |
| **B-3 Obtain specified equipment** | ***Trainee must be able to***1. Select required equipment
2. Check the physical condition of equipment
 | *You need to know and understand*1. Understand the application of equipment
2. Understand the structure of equipment
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| **B-4 Deliver material** **to job site**  | ***Trainee must be able to***1. Transport material accordingly
2. Load/ unload material safely

Acknowledge from user accordingly  | *You need to know and understand*1. Understand the nature of material
2. Understand procedure of safe handling
3. Understand valid acknowledgement procedure
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| **B-5 Position HVAC equipment**  | ***Trainee must be able to***1. Prepare foundation for equipment
2. Arrange hoisting machines
3. Place HVAC equipment on prescribed location

  | *You need to know and understand*1. Understand the structure of foundation
2. Understand type of hoisting machines
3. Understand noise and vibration control
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| **B-6 Install duct system(verify installation of duct)**  | ***Trainee must be able to***1. Check duct rout according to drawing
2. Verify duct size according to drawing
3. Check hangers and joints of duct
4. Check duct joints by smoke/ light test

Check insulation accordingly  | *You need to know and understand*1. Interpret duct drawing
2. Understand material specifications
3. Describe duct testing standards
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| **B-7 Install flues /Smoke pipes (verify installation of flues/ smoke pipes)**  | ***Trainee must be able to***1. Check flues/smoke pipes rout according to drawing
2. Verify flues/smoke pipes size according to drawing
3. Check Support/ hangers and joints of flues/smoke pipes
4. Check flues/smoke pipes height
5. Check insulation accordingly
 | *You need to know and understand*1. Interpret piping drawing
2. Understand material specifications
3. Describe flues/smoke pipes testing standards
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| **B-8 Install control wiring** | ***Trainee must be able to***1. Check wining rout according to drawing
2. Verify wiring gauge according to drawing
3. Verify wiring circuit accordingly Connect wiring according to drawing
 | *You need to know and understand*1. Read wiring diagram
2. Understand color code standard
3. Understand basic electrical concepts

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| **B-9 Install refrigerant piping**  | ***Trainee must be able to***1. Check piping rout according to drawing
2. Verify piping size according to drawing
3. Install hangers for piping
4. Perform pipe jointing
5. Install piping accordingly
6. Perform pipe leakage test Perform insulation accordingly
 | *You need to know and understand* K1. Interpret HVARC piping drawingK2. Understand material specificationsK3. Describe pipe jointing methods K4. Describe leakage testing methods K5. Describe drawbacks of sharp bending  |
| **B-10 Perform evacuation and dehydration of refrigeration system**  | ***Trainee must be able to*** 1. Install gauge manifold
2. Flash with nitrogen
3. Perform evacuation
 | *You need to know and understand*1. Understand pressure testing equipment
2. Describe refrigeration system flashing methods
3. Understand vacuum standards
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| **B-11 Install primary wiring** | ***Trainee must be able to***1. Check wining rout according to drawing
2. Verify wiring gauge according to drawing
3. Verify wiring circuit accordingly
4. Connect wiring as described
 | ***You need to know and understand***1. Read wiring diagram
2. Understand color code standard
3. Understand basic electrical concepts

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| **B-12 Install fuel piping** | ***Trainee must be able to***1. Check fuel pipes rout according to drawing
2. Verify fuel pipes size according to drawing
3. Check Support/ hangers and joints of fuel pipes
4. Perform leakage test
 | ***You need to know and understand***1. Interpret fuel piping drawing
2. Understand material specifications
3. Describe fuel pipes testing methods
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| **B-13 Install condensate drain piping** | ***Trainee must be able to***1. Check drain pipes rout according to drawing
2. Verify drain pipes size according to drawing
3. Install Support/ hangers and joints of drain pipes
4. check drain pipes level
5. install insulation accordingly
 | ***You need to know and understand***1. Interpret piping drawing
2. Understand material specifications
3. Understand importance of air vent

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| **B-14 Mount supply and return air (Duct) terminals** | ***Trainee must be able to***1. Check duct rout according to drawing
2. Verify duct size according to drawing
3. Check hangers and joints of duct
4. Check duct joints by smoke/ light test
5. Check insulation accordingly
 | ***You need to know and understand***1. Interpret duct drawing
2. Understand material specifications
3. Describe duct testing standards

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| **B-15 Seal structural penetration** | ***Trainee must be able to***1. Seal structure opening during installation accordingly
 | ***You need to know and understand***1. Understand sealant materials
2. Understand sealing methods
3.
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| **B-16 Mount control systems** | ***Trainee must be able to***1. Select position of control system accordingly
2. Place control equipment on prescribed location
3. Check control system performance
 | ***You need to know and understand***1. Read control system diagram
2. Understand HVACR controls
3. Understand the application of HVACR controls

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| **B-17 Refrigerant charging** | ***Trainee must be able to***1. Purge the charging line accordingly
2. Charge the refrigerant
3. Start the system accordingly
4. Check performance
 | ***You need to know and understand***1. Understand refrigerants
2. Understand Refrigerant charging process
3. Understand performance parameters

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