

TRAINING REGULATIONS

RAC SERVICING (DomRAC) NC II



**HEATING, VENTILATING, AIR-
CONDITIONING AND REFRIGERATION
TECHNOLOGY SECTOR**

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Luzon Expressway (SLEX), Taguig City, Metro Manila

Technical Education and Skills Development Act of 1994
(Republic Act No. 7796)

Section 22, “Establishment and Administration of the National Trade Skills Standards” of the RA 7796 known as the TESDA Act mandates TESDA to establish national occupational skills standards. The Authority shall develop and implement a certification and accreditation program in which private industry group and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

@ 2021 by Technical Education and Skills Development Authority

All rights reserved. Any part of this publication may be used and reproduced, provided proper acknowledgement is made.

The Training Regulations (TR) serve as basis for the:

- 1 Registration and delivery of training programs;
- 2 Development of curriculum and assessment instruments; and
- 3 Competency assessment and certification

Each TR has four sections:

Section 1 **Definition of Qualification** describes the qualification and defines the competencies that comprise the qualification.

Section 2 **Competency Standards** gives the specifications of competencies required for effective work performance.

Section 3 **Training Arrangements** contains information and requirements in designing training program for certain qualification. It includes curriculum design; training delivery; trainee entry requirements; tools, equipment and materials; training facilities; trainer's qualification; and institutional assessment.

Section 4 **Assessment and Certification Arrangements** describes the policies governing assessment and certification procedures.

TABLE OF CONTENTS

HVAC/R SECTOR REFRIGERATION AND AIR-CONDITIONING (RAC) SERVICING NC II [Domestic Refrigeration and Air-Conditioning]

	Page No.
SECTION 1 RAC SERVICING (DomRAC) NC II QUALIFICATION	1
SECTION 2 COMPETENCY STANDARDS	
• Basic Competencies	2 - 27
• Common Competencies	28 - 57
• Core Competencies	58 - 70
SECTION 3 TRAINING STANDARDS	71 - 93
3.1 Curriculum Design	71
• Basic Competencies	72 - 80
• Common Competencies	81 - 89
• Core Competencies	90 - 93
3.2 Training Delivery	94 - 95
3.3 Trainee Entry Requirements	95
3.4 List of Tools, Equipment and Materials	96 - 98
3.5 Training Facilities	99
3.6 Trainers' Qualifications	99
3.7 Assessment	99
SECTION 4 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS	100 - 101
COMPETENCY MAP	102
GLOSSARY OF TERMS	103 - 105
REFERENCES	
ACKNOWLEDGEMENTS	106-107
TRAINING REGULATIONS DOCUMENT REVISION HISTORY	108

TRAINING REGULATIONS FOR
REFRIGERATION AND AIR-CONDITIONING (RAC)
[Domestic Refrigeration and Air-Conditioning] SERVICING NC II

SECTION 1 RAC SERVICING (DomRAC) NC II QUALIFICATION DESCRIPTION

The **RAC SERVICING (DomRAC) NC II** Qualification consists of competencies that a person must achieve to enable him/her to install, service, maintain, troubleshoot and repair domestic air-conditioning and refrigeration units. This qualification covers window-type air-conditioning and domestic refrigerators only.

This Qualification is packaged from the competency map of **HVAC/R Sector – RAC Servicing** as shown in Annex A.

The Units of Competency comprising this Qualification include the following:

CODE NO.	BASIC COMPETENCIES
400311210	Participate in workplace communication
400311211	Work in a team environment
400311212	Solve/address general workplace problems
400311213	Develop career and life decisions
400311214	Contribute to workplace innovation
400311215	Present relevant information
400311216	Practice occupational safety and health policies and procedures
400311217	Exercise efficient and effective sustainable practices in the workplace
400311218	Practice entrepreneurial skills in the workplace

CODE NO.	COMMON COMPETENCIES
HVC713201	Prepare materials and tools
HVC311202	Interpret technical drawing and plans
HVC311201	Observe procedures, specifications and manuals of instructions
HVC311203	Perform mensurations and calculations
HVC713202	Perform basic benchworks
HVC724201	Perform basic electrical works
HVC311204	Maintain tools, instruments and equipment
HVC315201	Perform housekeeping and safety practices
HVC311205	Document work accomplished

CODE NO.	CORE COMPETENCIES
HVC723337	Install domestic refrigeration and air-conditioning units
HVC723338	Service and maintain domestic refrigeration and air-conditioning units
HVC723339	Troubleshoot and repair domestic refrigeration and air-conditioning systems

A person who has achieved this Qualification is competent to be:

- Domestic Refrigeration and Air-conditioning Technician

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the basic, common and core units of competency required in **RAC Servicing (DomRAC) NC II**.

BASIC COMPETENCIES

UNIT OF COMPETENCY : PARTICIPATE IN WORKPLACE COMMUNICATION

UNIT CODE : 400311210

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Obtain and convey workplace information	1.1 Specific and relevant information is accessed from appropriate sources 1.2 Effective questioning, active listening and speaking skills are used to gather and convey information 1.3 Appropriate medium is used to transfer information and ideas 1.4 Appropriate non- verbal communication is used 1.5 Appropriate lines of communication with supervisors and colleagues are identified and followed 1.6 Defined workplace procedures for the location and storage of information are used 1.7 Personal interaction is carried out clearly and concisely	1.1 Effective communication 1.2 Different modes of communication 1.3 Medium of communication in the workplace 1.4 Organizational policies 1.5 Communication procedures and systems 1.6 Lines of communication 1.7 Technology relevant to the enterprise and the individual's work responsibilities 1.8 Workplace etiquette	1.1 Following simple spoken language 1.2 Performing routine workplace duties following simple written notices 1.3 Participating in workplace meetings and discussions 1.4 Preparing work-related documents 1.5 Estimating, calculating and recording routine workplace measures 1.6 Relating/ Interacting with people of various levels in the workplace 1.7 Gathering and providing basic information in response to workplace requirements 1.8 Basic business writing skills 1.9 Interpersonal skills in the workplace 1.10 Active-listening skills
2. Perform duties following workplace instructions	2.1 Written notices and instructions are read and interpreted in accordance with organizational guidelines 2.2 Routine written instruction are followed	2.1 Effective verbal and non-verbal communication 2.2 Different modes of communication 2.3 Medium of communication in the workplace	2.1 Following simple spoken instructions 2.2 Performing routine workplace duties following simple written notices 2.3 Participating in workplace meetings

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	<p>based on HVAC established procedures</p> <p>2.3 Feedback is given to workplace supervisor-based instructions/information received</p> <p>2.4 Workplace interactions are conducted in a courteous manner</p> <p>2.5 Where necessary, clarifications about routine workplace procedures and matters concerning conditions of employment are sought and asked from appropriate sources</p> <p>2.6 Meeting's outcomes are interpreted and implemented</p>	<p>2.4 Organizational/ Workplace policies</p> <p>2.5 Communication procedures and systems</p> <p>2.6 Lines of communication</p> <p>2.7 Technology relevant to the enterprise and the individual's work responsibilities</p> <p>2.8 Effective questioning techniques (clarifying and probing)</p> <p>2.9 Workplace etiquette</p>	<p>and discussions</p> <p>2.4 Completing work-related documents</p> <p>2.5 Estimating, calculating and recording routine workplace measures</p> <p>2.6 Relating/ Responding to people of various levels in the workplace</p> <p>2.7 Gathering and providing information in response to workplace requirements</p> <p>2.8 Basic questioning/ querying</p> <p>2.9 Skills in reading for information</p> <p>2.10 Skills in locating</p>
3. Complete relevant work-related documents	<p>3.1 Range of forms relating to conditions of employment are completed accurately and legibly</p> <p>3.2 Workplace data is recorded on standard workplace forms and documents</p> <p>3.3 Errors in recording information on forms/ documents are identified and properly acted upon</p> <p>3.4 Reporting requirements to supervisor are completed according to organizational guidelines</p>	<p>3.1 Effective verbal and non-verbal communication</p> <p>3.2 Different modes of communication</p> <p>3.3 Workplace forms and documents</p> <p>3.4 Organizational/ Workplace policies</p> <p>3.5 Communication procedures and systems</p> <p>3.6 Technology relevant to the enterprise and the individual's work responsibilities</p>	<p>3.1 Completing work-related documents</p> <p>3.2 Applying operations of addition, subtraction, division and multiplication</p> <p>3.3 Gathering and providing information in response to workplace requirements</p> <p>3.4 Effective record keeping skills</p>

RANGE OF VARIABLES

VARIABLE	RANGE
1. Appropriate sources	May include: 1.1. Team members 1.2. Suppliers 1.3. Trade personnel 1.4. Local government 1.5. Industry bodies
2. Medium	May include: 2.1. Memorandum 2.2. Circular 2.3. Notice 2.4. Information discussion 2.5. Follow-up or verbal instructions 2.6. Face to face communication
3. Storage	May include: 3.1. Manual filing system 3.2. Computer-based filing system
4. Workplace interactions	May include: 4.1. Face to face 4.2. Telephone 4.3. Electronic and two-way radio 4.4. Written including electronic, memos, instruction and forms, 4.5. Non-verbal including gestures, signals, signs and diagrams
5. Forms	May include: 5.1. HR/Personnel forms, telephone message forms, safety reports

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ol style="list-style-type: none"> 1.1. Prepared written communication following standard format of the organization 1.2. Accessed information using workplace communication equipment/systems 1.3. Made use of relevant terms as an aid to transfer information effectively 1.4. Conveyed information effectively adopting the formal or informal communication
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ol style="list-style-type: none"> 2.1. Fax machine 2.2. Telephone 2.3. Notebook 2.4. Writing materials 2.5. Computer with internet connection
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ol style="list-style-type: none"> 3.1. Demonstration with oral questioning 3.2. Interview 3.3. Written test 3.4. Third-party report
<p>4. Context for Assessment</p>	<p>4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center</p>

UNIT OF COMPETENCY: WORK IN TEAM ENVIRONMENT

UNIT CODE : 400311211

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes to identify one's roles and responsibilities as a member of a team.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Describe team role and scope	1.1. The role and objective of the team is identified from available sources of information 1.2. Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources	1.1 Group structure 1.2 Group development 1.3 Sources of information	1.1 Communicating with others, appropriately consistent with the culture of the workplace 1.2 Developing ways in improving work structure and performing respective roles in the group or organization
2. Identify one's role and responsibility within team	2.1. Individual role and responsibilities within the team environment are identified 2.2. Roles and objectives of the team is identified from available source of information 2.3. Team parameters, reporting relationships and responsibilities are identified based on team discussions and appropriate external sources	2.1. Team roles and objectives 2.2. Team structure and parameters 2.3. Team development 2.4. Sources of information	2.1. Communicating with others, appropriately consistent with the culture of the workplace 2.2. Developing ways in improving work structure and performing respective roles in the group or organization
3. Work as a team member	3.1. Effective and appropriate forms of communications are used and interactions undertaken with team members based on company practices 3.2. Effective and appropriate contributions is made to complement team activities and objectives based on workplace context 3.3. Protocols in reporting are observed based on standard company practices 3.4. Contribute to the development of team work plans based on an understanding of team's role and objectives	3.1. Communication process 3.2. Workplace communication protocol 3.3. Team planning and decision making 3.4. Team thinking 3.5. Team roles 3.6. Process of team development 3.7. Workplace context	3.1. Communicating with others, appropriately consistent with the culture of the workplace 3.2. Interacting effectively with others 3.3. Deciding as an individual and as a group using group think strategies and techniques 3.4. Contributing to Resolution of issues and concerns

RANGE OF VARIABLES

VARIABLE	RANGE
1. Role and objective of team	May include but not limited to: <ol style="list-style-type: none"> 1.1. Work activities in a team environment with enterprise or specific sector 1.2. Limited discretion, initiative and judgement maybe demonstrated on the job, either individually or in a team environment
2. Sources of information	May include but not limited to: <ol style="list-style-type: none"> 2.1. Standard operating and/or other workplace procedures 2.2. Job procedures 2.3. Machine/equipment manufacturer's specifications and instructions 2.4. Organizational or external personnel 2.5. Client/supplier instructions 2.6. Quality standards 2.7. OHS and environmental standards
3. Workplace context	May include but not limited to: <ol style="list-style-type: none"> 3.1. Work procedures and practices 3.2. Conditions of work environments 3.3. Legislation and industrial agreements 3.4. Standard work practice including the storage, safe handling and disposal of chemicals 3.5. Safety, environmental, housekeeping and quality guidelines

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ol style="list-style-type: none"> 1.1. Worked in a team to complete workplace activity 1.2. Worked effectively with others 1.3. Conveyed information in written or oral form 1.4. Selected and used appropriate workplace language 1.5. Followed designated work plan for the job
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ol style="list-style-type: none"> 2.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2. Materials relevant to the proposed activity or tasks
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ol style="list-style-type: none"> 3.1. Role play involving the participation of individual member to the attainment of organizational goal 3.2. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork 3.3. Socio-drama and socio-metric methods 3.4. Sensitivity techniques 3.5. Written Test
<p>4. Context for Assessment</p>	<ol style="list-style-type: none"> 4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while task are being undertaken whether individually or in group

UNIT OF COMPETENCY: SOLVE/ADDRESS GENERAL WORKPLACE PROBLEMS

UNIT CODE : 400311212

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to apply problem-solving techniques to determine the origin of problems and plan for their resolution. It also includes addressing procedural problems through documentation, and referral.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify routine problems	1.1 Routine <i>problems or procedural problem</i> areas are identified 1.2 Problems to be investigated are defined and determined 1.3 Current conditions of the problem are identified and documented	1.1 Current industry hardware and software products and services 1.2 Industry maintenance, service and helpdesk practices, processes and procedures 1.3 Industry standard diagnostic tools 1.4 Malfunctions and resolutions	1.1 Identifying current industry hardware and software products and services 1.2 Identifying current industry maintenance, services and helpdesk practices, processes and procedures. 1.3 Identifying current industry standard diagnostic tools 1.4 Describing common malfunctions and resolutions. 1.5 Determining the root cause of a routine malfunction
2. Look for solutions to routine problems	2.1 Potential solutions to problem are identified 2.2 Recommendations about possible solutions are developed, <i>documented</i> , ranked and presented to <i>appropriate person</i> for decision	2.1 Current industry hardware and software products and services 2.2 Industry service and helpdesk practices, processes and procedures 2.3 Operating systems 2.4 Industry standard diagnostic tools 2.5 Malfunctions and resolutions. 2.6 Root cause analysis	2.1 Identifying current industry hardware and software products and services 2.2 Identifying services and helpdesk practices, processes and procedures. 2.3 Identifying operating system 2.4 Identifying current industry standard diagnostic tools 2.5 Describing common malfunctions and resolutions. 2.6 Determining the root cause of a routine malfunction
3. Recommend solutions to problems	3.1 Implementation of solutions are <i>planned</i> 3.2 Evaluation of implemented solutions are planned 3.3 Recommended solutions are documented and submit to appropriate person for confirmation	3.1 Standard procedures 3.2 Documentation produce	3.1 Producing documentation that recommends solutions to problems 3.2 Following established procedures

RANGE OF VARIABLES

VARIABLE	RANGE
1. Problems/Procedural Problem	May include but not limited to: 1.1 Routine/non – routine processes and quality problems 1.2 Equipment selection, availability and failure 1.3 Teamwork and work allocation problem 1.4 Safety and emergency situations and incidents 1.5 Work-related problems outside of own work area
2. Appropriate person	May include but not limited to: 2.1 Supervisor or manager 2.2 Peers/work colleagues 2.3 Other members of the organization
3. Document	May include but not limited to: 3.1 Electronic mail 3.2 Briefing notes 3.3 Written report 3.4 Evaluation report
4. Plan	May include but not limited to: 4.1 Priority requirements 4.2 Co-ordination and feedback requirements 4.3 Safety requirements 4.4 Risk assessment 4.5 Environmental requirements

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Determined the root cause of a routine problem 1.2 Identified solutions to procedural problems. 1.3 Produced documentation that recommends solutions to problems. 1.4 Followed established procedures. 1.5 Referred unresolved problems to support persons.
<p>2. Resource Implications</p>	<p>2.1 Assessment will require access to a workplace over an extended period, or a suitable method of gathering evidence of operating ability over a range of situations.</p>
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Case Formulation 3.2 Life Narrative Inquiry 3.3 Standardized test <p>The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.</p>
<p>4. Context for Assessment</p>	<p>4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.</p>

UNIT OF COMPETENCY : DEVELOP CAREER AND LIFE DECISIONS

UNIT CODE : 400311213

UNIT DESCRIPTOR : This unit covers the knowledge, skills, and attitudes in managing one’s emotions, developing reflective practice, and boosting self-confidence and developing self-regulation.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Manage one’s emotion	1.1. Self-management strategies are identified 1.2. Skills to work independently and to show initiative, to be conscientious, and persevering in the face of setbacks and frustrations are developed 1.3. Techniques for effectively handling negative emotions and unpleasant situation in the workplace are examined	1.1. Self-management strategies that assist in regulating behavior and achieving personal and learning goals (e.g. Nine self-management strategies according to Robert Kelley) 1.2. Enablers and barriers in achieving personal and career goals 1.3. Techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.	1.1. Managing properly one’s emotions and recognizing situations that cannot be changed and accept them and remain professional 1.2. Developing self-discipline, working independently and showing initiative to achieve personal and career goals 1.3. Showing confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace
2. Develop reflective practice	2.1. Personal strengths and achievements, based on self-assessment strategies and teacher feedback are contemplated 2.2. Progress when seeking and responding to feedback from teachers to assist them in consolidating strengths, addressing weaknesses and fulfilling their potential are monitored 2.3. Outcomes of personal and academic challenges by reflecting on previous problem solving and decision-making strategies and feedback from peers and teachers are predicted	2.1. Basic SWOT analysis 2.2. Strategies to improve one’s attitude in the workplace 2.3. Gibbs’ Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan)	2.1. Using the basic SWOT analysis as self-assessment strategy 2.2. Developing reflective practice through realization of limitations, likes/dislikes; through showing of self-confidence 2.3. Demonstrating self-acceptance and being able to accept challenges

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Boost self-confidence and develop self-regulation	3.1. Efforts for continuous self-improvement are demonstrated 3.2. Counter-productive tendencies at work are eliminated 3.3. Positive outlook in life is maintained.	3.1. Four components of self-regulation based on Self-Regulation Theory (SRT) 3.2. Personality development concepts 3.3. Self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts)	3.1. Performing effective communication skills – reading, writing, conversing skills 3.2. Showing affective skills – flexibility, adaptability, etc. 3.3. Self-assessment for determining one’s strengths and weaknesses

RANGE OF VARIABLES

VARIABLE	RANGE
1. Self-management strategies	<p>May include but not limited to:</p> <ul style="list-style-type: none"> 1.1 Seeking assistance in the form of job coaching or mentoring 1.2 Continuing dialogue to tackle workplace grievances 1.3 Collective negotiation/bargaining for better working conditions 1.4 Share your goals to improve with a trusted co-worker or supervisor 1.5 Make a negativity log of every instance when you catch yourself complaining to others 1.6 Make lists and schedules for necessary activities
2. Unpleasant situation	<p>May include but not limited to:</p> <ul style="list-style-type: none"> 2.1 Job burn-out 2.2 Drug dependence 2.3 Sulking

EVIDENCE GUIDE

1 Critical aspects of Competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Express emotions appropriately 1.2 Work independently and show initiative 1.3 Consistently demonstrate self-confidence and self-discipline
2 Resource Implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Access to workplace and resources 2.2 Case studies
3 Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Demonstration or simulation with oral questioning 3.2 Case problems involving work improvement and sustainability issues 3.3 Third-party report
4 Context for Assessment	<ul style="list-style-type: none"> 4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY : CONTRIBUTE TO WORKPLACE INNOVATION

UNIT CODE : 400311214

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to make a pro-active and positive contribution to workplace innovation.

ELEMENTS	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify opportunities to do things better.	1.1. Opportunities for improvement are identified proactively in own area of work. 1.2. Information is gathered and reviewed which may be relevant to ideas and which might assist in gaining support for idea.	1.1. Roles of individuals in suggesting and making improvements. 1.2. Positive impacts and challenges in innovation. 1.3. Types of changes and responsibility. 1.4. Seven habits of highly effective people.	1.1. Identifying opportunities to improve and to do things better. Involvement. 1.2. Identifying the positive impacts and the challenges of change and innovation. 1.3. Identifying examples of the types of changes that are within and outside own scope of responsibility
2. Discuss and develop ideas with others	2.1. People who could provide input to ideas for improvements are identified. 2.2. Ways of approaching people to begin sharing ideas are selected. 2.3. Meeting is set with relevant people. 2.4. Ideas for follow up are review and selected based on feedback. 2.5. Critical inquiry method is used to discuss and develop ideas with others.	2.1. Roles of individuals in suggesting and making improvements. 2.2. Positive impacts and challenges in innovation. 2.3. Types of changes and responsibility. 2.4. Seven habits of highly effective people.	2.1. Identifying opportunities to improve and to do things better. Involvement. 2.2. Identifying the positive impacts and the challenges of change and innovation. 2.3. Providing examples of the types of changes that are within and outside own scope of responsibility 2.4. Communicating ideas for change through small group discussions and meetings.
3. Integrate ideas for change in the workplace.	3.1. Critical inquiry method is used to integrate different ideas for change of key people. 3.2. Summarizing, analyzing and generalizing skills are used to extract salient points in the pool of ideas. 3.3. Reporting skills are likewise used to communicate results. 3.4. Current issues and concerns on the systems, processes and procedures, as well as the need for simple innovative practices are identified.	3.1. Roles of individuals in suggesting and making improvements. 3.2. Positive impacts and challenges in innovation. 3.3. Types of changes and responsibility. 3.4. Seven habits of highly effective people. 3.5. Basic research skills.	3.1. Identifying opportunities to improve and to do things better. Involvement. 3.2. Identifying the positive impacts and the challenges of change and innovation. 3.3. Providing examples of the types of changes that are within and outside own scope of responsibility. 3.4. Communicating ideas for change through small group discussions and meetings. 3.5. Demonstrating skills in analysis and interpretation of data.

RANGE OF VARIABLES

VARIABLES	RANGE	
1. Opportunities for improvement	May include: 1.1 Systems. 1.2 Processes. 1.3 Procedures.	1.4 Protocols. 1.5 Codes. 1.6 Practices.
2. Information	May include: 2.1 Workplace communication problems. 2.2 Performance evaluation results. 2.3 Team dynamics issues and concerns. 2.4 Challenges on return of investment 2.5 New tools, processes and procedures. 2.6 New people in the organization.	
3. People who could provide input	May include: 3.1 Leaders 3.2 Managers 3.3 Specialists 3.4 Associates 3.5 Researchers 3.6 Supervisors	3.7 Staff 3.8 Consultants (external) 3.9 People outside the organization in the same field or similar expertise/industry. 3.10 Clients
4. Critical inquiry method	May include: 4.1 Preparation. 4.2 Discussion. 4.3 Clarification of goals. 4.4 Negotiate towards a Win-Win outcome. 4.5 Agreement. 4.6 Implementation of a course of action. 4.7 Effective verbal communication. See pages: Verbal Communication and Effective Speaking. 4.8 Listening. 4.9 Reducing misunderstandings is a key part of effective negotiation. 4.10 Rapport Building. 4.11 Problem Solving. 4.12 Decision Making. 4.13 Assertiveness. 4.14 Dealing with Difficult Situations.	
5. Reporting skills	May include: 5.1 Data management. 5.2 Coding. 5.3 Data analysis and interpretation. 5.4 Coherent writing. 5.5 Speaking.	

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Identified opportunities to do things better. 1.2 Discussed and developed ideas with others on how to contribute to workplace innovation. 1.3 Integrated ideas for change in the workplace. 1.4 Analyzed and reported rooms for innovation and learning in the workplace.
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Pens, papers and writing implements. 2.2 Cartolina. 2.3 Manila papers.
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Psychological and behavioral Interviews. 3.2 Performance Evaluation. 3.3 Life Narrative Inquiry. 3.4 Review of portfolios of evidence and third-party workplace reports of on-the-job performance. 3.5 Sensitivity analysis. 3.6 Organizational analysis. 3.7 Standardized assessment of character strengths and virtues applied.
<p>4. Context for Assessment</p>	<ul style="list-style-type: none"> 4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.

UNIT OF COMPETENCY : PRESENT RELEVANT INFORMATION

UNIT CODE : 400311215

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to present data/information appropriately.

ELEMENTS	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Gather data/information	1.1 Evidence, facts and information are collected 1.2 Evaluation, terms of reference and conditions are reviewed to determine whether data/information falls within project scope	1.1 Organisational protocols 1.2 Confidentiality 1.3 Accuracy 1.4 Business mathematics and statistics 1.5 Data analysis techniques/procedures 1.6 Reporting requirements to a range of audiences 1.7 Legislation, policy and procedures relating to the conduct of evaluations 1.8 Organisational values, ethics and codes of conduct	1.1 Describing organisational protocols relating to client liaison 1.2 Protecting confidentiality 1.3 Describing accuracy 1.4 Computing business mathematics and statistics 1.5 Describing data analysis techniques/procedures 1.6 Reporting requirements to a range of audiences 1.7 Stating legislation, policy and procedures relating to the conduct of evaluations 1.8 Stating organisational values, ethics and codes of conduct
2. Assess gathered data/information	2.1 Validity of data/information is assessed 2.2 Analysis techniques are applied to assess data/information. 2.3 Trends and anomalies are identified 2.4 Data analysis techniques and procedures are documented 2.5 Recommendations are made on areas of possible improvement.	2.1 Business mathematics and statistics 2.2 Data analysis techniques/procedures 2.3 Reporting requirements to a range of audiences 2.4 Legislation, policy and procedures relating to the conduct of evaluations 2.5 Organisational values, ethics and codes of conduct	2.1 Computing business mathematics and statistics 2.2 Describing data analysis techniques/procedures 2.3 Reporting requirements to a range of audiences 2.4 Stating legislation, policy and procedures relating to the conduct of evaluations 2.5 Stating organisational values, ethics and codes of conduct

ELEMENTS	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Record and present information	3.1 Studied data/information are recorded. 3.2 Recommendations are analysed for action to ensure they are compatible with the project's scope and terms of reference. 3.3 Interim and final reports are analysed and outcomes are compared to the criteria established at the outset. 3.4 Findings are presented to stakeholders.	3.1 Data analysis techniques/procedures 3.2 Reporting requirements to a range of audiences 3.3 Legislation, policy and procedures relating to the conduct of evaluations 3.4 Organisational values, ethics and codes of conduct	3.1 Describing data analysis techniques/procedures 3.2 Reporting requirements to a range of audiences 3.3 Stating legislation, policy and procedures relating to the conduct of evaluations 3.4 Stating organisational values, ethics and codes of conduct practices

RANGE OF VARIABLES

VARIABLES	RANGE
1. Data analysis techniques	May include but not limited to: 1.1. Domain analysis 1.2. Content analysis 1.3. Comparison technique

EVIDENCE GUIDE

1. Critical aspects of Competency	<p>Assessment requires evidence that the candidate:</p> <p>1.1 Determine data / information 1.2 Studied and applied gathered data/information 1.3 Recorded and studied data/information</p> <p>These aspects may be best assessed using a range of scenarios what ifs as a stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have happened.</p>
2. Resource Implications	<p>Specific resources for assessment</p> <p>2.1. Evidence of competent performance should be obtained by observing an individual in an information management role within the workplace or operational or simulated environment.</p>
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <p>3.1. Written Test 3.2. Interview 3.3. Portfolio</p> <p>The unit will be assessed in a holistic manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations, which will include disruptions to normal, smooth operation. Simulation may be required to allow for timely assessment of parts of this unit of competency. Simulation should be based on the actual workplace and will include walk through of the relevant competency components.</p>
4. Context for Assessment	<p>4.1. Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions.</p>

**UNIT OF COMPETENCY : PRACTICE OCCUPATIONAL SAFETY AND HEALTH
POLICIES AND PROCEDURES**

UNIT CODE : 400311216

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to identify OSH compliance requirements, prepare OSH requirements for compliance, and perform tasks in accordance with relevant OSH policies and procedures.

ELEMENTS	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify OSH compliance requirements	<p>1.1 Relevant <i>OSH requirements, regulations, policies and procedures</i> are identified in accordance with workplace policies and procedures</p> <p>1.2 OSH activity non-conformities are conveyed to <i>appropriate personnel</i></p> <p>1.3 <i>OSH preventive and control requirements</i> are identified in accordance with OSH work policies and procedures</p>	<p>1.1. OSH preventive and control requirements</p> <p>1.2. Hierarchy of Controls</p> <p>1.3. Hazard Prevention and Control</p> <p>1.4. General OSH principles</p> <p>1.5. Work standards and procedures</p> <p>1.6. Safe handling procedures of tools, equipment and materials</p> <p>1.7. Standard emergency plan and procedures in the workplace</p>	<p>1.1. Communication skills</p> <p>1.2. Interpersonal skills</p> <p>1.3. Critical thinking skills</p> <p>1.4. Observation skills</p>
2. Prepare OSH requirements for compliance	<p>2.1 OSH work activity material, tools and equipment requirements are identified in accordance with workplace policies and procedures</p> <p>2.2. Required OSH materials, tools and equipment are acquired in accordance with workplace policies and procedures</p> <p>2.3. Required OSH materials, tools and equipment are arranged/ placed in accordance with OSH work standards</p>	<p>2.1. Resources necessary to execute hierarchy of controls</p> <p>2.2. General OSH principles</p> <p>2.3. Work standards and procedures</p> <p>2.4. Safe handling procedures of tools, equipment and materials</p> <p>2.5. Different OSH control measures</p>	<p>2.1. Communication skills</p> <p>2.2. Estimation skills</p> <p>2.3. Interpersonal skills</p> <p>2.4. Critical thinking skills</p> <p>2.5. Observation skills</p> <p>2.6. Material, tool and equipment identification skills</p>
3. Perform tasks in accordance with relevant OSH policies and procedures	<p>3.1. Relevant OSH work procedures are identified in accordance with workplace policies and procedures</p> <p>3.2. Work Activities are executed in accordance with OSH work standards</p> <p>3.3. <i>Non-compliance work activities</i> are reported to appropriate personnel</p>	<p>3.1. OSH work standards</p> <p>3.2. Industry related work activities</p> <p>3.3. General OSH principles</p> <p>3.4. OSH Violations Non-compliance work activities</p>	<p>3.1. Communication skills</p> <p>3.3. Interpersonal skills</p> <p>3.4. Troubleshooting skills</p> <p>3.5. Critical thinking skills</p> <p>3.6. Observation skills</p>

RANGE OF VARIABLES

VARIABLE	RANGE
1. OSH Requirements, Regulations, Policies and Procedures	May include: 1.1 Clean Air Act 1.2 Building code 1.3 National Electrical and Fire Safety Codes 1.4 Waste management statutes and rules 1.5 Permit to Operate 1.6 Philippine Occupational Safety and Health Standards 1.7 Department Order No. 13 (Construction Safety and Health) 1.8 ECC regulations
2. Appropriate Personnel	May include: 2.1 Manager 2.2 Safety Officer 2.3 EHS Offices 2.4 Supervisors 2.5 Team Leaders 2.6 Administrators 2.7 Stakeholders 2.8 Government Official 2.9 Key Personnel 2.10 Specialists 2.11 Himself
3. OSH Preventive and Control Requirements	May include: 3.1 Resources needed for removing hazard effectively 3.2 Resources needed for substitution or replacement 3.3 Resources needed to establishing engineering controls 3.4 Resources needed for enforcing administrative controls 3.5 Personal Protective equipment
4. Non OSH-Compliance Work Activities	May include non-compliance or observance of the following safety measures: 4.1 Violations that may lead to serious physical harm or death 4.2 Fall Protection 4.3 Hazard Communication 4.4 Respiratory Protection 4.5 Power Industrial Trucks 4.6 Lockout/Tag-out 4.7 Working at heights (use of ladder, scaffolding) 4.8 Electrical Wiring Methods 4.9 Machine Guarding 4.10 Electrical General Requirements 4.11 Asbestos work requirements 4.12 Excavations work requirements

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires evidence that the candidate:</p> <ol style="list-style-type: none"> 1.1. Convey OSH work non-conformities to appropriate personnel 1.2. Identify OSH preventive and control requirements in accordance with OSH work policies and procedures 1.3. Identify OSH work activity material, tools and equipment requirements in accordance with workplace policies and procedures 1.4. Arrange/Place required OSH materials, tools and equipment in accordance with OSH work standards 1.5. Execute work activities in accordance with OSH work standards 1.6. Report OSH activity non-compliance work activities to appropriate personnel
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ol style="list-style-type: none"> 2.1 Facilities, materials tools and equipment necessary for the activity
<p>3. Methods of Assessment</p>	<p>Competency in this unit may be assessed through:</p> <ol style="list-style-type: none"> 3.1 Observation/Demonstration with oral questioning 3.2 Third party report
<p>4. Context for Assessment</p>	<ol style="list-style-type: none"> 4.1 Competency may be assessed individually in the actual workplace or simulation environment in TESDA accredited institutions

UNIT OF COMPETENCY : **EXERCISE EFFICIENT AND EFFECTIVE SUSTAINABLE PRACTICES IN THE WORKPLACE**

UNIT CODE : **400311217**

UNIT DESCRIPTOR : This unit covers knowledge, skills and attitude to identify the efficiency and effectiveness of resource utilization, determine causes of inefficiency and/or ineffectiveness of resource utilization and convey inefficient and ineffective environmental practices

ELEMENTS	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the efficiency and effectiveness of resource utilization	1.1. Required resource utilization in the workplace is measured using appropriate techniques 1.2. Data are recorded in accordance with workplace protocol 1.3. Recorded data are compared to determine the efficiency and effectiveness of resource utilization according to established environmental work procedures	1.1. Importance of Environmental Literacy 1.2. Environmental Work Procedures 1.3. Waste Minimization 1.4. Efficient Energy Consumptions	1.1 Recording Skills 1.2 Writing Skills 1.3 Innovation Skills
2. Determine causes of inefficiency and/or ineffectiveness of resource utilization	2.1. Potential causes of inefficiency and/or ineffectiveness are listed 2.2. Causes of inefficiency and/or ineffectiveness are identified through deductive reasoning 2.3. Identified causes of inefficiency and/or ineffectiveness are validated thru established environmental procedures	2.1. Causes of environmental inefficiencies and ineffectiveness	2.1. Deductive Reasoning Skills 2.2. Critical thinking 2.3. Problem Solving 2.4. Observation Skills
3. Convey inefficient and ineffective environmental practices	3.1. Efficiency and effectiveness of resource utilization are reported to appropriate personnel 3.2. Concerns related resource utilization are discussed with appropriate personnel 3.3. Feedback on information/ concerns raised are clarified with appropriate personnel	3.1. Appropriate Personnel to address the environmental hazards 3.2. Environmental corrective actions	3.1. Written and Oral Communication Skills 3.2. Critical thinking 3.3. Problem Solving 3.4. Observation Skills 3.5. Practice Environmental Awareness

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Environmental Work Procedures	May include: 1.1. Utilization of Energy, Water, Fuel Procedures 1.2. Waster Segregation Procedures 1.3. Waste Disposal and Reuse Procedures 1.4. Waste Collection Procedures 1.5. Usage of Hazardous Materials Procedures 1.6. Chemical Application Procedures 1.7. Labeling Procedures	
2. Appropriate Personnel	May include: 2.1. Manager 2.2. Safety Officer 2.3. EHS Offices 2.4. Supervisors 2.5. Team Leaders	2.6. Administrators 2.7. Stakeholders 2.8. Government Official 2.9. Key Personnel 2.10. Specialists 2.11. Himself

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1. Measured required resource utilization in the workplace using appropriate techniques 1.2. Recorded data in accordance with workplace protocol 1.3. Identified causes of inefficiency and/or ineffectiveness through deductive reasoning 1.4. Validate the identified causes of inefficiency and/or ineffectiveness thru established environmental procedures 1.5. Report efficiency and effectives of resource utilization to appropriate personnel 1.6. Clarify feedback on information/concerns raised with appropriate personnel
2. Resource Implications	The following resources should be provided: 2.1 Workplace 2.2 Tools, materials and equipment relevant to the tasks 2.3 PPE 2.4 Manuals and references
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration 3.2 Oral questioning 3.3 Written examination
4. Context for Assessment	4.1 Competency assessment may occur in workplace or any appropriately simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in-group

UNIT OF COMPETENCY : PRACTICE ENTREPRENEURIAL SKILLS IN THE WORKPLACE

UNIT CODE : 400311218

UNIT DESCRIPTOR : This unit covers the outcomes required to apply entrepreneurial workplace best practices and implement cost-effective operations

ELEMENTS	PERFORMANCE CRITERIA <i>Italicized terms</i> are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Apply entrepreneurial workplace best practices	1.1. Good practices relating to workplace operations are observed and selected following workplace policy. 1.2. Quality procedures and practices are complied with according to workplace requirements. 1.3. Cost-conscious habits in resource utilization are applied based on industry standards.	1.1. Workplace best practices, policies and criteria 1.2. Resource utilization 1.3. Ways in fostering entrepreneurial attitudes: 1.3.1. Patience 1.3.2. Honesty 1.3.3. Quality-consciousness 1.3.4. Safety-consciousness 1.3.5. Resourcefulness	1.1. Communication skills 1.2. Complying with quality procedures
2. Communicate entrepreneurial workplace best practices	2.1. Observed good practices relating to workplace operations are communicated to appropriate person . 2.2. Observed quality procedures and practices are communicated to appropriate person 2.3. Cost-conscious habits in resource utilization are communicated based on industry standards.	2.1. Workplace best practices, policies and criteria 2.2. Resource utilization 2.3. Ways in fostering entrepreneurial attitudes: 2.3.1. Patience 2.3.2. Honesty 2.3.3. Quality-consciousness 2.3.4. Safety-consciousness 2.3.5. Resourcefulness	2.1. Communication skills 2.2. Complying with quality procedures 2.3. Following workplace communication protocol
3. Implement cost-effective operations	3.1. Preservation and optimization of workplace resources is implemented in accordance with enterprise policy 3.2. Judicious use of workplace tools, equipment and materials are observed according to manual and work requirements. 3.3. Constructive contributions to office operations are made according to enterprise requirements. 3.4. Ability to work within one's allotted time and finances is sustained.	3.1. Optimization of workplace resources 3.2. 5S procedures and concepts 3.3. Criteria for cost-effectiveness 3.4. Workplace productivity 3.5. Impact of entrepreneurial mindset to workplace productivity 3.6. Ways in fostering entrepreneurial attitudes: 3.6.1. Quality-consciousness 3.6.2. Safety-consciousness	3.1. Implementing preservation and optimizing workplace resources 3.2. Observing judicious use of workplace tools, equipment and materials 3.3. Making constructive contributions to office operations 3.4. Sustaining ability to work within allotted time and finances

RANGE OF VARIABLES

VARIABLE	RANGE
1. Good practices	May include: 1.1. Economy in use of resources 1.2. Documentation of quality practices
2. Resource utilization	May include: 2.1. Consumption/ use of consumables 2.2. Use/Maintenance of assigned equipment and furniture 2.3. Optimum use of allotted /available time

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Demonstrated ability to identify and sustain cost-effective activities in the workplace 1.2. Demonstrated ability to practice entrepreneurial knowledge, skills and attitudes in the workplace.
2. Resource Implications	The following resources should be provided: 2.1. Simulated or actual workplace 2.2. Tools, materials and supplies needed to demonstrate the required tasks 2.3. References and manuals 2.3.1 Enterprise procedures manuals 2.3.2 Company quality policy
3. Methods of Assessment	Competency in this unit should be assessed through: 3.1. Interview 3.2. Third-party report
4. Context of Assessment	4.1. Competency may be assessed in workplace or in a simulated workplace setting 4.2. Assessment shall be observed while tasks are being undertaken whether individually or in-group

COMMON COMPETENCIES

UNIT OF COMPETENCY: PREPARE MATERIALS AND TOOLS

UNIT CODE : HVC713201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in identifying, requesting and receiving HVAC/R materials and tools based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify supplies/ materials and tools	1.1. Supplies/Materials are listed as per job requirements 1.2. Quantity and description of materials are conformed to the job requirements 1.3. Tools and accessories are identified according to job requirements	1.1. Types and uses of HVAC/R materials and tools 1.2. Different forms for preparation of materials, tools and accessories 1.3. Requisition procedures	1.1. Preparing materials and tools 1.2. Proper handling of tools and equipment 1.3. Following Instructions
2. Request materials and tools	2.1. Materials and tools needed are requested according to the list prepared 2.2. Request is done as per company standard operating procedures 2.3. Substitute materials and tools are provided without sacrificing cost and quality of the work	2.1. Standard procedures in requisition of materials and tools 2.2. Listing of different HVAC/R materials and tools 2.3. Probable substitute materials	2.1. Preparing requisition slip 2.2. Communication skills 2.3. Identifying HVAC/R materials and tools
3. Receive and inspect materials and tools	3.1. Materials and tools issued are inspected as per quantity and specification 3.2. Tools, accessories and materials checked for damages according to enterprise procedures 3.3. Materials and tools are set aside to appropriate location nearest to the workplace	3.1. Safety requirements in inspection of materials and tools 3.2. Standard procedures in checking materials and tools 3.3. 5S principles	3.1. Applying safety procedures in the workplace 3.2. Preparing materials and tools 3.3. Proper handling of tools and equipment 3.4. Following Instructions

RANGE OF VARIABLES

VARIABLE	RANGE
1. Supplies/Materials and tools	May include: 1.1 Air-conditioning 1.2 Refrigeration
2. Description of materials and tools	May include: 2.1 Brand name 2.2 Size 2.3 Capacity 2.4 Kind of application
3. Company standard procedures	May include: 3.1 Job Order 3.2 Requisition Slip 3.3 Borrower Slip

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Listed materials and tools according to quantity and job requirements 1.2 Requested materials and tools according to the list prepared and as per company standard operating procedures 1.3 Inspected issued materials and tools as per quantity and job specifications 1.4 Tools provided with appropriate safety devices
2. Resource Implications	The following resources should be provided: 2.1 Workplace location 2.2 Materials relevant to the unit of competency 2.3 Technical plans, drawings and specifications relevant to the activities
3. Methods of Assessment	Competency in this unit must be assessed through: 3.1 Direct observation and oral questioning
4. Context for Assessment	4.1 Competency may be assessed in the workplace or in a simulated workplace 4.2 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY: INTERPRET TECHNICAL DRAWINGS AND PLANS

UNIT CODE : HVC311202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in analyzing and interpreting symbols, data and work plan based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Analyze signs, symbols and data	1.1 Technical plans are obtained according to job requirements 1.2 Signs, symbols and data are identified according to job specifications 1.3 Signs symbols and data are determined according to classification or as appropriate in drawing	1.1 Trade Mathematics 1.1.1 Linear measurement 1.1.2 Dimension 1.1.3 Unit conversion 1.2 Blueprint Reading and Plan Specification 1.2.1 Electrical, mechanical plan, symbols and abbreviations 1.2.2 Drawing standard symbols 1.3 Basic Technical Drawing 1.4 Types Technical Plans 1.5 Various Types of Drawings 1.6 Notes and Specifications	1.1 Interpreting drawing/ orthographic drawing 1.2 Interpreting technical plans 1.3 Matching specification details with existing resources 1.4 Following instructions 1.5 Handling of drawing instruments
2. Interpret technical drawings and plans	2.1 Necessary tools, materials and equipment are identified according to the plan 2.2 Supplies and materials are listed according to specifications 2.3 Components, assemblies or objects are recognized as required 2.4 Dimensions are identified as appropriate to the plan 2.5 Specification details are matched with existing/available resources in line with job requirements 2.6 Work plan is drawn following the specifications	2.1 Trade Mathematics 2.1.1 Linear measurement 2.1.2 Dimension 2.1.3 Unit conversion 2.2 Blueprint Reading and Plan Specification 2.2.1 Electrical, mechanical plan, symbols and abbreviations 2.2.2 Drawing standard symbols 2.3 Basic Technical Drawing 2.4 Types Technical Plans 2.5 Various Types of Drawings 2.6 Notes and Specifications	2.1 Interpreting drawing/ orthographic drawing 2.2 Interpreting technical plans 2.3 Matching specification details with existing resources 2.4 Following instructions 2.5 Handling of drawing instruments
3. Apply freehand sketching	3.1 Where applicable, correct freehand sketching is produced in accordance with the job requirements	3.1 Trade Mathematics 3.1.1 Linear measurement 3.1.2 Dimension 3.1.3 Unit conversion 3.2 Blueprint Reading and	3.1 Interpreting drawing/ orthographic drawing 3.2 Interpreting technical plans

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		Plan Specification 3.2.1 Electrical, mechanical plan, symbols and abbreviations 3.2.2 Drawing standard symbols 3.3 Basic Technical Drawing 3.4 Types Technical Plans 3.5 Various Types of Drawings 3.6 Notes and Specifications	3.3 Matching specification details with existing resources 3.4 Following instructions 3.5 Handling of drawing instruments

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technical plans	Including but not limited to: 1.1. Electrical Plans 1.2. Architectural Plans 1.3. Welding Procedures Specifications (WPS)
2. Classification	Including but not limited to: 2.1. Electrical 2.2. Mechanical
3. Drawing	Including but not limited to: 3.1. Drawing symbols 3.2. Alphabet of lines 3.3. Orthographic views - Front view - Right side view/left side view - Top view - Pictorial 3.4. Schematic diagram 3.5. Electrical drawings 3.6. Structural drawings 3.7. Welding symbols
4. Tools and materials	Including but not limited to: 4.1. Compass 4.2. Divider 4.3. Rulers 4.4. Triangles 4.5. Drawing tables 4.6. Computer
5. Work plan	Including but not limited to: 5.1. Job requirements 5.2. Installation instructions 5.3. Components instruction

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires that the candidate:</p> <ul style="list-style-type: none"> 1.1 Identified and determined signs, symbols and data according to work plan, job requirements and classifications 1.2 Identified tools and equipment in accordance with job requirements 1.3 Listed supplies and materials according to blueprint specifications 1.4 Drawn work plan following specifications 1.5 Demonstrated ability to determine job specifications based on working/technical drawing
<p>2. Resource implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Workplace 2.2 Drawings and specification relevant to task 2.3 Materials and instrument relevant to proposed activity
<p>3. Methods of assessment</p>	<p>Competency should be assessed through:</p> <ul style="list-style-type: none"> 3.1 Direct Observation 3.2 Questions/Interview 3.3 Written test related to required knowledge
<p>4. Context of assessment</p>	<ul style="list-style-type: none"> 4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in group 4.3 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

**UNIT OF COMPETENCY: OBSERVE PROCEDURES, SPECIFICATIONS
AND MANUALS OF INSTRUCTION**

UNIT CODE : HVC311201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in identifying, interpreting, applying services to specifications and manuals, and storing manuals.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify and access specification/ manuals	1.1 Appropriate manuals are identified and accessed as per job requirements 1.2 Version and date of manual is checked to ensure correct specification and procedure are identified	1.1 Types of manuals used in HVAC/R sector 1.2 Identification of symbols used in the manuals	1.1 Reading and comprehension skills required to identify and interpret construction manuals and specifications 1.2 Identifying manuals and specifications 1.3 Accessing information and data
2. Interpret manuals	2.1 Relevant sections, chapters of specifications/ manuals are located in relations to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance to industry practices	2.1 Types of manuals used in HVAC/R sector 2.2 Types of symbols used in the manuals 2.3 System of measurements 2.4 Unit conversion	2.1 Interpreting symbols and specifications 2.2 Accessing information and data 2.3 Applying conversion of units of measurements
3. Apply information in manual	3.1 Manual is interpreted according to job requirements 3.2 Work steps are correctly identified in accordance with manufacturer's specification 3.3 Manual data is applied according to the given task 3.4 All correct sequencing and adjustments are interpreted in accordance with information contained on the manual or specifications	3.1 Types of manuals used in HVAC/R sector 3.2 Types and application of symbols in manuals 3.3 Unit conversion	3.1 Applying information from manuals
4. Store manuals	4.1 Manual or specification are stored appropriately to ensure prevention of damage and for easy access 4.2 Updating of information when required is performed in accordance with company requirements	4.1 Types of manuals used in HVAC/R sector 4.2 Manual storing and maintaining procedures	4.1 Storing and maintaining manuals

RANGE OF VARIABLES

VARIABLE	RANGE
1. Manual	Kinds of Manuals: 1.1 Installation Manual 1.1.1 Manufacturer's Specification Manual 1.2 Owner's Manual 1.2.1 Maintenance Procedure Manual 1.2.2 Periodic Maintenance Manual

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires that the candidate: 1.1 Identified and accessed specification/manuals as per job requirements 1.2 Interpreted manuals in accordance to industry practices 1.3 Applied information in manuals according to the given task 1.4 Stored manuals in accordance with company requirements
2. Resource Implications	The following resources should be provided: 2.1 All manuals/catalogues relative to HVAC/R sector
3. Methods of Assessment	Competency should be assessed through: 3.1 Direct Observation 3.2 Questions/Interview Assessment of required knowledge and practical skills may be combined
4. Context for Assessment	4.1 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines 4.2 Assessment may be conducted in the workplace or a simulated environment

UNIT OF COMPETENCY: PERFORM MENSURATIONS AND CALCULATIONS

UNIT CODE : HVC311203

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in identifying and measuring objects, pressure, temperature, current, voltage resistance and power based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select measuring instruments	1.2 Object or component to be measured is identified, classified and interpreted to the appropriate regular <i>geometric shape</i> 1.3 Measuring tools are selected/ identified as per object to be measured or job requirements 1.4 Correct specifications are obtained from relevant sources 1.5 Appropriate <i>measuring instruments</i> are selected according to job requirements 1.6 Alternative measuring tools are used without sacrificing cost and quality of work	1.1. Category of measuring instruments 1.2. Types and uses of measuring instruments 1.3. Shapes and Dimensions 1.4. Formulas for volume, areas, perimeters of plane and geometric figures	1.1. Identifying and selecting measuring instruments 1.2. Visualizing objects and shapes
2. Carry out measurements and calculations	2.1 Accurate <i>measurements and calculations</i> are obtained to job requirements 2.2 Alternative measuring tools are used without sacrificing cost and quality of work 2.3 Calculation needed to complete work tasks are performed using the four basic process of addition (+), subtraction (-), multiplication (x) and division (/) including but not limited to: trigonometric functions, algebraic computations 2.4 Calculations involving fractions, percentages and mixed numbers are used to complete workplace tasks 2.5 Numerical computation is self-checked and corrected for accuracy 2.6 Instruments are read to the limit of accuracy of the tool 2.7 Systems of measurement identified and converted according to job requirements/ISO 2.8 Work pieces are measured according to job requirements	2.1. Calculation & measurement 2.2. Four fundamental operation 2.3. Linear measurement 2.4. Dimensions 2.5. Unit conversion 2.6. Ratio and proportion	2.1. Performing calculation by addition, subtraction, multiplication and division; 2.2. Interpreting formulas for volume, areas, perimeters of plane and geometric figures 2.3. Handling of measuring instruments

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Maintain measuring instruments	3.1. Measuring instruments are carefully handled to avoid damage 3.2. Measuring instruments are cleaned before and after using. 3.3. Proper storage of instruments undertaken according to manufacturer's specifications and standard operating procedures.	3.1. Types of measuring instruments and their uses 3.2. Safe handling procedures in using measuring instruments 3.3. Four fundamental operation of mathematics 3.4. Formula for volume, area, perimeter and other geometric figures	3.1. Handling and maintaining measuring instruments 3.2. Properly storing measuring instruments

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Geometric Shape	Including but I not limited to: 1.1 Round 1.2 Square 1.3 Rectangular 1.4 Triangle 1.5 Sphere 1.6 Conical	
2. Measuring instruments	Including but not limited to: 2.1 Micrometer (In-out, depth) 2.2 Vernier caliper (out, inside) 2.3 Dial gauge with mag, std. 2.4 Straight edge 2.5 Thickness gauge 2.6 Torque gauge 2.7 Small hole gauge 2.8 Telescopic gauge 2.9 Try-square	2.10 Protractor 2.11 Combination gauge 2.12 Steel rule 2.13 Voltmeter 2.14 Ammeter 2.15 Mega-ohmmeter 2.16 KWH meter 2.17 Gauges 2.18 Thermometers
3. Measurements and calculations	3.1 Linear 3.2 Volume 3.3 Area 3.4 Wattage 3.5 Voltage 3.6 Resistance 3.7 Amperage 3.8 Frequency 3.9 Impedance 3.10 Conductance 3.11 Capacitance	3.12 Displacement 3.13 Inside diameter 3.14 Circumference 3.15 Length 3.16 Thickness 3.17 Outside diameter 3.18 Taper 3.19 Out of roundness 3.20 Oil clearance 3.21 End play/thrust clearance

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires that the candidate:</p> <ul style="list-style-type: none"> 1.1 Selected and prepared appropriate measuring instruments in accordance with job requirements 1.2 Performed measurements and calculations according to job requirements/ ISO
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Workplace location 2.2 Problems to solve 2.3 Measuring instrument appropriate to carry out tasks 2.4 Instructional materials relevant to the propose activity <p>Assessment of required knowledge and practical skills may be combined</p>
<p>3. Methods of Assessment</p>	<p>Competency should be assessed through:</p> <ul style="list-style-type: none"> 3.1 Actual demonstration 3.2 Direct observation 3.3 Written test/questioning related to required knowledge
<p>4. Context for Assessment</p>	<ul style="list-style-type: none"> 4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in group 4.3 Competency assessment must be undertaken in accordance with the TESDA assessment guidelines

UNIT OF COMPETENCY : PERFORM BASIC BENCHWORKS

UNIT CODE : HVC713202

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in preparing materials, tools and equipment, lay-outing dimensions and performing basic benchwork based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare materials, tools and equipment	1.1. Work plan is interpreted to determine job requirements 1.2. Materials, tools and equipment are identified and prepared according to job requirements 1.3. Materials are checked according to the required specifications 1.4. Tools and equipment conditions are checked following the standard operating procedures (SOPs)	1.1. Communication skills 1.2. Materials, tools and equipment; uses and specifications 1.3. Material estimation 1.4. Mensuration	1.1. Interpretation skills 1.2. Handling of tools and materials
2. Lay-out and mark dimensions/features on workplace	2.1. Metallic and non-metallic materials are selected according to the requirements specified in the blueprint 2.2. Dimensions/features are laid-out/marked according to job specifications/blueprint and within the required tolerance 2.3. Dimensions are checked against the actual work plan	2.1. Metallic and non-metallic materials 2.2. Measuring tools, functions and use 2.3. Trade mathematics 2.4. Mensuration 2.5. Calculation 2.6. Conversion 2.7. Plan specifications 2.8. Quality assurance	2.1. Measuring and lay-outing 2.2. Blueprint reading 2.3. Communication skills
3. Perform required basic metal works	3.1. Work instructions are followed to ensure work safety 3.2. Basic metal works are performed applying knowledge on safety procedures and according to job requirements 3.3. Workpieces are clamped in workholding device to avoid damage and accidents 3.4. Work pieces are cut, chipped or filed according to required measurements, tolerance specified in the blueprint and free from burrs and sharp edges 3.5. Drilling is performed according to recommended sequence and specifications 3.6. Proper usage of materials, tools and equipment is	3.1. Tools and equipment: use and specifications 3.2. Grinding, cutting, drilling, filing techniques 3.3. Basic welding principles and application 3.4. Applied occupational health and safety (OH&S)	3.1. Using tools and equipment 3.2. Basic metal works skills <ul style="list-style-type: none"> ○ Grinding ○ Cutting ○ Drilling ○ Filing ○ Threading ○ Reaming ○ Welding 3.3. Practice safety skills

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	observed 3.7. Appropriate PPE and safety procedures are applied 3.8. Worksite is cleaned and cleared of all debris and left in safe state in accordance with OHS regulations		

RANGE OF VARIABLES

VARIABLE	RANGE	
1. Work plan	1.1 Job requirements 1.2 Schedule of work	
2. Materials	2.1 Steel brackets 2.2 Grinding disc 2.3 Drill bit 2.4 Flat/angle bars	2.5 Fastening screws 2.6 Masonry
3. Tools and equipment	3.1 Portable grinder 3.2 Hacksaw 3.3 File 3.4 Markers 3.5 Screw drivers 3.6 Ballpeen hammer 3.7 L-square/steel square 3.8 Steel rule	3.9 Measuring tools 3.10 PPE 3.11 Portable electric drill 3.12 Bench wire 3.13 Tri-square 3.14 Flaring tool 3.15 Swaging tool 3.16 Reamer
4. Metallic materials	4.1 Mild steel plate 4.2 Flat bar 4.3 Square bar 4.4 Angle bar 4.5 Round bar	4.6 G.I. sheet 4.7 B.I. sheet 4.8 Beam
5. Non-metallic materials	5.1 PVC 5.2 Rubber 5.3 Wood 5.4 Fiber glass	5.5 Plastic 5.6 Ceramics
6. Dimensions	6.1 Measurements 6.2 Tolerances	
7. Work instructions	7.1 Work plan 7.2 Blueprint 7.3 Manufacturer's specifications	
8. Personal Protective Equipment (PPE)	8.1 Safety shoes 8.2 Gloves 8.3 Appropriate Goggles 8.4 Working clothes/coverall/apron 8.5 Respiratory mask 8.6 Face mask	
9. Basic metal works	9.1 Sheet metal 9.2 Cutting 9.3 Filing 9.4 Drilling	9.5 Arc welding 9.6 Gas welding 9.7 Flaring 9.8 Swaging
10. Workholding device	10.1 Machine vise 10.2 Pliers 10.3 Vise grip	
11. Manual	11.1 Procedure's manual 11.2 Instructional manual	

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires that the candidate:</p> <ul style="list-style-type: none"> 1.1 Interpreted work plan to determine job requirements 1.2 Identified and prepared supplies, materials, tools and equipment in accordance with job requirements 1.3 Selected and used appropriate processes, tools and equipment to carry out task 1.4 Laid-out and checked dimensions in accordance with job requirements and within the tolerances 1.5 Followed work instructions to ensure safety 1.6 Performed benchworks in accordance with job requirements 1.7 Cleaned worksite and left in safe state in accordance with OHSA regulations
<p>2. Resource implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Workplace 2.2 Work plan 2.3 Materials, tools and equipment relevant to the proposed activity/task
<p>3. Methods of assessment</p>	<p>Competency should be assessed through:</p> <ul style="list-style-type: none"> 3.1 Actual demonstration 3.2 Direct observation 3.3 Written/questioning related to required knowledge
<p>4. Context of assessment</p>	<ul style="list-style-type: none"> 4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in group 4.3 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY : PERFORM BASIC ELECTRICAL WORKS

UNIT CODE : HVC724201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in preparing materials, tools and equipment, testing electrical components and basic repairing in electricity based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Bold & Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Prepare electrical tools, test instruments and materials	1.1. Work plan is interpreted to determine job requirements 1.2. Electrical tools, instruments and materials are identified and prepared according to job requirements 1.3. Electrical tools and instruments are checked for conditions and calibrated as required	1.1. Uses of tools and testing instruments 1.2. Calibration of testing instruments 1.3. Safe handling and proper care of tools and testing instruments	1.1. Interpretation skills 1.2. Handling of tools and materials 1.3. Calibration skills 1.4. Communication skills (oral and written)
2. Test power supply and electrical components	2.1. Instruments are tested in accordance with PEC 2.2. Power supply and electrical components are checked in accordance with manufacturer's specifications/PEC 2.3. Defects of power supply and electrical components are identified and recorded 2.4. Safe working habits is observed	2.1. Functions and uses of testing instruments 2.2. Basic electricity 2.3. Electrical safety and hazards 2.4. Testing procedures	2.1. Usage of testing instruments 2.2. Basic troubleshooting skills 2.3. Practice safety skills
3. Perform basic electrical repair	3.1. Work instructions are followed to ensure safety work 3.2. Loose connections are tightened in accordance with PEC 3.3. Defective electrical components are replaced and tested in accordance with PEC 3.4. Work place is cleaned and in safe state in line with OSHA regulations	3.1. Types of electrical parts and fixtures 3.2. Testing procedures 3.3. Electrical safety and hazards 3.4. Applied occupational health & safety (OH & S) 3.5. Electrical joints and splices	3.1. Basic electrical servicing and troubleshooting skills 3.2. Wire splicing skills 3.3. Practice safety skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work plan	May include: 1.1. Job requirements 1.2. Schedule of work
2. Materials	May include: 2.1. Solid, stranded wire 2.2. Service plug/outlet 2.3. HVAC/R electrical components 2.4. Soldering lead 2.5. Terminal clips 2.6. Moulding 2.7. Fuses 2.8. PVC/Mold flux 2.9. Electrical tape
3. Tools and equipment	May include: 3.1. Clamp ammeter 3.2. Multi tester 3.3. Insulation tester 3.4. PPE 3.5. Soldering gun/iron 3.6. Wire stripper 3.7. Measuring tool 3.8. Markers 3.9. Crimping tools 3.10. Screw drivers 3.11. Electrician pliers 3.12. Electric drill 3.13. Long nose
4. Work instructions	May include: 4.1. Work plan 4.2. Schematic diagrams 4.3. Installation instruction

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires that the candidate:</p> <ul style="list-style-type: none"> 1.1 Interpreted work plan to determine job requirements 1.2 Selected and used appropriate processes, tools and equipment to carry out task 1.3 Identified electrical tools and instruments are tested in accordance with PEC 1.4 Replaced defective tools and instruments 1.5 Checked power supply and electrical components in accordance with PEC 1.6 Cleaned work place and left in safe state in line with OSHA regulations 1.7 Completed electrical wiring in HVAC/R units based in manufacturer's specifications and PEC 1.8 Communicated effectively to ensure safety works
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Work place 2.2 Work plan 2.3 Materials, tools and equipment relevant to the proposed activity/task
<p>3. Methods of Assessment</p>	<p>Competency should be assessed through:</p> <ul style="list-style-type: none"> 3.1 Direct observation 3.2 Written test/questioning relevant to required knowledge
<p>4. Context of Assessment</p>	<ul style="list-style-type: none"> 4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Assessment shall be observed while task are being undertaken whether individually or in group 4.3 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY : MAINTAIN TOOLS, INSTRUMENTS AND EQUIPMENT

UNIT CODE : HVC311205

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in checking condition, performing preventive maintenance and storing of tools, instruments and equipment based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check condition of tools, instruments and equipment	1.1. Materials, tools, instruments and equipment are identified according to classification and job requirements 1.2. Non-functional tools, instruments and equipment are segregated and labeled according to classification 1.3. Safety of tools, instruments and equipment are observed in accordance with manufacturer's instructions 1.4. Condition of PPE are checked in accordance with manufacturer's instructions	1.1. Safety Practices <ul style="list-style-type: none"> ○ Use of PPE ○ Handling of tools and equipment ○ Good housekeeping 1.2. Materials, Tools, instruments and Equipment <ul style="list-style-type: none"> ○ Types and uses of lubricants ○ Types and uses of cleaning materials ○ Types and uses of HVAC/R tools ○ Types and uses of HVAC/R instruments ○ Types and uses of HVAC/R equipment 1.3. Operational conditions of HVAC/R tools, instrument and equipment 1.4. HVAC/R tools, instrument and equipment defects	1.1. Maintaining tools, instruments and equipment 1.2. Handling of tools, instruments and equipment 1.3. Identifying tools, instruments and equipment defects
2. Perform basic preventive maintenance on tools, instruments and equipment	2.1. Appropriate lubricants are identified according to types of equipment 2.2. Tools and equipment are lubricated according to preventive maintenance schedule or manufacturer's specifications 2.3. Measuring instruments are checked and calibrated in accordance with manufacturer's instructions 2.4. Tools are cleaned and lubricated according to standard procedures 2.5. Defective instruments, equipment and accessories are inspected and replaced according to manufacturer's specifications	2.1. Safety Practices <ul style="list-style-type: none"> ○ Use of PPE ○ Handling of tools, instruments and equipment ○ Good housekeeping 2.2. Materials, Tools and Equipment <ul style="list-style-type: none"> ○ Types and uses of lubricants ○ Types and uses of cleaning materials 2.3. Preventive Maintenance <ul style="list-style-type: none"> ○ Methods and techniques ○ Procedures 	2.1. Handling of tools, instruments and equipment 2.2. Performing preventive maintenance

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.6. Tools are inspected, repaired and replaced every after use 2.7. Work place are cleaned and in safe state in line with OHSА regulations		
3. Store tools, instruments and equipment	3.1. Inventory of tools, instruments and equipment are conducted and recorded as per company practices 3.2. Tools, instruments and equipment are stored safely in appropriate locations in accordance with manufacturer's specifications or company procedures	3.1. Safety Practices <ul style="list-style-type: none"> ○ Use of PPE ○ Handling of tools, instruments and equipment ○ Storing procedures and techniques ○ Storage conditions/ locations 	3.1. Storing tools, instruments and equipment 3.2. Handling of tools, instruments and equipment

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials	May include: 1.1. Lubricants 1.2. Cleaning materials 1.3. Rust remover 1.4. Rugs 1.5. Spare parts
2. Tools and equipment	May include: 2.1 Tools <ul style="list-style-type: none"> - Cutting tools - hacksaw, crosscut saw, rip saw - Boring tools - auger, brace, grinlet, hand drill - Holding tools - vise grip, C-clamp, bench vise - Threading tools - die and stock, taps 2.2 Measuring instruments/Equipment
3. PPE	May include: 3.1 Goggles 3.2 Gloves 3.3 Safety shoes 3.4 Aprons/Coveralls
4. Forms	May include: 4.1. Maintenance schedule forms 4.2. Requisition Slip 4.3. Inventory Form Slip 4.4. Inspection Form Slip 4.5. Procedures

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires that the candidate:</p> <ul style="list-style-type: none"> 1.1 Selected and used appropriate processes, tools and equipment to carry out task 1.2 Identified functional and non-functional tools and equipment 1.3 Checked, lubricated and calibrated tools, equipment and instruments according to manufacturer’s specifications 1.4 Replaced defective tools, equipment and its accessories 1.5 Observed and applied safe handling of tools and equipment and safety work practices 1.6 Prepared and submitted inventory report, where applicable 1.7 Maintained work place in accordance with OHSa regulations 1.8 Stored tools and equipment safely in appropriate locations and in accordance with company practices
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Work place 2.2 Maintenance Schedule 2.3 Maintenance materials, tools and equipment relevant to the proposed activity/task
<p>3. Methods of Assessment</p>	<p>Competency should be assessed through:</p> <ul style="list-style-type: none"> 3.1 Direct observation 3.2 Written test/questioning relevant to required knowledge
<p>4. Context for Assessment</p>	<ul style="list-style-type: none"> 4.1 Competency assessment may occur in workplace or any appropriate simulated environment 4.2 Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY : PERFORM HOUSEKEEPING AND SAFETY PRACTICES FOR RAC SERVICING

UNIT CODE : HVC7315201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes needed to work safely in the workplace including sorting, cleaning and dispensing materials, tools, instruments and equipment, identifying and minimizing hazards, responding and recording accidents and following basic security.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Sort materials, tools, instruments and equipment	1.1. Materials, tools, instruments and equipment are classified according to its kinds 1.2. Appropriate areas for materials, tools, instruments and equipment are designated	1.1. Classification of tools, instruments equipment and materials 1.2. Selection of appropriate areas for storing materials, tools, instruments and equipment 1.3. Sorting procedures and considerations 1.4. 5S principles	1.1. Applying 5S (sorting) 1.2. Identifying tools and materials
2. Clean workplace area, materials, tools, instruments and equipment	2.1. Cleaning materials are identified and used as per procedure 2.2. Workplace areas, materials, tools, instruments and equipment are cleaned as per company practices 2.3. Workplace are in safe state in accordance with safety regulations/company practices	2.1. Cleaning materials, types and applications. 2.2. Procedures in cleaning workplace area, tools, instruments and equipment. 2.3. Consideration of a safe workplace area, tools, instruments and equipment	2.1. Applying 5S (cleaning)
3. Systematize dispensing and retrieval of materials, tools, instruments and equipment	3.1. Systems for requesting, borrowing and returning of materials, tools, instruments and equipment is in-place and implemented 3.2. Forms used are completely filled-up and filed 3.3. Borrowed tools, instruments and equipment are returned to designated area 3.4. Consumable materials are requested in exact quantity	3.1. Procedures in dispensing and retrieval of materials; tools, instruments and equipment 3.2. Things to be considered in returning the borrowed tools, instruments and equipment.	3.1. Applying 5S (systematize) 3.2. documentation skills
4. Identify and minimize/eliminate hazards	4.1. Hazards in the work area are recognized and reported to designated personnel and appropriate control actions are taken 4.2. Workplace policies and procedures for controlling risks are established and followed	4.1. Composition of safety committee 4.2. Policies and procedures in controlling risk 4.3. Safety signs and first aid 4.4. Safety signs and	4.1. Hazard identification skills 4.2. Practice safety skills 4.3. Identifying safety signs and symbols

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	<p>accurately</p> <p>4.3. Workplace procedures for dealing with emergencies are followed whenever necessary within the scope of responsibilities and competencies</p> <p>4.4. Safety signs and hazard warnings are displayed and observed at all times in line with workplace health and safety regulations</p> <p>4.5. Equipment and safety devices/PPE are used/handled according to company or manufacturer's procedures and guidelines</p> <p>4.6. Work areas are kept clean, free from obstacles and emergency exits are known and kept clear at all times</p> <p>4.7. Safe manual handling/fighting techniques and safe equipment operation techniques are employed at all times</p>	<p>hazards warning preparation</p> <p>4.5. Equipment and safety devices</p> <p>4.6. Safe handling technique in using equipment and safe devices.</p> <p>4.7. Identification of Safety Signs and Symbols</p>	
5. Respond and record accidents	<p>5.1. Workplace accidents are identified</p> <p>5.2. Workplace emergency first-aid procedures/ treatment are followed/carried out correctly in accordance with standards/regulations and enterprise procedures/policies</p> <p>5.3. Medical assistance/rescue is coordinated with concerned personnel in line with organizational policies</p> <p>5.4. Accident/incident records maintained in accordance with standard operating procedures</p>	<p>5.1. Types of accidents</p> <p>5.2. Procedures in applying first aid/ treatment</p> <p>5.3. First aid supplies</p> <p>5.4. Steps in responding to and recording accidents</p>	<p>5.1. First aid application skills</p> <p>5.2. Coordination skills</p> <p>5.3. Documentation skills</p>
6. Follow basic security	<p>6.1. Security policies/ procedures are followed according to enterprise practices and appropriate legislation</p> <p>6.2. Security related events are recorded/reported on the relevant forms</p> <p>6.3. Staff are advised of enterprise security procedures and correct methods of implementation</p>	<p>6.1. Basic security procedures</p> <p>6.2. Security signs and symbols</p> <p>6.3. Loss control management</p> <p>6.3.1. Hazards</p> <p>6.3.2. Safety signs</p>	<p>6.1. Coordination skills</p> <p>6.2. Reporting skills</p> <p>6.3. Documentation skills</p> <p>6.4. Practice safety skills</p>

RANGE OF VARIABLES

VARIABLE	RANGE
1. Hazards	Hazards that may be present in the workplace include but not limited to: <ol style="list-style-type: none"> 1.1. Flammable materials 1.2. Running machinery/equipment 1.3. Toxic substances 1.4. Debris 1.5. Open flames 1.6. Loose objects/fixtures 1.7. Chemicals 1.8. Electrical faults 1.9. Hot metals
2. Emergencies	Emergencies may include but not limited to: <ol style="list-style-type: none"> 2.1. Fire 2.2. Explosion 2.3. Spills 2.4. Falls 2.5. Electrocution 2.6. Injuries caused by falling objects 2.7. Injuries caused by sharp objects 2.8. Injuries caused by wrong usage of tools
3. Safety signs, symbols and hazard warnings	Safety signs and symbols include but not limited to: <ol style="list-style-type: none"> 3.1. Industry recognized hazard warning signs and safety symbols <ul style="list-style-type: none"> - Danger-High Voltage - Unauthorized Persons Keep Out - No Smoking - Poisonous Gases - Caution - Men working on live wires - Flammable Materials 3.2. Internationally recognized hazard warning signs and safety symbols
4. Personal Protective Equipment (PPE)	PPE may include but not limited to: <ol style="list-style-type: none"> 4.1. Goggles 4.2. Gas mask 4.3. Working gloves 4.4. Safety shoes 4.5. Face shield 4.6. Insulating mat 4.7. Over-all apron 4.8. Hard hat 4.9. Safety belt 4.10. Protective eyewear
5. First-aid Treatment	First-aid treatment includes but is not limited to: <ol style="list-style-type: none"> 5.1. CPR 5.2. Mouth to mouth resuscitation 5.3. Application of tourniquet 5.4. Application of pressure to bleeding wounds or cuts 5.5. First-aid treatment for burned victims
6. Standards and	6.1. Philippine Electrical Code

VARIABLE	RANGE
Regulations	6.2. Philippine OH&S Standards 6.3. Building Code 6.4. Philippine Environmental Standards 6.5. Welding Procedures Specifications 6.6. Clean Air Act
7. Security policies	7.1. Wearing of ID 7.2. Logging-in and out 7.3. Wearing of uniform 7.4. Observance of safety/security signs and symbols

EVIDENCE GUIDE

<p>1. Critical aspects of Competency</p>	<p>Assessment requires that the candidate:</p> <ol style="list-style-type: none"> 1.1. Classified materials, tools and equipment according to kind 1.2. Cleaned workplace areas, materials, tools and equipment as per standard procedures 1.3. Implemented systematize dispensing and retrieval of materials, tools and equipment 1.4. Identified and described safety working practices relating to all tasks undertaken in the workplace 1.5. Identified and selected appropriate equipment and safety devices for particular workplace tasks and activities 1.6. Interpreted hazard warnings and safety signs correctly and described the application of these warnings and signs in the work activities 1.7. Workplace emergency first-aid procedures/treatment are carried out in accordance with OHSA standards/legislation and enterprise procedures 1.8. Responded/maintained accidents/incidents records in accordance with SOPs 1.9. Followed security procedures/policies in accordance with enterprise practices and legislation 1.10. Workplace kept in safe state in accordance with safety regulations
<p>2. Resource Implications</p>	<p>The following resources should be provided:</p> <ol style="list-style-type: none"> 2.1. Work place 2.2. Materials, tools and equipment relevant to the proposed activity/task 2.3. Safety signs 2.4. Safety devices 2.5. Accident reporting procedures 2.6. First-aid materials and guidelines
<p>3. Methods of Assessment</p>	<p>Competency should be assessed through:</p> <ol style="list-style-type: none"> 3.1. Direct observation while task is being undertaken 3.2. Written test/questioning relevant to required knowledge <p>Assessment of required knowledge and practical skills may be combined</p>
<p>4. Context for Assessment</p>	<ol style="list-style-type: none"> 4.1. Competency assessment may occur in workplace or any appropriate simulated environment 4.2. Assessment shall be observed while task are being undertaken whether individually or in group in accordance with the approved industry OHSA regulations 4.3. Competency assessment must be undertaken in accordance with the endorsed TESDA assessment guidelines

UNIT OF COMPETENCY : DOCUMENT WORK ACCOMPLISHED

UNIT CODE : HVC311205

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in documenting work accomplished.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify forms and collect data	1.1. Forms are selected based on the reports to be prepared 1.2. Data are collected based on the reports to be prepared	1.1. Selecting and interpreting forms 1.2. Interpreting work accomplished 1.3. Data gathering techniques	1.1. Documentation skills 1.2. Interpretation skills 1.3. Data gathering skills
2. Prepare reports	2.1. Reports are completed using standard form as per company procedures 2.2. Reports are prepared providing details of work completed, further action to be taken and other details as per company procedures 2.3. Reports are completed and submitted within specified time to the concerned personnel/supervisor	2.1. Details of work completion 2.2. Kinds of reports 2.3. Preparation of reports	2.1. Documentation skills 2.2. Report preparation skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Forms	1.1 Warranty Paper Request 1.2 Operating Log Sheet 1.3 Requisition Forms 1.4 Start-up data sheet
2. Data	2.1 Current drawn 2.2 Operating data 2.3 Unit specifications 2.4 Records of work accomplished 2.5 Further work required 2.6 Spare parts used
3. Reports	3.1 Start-up commissioning Report 3.2 Warranty Paper Request 3.3 Turn-over Report 3.4 Operating Log Sheet 3.5 Service Report 3.6 Requisition

EVIDENCE GUIDE

1. Critical aspects of Competency	Competency requires evidence that the candidate: <ul style="list-style-type: none"> 1.1 Prepared reports used terminology and language appropriate to all users 1.2 Prepared reports to include alternatives, views, approaches and other findings and recommendations for consideration by the supervisor 1.3 Prepared reports are coherent and based on actual findings/analysis/results 1.4 Prepared reports are accomplished, completed as per standard format and submitted within specified time to the concerned supervisor
2. Resource Implications	Things necessary to conduct method of assessment: <ul style="list-style-type: none"> 2.1 Work place location 2.2 Materials relevant to the proposed activity
3. Methods of Assessment	Competency in this unit must be assessed through: <ul style="list-style-type: none"> 3.1 Direct observation 3.2 Questions related to required knowledge
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

CORE COMPETENCIES

UNIT OF COMPETENCY: INSTALL DOMESTIC REFRIGERATION AND AIR-CONDITIONING (DomRAC) UNITS

UNIT CODE : HVC723337

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to safely and properly install and test domestic refrigeration and air-conditioning units. It includes conducting survey for installation, installing DomRAC unit and conducting performance testing.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Conduct survey	1.1. Site conditions and installation requirements are assessed according to manufacturer's specification, existing layout and prevailing codes and ordinances* 1.2. Tools, equipment and materials needed for installation are determined according to site conditions and site installation requirements * 1.3. Cost and estimate of materials are determined according to site conditions and site installation requirements 1.4. Survey result is reported in accordance with enterprise policies and procedures	1.1. Electrical plans, symbols and abbreviations 1.2. Site conditions and installation requirements 1.3. Codes and ordinances 1.4. Tools, equipment and materials needed for installation 1.5. Basic electrical installation 1.6. Heat load calculations and estimate 1.7. RA 11058 provisions	1.1. Interpreting plans and details 1.2. Preparing materials 1.3. Inspection skills 1.4. Identifying tools, equipment and materials 1.5. Basic Mathematical skills 1.6. Communicating effectively
2. Check DomRAC electrical circuit *	2.1. Electrical cabling and wiring devices of correct load carrying capacity are checked in accordance with equipment electrical requirements * 2.2. Electrical circuit is tested in accordance with applicable Philippine Electrical Code (PEC) provisions*	2.1. Protective personal equipment/safety gears 2.2. Handling of tools, equipment and accessories 2.3. Safety signs and symbols 2.4. Good housekeeping 2.5. Basic electricity 2.6. Electrical cabling and wiring devices 2.7. PEC provisions (Testing electrical circuits)	2.1. Interpreting plans and details 2.2. Preparing materials 2.3. Proper handling of tools and equipment 2.4. Working safely 2.5. Testing power supply 2.6. Connecting power circuit 2.7. Communicating effectively

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
		2.8. RA 11058 provisions	
3. Install DomRAC unit *	3.1. Unit and equipment/ components are prepared based on work procedures 3.2. Bracket, hangers and frames are installed in accordance with manufacturer's recommendation and/or RAC Code of Practice 3.3. Unit is positioned and leveled in line with manufacturer's instructions and/or RAC Code of Practice 3.4. Sealing materials are applied to ensure an air tight seal around the unit in line with manufacturer's instructions and/or RAC Code of Practice 3.5. Condensate drain is installed in accordance with manufacturer's recommendation and/or RAC Code of Practice 3.6. Safe manual handling techniques are employed in line with enterprise OH&S procedures 3.7. 5's principles is applied in line with enterprise policy	3.1. Protective personal equipment/safety gears 3.2. Handling of tools, equipment and accessories 3.3. Safety signs and symbols 3.4. Good housekeeping 3.5. RAC Code of Practice 3.6. Safe manual handling techniques 3.7. Application of sealing materials 3.8. Types of sealant 3.9. Installation of condensate drain 3.10. 5's principles 3.11. RA 11058 provisions	3.1. Interpreting plans and details 3.2. Preparing materials 3.3. Proper handling of tools and equipment 3.4. Working safely 3.5. Installing window-type air-conditioning and domestic refrigeration unit 3.6. Testing power supply 3.7. Connecting power circuit 3.8. Operating window-type air-conditioning unit and domestic refrigeration unit 3.9. Communicating effectively
4. Conduct performance test*	4.1. Voltage and current are measured according to unit power requirements. 4.2. Air temperature and velocity are measured based on unit specifications. 4.3. Sounds and vibration are checked based on unit specifications 4.4. Service report is accomplished in line with enterprise policies and procedures	4.1. Protective personal equipment/safety gears 4.2. Operations and installation manuals 4.3. Usage of measuring instruments 4.4. Measurement parameters 4.5. Preparation of service report 4.6. RA 11058 provisions	4.1. Proper handling of measuring instruments 4.2. Working safely 4.3. Operating window-type air-conditioning unit and domestic refrigeration unit 4.4. Measuring parameters 4.5. Communicating effectively

RANGE OF VARIABLES

VARIABLE	RANGE
1. Site conditions	Site conditions may include: <ol style="list-style-type: none"> 1.1. Assessment of structural and architectural installation provisions 1.2. Assessment of availability of power source and unit's electrical provisions 1.3. Assessment of wall finishing provisions 1.4. Assessment of drainage provisions 1.5. Assessment of air circulation/ ventilation provisions
2. Installation requirements	Installation requirements may include: <ol style="list-style-type: none"> 2.1. Installation location requirements 2.2. Wall finishing requirements 2.3. Electrical requirements <ul style="list-style-type: none"> • A/C plug and outlet • Wire size • Protection devices • Grounding 2.4. Drain pipe requirements
3. Tools and equipment	Tools and equipment may include: <ol style="list-style-type: none"> 3.1. Measuring tools 3.2. Spirit level 3.3. Plumb bob 3.4. Clear/Transparent water hose 3.5. Screw driver, flat and philips 3.6. Chisel 3.7. Hammer (claw and ballpein) 3.8. Hacksaw 3.9. Electric drill 3.10. Drill bits 3.11. Cross cut/Rip saw 3.12. Welding equipment 3.13. Masonry tools (e.g. trowel, spade, level, etc.) 3.14. Calculator/Cellphone
4. Materials	Materials includes: <ol style="list-style-type: none"> 4.1. Expansion bolt 4.2. Welding electrode (rod) 4.3. Sealant 4.4. Masonry materials (e.g. cement, sand, etc.) 4.5. Drain pipe/tube / PVC pipe
5. Wiring devices	May include: <ol style="list-style-type: none"> 5.1. Service grounding 5.2. Service outlet 5.3. Service plug 5.4. Circuit breaker
6. Unit	Unit includes:

VARIABLE	RANGE
	6.1. Window type air-conditioner 6.2. Domestic Refrigeration unit (e.g. refrigerator, water cooler, household freezer, etc.
7. Sealing materials	May include: 7.1. Rubber gasket 7.2. Foam 7.3. Silicone
8. Condensate drain	May include: 8.1. PVC pipe/clamp 8.2. Plastic tubing/clamp 8.3. G.I. or metal tubing/clamp
9. OH&S procedures	May include: 9.1. Wearing of PPE 9.2. Lifting procedures 9.3. Ladder safety 9.4. Housekeeping
10. Service report	May include: 10.1. Survey report 10.2. Installation report 10.3. Testing report 10.4. Commissioning report

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Assessed site conditions for DomRAC installation 1.2 Installed electrical circuit 1.3 Installed unit 1.4 Tested unit 1.5 Performed housekeeping
2. Resource Implications	The following resources should be provided: 2.1 Access to work place location/installation area 2.2 Tools and equipment appropriate to installation 2.3 Materials relevant to the proposed activity/task 2.4 Drawings and specifications relevant to the task
3. Methods of Assessment	Competency must be assessed through: 3.1 Demonstration/Direct observation with oral questioning 3.2 Portfolio with interview 3.3 Third party report
4. Context for Assessment	4.1 Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY: SERVICE AND MAINTAIN DOMESTIC REFRIGERATION AND AIR-CONDITIONING (DomRAC) UNITS

UNIT CODE : HVC723338

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in servicing and maintaining domestic refrigeration and air-conditioning units. Specifically, it includes cleaning and replacing air filters, servicing evaporator/ condenser, maintaining fan motor assembly, servicing electrical power and control circuits as well as accomplishing service and maintenance report.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Clean air filter	1.1 Air filter is identified and removed following standard procedures 1.2 Air filter is checked for damage and replaced, if required, in accordance with air filter specifications* 1.3 Air filter is cleaned using the correct tools and cleaning procedures*	1.1 Protective personal equipment/ safety gears 1.2 Cleaning agents 1.3 Air filter cleaning procedures 1.4 RAC Code of Practice 1.5 RA 11058 provisions 1.6 5s / housekeeping	1.1 Proper handling of tools and equipment 1.2 Removing air filter properly 1.3 Cleaning skills 1.4 Following cleaning procedures 1.5 Interpersonal skills
2. Service evaporator/ condenser	2.1 Tools are selected in dismantling the evaporator/ condensing unit as per standard operating procedures (SOPs) 2.2 High pressure washer and compressed air are used in cleaning evaporator/ condensing coil based on established procedures* 2.3 Evaporator/condenser coil fins are straightened in accordance with service procedure 2.4 Cleaning agent or non-corrosive chemical is used in cleaning and maintaining evaporator/ condensing coil, fins and other body accessories as per standard operating procedures (SOPs)*	2.1 Protective personal equipment/ safety gears 2.2 Cleaning agents 2.3 evaporator/ condenser cleaning procedures 2.4 RAC Code of Practice 2.5 RA 11058 provisions 2.6 5s / housekeeping	2.1 Preparing materials 2.2 Proper handling of tools and equipment 2.3 Cleaning and maintaining DomRAC units 2.4 Skills in using high pressure washer and compressed air 2.5 Interpersonal skills
3. Maintain fan motor assembly	3.1 Fan motor is maintained in line with manufacturer's instructions	3.1 Principle and operation of motors 3.2 Types of fan motors 3.3 Fan motor terminals	3.1 Interpreting diagrams 3.2 Preparing materials 3.3 Proper handling of tools and equipment

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.2 Fan blades and blower are serviced and maintained in line with manufacturer's instructions. 3.3 Fan motor terminals' condition are checked and serviced in line with SOP. 3.4 Fan motor bearing/bushing is checked and lubricated based on manufacturer's instruction 3.5 Fan motor mounting is checked and serviced in line with manufacturer's instruction	3.4 Fan motor diagram 3.5 Fan motor assembly 3.6 Types of fan blades and blower 3.7 Manufacturer's instructions 3.8 RAC Code of Practice 3.9 RA 11058 provisions 3.10 5s / housekeeping	3.4 Testing electrical system 3.5 Fan motor terminal identification skills 3.6 Maintaining fan motor assembly
4. Service electrical power and control circuits	4.1 <i>Proper instrument</i> is used in checking power supply and diagnosing electrical control 4.2 Loose connections/ wirings are checked, repaired and reported in line with SOP 4.3 Plugs and outlets are checked in line with SOP 4.4 Grounding is checked in line with SOP	4.1 Protective personal equipment/safety gears 4.2 Handling of tools, instruments, equipment and accessories 4.3 Electrical power and control circuits 4.4 Electronic control systems including inverters 4.5 RA 11058 provisions	4.1 Interpreting diagrams 4.2 Preparing materials 4.3 Proper handling of tools, instruments and equipment 4.4 Testing electrical system 4.5 Diagnostic skills 4.6 Interpersonal skills
5. Accomplish service and maintenance report	5.1 All defects and problems encountered are reported in line with enterprise policies and procedures. 5.2 Observation and recommendation are properly reported in line with enterprise policies and procedures	5.1 Preparation of service and maintenance report 5.2 Types of defects and problems encountered	5.1 Preparing service and maintenance report 5.2 Communicating effectively

RANGE OF VARIABLES

VARIABLE	RANGE
1. Air filter	May include: 1.1. Disposable 1.2. Reusable
2. Cleaning agent	May include: 2.1. Soap powder 2.2. Liquid soap 2.3. Alkaline-based chemical
3. Other body accessories	May include: 3.1. base pan 3.2. drip tray 3.3. shroud 3.4. face cover 3.5. housing 3.6. propeller blade 3.7. centrifugal fan (blower)
4. proper instrument	May include: 4.1. clamp meter 4.2. VOM multi-tester

EVIDENCE GUIDE

1. Critical aspects of competency	Assessment requires evidence that the candidate: 1.1. Cleaned and/or replaced air filter parts/components 1.2. Cleaned evaporator/condensing coil 1.3. Maintained fan motor assembly 1.4. Serviced electrical power and control circuits 1.5. Accomplished service report.
2. Resource Implications	The following resources must be provided: 2.1. Access to work place location 2.2. Tools and equipment 2.3. Materials relevant to the proposed activity 2.4. service manual
3. Methods of Assessment	Competency must be assessed through: 3.1. Direct observation/demonstration with oral questioning 3.2. Portfolio with interview 3.3. Third party results
4. Context for Assessment	4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.

UNIT OF COMPETENCY: TROUBLESHOOT AND REPAIR DOMESTIC REFRIGERATION AND AIR-CONDITIONING (DomRAC) SYSTEMS

UNIT CODE : HVC723339

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to identify and analyze faults and troubles found in domestic refrigeration and air-conditioning (DomRAC) systems. It also covers identifying and repairing faults/troubles, performing refrigerant recovery/ recycling on DomRAC unit as well as performing test-run on repaired DomRAC units.

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Plan and prepare for troubleshooting and repair	1.1. Appropriate wiring diagrams, charts and manuals are interpreted in line with the job requirements 1.2. Appropriate materials, tools and equipment are selected based on job requirements 1.3. Nameplates are interpreted as per manufacturer's specifications	1.1 Schematic and wiring diagrams 1.2 Tools, materials, instruments and equipment for troubleshooting and repair 1.3 Nameplates specifications 1.4 Electronic control systems including inverters 1.5 Troubleshooting and repair procedures 1.6 Manufacturer's service manuals	1.1 Interpreting schematic and wiring diagram 1.2 Preparing tools, materials, instruments and equipment for troubleshooting and repair 1.3 Interpreting nameplates
2. Identify and repair faults/troubles	2.1. Appropriate PPE are selected and used in line with job requirements 2.2. Components are tested following manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy 2.3. Faults/problems with components are diagnosed in line with manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy 2.4. Remedial action is taken to overcome faults/problems in line manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy 2.5. Work is completed safely in line with workplace safety guidelines	2.1. Protective personal equipment/safety gears 2.2. Proper handling of tools, instruments, equipment and accessories 2.3. Electrical and mechanical components 2.4. Electronic control systems including inverters 2.5. Different faults and problems in DomRAC system 2.6. Errors codes as per manufacturer's specifications 2.7. Enterprise troubleshooting policy 2.8. workplace safety guidelines 2.9. RAC Code of Practice	2.1. Interpreting schematic diagram 2.2. Preparing materials 2.3. Proper handling of electrical tools/instruments / equipment 2.4. Testing electrical system 2.5. Testing mechanical system 2.6. Tube processing 2.7. Proper handling of refrigerant and refrigeration oil 2.8. Performing recovery/recycling refrigerants 2.9. Performing system reprocess 2.10. Brazing and

ELEMENT	PERFORMANCE CRITERIA <i>Italicized</i> fonts are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.6. Report on testing procedure, including faults and minor repair, is completed in line with manufacturer's manual, RAC Code of Practice and/or enterprise troubleshooting policy	2.10. Testing of electrical system 2.11. Testing of mechanical system 2.12. Handling of refrigerant and refrigeration oil 2.13. Recovery/recycling of refrigerants 2.14. System reprocess 2.15. Brazing and soldering process 2.16. RA 11058 provisions	soldering skills
3. Perform refrigerant recovery/recycling on DomRAC unit	3.1. Safe working practices are observed throughout the task as per enterprise procedure 3.2. Suitable tools and equipment are selected and used based on job requirement 3.3. Optimum recovery/recycling of refrigerant is performed in line with RAC Code of Practice 3.4. Flammable refrigerants are handled properly according to international standards	3.1. Protective personal equipment/safety gears 3.2. Handling of tools, instruments, equipment and accessories 3.3. workplace safety guidelines 3.4. electrical parameters 3.5. RAC Code of Practice 3.6. Handling of refrigerant and refrigeration oil 3.7. Proper handling of flammable refrigerants per international standards 3.8. Recovery/recycling of refrigerants 3.9. System reprocess 3.10. Kigali agreement provisions 3.11. RA 11058 provisions	3.1. Preparing materials 3.2. Proper handling of electrical tools/instruments/equipment 3.3. Checking electrical parameters 3.4. Handling refrigerant and refrigeration oil 3.5. Handling of Flammable refrigerants 3.6. Performing recovery/recycling refrigerants 3.7. Performing system reprocess
4. Test-run repaired unit	4.1. Unit is tested in line with troubleshooting/repair procedures 4.2. Operating parameters are measured based on manufacturer's specifications 4.3. Report on repair and testing of unit is prepared in line with enterprise procedures	4.1. Measurement of operational parameters 4.2. Testing procedures 4.3. Preparation of repair and testing report 4.4. RA 11058 provisions 4.5. 5S/housekeeping	4.1. Measuring operating parameters 4.2. Using testing instrument 4.3. Data gathering skills 4.4. Preparing repair and testing report 4.5. Communication skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Components	May include but not limited to: <ul style="list-style-type: none"> 1.1. Electrical controls <ul style="list-style-type: none"> - Thermostat - Defrost timer - Relay - Thermo disc/Defrost thermostat - Switches - Overload protector 1.2. Compressor motor 1.3. Fan motors 1.4. Refrigerator defrost heater 1.5. Capacitor 1.6. Electronic controls
2. PPE	Includes but not limited to: <ul style="list-style-type: none"> 2.1. Mask 2.2. Safety shoes 2.3. Safety goggles 2.4. Apron/coverall 2.5. Gloves
3. Remedial action	<ul style="list-style-type: none"> 3.1. Repair 3.2. Replace
4. Test	Testing may include: <ul style="list-style-type: none"> 4.1. Insulation 4.2. Resistance 4.3. Mechanical 4.4. Continuity 4.5. Timing Sequence 4.6. Leak

EVIDENCE GUIDE

<p>1. Critical aspects of competency</p>	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Planned and prepared for troubleshooting and repair 1.2 Diagnosed and repaired DomRAC faults/problems 1.3 Recover/Recycle refrigerants 1.4 Tested Unit 1.5 Accomplished Service Report
<p>2. Resource Implications</p>	<p>The following resources must be provided:</p> <ul style="list-style-type: none"> 2.1. Access to work place location and mockup unit 2.2. Tools and equipment appropriate to troubleshooting and repair 2.3. Materials relevant to the proposed activity 2.4. Drawings and specifications relevant to the task
<p>3. Methods of Assessment</p>	<p>Competency must be assessed through:</p> <ul style="list-style-type: none"> 3.1. Demonstration/Direct observation with oral questioning 3.2. Portfolio with interview 3.3. Third party report
<p>4. Context for Assessment</p>	<p>4.1. Competency may be assessed in actual workplace or at the designated TESDA Accredited Assessment Center.</p>

SECTION 3. TRAINING ARRANGEMENTS

These standards are set to provide technical and vocational education and training (TVET) providers with information and other important requirements to consider when designing training programs for RAC Servicing [Domestic Refrigeration and Air-Conditioning (DomRAC)] NC II.

3.1. CURRICULUM DESIGN

TESDA shall provide the training on the development of competency-based curricula to enable training providers develop their own curricula with the components mentioned below.

Delivery of knowledge requirements for the basic, common and core units of competency specifically in the areas of mathematics, science/technology, communication/language and other academic subjects shall be contextualized. To this end, TVET providers shall develop a Contextual Learning Matrix (CLM) to include green technology, issues on health and drugs and catering to persons with disabilities (PWD's) to accompany their curricula.

Course Title: **RAC SERVICING (DomRAC)**
PQF Level: **NC II**

Nominal Training Duration: 37 Hours (Basic)
35 Hours (Common)
216 Hours (Core)

288 - Total
240 – Supervised Industry Learning (SIL)

528 Hour - Total training duration

* SIL can be delivered thru Dual Training System (DTS)/Dualized Training Program (DTP) or Enterprise-based Training

Course Description:

This course is designed to provide the learner with knowledge, practical skills and attitude, applicable in performing work activities involve in installing, servicing and maintaining, troubleshooting and repairing domestic refrigeration and air-conditioning (Dom/RAC) units. This includes classroom learning activities and practical work in actual work site or simulation area.

Upon completion of the course, the learners are expected to demonstrate the above-mentioned competencies to be employed. To obtain this, all units prescribed for this qualification must be achieved:

BASIC COMPETENCIES

(37 hours)

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
1. Participate in workplace communication	1.1. Obtain and convey workplace information	1.1.1. Describe Organizational policies 1.1.2. Read: 1.1.2.1. Effective communication 1.1.2.2. Written communication 1.1.2.3. Communication procedures and systems 1.1.3. Identify: 1.1.3.1. Different modes of communication 1.1.3.2. Medium of communication 1.1.3.3. Flow of communication 1.1.3.4. Available technology relevant to the enterprise and the individual's work responsibilities 1.1.4. Prepare different Types of question 1.1.5. Gather different sources of information 1.1.6. Apply storage system in establishing workplace information 1.1.7. Demonstrate Telephone courtesy	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration 	<ul style="list-style-type: none"> • Oral evaluation • Written examination • Observation 	2 hours
	1.2. Perform duties following workplace instructions	1.2.1. Read: 1.2.1.1. Written notices and instructions 1.2.1.2. Workplace interactions and procedures 1.2.2. Read instructions on work related forms/documents 1.2.3. Perform workplace duties scenario following workplace instructions	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration 	<ul style="list-style-type: none"> • Oral evaluation • Written examination • Observation 	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	1.3. Complete relevant work related documents	1.3.1. Describe Communication procedures and systems 1.3.2. Read 1.3.2.1. Meeting protocols 1.3.2.2. Nature of workplace meetings 1.3.2.3. Workplace interactions 1.3.2.4. Barriers of communication 1.3.3. Read instructions on work related forms/documents 1.3.4. Practice: 1.3.4.1. Estimate, calculate and record routine workplace measures 1.3.4.2. Basic mathematical processes of addition, subtraction, division and multiplication 1.3.5. Demonstrate office activities in: 1.3.5.1. workplace meetings and discussions scenario 1.3.6. Perform workplace duties scenario following simple written notices 1.3.7. Follow simple spoken language 1.3.8. Identify the different Non-verbal communication 1.3.9. Demonstrate ability to relate to people of social range in the workplace 1.3.10. Gather and provide information in response to workplace requirements 1.3.11. Complete work related documents	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role play 	<ul style="list-style-type: none"> • Oral evaluation • Written examination • Observation 	2 hours
2. Work in a team environment	2.1. Describe team role and scope	2.1.1. Discussion on the team roles and scope 2.1.2. Participate in the discussion 2.1.2.1. Definition of Team 2.1.2.2. Difference between team and group 2.1.2.3. Objectives and goals of team	<ul style="list-style-type: none"> • Lecture/ Discussion • Group work • Individual work • Role play 	<ul style="list-style-type: none"> • Role play • Case study • Written test 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		2.1.3. Locate needed information from the different sources of information			
	2.2. Identify one's role and responsibility within team	2.2.1. Role play 2.2.1.1. Individual role and responsibility 2.2.2. Role play 2.2.2.1. Understanding individual differences 2.2.3. Discussion on gender sensitivity	<ul style="list-style-type: none"> • Role play • Lecture/ Discussion 	<ul style="list-style-type: none"> • Role play • Written test 	1 hour
	2.3. Work as a team member	2.3.1. Participate in group planning activities 2.3.2. Role play : Communication protocols 2.3.3. Participate in the discussion of standard work procedures and practices	<ul style="list-style-type: none"> • Group work • Role play • Lecture/ Discussion 	<ul style="list-style-type: none"> • Role play • Written test 	1 hour
3. Solve/address routine problems	3.1. Identify routine problems	3.1.1. Review of the current industry hardware and software products and services 3.1.2. Identify correctly the industry maintenance, service and helpdesk practices, processes and procedures 3.1.3. Make use of the industry standard diagnostic tools 3.1.4. Share best practices in determining basic malfunctions and resolutions to general problems in the workplace 3.1.5. Analyze routine/procedural problems	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role playing 	<ul style="list-style-type: none"> • Case Formulation • Life Narrative Inquiry (Interview) • Standardized test 	1 hour
	3.2. Look for solutions to routine problems	3.2.1. Review of the current industry hardware and software products and services 3.2.2. Identify correctly the industry maintenance, service and helpdesk practices, processes and procedures 3.2.3. Make use of the industry standard diagnostic tools 3.2.4. Share best practices in determining basic malfunctions and resolutions to general problems in the workplace 3.2.5. Formulate possible solutions to problems	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role playing 	<ul style="list-style-type: none"> • Case Formulation • Life Narrative Inquiry (Interview) • Standardized test 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		and document procedures for reporting			
	3.3. Recommend solutions to problems	3.3.1. Discuss standard operating procedures and documentation processes	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role playing 	<ul style="list-style-type: none"> • Case Formulation • Life Narrative Inquiry (Interview) • Standardized test 	1 hour
4. Develop Career and Life Decisions	4.1. Manage one's emotion	<p>4.1.1. Demonstrate self-management strategies that assist in regulating behavior and achieving personal and learning goals</p> <p>4.1.2. Explain enablers and barriers in achieving personal and career goals</p> <p>4.1.3. Identify techniques in handling negative emotions and unpleasant situation in the workplace such as frustration, anger, worry, anxiety, etc.</p> <p>4.1.4. Manage properly one's emotions and recognize situations that cannot be changed and accept them and remain professional</p> <p>4.1.5. Recall instances that demonstrate self-discipline, working independently and showing initiative to achieve personal and career goals</p> <p>4.1.6. Share experiences that show confidence, and resilience in the face of setbacks and frustrations and other negative emotions and unpleasant situations in the workplace</p>	<ul style="list-style-type: none"> • Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing 	<ul style="list-style-type: none"> • Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	4.2. Develop reflective practice	4.2.1. Enumerate strategies to improve one's attitude in the workplace 4.2.2. Explain Gibbs' Reflective Cycle/Model (Description, Feelings, Evaluation, Analysis, Conclusion, and Action plan) 4.2.3. Use basic SWOT analysis as self-assessment strategy 4.2.4. Develop reflective practice through realization of limitations, likes/ dislikes; through showing of self-confidence 4.2.5. Demonstrate self-acceptance and being able to accept challenges	<ul style="list-style-type: none"> • Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • 5 Role-playing 	<ul style="list-style-type: none"> • Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues 	1 hour
	4.3. Boost self-confidence and develop self-regulation	4.3.1. Describe the components of self-regulation based on Self-Regulation Theory (SRT) 4.3.2. Explain personality development concepts 4.3.3. Cite self-help concepts (e. g., 7 Habits by Stephen Covey, transactional analysis, psycho-spiritual concepts) 4.3.4. Perform effective communication skills – reading, writing, conversing skills 4.3.5. Show affective skills – flexibility, adaptability, etc. 4.3.6. Determine strengths and weaknesses	<ul style="list-style-type: none"> • Small Group Discussion • Interactive Lecture • Brainstorming • Demonstration • Role-playing 	<ul style="list-style-type: none"> • Demonstration or simulation with oral questioning • Case problems involving workplace diversity issues 	1 hour
5. Contribute to workplace innovation	5.1. Identify opportunities to do things better	5.1.1. Identify different roles of individuals in contributing to doing things better in the workplace 5.1.2. Appreciate positive impacts and challenges in innovation 5.1.3. Show mastery of the different types of changes and levels of participation in the workplace 5.1.4. Discuss 7-habits of highly effective people	<ul style="list-style-type: none"> • Interactive Lecture • Appreciative Inquiry • Demonstration • Group work 	<ul style="list-style-type: none"> • Psychological and behavioral Interviews • Performance Evaluation • Life Narrative Inquiry • Review of portfolios of evidence and third-party 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
				workplace reports of on-the-job performance. <ul style="list-style-type: none"> Standardized assessment of character strengths and virtues applied 	
	5.2. Discuss and develop ideas with others	5.2.1. Identify different roles of individuals in contributing to doing things better in the workplace 5.2.2. Appreciate positive impacts and challenges in innovation 5.2.3. Show mastery of the different types of changes and levels of participation in the workplace 5.2.4. Discuss 7-habits of highly effective people 5.2.5. Communicate ideas through small group discussions and meetings	<ul style="list-style-type: none"> Interactive Lecture Appreciative Inquiry Demonstration Group work 	<ul style="list-style-type: none"> Psychological and behavioral Interviews Performance Evaluation Life Narrative Inquiry Review of portfolios of evidence and third-party workplace reports of on-the-job performance. Standardized assessment of character strengths and virtues applied 	1 hour
	5.3. Integrate ideas for change in the workplace	5.3.1. Identify different roles of individuals in contributing to doing things better in the workplace 5.3.2. Appreciate positive impacts and challenges in innovation 5.3.3. Show mastery of the different types of changes and levels of participation in the workplace 5.3.4. Discuss 7-habits of highly effective people	<ul style="list-style-type: none"> Interactive Lecture Appreciative Inquiry Demonstration Group work 	<ul style="list-style-type: none"> Psychological and behavioral Interviews Performance Evaluation Life Narrative Inquiry Review of portfolios of evidence and 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
		5.3.5. Communicate ideas through small group discussions and meetings 5.3.6. Demonstrate basic skills in data analysis		third-party workplace reports of on-the-job performance. • Standardized assessment of character strengths and virtues applied	
6. Present relevant information	6.1. Gather data/ information	6.1.1. Lecture and discussion on: 6.1.1.1. Organizational protocols 6.1.1.2. Confidentiality and accuracy 6.1.1.3. Business mathematics and statistics 6.1.1.4. Legislation, policy and procedures relating to the conduct of evaluations 6.1.2. Reviewing data/ information	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role Play 	<ul style="list-style-type: none"> • Oral evaluation • Written Test • Observation • Presentation 	2 Hours
	6.2. Assess gathered data/ information	6.2.1. Lecture and discussion on: 6.2.1.1. Data analysis techniques/ procedures 6.2.1.2. Organizational values, ethics and codes of conduct 6.2.1.3. Trends and anomalies 6.2.2. Computing business mathematics and statistics 6.2.3. Application of data analysis techniques	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role Play • Practical exercises 	<ul style="list-style-type: none"> • Oral evaluation • Written Test • Observation • Presentation 	3 Hours
	6.3. Record and present information	6.3.1. Lecture and discussion on: 6.3.1.1. Reporting requirements to a range of audiences 6.3.1.2. Recommendations for possible improvements 6.3.2. Analysis and comparison of interim and final reports' outcomes 6.3.3. Reporting of data findings	<ul style="list-style-type: none"> • Group discussion • Lecture • Demonstration • Role Play • Practical exercises 	<ul style="list-style-type: none"> • Oral evaluation • Written Test • Observation • Presentation 	3 Hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
7. Practice Occupational Safety And Health Policies And Procedures	7.1. Identify OSH compliance requirements	7.1.1. Discussion regarding: 7.1.1.1. Hierarchy of Controls 7.1.1.2. Hazard Prevention and Controls 7.1.1.3. Work Standards and Procedures 7.1.1.4. Personal Protective Equipment	<ul style="list-style-type: none"> Lecture Group Discussion 	<ul style="list-style-type: none"> Written Exam Demonstration Observation Interviews / Questioning 	1 Hour
	7.2. Prepare OSH requirements for compliance	7.2.1. Identification of required safety materials, tools and equipment 7.2.2. Handling of safety control resources	<ul style="list-style-type: none"> Lecture Group Discussion 	<ul style="list-style-type: none"> Written Exam Demonstration Observation Interviews / Questioning 	1 Hour
	7.3. Perform tasks in accordance with relevant OSH policies and procedures	7.3.1. Discussion of General OSH Standards and Principles 7.3.2. Performing industry related work activities in accordance with OSH Standards	<ul style="list-style-type: none"> Lecture Group Discussion 	<ul style="list-style-type: none"> Written Exam Demonstration Observation Interviews / Questioning 	2 Hours
8. Exercise Efficient and Effective Sustainable Practices in the Workplace	8.1. Identify the efficiency and effectiveness of resource utilization	8.1.1. Discussion on the process how Environmental Policies coherence is achieved 8.1.2. Discussion on Necessary Skills in response to changing environmental policies needs 8.1.2.1. Waste Skills 8.1.2.2. Energy Skills 8.1.2.3. Water Skills 8.1.2.4. Building Skills 8.1.2.5. Transport Skills 8.1.2.6. Material Skills	<ul style="list-style-type: none"> Lecture Group Discussion Simulation Demonstration 	<ul style="list-style-type: none"> Written Exam Demonstration Observation Interviews / Questioning 	1 Hour
	8.2. Determine causes of inefficiency of resource utilization	8.2.1. Discussion of Environmental Protection and Resource Efficiency Targets 8.2.2. Analysis on the Relevant Work Procedure	<ul style="list-style-type: none"> Lecture Group Discussion Demonstration 	<ul style="list-style-type: none"> Written Exam Demonstration Observation Interviews / Questioning 	1 Hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodology	Assessment Approach	Nominal Duration
	8.3. Convey inefficient and ineffective environmental practices	8.3.1. Identification of (re)training needs and usage of environment friendly methods and technologies 8.3.2. Identification of environmental corrective actions 8.3.3. Practicing Environment Awareness	<ul style="list-style-type: none"> • Lecture • Group Discussion • Role Play • Demonstration 	<ul style="list-style-type: none"> • Written Exam • Demonstration • Observation • Interviews / • Questioning 	1 Hour
9. Practice Entrepreneurial Skills in the Workplace	9.1. Apply entrepreneurial workplace best practices	9.1.1. Case studies on Best entrepreneurial practices 9.1.2. Discussion on Quality procedures and practices 9.1.3. Case studies on Cost consciousness in resource utilization	<ul style="list-style-type: none"> • Case Study • Lecture/ Discussion 	<ul style="list-style-type: none"> • Case Study • Written Test • Interview 	1 Hour
	9.2. Communicate entrepreneurial workplace best practices	9.2.1. Discussion on communicating entrepreneurial workplace best practices	<ul style="list-style-type: none"> • Lecture/ Discussion 	<ul style="list-style-type: none"> • Written Test • Interview 	1 Hour
	9.3. Implement cost-effective operations	9.3.1. Case studies on Preservation, optimization and judicious use of workplace resources	<ul style="list-style-type: none"> • Case Study • Lecture/ Discussion 	<ul style="list-style-type: none"> • Case Study • Written Test • Interview 	2 Hours

COMMON COMPETENCIES

35 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
1. Prepare materials and tools	1.1. Identify materials and tools	1.1.1. Read and familiarize <ul style="list-style-type: none"> ○ Different work specifications ○ Types, uses and description of HVAC/R materials and accessories ○ Types, uses and description of HVAC/R tools ○ List of materials as per company standards 1.1.2. Identify and prepare tools according to the job requirements 1.1.3. Identify and prepare materials and accessories according to the job requirements	<ul style="list-style-type: none"> • Lecture-demonstration • Group discussion • PowerPoint presentation 	<ul style="list-style-type: none"> • Written • Practical / Performance Test 	1 hour
	1.2. Request materials and tools	1.2.1. Read and familiarize <ul style="list-style-type: none"> ○ Work requirements ○ Types & uses of HVAC/R materials & tools ○ Material take-off ○ Requisition procedures 1.2.2. Prepare material take-off 1.2.3. Request materials and tools	<ul style="list-style-type: none"> • Simulation/ Demonstration • Discussion 	<ul style="list-style-type: none"> • Written • Practical / Performance Test 	1 hour
	1.3. Receive and inspect materials and tools	1.3.1. Read and familiarize <ul style="list-style-type: none"> ○ Policy on receiving material deliveries ○ Material and tools quality and defects ○ Material handling ○ Check and inspect materials and tools 1.3.2. Store/stack tools and materials	<ul style="list-style-type: none"> • Lecture/discussion • Demonstration 	<ul style="list-style-type: none"> • Written / Oral Test • Demonstration • Practical Exercise 	1 hour
2. Interpret technical drawings and plans	2.1. Analyze signs, symbols and data	2.1.1. Read and familiarize <ul style="list-style-type: none"> ○ Blueprint reading and plan specifications - Electrical plan, symbols & abbreviations ○ Written communication ○ Signs and symbols - Electrical and Mechanical ○ Parts and specification 2.1.2. Identify signs and symbols	<ul style="list-style-type: none"> • Discussion • Lecture • Modular 	<ul style="list-style-type: none"> • Written • Practical / Performance Test 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		2.1.3. Interpret different type of plans			
	2.2. Interpret technical drawings and plans	2.2.1. Read and familiarize <ul style="list-style-type: none"> ○ Alphabet of lines ○ Orthographic drawings ○ Perspective view ○ Trade mathematics/ Mensuration ○ Types technical plans ○ Notes and specifications 2.2.2. Perform drawing exercises 2.2.3. Perform technical plan interpretation 2.2.4. Follow measuring procedures	<ul style="list-style-type: none"> ● Discussion ● Lecture ● Modular 	<ul style="list-style-type: none"> ● Written ● Practical / Performance Test 	2 hour
	2.3. Apply freehand sketching	2.3.1. Read and familiarize <ul style="list-style-type: none"> ○ Drawing conventions ○ Dimensioning Conventions ○ Trade mathematics 2.3.2. Trace electrical/electronic/RAC schematics and drawings 2.3.3. Perform measurement 2.3.4. Sketch drawings and plans 2.3.5. Sketch pictures 2.3.6. Compute formulas 2.3.7. Use drawing instruments	<ul style="list-style-type: none"> ● Discussion ● Lecture ● Modular 	<ul style="list-style-type: none"> ● Written ● Practical / Performance Test 	2 hour
3. Observe procedures, specifications and manuals of instructions	3.1. Identify and access specifications and manuals	3.1.1. Read and familiarize <ul style="list-style-type: none"> ○ Types of manuals used in HVAC/R ○ Identification of symbols used in the manuals 3.1.2. Identify manuals and specifications 3.1.3. Access information and data	<ul style="list-style-type: none"> ● Discussion ● Lecture 	<ul style="list-style-type: none"> ● Oral questioning ● Written Test 	1 hour
	3.2. Interpret manuals	3.2.1. Read and familiarize <ul style="list-style-type: none"> ○ Types of manuals used in HVAC/R ○ Types of symbols used in manuals ○ System of measurements ○ Unit conversion 	<ul style="list-style-type: none"> ● Discussion ● Lecture ● Modular 	<ul style="list-style-type: none"> ● Written ● Practical / Performance Test 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		3.2.2. Interpret symbols and specifications 3.2.3. Access information and data 3.2.4. Compute/Determine conversion of units of measurements			
	3.3. Apply information in manuals	3.3.1. Read and familiarize <ul style="list-style-type: none"> ○ Types of manuals used in HVAC/R ○ Types and application of symbols in manuals ○ Unit conversion 3.3.2. Apply information from manuals	<ul style="list-style-type: none"> • Discussion • Lecture • Demonstration • Group discussion 	<ul style="list-style-type: none"> • Demonstration (able to impart knowledge and skills) • Practical and oral exam 	1 hour
	3.4. Store Manual	3.4.1. Read and familiarize <ul style="list-style-type: none"> ○ types of manuals used in HVAC/R ○ Manual storing and maintenance procedures 3.4.2. Store and maintain manuals	<ul style="list-style-type: none"> • Demonstration • Group discussion 	<ul style="list-style-type: none"> • Demonstration • Practical and oral exam 	1 hour
4. Perform mensuration and calculation	4.1. Select measuring instruments;	4.1.1. Identify category and types of measuring tools and its uses 4.1.2. Select measuring instruments as per category 4.1.3. Interpret shapes and dimensions of objects/components	<ul style="list-style-type: none"> • Lecture • Group discussion 	<ul style="list-style-type: none"> • Written examination • Oral evaluation 	1 hour
	4.2. Carry-out measurements and calculations	4.2.1. Read <ul style="list-style-type: none"> ○ Measurements <ul style="list-style-type: none"> - Linear measurement - Geometrical measurement ○ Trade Mathematics <ul style="list-style-type: none"> - Unit conversion - Ratio and proportion - Area 4.2.2. Interpret formulas for volume, areas, perimeters of plane and geometric figures 4.2.3. Perform measurement 4.2.4. Compute measurement formulas	<ul style="list-style-type: none"> • Lecture • Group discussion • Problem analysis 	<ul style="list-style-type: none"> • Written examination • Oral evaluation • Problem solving 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
	4.3. Maintain measuring instruments	4.3.1. Identify and practice safe handling procedures in using measuring instruments 4.3.2. Describe procedures on maintenance of measuring instruments 4.3.3. Demonstrate proper cleaning and storage of measuring instruments	<ul style="list-style-type: none"> • Lecture • Demonstration • Group discussion • Simulation 	<ul style="list-style-type: none"> • Written examination • Oral evaluation 	1 hour
5. Perform basic bench work	5.1. Prepare materials, tools and equipment	5.1.1. Read and familiarize <ul style="list-style-type: none"> ○ Communication methods ○ Work plan interpretation ○ Materials, tools and equipment; uses and specifications 5.1.2. Interpret work plan 5.1.3. List and prepare materials, tools and equipment needed	<ul style="list-style-type: none"> • Self-paced instruction • Film viewing • Direct laboratory experience • Group discussion 	<ul style="list-style-type: none"> • Written test/examination • Demonstration • Direct Observation 	1 hour
	5.2. Lay-out and mark dimensions/features on workplace	5.2.1. Read and familiarize <ul style="list-style-type: none"> ○ Measuring tools; functions and use ○ Communication principles ○ Trade mathematics ○ Mensuration ○ Calculation ○ Conversion ○ Plan specifications 5.2.2. Plan drawing/lay-outing activity 5.2.3. Perform measuring activity 5.2.4. Perform marking and labeling activity	<ul style="list-style-type: none"> • Self-paced instruction • Film viewing • Direct laboratory experience • Group discussion • Industry Immersion 	<ul style="list-style-type: none"> • Interview • Demonstration • Direct Observation 	1 hour
	5.3. Perform required basic metal works	5.3.1. Read and familiarize <ul style="list-style-type: none"> ○ Tools and equipment: use and specifications ○ Grinding, cutting, drilling, filing techniques ○ Basic welding principles and application ○ Applied occupational health and safety (OH&S) 5.3.2. Perform measuring activity 5.3.3. Perform grinding activity	<ul style="list-style-type: none"> • Self-paced Instruction • Film viewing • Direct laboratory experience • Group discussion 	<ul style="list-style-type: none"> • Interview • Written test/examination • Observation with questioning • Demonstration with questioning 	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
		5.3.4. Perform cutting activity 5.3.5. Perform drilling activity 5.3.6. Perform filing activity 5.3.7. Perform welding activity			
6. Perform basic electrical works	6.1. Prepare electrical tools and test instruments	6.1.1. Read and familiarize <ul style="list-style-type: none"> ○ Uses of tools and testing instruments ○ Calibration of testing instruments ○ Safe handling and proper care of tools and testing instruments ○ Communication (oral and written) 6.1.2. Calibrate and testing of instruments 6.1.3. Interpret work plans 6.1.4. Identify and prepare electrical tools and test instruments	<ul style="list-style-type: none"> ● Self -paced Instruction ● Film viewing ● Direct laboratory experience ● Group discussion ● Industry immersion 	<ul style="list-style-type: none"> ● Interview ● Written test/ examination ● Observation with questioning ● Demonstration with questioning 	1 hour
	6.2. Test power supply and electrical components	6.2.1. Read and familiarize <ul style="list-style-type: none"> ○ Functions and uses of testing instruments ○ Basic electricity ○ Electrical safety and hazards ○ Testing procedures 6.2.2. Perform resistance reading 6.2.3. Perform voltage reading 6.2.4. Perform continuity testing 6.2.5. Perform current reading 6.2.6. Perform ground testing	<ul style="list-style-type: none"> ● Self -paced Instruction ● Film viewing ● Group discussion 	<ul style="list-style-type: none"> ● Interview ● Written test/ examination ● Observation with questioning ● Demonstration with questioning 	1 hour
	6.3. Perform basic electrical repair	6.3.1. Read and familiarize <ul style="list-style-type: none"> ○ Types of electrical fixtures ○ Electrical joints and splices ○ Electrical safety and hazards ○ Applied occupational health & safety (OH&S) 6.3.2. Repair minor electrical system troubles 6.3.3. Test simple electrical components and connections	<ul style="list-style-type: none"> ● Self-paced instruction ● Film viewing ● Direct laboratory experience ● Industry Immersion ● E-learning 	<ul style="list-style-type: none"> ● Interview ● Written test/ examination ● Observation with questioning ● Demonstration with questioning 	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
7. Maintain tools and equipment	7.1. Check the conditions of tools and equipment;	7.1.1. Read and familiarize safety practices <ul style="list-style-type: none"> ○ handling of tools and equipment ○ good housekeeping ○ materials, tools and equipment <ul style="list-style-type: none"> - types and uses of cleaning materials - types and uses of HVAC/R tools - types and uses of HVAC/R equipment ○ operational conditions of HVAC/R tools and equipment ○ HVAC/R tools and equipment defects ○ Maintaining tools and equipment 7.1.2. Observe proper handling of tools and equipment 7.1.3. Identify tools and equipment defects	<ul style="list-style-type: none"> • Small Group Discussion • Demonstration of Practical Skills 	<ul style="list-style-type: none"> • Observation and Oral questioning • Demonstration and Oral questioning • Written test 	1 hour
	7.2. Perform basic preventive maintenance	7.2.1. Read and familiarize safety practices <ul style="list-style-type: none"> ○ use of PPE ○ good housekeeping ○ usage of materials, tools and equipment <ul style="list-style-type: none"> - types and uses of lubricants - types and uses of cleaning materials - types and uses of HVAC/R equipment ○ Preventive maintenance on tools and equipment <ul style="list-style-type: none"> - Methods and techniques - Procedures 7.2.2. Practice proper handling of tools and equipment 7.2.3. Perform preventive maintenance on tools and equipment	<ul style="list-style-type: none"> • Simulation • Group discussion • Practical Lab • Demonstration 	<ul style="list-style-type: none"> • Observation and Oral questioning • Demonstration and Oral questioning • Written test 	2 hours

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
	7.3. Store tools and equipment	7.3.1. Read and familiarize safety practices <ul style="list-style-type: none"> ○ Handling of tools and equipment ○ good housekeeping ○ Storing procedures and techniques ○ Storage conditions/ locations 7.3.2. Store tools and equipment	<ul style="list-style-type: none"> ● Demonstration ● Group discussion ● Practical Lab 	<ul style="list-style-type: none"> ● Practical exam ● Direct observation ● Written test 	1 hour
8. Perform housekeeping and safety practices	8.1. Sort materials, tools and equipment	8.1.1. Read and familiarize <ul style="list-style-type: none"> ○ Classification of tools, equipment and materials <ul style="list-style-type: none"> - Consideration in the selection of appropriate areas for storing materials, tools and equipment - Sorting procedures and considerations - Identify tools, equipment and materials - Perform sorting activities 	<ul style="list-style-type: none"> ● Self-paced instruction ● Film viewing ● Direct laboratory experience ● Group discussion ● Industry Immersion 	<ul style="list-style-type: none"> ● Interview ● Written test/ examination ● Observation with questioning ● Demonstration with questioning 	1 hour
	8.2. Clean workplace area, materials, tools and equipment	8.2.1. Read and familiarize <ul style="list-style-type: none"> ○ Cleaning materials, types and applications. ○ Procedures in cleaning workplace area, tools and equipment. ○ Consideration of a safe workplace area, tools and equipment ○ Identification of cleaning materials and its applications 8.2.2. Apply procedures in cleaning workplace area, tools and equipment	<ul style="list-style-type: none"> ● Self-paced instruction ● Film viewing ● Direct laboratory experience ● Group discussion ● Immersion 	<ul style="list-style-type: none"> ● Interview ● Written test/ examination ● Observation with questioning ● Demonstration with questioning 	1 hour
	8.3. Systematize dispensing and retrieval of materials, tools and equipment	8.3.1. Read and familiarize <ul style="list-style-type: none"> ○ Procedures in dispensing and retrieval of materials; tools, and equipment ○ Things to be considered in returning the borrowed tools and equipment. 8.3.2. Apply procedures in dispensing and retrieval of materials; tools, and equipment	<ul style="list-style-type: none"> ● Self-paced instruction ● Film viewing ● Direct laboratory experience ● Group 	<ul style="list-style-type: none"> ● Interview ● Written test/ examination ● Observation with questioning ● Demonstration with questioning 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
			discussion • Immersion		
	8.4. Identify and minimize/ eliminate hazards	8.4.1. Read and familiarize <ul style="list-style-type: none"> ○ Composition of safety committee ○ Policies and procedures in controlling risk ○ Basic first aid procedure ○ Safety signs and hazards warning preparation ○ Equipment and safety devices ○ Safe handling technique in using equipment and safe devices. ○ roles of safety committee 8.4.2. Identify safety signs and workplace hazards 8.4.3. Demonstrate the first aid procedure 8.4.4. Demonstrate safe handling of equipment and safety devices	<ul style="list-style-type: none"> • Self-paced instruction • Film viewing • Direct laboratory experience • Group discussion • Industrial/Plant visit 	<ul style="list-style-type: none"> • Interview • Written test/ examination • Observation with questioning • Demonstration with questioning 	1 hour
	8.5. Respond and record accidents	8.5.1. Read and familiarize <ul style="list-style-type: none"> ○ Types of accidents ○ Procedures in applying first aid /treatment ○ First aid supplies ○ Steps in responding to and recording accidents 8.5.2. Demonstrate first aid/ treatment procedures 8.5.3. Prepare incident/ accident report	<ul style="list-style-type: none"> • Self-paced instruction • Film viewing • Direct laboratory experience • Group discussion 	<ul style="list-style-type: none"> • Interview • Written test/ examination • Observation with questioning • Demonstration with questioning 	1 hour
	8.6. Follow basic securities	8.6.1. Read and familiarize <ul style="list-style-type: none"> ○ Basic security procedures ○ Security signs and symbols ○ Loss control management <ul style="list-style-type: none"> - Hazards - Safety signs 8.6.2. Apply basic security procedures 8.6.3. Prepare incident/ accident report	<ul style="list-style-type: none"> • Small Group Discussion • Demonstration of Practical Skills • Modular • Self-paced 	<ul style="list-style-type: none"> • Actual demonstration • Written test/exam • Observation • Oral questioning 	1 hour

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
			instruction • Film viewing • Demonstration Group discussion		
9. Document work accomplished	9.1. Identify forms and data	9.1.1. Read and familiarize ○ Selecting and interpreting forms ○ Interpreting work accomplished ○ Data gathering techniques 9.1.2. Identify and interpret forms and data	• Lecture • Discussion • Group work	• Interview • Written • demonstration with questioning	1 hour
	9.2. Prepare reports	9.2.1. Read and familiarize ○ Details of work completion ○ Kinds of reports ○ Preparation of reports 9.2.2. Prepare completion/ accomplishment reports	• Lecture • Discussion • Group work	• demonstration with questioning	1 hour

CORE COMPETENCIES
456 Hours (216 Hours in-school + 240 Hours SIL) *

Unit of Competency	Learning Outcomes	Learning Activities	Methodologies	Assessment Approach	Nominal Duration
1. Install domestic refrigeration and air-conditioning (DomRAC) units 72 hours	1.1. Conduct survey	1.1.1. Lecture and discussion on: 1.1.1.1. Site conditions and installation requirements 1.1.1.2. Prevailing codes and ordinances 1.1.1.3. Tools, equipment and materials needed for installation 1.1.2. Perform mensuration 1.1.3. Perform assessment of installation site and requirements	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	16 hours
	1.2. Check DomRAC electrical circuit	1.2.1. Lecture and discussion on: 1.2.1.1. Basic electricity 1.2.1.2. Electrical cabling and wiring devices load carrying capacity 1.2.1.3. Equipment electrical requirements 1.2.1.4. Applicable Philippine Electrical Code (PEC) provisions 1.2.2. Perform testing of electrical circuit	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	16 hours
	1.3. Install DomRAC unit	1.3.1. Lecture and discussion on: 1.3.1.1. 5's principles 1.3.1.2. Protective personal equipment/safety gears 1.3.1.3. Safe manual handling techniques 1.3.1.4. Unit and equipment/components 1.3.1.5. Types of bracket, hangers and frames 1.3.1.6. Kinds and application of sealing materials 1.3.1.7. Types of condensate drain 1.3.1.8. RAC Code of Practice (installation of unit) 1.3.2. Install bracket, hangers and frames 1.3.3. Perform positioning and leveling of unit	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	32 hours

		1.3.4. Install condensate drain			
	1.4. Conduct performance test	1.4.1. Lecture and discussion on: 1.4.1.1. Usage of measuring instruments 1.4.1.2. Measurement parameters 1.4.1.3. Voltage and current measurement 1.4.1.4. Air temperature and velocity measurement 1.4.1.5. Types of service report 1.4.1.6. Service report preparation 1.4.2. Perform measurement of voltage and current 1.4.3. Perform measurement air temperature and velocity 1.4.4. Prepare service report	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	8 hours
			<ul style="list-style-type: none"> • Supervised Industry Learning (SIL) 		40 hours
2. Service and maintain domestic refrigeration and air-conditioning (DomRAC) units 64hrs	2.1. Clean air filter	2.1.1. Lecture and discussion on: 2.1.1.1. Air filter cleaning procedures 2.1.1.2. Air filter specifications 2.1.1.3. Cleaning tools and agents 2.1.2. Perform cleaning of air filters based on proper procedures	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	8 hours
	2.2. Service evaporator/condenser	2.2.1. Lecture and discussion on: 2.2.1.1. Evaporator/condenser servicing procedures 2.2.1.2. Evaporator/condenser assembling and disassembling procedures 2.2.2. Perform servicing of evaporator/condenser	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	16 hours
	2.3. Maintain fan motor assembly	2.3.1. Lecture and discussion on: 2.3.1.1. Principle and operation of motors 2.3.1.2. Types of fan motors 2.3.1.3. Fan motor terminals 2.3.1.4. Fan motor diagram 2.3.1.5. Fan motor assembly	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration 	16 hours

		2.3.1.6. Types of fan blades and blower 2.3.2. Perform maintenance of fan blades, blower and fan motor terminals and mounting		with questioning	
	2.4. Service electrical power and control circuits	2.4.1. Lecture and discussion on: 2.4.1.1. Electrical power and control circuits diagram 2.4.1.2. Checking of power supply and diagnosing electrical control 2.4.1.3. Electrical grounding 2.4.2. Perform servicing of electrical power and control circuits	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	16 hours
	2.5. Accomplish service and maintenance report	2.5.1. Lecture and discussion on preparation of service and maintenance report 2.5.2. Prepare sample service and maintenance report	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	8 hours
			<ul style="list-style-type: none"> • Supervised Industry Learning (SIL) 		100hours
80 hrs	3.1. Plan and prepare for troubleshooting and repair	3.1.1. Lecture and discussion on: 3.1.1.1. Schematic and wiring diagrams 3.1.1.2. Tools, materials, instruments and equipment for troubleshooting and repair 3.1.1.3. troubleshooting and repair procedures	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	8 hours
	3.2. Identify and repair faults/troubles	3.2.1. Lecture and discussion on: 3.2.1.1. Workplace safety guidelines 3.2.1.2. RAC Code of Practice 3.2.1.3. RAC Electrical control and components 3.2.1.4. Testing of electrical system 3.2.1.5. RAC mechanical components 3.2.1.6. Testing of mechanical system 3.2.1.7. Recovery/recycling of refrigerants	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/examination • Direct Observation with questioning • Demonstration with questioning 	32 hours

		3.2.1.8. Different faults and problems in DomRAC system 3.2.2. Perform testing of components 3.2.3. Perform faults/troubles diagnostics and repair			
	3.3. Perform refrigerant recovery/ recycling on domestic refrigeration and air-conditioning unit	3.3.1. Lecture and discussion on: 3.3.1.1. Safe working practices 3.3.1.2. Workplace safety guidelines 3.3.1.3. Types of refrigerants and refrigerant oil 3.3.1.4. Procedures and methods of recovery of refrigerant 3.3.1.5. Transport, handling and storing of refrigerant and refrigerant oil 3.3.1.6. Recovery/recycling of refrigerants 3.3.1.7. System reprocess • Leak testing • Vacuuming • Refrigerant charging 3.3.1.8. Electrical parameters 3.3.1.9. RAC Code of Practice 3.3.1.10. Kigali agreement provisions 3.3.2. Perform optimum refrigerant recovery/ recycling 3.3.3. Perform system reprocess	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/ examination • Direct Observation with questioning • Demonstration with questioning 	32 hours
	3.4. Test-run repaired unit	3.4.1. Lecture and discussion on: 3.4.1.1. Measurement of operational parameters 3.4.1.2. Testing procedures 3.4.1.3. Preparation of repair and testing report 3.4.2. Perform testing of repaired unit 3.4.3. Prepare repair and testing of unit report	<ul style="list-style-type: none"> • Lecture • Demonstration • Trainee Hands-on 	<ul style="list-style-type: none"> • Interview • Written test/ examination • Direct Observation with questioning • Demonstration with questioning 	8 hours
			<ul style="list-style-type: none"> • Supervised Industry Learning (SIL) 		100hours

*Note: SIL – supervised-industry leaning/exposure in actual work environment is included in the nominal training duration

3.2. 3.2 TRAINING DELIVERY

1. The delivery of training shall adhere to the design of the curriculum. Delivery shall be guided by the principles of competency-based TVET.
 - a. Course design is based on competency standards set by the industry or recognized industry sector; (Learning system is driven by competencies written to industry standards)
 - b. Training delivery is learner-centered and should accommodate individualized and self-paced learning strategies;
 - c. Training can be done on an actual workplace setting, simulation of a workplace and/or through adoption of modern technology.
 - d. Assessment is based in the collection of evidence of the performance of work to the industry required standards;
 - e. Assessment of competency takes the trainee's knowledge and attitude into account but requires evidence of actual performance of the competency as the primary source of evidence.
 - f. Training program allows for recognition of prior learning (RPL) or current competencies;
 - g. Training completion is based on satisfactory performance of all specified competencies.
2. The competency-based TVET system recognizes various types of delivery modes, both on-and off-the-job as long as the learning is driven by the competency standards specified by the industry. The following training modalities and their variations/components may be adopted singly or in combination with other modalities when designing and delivering training programs:

2.1. Institution- Based:

- **Dual Training System (DTS)/Dualized Training Program (DTP)** which contain both in-school and in-industry training or fieldwork components. Details can be referred to the Implementing Rules and Regulations of the DTS Law and the TESDA Guidelines on the DTP;
- **Distance learning** is a formal education process in which majority of the instruction occurs when the students and instructor are not in the same place. Distance learning may employ correspondence study, audio, video, computer technologies or other modern technology that can be used to facilitate learning and formal and non-formal training. Specific guidelines on this mode shall be issued by the TESDA Secretariat.
- The **traditional classroom-based or in-center instruction** may be enhanced through use of learner-centered methods as well as laboratory or fieldwork components.

2.2. Enterprise-Based:

- **Formal Apprenticeship** – Training within employment involving a contract between an apprentice and an enterprise on an approved apprenticeable occupation.
- **Informal Apprenticeship** - is based on a training (and working) agreement between an apprentice and a master craftsman wherein the agreement may be written or oral and the master craftsman commits to training the apprentice in all the skills relevant to his or her trade over a significant period of time, usually between one and four years, while the apprentice commits to contributing productively to the work of the business. Training is integrated into the production process and apprentices learn by working alongside the experienced craftsman.
- **Enterprise-based Training**- where training is implemented within the company in accordance with the requirements of the specific company. Specific guidelines on this mode shall be issued by the TESDA Secretariat.

2.3. Community-Based:

- **Community-Based Training** – short term programs conducted by non-government organizations (NGOs), LGUs, training centers and other TVET providers which are intended to address the specific needs of a community. Such programs can be conducted in informal settings such as barangay hall, basketball courts, etc. These programs can also be mobile training program (MTP).

3.3. TRAINEE ENTRY REQUIREMENTS

Trainees or students wishing to enroll in this program must possess the following requirements.

- Completed at least 10 yrs. basic education or an alternative learning systems (ALS) certificate of completion with grade 10 equivalent holder
- Can communicate both oral and written
- Can perform basic mathematical computation

This list does not include specific institutional requirements such as educational attainment, appropriate work experience, and others that may be required of the trainees by the school or training center delivering the TVET program.

3.4. LIST OF TOOLS, EQUIPMENT AND MATERIALS RAC SERVICING (DomRAC) NC II

Recommended list of tools, equipment and materials for the training of 25 trainees for RAC Servicing (DomRAC) NC II.

Up-to-date tools, materials, and equipment of equivalent functions can be used as alternatives. This also applies in consideration of community practices and their availability in the local market.

TOOLS		
Quantity	Unit	Description / Specification
10	sets	Flaring tool
10	sets	Swaging tool
10	pcs.	Tube cutter
2	pcs.	Tube bender (lever type), 5/8
3	pcs.	Tube bender (lever type), 1/2
3	pcs.	Tube bender (lever type), 5/16
3	pcs.	Tube bender (lever type), 3/8
3	pcs.	Tube bender (lever type), 1/4
3	sets	Tube bender (spring type)
2	pcs.	Service cylinder, 2.5 kg. Capacity
2	pcs.	Service cylinder, 10 kg. Capacity
10	pcs.	Electrical pliers
10	pcs.	Pliers, long nose
10	pcs.	Pliers, diagonal
10	pcs.	Capillary tube cutter
10	pcs.	Screw driver, flat
10	pcs.	Screw driver Philips
5	pcs.	Flat files, fine
3	sets	Allen wrench, metric
3	sets	Allen wrench, English
5	pcs.	Adjustable wrench 8"
5	pcs.	Adjustable wrench 10"
2	sets	Open wrench, metric
2	sets	Open wrench, English
2	sets	Box wrench
2	sets	Socket wrench
5	pcs.	Ratchet wrench (service valve)
5	pcs.	Vise grip, 8"
10	pcs.	Ballpein hammer, 8 oz
5	pcs.	Rubber mallet
10	pcs.	Hack saw, standard size
10	pcs.	Steel rule, metric & English, 12"
10	pcs.	Push rule, 15 meters
5	pcs.	L – square, 12"
10	pcs.	Pinch off tool
5	pcs.	Soldering iron, 100w , 220 volts
2	pcs.	Aviation snip, straight

EQUIPMENT		
Quantity	Unit	Description / Specification
3	units	Vacuum pump motor, two stage, 1/2 HP , 220 volts
2	units	Recovery/ Recycling unit, portable type, 220 volts
2	sets	Oxy- Acetylene welding machine w/ complete outfit
3	units	Recovery Cylinder 20 kg
1	unit	Refrigerator , single door 5 cu. Ft. 220 volts
1	unit	Refrigerator , two door no frost, 6 cu. Ft. 220 volts
1	unit	Freezer chest type, 10 cu Ft. 220 volts
1	unit	Freezer, upright 6 cu. Ft. 220 volts
1	unit	Water dispenser 220 volts
5	units	Digital Clamp meter
2	units	Analog clamp meter
2	units	Window type aircon 1 hp 220 volts, non-inverter type
2	units	Window type aircon 1 hp 220 volts, inverter type
1	unit	Air compressor, complete w/ accessories 220 volts, 60 Hz
5	units	Compressor motor 100 watts, 220 volts, 60 Hz
2	units	Electric drill portable, 3/8, 220 volts, 60 Hz
1	unit	Pedestal grinding machine, 220 volts, 60 Hz
2	units	Portable grinding machine, 220 volts, 60 HZ
3	units	Air blower (portable), 220 volts, 60 Hz
1	unit	Arc welding machine, AC max. 50 amps. 220 V, 60 Hz
5	sets	Gauge manifold and hoses w/ ball valves, R-410A / R-32
5	sets	Gauge manifold and hoses w/ ball valves, R-22 / R-134a
10	units	Digital Volt ohm milli-ammeter
1	unit	Electronic leak detector (Fluorine based)
1	unit	Electronic leak detector (Hydrocarbon based)
10	units	Digital Thermometer
1	set	Nitrogen regulator
2	units	Vacuum meter
1	unit	Refrigerant identifier
2	units	Weighing scale, digital
Personal Protective Equipment		
15	pairs	Hard hat
15	pairs	Safety gloves
15	pairs	Safety shoes
15	pcs.	Safety goggles/spectacles
15	pcs.	Face mask
15	pcs.	Gas mask

MATERIALS		
Quantity	Unit	Description / Specification
1	roll	Copper tube 1/4 " , 3/8", 5/16", 1/2, 1/8, 3/16, "OD, 50 ft. per roll
1	roll	Aluminum tube, 3/8 "OD, 100 ft. per roll
1	roll	Capillary tube 1/16, OD, 100 ft. per roll
50	pcs.	Silver rod
50	pcs.	Aluminum rod
10	pcs.	Silver flux
15	pcs.	Filter drier, 1/4 "OD flared connection
15	pcs.	Filter drier, 1/4 "OD solder connection

MATERIALS		
Quantity	Unit	Description / Specification
25	pcs.	Flare cap, 1/4 " OD
25	pcs.	Flare union, 1/4 " OD
25	pcs.	Flare plug, 1/4 "OD
13.6	kg.	Refrigerant 134a
13.6	kg.	Refrigerant 22
13.6	kgs	R-410A
3	kgs	R-32
3	kgs	R-600a
1	cylinder	Nitrogen gas
2	cylinder	Oxygen
2	cylinder	Acetylene gas
10	pcs.	Dual capacitor 25, 30, 35 mfd 370 vac
10	pcs.	Fan capacitor ,3, 4, 5, 6, 7, mfd 220 vac
10	pcs.	Starting capacitor 60, 80, 100-105 mfd 220 volts
10	pcs.	Potential relay 1, 1.5 2 hp 220 volts
10	pcs.	Overload protector 1/6 ,1/8, 1/10 , 1/5, 1.5 2hp 220 volts
10	pcs.	Current relay 1/5, 1/6, 1/8 , 1/10, hp 220 volts
1	roll	Soldering lead

Subject to conformity of the health and safety protocols

3.5. TRAINING FACILITIES RAC SERVICING (DomRAC) NC II

Based on a class intake of 25 students/trainees.

SPACE REQUIREMENTS	Space (m)	Area in Sq. Meters	Qty	Total Area in Sq. Meters
A. LECTURE AREA*	6 x 8	48	1	48
B. WORKSHOP AREA	6 x 10	60	1	60
C. LEARNING RESOURCE AREA	4 x 4	16	1	16
D. TOOL/STORAGE AREA*	3 x 4	12	1	12
E. WASH, TOILET AND LOCKER ROOM*	3 x 4	12	1	12
TOTAL				148
F. FACILITIES/EQUIPMENT/ CIRCULATION				45
TOTAL AREA				193

*Common facilities for all HVAC/R Courses

NOTES: Access to and use of equipment /facilities can be provided through cooperative arrangements or MOA with other partner-companies

Subject to conformity of the health and safety protocols

3.6. TRAINER'S QUALIFICATION FOR HVAC/R SECTOR RAC SERVICING (DomRAC) NC II

- Holder of National TVET Trainers Certificate (NTTC) Level I in RAC Servicing (DomRAC) NC II or Commercial Air-conditioning Installation and Servicing NC III / Commercial Refrigeration Installation and Servicing NC III or graduate of BSIE/BTTE/BTVTEd - Major in RAC and with RAC Servicing (DomRAC) NC II or Commercial Air-conditioning Installation and Servicing NC III / Commercial Refrigeration Installation and Servicing NC II certificate
- Must be computer literate
- Must have at least two (2) years related industry experience within the past 5 years

3.7. INSTITUTIONAL ASSESSMENT

Institutional Assessment is gathering of evidences to determine the achievements of the requirements of the qualification to enable the trainer make judgement whether the trainee is competent or not competent.

SECTION 4. ASSESSMENT AND CERTIFICATION ARRANGEMENT

Competency Assessment is the process of collecting evidence and making judgments whether competency has been achieved. The purpose of assessment is to confirm that an individual can perform to the standards expected at the workplace as expressed in relevant competency standards.

The assessment process is based on evidence or information gathered to prove achievement of competencies. The process may be applied to an employable unit(s) of competency in partial fulfillment of the requirements of the national qualification.

4.1 NATIONAL ASSESSMENT AND CERTIFICATION ARRANGEMENTS

- 4.1.1 To attain the National Qualification of **RAC Servicing (DomRAC) NC II**, the candidate must demonstrate competence in all the units listed in Section 1. Successful candidates shall be awarded a **National Certificate NC II** signed by the TESDA Director General.
- 4.1.2 The qualification of **RAC Servicing (DomRAC) NC II** may be attained through demonstration of competence through a single comprehensive project-type assessment covering all required units of competency of this qualification.
- 4.1.3 Assessment shall cover all competencies, with basic and common integrated or assessed concurrently with the core units of competency.
- 4.1.4 Any of the following are qualified to apply for assessment and certification:
 - 4.1.4.1 Graduates of formal, non-formal and informal including enterprise-based training programs
 - 4.1.4.2 Experienced Workers in RAC servicing for at least 2 years (wage employed or self-employed)
- 4.1.5 **Recognition of Prior Learning (RPL).** Candidates who have gained competencies through previous work or life experiences, education, and informal training related to all the core competencies may apply for recognition in the qualification through Portfolio Assessment in accordance with the provision of **TESDA Circular No. 59, Series of 2020**.
- 4.1.6 The existing National Certificate (NC) of individuals in **RAC Servicing (DomRAC) NC II** shall be in effect until the said NC have expired. Individuals are advised to take the assessment for this amended/updated TR on or before the expiration of such certificates.
- 4.1.7 The guidelines on assessment and certification are discussed in detail in the "Operating Procedures on Assessment and Certification" and "Guidelines on the Implementation of the Philippine TVET Competency Assessment and Certification System (PTCACS)".

4.2 COMPETENCY ASSESSMENT REQUISITE

4.2.1 *Self-Assessment Guide.* The self-assessment guide (SAG) is accomplished by the candidate prior to actual competency assessment. SAG is a pre-assessment tool to help the candidate and the assessor determine what evidence is available, where gaps exist, including readiness for assessment.

This document can:

- a. Identify the candidate's skills and knowledge
- b. Highlight gaps in candidate's skills and knowledge
- c. Provide critical guidance to the assessor and candidate on the evidence that need to be presented
- d. Assist the candidate to identify key areas in which practice is needed or additional information or skills that should be gained prior to assessment.

4.2.2 *Accredited Assessment Center.* Only Assessment Center accredited by TESDA is authorized to manage the assessment activities of candidates for national certification.

4.2.3 *Accredited Competency Assessor.* Only competency assessor accredited by TESDA is authorized to assess the competencies of candidates for national certification.

COMPETENCY MAP - HVAC/R Sector

RAC Servicing (Domestic RAC) NC II

CORE COMPETENCIES

Install window-type AC/ domestic refrigeration units	Service & maintain window-type AC/ domestic refrigeration units	Troubleshoot window-type AC/domestic refrigeration systems	Recover & recycle refrigerant in window-type AC/domestic refrigeration systems	Repair & retrofit window-type AC/ domestic refrigeration systems
Perform Testing and commissioning for window-type AC/domestic refrigeration	Install package-type air-conditioning unit (PACU) / commercial refrigeration equipment (CRE)	Install PACU/CRE electrical systems	Install PACU/CRE piping systems	Service & maintain PACU/CRE units
Survey site for installation	Troubleshoot PACU/CRE n systems	Recover / recycle refrigerant in PACU/ CRE systems	Repair & retrofit PACU/CRE systems & its accessories	Perform start-up, testing and commissioning for PACU/CRE
Install transport air-conditioning & refrigeration units	Service & maintain transport AC & refrigeration units	Recover & recycle refrigerant in transport AC & refrigeration systems	Troubleshoot transport air-conditioning & refrigeration systems	Perform testing & commissioning for transport AC & refrigeration
Install package-type air-conditioning unit (PACU)	Service & maintain PACU	Troubleshoot and repair PACU	Perform start-up, test and commissioning for PACU	Service & maintain mobile air-conditioning (MAC) units
Install commercial refrigeration equipment (CRE)	Service & maintain CRE	Troubleshoot and repair CRE	Perform start-up, test and commissioning for CRE	Troubleshoot & repair mobile air-conditioning systems
Install commercial air-conditioning unit (CACU)	Service & maintain CACU	Troubleshoot and repair CACU	Perform start-up, testing and commissioning for CACU	Perform start-up, test and commissioning for mobile air-conditioning systems
Repair & retrofit transport ac & refrigeration systems & its accessories	Install domestic refrigeration and air-conditioning units	Service & maintain domestic refrigeration and air-conditioning units	Troubleshoot & repair domestic refrigeration and air-conditioning systems	

COMMON COMPETENCIES

Prepare materials and tools	Observe procedures, specifications & manuals of instructions	Perform mensurations & calculations	Perform basic benchwork	Perform basic electrical works
Maintain tools and equipment	Perform housekeeping and safety practices	Document work accomplished	Interpret technical drawings and plans	

BASIC COMPETENCIES

Receive and respond to workplace communication	Participate in workplace communication	Lead workplace communication	Utilize specialized communication skill	Manage and sustain effective communication strategies
Work with others	Work in team environment	Lead small teams	Develop and lead teams	Manage and sustain high performing teams
Solve/address routine problems	Solve/address general workplace problems	Apply critical thinking and problem solving techniques in the workplace	Perform higher order thinking processes and apply techniques in the workplace	Evaluate higher order thinking skills and adjust problem solving techniques
Enhance self-management skills	Develop career and life decisions	Work in a diverse environment	Contribute to the practice of social justice in the workplace	Advocate strategic thinking for global citizenship
Support Innovation	Contribute to workplace innovation	Propose methods of applying learning and innovation in the organization	Manage innovative work instructions	Incorporate innovation into work procedures
Access and maintain information	Present relevant information	Use information systematically	Manage and evaluate usage of information	Develop systems in managing, and maintaining information
Follow occupational safety and health policies and procedures	Practice occupational safety and health policies and procedures	Evaluate occupational safety and health work practices	Lead in improvement of Occupational Safety and Health Program, Policies and Procedures	Manage implementation of occupational safety and health programs in the workplace
Apply environmental work standards	Exercise efficient and effective sustainable practices in the workplace	Evaluate environmental work practices	Lead towards improvement of environmental work programs, policies and procedures	Manage implementation of environmental programs in the workplace
Adopt entrepreneurial mindset in the workplace	Practice entrepreneurial skills in the workplace	Facilitate entrepreneurial skills for micro-small-medium enterprises (MSMEs)	Sustain entrepreneurial skills	Develop and sustain a high-performing enterprise

DEFINITION OF TERMS

- 1) **Air Cooled Condensing Unit (ACCU)/OUTDOOR UNIT** – an equipment that condenses refrigerant vapor using air as the condensing medium. It consists of compressor, condenser coil and fan motor
- 2) **Air Cooled Condenser** – an equipment that condenses refrigerant vapor using air as the condensing medium
- 3) **Air Handling Unit (AHU)/INDOOR UNIT** – an air-conditioning component that consists of a fan motor and an evaporator coil. It is this equipment used in air-conditioning that absorbs heat from the space
- 4) **Air Distribution** – the process of distributing conditioned air into a confined space
- 5) **Check** – to verify, inspect, or test an HVAC/R component for satisfactory condition with the use of an instrument or a device
- 6) **Commercial Refrigeration** - covers water coolers/ display coolers, vendo machine, beverage machine icedrop/ice cream/ice cube vending machines
- 7) **Dehydration** – the process of removing moisture from a refrigeration system
- 8) **Electric Heat Defrost** – use of electric resistance heating coils to melt ice or frost from evaporators
- 9) **Evacuation** – removal of air/any gas and moisture from a refrigeration system
- 10) **Evaporator** – the component in a refrigeration system where liquid refrigerant is changed into a vapor by the absorption of heat
- 11) **Fan** – a mechanical device for moving air
- 12) **Fan Coil Unit (FCU)** – an air-conditioning component that consists of a fan motor and an evaporator coil
- 13) **Filter Drier** – the component part used in air-conditioning or refrigeration system to filter and dehydrates refrigerant in the system
- 14) **Hot Gas Defrost** – component part used to remove frosting on the evaporator coil using hot gas refrigerant from the compressor
- 15) **Idler Pulley** – a pulley used to maintain proper belt tension
- 16) **Inspect** – determine the actual condition of HVAC/R component without the use of instrument

- 17) **Interlocking** – it is the action of interconnecting electric control wires to achieve a sequential action
- 18) **Leak Test** – the procedure of determining/pin pointing leaks in a pressurized system
- 19) **Liquid Line Solenoid Valve** – electrically operated valve that shuts-off the flow of the refrigerant to the evaporator
- 20) **Metering Device** – it is one of the major components in a refrigeration system used to regulate the flow of refrigerant into the evaporator
- 21) **Package Air-conditioning Unit (PACU)/SPLIT-TYPE** – an air-conditioning unit that contains the compressor, water-cooled condenser, metering device and evaporator all of which is in one casing
- 22) **Pull-out** – to remove from a place of installation
- 23) **Pressure Test** – a procedure whereby pressure is applied to the piping system, the purpose of which is to determine its soundness and stability
- 24) **Pump down** – a process of using the compressor to pump and contain all the refrigerant charge into the condenser and/or receiver
- 25) **Refrigerant Charging** – the process of introducing into the system the proper amount of refrigerant
- 26) **Service Mechanic** – worker who possess basic skills related to HVAC/R system
- 27) **Sight Glass/Liquid Line Moisture Indicator** – indicates refrigerant quality and charge
- 28) **Split-Type Air-conditioning unit** – an air-conditioning unit that contains the compressor, air or water-cooled condenser, metering device in one casing as outdoor unit and evaporator in another casing as indoor unit.
- 29) **Supervised Industry Learning** – similar to on-the-job training – an approach in training designed to enhance the knowledge and skills of the trainee through actual experience in the workplace to acquire specific competencies prescribed in the training regulations. Likewise, the term Supervised Industry Learning or SIL in replacement of the term Supervised Industry Training (SIT) or On-the-Job Training (OJT) to provide more focus on the process of absorbing and retaining learner's enhanced competencies in a workplace and thus enable the learner to practice those competencies in a variety of workplace situation.
- 30) **Thermostat Expansion Valve (TXV)** – a refrigerant control valve connected before an evaporator that regulates flow of refrigerant. Operated by temperature and pressure, and reacts to the degree of gas superheat at the evaporator outlet through a feeler bulb

- 31) **Transport Air-conditioning Unit** – refers to an air-conditioning unit driven directly from the turning axle of the vehicle when they are in motion, or by the vehicle engine itself, or by a separate gasoline/diesel engine and/or electric motor mounted on the same vehicle. It covers the land and marine/sea transports.
- 32) **Troubleshoot** – the process of analyzing system defect or malfunction
- 33) **Vacuum** – pressure lower than atmospheric pressure measured in inches of mercury. Complete vacuum is 29.92 in. mercury or at least 500 microns
- 34) **Water Treatment** – the use of chemicals in water to prevent corrosion, formation of scales, algae growth and formation of slime
- 35) **Window Type Air-conditioning Unit** – is a self-contained air-conditioning unit **house** in a single casing mounted in a wall or window opening
- 36) **Workmanlike-manner** – quality of work within the accepted industry standard

ACKNOWLEDGEMENTS

The Technical Education and Skills Development Authority (TESDA) wishes to extend thanks and appreciation to the many representatives of business, industry, academe and government agencies who donated their time and expertise to the development and validation of these Training Regulations.

- **THE TECHNICAL AND INDUSTRY EXPERT AND REVIEW PANEL – FY 2019**

MR. MANUEL P. AZUCENA
RACTAP

MR. EDUARDO M. FERNANDEZ
TUP–Manila / PSVARE / RACTAP

MR. RAMON ELIAS F. ORTIZ
RACTAP

MR. AUGUSTO T. QUITCO
Koppel Inc. - Philippines

MR. KRIZ S. BERNARDINO
KSB HVAC-R Services / PSVARE / RACTAP

MR. LAMBERTO B. BALDOVINO
ILAC HVAC-R Services

- **THE PARTICIPANTS IN THE NATIONAL VALIDATION OF THIS TRAINING REGULATION**

MR. JOVYLON B. CANENCIA
Technological University of the Phils.-Manila

MS. ANNE R. DELOS REYES
Frigid Zone Auto Aircon Specialist Co.

MR. SAMSON A. DEFEO
Sam Refrigeration

MR. ANECENCIO “BOY” D. GASCON
Frigid Zone Auto Aircon Specialist Co.

MR. ELWILFREDO P. MONZON
Frenzy Cool Car Aircon

MR. LEONILO C. ROBLEDO
Frigid Zone Auto Aircon Specialist Co.

MR. EARL JOHN C. RONQUILLO
Frigid Zone Auto Aircon Specialist Co.

MR. BERNABE M. PEREZ, JR.
CAN AIRE

MR. REYNALDO Q. DALAG
Frigid Zone Auto Aircon Specialist Co.

MR. VALENTINO J. ANGELES
Technological University of the Phils.-Manila

MR. CLIFFORD V. QUEVEDO
Haiyanaire Marketing & Air-conditioning Services

MR. GILBERTO ORTEGA
GEF Incorporated

MR. JAY RALD E. DINOLAN
Moredone Ventures Inc.

MR. FIEL B. PEREZ
GEF Incorporated

MR. ROSELL PEDRO JR.
Moredone Ventures Inc.

MS. ARLENE R. LANGBID
Comfort Aire

MR. DARWIN A. ASUFRA
Real Air-conditioning Services

MR. REMIGIO L. BUSTAMANTE
College of Technological Sciences

MR. ENRIQUE P. LOBIANO
Daikin Air-conditioning Phils.

MS. AMY T. LAURON
Lauron Refrigeration and Aircon

MR. PEDRO A. CARZANO
TESDA Region 7- RTC, Cebu City

MR. ROY G. CANENCIA
JKAE Ref and Aircon Allied Services

MR. RENATO S. GARCIA
GAB Appliance Service Center

MR. PHILIP M. LIGAN
CARESYSTEM

MR. PETER JOHN T. ROSARIO
College of Technological Sciences

MR. VICTOR B. VILLAMOR, JR.
TESDA Region 7- RTC, Cebu City

- **THE REFRIGERATION AND AIR-CONDITIONING TECHNICIANS FOR DEVELOPMENT OF THE PHILIPPINES (RACTAP)**
- **THE MEMBERS OF THE TESDA BOARD AND SECRETARIAT**
- **THE MANAGEMENT AND STAFF OF THE TESDA SECRETARIAT**
 - **Qualifications and Standards Office (QSO)**
 - Imelda B. Taganas - TESDA-QSO
 - Ma. Isabel G. Gamurot - TESDA-QSO-CSDD
 - Samuel E. Calado, Jr. - TESDA-QSO-CSDD
 - Raymundo C. Vergara - TESDA-QSO-CPSDD
 - Adrian Brian C. Sabanal - TESDA-QSO-CPSDD



**TRAINING REGULATIONS (TR)
DOCUMENT REVISION HISTORY**

Qualification Title : RAC Servicing (DomRAC) NC II

Qualification Code: HVCDRA221

Revision No.	Document Description Types*	Replaces Version (TESDA Board Resolution No./ Date)	New Version (TESDA Board Resolution No./ Date)	Deployment Circular
00	Document Created – RAC Servicing (Window-type) NC I	Not Applicable	TB No. 2005-04/ March 18, 2005	Not Applicable
01	Document Amended – RAC Servicing (DomRAC) NC II	TB No. 2005-04/ March 18, 2005	TB No. 2011-12/ October 7, 2011	Not Applicable
02	Document Amended – RAC Servicing (DomRAC) NC II	TB No. 2011-12/ October 7, 2011	TB No. 2019-23/ June 8, 2021	TESDA Circular No. 087 s. 2021

Legend: *Description Types
- Document Created
- Document Amended

Training Regulation are available in both printed and electronic copies for more information, please contact:
Technical Education and Skills Development Authority (TESDA)
Tele Fax No.: 8818-7728
or visit our website: www.tesda.gov.ph