TRAINING REGULATIONS

PLUMBING NC III

CIVIL WORKS
(CONSTRUCTION SECTOR)

TECHNICAL EDUCATION AND SKILLS DEVELOPMENT AUTHORITY
East Service Road, South Superhighway, Taguig City, Metro Manila

TABLE OF CONTENTS

CONSTRUCTION SECTOR

PLUMBING NC III

TRAINING REGULATIONS FOR PLUMBING NC III

SECTION 1 PLUMBING NC III QUALIFICATION

The **Plumbing NC III** Qualification consists of competencies that a person must achieve in installing simple and complex plumbing systems including centralized and storage type of water heater system for high-rise buildings. He/she leads, supervises and works with the team.

This Qualification is packaged from the competency map of Construction – Civil Works sub-sector as shown in Annex A.

The Units of Competency comprising this Qualification include the following:

CODE NO.	BASIC COMPETENCIES
	Units of Competency
500311109	Lead workplace communication
500311110	Lead small teams
500311111	Develop and practice negotiation skills
500311112	Solve problems related to work activities
500311113	Use Mathematical concepts and techniques
500311114	Use relevant technologies

CODE NO.	COMMON COMPETENCIES
	Units of Competency
CON931201	Prepare construction materials and tools
CON311201	Observe procedures, specifications and manuals of instruction
CON311202	Interpret technical drawings and plans
CON311203	Perform mensurations and calculations
CON311204	Maintain tools and equipment

CODE NO.	CORE COMPETENCIES
	Units of Competency
CON712352	Install centralized hot, chilled and /or potable water piping system
CON712353	Install riser/downfeed and distribution water supply system
CON712354	Install and connect pumps to plumbing system
CON712355	Perform finishing and trimming of plumbing fixtures and accessories
CON712356	Oversee plumbing works

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

- Plumber III

SECTION 2 COMPETENCY STANDARDS

This section gives the details of the contents of the core units of competency required for **PLUMBING NC III**.

BASIC COMPETENCIES

UNIT OF COMPETENCY : **LEAD WORKPLACE COMMUNICATION**

UNIT CODE : **500311109**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required to lead in the dissemination and discussion of ideas, information and issues in the workplace.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Communicate information about workplace processes	1.1 Appropriate ***communication method*** is selected 1.2 Multiple operations involving several topics areas are communicated accordingly 1.3 Questions are used to gain extra information 1.4 Correct sources of information are identified 1.5 Information is selected and organized correctly 1.6 Verbal and written reporting is undertaken when required 1.7 Communication skills are maintained in all situations	1.1 Organization requirements for written and electronic communication methods 1.2 Effective verbal communication methods	1.1 Organize information 1.2 Understand and convey intended meaning 1.3 Participate in variety of workplace discussions 1.4 Comply with organization requirements for the use of written and electronic communication methods
2. Lead workplace discussions	2.1 Response to workplace issues are sought 2.2 Response to workplace issues are provided immediately	2.1 Organization requirements for written and electronic communication methods	2.1 Organize information 2.2 Understand and convey intended meaning

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.3 Constructive contributions are made to workplace discussions on such issues as production, quality and safety 2.4 Goals/objectives and action plan undertaken in the workplace are communicated	2.2 Effective verbal communication methods	2.3 Participate in variety of workplace discussions 2.4 Comply with organization requirements for the use of written and electronic communication methods
3. Identify and communicate issues arising in the workplace	3.1 Issues and problems are identified as they arise 3.2 Information regarding problems and issues are organized coherently to ensure clear and effective communication 3.3 Dialogue is initiated with appropriate personnel 3.4 Communication problems and issues are raised as they arise	3.1 Organization requirements for written and electronic communication methods 3.2 Effective verbal communication methods	3.1 Organize information 3.2 Understand and convey intended meaning 3.3 Participate in variety of workplace discussions 3.4 Comply with organization requirements for the use of written and electronic communication methods

RANGE OF VARIABLES

VARIABLE	RANGE
1. Methods of communication	1.1. Non-verbal gestures 1.2. Verbal 1.3. Face to face 1.4. Two-way radio 1.5. Speaking to groups 1.6. Using telephone 1.7. Written 1.8. Internet

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Dealt with a range of communication/information at one time 1.2 Made constructive contributions in workplace issues 1.3 Sought workplace issues effectively 1.4 Responded to workplace issues promptly 1.5 Presented information clearly and effectively written form 1.6 Used appropriate sources of information 1.7 Asked appropriate questions 1.8 Provided accurate information
2. Resource Implications	**The following resources should be provided:** 2.1 Variety of Information 2.2 Communication tools 2.3 Simulated workplace
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Competency in this unit must be assessed through 3.2 Direct Observation 3.3 Interview
4. Context for Assessment	4.1. Competency may be assessed in the workplace or in simulated workplace environment

UNIT OF COMPETENCY : **LEAD SMALL TEAMS (*Guide and lead others/ Be responsible to others)***

UNIT CODE : **500311110**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes to lead small teams including setting and maintaining team and individual performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Provide team leadership	1.1 ***Work requirements*** are identified and presented to team members 1.2 Reasons for instructions and requirements are communicated to team members 1.3 ***Team members' queries and concerns*** are recognized, discussed and dealt with	1.1 Company policies and procedures 1.2 How performance expectations are set 1.3 Methods of Monitoring Performance 1.4 Client expectations 1.5 Team member's duties and responsibilities	1.1 Communication skills required for leading teams 1.2 Team building skills 1.3 Negotiating skills
2. Assign responsibilities	2.1 Duties, and responsibilities are allocated having regard to the skills, knowledge and aptitude required to properly undertake the assigned task and according to company policy 2.2 Duties are allocated having regard to individual preference, domestic and personal considerations, whenever possible	1.1 Company policies and procedures 1.2 Relevant legal requirements 1.3 How performance expectations are set 1.4 Methods of Monitoring Performance 1.5 Team member's duties and responsibilities	1.1 Communication skills required for leading teams 1.2 Team building skills 1.3 Negotiating skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Set performance expectations for team members	3.1 Performance expectations are established based on client needs and according to assignment requirements 3.2 Performance expectations are based on individual team members duties and area of responsibility 3.3 Performance expectations are discussed and disseminated to individual team members	3.1 Company policies and procedures 3.2 Relevant legal requirements 3.3 How performance expectations are set 3.4 Methods of Monitoring Performance 3.5 Client expectations 3.6 Team member's duties and responsibilities	3.1 Communication skills required for leading teams 3.2 Informal performance counseling skills 3.3 Team building skills 3.4 Negotiating skills
4. Supervise team performance	4.1 ***Monitoring of performance*** takes place against defined performance criteria and/or assignment instructions and corrective action taken if required 4.2 Team members are provided with ***feedback***, positive support and advice on strategies to overcome any deficiencies 4.3 ***Performance issues*** which cannot be rectified or addressed within the team are referenced to appropriate personnel according to employer policy	4.1 Company policies and procedures 4.2 Relevant legal requirements 4.3 How performance expectations are set 4.4 Methods of Monitoring Performance 4.5 Client expectations 4.6 Team member's duties and responsibilities	4.1 Communication skills required for leading teams 4.2 Informal performance counseling skills 4.3 Team building skills 4.4 Negotiating skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	4.4 Team members are kept informed of any changes in the priority allocated to assignments or tasks which might impact on client/customer needs and satisfaction 4.5 Team operations are monitored to ensure that employer/client needs and requirements are met 4.6 Follow-up communication is provided on all issues affecting the team 4.7 All relevant documentation is completed in accordance with company procedures		

RANGE OF VARIABLES

VARIABLE	RANGE
1. Work requirements	1.1. Client Profile 1.2. Assignment instructions
2. Team member's concerns	2.1. Roster/shift details
3. Monitor performance	3.1. Formal process 3.2. Informal process
4. Feedback	4.1. Formal process 4.2. Informal process
5. Performance issues	5.1. Work output 5.2. Work quality 5.3. Team participation 5.4. Compliance with workplace protocols 5.5. Safety 5.6. Customer service

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1. Maintained or improved individuals and/or team performance given a variety of possible scenario 1.2. Assessed and monitored team and individual performance against set criteria 1.3. Represented concerns of a team and individual to next level of management or appropriate specialist and to negotiate on their behalf 1.4. Allocated duties and responsibilities, having regard to individual's knowledge, skills and aptitude and the needs of the tasks to be performed 1.5. Set and communicated performance expectations for a range of tasks and duties within the team and provided feedback to team members
2. Resource Implications	**The following resources should be provided:** 2.1. Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2. Materials relevant to the proposed activity or task
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1. Direct observations of work activities of the individual member in relation to the work activities of the group 3.2. Observation of simulation and/or role play involving the participation of individual member to the attainment of organizational goal 3.3. Case studies and scenarios as a basis for discussion of issues and strategies in teamwork
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 : DEVELOP AND PRACTICE NEGOTIATION SKILLS

UNIT CODE : 500311111

UNIT DESCRIPTOR : This unit covers the skills, knowledge and attitudes required to collect information in order to negotiate to a desired outcome and participate in the negotiation.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Plan negotiations	1.1 Information on ***preparing for negotiation*** is identified and included in the plan 1.2 Information on creating ***non-verbal environments*** for positive negotiating is identified and included in the plan 1.3 Information on ***active listening*** is identified and included in the plan 1.4 Information on different questioning techniques is identified and included in the plan 1.5 Information is checked to ensure it is correct and up-to- date	1.1 Codes of practice and guidelines for the organization 1.2 Organizations policy and procedures for negotiations 1.3 Decision making and conflict resolution strategies procedures 1.4 Flexibility	1.1 Interpersonal skills to develop rapport with other parties 1.2 Communication skills (verbal and listening) 1.3 Observation skills 1.4 Negotiation skills
2 Participate in negotiations	2.1 Criteria for successful outcome are agreed upon by all parties 2.2 Desired outcome of all parties are considered 2.3 Appropriate language is used throughout the negotiation 2.4 A variety of ***questioning techniques*** are used	2.1 Codes of practice and guidelines for the organization 2.2 Organizations policy and procedures for negotiations 2.3 Decision making and conflict resolution strategies procedures	2.1 Interpersonal skills to develop rapport with other parties 2.2 Communication skills (verbal and listening) 2.3 Observation skills 2.4 Negotiation skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.5 The issues and processes are documented and agreed upon by all parties 2.6 Possible solutions are discussed and their viability assessed 2.7 Areas for agreement are confirmed and recorded 2.8 Follow-up action is agreed upon by all parties	2.4 Problem solving strategies on how to deal with unexpected questions and attitudes during negotiation 2.5 Flexibility 2.6 Empathy	

RANGE OF VARIABLES

VARIABLE	RANGE
1. Preparing for negotiation	1.1 Background information on other parties to the negotiation 1.2 Good understanding of topic to be negotiated 1.3 Clear understanding of desired outcome/s 1.4 Personal attributes 1.4.1 self awareness 1.4.2 self esteem 1.4.3 objectivity 1.4.4 empathy 1.4.5 respect for others 1.5 Interpersonal skills 1.5.1 listening/reflecting 1.5.2 non verbal communication 1.5.3 assertiveness 1.5.4 behavior labeling 1.5.5 testing understanding 1.5.6 seeking information 1.5.7 self disclosing 1.6 Analytic skills 1.6.1 observing differences between content and process 1.6.2 identifying bargaining information 1.6.3 applying strategies to manage process 1.6.4 applying steps in negotiating process 1.6.5 strategies to manage conflict 1.6.6 steps in negotiating process 1.6.7 options within organization and externally for resolving conflict
2. Non verbal environments	2.1 Friendly reception 2.2 Warm and welcoming room 2.3 Refreshments offered 2.4 Lead in conversation before negotiation begins
3. Active listening	3.1 Attentive 3.2 Don't interrupt 3.3 Good posture 3.4 Maintain eye contact 3.5 Reflective listening
4. Questioning techniques	4.1 Direct 4.2 Indirect 4.3 Open-ended

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Demonstrated sufficient knowledge of the factors influencing negotiation to achieve agreed outcome 1.2 Participated in negotiation with at least one person to achieve an agreed outcome
2. Resource Implications	**The following resources should be provided:** 2.1 Room with facilities necessary for the negotiation process 2.2 Human resources (negotiators)
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Observation/demonstration and questioning 3.2 Portfolio assessment 3.3 Oral and written questioning 3.4 Third party report
4. Context for Assessment	4.1 Competency to be assessed in real work environment or in a simulated workplace setting.

UNIT OF COMPETENCY : **SOLVE PROBLEMS RELATED TO WORK ACTIVITIES**

UNIT CODE : **500311112**

UNIT DESCRIPTOR : This unit of covers the knowledge, skills and attitudes required to solve problems in the workplace including the application of problem solving techniques and to determine and resolve the root cause of problems.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify the problem	1.1 Variances are identified from normal operating parameters; and product quality 1.2 Extent, cause and nature are of the problem are defined through observation, investigation and ***analytical techniques*** 1.3 ***Problems*** are clearly stated and specified	1.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 1.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 1.2.1 Relevant equipment and operational processes 1.2.2 Enterprise goals, targets and measures 1.2.3 Enterprise quality, OSH and environmental requirement 1.2.4 Enterprise information systems and data collation 1.2.5 Industry codes and standards	1.1 Using range of formal problem solving techniques 1.2 Identifying and clarifying the nature of the problem

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Determine fundamental causes of the problem	2.1 Possible causes are identified based on experience and the use of problem solving tools / analytical techniques. 2.2 Possible cause statements are developed based on findings 2.3 Fundamental causes are identified per results of investigation conducted	2.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 2.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 2.2.1 Relevant equipment and operational processes 2.2.2 Enterprise goals, targets and measures 2.2.3 Enterprise quality, OSH and environmental requirement 2.2.4 Enterprise information systems and data collation 2.2.5 Industry codes and standards	2.1 Using range of formal problem solving techniques 2.2 Identifying and clarifying the nature of the problem

ELEMENT	PERFORMANCE CRITERIA *Italicized terms* are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Determine corrective action	3.1 All possible options are considered for resolution of the problem 3.2 Strengths and weaknesses of possible options are considered 3.3 Corrective actions are determined to resolve the problem and possible future causes 3.4 ***Action plans*** are developed identifying measurable objectives, resource needs and timelines in accordance with safety and operating procedures	3.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 3.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 3.2.1 Relevant equipment and operational processes 3.2.2 Enterprise goals, targets and measures 3.2.3 Enterprise quality, OSH and environmental requirement 3.2.4 Principles of decision making strategies and techniques 3.2.5 Enterprise information systems and data collation 3.2.6 Industry codes and standards	3.1 Using range of formal problem solving techniques 3.2 Identifying and clarifying the nature of the problem 3.3 Devising the best solution 3.4 Evaluating the solution 3.5 Implementation of a developed plan to rectify the problem

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
4. Provide recommendation/s to manager	4.1 Report on recommendations are prepared 4.2 Recommendations are presented to appropriate personnel. 4.3 Recommendations are followed-up, if required	4.1 Competence includes a thorough knowledge and understanding of the process, normal operating parameters, and product quality to recognize non-standard situations 4.2 Competence to include the ability to apply and explain, sufficient for the identification of fundamental cause, determining the corrective action and provision of recommendations 4.2.1 Relevant equipment and operational processes 4.2.2 Enterprise goals, targets and measures 4.2.3 Enterprise quality, OSH and environmental requirement 4.2.4 Principles of decision making strategies and techniques 4.2.5 Enterprise information systems and data collation 4.2.6 Industry codes and standards	4.1 Using range of formal problem solving techniques 4.2 Identifying and clarifying the nature of the problem 4.3 Devising the best solution 4.4 Evaluating the solution 4.5 Implementation of a developed plan to rectify the problem

RANGE OF VARIABLES

VARIABLE	RANGE
1. Analytical techniques	1.1 Brainstorming 1.2 Intuitions/Logic 1.3 Cause and effect diagrams 1.4 Pareto analysis 1.5 SWOT analysis 1.6 Gant chart, Pert CPM and graphs 1.7 Scattergrams
2. Problem	2.1 Non – routine process and quality problems 2.2 Equipment selection, availability and failure 2.3 Teamwork and work allocation problem 2.4 Safety and emergency situations and incidents
3. Action plans	3.1 Priority requirements 3.2 Measurable objectives 3.3 Resource requirements 3.4 Timelines 3.5 Co-ordination and feedback requirements 3.6 Safety requirements 3.7 Risk assessment 3.8 Environmental requirements

EVIDENCE GUIDE

1. Critical aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified the problem 1.2 Determined the fundamental causes of the problem 1.3 Determined the correct / preventive action 1.4 Provided recommendation to manager These aspects may be best assessed using a range of scenarios / case studies / 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.
2. Resource Implications	2.1. Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios / case studies / what ifs will be required as well as bank of questions which will be used to probe the reason behind the observable action.
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Case studies on solving problems in the workplace 3.2 Observation 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.
4. Context for Assessment	4.1. In all workplace, it may be appropriate to assess this unit concurrently with relevant teamwork or operation units.

UNIT OF COMPETENCY : USE MATHEMATICAL CONCEPTS AND TECHNIQUES

UNIT CODE : 500311113

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes required in application of mathematical concepts and techniques.

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify mathematical tools and techniques to solve problem	1.1 Problem areas are identified based on given condition 1.2 ***Mathematical techniques*** are selected based on the given problem	1.1 Fundamental operation (addition, subtraction, division, multiplication) 1.2 Measurement system 1.3 Precision and accuracy 1.4 Basic measuring tools/devices	1.1 Applying mathematical computations 1.2 Using calculator 1.3 Using different measuring tools
2 Apply mathematical procedure/solution	2.1 Mathematical techniques are applied based on the problem identified 2.2 Mathematical computations are performed to the level of accuracy required for the problem 2.3 Results of mathematical computation is determined and verified based on job requirements	2.1 Fundamental operation (addition, subtraction, division, multiplication) 2.2 Measurement system 2.3 Precision and accuracy 2.4 Basic measuring tools/devices	2.1 Applying mathematical computations 2.2 Using calculator 2.3 Using different measuring tools
3 Analyze results	3.1 Result of application is reviewed based on expected and required specifications and outcome 3.2 ***Appropriate action*** is applied in case of error	3.1 Fundamental operation (addition, subtraction, division, multiplication) 3.2 Measurement system 3.3 Precision and accuracy 3.4 Basic measuring tools/devices	3.1 Applying mathematical computations 3.2 Using calculator 3.3 Using different measuring tools

RANGE OF VARIABLES

VARIABLE	RANGE
1. Mathematical techniques	May include: 1.1 Four fundamental operations 1.2 Measurements 1.3 Use/Conversion of units of measurements 1.4 Use of standard formulas
2. Appropriate action	2.1 Review in the use of mathematical techniques (e.g. recalculation, re-modeling) 2.2 Report error to immediate superior for proper action

EVIDENCE GUIDE

1. Critical Aspects of Competency	**Assessment requires evidence that the candidate:** 1.1 Identified, applied and reviewed the use of mathematical concepts and techniques to workplace problems
2. Resource Implications	**The following resources should be provided:** 2.1 Calculator 2.2 Basic measuring tools 2.3 Case Problems
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Authenticated portfolio 3.2 Written Test 3.3 Interview/Oral Questioning 3.4 Demonstration
4. Context for Assessment	4.1 Competency may be assessed in the work place or in a simulated work place setting

UNIT OF COMPETENCY : USE RELEVANT TECHNOLOGIES *(Apply technology effectively)*

UNIT CODE : 500311114

UNIT DESCRIPTOR : This unit of competency covers the knowledge, skills, and attitude required in selecting, sourcing and applying appropriate and affordable technologies in the workplace

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Study/select appropriate technology	1.1 Usage of different ***technologies*** is determined based on job requirements 1.2 Appropriate technology is selected as per work specification	1.1 Awareness on technology and its function 1.2 Operating instructions 1.3 Communication techniques 1.4 Health and safety procedure 1.5 Company policy in relation to relevant technology	1.1 Relevant technology application/implementation 1.2 Basic communication skills 1.3 Software applications skills
2 Apply relevant technology	2.1 Relevant technology is effectively used in carrying out function 2.2 Applicable software and hardware are used as per task requirement 2.3 ***Management concepts*** are observed and practiced as per established industry practices	2.1 Awareness on technology and its function 2.2 Operating instructions 2.3 Applicable software 2.4 Communication techniques 2.5 Health and safety procedure 2.6 Company policy in relation to relevant technology 2.7 Different management concepts 2.8 Technology adaptability	2.1 Relevant technology application/implementation 2.2 Basic communication skills 2.3 Software applications skills

ELEMENT	PERFORMANCE CRITERIA ***Italicized terms*** are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3 Maintain/ enhance relevant technology	3.1 Maintenance of technology is applied in accordance with the ***industry standard operating procedure***, ***manufacturer's operating guidelines*** and ***occupational health and safety procedure*** to ensure its operative ability 3.2 Updating of technology is maintained through continuing education or training in accordance with job requirement 3.3 Technology failure/ defect is immediately reported to the concern/responsible person or section for ***appropriate action***	3.1 Awareness on technology and its function 3.2 Repair and maintenance procedure 3.3 Operating instructions 3.4 Communication techniques 3.5 Health and safety procedure	3.1 Relevant technology application/implementation 3.2 Basic communication skills 3.3 Software applications skills 3.4 Basic troubleshooting skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technology	May include: 1.1 Office technology 1.2 Industrial technology 1.3 System technology 1.4 Information technology 1.5 Training technology
2. Management concepts	May include: 2.1 Real Time Management 2.2 KAIZEN or continuous improvement 2.3 5s 2.4 Total Quality Management 2.5 Other management/productivity tools
3. Industry standard operating procedure	3.1 Written guidelines relative to the usage of office technology/equipment 3.2 Verbal advise/instruction from the co-worker
4. Manufacturer's operating guidelines/ instructions	4.1 Written instruction/manuals of specific technology/ equipment 4.2 General instruction manual 4.3 Verbal advise from manufacturer relative to the operation of equipment
5. Occupational health and safety procedure	5.1 Relevant statutes on OSH 5.2 Company guidelines in using technology/equipment
6. Appropriate action	6.1 Implementing preventive maintenance schedule 6.2 Coordinating with manufacturer's technician

EVIDENCE GUIDE

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Studied and selected appropriate technology consistent with work requirements 1.2 Applied relevant technology 1.3 Maintained and enhanced operative ability of relevant technology
2. Resource Implications	**The following resources should be provided:** 2.1 Relevant technology 2.2 Interview and demonstration questionnaires 2.3 Assessment packages
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Interview 3.2 Actual demonstration 3.3 Authenticated portfolio (related certificates of training/seminar)
4. Context for Assessment	4.1 Competency may be assessed in actual workplace or simulated environment

COMMON COMPETENCIES

UNIT OF COMPETENCY: PREPARE CONSTRUCTION MATERIALS AND TOOLS

UNIT CODE : CON931201

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on identifying, requesting and receiving construction (plumbing) materials and tools in various workplace settings.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Identify materials	1.1 ***Materials*** are identified as per job requirements 1.2 Quantity and ***description of materials*** conform with the job requirements 1.3 Tools and accessories are identified according to job requirements	1.1 Different work specifications 1.2 Types and uses of plumbing materials and accessories 1.3 Types and uses of plumbing tools	1.1 Identifying tools according to the job requirements 1.2 Identifying materials and accessories according to the job requirements
2 Prepare requisition of materials	2.1 Materials and tools needed are requested according to the identified requirements 2.2 Request is done as per company standard operating procedures (SOP) 2.3 Substitute materials and tools are provided without sacrificing cost and quality of work	2.1 Work requirements 2.2 Types and uses of plumbing materials and tools 2.3 Material take-off 2.4 Requisition procedures	2.1 Preparing material take-off 2.2 Requesting materials and tools

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3 Receive and inspect materials	3.1 Materials and tools issued are inspected as per quantity and specification 3.2 Tools, accessories and materials are checked 3.3 Materials and tools are set aside to appropriate location	3.1 Policy on receiving material deliveries 3.2 Material and tools quality and defects 3.3 Material handling	3.1 Checking and inspecting materials and tools 3.2 Storing/ stacking of tool and materials

RANGE OF VARIABLES

VARIABLE	RANGE
1. Materials and Tools	May include: 1.1 Electrical supplies 1.2 Structural 1.3 Plumbing 1.4 Welding/pipefitting 1.5 Carpentry 1.6 Masonry
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 SOP 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:** 4.1 Direct observation and oral questioning
4. Context of 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: OBSERVE PROCEDURES, SPECIFICATIONS AND MANUALS OF INSTRUCTIONS

UNIT CODE : CON311201

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

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms 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 are checked to ensure that correct specification and procedures are identified	1.1 Types of manuals used in plumbing 1.2 Identification of symbols used in the manuals	1.1 Identifying manuals and specifications 1.2 Accessing information and data
2. Interpret manuals	2.1 Relevant sections, chapters of specifications/ manuals are located in relation to the work to be conducted 2.2 Information and procedure in the manual are interpreted in accordance with industry practices	2.1 Types of manuals used in plumbing 2.2 Types of symbols used in 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

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
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 are 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 plumbing 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 is stored appropriately to prevent damage, ready access and updating of information when required in accordance with company requirements	4.1 Types of manuals used in plumbing 4.2 Manual storing and maintaining procedures	4.1 Storing and maintaining manuals

RANGE OF VARIABLES

VARIABLE	RANGE
1. Procedures, Specifications and Manuals of Instructions	May include: 1.1 Manufacturer's Specification Manual 1.2 Repair Manual 1.3 Maintenance Procedure Manual 1.4 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 with 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 construction sector
3. Methods of assessment	**Competency should be assessed through:** 3.1 Direct observation 3.2 Questions/interview Assessment of underpinning knowledge and practical skills may be combined
4. Context of 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: INTERPRET TECHNICAL DRAWINGS AND PLANS
UNIT CODE : CON311202

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 ***Italicized*** terms 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 Blueprint Reading and Plan Specification 1.1.1 Plumbing symbols and abbreviations 1.2 Trade Theory 1.2.1 Types of plumbing plans 1.2.2 Notes and specifications	1.1 Interpreting technical plumbing plans
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	2.1 Systems of measurement 2.1.1 Linear measurement 2.1.2 Dimension 2.1.3 Unit conversion 2.2 Types of plumbing plans 2.3 Plumbing symbols and abbreviations 2.4 Notes and specifications	2.1 Interpreting technical plumbing plans 2.2 Matching specification details with existing resources

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	2.5 Specification details are matched with existing/available resources and in line with job requirements 2.6 Work plan is drawn following the specifications		
3 Apply freehand sketching	3.1 Where applicable, correct freehand sketching is produced in accordance with the job requirements	3.1 Freehand sketching techniques 3.2 Pictorial drawing	3.1 Sketching skills

RANGE OF VARIABLES

VARIABLE	RANGE
1. Technical Plans	May include: 1.1 Electrical plans 1.2 Structural plans 1.3 Architectural plans 1.4 Plumbing plans 1.5 Mechanical plans 1.6 Welding Procedures Specifications (WPS)
2. Work plan	May include: 2.1 Job requirements 2.2 Installation instructions 2.3 Components instruction
3. Classification	May include: 3.1 Electrical 3.2 Mechanical 3.3 Plumbing
4. Drawing	May include: 4.1 Drawing symbols 4.2 Alphabet of lines 4.3 Orthographic views 4.4 Front view 4.5 Right side view/left side view 4.6 Top view 4.7 Pictorial 4.8 Schematic diagram 4.9 Electrical drawings 4.10 Structural drawings 4.11 Plumbing drawings 4.12 Water 4.13 Sewerage/Drainage 4.14 Ventilation 4.15 Welding symbols
5. Tools and materials	May include: 5.1 Compass 5.2 Divider 5.3 Rulers 5.4 Triangles 5.5 Drawing tables 5.6 Computer

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires that the candidate:** 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
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace 2.2 Drawings and specification relevant to task 2.3 Materials and instrument relevant to proposed activity
3. Methods of Assessment	**Competency should be assessed through:** 3.1 Direct Observation 3.2 Questions/Interview 3.3 Written test related to underpinning knowledge
4. Context of Assessment	4.1 Competency assessment may occur in the workplace or in 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 MENSURATIONS AND CALCULATIONS
UNIT CODE : CON311203

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on identifying and measuring objects based on the required performance standards.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** *terms* are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Select measuring instruments	1.1 Object or component to be measured is identified, classified and interpreted according to the appropriate regular ***geometric shape*** 1.2 Measuring tools are selected/identified as per object to be measured or job requirements 1.3 Correct specifications are obtained from relevant sources 1.4 Appropriate ***measuring instruments*** are selected according to job requirements 1.5 Alternative measuring tools are used without sacrificing cost and quality of work	1.1 Types of measuring tools and its uses	1.1 Selecting measuring instruments

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** *terms* are elaborated in the Range of Variable	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Carry out measurements and calculations	2.1 Accurate ***measurements*** are obtained according 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 (/) 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 Workpieces are measured according to job requirements	2.1 Measurements • Linear measurement • Geometrical measurement 2.2 Trade Mathematics • Unit conversion • Ratio and proportion • Area	2.1 Interpreting formulas for volume, areas, perimeters of plane and geometric figures 2.2 Handling of measuring instruments

RANGE OF VARIABLES

VARIABLE	RANGE
1. Geometric shape	May include: 1.1 Round 1.2 Square 1.3 Rectangular 1.4 Triangle 1.5 Sphere 1.6 Conical
2. Measuring instruments	May include: 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 ohmeter 2.16 Kilowatt hour meter 2.17 Gauges 2.18 Thermometers
3. Measurements and calculations	May include: 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

1. Critical aspects of competency	**Assessment requires that the candidate:** 1.1 Selected and prepared appropriate measuring instruments in accordance with job requirements 1.2 Performed measurements and calculations according to job requirements/ ISO
2. Resource implications	**The following resources should be provided:** 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 Assessment of underpinning knowledge and practical skills may be combined
3. Methods of assessment	**Competency should be assessed through:** 3.1 Actual demonstration 3.2 Direct observation 3.3 Written test/questioning related to underpinning knowledge
4. Context of assessment	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: MAINTAIN TOOLS AND EQUIPMENT
UNIT CODE : CON311204

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes on checking condition, performing preventive maintenance and storing of plumbing tools and equipment.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check condition of tools and equipment	1.1 ***Materials, tools and equipmen***t are identified according to classification and job requirements 1.2 Non-functional tools and equipment are segregated and labeled according to classification 1.3 Safety of tools 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 1.1.1 Use of PPE 1.1.2 Handling of tools and equipment 1.1.3 Good housekeeping 1.2 Materials, Tools and Equipment 1.2.1 Types and uses of lubricants 1.2.2 Types and uses of cleaning materials 1.2.3 Types and uses of plumbing tools 1.2.4 Types and uses of plumbing equipment 1.3 Operational conditions of plumbing tools and equipment 1.4 Plumbing tools and equipment defects	1.1 Maintaining tools and equipment 1.2 Handling of tools and equipment 1.3 Identifying tools and equipment defects

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Perform basic preventive maintenance	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 2.6 Tools are inspected, repaired and replaced after use 2.7 Work place is cleaned and kept in safe state in line with Occupational Safety and Health Standards (OSHS)	2.1 Safety Practices 2.1.1 Use of PPE 2.1.2 Handling of tools and equipment 2.1.3 Good housekeeping 2.2 Materials, Tools and Equipment 2.2.1 Types and uses of lubricants 2.2.2 Types and uses of cleaning materials 2.3 Preventive Maintenance 2.3.1 Methods and techniques 2.3.2 Procedures	2.1 Handling of tools and equipment 2.2 Performing preventive maintenance

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3. Store tools and equipment	3.1 Inventory of tools, instruments and equipment are conducted and recorded as per company practices 3.2 Tools and equipment are stored safely in appropriate locations in accordance with manufacturer's specifications or company procedures	3.1 Safety Practices 3.1.1 Use of PPE 3.1.2 Handling of tools and equipment 3.1.3 Storing procedures and techniques 3.1.4 Storage conditions/ locations	3.1 Storing tools and equipment 3.2 Handling of tools 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 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 4.4 Inspection Form 4.5 Procedures

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires that the candidate:** 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 instrument according to manufacturer's specifications 1.4 Replaced defective tools, equipment and their 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 workplace in accordance with OSHS 1.8 Stored tools and equipment safely in appropriate locations and in accordance with company practices
2. Resource implications	**The following resources should be provided:** 2.1 Workplace 2.2 Maintenance schedule 2.3 Maintenance materials, tools and equipment relevant to the proposed activity/task
3. Methods of assessment	**Competency should be assessed through:** 3.1 Direct observation 3.2 Written test/questioning relevant to Underpinning knowledge
4. Context of assessment	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

CORE COMPETENCIES

UNIT OF COMPETENCY : **INSTALL CENTRALIZED HOT-, CHILLED- AND / OR POTABLE-WATER PIPING SYSTEM**

UNIT CODE : **CON712352**

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitude in preparing, connecting, and installing centralized hot-, chilled- and potable-water piping system using copper pipes and fittings and other approved materials in a range of workplace settings.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEGE	REQUIRED SKILLS
1. Prepare pipes prior to assembly/ installation	1.1 Work instructions are read and interpreted in accordance with the job requirements 1.2 ***Pipes and fittings*** including ***materials and consumables*** are prepared according to the prescribed procedures, tolerances and finishes consistent with job requirements 1.3 ***Tools and equipment*** are selected and prepared in accordance with job requirements 1.4 Appropriate ***PPE*** is selected in accordance with job requirements	1.1 Workplace procedures 1.2 Material take-off 1.3 Blue print reading 1.4 Materials specification 1.5 work processes 1.6 Use of plumbing materials, consumables, tools and equipment 1.7 Plumbing codes 1.8 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 1.9 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	1.1 Observing work instructions 1.2 Interpreting plan symbols and details 1.3 Handling of tools and equipment 1.4 Communication (written and verbal)

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEGE	REQUIRED SKILLS
2. Perform potable-, hot- and chilled-water piping installation	2.1 Pipes and fittings are aligned, connected and welded consistent with job requirements 2.2 Pipe support/braces/insulation materials are installed according to the prescribed procedures, material specification, location and finishes consistent with job requirements 2.3 Proper use of tools and equipment is observed in accordance with the job requirements 2.4 Appropriate PPE is used in accordance with the job requirements 2.5 Work site is cleaned and kept in safe state and in accordance with Occupational Safety and Health Standards (OSHS)	2.1 Linear measurement 2.2 Blue print reading 2.3 Materials specification 2.4 Piping supports/ braces and insulations 2.5 Piping installation procedures 2.6 Plumbing codes 2.7 5S 2.8 Welding, soldering and brazing procedures 2.9 Use of plumbing tools and equipment 2.10Temperature control components and settings 2.11Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 2.12DOLE Department Order No. 13 s. 1998Guidelines Governing Occupational Safety and Health in the Construction Industry	2.1 Interpreting plan 2.2 Handling of tools and equipment 2.3 Joining copper pipes and fittings 2.4 Brazing or soldering of copper pipes and fittings 2.5 Setting/ adjustment temperature controls 2.6 Installing different types of pipes and fittings for hot and cold water line 2.7 Installing piping supports/ braces and insulations 2.8 Communication (written and verbal)

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEGE	REQUIRED SKILLS
3. Perform pipe leak testing	3.1 All openings in the pipe system are tightly closed except the highest opening prior to ***leak testing*** 3.2 Leak testing is applied after completion of roughing-ins and complete installation of pipe supports. 3.3 Testing apparatus is set to specified pressure rating according to testing standards. 3.4 Gravity or flood testing are applied to sanitary, waste, vent and storm drainage piping. 3.5 Pressure testing are applied to hot and cold water piping. 3.6 Proper use of tools and equipment is observed in accordance with manufacturer's specifications 3.7 Appropriate PPE are used in accordance with job requirements 3.8 Work site is cleaned and kept in safe state and in accordance with OSHS	3.1 Blue print reading 3.2 5S 3.3 Use of plumbing materials, tools and equipment 3.4 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 3.5 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	2.1 Interpreting plan and details 2.2 Handling of materials, tools and equipment 2.3 Communication (written and verbal) 2.4 Applying methods and techniques in pipe leak testing

RANGE OF VARIABLES

VARIABLE	RANGE
1. Pipes and fittings	May include: 1.1 Copper pipes and fittings 1.2 Pipe support and braces 1.3 PP-R pipes and fittings 1.4 Stainless pipes and fittings 1.5 BI / GI pipes and fittings
2. Materials and consumables	May include: 2.1 Soldering paste 2.2 Brazing compound 2.3 Silver rod 2.4 Soldering lead 2.5 Pipe insulation
3. Tools and equipment	May include: 3.1 Pipe cutter 3.2 Hack saw with blade 3.3 Blow torch 3.4 Steel tape 3.5 Manual Test pump 3.6 Electric test pump 3.7 Pipe wrench 3.8 Adjustable wrench 3.9 Screw driver (philip and flat) 3.10 Ballpeen Hammer 3.11 Cutting and welding outfit with oxygen and acetylene tank 3.12 Fire extinguisher
4. Personal Protective Equipment (PPE)	Must include: 4.1 Gloves 4.2 Hard hat 4.3 Safety shoes 4.4 Goggles 4.5 Dust mask 4.6 Face shield 4.7 Welding mask 4.8 Apron

EVIDENCE GUIDE

1. Critical aspects of competency	**Competency assessment requires evidence that the candidate:** 1.1 Read and interpreted work instructions in accordance with the job requirements 1.2 Prepared pipes and fittings according to the prescribed procedures, tolerances and finishes consistent with job requirements 1.3 Selected and prepared tools and equipment in accordance with job requirements 1.4 Performed potable-, hot- and chilled-water piping installation 1.5 Demonstrated compliance with safety regulations applicable to work site operations 1.6 Identified and rectified faults and problems related to installation of potable-, hot- and chilled-water piping system 1.7 Communicated interactively with others where applicable to ensure safe and effective work operations
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace location 2.2 Tools and equipment appropriate to construction processes 2.3 Materials relevant to the proposed activity 2.4 Drawings and specifications relevant to the task
3. Methods of Assessment	**Competency should be assessed through:** 3.1 Direct observation on application of tasks 3.2 Questions related to required knowledge 3.3 Written examination
4. Context for Assessment	4.1 Competency may be assessed in the workplace or in a simulated workplace setting

UNIT OF COMPETENCY : INSTALL RISER/DOWNFEED AND DISTRIBUTION WATER SUPPLY SYSTEM

UNIT CODE : CON712353

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in installing/assembling riser/downfeed and distribution of water supply pipes in all types of building.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Fit-up joints of pipes and fittings	1.1 All measurements are in accordance with the piping lay-out/plans and specifications 1.2 Joint*s* are made with strict compliance to plumbness and levelness and / or alignment in accordance with job requirements. 1.3 Appropriate ***tools and equipments*** are selected in line with job requirements 1.4 Appropriate ***PPE*** is selected in accordance with jobrequirements 1.5 Joints between ***pipes and fittings*** are properly cleaned and fitted-up for a leak free connections. 1.6 Dry fittings are performed in accordance with job requirements. 1.7 All ***valves*** are tagged and identified according to its usage and specifications. 1.8 Pipe supports and braces are installed rigidly and secured in accordance with the approved plans	1.1 Linear measurements 1.2 Blue print reading 1.3 Materials specification 1.4 Scaffolding erection procedures 1.5 Plumbing codes 1.6 Use of tools and equipment 1.7 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 1.8 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	1.1 Interpreting plan 1.2 Handling of tools and equipment 1.3 Erecting scaffolding flat form assembly 1.4 Installing pipe supports and braces 1.5 Communication (written and verbal)

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	1.9 Erect scaffoldings and flat forms according to job requirements and safety standards		
2. Perform precise pipe cutting and connection	2.1 All measurements are in accordance with the piping lay-out/plans and specifications 2.2 Threaded connections are done in line with the piping table and approved specification 2.3 Teflon tape or any other type of jointing materials are used to ensure the water tightness of the joint according to job description. 2.4 Testing is applied after completion of installation in accordance with the job requirements 2.5 Appropriate PPE are used in accordance with job requirements 2.6 Materials tools and equipment are selected in accordance to job requirements	2.1 Linear measurements 2.2 Blue print reading 2.3 Materials specification 2.4 Pipe cutting and connecting procedures 2.5 Plumbing codes 2.6 5S 2.7 Use of materials tools and equipment 2.8 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 2.9 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	2.1 Interpreting plan 2.2 Handling of tools, equipment and materials 2.3 Performing linear measurement 2.4 Cutting pipes and connecting techniques
3. Make piping connections using fussed, butt and flange	3.1 PP-R pipes and fittings connections are fitted and fussed according to standard practice *3.2* Flange is fully welded according to standard practice	3.1 Linear measurements 3.2 Blue print reading 3.3 Materials specification 3.4 Plumbing codes 3.5 5S 3.6 Types of pipes and characteristics	3.1 Interpreting plans 3.2 Handling of tools, equipment and materials 3.3 Performing linear measurement

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
	3.3 HDPE pipes and fittings connections are fitted according to standard practice 3.4 Appropriate PPE are used in accordance with job requirements 3.5 Tools and equipment are selected according to job requirements 3.6 Scaffoldings and platforms are erected according to job requirements and safety standards	3.7 Installing PP-R and HDPE pipes and fittings installation procedures 3.8 Use of materials, tools and equipment 3.9 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 3.10 DOLE Department Order No. 13 s. 1998 (Guidelines Governing Occupational Safety and Health in the Construction Industry)	3.4 Applying scaffoldings and flat form assembly 3.5 Connecting pipes through fuse, butts and flange
4. Fabricate & install pipe hangers, sway braces and supports	4.1 Pipe hangers, sway braces and supports are fabricated and installed according to standards and specifications. 4.2 Appropriate tools and equipments are selected in line with job requirements *4.3* ***Pipes and fittings*** supports are properly anchored according to job requirements 4.4 Erect scaffoldings and flat forms according to job requirements and safety standards	4.1 Linear measurements 4.2 Blue print reading 4.3 Materials specification 4.4 Plumbing codes 4.5 5S 4.6 Piping supports fabrications and installation 4.7 Scaffolding erection 4.8 Use of materials, tools and equipment 4.9 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 4.10 DOLE Department Order No. 13 s. 1998`Guidelines Governing Occupational Safety and Health in the Construction Industry	4.1 Interpreting plans 4.2 Handling of materials tools, equipment 4.3 Handling and maintenance of tools and equipment 4.4 Erecting scaffolding flatform assembly 4.5 Fabricating and installing of various pipe hangers and supports

RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools and Equipment	May include: 1.1 Pipe threader 1.2 Pipe wrench 14”- 36” 1.3 Push – pull rule/steel tape 1.4 Reamer 1.5 Pipe Vise 1.6 Pipe cutter/hacksaw 1.7 Hammer 1.8 Leveling tools 1.9 Welding machine 1.10 Threading machine 1.11 Cutting outfit set 1.12 Electric drill 1.13 Combination wrench 1.14 Screw Drivers (phillips & flat) 1.15 Flash Light 1.16 Chain Block 1.17 Rope and Pulley 1.18 Fusion tools 1.19 Fire extinguisher
2. Personal Protective Equipment (PPE)	Must include: 2.1 Gloves 2.2 Hard hat 2.3 Safety Shoes 2.4 Goggles 2.5 Safety Harness 2.6 Safety Belts 2.7 Face shield 2.8 Welding mask 2.9 Apron
3. Pipes and fittings	May include: 3.1 Stainless Steel pipes and fittings 3.2 PP-r pipes and fittings 3.3 G.I. pipes and fittings 3.4 HDPE pipes and fittings 3.5 Copper pipes and fittings 3.6 ABS pipes and fittings

VARIABLE	RANGE
4. Valves	May include: 4.1 Foot Valve 4.2 Check Valve 4.3 Float Valve 4.4 Gate Valve 4.5 Butterfly Valve 4.6 Pressure Reducing Valve 4.7 Pressure Relief Valve 4.8 Globe Valve

EVIDENCE GUIDE

1. Critical aspects of competency	**Competency assessment requires evidence that the candidate:** 1.1 Read and interpreted work instructions/plans in accordance with the job requirements 1.2 Selected and prepared materials, tools and equipment according to job requirements 1.3 Installed pipes and fittings in accordance with the approved working plan and materials specifications 1.4 Installed building upfeed/downfeed pipes in accordance with approved working plan and materials specifications and followed standard plumbness and alignment requirements 1.5 Installed horizontal pipes according to specified rough-in measurements and/or manufacturer's specifications and required standard in the RNPCP 1.6 Demonstrated compliance with safety regulations applicable to work site operations 1.7 Identified faults and problems that occur and made necessary action to rectify 1.8 Communicated interactively with others where applicable to ensure safe and effective work operations 1.9 Completed performing installation of riser/down feed piping for the complex/multi-storey plumbing installation / assemblies within specifications 1.10 Fabricated & installed pipe hangers, sway braces and supports
2. Resource Implications	**The following resources should be provided:** 1.11 Tools and equipment appropriate to construction processes 1.12 Materials relevant to the proposed activity 1.13 Drawings and specifications relevant to the task
3. Methods of Assessment	**Competency should be assessed through:** 3.1 Direct observation of application to tasks 3.2 Questions related to underpinning knowledge 3.3 Oral Questioning or written examination
4. Context for Assessment	1.14 Competency may be assessed in the workplace or in a simulated workplace setting

UNIT OF COMPETENCY : INSTALL AND CONNECT PUMPS TO PLUMBING SYSTEM
UNIT CODE : CON712354
UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in installing and connecting pumps to plumbing system.

ELEMENT	PERFORMANCE CRITERIA *Italicized* terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Mount and install pumps and accessories	1.1 Location of pump mounting pad are identified and selected for installation of pump and accessories according to plan. 1.2 ***Rating and capacity*** of pumps and accessories are checked in accordance with the application and uses. 1.3 Pump ***Operation and maintenance*** manual are read and interpreted according to manufacturer's specifications. 1.4 ***Power requirements*** of pumps and accessories are identified in accordance with the voltage requirements. 1.5 Appropriate ***PPE*** are selected and used in accordance with the job requirements. 1.6 Appropriate tools and equipments are selected in line with job requirements	1.1 Blue print reading 1.2 Linear measurement 1.3 Types of Pumps and specifications 1.4 Various pump mounting/ installation procedures 1.5 Plumbing codes and local regulations 1.6 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 1.7 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	1.1 Interpreting plans, 1.2 Handling of tools and equipment 1.3 Communication (written and verbal) 1.4 Mounting and installing of pumps and accessories 1.5 Applying waste management procedures

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Identify and select capacity and rating of valves	2.1 Capacity and rating of valves are identified and selected in line with pump rating capacity. 2.2 Normally open or closed gate valves are marked during system operation. 2.3 Operation and maintenance manual of each valve are identified according to each application.	2.1 Blue print reading 2.2 Mensuration (Volume, Pressure) 2.3 Valves specifications 2.4 Valve connections and procedures 2.5 Plumbing codes 2.6 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	2.1 Interpreting plans, symbols 2.2 Communication (written and verbal) 2.3 Identifying and selecting various types of valves
3. Test and commission pumps and accessories	1.1 All pumps and accessories are installed in accordance with approved plan. 1.2 Power requirements of pumps and accessories are checked and verified in accordance with the application. 1.3 Testing and commissioning of pumps and accessories are strictly followed in accordance with the operation and maintenance manual. 1.4 Appropriate tools are selected in line with job requirements	3.1 Blue print reading 3.2 Pumps specifications 3.3 Testing and commissioning procedures 3.4 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 3.5 DOLE Department Order No. 13 s. 1998 (Guidelines Governing Occupational Safety and Health in the Construction Industry)	3.1 Interpreting plans 3.2 Handling of tools 3.3 Communication (written and verbal) 3.4 Applying pump testing and commissioning

RANGE OF VARIABLES

VARIABLE	RANGE
1. Rating and capacity	May include: 1.1 Horsepower/KW requirement 1.2 Total dynamic head (TDH) 1.3 1800 – 3600 RPM 1.4 Vertical Turbine or Centrifugal type 1.5 Clogged or non - clogged type
2. Operation and Maintenance	May include: 2.1 Predictive Maintenance 2.2 Preventive Maintenance 2.3 Reactive Maintenance 2.4 Pressure Gauges Maintenance
3. Power requirements	May include: 3.1 220 / 440 volts 3.2 380 – 400 volts 3.3 Single Phase or 3 phase 3.4 50 – 60 Hertz
4. Personal Protective Equipment (PPE)	Must include: 4.1 Safety shoes 4.2 Hard hat 4.3 Face shield 4.4 Dust mask 4.5 Welding mask 4.6 Goggles 4.7 Safety harness / belt 4.8 Apron

EVIDENCE GUIDE

1. Critical aspects of competency	**Competency assessment requires evidence that the candidate:** 1.1 Read and interpreted work instructions 1.2 Mounted and installed pumps and accessories according to job requirements. 1.3 Identified and selected the rating and capacity of valves (PSI and GPM rating) 1.4 Performed testing and commissioning of pumps and accessories 1.5 Identified and selected power requirements of the pumps 1.6 Demonstrated compliance with safety regulations applicable to worksite operations 1.7 Selected materials, tools and equipment according to job requirements. 1.8 Communicated interactively with others where applicable to ensure safe and effective work operations
2. Resource Implications	**The following resources should be provided:** 2.1 Blue–print drawing and specifications relevant to job requirements 2.2 Complete tools and equipment appropriate for the pump installation 2.3 Valves and other relevant materials and equipment to the proposed activity
3. Methods of Assessment	**Competency should be assessed through:** 3.1 Direct observation of application to tasks 3.2 Questions related to required knowledge and skills 3.3 Oral and written exam
4. Context for Assessment	4.1 Competency may be assessed in the workplace or in a simulated workplace setting

UNIT OF COMPETENCY : PERFORM FINISHING AND TRIMMINGS OF PLUMBING FIXTURES AND ACCESSORIES

UNIT CODE : CON712355

UNIT DESCRIPTOR : This unit covers the knowledge, skills and attitudes in performing the finishing and trimming of various plumbing fixtures and accessories.

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Determine stub-outs for plumbing fixture	1.1 Location and roughing-in stub-out is determined within the scope of the working plan. 1.2 Plumbing fixtures are mounted upon approval of person in charge. 1.3 ***Finishing tools and equipment*** are prepared in accordance with the job requirements 1.4 ***Plumbing fixtures*** are listed and selected in accordance with finishing schedules. 1.5 Reports are prepared and submitted to person in charge in accordance to job requirements.	1.1 Linear measurement 1.2 Blueprint reading 1.3 Use of finishing tools and equipment 1.4 Types of plumbing fixtures 1.5 Plumbing codes 1.6 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 1.7 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	1.1 Interpreting plans 1.2 Handling of tools and equipments 1.3 Mounting plumbing fixtures 1.4 Communication (written and verbal)

ELEMENT	PERFORMANCE CRITERIA ***Italicized*** terms are elaborated in the Range of Variables	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2. Prepare plumbing fixtures	2.1 Plumbing fixtures are prepared according to the prescribed requirements, steps and procedures. 2.2 Proper use of finishing tools and equipment is observed in accordance to manufacturer's instruction manual. 2.3 Plumbing fixtures and ***accessories*** are checked and verified according to job requirements. 2.4 Reports are prepared and submitted to person in charge in accordance to job requirements.	2.1 Materials specification 2.2 Use of finishing tools and equipments 2.3 Types of plumbing fixtures an accessories 2.4 Reporting procedures 2.5 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	2.1 Interpreting plan 2.2 Handling of tools and equipments 2.3 Handling plumbing fixtures 2.4 Interpreting manufacturers instructions manual 2.5 Communication (written and oral)
3. Finish and trim plumbing fixtures	3.1 Plumbing fixtures are mounted and trimmed according to manufacturer's instruction manuals. 3.2 Finishing tools and equipment are selected and used in accordance with job requirements 3.3 Testing and flushing is conducted in accordance with the job requirements 3.4 Housekeeping is performed in accordance with OSHS 3.5 Used appropriate ***PPE*** uniform	2.6 Linear measurements 2.7 Blueprint reading 2.8 Materials specification 2.9 Use of finishing tools and equipment 2.10 Plumbing fixtures mounting and trimming procedures 2.11 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 2.12 DOLE Department Order No. 13 s. 1998Guidelines Governing Occupational Safety and Health in the Construction Industry	3.1 Interpreting plans 3.2 Handling of tools and equipments 3.3 Handling plumbing fixtures 3.4 Interpreting manufacturers instructions manual 3.5 Mounting and trimming plumbing fixtures 3.6 Communication (written and verbal)

RANGE OF VARIABLES

VARIABLE	RANGE
1. Finishing tools and equipment	May include: 1.1 Templates for Watercloset & Lavatory 1.2 Marking Pens 1.3 Basin Wrench 1.4 Adjustable wrench 10”-16” 1.5 Mechanical pliers 1.6 Pipe cutter (1/4’-1-1/2”) 1.7 Cold Chisel 10” 1.8 Gun Sealant 1.9 Hack saw with blade 1.10 Push-pull rule or steel tape 1.11 Spirit level/Level bar 1.12 Electric Drill with bits 1.13 Electric Grinder 1.14 Ball peen Hammer 1.15 Spud wrench 1.16 Strap Wrench 1.17 Screwdriver (philip and flat) 1.18 Rags 1.19 Sand paper 1.20 Paint brush 1.21 Allen wrench
2. Plumbing fixtures	May include: 2.1 Waterclosets with flush valve/ tank 2.2 Lavatory with faucet 2.3 Urinal with sloan or push button valve 2.4 Shower head & valve 2.5 Bath tub with waste and over flow fittings 2.6 Bidet 2.7 Kitchen sink with faucet 2.8 Mop Sink with faucet 2.9 Drinking fountain 2.10 Laundry sink 2.11 Floor drains 2.12 Grease Trap

VARIABLE	RANGE
3. Accessories	May include: 3.1 Paper holder 3.2 Soap holder 3.3 Robe hook 3.4 Towel bar hanger 3.5 Tumbler Holder 3.6 Toothbrush holder 3.7 Soap Dispenser 3.8 Supply pipe 3.9 Angle valve 3.10 Strainer 3.11 Tail piece 3.12 Lavatory traps 3.13 Lavatory pop-up plug 3.14 Lavatory ear bracket 3.15 Water heater with bracket 3.16 Urinal bracket 3.17 Floor drain
4. Personal Protective Equipment (PPE)	Must include: 3.7 Safety Shoes 3.8 Hard hat 3.9 Gloves 3.10 Goggles 3.11 Face shield 3.12 Dust mask

EVIDENCE GUIDE

1. Critical aspects of competency	**Competency assessment requires evidence that the candidate:** 1.1 Determined location and roughing-in stub-outs of plumbing fixtures. 1.2 Consulted the person in-charge on the finishing and trimming works. 1.3 Prepared and observed correct used of finishing tools and equipment in accordance with the job requirements. 1.4 Listed and selected plumbing fixtures in accordance with the job requirements. 1.5 Prepared report to be submitted to person in-charge in accordance with the job requirements. 1.6 Prepared plumbing fixtures in accordance with the job requirements. 1.7 Checked and verified plumbing fixtures and accessories according to manufacturer's manual. 1.8 Mounted and trimmed plumbing fixtures and accessories according to job requirements. 1.9 Applied testing after completion of finishing and trimming. 1.10 Performed housekeeping in accordance with OSHA standards.
2. Resource Implications	**The following resources should be provided:** 2.1 Workplace location 2.2 Appropriate finishing tools and equipments 2.3 Materials relevant to the proposed activity 2.4 Drawings and specifications relevant to the task
3. Methods of Assessment	**Competency should be assessed through:** 3.1 Direct observation on application of tasks 3.2 Questions related to required knowledge 3.3 Hands on and application 3.4 Written examinations
4. Context for Assessment	4.1 Competency may be assessed in the workplace or in a simulated workplace setting

UNIT OF COMPETENCY : OVERSEE PLUMBING WORKS

UNIT CODE : CON712356

UNIT DESCRIPTOR : This unit deals with knowledge, skills and attitudes in the oversight or supervision of the plumbing works.

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are elaborated in the Range of Variables*	REQUIRED KNOWLEDGE	REQUIRED SKILLS
1. Check preparation undertaken prior plumbing works	1.1 Preparatory activities are checked based on workplace procedures and job requirements 1.2 ***Tools and equipment*** are checked before start of work 1.3 Safety of manpower is observed and ensured in accordance with job requirements	1.1 Workplace procedures 1.2 Material take-off 1.3 Blue print reading 1.4 Materials specification 1.5 work processes 1.6 Use of plumbing materials, consumables, tools and equipment 1.7 Plumbing codes 1.8 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 1.9 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	1.1 Observing work instructions 1.2 Interpreting plan symbols and details 1.3 Handling of tools and equipment 1.4 Communication (written and verbal) 1.5 Handling of Manpower and safety control

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are elaborated in the Range of Variables*	REQUIRED KNOWLEDGE	REQUIRED SKILLS
2 Check compliance with occupational work and safety standards	2.1 All measurements, joints, ***appropriate PPE***, materials, tools and equipment are checked in accordance with occupational health and safety guidelines 2.2 All ***valves***, pipe supports, hangers and sway braces are checked for plumbness in accordance with work standards 2.3 Safety of manpower is observed in accordance with job requirements	2.1 Linear measurement 2.2 Blue print reading 2.3 Materials specification 2.4 Piping supports/ braces and insulations 2.5 Piping installation procedures 2.6 Plumbing codes 2.7 5S 2.8 Welding, soldering and brazing procedures 2.9 Use of plumbing tools and equipment 2.10 Temperature control components and settings 2.11 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 2.12 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	2.1 Interpreting plan 2.2 Handling of tools and equipment 2.3 Joining copper pipes and fittings 2.4 Brazing or soldering of copper pipes and fittings 2.5 Setting adjustment temperature controls 2.6 Installing different types of pipes and fittings for hot and cold water line 2.7 Installing piping supports/ braces and insulations 2.8 Communication (written and verbal) 2.9 Handling of Manpower and safety control

ELEMENT	PERFORMANCE CRITERIA *Italicized terms are elaborated in the Range of Variables*	REQUIRED KNOWLEDGE	REQUIRED SKILLS
3 Check quality of work performance	3.1 Location of pump, ***ratings, capacity and power requirements*** are determined, and evaluated in accordance with manufacturer's manual. 3.2 Pump operation, maintenance manual, and appropriate tools and equipment are checked in accordance with work standards. 3.3 Safety of manpower is observed in accordance with job requirements	3.6 Blue print reading 3.7 Types of Pumps and specifications 3.8 Various pump mounting/ installation procedures 3.9 Plumbing codes and local regulations 3.10 Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) 3.11 DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	3.1 Interpreting plans, 3.2 Handling of tools and equipment 3.3 Communication (written and verbal) 3.4 Mounting and installing of pumps and accessories 3.5 Applying waste management procedures 3.6 Handling of Manpower and safety control

RANGE OF VARIABLES

VARIABLE	RANGE
1. Tools and equipment	May include: 1.1 Pipe cutter 1.2 Hack saw with blade 1.3 Blow torch 1.4 Steel tape 1.5 Manual Test pump 1.6 Electric Test pump 1.7 Pipe wrench 1.8 Adjustable wrench 1.9 Screw driver (Philip and flat) 1.10 Ballpeen Hammer 1.11 Cutting and welding outfit with oxygen and acetylene tank 1.12 Fire extinguisher
2. Personal Protective Equipment (PPE)	May include: 2.1 Gloves 2.2 Hard hat 2.3 Safety shoes 2.4 Goggles 2.5 Dust mask 2.6 Face shield 2.7 Welding mask 2.8 Apron
3. Valves	May include: 3.1 Foot Valve 3.2 Check Valve 3.3 Float Valve 3.4 Gate Valve 3.5 Butterfly Valve 3.6 Pressure Reducing Valve 3.7 Pressure Relief Valve 3.8 Globe Valve
4. Rating and capacity	May include: 4.1 Horsepower/KW requirement 4.2 Total dynamic head (TDH) 4.3 1800 – 3600 RPM 4.4 Vertical Turbine or Centrifugal type 4.5 Clogged or non - clogged type
5. Power requirements	5.1 220 / 440 volts 5.2 380 – 400 volts 5.3 Single Phase or 3 phase 5.4 50 – 60 Hertz

EVIDENCE GUIDE

1. Critical aspects of competency	**Assessment requires evidence that the candidate :** 1.1 Checked preparation undertaken prior to conduct of plumbing work 1.2 Ensured compliance with occupational work and safety standards 1.3 Ensured quality of work performance 1.4 Demonstrated awareness of DOLE Department Order No. 13 s. 1998 (Guidelines Governing Occupational Safety and Health in the Construction Industry)
2. Resource Implications	**The following resources should be provided :** 2.1 Access to relevant workplace where assessment can take place 2.2 Tools, equipment and materials/supplies relevant to the activity or task
3. Methods of Assessment	**Competency in this unit may be assessed through:** 3.1 Written Examination 3.2 Oral Questioning 3.3 Portfolio
4. Context of Assessment	4.1 Competency may be assessed in relevant workplace setting (accredited assessment centers) 4.2 Assessment shall be observed while tasks are being undertaken individually

SECTION 3 TRAINING ARRANGEMENTS

These standards are developed to give technical and vocational education and training (TVET) provides information and guidance on important requirements needed to when designing training programs for certain qualifications.

These include information on curriculum design; training delivery; trainee entry requirements; tools and equipment; training facilities; and trainer's qualification.

3.1 CURRICULUM DESIGN

TESDA shall provide the training on the development of competency-based curricula to training providers. This will equip them with needed knowledge and skill in developing their own curricula based on 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 accompany their curricula.

Course Title: PLUMBING **NC Level: III**

Nominal Training Duration: **24 hours (Basic)**
24 hours (Common)
200 hours (Core)
248 hours

Course Description:

This course is designed to equip individual with operation skills in Plumbing, such as install centralized hot, chilled and/or potable water piping system, install riser/downfeed and distribution water supply system, install and connect pumps to plumbing system, perform finishing and trimming of plumbing fixtures and accessories and oversee plumbing works.

To complete the course, all units prescribed for this qualification must be achieved:

BASIC COMPETENCIES

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
1. Lead workplace communication	1.1 Communicate information about workplace processes	• Organization requirements for written and electronic communication methods • Effective verbal communication methods • Sources of information	• Organize information • Understand and convey intended meaning • Comply with organization requirements for the use of written and electronic communication methods	• Lecture • Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour
	1.2 Lead workplace discussions	• Effective verbal communication methods • Organizational policy on production, quality and safety • Goals/ objectives and action plan setting	• Participate in variety of workplace discussions • Prepare/set action plans based on organizational goals and objectives	• Group discussion • Practical exercises	• Observation and oral questioning • Written test	1 hour
	1.3 Identify and communicate issues arising in the workplace	• Effective verbal and written communication methods • Organizational policy in dealing with issues and problems	• Organize information • Understand and convey intended meaning	• Group discussion • Practical exercises	• Observation and oral questioning • Written test	2 hours
2. Lead small team	2.1 Provide team leadership	• Company policies and procedures • Client expectations	• Communication skills required for leading teams	• Lecture • Demonstration • Practical exercises	• Observation and oral questioning	1 hour

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
			• Team building skills		• Written test	
	2.2 Assign responsibilities	• Client expectations • Team member's duties and responsibilities	• Skills and techniques in promoting team building • Negotiating skills	Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour
	2.3 Set performance expectations for team members	• How performance expectations are set • Client expectations • Team member's duties and responsibilities	• Skills in setting individual target/expectation • Up to date dissemination of instruction and requirements to members	• Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour
	2.4 Supervise team performance	• Methods of Monitoring Performance	• Skills in monitoring team performance • Listening and treating individual team members concern	• Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour
3. Solve workplace problems related to work activities	3.1 Identify the problem	• Observation, investigation & analytical techniques • Brainstorming • Cause and effect diagrams • PARETO analysis • SWOT analysis • GANT chart • PERT CPM & graph • SCATTERGRAMS	• Identifying & clarifying the nature of problem • Application of analytical techniques • Normal operating parameters & product quality	• Lecture • Demonstration • Practical exercises	• Observation and oral questioning • Written test	2 hours
	3.2 Determine fundamental cause of the problem	• Relevant equipment and operational processes • Enterprise goals, targets and	• Using range of formal problem solving techniques • Identifying and clarifying the nature of	• Lecture • Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		measures • Enterprise quality, OSH and environmental requirement • Non-routine process and quality problems • Teamwork and work allocation problem • Safety and emergency situations and incidents	the problem			
	3.3 Determine correct / preventive action	• Principles of decision making strategies and techniques	• Devising the best solution • Evaluating the solution • Implementation of a developed plan to rectify the problem	• Lecture • Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour
	3.4 Provide recommendation to manager	• Enterprise information systems and data collation • Industry codes and standards	• Writing recommendation letter	• Lecture • Demonstration • Practical exercises	• Observation and oral questioning • Written test	1 hour
4. Develop and practice negotiation skills	4.1 Identify relevant information in planning negotiations	• Codes of practice and guidelines for the organization • Organizations policy and procedures for negotiations • Decision making and conflict resolution strategies procedures	• Observing differences between content and process • Identifying bargaining information • Applying strategies to manage process • Applying steps in negotiating process • Strategies to manage	• Direct observation	• Written test	2 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		• Flexibility	conflict • Steps in negotiating process			
	4.2 Participate in negotiations	• Decision making and conflict resolution strategies procedures • Problem solving strategies on how to deal with unexpected questions and attitudes during negotiation • Empathy	• Interpersonal skills to develop rapport with other parties • Communication skills (verbal and listening) • Observation skills • Negotiation skills	• Simulation / role playing • Case studies	• Practical / performance test	1 hour
	4.3 Document areas for agreement	• Procedure in documenting negotiations	• Managing information • Filing documents	• Simulation / role playing • Case studies	• Practical / performance test	1 hour
5. Use mathematical concepts and techniques	5.1 Identify mathematical tools and techniques to solve problems	• Fundamental operation (addition, subtraction, division, multiplication) • Measurement system • Precision and accuracy • Basic measuring	• Applying mathematical computations • Using calculator • Using different measuring tools	• Direct observation	• Written test	1 hour

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
	5.2 Apply mathematical procedures / solution	• Problem-based questions • Estimation • Use of mathematical tools and standard formulas • Mathematical techniques	• Applying mathematical computations • Using calculator • Using different measuring tools	• Simulation / role playing	• Practical performance test	1 hour
	5.3 Analyze results	• Fundamental operation (addition, subtraction, division, multiplication) • Measurement system • Precision and accuracy • Basic measuring tools/devices	• Applying mathematical computations • Using calculator • Using different measuring tools	• Case studies	• Practical performance test	2 hours
6. Use relevant technologies	6.1 Identify appropriate technology	• Awareness on technology and its function • Operating instructions • Company policy in relation to relevant technology	• Relevant technology application/ implementation • Basic communication skills	• Direct observation	• Written test	1 hour
	6.2 Apply relevant technology	• Applicable software • Communication techniques • Health and safety procedure • Different management concepts	• Relevant technology application/ implementation • Basic communication skills • Software applications skills	• Simulation / role playing	• Practical / performance test	1 hour

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		• Technology adaptability				
	6.3 Maintenance / enhance relevant technology	• Repair and maintenance procedure • Operating instructions	• Software applications skills • Basic troubleshooting skills	• Case studies	• Practical / performance test	1 hour

COMMON COMPETENCIES

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
1. Prepare construction materials and tools	1.1 Identify materials	• Different work specifications • Types, uses and description of plumbing materials and accessories • Types, uses and description of plumbing tools • List of materials as per company standards	• Identifying tools according to the job requirements • Identifying materials and accessories according to the job requirements	• Lecture-demonstration • Group discussion • PowerPoint presentation	• Direct observation • Questions or interview • Written test • Portfolio (credentials)	1 hour
	1.2 Requisition materials	• Work requirements • Types and uses of plumbing materials and tools • Material take-off • Requisition procedures	• Preparing material take-off • Requesting materials and tools	• Simulation • Discussion	• Direct observation • Questions or interview	1 hour
	1.3 Receive and inspect materials	• Policy on receiving material deliveries • Material and tools quality and defects • Material handling	• Checking and inspecting materials and tools • Storing/ stacking of tool and materials	• Practical Exercise • Demonstration	• Written / Oral Test • Demonstration	2 hours
2. Observe procedures, Specifications and Manuals of Instructions	2.1 Identify and access specification/ manuals	• Types of manuals used in plumbing • Identification of symbols used in the manuals	• Identifying manuals and specifications • Accessing information and data	• Lecture-demonstration	• Oral questioning • Written test or examination	2 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
	2.2 Interpret manuals	• Types of manuals used in plumbing • Types of symbols used in manuals • System of measurements • Unit conversion	• Interpreting symbols and specifications • Accessing information and data • Applying conversion of units of measurements	• Actual demonstration • Group discussion	• Direct observation • Written test or examination	2 hours
	2.3 Apply information in manual	• Types of manuals used in plumbing • Types and application of symbols in manuals • Unit conversion	• Applying information from manuals	• Demonstration • Group discussion	• Demonstration (able to impart knowledge and skills) • Practical and oral exam	2 hours
	.1 Store Manual	• Types of manuals used in plumbing • Manual storing and maintaining procedures	• Storing and maintaining manuals	• Demonstration • Group discussion	• Demonstration • Practical and oral exam	2 hours
3. Perform mensuration and calculation	3.1 Select measuring instruments	• Types of measuring tools and its uses	• Selecting measuring instruments	• Lecture-demonstration • Group discussion	• Direct observation • Oral questioning	2 hours
	3.2 Carry out measurements and calculations	• Measurements • Linear measurement • Geometrical measurement • Trade Mathematics • Unit conversion • Ratio and proportion • Area	• Interpreting formulas for volume, areas, perimeters of plane and geometric figures • Handling of measuring instruments	• Group discussion • Practical Lab • Demonstration	• Written test or examination • Third party report • Demonstration (able to impart knowledge and skills)	2 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
4. Maintain Tools and Equipment	4.1 Check condition of tools and equipment	• Safety practices - use of PPE - handling of tools and equipment - good housekeeping • Materials, tools and equipment - types and uses of lubricants - types and uses of cleaning materials - types and uses of plumbing tools - types and uses of plumbing equipment • Operational conditions of plumbing tools and equipment • Plumbing tools and equipment defects	• Maintaining tools and equipment • Handling of tools and equipment • Identifying tools and equipment defects	• Lecture-demonstration • Group discussion	• Direct observation • Oral questioning	2 hours
	4.2 Perform basic preventive maintenance	• Safety practices - use of PPE - handling of tools and equipment - good housekeeping • Materials, tools and equipment - types and uses of lubricants - types and uses of cleaning materials	• Handling of tools and equipment • Performing preventive maintenance	• Simulation • Group discussion • Practical Lab • Demonstration	• Written test or examination • Third party report • Demonstration (able to impart knowledge and skills)	3 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		• Preventive maintenance - Methods and techniques - Procedures				
	4.3 Store tools and equipment	• Safety practices - use of PPE - handling of tools and equipment - good housekeeping - Storing procedures and techniques - Storage conditions/ locations	• Storing tools and equipment • Handling of tools and equipment	• Demonstration • Group discussion • Practical Lab	• Practical exam • Direct observation • Written test	3 hours

CORE COMPETENCIES

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
1. Install centralized hot-, chilled- and potable-water piping system	1.1 Prepare pipes prior to assembly/ installation	• Workplace procedures • Material take-off • Blue print reading • Materials specification • work processes • Use of plumbing materials, consumables, tools and equipment • Plumbing codes	• Observing work instructions • Interpreting plan symbols and details • Handling of tools and equipment • Communication (written and verbal)	• Lecture • Discussion	• Observation • Written and oral examination	20 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		• Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry				
	1.2 Perform potable hot and chilled water piping installation	• Linear measurement • Blue print reading • Materials specification • Piping supports/ braces and insulations • Piping installation procedures • Plumbing codes • 5S • Welding, soldering and brazing procedures • Use of plumbing tools and equipment • Temperature	• Interpreting plan • Handling of tools and equipment • Joining copper pipes and fittings • Brazing or soldering of Copper pipes and fittings • Setting/ adjustment temperature controls • Installing different types of pipes and fittings for hot and cold water line • Installing piping supports/ braces and insulations • Communication (written and verbal)	• Demonstration • Practical exercises	• Demonstration	20 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		control components and settings • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry				
2. Install riser/ downfeed and distribution water supply system	2.1 Fit –up joint of pipes and fittings	• Linear measurements • Blue print reading • Materials specification • Scaffolding erection procedures • Plumbing codes • Use of tools and equipment • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines	• Interpreting plan • Handling of tools and equipment • Erecting scaffolding flat form assembly • Installing pipe supports and braces • Communication (written and verbal)	• Discussion • Lecture/ • Demonstration	• Observation • Written and oral examination • Demonstration	10 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		Governing Occupational Safety and Health in the Construction Industry				
	2.2 Perform precise pipe cutting and threading	• Linear measurements • Blue print reading • Materials specification • Pipe cutting and connecting procedures • Plumbing codes • 5S • Use of materials tools and equipment • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	• Interpreting plan • Handling of tools, equipment and materials • Performing linear measurement • Cutting pipes and connecting techniques	• Discussion • Lecture/ • Demonstration • Practical exercises/ hands-on	• Observation • Written and oral examination • Demonstration	10 hours 10 hours
	2.3 Make piping connections using fussed,	• Linear measurements	• Interpreting plans • Handling of tools,	• Discussion • Lecture/	• Observation • Written and	

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
	butt and flange	• Blue print reading • Materials specification • Plumbing codes • 5S • Types of pipes and characteristics • Installing PP-R and HDPE pipes and fittings installation procedures • Use of materials, tools and equipment • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	equipment and materials • Performing linear measurement • Applying scaffoldings and flat form assembly • Connecting pipes through fuse, butts and flange	• Demonstration • Practical exercises/ hands-on	oral examination • Demonstration	10 hours
	2.4 Fabricate & install pipe hangers, sway braces and supports	• Linear measurements • Blue print reading • Materials specification • Plumbing codes	• Interpreting plans • Handling of materials tools, equipment • Handling and maintenance of tools and equipment • Erecting scaffolding	• Discussion • Lecture/ • Demonstration • Practical exercises/ hands-on	• Observation • Written and oral examination • Demonstration	

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		• 5S • Piping supports fabrications and installation • Scaffolding erection • Use of materials, tools and equipment • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	flatform assembly • Fabricating and installing of various pipe hangers and supports			
3. Install and connect pumps to plumbing system	3.1 Mount and install pumps and accessories	• Blue print reading • Linear measurement • Types of Pumps and specifications • Various pump mounting/ installation procedures • Plumbing codes and local regulations • Environmental-	• Interpreting plans, • Handling of tools and equipment • Communication (written and verbal) • Mounting and installing of pumps and accessories • Applying waste management procedures	• Discussion • Lecture/ • Demonstration • Practical exercises/ hands-on	• Observation • Written and Oral • examination • Demonstration	14 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry				12 hours
	3.2 Identify and select the capacity and rating of valves	• Blue print reading • Mensuration (Volume, Pressure) • Valves specifications • Valve connections and procedures • Plumbing codes • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	• Interpreting plans, symbols • Communication (written and verbal) • Identifying and selecting various types of valves	• Discussion • Lecture/ • Demonstration • Practical exercises/ hands-on	• Observation • Written and Oral • examination • Demonstration	14 hours
	3.3 Perform testing and commissioning of pumps and accessories	• Blue print reading • Pumps specifications • Testing and commissioning procedures	• Interpreting plans • Handling of tools • Communication (written and verbal) • Applying pump testing	• Discussion • Lecture/ • Demonstration • Practical exercises/ hands-	• Observation • Written and Oral • examination • Demonstration	

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		• Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	and commissioning	on		
4. Perform finishing and trimming of plumbing fixtures and accessories	4.1 Determine stub-outs for plumbing fixture 4.2 Prepare plumbing fixtures 4.3 Perform finishing and trimmings of plumbing fixtures	• Linear measurement • Blueprint reading • Use of finishing tools and equipment • Types of plumbing fixtures • Plumbing codes • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction	• Interpreting plans • Handling of tools and equipments • Mounting plumbing fixtures • Communication (written and verbal)	• Discussion • Lecture/ • Demonstration • Practical exercises/ hands-on	• Observation • Written and Oral • examination • Demonstration	14 hours 12 hours 15

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
		Industry				
5. Oversee plumbing works	4.1 Check preparation undertaken prior to plumbing work	• Workplace procedures • Material take-off • Blue print reading • Materials specification • work processes • Use of plumbing materials, consumables, tools and equipment • Plumbing codes • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	• Observing work instructions • Interpreting plan • symbols and • details • Handling of tools and equipment • Communication (written and verbal) • Handling of Manpower and safety control	• Discussion • Lecture/ • Demonstration • Practical exercises/hands-on	• Observation • Written and Oral • examination • Demonstration	10 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
	4.2 Check compliance to occupational work and safety	• Linear measurement • Blue print reading • Materials specification • Piping supports/ braces and insulations • Piping installation procedures • Plumbing codes • 5S • Welding, soldering and brazing procedures • Use of plumbing tools and equipment • Temperature control components and settings • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	• Interpreting plan • Handling of • tools and • equipment • Joining copper • pipes and • fittings • Brazing or • soldering of • copper pipes • and fittings • Setting/ • adjustment • temperature controls • Installing different types of pipes and fittings for hot and cold water line • Installing piping supports/ braces and insulations • Communication (written and verbal) • Handling of Manpower and safety control			10 hours

Unit of Competency	Learning Outcomes	Learning Contents	Practical Activities	Methodologies	Assessment Methods	Nominal Duration
	4.3 Check quality of work performance	• Blue print reading • Types of Pumps and specifications • Various pump mounting/ installation procedures • Plumbing codes and local regulations • Environmental-conservation procedures, e.g. 3R (reduce, reuse, recycle) • DOLE Department Order No. 13 s. 1998 Guidelines Governing Occupational Safety and Health in the Construction Industry	• Interpreting plans, • Handling of tools and equipment • Communication (written and verbal) • Mounting and installing of pumps and accessories • Applying waste management procedures • Handling of Manpower and safety control			10 hours

3.2 TRAINING DELIVERY

1. The delivery of training shall adhere to the design of the curriculum.and 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 learning is guided by the competency standards specified by the industry. The following training modalities and its 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 field-work 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 craftsperson wherein the agreement may be written or oral and the master craftsperson 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 craftsperson.

- **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 – 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

This section specifies the qualifications of trainees including their education/ experience.

- At least Grade 12 graduate
- Holder of National Certificate for Plumbing NC II or relevant industry experience (plumbing works) for a minimum of 3 years * in all of the following:
  - Prepare estimation of materials for single plumbing unit
  - Perform Complex Plumbing Installation and Assemblies
  - Conduct pipe leak testing
  - Perform plumbing repair and maintenance works

  Note: * Certified by the employer or a Registered Plumber
- Able to communicate orally and in writing

This list does not include specific institutional requirements such as written entrance exam, and other that may be required of the trainees by the school or training center delivering TVET program.

3.4 LIST OF TOOLS, EQUIPMENT AND MATERIALS FOR CIVIL WORKS (PLUMBING) NC III

Recommended list of tools, equipment and materials for the training of 25 trainees for (Plumbing) NC III.

TOOLS					
Qty	**Description**	**Qty**	**Description**	**Qty**	**Description**
6 pcs.	Pipe wrench (2 pcs each sizes 10", 12" ,14")	4 units	Pipe Vise 1" – 4" (2 Yoke vise and 2 chain vise)	5 pcs	Mechanical Plier
5 pcs.	Pressure gauges (3" dia. X ¼" dia. 0-300 psi)	5 pcs.	Pipe Cutter ½" – 2"	6 pcs	Adjustable wrench (3each 10" & 12")
25 pcs.	Steel Tape (5m)	25 pcs.	Ballpeen Hammer	5 pcs.	Flat Screw Driver 10"
25 pcs	Hacksaw with Blade	25 pcs	Pointed Cold Chisel (various length 10" -12")	5 pcs.	Philip Screw Driver 10"
5 pcs.	Spirit level bar 24" length	5 pcs.	Electrical Plier	25 pcs	Cold Chisel (var. lengths 8"-12" dia. 5/8")
5 units	Pipe Reamer	5 pcs	Plumb Bob (Std. size)	1 set	Manual Pipe Threader (2 ½" – 4")
4 pcs.	Pipe wrench (2 pcs each sizes 24", 36")	1pc	Pipe Cutter 2 ½" –4"		
TOOLS					
Qty	**Description**	**Qty**	**Description**	**Qty**	**Description**
5pcs.	Monkey wrench	5pcs.	Back wrench	5pcs.	Combination wrench
5pcs.	Plum bob	5pcs.	Open wrench	5pcs.	Vise grip
EQUIPMENT					
Qty	**Description**	**Qty**	**Description**	**Qty**	**Description**
1 unit	Threading Machine complete with the following 220 V 1 units Die head 2 sets dies (1/2" & ¾" – 1" – 2") 1 pc pipe reamer 1 pc pipe cutter	1 set	Cutting outfit set (Harris or Morris) with oxygen / acetylene cylinder with gas content (refillable)	1 unit	Welding machine 300 amperes with grounding and extension cable, electrode holder and welding mask.
2 units	Fusion Machine (20mm – 32mm)	2 units	Electric Grinder (4")	1 unit	Electric Test Pump
2 units	Electric Drill (drill bit ¼" – 5/8")	1 unit	Push Drill ¼" – 5/8" size	5 units	Blow Torch
2 units	Manual Test Pump	5 cylinders	Portable Soldering Kit	1 unit	Cut-off machine (14" dia. cutting disc)

MATERIALS and CONSUMABLES					
Qty	**Description**	**Qty**	**Description**	**Qty**	**Description**
SANITARY, WASTE AND VENT SYSTEM		**HOT AND COLD WATER SUPPLY AND DISTRIBUTION PIPING**		**CONSUMABLES**	
8 lengths	PVC Pipe 6" m dia. x 3 m s-1000	**COPPER PIPES AND FITTINGS**		6 sets	Plumbing Blue - print plan
16 lengths	PVC Pipe 4" m dia. x 3 m s-1000	5 pcs.	Copper pipe ¾ " dia. x 6 mtrs.(Type L)	6 pcs	Paint brush 9 3 each, 1" & 1 ½")
5 lengths	PVC Pipe 3"m dia. x 3"m s-1000	5 pcs.	Copper pipe ½ " x 6mtrs. (Type L)	10 sheets	Sand Paper (12" x 12" rough)
30 length	PVC Pipe 2"m dia. x 3"m s-1000	5 pcs	Copper Tee reducer ¾" x ½"	6 pcs	Chalk Stone
5 pcs	PVC Wye 6" x 4"	150 pcs	Copper Tee ½" x ½"	1 pad	Writing Paper
12 pcs	PVC Wye 4" x 4"	150 pcs	Copper Tee Female ½" x ½"	2 kls	Welding Rod (each 6011 and 6013 x 1/8"
15 pcs	PVC Wye 4" x 2"	150 pcs	Copper Elbow ½" x 90˚	2 kls	G.I. Wire # 18
10 pcs	PVC Tee 4" x 2"	75 pcs	Copper Elbow Female ½" x 90˚	**PPR PIPES AND FITTINGS**	
40 pcs	PVC Tee 2" x 2"	75 pcs	Copper Cap ½"	5 pcs	PPR Pipe 32mm dia. x 4 mtrs.
12 pcs	PVC Elbow 4" x 90˚	100 pcs	Copper Male Adapter ½"	25 pcs	PPR Pipes 20mm dia. x 20mm
35 pcs	PVC Elbow 2" x 90˚	100 pcs	Copper Female Adapter ½"	25 pcs	PPR Gate Valve 20mm dia.
10 pcs	PVC Elbow 4" x 45˚	150 rolls	Teflon Tape	150 pcs	PPR Tee Equal 20mm dia. x 20mm
20 pcs	PVC Elbow 2" x 45˚	200 pcs	G.I Plug ½"	225 pcs	PPR Tee Female 20mm x ½"
5 pcs	PVC Elbow 3" x 90˚	25 pcs	Gate Valve ½" Screwed Type	150 pcs	PPR Equal Elbow 20mm dia. x 90º
15 pcs	PVC P- Trap 2"			75 pcs	PPR Elbow Female 20mm dia. x ½" x 90º
5 pcs	PVC Cleanout 4"	**G.I. PIPES AND FITTINGS**		75 pcs	PPR End Cap 20mm
4 cans	PVC Solvent Cement 400cc	5 pcs.	G.I. Tee Reducer 1" x ½"	150 pcs	PPR Male Adapter ½"
5 unit	PVC Wye 4" x 3"	13 pcs	G.I. Pipe ½" x 20 sch. 40	150 pcs	PPR Female Adapter ½"
10 pcs	PVC Wye 3" x 2"	25 pcs	Gate Valve ½" - Screwed Type	5 pcs.	PPR Tee Reducer 32mm dia. x 20mm
10 pcs	PVC Elbow 3" x 45˚	75 pcs	G.I. Tee ½" x ½"	5 pcs.	Combination shower valve (Hot and Cold)
5 pcs	PVC Cleanout 3"	100 pcs	G.I. Elbow ½" x 90º		
		75 pcs	G.I. Cap ½"		

		175 pcs	G.I. Plug ½"		
		5 pcs	G.I. Pipe 1" x 6 mtrs.		
PLUMBING FIXTURES					
5 units	Water Meter, ½ dia.	1 set	Bath Tub with complete fittings		
5 units	Water Closet (Flush Tank) with Bidet Spray	1 set	Urinal with push-button or flush valve and complete fittings		
5 sets	Lavatory with faucet	2 units	Grease trap, 7.5 gpm capacity		
5 sets	Kitchen Sink with faucet	1 unit	Booster Pump,1hp		
1 unit	Storage water heater, 10 gals. capacity	1 unit	PressureTank, 82 gals. capacity		
15 pcs	Floor drains				
10 sets	Faucets				

NOTE: Implementation of the training program can be made possible through a MOA between the training school and industry. It is so because of the high cost of equipment that the school can't afford to attain.

3.5 TRAINING FACILITIES

The Construction – Civil Works (Plumbing) NC III workshop must be of concrete structure. Based on class size of 25 students/trainees the space requirements for the teaching/learning and circulation areas are as follows:

SPACE REQUIREMENT	SIZE IN METERS	AREA IN SQ. METERS	TOTAL AREA IN SQ. METERS
• Student/Trainee Working Space	5 x 8	40	40
• Lecture Room/Demo Room	5 x 5	25	25
• Wash Room	2 x 5	10	10
• Tool Room	5 x 5	25	25
• Laboratory Area	5 unit – 2 x 4	40	40
• Facilities/Equipment/ Circulation area	6 x 7	42	42
Workshop Area	**10 x 18**		**180**

3.6 TRAINER'S QUALIFICATION

- Holder of National TVET Trainers Certificate level I - Plumbing NC III
- Preferably a Registered Master Plumber;
- Preferably with a minimum of 5 years relevant industry experience * (plumbing works) in all of the following:
  - Install hot, chilled and /or potable water piping system
  - Install riser/downfeed and distribution water supply system
  - Install and connect pumps to plumbing system.
  - Perform finishing and trimming of plumbing fixtures and accessories
  - Draft plumbing plan

  Note: *Certified by the employer or Registered Master Plumber
- Must be computer-literate
- Must have completed the 40-Hour Construction Safety Training Course (COSH) as per (COSH) as per Department Order No. 13 s. 1998, *(Guidelines Governing Occupational Safety and Health in the Construction Industry)* conducted by OSHC and DOLE-accredited Safety Training Organizations

3.7 INSTITUTIONAL ASSESSMENT

Institutional assessment is undertaken by trainees to determine their achievement of units of competency. A certificate of achievement is issued for each unit of competency.

SECTION 4 ASSESSMENT AND CERTIFICATION ARRANGEMENTS

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 according 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 A National Certificate (NC) is issued when a candidate has demonstrated competence through project-type assessment covering all the units of competency that comprise the Training Regulations for Plumbing NC III as follows:

BASIC COMPETENCIES
Lead workplace communication
Lead small teams
Develop and practice negotiation skills
Solve problems related to work activities
Use Mathematical concepts and techniques
Use relevant technologies
COMMON COMPETENCIES
Prepare construction materials and tools
Observe procedures, specifications and manuals of instruction
Interpret technical drawings and plans
Perform mensuration and calculations
Maintain tools and equipment
CORE COMPETENCIES
Install centralized hot, chilled and /or potable water piping system
Install riser/downfeed and distribution water supply system
Install and connect pumps to plumbing system
Perform finishing and trimming of plumbing fixtures and accessories
Oversee plumbing works

4.12 Candidates aiming to be certified will have to be assessed in accordance with the requirements identified in the evidence guide of the relevant unit/s of competency.

4.13 Candidates applying for competency assessment and certification for Plumbing NC III should be:

4.13.1 Graduates of formal, non-formal and informal institutions including enterprise-based training programs

4.13.2 Experienced workers (wage-employed or self-employed)

4.14 Conduct of assessment and issuance of certificates shall follow the procedures manual and implementing guidelines developed for the purpose.

4.2 COMPETENCY ASSESSMENT REQUISITES

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 `

4.2.2 Accredited Assessment Center. Only Assessment Center accredited by TESDA is authorized to conduct competency assessment. Assessment centers undergo a quality assured procedure for accreditation before they are authorized by TESDA to manage the assessment for National Certification.

4.2.3 Accredited Competency Assessor. Only accredited competency assessor is authorized to conduct assessment of competence. Competency assessors undergo a quality assured system of accreditation procedure before they are authorized by TESDA to assess the competencies of candidates for National Certification.

COMPETENCY MAP
CONSTRUCTION
PLUMBING SUB-SECTOR

PLUMBING NC III

DEFINITION OF TERMS

1.	Certification	Refers to the process of verifying and validating competencies of a person through assessment.
2.	Competency	Is the application of knowledge, skills and attitudes to perform work activities to the standard expected in the workplace.
3.	Element	Refers to the building blocks of a unit of competency. It describes in outcome terms the functions that a person who works in a particular area of work is able to perform.
4.	Evidence Guide	It is a guide for assessment that provides information on critical aspects of competency, underpinning knowledge, underpinning skills, resource implications, context of assessment and assessment method.
5.	Level	Refers to the category following the level of difficulty and complexity of skills and knowledge required to do the job.
6.	Performance Criteria	Is an evaluative statement that specifies what is to be assessed and the required level of performance.
7.	Philippine Qualifications Framework	A quality-assured national system for the development, recognition and award of qualifications based on standards of knowledge, skills and values acquired in different ways and methods by learners and workers in the country
8.	Pipe	Refers to a cylindrical conduit or conductor conforming to the particular dimensions commonly known as “pipe size” and is denoted by its interior diameter or I.D.
9.	Plumbing appliance	Refers to any one of a special class of device or equipment intended to perform a special plumbing function. Its operation and/or control may be dependent upon one or more energized components, such as motors, controls, heating elements and pressure-temperature-sensing elements. Such device or equipment may operate automatically through one or more of the following actions; a time cycle, a temperature range, a pressure range, a measured volume or weight; or the device or equipment may be manually adjusted or controlled by the user or operator.

10. Plumbing appurtenance	It is a manufactured device or a prefabricated assembly or an on-the-job assembly of component parts, and serve as adjunct to the basic piping system and plumbing fixtures. An appurtenance demands no additional water supply nor does it add any discharge load to fixture or the drainage system. It performs some useful functions in the operation, maintenance, servicing, economy or safety of the plumbing system.
11. Plumbing	It is the art and technique of installing pipes, fixtures and other apparatuses in buildings for bringing in the supply, liquids, substances and/or ingredients and removing them; and such water, liquid and other carried-wastes hazardous to health, sanitation, life, property; also the pipes and fixtures after installation i.e., the plumbing system.
12. Plumbing fixtures	Are approved-type installed receptacles, devices or appliances supplied with water or receive liquid or liquid-borne wastes and discharge such wastes into the drainage system to which they may be directly or indirectly connected. Industrial or commercial tanks, vats and similar processing equipment are not plumbing system fixtures, but may be connected to or discharged into approved traps or plumbing fixtures as provided for in this Code.
13. Plumbing system	Refers to all potable water supply and distribution pipes, all plumbing fixtures and traps, all sanitary and storm drainage systems; vent pipes, roof drains, leaders and downspouts; and all building drains and sewers, including their respective joints and connections; devices, receptacles, and appurtenances within the property; water lines in the premises; potable , tap, hot and chilled water pipings; potable water treating or using equipment; fuel gas piping; water heaters and vents for same.
14. Plumbing unit	Refers to a minimum standard quantity of plumbing fixtures that discharge wastes into a plumbing installation including; one (1) water meter, one (1) water closet, one (1) lavatory, one (1) shower head and drain for a bathtub or shower stall, one (1) kitchen sink, one (1) laundry tray and three (3) floor drains and four (4) faucets/hose bibb.
15. Potable water	Is a water satisfactory for drinking, culinary and domestic purposes and meets the requirements of the Philippine National Standards for Drinking Water.

16.	Pressure	Is a normal force exerted by a homogenous liquid or gas, per unit of area on the wall of the container.
17.	Qualification	Refers to the national certificate issued by the TESDA or its accredited industry organizations in recognition that a person has achieved competencies relevant to a trade or industry.
18.	Range of Variable	It describes the circumstances or context in which the work is to be performed.
19.	Unit of Competency	Refers to a discrete aspect of work, which would normally be performed by only one person.
20.	Unplasticized Polyvinyl Chloride Conduit (UPVC)	Refers to a non-metallic conduit into which electrical wire may be drawn and with an outside diameter sufficiently different from that of metallic conduit.
21.	Multiple plumbing system	a battery of fixture; composed of two or more plumbing system connections
22.	Centralized multiple plumbing hot water	is a system that supplies or distribute hot water to fixtures that requires hot water using storage type water heater and boilers
23.	High-rise building	multi-storey building minimum of 15 storey and above
24.	Medium-rise building	multi - level storey building from ground floor to 15 storey building

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