



ASSESSMENT RESOURCES BOOK

PLUMBING IV



GREEN
CLIMATE
FUND

MNSDA



Ministry of Environment
Climate Change & Technology

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Instructions to the Assessor on Competency Based Assessment (CBA)

Assessment is the process of identifying a participant's current knowledge, skills and attitudes sets against all elements of competency within a unit of competency.

Suggested Assessment Methods

For each unit of competency, a number of assessment tools have been identified including:

- ✓ Work Projects
- ✓ Oral Questions
- ✓ Written Questions
- ✓ Third Party Statements
- ✓ Observation Checklists.

Instructions and Evidence Recording Sheets have been identified in this Assessment Manual for use by Assessors.

Alternative Assessment Methods

Whilst the above-mentioned assessment methods are suggested assessment methods, the assessor may use an alternate method of assessment taking into account:

- a. The nature of the unit
- b. The strengths of participants
- c. The number of participants in the class
- d. Time required to complete assessments
- e. Time dedicated to assessment
- f. Equipment and resources required.

Alternate assessment methods include:

- ✓ Practical demonstrations
- ✓ Practical demonstrations in simulated work conditions Problem solving
- ✓ Portfolios of evidence
- ✓ Critical incident reports
- ✓ Journals
- ✓ Oral presentations
- ✓ Interviews
- ✓ Videos
- ✓ Visuals/slides/audio tapes
- ✓ Case studies
- ✓ Log books
- ✓ Projects and Role plays
- ✓ Group projects
- ✓ Recognition of Prior Learning.

Whilst there is no specific instruction or evidence collection documents for all the alternative assessment methods, assessors can record competency in the „Other“ section within the “Competency Recording Sheet”.

Selection of Assessment Methods

Each assessor will determine the combination of Assessment Methods to be used to determine Competency for each Competency Unit on a student by student basis.

“Sufficient“ evidence to support the „Competent“/“Not Yet Competent“ decision must be captured.

In practice this means a minimum of two - three Assessment Methods for each candidate for each Competency Element is suggested.

At least one method should provide evidence of practical demonstration of competence.

The following assessment methods deemed to provide evidence of practical demonstration of competence include:

- ✓ Practical Work Projects
- ✓ Third Party Statement
- ✓ Observation Checklist.

Assessing Competency

Competency based assessment does not award grades, but simply identifies if the participant has the knowledge, skills and attitudes to undertake the required task to the specified standard.

Therefore, when assessing competency, an assessor has two possible results that can be awarded:

- ✓ "Competent" (C)
- ✓ "Not Yet Competent (NYC)

Competent (C)

If the participant is able to successfully answer or demonstrate what is required, to the expected standards of the performance criteria, they will be deemed as "Competent" (C).

The assessor will award a "Competent" (C) if they feel the participant has the necessary knowledge, skills and attitudes in all assessment tasks for a unit.

Not Yet Competent' (NYC)

If the participant is unable to answer or demonstrate competency to the desired standard, they will be deemed to be „Not Yet Competent" (NYC).

This does not mean the participant will need to complete all the assessment tasks again. The focus will be on the specific assessment tasks that were not performed to the expected standards.

The participant may be required to:

- a. Undertake further training or instruction
- b. Undertake the assessment task again until they are deemed to be "Competent".

Trade Testing (Recognition of Prior Learning)

Trade Testing or Recognition of Prior Learning is the process that gives current industry professionals who do not have a formal qualification, the opportunity to benchmark their extensive skills and experience against the standards set out in each unit of competency/subject.

This process is a learning and assessment pathway which encompasses:

- ✓ Recognition of Current Competencies (RCC)
- ✓ Skills auditing
- ✓ Gap analysis and training
- ✓ Credit transfer.

Code of practice for assessors

This Code of Practice provides:

- ✓ Assessors with direction on the standard of practice expected of them
- ✓ Candidates with assurance of the standards of practice expected of assessors
- ✓ Employers with assurance of the standards maintained in the conduct of assessment.

The Code detailed below is based on the available international code of ethics and practice.

- ✓ The differing needs and requirements of the person being assessed, the local enterprise and/or industry are identified and handled with sensitivity
- ✓ Potential forms of conflict of interest in the assessment process and/or outcomes are identified and appropriate referrals are made, if necessary
- ✓ All forms of harassment are avoided throughout the planning, conducting, reviewing and reporting of the assessment outcomes
- ✓ The rights of the candidate are protected during and after the assessment
- ✓ Personal and interpersonal factors that are not relevant to the assessment of competency must not influence the assessment outcomes
- ✓ The candidate is made aware of rights and process of appeal
- ✓ Evidence that is gathered during the assessment is verified for validity, reliability, authenticity, sufficiency and currency
- ✓ Assessment decisions are based on available evidence that can be produced and verified by another assessor
- ✓ Assessments are conducted within the boundaries of the assessment system policies and procedures
- ✓ Formal agreement is obtained from both the candidate and the assessor that the assessment was carried out in accordance with agreed procedures
- ✓ The candidate is informed of all assessment reporting processes prior to the assessment
- ✓ The candidate is informed of all known potential consequences of decisions arising from an assessment, prior to the assessment
- ✓ Confidentiality is maintained regarding assessment results
- ✓ The assessment results are used consistently with the purposes explained to the candidate
- ✓ Opportunities are created for technical assistance in planning, conducting and reviewing assessment procedures and outcomes.

Instructions and checklist for assessors

Instructions

General instructions for the assessment

- ✓ Assessment should be conducted at a scheduled time that has been notified to the candidate
- ✓ Facilitators must ensure participants are made aware of the need to complete assessments and attend assessment sessions
- ✓ If a participant is unable to attend a scheduled session, they must make arrangements with the Assessor to undertake the assessment at an alternative time
- ✓ At the end of the assessment the Assessor must give feedback and advise the participant on their C/NYC status
- ✓ Complete the relevant documentation and submit to the appropriate department.

Preparation

- ✓ Gain familiarity with the Unit of Competency, Elements of Competency and the Performance Criteria expected
- ✓ Study details assessment documentation and requirements
- ✓ Brief candidate regarding all assessment criteria and requirements.

Briefing Checklist

- ✓ Begin the assessment by implementing the following checklist and then invite the candidate to proceed with assessment.

Checklist for Assessors

#	Activity to Follow	Tick	Remarks
Prior to the assessment I have:			
1	Ensured the candidate is informed about the venue and schedule of assessment.		
2	Received current copies of the performance criteria to be assessed, assessment plan, evidence gathering plan, assessment checklist, appeal form and the company's standard operating procedures (SOP).		
3	Reviewed the performance criteria and evidence plan to ensure I clearly understood the instructions and the requirements of the assessment process.		
4	Identified and accommodated any special needs of the candidate.		
5	Checked the set-up and resources for the assessment.		
During the assessment I have:			
6	Introduced myself and confirmed identities of candidates.		
7	Put candidates at ease by being friendly and helpful.		
8	Explained to candidates the purpose, context and benefits of the assessment.		
9	Ensured candidates understood the assessment process and all attendant procedures.		
10	Provided candidates with an overview of performance criteria to be assessed.		
11	Explained the results reporting procedure.		
12	Encouraged candidates to seek clarifications if in doubt.		
13	Asked candidates for feedback on the assessment		
14	Explained legal, safety and ethical issues, if applicable.		
After the assessment I have:			
14	Ensured candidate is given constructive feedback.		
16	Completed and signed the assessment record.		
17	Thanked candidate for participating in the assessment.		

Instructions for recording competency

Specifications for Recording Competency

The following specifications apply to the preparation of Evidence Gathering Plans:

- ✓ A Competency Recording Sheet must be prepared for each candidate to ensure and demonstrate all Performance Criteria and Competency Elements are appropriately assessed. This Sheet indicates how the Assessor will gather evidence during their assessment of each candidate
- ✓ This Competency Recording Sheet is located at the end of the Assessment Plan It is the overriding document to record competency
- ✓ Assessor may vary the Competency Recording Sheet to accommodate practical and individual candidate and/or workplace needs
- ✓ Assessor must place a tick (☑) in the „Assessment Method“ columns to identify the methods of assessment to be used for each candidate
- ✓ Multiple Competency Elements/Performance Criteria may be assessed at the one time, where appropriate

- ✓ The assessor and participant should sign and date the Competency Recording Sheet, when all forms of evidence and assessment have been completed
- ✓ The assessor may provide and feedback or clarify questions which the participant may have in regards to the assessment grade or findings
- ✓ All documents used to capture evidence must be retained, and attached to the Competency Recording Sheet for each candidate for each Competency Unit.

Instructions for different assessment methods

Specifications for Work Project Assessment

These guidelines concern the use of work projects.

The work projects identified in the Training Manuals involve a range of tasks, to be performed at the discretion of the Assessor.

Work project tasks can be completed through any form of assessment as identified in the Trainer and Trainee Manuals and stated at the start of this section.

Assessors should follow these guidelines:

- ✓ Review the Work Projects at the end of each „Element of Competency“ in the Trainee Manual to ensure you understand the content and what is expected
- ✓ Prepare sufficient resources for the completion of work activities including:
 - Time – whether in scheduled delivery hours or suggested time participants to spend outside of class hours
 - Resources – this may involve technical equipment, computer, internet access, stationery and other supplementary materials and documents
- ✓ Prepare assessment location (if done in class) making it conducive to assessment
- ✓ Explain Work Projects assessment to candidate, at the start of each Element of Competency. This ensures that participants are aware of what is expected and can collate information as delivery takes place.
- ✓ Assessors can use the following phrase as a guide (where an „X“ is identified, please input appropriate information):

“At the end of each Element of Competency there are Work Projects which must be completed. These projects require different tasks that must be completed.

These work projects are part of the formal assessment for the unit of competency titled X.

- You are required to complete these activities:
 - Using the ‘X’ method of assessment.
 - At ‘X’ location
 - You will have ‘X time period’ for this assessment.
- You are required to compile information in a format that you feel is appropriate to the assessment.
- Do you have any questions about this assessment?”
- ✓ Commence Work Project assessment:
- ✓ The assessor may give time for participants to review the questions at this time to ensure they understand the nature of the questions. The assessor may need to clarify questions.
- ✓ Participants complete work projects in the most appropriate format

- ✓ Participants must submit Work Project evidence to the assessor before the scheduled due date
- ✓ Assessor must assess the participant's evidence against the competency standards specified in each Element of Competency and their own understanding. The assessor can determine if the participant has provided evidence to a "competent" standard.
- ✓ Transcribe results/details to Competency Recording Sheet
- ✓ Forward/file assessment record.

Specifications for Oral Question Assessment

These guidelines concern the use of oral questioning. Assessors should follow these guidelines.

- ✓ Prepare Assessment Record for Oral Questioning. One record for each candidate:
 - Enter Student name
 - Enter Assessor name
 - Enter Location

- ✓ Familiarize self with Questions to be asked
- ✓ Prepare assessment location (table and chairs) making it conducive to assessment
- ✓ Explain Oral Questioning assessment to candidate, using the following phrase as a guide (where a "X" is identified, please input appropriate information):
 "These oral questions are part of the formal assessment for the unit of competency titled X.
 There are X questions and you are required to answer all of them to the best of your ability and I will record whether or not you have answered correctly.
 - I will give you feedback at the end of the assessment.
 - Do you have any questions about this assessment?"

- ✓ Commence Oral Questioning assessment
- ✓ Complete Assessment Record for the Oral Questioning by:
 - Ticking C or NYC, as appropriate
 - Entering „Remarks" as required
 - Completing Oral Questioning within 60 minutes

- ✓ Complete Oral Questioning and provide feedback to candidate
- ✓ Transcribe results/details to Competency Recording Sheet
- ✓ Forward/file assessment record.

Specifications for Written Question Assessment

These guidelines concern the use of written questioning.

Assessors should follow these guidelines.

- ✓ Familiarize self with Questions and Answers provided.
- ✓ Print and distribute copies of „Written Questions" for participants. Ideally this should take place with adequate time for participants to answer all questions before the expected due date.
- ✓ Explain Written Questioning assessment to candidate, using the following phrase as a guide (where a „X" is identified, please input appropriate information):
 "These written questions are part of the formal assessment for the unit of competency titled X.
 There are X questions and you are required to answer all of them to the best of your ability.

You may refer to your subject materials, however where possible try to utilise your existing knowledge when answering questions.

Where you are unsure of questions, please ask the Assessor for further instruction. This may be answering the question orally or asking the assessor to redefine the question.

We have X time for this assessment.

- The due date for completion of this assessment is X
 - On this date you must forward the completed questions to the assessor by X time on the date of X
 - Do you have any questions about this assessment?"
-
- ✓ The assessor may give time for participants to review the questions at this time to ensure they understand the nature of the questions. The assessor may need to clarify questions. Participants may record written answers (where possible)
 - ✓ Participants must submit the written answers to the assessor before the scheduled due date
 - ✓ Assessor must assess the participant's written answers against the model answers provided as a guide, or their own understanding. The assessor can determine if the participant has answered the questions to a "competent" standard.
 - ✓ Transcribe results/details to Competency Recording Sheet
 - ✓ Forward/file assessment record.

Specifications for Observation Checklist

These specifications apply to the use of the Observation Checklist in determining competency for candidates.

Only an approved assessor is authorized to complete the Observation Checklist.

The assessor is required to observe the participant, ideally in a simulated environment or their practical workplace setting and record their performance (or otherwise) of the competencies listed on the Observation Checklist for the Competency Unit.

To complete the Observation Checklist the Assessor must:

- ✓ Insert name of candidate
- ✓ Insert assessor name
- ✓ Insert identify of location where observations are being undertaken
- ✓ Insert date/s of observations – may be single date or multiple dates
- ✓ Place a tick in either the „Yes" or „No" box for each listed Performance Criteria to indicate the candidate has demonstrated/not demonstrated that skill
- ✓ Provide written (and verbal) feedback to candidate – as/if appropriate Sign and date the form
- ✓ Present form to candidate for them to sign and date
- ✓ Transcribe results/details to Competency Recording Sheet for candidate
- ✓ Forward/file Observation Checklist.

This source of evidence combines with other forms of assessment to assist in determining the "Competent" or "Not Yet Competent" decision for the participant.

Specifications for Third Party Statement

These specifications relate to the use of a relevant workplace person to assist in determining competency for candidates.

The Third-Party Statement is to be supplied by the assessor to a person in the workplace who supervises and/or works closely with the participant.

This may be their Supervisor, the venue manager, the Department Manager or similar.

The Third-Party Statement asks the Supervisor to record what they believe to be the competencies of the participant based on their workplace experience of the participant. This

experience may be gained through observation of their workplace performance, feedback from others, inspection of candidate's work etc.

A meeting must take place between the Assessor and the Third Party to explain and demonstrate the use of the Third-Party Statement.

To complete the Third-Party Verification Statement the Assessor must:

- ✓ Insert candidate name
- ✓ Insert name and contact details of the Third Party
- ✓ Tick the box to indicate the relationship of the Third Party to the candidate
- ✓ Present the partially completed form to the Third Party for them to finalize
- ✓ Collect the completed form from the Third Party
- ✓ Transcribe results/details to Competency Recording Sheet for candidate Forward/file Third Party Statement.

The Third Party must:

1. Record their belief regarding candidate ability/competency as either:
 - Competent = Yes
 - Not Yet Competent = No
 - Unsure about whether candidate is competent or not = Not Sure

2. Meet briefly with the assessor to discuss and/or clarify the form.

This source of evidence combines with other forms of assessment to assist in determining the „Competent“ or “Not Yet Competent“ decision for the candidate.

A separate Third-Party Statement is required for each Competency Unit undertaken by the candidate.

Unit-1: Write technical reports

Unit No	01
Unit Title	Write technical reports
Unit Code	CONCM08V1/21

Evidence Matrix

Following matrix is developed using which the Assessment will be planned and undertaken.

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Plan the research and write the proposal							
Purpose or objective of the research is identified, and confirmed with stakeholders	✓	✓	✓	✓	✓	✓	✓
Scope and nature of the information requirements are identified	✓		✓	✓	✓		✓
All possible sources of the required information are researched and identified	✓	✓		✓	✓	✓	
A systematic research or information collection plan is designed to optimize the process		✓	✓	✓		✓	✓
Resources are obtained and scheduled to service the research requirements	✓	✓	✓		✓	✓	✓
2. Conduct research							
Research is undertaken effectively in accordance with the plan	✓	✓	✓	✓	✓	✓	✓
Experiments and tests to support the research effort are conducted in a manner which ensures the demonstrable integrity of the outcomes or findings	✓		✓	✓	✓		✓
Research findings are logged, documented and stored to maintain traceability	✓	✓		✓	✓	✓	
Preliminary analysis is conducted to identify requirements for variations or additions to the research plan		✓	✓	✓		✓	✓
3. Analyse the information							
Information is sorted, documented and prepared for the analytical process	✓	✓	✓	✓	✓	✓	✓
Information and data is manipulated to enable reasonable comparisons and judgments	✓		✓	✓	✓		✓
Clarification by way of expert advice and opinion is sought	✓	✓		✓	✓	✓	
4. Prepare and present the report							

Report clearly defines the objectives, process, findings and further actions	✓	✓	✓	✓	✓	✓	✓
Report addresses and satisfies the stated objective and timeframe	✓		✓	✓	✓		✓
Report and associated presentation materials are of a standard and quality for the intended audience	✓	✓		✓	✓	✓	
Reader comprehension of the report is aided by use of executive summaries and attachments		✓	✓	✓		✓	✓
Information management requirements, including documenting and repository actions are satisfied in accordance with enterprise procedures	✓	✓	✓		✓	✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Questions	Answers
1	What is the purpose of a proposal?	A proposal allows the writer to clarify what it is he/she wants to do, why and how he/she wants to do it and present what you want to do in the manner and timeframe proposed.
2	What are the components to a proposal?	<ol style="list-style-type: none"> 1. Title 2. Introduction 3. Research question 4. Method 5. Project 6. Timeline 7. References
3	Explain what a research plan is	The research plan shall detail completely the prosecution of the research, including the submission of an acceptable final report. The plan ultimately becomes a part of the contract by reference of the proposal; therefore, it should describe, in a specific and straightforward manner, the proposed approach to the solution of the problem described in the project statement.
4	While evaluating a research project an expert opinion is important. What is an expert opinion?	This method involves obtaining the opinions of people who are knowledgeable about the subject of the research and the impact of the project being evaluated. The experts can be internal or external to the agency.
5	What is user or client opinion?	This method involves obtaining the opinions of clients, often through technical advisory committees or project panels.
6	What are the advantages of case studies?	The advantage of case studies is that they afford the best opportunity of identifying the relationship between the

		research study and the impact of the research results. They are particularly useful for evaluating projects that benefit the public good, rather than using cost-benefit analyses that assign dubious values to some impacts such as the value of a human life. Because the results are usually qualitative, it is difficult to use case studies to compare the value of projects, or to aggregate the results to demonstrate the value of research programs.
7	What is a report?	A report is a written presentation of factual information based on an investigation or research.
8	What makes an effective report?	<ul style="list-style-type: none"> ✓ Clear, concise and accurate ✓ Easy for the audience to understand ✓ Appropriate for the audience ✓ Well organized with clear section headings
9	What are the content that a report must cover?	<ul style="list-style-type: none"> ✓ Title page ✓ Table of contents ✓ Abstract or executive summary ✓ Introduction (or Terms of Reference & Procedure) ✓ Findings and / or Discussion ✓ Recommendations ✓ References
10	What is the purpose of "Terms of Reference" in a report?	Briefly states the purpose and scope of the report. This includes who requested the report, the main issues or problems to be identified, the reason for undertaking the report and the due date of the report.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to writing technical reports, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	<p>Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas.</p> <ul style="list-style-type: none"> ✓ Plan the research and write the proposal ✓ Conduct research ✓ Analyse the information ✓ Prepare and present the report
3	Review Assessment papers	<p>Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.</p> <ul style="list-style-type: none"> ✓ Plan the research and write the proposal ✓ Conduct research ✓ Analyse the information ✓ Prepare and present the report

4	Prepare and present a report	Every student is expected to conduct a research effectively in accordance with the plan. The information is sorted, documented and prepared for analytical process. Students must clearly define the objective, process, findings & further actions
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3. OW =Observation at work Place

#	Types of Skills	Techniques for validation
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Plan the research and write the proposal ✓ Conduct research ✓ Analyse the information ✓ Prepare and present the report
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to identifying and analysing requirements, planning and conducting research, evaluating information and findings, and developing, documenting and presenting technical reports.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Presenting the report	<ul style="list-style-type: none"> ✓ Accuracy of the information shared ✓ Report addresses and satisfies the stated objective and time frame. ✓ Relevancy of the information ✓ Application of different knowledge to relevant situations

4. OQ=Oral Questioning

#	Questions	Answers
1	Plan the research and write the proposal	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Purpose or objective of the research is identified, and confirmed with stakeholders ✓ Scope and nature of the information requirements are identified.

		<ul style="list-style-type: none"> ✓ All possible sources of the required information are researched and identified ✓ A systematic research or information collection plan is designed to optimize the process. ✓ Resources are obtained and scheduled to service the research requirements.
2	Conduct research	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Research is undertaken effectively in accordance with the plan ✓ Experiments and tests to support the research effort are conducted in a manner which ensures the demonstrable integrity of the outcomes or findings ✓ Research findings are logged, documented and stored to maintain traceability ✓ Preliminary analysis is conducted to identify requirements for variations or additions to the research plan
3	Analyze the information	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Information is sorted, documented and prepared for the analytical process. ✓ Information and data is manipulated to enable reasonable comparisons and judgements. ✓ Clarification by way of expert advice and opinion is sought.
4	Prepare and present the report	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Report clearly defines the objectives, process, findings and further actions. ✓ Report addresses and satisfies the stated objective and timeframe ✓ Report and associated presentation materials are of a standard and quality for the intended audience ✓ Reader comprehension of the report is aided by use of executive summaries and attachments.

		✓ Information management requirements, including documenting and repository actions are satisfied in accordance with enterprise procedures.
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5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-2: Apply and maintain Occupational Health and Safety

Unit No	02
Unit Title	Apply and maintain Occupational Health and Safety
Unit Code	CONCM09V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Perform all work safely							
One's unique sense of purpose for working and the whys of work are identified, reflected on and clearly defined for one's development as a person and as a member of society.	✓	✓	✓	✓		✓	✓
Personal mission is in harmony with company's values.	✓		✓	✓	✓		✓
2. Ensure others in the work group are able to implement safe work practices							
Work values/ethics/concepts are identified and classified in accordance with companies' ethical standard guidelines.	✓	✓	✓	✓		✓	✓
Work policies are undertaken in accordance with company's policies, guidelines on work ethical standard.	✓		✓	✓	✓		✓
Resources are used in accordance with company's policies and guidelines.	✓	✓	✓	✓		✓	✓
Punctuality, absence from work, sick, family and annual leave is maintained alignment to the Employment Act of the Maldives	✓		✓	✓	✓		✓
3. Monitor observance of safe work practices in the work area							
Company ethical standards, organizational policy and guidelines on the prevention and reporting of unethical conduct/behavior are followed.	✓	✓	✓	✓		✓	✓
Work incidents/situations are reported according to company protocol/guidelines.	✓		✓	✓	✓		✓
Resolution and/or referral of ethical problems identified are reported/documented based on standard operating procedure	✓	✓	✓	✓		✓	✓
4. Participate in risk management processes							

Personal behavior and relationships with co-workers and/or clients are demonstrated consistent with ethical standards, policy and guidelines.	✓	✓	✓	✓		✓	✓
Work practices are satisfactorily demonstrated and consistent with industry work ethical standards, organizational policy and guidelines.	✓		✓	✓	✓		✓
Instructions to co-workers are provided based on ethical lawful and reasonable directives	✓	✓	✓	✓		✓	✓
5. Support the implementation of emergency procedures within the work group							
Ensure that workplace procedures for dealing with incidents and emergencies are available and known by work group	✓	✓	✓	✓		✓	✓
Implement processes to ensure that others in the work area are able to respond appropriately to incidents and emergencies	✓		✓	✓	✓		✓
Participate, as required, in investigations of hazardous incidents to identify their cause	✓	✓	✓	✓		✓	✓

Note:

- ✓ “Other Sources” meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Question	Answer
1	What is the objective of a safety program?	A safety program is to prevent injuries and to allow you to do your job efficiently and safely
2	Why is it important to let your supervisor know if you are under any medication?	As some medications may impair your ability to work or operate equipment safely.
3	What is workplace hazard?	Hazard means a situation or thing that has the potential to harm a person. Hazards at work may include: noisy machinery, a moving forklift, chemicals, electricity, working at heights, a repetitive job, bullying and violence at the workplace.
4	What is Risk Control?	Risk control means taking action to eliminate health and safety risks so far as is reasonably practicable, and if that is not possible, minimising the risks so far as is reasonably practicable.
5	What does a risk assessment help determine?	<ul style="list-style-type: none"> ✓ How severe a risk is? ✓ Whether any existing control measures are effective ✓ What action you should take to control the risk ✓ How urgently the action needs to be taken.
6	How would you work out the chain of events?	One way of working out the chain of events is to determine the starting point where things begin to go wrong and then consider: 'If this happens, what may happen next?' This will provide a list of events that sooner or later cause harm.
7	What are the things you should consider to estimate the severity of a hazard?	<ul style="list-style-type: none"> ✓ What type of harm could occur? ✓ What factors could influence the severity of harm that occurs? ✓ How many people are exposed to the hazard and how many could be harmed in and outside your workplace? ✓ Could one failure lead to other failures?
8	"All hazards have the potential to cause different types and severities of harm." Give an example for this statement	For example, heavy liquefied petroleum gas (LPG) cylinders can cause muscular strain when they are handled manually. However, if the cylinder is damaged causing gas to leak which is then ignited, a fire could result in serious burns. If that leak occurs in a store room or similar enclosed space, it could result in an explosion that could destroy the building and kill or injure anyone nearby. Each of the outcomes involves a different type of harm with a range of severities, and each has a different likelihood of occurrence.
9	Describe 3 situations where a risk assessment is not necessary.	<ol style="list-style-type: none"> 1. Legislation requires some hazards or risks to be controlled in a specific way – these requirements must be complied with. 2. A code of practice or other guidance sets out a way of controlling a hazard or risk that is applicable to your

		<p>situation and you choose to use the recommended controls. In these instances, the guidance can be followed.</p> <p>3. There are well-known and effective controls that are in use in the particular industry, that are suited to the circumstances in your workplace. These controls can simply be implemented</p>
10	When should a risk assessment must be carried out?	<p>When:</p> <ul style="list-style-type: none"> ✓ There is uncertainty about how a hazard may result in injury or illness ✓ The work activity involves a number of different hazards and there is a lack of understanding about how the hazards may interact with each other to produce new or greater risks ✓ Changes at the workplace occur that may impact on the effectiveness of control measures.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to planning to monitor and maintain work health and safety (WHS) within a work area, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	<p>Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas.</p> <ul style="list-style-type: none"> ✓ Perform all work safely ✓ Ensure others in the work group are able to implement safe work practices ✓ Monitor observance of safe work practices in the work area ✓ Participate in risk management processes ✓ Support the implementation of emergency procedures within the work group
3	Review Assessment papers	<p>Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.</p> <ul style="list-style-type: none"> ✓ Perform all work safely ✓ Ensure others in the work group are able to implement safe work practices ✓ Monitor observance of safe work practices in the work area ✓ Participate in risk management processes ✓ Support the implementation of emergency procedures within the work group

4	Carryout risk assessment process	<p>Students must participate</p> <ul style="list-style-type: none"> ✓ In reporting and addressing any identified hazards and inadequacies in existing risk controls ✓ In identifying and analyzing risks ✓ In implementing procedures to control risk ✓ In ensuring records of incidents in the work area and other required documentation are accurately completed.
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3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Perform all work safely ✓ Ensure others in the work group are able to implement safe work practices ✓ Monitor observance of safe work practices in the work area ✓ Participate in risk management processes ✓ Support the implementation of emergency procedures within the work group
2	Log Books	<p>Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.</p>
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Carryout risk assessment process	<p>Use the presentation and assess the following</p> <p>Participate in risk assessments to identify and analyses risks</p>

4. OQ=Oral Questioning

#	Questions	Answers
1	Perform all work safely	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Use established work practices and personal protective equipment (PPE) to ensure personal safety and that of other workplace personnel ✓ Clean, care for and store equipment, materials and reagents as required ✓ Minimise the generation of wastes and environmental impacts ✓ Ensure safe disposal of laboratory/hazardous wastes
2	Ensure others in the work group are able to implement safe work practices	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Ensure hazard controls and PPE appropriate to the work requirements are available and functional ✓ Provide and communicate current information about workplace health and safety policies, procedures and programs to others ✓ Ensure hazards and control measures relating to work responsibilities are known by those in the work area ✓ Provide support to those in the work area to implement procedures to support safety ✓ Identify and address training needs within level of responsibility
3	Monitor observance of safe work practices in the work area	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Ensure workplace procedures are clearly defined, documented and followed ✓ Identify any deviation from identified procedures and report and address within level of responsibility ✓ Ensure personal behaviour is consistent with workplace policies and procedures ✓ Encourage and follow up others to identify and report hazards in the work area ✓ Monitor conditions and follow up to ensure housekeeping standards in the work area are maintained
4	Participate in risk management processes	<p>Make sure the students answer questions related to the following areas</p>

		<ul style="list-style-type: none"> ✓ Report and address any identified hazards and inadequacies in existing risk controls within level of responsibility and according to workplace procedures ✓ Participate in risk assessments to identify and analyse risks ✓ Support the implementation of procedures to control risk (based on the hierarchy of control) ✓ Ensure records of incidents in the work area and other required documentation are accurately completed and maintained
5	Support the implementation of emergency procedures within the work group	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Ensure that workplace procedures for dealing with incidents and emergencies are available and known by work group ✓ Implement processes to ensure that others in the work area are able to respond appropriately to incidents and emergencies ✓ Participate, as required, in investigations of hazardous incidents to identify their cause

5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play. Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-3: Carry out data entry and retrieval procedures

Unit No	03
Unit Title	Carry out data entry and retrieval procedures
Unit Code	CONCM10V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Initiate computer system							
The hardware components of the computer and their functions are correctly identified	✓	✓	✓	✓		✓	✓
Equipment is powered up correctly	✓		✓	✓	✓		✓
Access codes are correctly applied	✓	✓	✓	✓		✓	✓
Appropriate software is selected or loaded from the menu	✓		✓	✓	✓		✓
2. Enter data							
Types of data for entry correctly identified and collected	✓	✓	✓	✓		✓	✓
Input devices selected and used are appropriate for the intended operations	✓		✓	✓	✓		✓
Manipulative procedures of Input device conform to established practices	✓	✓	✓	✓		✓	✓
Computer files are correctly located or new files are created, named and saved	✓		✓	✓	✓		✓
Data is accurately entered in the appropriate files using specified procedure and format	✓	✓	✓	✓		✓	✓
Back-up made in accordance with operative procedures	✓		✓	✓	✓		✓
3. Retrieve data							
The identity and source of information is established	✓	✓	✓	✓		✓	✓
Authority to access data is obtained where required	✓		✓	✓	✓		✓
Files and data are correctly located and accessed	✓	✓	✓	✓		✓	✓
Integrity and confidentiality of data are maintained	✓		✓	✓	✓		✓
The relevant reports or information retrieved using approved procedure	✓	✓	✓	✓		✓	✓
Formats of retrieved report or information conform to that required	✓		✓	✓	✓		✓
Copy of the data is printed where required	✓	✓	✓	✓		✓	✓
4. Amend data							

Source of data/information for amendment is established	✓	✓	✓	✓		✓	✓
Data to be amended is correctly located within the file	✓		✓	✓	✓		✓
The correct data/information is entered, changed or deleted using appropriate input device and approved procedures	✓	✓	✓	✓		✓	✓
The Integrity of data is maintained	✓		✓	✓	✓		✓
5. Monitor the operation of equipment							
The system is monitored for correct operation of tasks	✓	✓	✓	✓		✓	✓
Routine system messages are promptly and correctly dealt with	✓		✓	✓	✓		✓
Error conditions within level of authority are dealt with promptly and uncorrected errors are promptly reported	✓	✓	✓	✓		✓	✓
Output devices and materials are monitored for quality	✓		✓	✓	✓		✓
6. Access and transmit information via the Internet							
Access to the Internet is gained in accordance with the provider's operating procedures	✓	✓	✓	✓		✓	✓
Evidence of the ability to negotiate web sites to locate and access specified information and other services is efficiently demonstrated	✓		✓	✓	✓		✓
E-mail is sent and retrieved competently	✓	✓	✓	✓		✓	✓
7. Close down computer system							
The correct shut down sequence is followed	✓	✓	✓	✓		✓	✓
Problem with shutting down computer is reported promptly	✓		✓	✓	✓		✓
All safety and protective procedures are observed	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play

1. Written Question

#	Question	Answer
1	What are the basic functions that a computer is programmed to do?	<ol style="list-style-type: none"> 1. Receive input 2. Process information 3. Produce output 4. Store information
2	Any computer system is made of two parts. What are they?	<ul style="list-style-type: none"> ✓ Hardware ✓ Software
3	What does a hardware consist of?	A hardware consists of the microprocessor (the computer's brain), the memory and the input or output connections which get data in and out of the microprocessor.
4	What are peripherals?	Peripherals are devices that allow us to communicate with the computer. Peripheral devices can be external -- such as a mouse, keyboard, printer, external zip drive or scanner -- or internal, such as a CD-ROM, CD-R or internal modem. Internal peripheral devices are often referred to as integrated peripherals
5	Software is divided into two categories. What are they?	<ol style="list-style-type: none"> 1. System software 2. Application software
6	What are input devices	Input devices feed data into the computer. The keyboard is the most common input device. Other input devices include pointing devices like the mouse and trackball.
7	What are output devices	Output devices produce output through two main types of devices: monitor screens for immediate visual output and printers for permanent paper output.
8	What is a processor?	A processor or CPU (Central Processing Unit) processes information, performs all the necessary arithmetic calculations and make decisions based on information values.
9	What are the advantages of customizing your desktop configuration?	The most used programs are easily accessible in one area, and if you plan to run more than one program at a time, it is better to have them in the same group window.
10	Name 2 data types and describe their characteristics.	<ul style="list-style-type: none"> ✓ Categorical data Categorical data represents characteristics. Therefore, it can represent things like a person's gender, language etc. Categorical data can also take on numerical values (Example: 1 for female and 0 for male). Note that those numbers don't have mathematical meaning ✓ Nominal data Nominal values represent discrete units and are used to label variables, that have no quantitative value. Just think of them as „labels “. Note that nominal data that has no order. Therefore, if you would change the order of its values, the meaning would not change.
11	Why are data types important?	Datatypes are an important concept because statistical methods can only be used with certain data types. You have to analyze

		continuous data differently than categorical data otherwise it would result in a wrong analysis. Therefore knowing the types of data you are dealing with, enables you to choose the correct method of analysis.
12	What are the basic aspects of information retrieval?	<ul style="list-style-type: none"> ✓ Information storage and organization ✓ Information representation ✓ Information access.
13	Name two information retrieval techniques	<ol style="list-style-type: none"> 1. Basic Retrieval Techniques 2. Advanced Retrieval Techniques
14	How do you make sure the efficiency of equipment's?	Exercising preventive maintenance measures such as systematic and routine cleaning, adjustment and replacement of equipment parts at scheduled intervals. Manufacturers generally recommend a set of equipment maintenance tasks that should be performed at regular intervals: daily, weekly, monthly or yearly. Following these recommendations will ensure that the equipment performs at maximum efficiency
15	What is HTML?	Hyper Text Markup Language or HTML is a very simple language having a number of options to represent text. Many other scripting languages have now been developed which can be embedded into HTML, giving it the power to interact with the users
16	The internet is extensively used for a wide variety of purposes. Name any 3.	<ol style="list-style-type: none"> 1. Search for information 2. Send and receive Emails 3. Teleconferencing
17	What are steps involved in sending an Email?	<ol style="list-style-type: none"> 1. Click on "Compose" 2. Enter the e-mail address of the receiver against any of the three options - To, CC and BCC. 3. Write in the message in the text box as indicated in the figure 4. After typing in the message click on send option
18	What are steps involved in shutting down the computer?	<ol style="list-style-type: none"> 1. Click the Windows Icon at the lower left side of the screen. 2. Click Shutdown button <p style="text-align: center;">OR</p> <p>Press Ctrl+Alt+Del and click the power button in the bottom-right corner of the screen.</p>

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to planning operate computer to enter, manipulate, and retrieve and to access data and communicate via the Internet, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Initiate computer system ✓ Enter data ✓ Retrieve data ✓ Amend data ✓ Monitor the operation of equipment ✓ Access and transmit information via the Internet ✓ Close down computer system
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Initiate computer system ✓ Enter data ✓ Retrieve data ✓ Amend data ✓ Monitor the operation of equipment ✓ Access and transmit information via the Internet
4	Undertake proper starting of the workplace computers	While performing the task, students will demonstrate knowledge and skills on the use of the computer and understand name of various parts and functions of workplace computers. Students will use proper starting procedures for safe and long-term use of the computers.
5	Possess skills to organise and manage folders and files in the computer	Workplace computers will have several documents and folders and need to be properly handled and managed. During performing the practical activity, student will know where different folders are located and follow common procedures of handling workplace documents stored within the computers.

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. <ul style="list-style-type: none"> ✓ Initiate computer system ✓ Enter data ✓ Retrieve data

		<ul style="list-style-type: none"> ✓ Amend data ✓ Monitor the operation of equipment ✓ Access and transmit information via the Internet
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Perform proper shut down of computer	As the students shut down computers, make sure they follow proper procedures and align these procedures to the workplace standards of the respective organizations. While shutting down, make sure manufacture recommendations are also taken applied.

4. OQ=Oral Questioning

#	Questions	Answers
1	Initiate computer system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ The hardware components of the computer and their functions are correctly identified. ✓ Equipment is powered up correctly ✓ Access codes are correctly applied. ✓ Appropriate software is selected or loaded from the menu.
2	Enter data	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Types of data for entry correctly identified and collected ✓ Input devices selected and used are appropriate for the intended operations. ✓ Manipulative procedures of Input device conform to established practices. ✓ Computer files are correctly located or new files are created, named and saved ✓ Data is accurately entered in the appropriate files using specified procedure and format. ✓ Back-up made in accordance with operative procedures.
3	Retrieve data	Make sure the students answer questions related to the following areas

		<ul style="list-style-type: none"> ✓ The identity and source of information is established. ✓ Authority to access data is obtained where required. ✓ Files and data are correctly located and accessed. ✓ Integrity and confidentiality of data are maintained ✓ The relevant reports or information retrieved using approved procedure ✓ Formats of retrieved report or information 18 conform to that required ✓ Copy of the data is printed where required
4	Amend data	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Source of data/information for amendment is established. ✓ Data to be amended is correctly located within the file ✓ The correct data/information is entered, changed or deleted using appropriate input device and approved procedures. ✓ The Integrity of data is maintained.
5	Monitor the operation of equipment	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ The system is monitored for correct operation of tasks. ✓ Routine system messages are promptly and correctly dealt with ✓ Error conditions within level of authority are dealt with promptly and uncorrected errors are promptly reported. ✓ Output devices and materials are monitored for quality
6	Access and transmit information via the Internet	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Access to the Internet is gained in accordance with the provider's operating procedures. ✓ Evidence of the ability to negotiate web sites to locate and access specified information and other services is efficiently demonstrated. ✓ E-mail is sent and retrieved competently
7	Close down computer system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ The correct shut down sequence is followed. ✓ Problem with shutting down computer is reported promptly.

		✓ Problem with shutting down computer is reported promptly.
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5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-4: Apply mathematics for water operations

Unit No	04
Unit Title	Apply mathematics for water operations
Unit Code	CONCM11V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW = Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Perform simple mathematic calculations							
Perform simple calculations on: fractions and decimals, calculations to a number of significant figures, decimal places	✓	✓	✓	✓		✓	✓
Identify and use the multiples and sub- multiples of units	✓		✓	✓	✓		✓
Perform calculations on: perimeter and area of plane figures (i.e. square and rectangle, triangle, circle), volume and surface area (i.e. cube, rectangular prism, cylinder), mass of containers and their contents (i.e. cube, rectangular prism, cylinder)	✓	✓	✓	✓		✓	✓
Perform mathematical calculations involving formulas, angles, triangles and geometric construction	✓		✓	✓	✓		✓
Identify and use formulas for SI quantities: length, area, volume, mass, density	✓	✓	✓	✓		✓	✓
2. Apply knowledge of mathematics in water operations							
Identify and use units of Measurement	✓	✓	✓	✓		✓	✓
Perform calculations on: Conversion Factors, Weight, Concentration, and Flow	✓		✓	✓	✓		✓
Perform mathematical calculations involving Typical Water/Wastewater Conversion Examples	✓	✓	✓	✓		✓	✓
Perform Temperature Conversions and Population Equivalent (PE) or Unit Loading Factor	✓		✓	✓	✓		✓
Perform calculations on: Specific Gravity and Density, Flow and Detention Time	✓	✓	✓	✓		✓	✓
Perform chemical Addition Conversions	✓		✓	✓	✓		✓
3. Undertake water/wastewater calculations							
Perform Faucet Flow Estimation	✓	✓	✓	✓		✓	✓
Calculate Service Line Flushing Time	✓		✓	✓	✓		✓

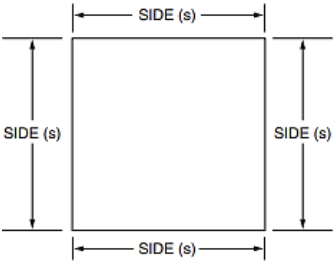
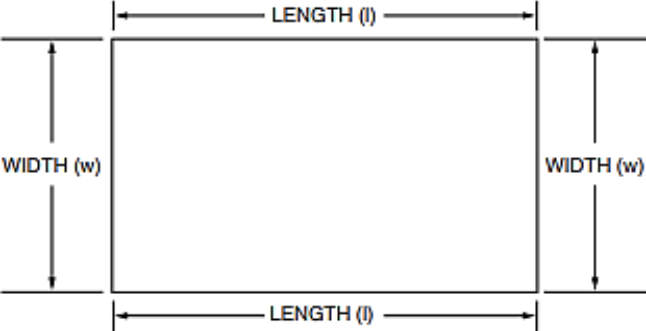
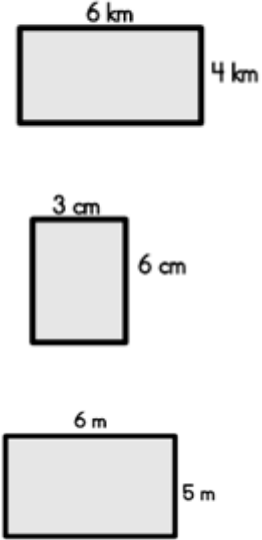
Perform Composite Sampling Calculation (Proportioning Factor) and Biochemical Oxygen Demand (BOD) Calculations	✓	✓	✓	✓		✓	✓
Perform mathematical calculations on Moles and Molarity, Normality, Settleability (Activated Biosolids Solids), Settleable Solids, Biosolids Total Solids, Fixed Solids, and Volatile Solids	✓		✓	✓	✓		✓
Calculate Biosolids Volume Index (BVI) and Biosolids Density Index (BDI)	✓	✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Question	Answer
1	What are the 2 types of fractions?	1. Common fractions 2. Decimal fractions
2	What is a denominator?	The bottom number (the denominator) of every fraction shows the number of pieces any one whole object is divided into; all pieces are of equal size
3	What is the top number of a fraction called?	A numerator.
4	What is a decimal point?	A decimal point separates the whole numbers from the parts, and the whole numbers are always to the left of the decimal point.
5	Round off the following to tenths ✓ .68 ✓ .64	✓ 7 ✓ 6
6	Round off the following to hundredths ✓ .357 ✓ .351	✓ .36 ✓ .35
7	What are significant figures?	The significant figures of a number are digits that carry meaning contributing to its measurement resolution.
8	What are the base units used for the following? 1. Mass 2. Length 3. Time	1. Kilogram (kg) 2. Meter (m) 3. Second 4. Kelvin (K)

4. Temperature		
9	How would you identify a square? Illustrate.	<p>All four sides are of equal length, and all four angles are 90°.</p> 
10	How would you identify a Rectangle? Illustrate.	<p>The lengths are equal only to each other and the widths are equal only to each other. All four angles are 90°.</p> 
11	<p>Find the area of the following</p> 	<ul style="list-style-type: none"> ✓ $A=L \times H$ $= 6 \times 4$ $= 24$ ✓ $A=L \times H$ $= 3 \times 6$ $= 18$ ✓ $A=L \times H$ $= 6 \times 5$ $= 30$

12	A cuboid measures 16 cm by 13 cm by 9 cm. Find the capacity of the cuboid. Give your answers in liters.	<p>Solution:</p> $\text{Volume} = 16 \times 13 \times 9 = 1872 \text{ cm}^3.$
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2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to: Use calculation to solve simple problems, construct plane figures, and develop patterns, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	<p>Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas.</p> <ul style="list-style-type: none"> ✓ Perform simple mathematic calculations ✓ Apply knowledge of mathematics in water operations ✓ Undertake water/wastewater calculations
3	Review Assessment papers	<p>Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.</p> <ul style="list-style-type: none"> ✓ Perform simple mathematic calculations ✓ Apply knowledge of mathematics in water operations ✓ Undertake water/wastewater calculations
4	Use calculations to solve simple problems	While answering, make sure they use correct formulas while calculating perimeter, area, volume and other mathematical calculations.

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Perform simple mathematic calculations ✓ Apply knowledge of mathematics in water operations ✓ Undertake water/wastewater calculations

2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Apply knowledge of mathematics in water operations	Assessor can verbally ask questions on the identification of unit measurements and how to perform calculations on Conversion Factors, Weight, Concentration, and Flow

4. OQ=Oral Questioning

#	Oral questioning activities	Answers
1	Perform simple mathematic calculations	Make sure the students answer questions related to the following areas <ul style="list-style-type: none"> ✓ Perform simple calculations on: fractions and decimals, calculations to a number of significant figures, decimal places ✓ Identify and use the multiples and sub-multiples of units ✓ Perform calculations on: perimeter and area of plane figures (i.e. square and rectangle, triangle, circle), volume and surface area (i.e. cube, rectangular prism, cylinder), mass of containers ✓ and their contents (i.e. cube, rectangular prism, cylinder) ✓ Perform mathematical calculations involving formulas, angles, triangles and geometric construction ✓ Identify and use formulas for SI quantities: length, area, volume, mass, density
2	Apply knowledge of mathematics in water operations	Make sure the students answer questions related to the following areas <ul style="list-style-type: none"> ✓ Identify and use units of Measurement ✓ Perform calculations on: Conversion Factors, Weight, Concentration, and Flow ✓ Perform mathematical calculations involving Typical Water/Wastewater Conversion Examples ✓ Perform Temperature Conversions and Population Equivalent (PE) or Unit Loading Factor ✓ Perform calculations on: Specific Gravity and Density, Flow and Detention Time

		<ul style="list-style-type: none"> ✓ Perform chemical Addition Conversions
3	Undertake water/wastewater calculations	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Perform Faucet Flow Estimation ✓ Calculate Service Line Flushing Time ✓ Perform Composite Sampling Calculation (Proportioning Factor) and Biochemical Oxygen Demand (BOD) Calculations ✓ Perform mathematical calculations on Moles and Molarity, Normality, Settleability (Activated Biosolids Solids), Settleable Solids, Biosolids Total Solids, Fixed Solids, and Volatile Solids ✓ Calculate Biosolids Volume Index (BVI) and Biosolids Density Index (BDI)

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-5: Prepare basic technical drawing

Unit No 05
 Unit Title Prepare basic technical drawing
 Unit Code CONS05CR01V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Identify drawing requirements							
Requirements and purpose of drawing are determined from customer and/or work specification and associated documents	✓	✓	✓	✓		✓	✓
All data necessary to produce the drawing is identified and collected	✓		✓	✓	✓		✓
Drawing requirements are confirmed with relevant personnel and timeframes for completion are established	✓	✓	✓	✓		✓	✓
2. Develop knowledge and proper techniques in preparing drawings and sketches							
Drafting equipment is selected appropriate to the drawing method chosen	✓	✓	✓	✓		✓	✓
Drafting principles are applied to produce a drawing that is consistent with standard operating procedures within the enterprise	✓		✓	✓	✓		✓
All work is undertaken safely and to prescribed procedure	✓	✓	✓	✓		✓	✓
Completed drawing is approved in accordance with standard operating procedures	✓		✓	✓	✓		✓
3. Perform drawing and sketches to workplace requirements							
Drawings and or parts lists records are completed in accordance with standard operating procedures	✓		✓	✓	✓		✓
Approved drawings and or parts lists are copied and issued to relevant personnel in accordance with standard operating procedures	✓	✓	✓	✓		✓	✓
Approved drawings and or parts lists are stored and catalogued in accordance with standard operating procedures	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Question	Answer
1	Briefly explain the first step of requirements gathering.	Often the first step for that should be to determine what the roles and responsibilities should be during this phase of the project. While the project manager would normally be responsible for the requirements of the project, it should typically be the customer, or an analyst, who is responsible for the requirements of the product. Even though the same person may play both roles, their overall responsibilities are different and it is important to be aware of which role is involved in what steps.
2	What is the project scope?	The project scope defines how the product (or service) will be developed while the product scope defines the actual functions and features of that same product.
3	What has the traditional focus in project management been on?	The traditional focus in project management has been on developing a product faster, cheaper, and better.
4	Why has the traditional focus in project management been changing?	This is changing through the popularity of agile approaches where it is assumed that the customer does not have a clear understanding of what they want up front, but rather that requirements gathering is a discovery process, where the customer gradually discovers the product requirements through iterations, prototyping and modelling.
5	Identify four techniques that are considered when determining the right approach.	<ul style="list-style-type: none">✓ One-on-one interviews✓ Surveys✓ Job shadowing or observation✓ Facilitated sessions/JAD (Joint Application Development) sessions
6	What does JAD sessions stand for?	Joint application design sessions.
7	What are JAD sessions?	JAD is a techniques largely focused on group dynamics and team synergy, it is important to get the right people involved.
8	What key people are required for a JAD session?	<ul style="list-style-type: none">✓ Facilitator✓ Scribe✓ Analyst✓ Customer
9	Explain the role of the facilitator in a JAD session.	The facilitator should be selected based on their ability to work with and lead a group of people in consensus building. They should be neutral to the outcome of the session, meaning that they should not have a vested impact in steering the discussion in a certain direction. This normally means that the project manager or the developers do not make good facilitators. Ideally,

		<p>it should be a person that has a general understanding of the customer's business areas, who is comfortable with modeling techniques that are to be used in the session and who can deal with a group of disagreeing people and move them along in the decision process.</p> <p>While the facilitator is not the most important person for the project, they are the one with the most influence on the success of the JAD session itself. They need to be able to sense how the JAD team is functioning, to deal with conflicts, and to make sure that the goals of the session are being met.</p>
10	Explain the role of the scribe in a JAD session.	<p>The scribe, or scribes, will capture the key decisions, and the rationale behind those decisions. If a 3-day JAD session is being held and at the end there is no documentation of the outcome, then everyone has just wasted 3 days. Have one scribe focus on conversations and one on models. This will improve the odds of catching everything important. The scribe must have good listening skills and must understand the business that is being discussed. You don't want constant interruptions from the scribe, requesting clarifications of items that are well understood by the rest of the room.</p>
11	Explain the role of the facilitator in a JAD session.	<p>The analyst is the person focusing on capturing the right information. Often the analyst will also be the facilitator, but when that happens they are playing two different roles. The facilitator is focusing on getting the group to consensus and to meet the session goals while the analyst is there to make sure that the right questions are asked and that the models correctly identify the business. The analyst is really more of a subject matter expert on the customer's business.</p>
12	Explain the role of the facilitator in a JAD session.	<p>Obviously you cannot hold a JAD session without a customer. While it is true that you may not be able to select your customer, there are ways to influence the selection of them. Identify the criteria that you are looking for and meet with management ahead of time and explain the importance of the role and the characteristics of the person that is needed.</p>
13	Identify four ground rules established for a JAD session.	<ul style="list-style-type: none"> ✓ Breaks and how to handle late comers ✓ Decision process and how consensus is defined ✓ What to do when a topic goes longer than the agenda ✓ Rules to deal with participants monopolizing the conversation
14	Explain the Parking Lot concept.	<p>A parking lot serves two main purposes, first, it allows the team to capture important information that should be addressed, but not by this team at this time. The second benefit is for the facilitator. It allows moving a person off a topic which is not in line with the goals of the session. There may not be intent to ever re-visit the topic again, but by putting it in writing and making it visible, it may allow the team to put the topic aside.</p>
15	Explain the forming stage.	<p>In the forming stage, the team is insecure and needs a lot of guidance. Team building and clear assignments are important for this stage.</p>
16	Explain the storming stage.	<p>In the storming stage the team is now trying to assess the competency of other team members and figure out where they fit. The facilitator needs to let the team storm, while making sure that the ground rules are being followed.</p>

17	Explain the norming stage.	In the norming stage the team is falling in to natural roles and responsibilities and the team starts to find its purposes.
18	Explain the performing stage.	When that has been sorted out the team is in the performing stage. In real life the team will move back and forth between these stages and the facilitator should adjust their facilitation style based on that.
19	List the key steps of implementing a JAD approach.	<ol style="list-style-type: none"> 1. Sell it to your management to the customer. If you don't get buy-in this will fail, so make sure you put together a good sales presentation. 2. Train your core team on the techniques you'll be using (could be Process Modeling, Data Modeling, Prototyping, etc.) 3. Train some facilitators (select people that can lead a discussion, not necessarily the ones that want to do the most talking) 4. Pick a pilot project. Pick something not too large, something that you can afford to learn one and work through. 5. Train all participants (the users in the sessions have to understand the technique) 6. Schedule and run the pilot session. 7. Do an extensive lessons and learned session.
20	Identify the different types of views in basic engineering drawing.	<ul style="list-style-type: none"> ✓ Isometric view ✓ Orthographic view ✓ Orthographic projection (ISO standard) ✓ Flat pattern ✓ Section view ✓ Cutout view ✓ Detail view ✓ Auxiliary view
21	Explain isometric view.	<p>Isometric drawings show parts as three-dimensional. All the vertical lines stay vertical (compared to front view) and otherwise parallel lines are shown on a 30-degree angle. The lines that are vertical and parallel are in their true length. Which means you can use a ruler and the scaling of the drawing to easily measure the length straight from a paper drawing, for example. The same does not apply to angled lines.</p> <p>It is important to distinguish the isometric view from a perspective view. A perspective view is an artistic one that represents an object as it seems to the eye. Engineers stay true to the dimensions rather than optical illusions.</p>
22	Explain orthographic projection (ISO standard).	<p>The most common way to communicate all the information is by using three different views in a multiview drawing:</p> <ul style="list-style-type: none"> ✓ Front view ✓ Top view ✓ Side view <p>It may be possible that some additional views are necessary to show all the info. But again, less is more.</p> <p>The positioning of the views differs a bit regionally. For example, look at the image below to compare the US and ISO layouts.</p>

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to preparing basic technical drawing, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Identify drawing requirements ✓ Develop knowledge and proper techniques in preparing drawings and sketches ✓ Perform drawing and sketches to workplace requirements
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Identify drawing requirements ✓ Develop knowledge and proper techniques in preparing drawings and sketches ✓ Perform drawing and sketches to workplace requirements
4	Demonstrate four methods by which you can identify drawing requirements	The student is expected to follow the correct step-by step processes of methods to identify drawing requirements. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ One-on-one interviews ✓ Surveys ✓ Job shadowing or observation ✓ JAD (Joint Application Development) sessions

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. <ul style="list-style-type: none"> ✓ Identify drawing requirements ✓ Develop knowledge and proper techniques in preparing drawings and sketches ✓ Perform drawing and sketches to workplace requirements
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to identifying the drawing requirements, preparing or making changes to

		<p>engineering drawings, preparing an engineering parts list and issuing the drawings.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate how to implement a JAD approach	As the students attend the practical test to assess their skill in implementing a JAD approach, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Identify drawing requirements	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Requirements and purpose of drawing are determined from customer and/or work specification and associated documents. ✓ All data necessary to produce the drawing is identified and collected. ✓ Drawing requirements are confirmed with relevant personnel and timeframes for completion are established.
2	Develop knowledge and proper techniques in preparing drawings and sketches	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Drafting equipment is selected appropriate to the drawing method chosen. ✓ Drafting principles are applied to produce a drawing that is consistent with standard operating procedures within the enterprise. ✓ All work is undertaken safely and to prescribed procedure. ✓ Completed drawing is approved in accordance with standard operating procedures.
3	Perform drawing and sketches to workplace requirements	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Drawings and or parts lists records are completed in accordance with standard operating procedures. ✓ Approved drawings and or parts lists are copied and issued to relevant personnel in accordance with standard operating procedures. ✓ Approved drawings and or parts lists are stored and catalogued in accordance with standard operating procedures.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.

2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-6: Apply science for Water Operations

Unit No 06
 Unit Title Apply science for Water Operations
 Unit Code CONS05CR02V1/21

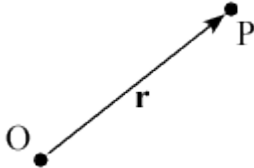
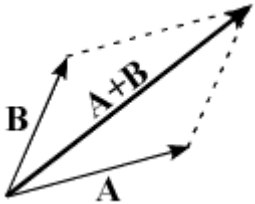
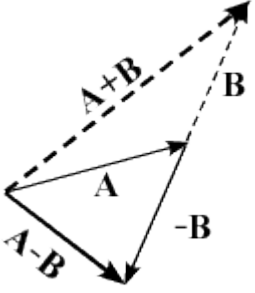
Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Apply principals and theories of physics in real world							
Perform scalars and vector arithmetic	✓	✓	✓	✓		✓	✓
Understand kinetics and perform simple calculations	✓		✓	✓	✓		✓
Understand circulation motion, and governing laws	✓	✓	✓	✓		✓	✓
Understand and apply the laws of Forces in real world examples	✓		✓	✓	✓		✓
Understand the Conservation of Energy principals and apply in real world	✓	✓	✓	✓		✓	✓
Understand the momentum and impulse	✓		✓	✓	✓		✓
Understand kinematics	✓	✓	✓	✓		✓	✓
Understand wave principals	✓		✓	✓	✓		✓
2. Apply principals and theories of chemistry in real world examples							
Understanding matter: <ul style="list-style-type: none"> States of matter, and properties related to it Pure substances and mixtures 	✓	✓	✓	✓		✓	✓
Understanding atoms, molecules, elements and compounds, and basic understanding of chemical reactions	✓		✓	✓	✓		✓
Understanding solvents, solutions, saturation facts, and concentration limits	✓	✓	✓	✓		✓	✓
Observing properties of acids and bases, and understanding strong and weak acids	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

	Question	Answer
1	Define scalars.	Scalars are mathematical entities which have only a magnitude- (and no direction).
2	List two examples of scalar quantities.	Physical examples include mass and energy.
3	Define vectors.	Vectors are mathematical entities which have both a magnitude and a direction.
4	List two examples of vector quantities.	Physical examples include forces, velocities, momenta and locations.
5	What is the notation of a scalar unit?	Plain (or often italicized) letters: a , k , etc.
6	What is the notation of a vector unit?	Either bold letters: \mathbf{x}, \mathbf{v} (often used in books), or a small vector sign: \vec{x}
7	What is the magnitude of a vector?	$A \equiv A $
8	Show the position vector of a given location P.	 <p>A diagram showing a point O (origin) and a point P. A vector labeled \mathbf{r} points from O to P.</p>
9	How do you add vectors? Explain with a diagram.	<p>The sum of two vectors is defined as the diagonal of the parallelogram formed when the two vectors \mathbf{A} and \mathbf{B} are placed at the same point, as is described in the diagram. Evidently, we see that the addition is commutative, that is, the order is not important: $\mathbf{A} + \mathbf{B} = \mathbf{B} + \mathbf{A}$.</p>  <p>A diagram showing two vectors \mathbf{A} and \mathbf{B} originating from the same point. Dashed lines complete a parallelogram. The diagonal vector is labeled $\mathbf{A} + \mathbf{B}$.</p>
10	How do you subtract vectors? Explain with a diagram.	<p>Vector subtraction $\mathbf{A} - \mathbf{B}$ is defined as: $\mathbf{A} + (-\mathbf{B})$, that is, adding the negative of the subtracted vector \mathbf{B}, as is apparent in the figure.</p>  <p>A diagram showing vector \mathbf{A} and vector $-\mathbf{B}$ (the negative of vector \mathbf{B}) originating from the same point. A dashed vector labeled $\mathbf{A} + \mathbf{B}$ is shown, and a solid vector labeled $\mathbf{A} - \mathbf{B}$ is shown as the resultant.</p>
11	Explain the concept of vector distributivity with a diagram.	<p>The graphical definition of vector addition also implies a very important characteristic: Vector addition is distributive, that is $\mathbf{A} + (\mathbf{B} + \mathbf{C}) = (\mathbf{A} + \mathbf{B}) + \mathbf{C}$. In other words, when we add three vectors, it does not matter whether we add the first pair first, or</p>

		<p>the second pair first. This is demonstrated in the following figure.</p>
12	Explain how to multiply by a scalar with a diagram.	<p>Multiplying a vector by a scalar gives a new vector with the same direction but with a magnitude which is multiplied by the scalar. A negative scalar would yield a vector in the opposite direction as the original vector. For example: $(-1)A = -A$.</p>
13	Define distance.	Distance is a scalar quantity that refers to "how much ground an object has covered" during its motion.
14	Define displacement.	Displacement is a vector quantity that refers to "how far out of place an object is"; it is the object's overall change in position.
15	Define speed.	Speed can be thought of as the rate at which an object covers distance.
16	Define velocity.	Velocity is a vector quantity that refers to the rate at which an object changes its position.
17	What is the equation used to calculate average speed?	$\text{Average Speed} = \frac{\text{Distance Traveled}}{\text{Time of Travel}}$
18	What is the equation used to calculate average velocity?	$\text{Average Velocity} = \frac{\Delta \text{position}}{\text{time}} = \frac{\text{displacement}}{\text{time}}$
19	Define instantaneous speed.	The speed at any given instant in time.
20	Define average speed.	The average of all instantaneous speeds; found simply by a distance/time ratio.
21	Define acceleration.	Acceleration is a vector quantity that is defined as the rate at which an object changes its velocity.
22	Define constant acceleration.	This is referred to as a constant acceleration since the velocity is changing by a constant amount each second.
23	What is the equation used to find average acceleration?	$\text{Ave. acceleration} = \frac{\Delta \text{velocity}}{\text{time}} = \frac{v_f - v_i}{t}$
24	Identify the three types of matter and explain their properties.	<ul style="list-style-type: none"> ✓ Solid: a substance that retains its size and shape without a container; a substance whose molecules cannot move freely except to vibrate. ✓ Gas: a substance that can only be contained if it is fully surrounded by a container (or held together by gravitational pull); a substance whose molecules have negligible intermolecular interactions and can move freely.

		✓ Liquid: a substance that flows and keeps no definite shape because its molecules are loosely packed and constantly moving. It takes the shape of its container but maintains constant volume.
25	Define chemical element.	A chemical element is a pure substance that consists of one type of atom.
26	Describe properties of metals.	<ul style="list-style-type: none"> ✓ Often conductive to electricity ✓ Malleable ✓ Shiny ✓ Sometimes magnetic.
27	Describe properties of non-metals.	<ul style="list-style-type: none"> ✓ Typically not conductive ✓ Not malleable ✓ Dull (not shiny) ✓ Not magnetic.
28	Define chemical compound.	When two distinct elements are chemically combined—i.e., chemical bonds form between their atoms—the result is called a chemical compound.
29	Describe properties of chemical compounds.	<ul style="list-style-type: none"> ✓ Molecular compounds held together by covalent bonds ✓ Salts held together by ionic bonds ✓ Intermetallic compounds held together by metallic bonds ✓ Complexes held together by coordinate covalent bonds.
30	Define solution.	A solution in chemistry is a homogenous mixture of two or more substances.
31	Define solvent.	The substance which is dissolved is called a solute
32	Define solute.	The substance in which the solute is dissolved is called a solvent.

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to applying science for water operations, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	<p>Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas.</p> <ul style="list-style-type: none"> ✓ Apply principals and theories of physics in real world ✓ Apply principals and theories of chemistry in real world examples
3	Review Assessment papers	<p>Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.</p> <ul style="list-style-type: none"> ✓ Apply principals and theories of physics in real world ✓ Apply principals and theories of chemistry in real world examples
4	Demonstrate Newton's Third Law can be proved with examples	The student is expected to follow the correct step-by step process to proving Newton's Third Law. The elements which should be assessed are:

		Consider the flying motion of birds. A bird flies by use of its wings. The wings of a bird push air downwards. Since forces result from mutual interactions, the air must also be pushing the bird upwards. The size of the force on the air equals the size of the force on the bird; the direction of the force on the air (downwards) is opposite the direction of the force on the bird (upwards). For every action, there is an equal (in size) and opposite (in direction) reaction. Action-reaction force pairs make it possible for birds to fly.
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3. OW = Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. <ul style="list-style-type: none"> ✓ Apply principals and theories of physics in real world ✓ Apply principals and theories of chemistry in real world examples
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	During the implementation of the training program, students would have completed assignments related to fundamental laws of science with routine tasks and work environment. Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.
4	Presentation on states of matter	As the students attend the practical test to assess their knowledge in differentiating between the states of matter, make sure the student uses the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Apply principals and theories of physics in real world	Make sure the students answer questions related to the following areas <ul style="list-style-type: none"> ✓ Perform scalars and vector arithmetic ✓ Understand kinetics and perform simple calculations ✓ Understand circulation motion, and governing laws ✓ Understand and apply the laws of Forces in real world examples ✓ Understand the Conservation of Energy principals and apply in real world

		<ul style="list-style-type: none"> ✓ Understand the momentum and impulse ✓ Understand kinematics ✓ Understand wave principals
2	Apply principals and theories of chemistry in real world examples	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Understanding matter: ✓ States of matter, and properties related to it ✓ Pure substances and mixtures ✓ Understanding atoms, molecules, elements and compounds, and basic understanding of chemical reactions ✓ Understanding solvents, solutions, saturation facts, and concentration limits ✓ Observing properties of acids and bases, and ✓ understanding strong and weak acids

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-7: Plan to undertake a routine task

Unit No 07
 Unit Title Plan to undertake a routine task
 Unit Code CONS05CR03V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Identify task requirements							
Instructions and procedures are obtained, understood and where necessary clarified	✓	✓	✓	✓		✓	✓
Relevant specifications for task outcomes are obtained, understood and where necessary clarified	✓		✓	✓	✓		✓
Task outcomes are identified	✓	✓	✓	✓		✓	✓
Task requirements such as completion time and quality measures are identified	✓		✓	✓	✓		✓
2. Plan steps required to complete task							
Based on instructions and specifications provided, the individual steps or activities required to undertake the task are understood and where necessary clarified	✓	✓	✓	✓		✓	✓
Sequence of activities is identified	✓		✓	✓	✓		✓
Plan is checked to ensure it complies with specifications and task requirements	✓	✓	✓	✓		✓	✓
3. Review plan							
Effectiveness of plan is reviewed against specifications and task requirements	✓	✓	✓	✓		✓	✓
If necessary, plan is revised to better meet specifications and task requirements	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

	Question	Answer
1	Define task analysis.	It is a structured framework that dissects a job and arrives at a reliable method of describing it across time and people by composing a detailed listing of all the tasks.
2	What does a task analysis contain?	<ul style="list-style-type: none"> ✓ Task frequency ✓ Difficulty of learning ✓ Importance to train ✓ Task criticality ✓ Task difficulty ✓ Overall task importance
3	Define task statement.	A task statement is composed of an action and a result (product).
4	What are task steps?	Task steps (also known as performance steps) are the step-by-step instructions for performing the process.
5	Demonstrate how to order manufacturing parts when the system flags a part as being low in stock	<ul style="list-style-type: none"> ✓ Look up usage for the item for the previous 12 month period. ✓ Calculate the average monthly use. ✓ Add the planned growth rate for the product line. ✓ Check parts catalogs or call the source for best buy rates. ✓ Check with planned usage tables or the business unit to ensure that the part will not go out of specifications for the best calculated buy period. ✓ Place purchase order.
6	List the four main methods for determining steps in a task analysis.	<ul style="list-style-type: none"> ✓ Hierarchical Task Analysis - arranging by order of actions ✓ IF and THEN Analysis - If and then relationship ✓ Model Based Analysis - possible actions listed ✓ Cognitive Task Analysis - critical decision based
7	IF text is a word, THEN?	<ul style="list-style-type: none"> ✓ move cursor to middle of word ✓ double-click mouse button
8	IF text is a section of words or letters, THEN?	<ul style="list-style-type: none"> ✓ move cursor to beginning of text ✓ press mouse button down ✓ move cursor to end of text ✓ release mouse button
9	What is the Model Based Analysis method used for?	This method is often used for professional tasks as the steps for performing certain tasks can be extremely vague to define.
10	List some acceptable techniques used in model based analysis.	<ul style="list-style-type: none"> ✓ use examples of others ✓ have them form a picture in their minds of what they are trying to learn ✓ help them gain and understand necessary information ✓ apply the task to their job ✓ present information using visual, auditory, and kinesthetic methods ✓ practice the task
12	Define cognitive task analysis.	A Cognitive Task Analysis is directed at the psychological processes underlying the performance and the subtle cues that may depend on context and experience.

13	What is the main goal of a cognitive task analysis?	To define the actual decision requirements of the task.
14	How can the actual decision requirements of the task be defined?	<ul style="list-style-type: none"> ✓ Mapping out the task using task analysis (traditional task analysis). ✓ Identifying the critical decision points. ✓ Clustering and linking the decision points. ✓ Prioritizing the decision points. ✓ Diagnosing and characterizing the decisions as to the strategies used, cues signaling the decision points, and the inferences made regarding cues and decision points.
15	Explain the difference between task analysis and cognitive task analysis.	Task analysis focuses mainly on observable behavior and does not offer information on overall organization of knowledge. A cognitive task analysis is directed at the psychological processes underlying the behavior. Cognitive task analysis concentrates on the critical decisions and cognitive processes that separate the expert from the novice.
16	Define duties.	Duties are a combination of related or like tasks.
17	What is the purpose of team task analysis?	The purpose of the team task analysis will dictate if the focus is to be upon team tasks, team processes, individual task-work, or some combination of the three.
18	Identify the basic criteria incorporated into task management plans.	<ul style="list-style-type: none"> ✓ Time management, ✓ Scheduling efficiency, ✓ Data consolidation, and ✓ Fluid communication
19	List four ways task management can help you stay organized at work.	<ul style="list-style-type: none"> ✓ They help restructure big picture goals into smaller picture objectives. ✓ They break those objectives into individual tasks and subtasks. ✓ They lay out start dates, end dates, milestones, and timelines in a way that's easy to see and coordinate. ✓ They make use of efficiency and productivity tools.
20	Identify the steps in a task management plan.	<ol style="list-style-type: none"> 1. Rework big goals into small objectives 2. Clarify objectives by converting them into a series of tasks 3. Lay out and manage task timelines visually 4. Take advantage of visual task management tools
21	List some benefits of reviewing your plans.	<ul style="list-style-type: none"> ✓ Reviewing your plans helps limit decision fatigue ✓ Reviewing your plans helps reveal assumptions that need to be adjusted ✓ Reviewing your plans helps you proactively problem-solve and coordinate ✓ Reviewing your plans helps you keep momentum on Big Projects ✓ Reviewing your plans ultimately helps you save time

2. PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to planning to undertake a routine task, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Identify task requirements ✓ Plan steps required to complete task ✓ Review plan
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Identify task requirements ✓ Plan steps required to complete task ✓ Review plan
4	Demonstrate how to order manufacturing parts when the system flags a part as being low in stock	The student is expected to follow the correct step-by step process to measuring with a pressure gauge. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ Look up usage for the item for the previous 12 month period. ✓ Calculate the average monthly use. ✓ Add the planned growth rate for the product line. ✓ Check parts catalogs or call the source for best buy rates. ✓ Check with planned usage tables or the business unit to ensure that the part will not go out of specifications for the best calculated buy period. ✓ Place purchase order.

3. OW =Observation at work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. <ul style="list-style-type: none"> ✓ Identify task requirements ✓ Plan steps required to complete task ✓ Review plan
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.

3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to planning their own work where tasks involve one or more steps or functions and are carried out routinely on a regular basis.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate how to use If/Then Analysis	As the students attend the practical test to assess their knowledge regarding If/Then Analysis, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Identify task requirements	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Instructions and procedures are obtained, understood and where necessary clarified. ✓ Relevant specifications for task outcomes are obtained, understood and where necessary clarified. ✓ Task outcomes are identified. ✓ Task requirements such as completion time and quality measures are identified.
2	Plan steps required to complete task	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Based on instructions and specifications provided, the individual steps or activities required to undertake the task are understood and where necessary clarified. ✓ Sequence of activities is identified. ✓ Plan is checked to ensure it complies with specifications and task requirements.
3	Review plan	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Effectiveness of plan is reviewed against specifications and task requirements. ✓ If necessary, plan is revised to better meet specifications and task requirements.

5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-8: Perform Industrial Welding Skill

Unit No	08
Unit Title	Perform industrial welding skill
Unit Code	CONS09CR04V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Prepare and undertake basic welding							
Determine welding requirements for polymer pipes and installation methods from relevant job plans and specifications.	✓	✓	✓	✓		✓	✓
Demonstrate welding safety	✓		✓	✓	✓		✓
Interpret functions and applications of various welding equipment	✓	✓	✓	✓		✓	✓
Develop basic arc welding knowledge and skills	✓		✓	✓	✓		✓
Select and check the serviceability of the appropriate tools, equipment and personal protective equipment (PPE)	✓	✓	✓	✓		✓	✓
2. Identify welding requirements							
Create a materials list and collect materials	✓	✓	✓	✓		✓	✓
Check welding equipment for correct operation according to manufacturer instructions	✓		✓	✓	✓		✓
3. Weld and inspect pipe joints							
Prepare joints using tools and techniques according to manufacturer specifications and relevant standards	✓	✓	✓	✓		✓	✓
Conduct test welds and verify according to job specifications.	✓		✓	✓	✓		✓
Carry out fusion welds according to relevant job plans and specifications and codes	✓	✓	✓	✓		✓	✓
Visually inspect fusion welds for compliance with relevant job plans and specifications and codes,	✓		✓	✓	✓		✓
4. Clean up							
Clear the work area, and dispose of, reuse or recycle materials in accordance with state and territory legislation and workplace policies and procedures.	✓	✓	✓	✓		✓	✓
Clean tools and equipment, check for serviceability and report any damage, and store and secure	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play

1. Written questions

#	Question	Answer
1	How are cold repairs done?	<ul style="list-style-type: none">✓ Clean surface to remove grease and accumulated dirt. Remove as much of the loose metal and oxides as possible. Thoroughly abrade the edge and the surrounding surface of the hole.✓ If the hole is large, a metal mesh formed to the shape of the hole should be made. Measure up and mix a small quantity of Metalgrade Express and apply it along the edge of the hole. Remember to squeeze the product hard into the surface to secure good bonding. The first thin covering acts as a "wetting layer" to improve adhesion.✓ Place the precut mesh down in the hole so that it makes contact with the polymer along the edge. If needed secure it with additional polymer.✓ Allow drying for 6 minutes (at 20°C). With the mesh securely fastened measure up and mix a sufficient quantity of Metalgrade Rebuild. Apply the product on to the mesh spreading it out evenly. Apply the product to totally encapsulate the mesh and blend it in with the Metalgrade Express already on the cast-iron edge.✓ If the mesh size is too big, and the polymer falls through, apply reinforcement bandage on the mesh to prevent it happening.✓ If necessary, support the mesh by placing steel wires across the hole. The wires can be fastened to the edge by a small tack weld or by drilling a hole with slightly bigger diameter.
2	In what cases should cold repairs be done?	When the cast iron is so corroded and oxidized that welding cannot be done
3	What is the cause of liquid penetrating through porosity in the weld or heat affected zone?	The residue oil in the cast iron structure

4	What are some precautions to ensure you do not get electric shock?	<ul style="list-style-type: none"> ✓ Do not touch live electrical parts. ✓ Wear dry, hole-free insulating gloves and body protection. ✓ Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground. ✓ Do not use AC weld output in damp, wet, or confined spaces, or if there is a danger of falling. ✓ Use AC output ONLY if required for the welding process. ✓ If AC output is required, use remote output control if present on unit.
5	How should you handle hot parts?	<ul style="list-style-type: none"> ✓ Do not touch hot parts bare-handed. ✓ Allow cooling period before working on equipment. ✓ To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.
6	How can you protect yourself against fumes and gases?	<ul style="list-style-type: none"> ✓ Keep your head out of the fumes. Do not breathe the fumes. ✓ Ventilate the work area and/or use local forced ventilation at the arc to remove welding fumes and gases. The recommended way to determine adequate ventilation is to sample for the composition and quantity of fumes and gases to which personnel are exposed. ✓ If ventilation is poor, wear an approved air-supplied respirator. ✓ Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded. ✓ Read and understand the Safety Data Sheets (SDSs) and the manufacturer's instructions for adhesives, coatings, cleaners, consumables, coolants, degreasers, fluxes, and metals. ✓ Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe. ✓ Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can

		react with vapors to form highly toxic and irritating gases
7	What are the ideal clothing for an operator?	<ul style="list-style-type: none"> ✓ Long-sleeved cotton shirt ✓ Sleeves rolled down and buttoned ✓ Strong trousers without cuffs ✓ Strong leather shoes or work boots ✓ Aprons ✓ Gloves ✓ Spats (leather) ✓ Caps ✓ Leather capes or jackets.
8	Why is an auto-darkening welding helmet important?	The purpose of the helmet, first of all, is to protect your eyes from the flash of the arc. However, when the arc of the torch is not active, the helmet's lens maintains a light shade, so you can still see your work. This eliminates the need to take the helmet on and off each time before welds. Another purpose of the welding helmet is to protect your face and neck from welding radiation and sparks.
9	Which material is not recommended for clothes and shoes when welding? And why?	Synthetic material because they burn
10	What is soft soldering?	Soft soldering is a means of jointing pipe using traditional plumbers solder which is a mixture of tin and lead. A comprehensive range of fittings are available and the solder is usually incorporated into each one in the form of an integral ring. Fitting without this ring of solder are also available but are not as popular as the first type
11	What is bronze welding?	A third common thermal process to join copper pipe is a method known as bronze welding. Although it is referred to as "welding", no melting of the parent metal takes place. However, the bond produced is equal in strength and comparable to a fusion weld.
12	What are the main types of bronze welding joints?	<ul style="list-style-type: none"> ✓ Bell Joint: Used on pipes in the vertical position. The lower pipe end is belled out to receive the top pipe. ✓ Butt Joint: Used to join pipes in the horizontal position. ✓ Branch Joint: Used for branch welds. The branch hole may be filled, cut or burned out. ✓ Reducing Joint: Used where it is necessary to join pipes of different sizes. ✓ Blank Welds: Used to blank pipe ends.
13	What are the purposes of clamp fittings?	Clamp fittings provide a crevice free joint and, depending on the clamp design, requires no tools for assembly or dismantling for cleaning. Provides quick method of regularly opening up a

		system and often has some kind of closure device such as a 'Triclover' clamp. Used where corrosion and contamination are particular hazards, as in the pharmaceutical industry. Also used in systems carrying warm semi-solids and viscous liquids, such as chocolate and tomato sauce, which must not cool in the line but tend to cause regular blockages.
14	What are some of the different standard for tri-clamp joints?	<ul style="list-style-type: none"> ✓ ASME BPE 2004 ✓ BS4825 Part 3 ✓ BS Sch 5 and Sch 10 ✓ DN32676 Series 2 (Standard and Non-standard) ✓ DN32676 Series 1 & 3 ✓ ISO1127
15	What are compression joints used for?	Compression joints are frequently used for small gauge, thin-walled piping such as fuel lines, gas lines or potable water systems, (to avoid the use of lead solder).
16	What are some advantages of compression joints?	<ul style="list-style-type: none"> ✓ Compression fittings are popular because they do not require soldering, so they are comparatively quick and easy to use. They require no special tools or skills to operate. They work at higher pressures and with toxic gases. Compression fittings are especially useful in installations that may require occasional disassembly or partial removal for maintenance etc, since these joints can be broken and remade without affecting the integrity of the joint. They are also used in situations where a heat source, in particular a soldering torch, is prohibited.
17	What are some disadvantages of compression joints?	<ul style="list-style-type: none"> ✓ Compression fittings are not as robust as soldered fittings. They should be used in applications where the fitting will not be disturbed and not subjected to flexing or bending. A soldered joint is highly tolerant of flexing and bending (such as when pipes knock or shake from sudden pressure changes). Compression fittings are much more sensitive to these types of dynamic stresses. They are also bulkier, and may be considered less aesthetically pleasing than a neatly soldered joint.
18	What are some points to note when assembling a flange joint?	<ul style="list-style-type: none"> ✓ Always use flat washers on both sides of the connection. ✓ Tighten all bolts until finger tight and ensure that joint and gasket are correctly aligned. ✓ Tighten the flange bolts with a calibrated torque wrench to the specified bolt torques. Note: For anti-seize compounds, the torque values will be different. ✓ Tighten the flange bolts with a torque wrench; using a "crisscross" pattern that alternately tightens the bolts located 180 degrees apart. (see illustration below for 4 hole and 8 hole flanges.) ✓ Using this pattern, tighten the bolts in 20% increments of the final bolt torque until 80% of final bolt torque has been achieved. ✓ For tightening to the final torque values, tighten bolts sequentially clockwise once around the flange. This will help ensure that the bolts are evenly stressed. ✓ Care should be taken to avoid over-torqueing, which can cause damage to the gasket and the sealing surfaces.

19	What are the results of effective housekeeping?	<p style="text-align: center;">Reduced handling to ease the flow of materials</p> <ul style="list-style-type: none"> ✓ Fewer tripping and slipping incidents in clutter-free and spill-free work areas ✓ Decreased fire hazards ✓ Lower worker exposures to hazardous products (e.g. Dusts, vapours) ✓ Better control of tools and materials, including inventory and supplies ✓ More efficient equipment cleanup and maintenance ✓ Better hygienic conditions leading to improved health ✓ More effective use of space ✓ Reduced property damage by improving preventive maintenance ✓ Less janitorial work ✓ Improved morale ✓ Improved productivity (tools and materials will be easy to find)
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2.PT=Practical Test

#	Practical Activity	Points to evaluate
1	Student Assignments	Students need to undertake assignments related to performing welding/fabrication inspection by selecting, conducting or verifying appropriate non-destructive tests, establishing and validating welding procedures, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Prepare and undertake basic welding ✓ Identify welding requirements ✓ Weld and inspect pipe joints ✓ Clean up
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Prepare and undertake basic welding ✓ Identify welding requirements ✓ Weld and inspect pipe joints ✓ Clean up
4	Demonstrate how to measure using a pressure gauge	The student is expected to follow the correct step-by step process to measuring with a pressure gauge. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ Prepare and undertake basic welding ✓ Identify welding requirements ✓ Weld and inspect pipe joints ✓ Clean up

3. OW=Observation at Work Place

#	Activity to be observed	Assess and evaluate performance of the activities
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Prepare and undertake basic welding ✓ Identify welding requirements ✓ Weld and inspect pipe joints ✓ Clean up
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to performing welding/fabrication inspection by selecting, conducting or verifying appropriate non-destructive tests, establishing and validating welding procedures, ensuring quality assurance is carried out, and monitoring procedures.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Knowledge about the fusion welds.	As the students attend the practical test to check their knowledge about fusion welds, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare and undertake basic welding	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Determine welding requirements for polymer pipes and installation methods from relevant job plans and specifications. ✓ Demonstrate welding safety ✓ Interpret functions and applications of various welding equipment ✓ Develop basic arc welding knowledge and skills ✓ Select and check the serviceability of the appropriate tools, equipment and personal protective equipment (PPE).
2	Identify welding requirements	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Create a materials list and collect materials. ✓ Check welding equipment for correct operation according to manufacturer instructions.

3	Weld and inspect pipe joints	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Prepare joints using tools and techniques according to manufacturer specifications and relevant standards. ✓ Conduct test welds and verify according to job specifications. ✓ Carry out fusion welds according to relevant job plans and specifications and codes ✓ Visually inspect fusion welds for compliance with relevant job plans and specifications and codes,
4	Clean up	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Clear the work area, and dispose of, reuse or recycle materials in accordance with state and territory legislation and workplace policies and procedures. ✓ Clean tools and equipment, check for serviceability and report any damage, and store and secure.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-9: Install Waste Water Pipe Line

Unit No	09
Unit Title	Install waste water pipe line
Unit Code	CONS09CR05V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Prepare for drainage system installation activities							
The construction site for the drainage system and construction method is identified according to the site and drainage system plans and enterprise work procedures.	✓	✓	✓	✓		✓	✓
Materials, tools, equipment and machinery are selected according to drainage system design requirements and enterprise work procedures.	✓		✓	✓	✓		✓
Pre-operational and safety checks are carried out on tools, equipment and machinery according to manufacturer's specifications and enterprise work procedures.	✓	✓	✓	✓		✓	✓
OHS hazards are identified, risks assessed, controls implemented and reported to the supervisor.	✓		✓	✓	✓		✓
Suitable safety and personal protective equipment (PPE) are selected, used and maintained	✓	✓	✓	✓		✓	✓
2. Co-ordinate installation work							
Enterprise work team, contractors and design consultants are identified and work tasks are coordinated in a sequential, timely and effective manner in consultation with the supervisor	✓	✓	✓	✓		✓	✓
Installation of the drainage system is undertaken according to OHS requirements and with due consideration of the environmental implications and relevant legislation and regulations.	✓		✓	✓	✓		✓
A clean and safe work area is maintained throughout and on completion of work.	✓	✓	✓	✓		✓	✓
3. Prepare the site for installation of drainage system							
Symbols and terminology are interpreted to ensure the concept of the drainage system plan is clearly understood according to industry practice	✓	✓	✓	✓		✓	✓

Layout of services is identified, depths checked against the site or drainage system plan and discrepancies are reported to the supervisor and the relevant authority.	✓		✓	✓	✓		✓
Survey, measurement and marking out of the site and confirmation of soil characteristics relevant to the planned drainage system are completed according to plan specifications and enterprise work procedures.	✓	✓	✓	✓		✓	✓
4. Undertake installation of drainage system							
Excavations are completed without damage to services, facilities, features and established plants according to plan specifications and enterprise work procedures	✓	✓	✓	✓		✓	✓
The drainage system is installed according to the drainage system plan and enterprise work procedures.	✓		✓	✓	✓		✓
The drainage system is tested for configuration, flow rates and capacity consistent with the drainage system plan and according to enterprise work procedures.	✓	✓	✓	✓		✓	✓
The supervisor is consulted and remedial action is taken when the drainage system operation does not meet the plan specifications.	✓		✓	✓	✓		✓
5. Complete installation of drainage system							
Earthworks are finished off to the plan specifications and enterprise work procedures.	✓	✓	✓	✓		✓	✓
The site is restored and waste material is removed from the site and disposed of in an environmentally aware and safe manner according to enterprise work procedures.	✓		✓	✓	✓		✓
Tools, equipment and machinery are cleaned, maintained and stored according to enterprise work procedures.	✓	✓	✓	✓		✓	✓
Work outcomes are recorded or reported to the supervisor according to enterprise work procedures.	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What should be done before a trench is excavated?	Before a trench is excavated, site surveys and drainage design works will combine to create an overall plan of sustainable drainage features that are part of gaining planning permission. Establishing facts such as soil type and water table level not only help in the design of the drainage plan, they also help the groundworks or drainage contractor to plan the practical aspects of the works
2	What should the designer consider when designing a drainage system?	<ul style="list-style-type: none"> ✓ The desired depth to which the water table should be lowered ✓ The amount of rainfall received and the amount of irrigation to be applied ✓ The proper depth and spacing of the relief and collector lines ✓ The maximum length of laterals ✓ The material and diameter of the pipe ✓ The slope grade at which the lines should be installed
3	What are some accident hazards related to drainage system designing works?	<ul style="list-style-type: none"> ✓ Falls from height, esp. when standing/working on ladders ✓ Slips, trips and falls (esp. while carrying heavy or bulky loads) ✓ Slips, trips and falls (esp. while carrying heavy or bulky loads) ✓ Cuts and injuries caused by sharp instruments and tools ✓ Hazard of suffocation from asphyxiant gases released in sewerage systems, or from oxygen deficiency, during maintenance and cleaning operations ✓ Burns caused by hot parts of equipment, steam lines, etc., or by release of hot water or steam ✓ Electric traumas, caused by defective installations and equipment (esp. portable) Musculoskeletal injury (esp. of back), resulting from lifting and moving of heavy loads
4	What is the easiest way to maintain a safe workplace?	A safe workplace is more easily achieved when everyone involved in the work communicates with each other to identify hazards and risks, talks about any health and safety concerns, and works together to find solutions. This includes cooperation between the people who manage or control the work and those who carry out the work or who are affected by the work.
5	How can you create a proper slope to install drainage system?	Use a sledgehammer to drive stakes/markers into the soil in the trench every four feet or so. Take a string and tie it where the pipe should start. Next, run that string to the next stake and wrap it around. Use a line level to make sure your string is level. Slide the string down half of an inch to create the slope and ensure that

		the water runs down the drainage pipe and away from the structure. Repeat this process until you've tied every stake
6	What are some examples of PPE?	<ul style="list-style-type: none"> ✓ Wide brimmed hats that shade face, head, neck and ears (where hard hats are required then it should be a hard hat brim or neck flap), sunglasses and broad spectrum SPF 30 or higher sunscreen to minimise the exposure to ultraviolet (UV) radiation. ✓ High visibility reflective clothing or vests. ✓ Ear plugs or ear muffs to minimise the risk of exposure to excessive noise when operating noisy machinery and power tools
7	What is a vertical plough?	A vertical plough acts as a subsoiler: the soil is lifted and large fissures and cracks are formed
8	What is the purpose of adding geotextile and gravel?	Geotextile should be laid to make sure that soil doesn't clog your drain pipe and force you to redo this project in a few years due to drainage problems
9	How should the geotextile and gravel be added?	Simply place the fabric along the trench. You'll need the fabric to be wide enough to eventually wrap around the drainage pipe and gravel that will surround it. Pour a 2-inch layer of gravel onto the fabric and, using a rake, level it.
10	What are the finishing steps to the drainage system?	After you've placed your drainage pipe, you'll need to cover it with a second layer of gravel. Place enough to bury the pipe 4 to 6 inches deep. Use the geotextile you placed in Step 4 to wrap the pipe and gravel. Cover the wrapped pipe with a few inches of dirt to hold the fabric in place. Finish filling the trench and replacing any affected landscaping.

2. PT=Practical Test

#	Activity to be performed	Activity to be evaluated and assessed
1	Student Assignments	Students need to undertake assignments related to installing surface and/or subsurface drainage systems., as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	<p>Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas.</p> <ul style="list-style-type: none"> ✓ Prepare for drainage system installation activities ✓ Coordinate installation work ✓ Prepare the site for installation of drainage system ✓ Undertake installation of drainage system ✓ Complete installation of drainage system
3	Review Assessment papers	<p>Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.</p> <ul style="list-style-type: none"> ✓ Prepare for drainage system installation activities ✓ Coordinate installation work ✓ Prepare the site for installation of drainage system

		<ul style="list-style-type: none"> ✓ Undertake installation of drainage system ✓ Complete installation of drainage system
4	Demonstrate how to design a drainage system	<p>The student is expected to follow the correct step-by step process on how to install drainage system according to the drainage system plan. These are the elements to be assessed:</p> <ul style="list-style-type: none"> ✓ The desired depth to which the water table should be lowered ✓ The amount of rainfall received and the amount of irrigation to be applied ✓ The proper depth and spacing of the relief and collector lines ✓ The maximum length of laterals ✓ The material and diameter of the pipe ✓ The slope grade at which the lines should be installed

3. OW =Observation at work Place

#	Activity to be observed	Evaluative Assessment of the observed activity
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Prepare for drainage system installation activities ✓ Coordinate installation work ✓ Prepare the site for installation of drainage system ✓ Undertake installation of drainage system ✓ Complete installation of drainage system
2	Log Books	<p>Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.</p>
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to installing surface and/or subsurface drainage systems</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate on practical test of undertaking an installation of drainage system	<p>As the students attend the practical test to demonstrate how to install a drainage system, make sure the student use the proper techniques and the information he shared is accurate.</p>

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for drainage system installation activities	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ The construction site for the drainage system and construction method is identified according to the site and drainage system plans and enterprise work procedures. ✓ Materials, tools, equipment and machinery are selected according to drainage system design requirements and enterprise work procedures. ✓ Pre-operational and safety checks are carried out on tools, equipment and machinery according to manufacturer's specifications and enterprise work procedures. ✓ OHS hazards are identified, risks assessed, controls implemented and reported to the supervisor. ✓ Suitable safety and personal protective equipment (PPE) are selected, used and maintained.
2	Co-ordinate installation work	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Enterprise work team, contractors and design consultants are identified and work tasks are coordinated in a sequential, timely and effective manner in consultation with the supervisor. ✓ Installation of the drainage system is undertaken according to OHS requirements and with due consideration of the environmental implications and relevant legislation and regulations. ✓ A clean and safe work area is maintained throughout and on completion of work.
3	Prepare the site for installation of drainage system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Symbols and terminology are interpreted to ensure the concept of the drainage system plan is clearly understood according to industry practice. ✓ Layout of services is identified, depths checked against the site or drainage system plan and discrepancies are reported to the supervisor and the relevant authority. ✓ Survey, measurement and marking out of the site and confirmation of soil characteristics relevant to the planned drainage system are completed according to plan specifications and enterprise work procedures.
4	Undertake installation of drainage system	<p>Make sure the students answer questions related to the following areas</p>

		<ul style="list-style-type: none"> ✓ Excavations are completed without damage to services, facilities, features and established plants according to plan specifications and enterprise work procedures. ✓ The drainage system is installed according to the drainage system plan and enterprise work procedures. ✓ The drainage system is tested for configuration, flow rates and capacity consistent with the drainage system plan and according to enterprise work procedures. ✓ The supervisor is consulted and remedial action is taken when the drainage system operation does not meet the plan specifications.
5	Complete installation of drainage system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Earthworks are finished off to the plan specifications and enterprise work procedures. ✓ The site is restored and waste material is removed from the site and disposed of in an environmentally aware and safe manner according to enterprise work procedures. ✓ Tools, equipment and machinery are cleaned, maintained and stored according to enterprise work procedures. ✓ Work outcomes are recorded or reported to the supervisor according to enterprise work procedures.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.

		Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.
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Unit-10: Install Trench Support

Unit No	10
Unit Title	Install trench support
Unit Code	CONS09CR06V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Plan and prepare for installing trench support							
Access, interpret and apply trench support documentation, and ensure the work activity is compliant	✓	✓	✓	✓		✓	✓
Obtain, read, interpret, clarify and confirm work requirements	✓		✓	✓	✓		✓
Identify and address potential risks, hazards and environmental issues, and implement control measures	✓	✓	✓	✓		✓	✓
Select and wear personal protective equipment appropriate for work activities	✓		✓	✓	✓		✓
Identify, obtain and implement traffic signage requirements	✓	✓	✓	✓		✓	✓
Select, and check for faults, equipment and/or attachments for work activities	✓		✓	✓	✓		✓
Obtain and interpret emergency procedures, and be prepared for fire/accident/emergency	✓	✓	✓	✓		✓	✓
2. Install trench shoring							
Communicate with plant operator and ensure the excavation of trenches complies with site plan, line and depth	✓	✓	✓	✓		✓	✓
Determine and prepare shoring method	✓		✓	✓	✓		✓
Set out positioning of shoring	✓	✓	✓	✓		✓	✓
Position/erect shoring within the trench	✓		✓	✓	✓		✓
Secure shoring in position and ensure structural conformity with regulations	✓	✓	✓	✓		✓	✓
Clean out excavation	✓		✓	✓	✓		✓
Locate ladders for safe access and egress	✓	✓	✓	✓		✓	✓
3. Remove trench shoring							

Release jacking mechanisms and remove ladders 3.2 3.3	✓	✓	✓	✓		✓	✓
Check shoring and prepare it for lifting from the trench	✓		✓	✓	✓		✓
Remove shoring from trench and store it	✓	✓	✓	✓		✓	✓
4. Conduct housekeeping activities							
Clear work area and dispose of or recycle materials	✓	✓	✓	✓		✓	✓
Clean and maintain condition of equipment, ensure suitability for use, and address/report issues	✓		✓	✓	✓		✓
Manage/report hazards, and maintain a safe working environment	✓	✓	✓	✓		✓	✓
Process written records	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What are the disadvantages of sloped or stepped excavation?	<ul style="list-style-type: none"> ✓ Additional volume of excavation and backfill are required. ✓ In poor soils in Christchurch, the safe angle of repose can be so shallow as to render this methodology impractical. ✓ Temporary works may be required to protect adjacent and crossing utilities.
2	What us the function of trench shields?	The function of trench shields (also known as trench boxes) is to protect workers in case of a trench collapse. Trench shields should not be confused with trench shores. Shields are not usually intended to shore up or otherwise provide positive support to the walls of the trench.
3	What are the advantages of trench shields?	<ul style="list-style-type: none"> ✓ Readily available and commonly used ✓ Protect workers effectively, without additional cost of supporting the trench walls
4	What are the disadvantages of trench shields?	<ul style="list-style-type: none"> ✓ In general, trench walls are not positively supported, which can lead to collapse / slumping / subsidence of native soil, especially if the trench is left open for an extended period ✓ The trench shield must be lifted progressively to ensure full-width compaction of backfill layers
5	What is a drag shield?	A drag shield is a type of trench shield that is dragged horizontally by an excavator often by means of certified chains attached to the shield and secured to the dipper arm of the excavator.
6	What are the advantages of drag shields?	<ul style="list-style-type: none"> ✓ Drag shields, in appropriate ground conditions, can facilitate quicker progress than ordinary trench shields, which must be lifted vertically in and out of the trench.

		<ul style="list-style-type: none"> ✓ A drag shield can provide positive support to the native soil when used in a trench that has been deliberately excavated to be slightly narrower than the shield itself.
7	What are the disadvantages of drag shields?	<ul style="list-style-type: none"> ✓ Cannot be used where existing services cross the path of the trench ✓ In many soils, the amount of force required to overcome friction on the shield walls makes this method impractical, i.e. the shield cannot cut through the native soil and larger equipment is generally required to overcome the frictional forces exerted between shield and the trench sides. ✓ There is a temptation to excavate the trench somewhat wider than the shield so that dragging the shield is not difficult, however this method is not recommended. Due to the voids outside the shield wall it becomes impossible to backfill the full width of the trench in compacted layers ✓ As the shield moves forward the positive support of the native soil is removed and trench collapse could follow the rear of the box.
8	What are the shoring systems categorized into?	<ul style="list-style-type: none"> ✓ Sheet piling, waling and strutting ✓ Traditional methods ✓ Systems incorporating hydraulic struts ✓ Proprietary shoring systems ✓ Sheet Piling
9	How are sheet piling used?	In poorer soils, sheet piling needs to be continuous in the trench ('full sheet piling'), and should be toed in especially where ground water was an issue. In good ground however, intermittent sheet piling or 'half sheet piling' may be considered
10	What are the advantages of sheet piling?	<ul style="list-style-type: none"> ✓ Interlocking sheets prevent water ingress · Native soils and adjacent utilities and/or structures can be adequately supported ✓ One advantage of Christchurch's relatively poor soils is that sheet piles can often be driven with relatively little effort by excavator mounted equipment e.g. Movax (Figure 2-9). Rarely is installation impeded by boulders or bed rock. These ground conditions can allow relatively lightweight sheets to be driven. ✓ Can add dewatering systems by preventing water migration under the toe of the excavation
11	What are the disadvantages of sheet piling?	<ul style="list-style-type: none"> ✓ Expensive – but should be viewed in overall context of mitigation of risks to the road pavement and adjacent utilities and properties ✓ Vibrations during installation (and removal) may liquefy native soil and lead to settlement ✓ May be difficult when coping with crossing services

12	What are the things to be considered when developing the concept design?	<ul style="list-style-type: none"> ✓ Trenchless alternatives, both for pipe replacement or rehabilitation of existing infrastructure ✓ Alignment changes to help with installation, access, traffic management etc. ✓ Appropriate trench support systems required given ground conditions anticipated
13	What are some things to consider to guide decisions regarding the design?	<ul style="list-style-type: none"> ✓ Depth of dig ✓ Underlying geology ✓ Water table (and likely fluctuation, artesian pressure, etc.) ✓ Location (adjacent to water courses, buildings, structures, existing utilities, etc.) · Likely traffic loading and road hierarchy adjacent to trench ✓ Historical evidence (EQ damage experienced) ✓ Likely timing of works (seasonal / daily variations) <p>Strategic importance</p>
14	How can floors be maintained to avoid incidents?	Allowing chips, shavings and dust to accumulate can also cause incidents. Trapping chips, shavings and dust before they reach the floor or cleaning them up regularly can prevent their accumulation. Areas that cannot be cleaned continuously, such as entrance ways, should have anti-slip flooring. Keeping floors in good order also means replacing any worn, ripped, or damaged flooring that poses a tripping hazard.

2. PT=Practical Test

#	Practical Activity	Additional Details
1	Student Assignments	Students need to undertake assignments related to installing trench support in civil construction, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Plan and prepare for installing trench support ✓ Install trench shoring ✓ Remove trench shoring ✓ Conduct housekeeping activities
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Plan and prepare for installing trench support ✓ Install trench shoring ✓ Remove trench shoring ✓ Conduct housekeeping activities

3. OW =Observation at work Place

#	Observation Area	Additional details of the observation
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Plan and prepare for installing trench support ✓ Install trench shoring ✓ Remove trench shoring ✓ Conduct housekeeping activities
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to locating and clearing blockages to sanitary plumbing and drainage with the use of mechanically operated drain clearing machines and attachments, closed circuit television (CCTV) and manually operated drain cleaning tools and equipment where required.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate during practical test how to install and remove trench	As the students attend the practical test to check their knowledge and skills of installing and removing trench shoring, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Assess and evaluating parameters
1	Plan and prepare for installing trench support	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Access, interpret and apply trench support documentation, and ensure the work activity is compliant ✓ Obtain, read, interpret, clarify and confirm work requirements ✓ Identify and address potential risks, hazards and environmental issues, and implement control measures ✓ Select and wear personal protective equipment appropriate for work activities ✓ Identify, obtain and implement traffic signage requirements ✓ Select, and check for faults, equipment and/or attachments for work activities

		<ul style="list-style-type: none"> ✓ Obtain and interpret emergency procedures, and be prepared for fire/accident/emergency
2	Install trench shoring	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Communicate with plant operator and ensure the excavation of trenches complies with site plan, line and depth ✓ Determine and prepare shoring method ✓ Set out positioning of shoring ✓ Position/erect shoring within the trench ✓ Secure shoring in position and ensure structural conformity with regulations ✓ Clean out excavation ✓ Locate ladders for safe access and egress
3	Remove trench shoring	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Release jacking mechanisms and remove ladders ✓ Check shoring and prepare it for lifting from the trench ✓ Remove shoring from trench and store it
4	Conduct housekeeping activities	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Clear work area and dispose of or recycle materials ✓ Clean and maintain condition of equipment, ensure suitability for use, and address/report issues ✓ Manage/report hazards, and maintain a safe working environment ✓ Process written records

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be

		<p>from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>
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Unit-11: Install control valve assemblies, actuating devices and local alarms

Unit No	11
Unit Title	Install control valve assemblies, actuating devices and local alarms
Unit Code	CONS09CR07V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Prepare for work.							
Plans and specifications are obtained from relevant authority.	✓	✓	✓	✓		✓	✓
Quality assurance requirements are identified and adhered to in accordance with workplace requirements.	✓		✓	✓	✓		✓
Tasks are planned and sequenced in conjunction with others involved in or affected by the work.		✓	✓	✓		✓	✓
Tools and equipment for installing control valve assemblies, actuating devices and local alarms, including personal protective equipment, are selected and checked for serviceability.	✓	✓	✓	✓		✓	✓
Work area is prepared to support efficient installation of control valve assemblies, actuating devices and local alarms.	✓		✓	✓	✓		✓
2. Identify installation requirements.							
System requirements are identified	✓	✓	✓	✓		✓	✓
Quantities of materials required are calculated from plans and specifications.	✓		✓	✓	✓		✓
Materials and equipment are identified, ordered and collected in accordance with workplace procedures.		✓	✓	✓		✓	✓
Materials and equipment are checked for compliance with standards, docket and order form, and for acceptable condition.	✓	✓	✓	✓		✓	✓
3. Install and test system components.							
Components are set out in accordance with plans, specifications and job instructions.	✓	✓	✓	✓		✓	✓
Pipe supports and fixings are installed to plans and manufacturer specifications.	✓		✓	✓	✓		✓

Assemblies, devices, alarms, piping and materials are installed in accordance with standards, plans and specifications.		✓	✓	✓		✓	✓
Joining systems are installed in compliance with standards.	✓	✓	✓	✓		✓	✓
Installed system is subjected to pressure testing in accordance with standards, plans and specifications	✓		✓	✓	✓		✓
Test data is recorded in format required by job specifications and quality assurance procedures		✓	✓	✓		✓	✓
4. Clean up							
Work area is cleared, with materials disposed of or recycled in accordance with state or territory statutory and regulatory authority legislation.	✓	✓	✓	✓		✓	✓
Tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturer recommendations and workplace procedures.	✓		✓	✓	✓		✓
Information is accessed and documentation completed in accordance with regulatory authorities and workplace requirements.		✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What should be defines in a quality plan?	<ul style="list-style-type: none"> ✓ Objectives to be attained (for example, characteristics or specifications, uniformity, effectiveness, aesthetics, cycle time, cost, natural resources, utilization, yield, dependability, and so on). ✓ Steps in the processes that constitute the operating practice or procedures of the organization. ✓ Allocation of responsibilities, authority, and resources during the different phases of the process or project. ✓ Specific documented standards, practices, procedures, and instructions to be applied. ✓ Suitable testing, inspection, examination, and audit programs at appropriate stages. ✓ A documented procedure for changes and modifications to a quality plan as a process is improved.

		<ul style="list-style-type: none"> ✓ A method for measuring the achievement of the quality objectives. ✓ Other actions necessary to meet the objectives.
2	What steps should the planning of work include?	<ul style="list-style-type: none"> ✓ Read the drawings and the specification to familiarize yourself with the work. ✓ Check the work site against the drawings to confirm orientation and work space. ✓ Check for normal work hazards. ✓ Check for special hazards, such as working over machinery, high temperatures or working at height. ✓ Identify entry and exit points and storage areas. ✓ Confirm location of other services, such as air conditioning ducts, that may affect your work. ✓ Plan with your supervisor, the builder or other contractors, a cooperative work strategy that avoids conflict. ✓ Organize test equipment, compressor and pump. ✓ Organize your equipment, such as ladders, scaffolds or scissor lifts and personal safety equipment for safe working. ✓ Confirm test timing with builder or representative.
3	What are the normal PPE supplied and used for installing control valve?	<ul style="list-style-type: none"> ✓ Overalls. ✓ Boots. ✓ Shirts. ✓ Hard hat. ✓ Safety glasses. ✓ Ear muffs or plugs. ✓ Safety vests. ✓ Bluey (coat). ✓ Gloves. ✓ Sunscreen
4	What is a typical list of tools required for installation work?	<ul style="list-style-type: none"> ✓ Tool box. ✓ Mash hammer. ✓ Claw hammer. ✓ Stillsons pipe wrench. ✓ shifter adjustable spanner. ✓ Hacksaw. ✓ Chalk line. ✓ Pump bob. ✓ Straight tin snips. ✓ Ratchet spanner. ✓ round/flat file. ✓ Flat screw driver. ✓ Phillips head screw driver. ✓ Cole chisels ✓ Deep sockets

		<ul style="list-style-type: none"> ✓ Tape. ✓ Key saw. ✓ String line. ✓ Pliers.
5	Why is procurement of material an important element in project planning and quality control?	<ul style="list-style-type: none"> ✓ Tool box. ✓ Mash hammer. ✓ Claw hammer. ✓ Stillsons pipe wrench. ✓ shifter adjustable spanner. ✓ Hacksaw. ✓ Chalk line. ✓ Pump bob. ✓ Straight tin snips. ✓ Ratchet spanner. ✓ round/flat file. ✓ Flat screw driver. ✓ Phillips head screw driver. ✓ Cole chisels ✓ Deep sockets ✓ Tape. ✓ Key saw. ✓ String line. ✓ Pliers.
6	What are the two main types of actuators?	<ul style="list-style-type: none"> ✓ Diaphragm actuators ✓ Piston actuators
7	What is a diaphragm actuator?	<ul style="list-style-type: none"> ✓ Diaphragm actuators, in which air pressure acts on a diaphragm with high surface area, and it's opposed by a spring that dictates fail direction. They're low-friction; provide a fast response to small changes (which account for most changes in a process); and have a longer response time for larger changes. They're the process industry standard.
8	What is a piston actuator?	<ul style="list-style-type: none"> ✓ Diaphragm actuators, in which air pressure acts on a diaphragm with high surface area, and it's opposed by a spring that dictates fail direction. They're low-friction; provide a fast response to small changes (which account for most changes in a process); and have a longer response time for larger changes. They're the process industry standard.
9	What are the two main designs of valves?	<ul style="list-style-type: none"> ✓ Rotary valve ✓ Sliding stem
10	What are rotary valves and sliding stems?	<ul style="list-style-type: none"> ✓ Rotary valves are modulated by a rotating stem, and are generally classified by the design of the

		<p>closing member. They're full port and free draining, have high capacity for a given line size, and have a narrower optimal control range. They include butterfly, v-notch ball and eccentric plug valves.</p> <ul style="list-style-type: none"> ✓ Sliding stem valves are modulated by moving the stem in a linear fashion. They have lower capacity for a given line size, and a wide control range. Their two varieties are balanced and unbalanced. Unbalanced moves against process pressure, and is easier to seal. Balanced uses holes to transfer pressure, and doesn't require as much force from the actuator, but requires a seal between the plug and the cage.
11	Before starting any operation of the control valve, what conditions should be corrected and secured?	<ul style="list-style-type: none"> ✓ Rotary valves are modulated by a rotating stem, and are generally classified by the design of the closing member. They're full port and free draining, have high capacity for a given line size, and have a narrower optimal control range. They include butterfly, v-notch ball and eccentric plug valves. ✓ Sliding stem valves are modulated by moving the stem in a linear fashion. They have lower capacity for a given line size, and a wide control range. Their two varieties are balanced and unbalanced. Unbalanced moves against process pressure, and is easier to seal. Balanced uses holes to transfer pressure, and doesn't require as much force from the actuator, but requires a seal between the plug and the cage

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to installing Install control valve assemblies, actuating devices and local alarms for fire protection systems in commercial, industrial, residential and domestic situations, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Prepare for work

		<ul style="list-style-type: none"> ✓ Identify installation requirements ✓ Install and test system components ✓ Clean up
3	Review papers Assessment	<p>Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following.</p> <ul style="list-style-type: none"> ✓ Prepare for work ✓ Identify installation requirements ✓ Install and test system components ✓ Clean up
4	Demonstrate the installation of the valve.	<p>The student is expected to follow the correct step-by step to install of the valve. The elements which should be assessed are:</p> <ul style="list-style-type: none"> ✓ accessible places and with a proper headroom for better operation ✓ stem position must be kept upwards <p>etc.</p>

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Prepare for work ✓ Identify installation requirements ✓ Install and test system components ✓ Clean up
2	Log Books	<p>Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.</p>
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to installing control valves and/or actuating devices.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate the installation of control valves	<p>As the students attend the practical test to check their knowledge and installation of control valves, make sure the student use the proper techniques and the information he shared is accurate.</p>

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for work	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Plans and specifications are obtained from relevant authority. ✓ Quality assurance requirements are identified and adhered to in accordance with workplace requirements. ✓ Tasks are planned and sequenced in conjunction with others involved in or affected by the work. ✓ Tools and equipment for installing control valve assemblies, actuating devices and local alarms, including personal protective equipment, are selected and checked for serviceability. ✓ Work area is prepared to support efficient installation of control valve assemblies, actuating devices and local alarms
2	Identify installation requirements.	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ System requirements are identified ✓ Quantities of materials required are calculated from plans and specifications. ✓ Materials and equipment are identified, ordered and collected in accordance with workplace procedures. ✓ Materials and equipment are checked for compliance with standards, docket and order form, and for acceptable condition.
3	Install and test system components	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Components are set out in accordance with plans, specifications and job instructions. ✓ Pipe supports and fixings are installed to plans and manufacturer specifications. ✓ Assemblies, devices, alarms, piping and materials are installed in accordance with standards, plans and specifications.
4	Clean up	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Work area is cleared, with materials disposed of or recycled in accordance with state or territory statutory and regulatory authority legislation.

		<ul style="list-style-type: none"> ✓ Tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturer recommendations and workplace procedures. ✓ Information is accessed and documentation completed in accordance with regulatory authorities and workplace requirements.
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5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-12: Install and commission water heating systems

Unit No	12
Unit Title	Install and commission water heating systems
Unit Code	CONS09CR08V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Prepare for work							
Drawings, plans and specifications are obtained.	✓	✓	✓	✓		✓	✓
Quality assurance requirements are identified and adhered to according to workplace requirements.	✓		✓	✓	✓		✓
Tasks are planned and sequenced in conjunction with others involved in or affected by the work and statutory and regulatory authorities' requirement		✓	✓	✓		✓	✓
Tools and equipment for installing water heaters, including personal protective equipment, are selected and checked for serviceability.	✓	✓	✓	✓		✓	✓
Work area is prepared to support efficient installation of water heaters.	✓		✓	✓	✓		✓
2. Identify installation requirements							
Installation position is assessed for compliance with authorities' requirements, manufacturer recommendations.	✓	✓	✓	✓		✓	✓
Quantity and type of materials required are calculated from job specifications and site inspection	✓		✓	✓	✓		✓
Materials and equipment are identified, ordered and collected according to workplace procedures		✓	✓	✓		✓	✓
Materials and equipment are checked for compliance	✓	✓	✓	✓		✓	✓
Sustainability principles and concepts are observed when preparing for and undertaking work process.	✓		✓	✓	✓		✓
3. Install, commission and maintain system.							
Water heating system is installed according to relevant standards, job specifications and manufacturer recommendations.	✓	✓	✓	✓		✓	✓
Pipe joints are fitted correctly and according to relevant standards.	✓		✓	✓	✓		✓

Installation is tested according to relevant standards, manufacturer specifications and authorities' requirements		✓	✓	✓		✓	✓
Water heating system is commissioned according to relevant standards and manufacturer specifications.	✓	✓	✓	✓		✓	✓
Water heating system is maintained according to manufacturer instructions.	✓		✓	✓	✓		✓
4. Clean up.							
Work area is cleared and materials disposed of, reused or recycled.	✓	✓	✓	✓		✓	✓
Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures.	✓		✓	✓	✓		✓
Documentation is completed according to workplace requirements.		✓	✓	✓		✓	✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

	Question	Answer
1	What are the tools and supplies needed for installing water heating systems?	<ul style="list-style-type: none"> ✓ Voltage Tester ✓ Tubing (pipe) cutter ✓ Flexible hoses ✓ Pipe Dope or Plumbers Tape ✓ Wrench and Screwdriver ✓ Sandpaper cloth ✓ Soldering Flux with torch & solder wire ✓ Dielectric Connectors
2	What is a large storage gas?	✓ Large Storage Gas is a storage gas water heater with input capacity greater than 75,000 Btu/h. They are rated with an AFUE and either a total standby loss numeric value or a percent standby loss.
3	What is a small storage electric?	✓ A Storage Electric water heater is an electric water heater designed to heat and store water at less than 180°F. Water temperature is controlled with a thermostat. Storage electric water heaters have a manufacturer's specified storage capacity of at least two gallons.
4	What is an instantaneous electric?	✓ An Instantaneous Electric water heater is an electric water heater controlled automatically by a thermostat, with a manufacturer's specified storage capacity of less than 2 gallons.
5	What are the standards implemented for systems using gas or	✓ A 120 V electrical receptacle that is within three feet of the water heater and accessible to the water heater with no obstructions; and,

	propane water heaters?	<ul style="list-style-type: none"> ✓ A Category III or IV vent, or a Type B vent with straight pipe between the outside termination and the space where the water heater is installed; and, ✓ A condensate drain that is no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance, and, ✓ A gas supply line with a capacity of to provide at least 200,000 Btu/hr to the water heater
6	What are the purposes of workplace housekeeping?	<ul style="list-style-type: none"> ✓ Tripping over loose objects on floors, stairs and platforms ✓ Being hit by falling objects ✓ Slipping on greasy, wet or dirty surfaces ✓ Striking against projecting, poorly stacked items or misplaced material ✓ Cutting, puncturing, or tearing the skin of hands or other parts of the body on projecting nails, wire or steel strapping
7	What are the benefits of good housekeeping practices?	<ul style="list-style-type: none"> ✓ Reduced handling to ease the flow of materials ✓ Fewer tripping and slipping incidents in clutter-free and spill-free work areas ✓ Decreased fire hazards ✓ Lower worker exposures to hazardous products (e.g. Dusts, vapours) ✓ Better control of tools and materials, including inventory and supplies ✓ More efficient equipment cleanup and maintenance ✓ Better hygienic conditions leading to improved health ✓ More effective use of space ✓ Reduced property damage by improving preventive maintenance ✓ Less janitorial work ✓ Improved morale ✓ Improved productivity (tools and materials will be easy to find)
8	What does a good housekeeping program identify and assigns responsibility for?	<ul style="list-style-type: none"> ✓ Clean up during the shift ✓ Day-to-day cleanup ✓ Waste disposal ✓ Removal of unused materials ✓ Inspection to ensure cleanup is complete
9	How can you maintain privacy during documentation?	<ul style="list-style-type: none"> ✓ If documentation contains personal information, such as names and addresses, you must ensure this information remains private.
10	What are the workplace documentation requirements?	<ul style="list-style-type: none"> ✓ Follow privacy protocols. ✓ Be accurate and precise. ✓ Pay attention to detail. ✓ Alert appropriate personnel if required. ✓ Store documentation appropriately.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to installing sewerage pump station and sea outfall, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Prepare for work ✓ Startup compressor systems / Equipment ✓ Control and monitor the compressor system ✓ Shut down compressor systems/equipment ✓ Maintain plant effectiveness
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Prepare for work ✓ Startup compressor systems / Equipment ✓ Control and monitor the compressor system ✓ Shut down compressor systems/equipment ✓ Maintain plant effectiveness
4	Demonstrate how to install, commission and maintain system	The student is expected to follow the correct step-by step to install, commission and maintain a system. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ Turn OFF the electricity to your water heater at the circuit breaker panel. ✓ Open a hot water faucet and allow the water to run until it is cold. ✓ Disconnect the electrical wires on the top of the water heater. ✓ Disconnect the hot and cold water supply lines. ✓ Once the tank is empty, remove the old water heater with a dolly. ✓ Move the new tank into place. ✓ Check that your electrical supply will adequately reach the tank. Double check that you can access the panels and the drain valve for maintenance. ✓ Remove the junction box cover to access the electrical wires. ✓ Connect the hot and cold-water supply lines. ✓ Install the discharge pipe to the T&P valve. ✓ To eliminate the air in the tank and plumbing, allow the hot water tap to run for a few minutes until it stops "sputtering".

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Prepare for work ✓ Startup compressor systems / Equipment ✓ Control and monitor the compressor system ✓ Shut down compressor systems/equipment ✓ Maintain plant effectiveness
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to operating and monitoring of a complex compressor system and associated equipment</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Knowledge about equipment efficiency requirements	As the students attend the practical test to check their knowledge about equipment efficiency requirements, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for work	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Identify work requirements ✓ Identify and control hazards ✓ Coordinate with appropriate personnel
2	Startup compressor systems / Equipment	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Perform pre-start-up checks ✓ Check the status of the system/equipment prior to commencing start-up process ✓ Check all required auxiliary systems, including oil and water, to confirm their operational condition ✓ Startup individual items of equipment and the entire compressor system as required ✓ Bring the system to required operating conditions.

3	Control and monitor the compressor system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Initiate load-up through the selection of appropriate speed or cycle ✓ Monitor and adjust downstream equipment as required ✓ Monitor the operational condition and safety status of the unit/system and take appropriate action ✓ Adjust operational speeds and operating cycles as required ✓ Monitor or activate safety systems to ensure that any system shutdowns are controlled and conducted safely and effectively
4	Shut down compressor systems/equipment	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Confirm shutdown cause with other personnel and plant operators before commencing to isolate or shut down the equipment/system ✓ Implement control measures to minimize damage and hazards ✓ Shut down system according to procedures ✓ Inspect the system/equipment as required by procedures ✓ Isolate and purge systems/equipment and prepare plant for maintenance as required
5	Maintain plant effectiveness	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Frequently and critically monitor all plant throughout shift ✓ Use measured/indicated data and smell, sight, sound and feel as appropriate to monitor plant ✓ Identify critical equipment/processes and tune their performance ✓ Identify issues likely to impact on plant performance and take appropriate action ✓ Predict impact of a change in one unit/area on other plant units/areas and communicate this to relevant people ✓ Test trips and alarms as required

5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc. Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.

Unit-13: Test and maintain fire hydrant and hose reel installations

Unit No	13
Unit Title	Test and maintain fire hydrant and hose reel installations
Unit Code	CONS09CR09V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Prepare for work							
Plans, specifications, maintenance manuals, previous maintenance reports and equipment data are obtained.	✓		✓	✓	✓		✓
Work health and safety (WHS) and environmental requirements associated with testing and maintaining fire hydrant and hose reel installations are adhered to throughout the work.		✓	✓	✓		✓	✓
Quality assurance requirements are identified and adhered to according to workplace requirements.	✓		✓	✓	✓		✓
Tasks are planned and sequenced in conjunction with others involved in or affected by the work.	✓		✓	✓	✓		✓
Tools, equipment and materials for testing and maintaining fire hydrant and hose reel installations, including personal protective equipment, are selected and checked for serviceability.		✓	✓	✓		✓	✓
Work area is prepared to support efficient testing and maintenance of fire hydrant and hose reel installations.	✓		✓	✓	✓		✓
2. Perform routine maintenance.							
Maintenance tasks detailed in maintenance schedule are performed to specification	✓		✓	✓	✓		✓
Mechanical equipment and system components are checked with appropriate instruments according to standards and job specifications.		✓	✓	✓		✓	✓
Faulty items or components are identified and appropriate service procedure is selected.	✓		✓	✓	✓		✓
3. Repair and replace faulty components and test job							
Equipment is safely isolated according to regulations and health and safety requirements.	✓		✓	✓	✓		✓

Faulty items or components are removed using appropriate tools, equipment and procedures.		✓	✓	✓		✓	✓
Replaceable items are selected from manufacturers' catalogue.	✓		✓	✓	✓		✓
Replacement or service items are fitted according to manufacturer recommendations and site specifications.	✓		✓	✓	✓		✓
Adjustments are made to equipment or components to ensure specifications are met.		✓	✓	✓		✓	✓
Operational check of system is carried out to ensure compliance with job specifications.	✓		✓	✓	✓		✓
Maintenance report is documented in format required by maintenance specification.	✓		✓	✓	✓		✓
Sustainability principles and concepts are observed when preparing for and undertaking work process.		✓	✓	✓		✓	✓
4. Clean up							
Work area is cleared and materials disposed of, reused or recycled according to legislation, regulation, codes of practice and job specification	✓		✓	✓	✓		✓
Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures		✓	✓	✓		✓	✓
Information is accessed and documentation completed according to regulatory authorities and workplace requirements.	✓		✓	✓	✓		✓

Note:

✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	How can you prepare work for fire hydrant?	Hydrants should be inspected at the time of delivery to verify compliance with specifications and to check for damage during shipment. Specifications to be checked during the initial inspection include the size and shape of the operating nut and its direction to open, depth of bury, size and type of inlet connection, size of the main valve (for a dry-barrel hydrant) or valve washer (for a wet-barrel hydrant), outlet nozzle sizes and configuration, and thread style. The hydrant should be cycled to full open and full closed positions to ensure that no internal damage or breakage has occurred during shipment and handling. Etc.
2	How can you conduct routine maintenance for fire hose reels?	Servicing of fire hose reels is depend on the manufacture guidelines and this requires that during the service ,a flow rate test and a pressure test is conducted and recorded on a service label attached to the reel. In addition, the hose itself must be pressure tested every five years.

3	What should be considered when repairing and replacing faulty components and test job?	Any condition that cannot be repaired easily during routine inspection should be recorded in the inspection report. The problem should be reported to repair crews for action. Leakage, broken parts, bad operation, corrosion, and other major defects should be repaired as soon as possible after the defect is reported. If repairs are to be performed in the field, the repair crew should take a full complement of repair parts to the job site.
4	To obtain the exact procedure for disassembly and repair of a specific hydrant. When conflict arises, what are the some manufacturer's recommendations that can be followed?	<ol style="list-style-type: none"> 1. Close the auxiliary valve ahead of the hydrant or use another means to cut off flow and pressure to the hydrant. CAUTION: Before proceeding, open the hydrant main valve a few turns to make certain pressure to the hydrant has been cut off. 2. Disassemble the hydrant in accordance with the manufacturer's recommendations. 3. Replace damaged parts and parts that show wear, corrosion, or signs of incipient failure. Always replace all gaskets, packing, and seals. 4. Reassemble the hydrant and open the auxiliary valve (or otherwise pressurize the hydrant). Test the main valve for leakage. 5. Vent the air from the hydrant and put the entire hydrant under pressure. Check for leakage, ease of operation, and drainage. 6. Always record the repair and operating condition of the hydrant after completion of the repairs. Notify the fire department after completion of the repair.
5	List down few fault-finding issues	<ul style="list-style-type: none"> ✓ No water ✓ Missing or broken mounting bolts ✓ Control Valve fitted with the arrow direction facing the wrong way ✓ Leaking reel after service ✓ Waterway leaks
6	Explain Water way leaks such as "O" ring type.	<ul style="list-style-type: none"> ✓ Remove Hose. ✓ Remove drum and waterway assembly ✓ Remove the three screw from the front plate behind the instruction label ✓ Remove the waterway from the drum ✓ Remove the circlip from the recess, and pull out the shaft ✓ Remove the old "O" rings, and clean the shaft / body ✓ Refit new "O" rings, lubricate, and refit shaft ✓ Refit the circlip ensuring correctly site in the groove. (failure to do this, and the drum will fly off under pressure) ✓ Refit waterway to the drum with the three screws ✓ Use thread tape for the threaded part of the shaft, and refit to the header bracket

		<ul style="list-style-type: none"> ✓ Refit hose, and slowly open the Control Valve.
7	What actions should be taken if any time that you switch the water supply to any fire protection equipment?	<ul style="list-style-type: none"> ✓ The fire department should be informed ✓ The client needs to inform the insurance company and anybody who is going to be affected by the switch off.
8	What are the incidents that can cause poor housekeeping?	<ul style="list-style-type: none"> ✓ tripping over loose objects on floors, stairs and platforms ✓ being hit by falling objects ✓ slipping on greasy, wet or dirty surfaces ✓ striking against projecting, poorly stacked items or misplaced material ✓ cutting, puncturing, or tearing the skin of hands or other parts of the body on projecting nails, wire or steel strapping
9	What are some benefits of good housekeeping practices?	<ul style="list-style-type: none"> ✓ reduced handling to ease the flow of materials ✓ fewer tripping and slipping incidents in clutter-free and spill-free work areas ✓ decreased fire hazards ✓ lower worker exposures to hazardous products (e.g. dusts, vapours) ✓ better control of tools and materials, including inventory and supplies ✓ more efficient equipment cleanup and maintenance ✓ better hygienic conditions leading to improved health ✓ more effective use of space ✓ reduced property damage by improving preventive maintenance ✓ less janitorial work
10	What are the responsibilities of a good housekeeping program?	<ul style="list-style-type: none"> ✓ clean up during the shift ✓ day-to-day cleanup ✓ waste disposal ✓ removal of unused materials ✓ inspection to ensure cleanup is complete
11	What are workplace documentation requirements?	<ul style="list-style-type: none"> ✓ Follow privacy protocols. ✓ Be accurate and precise. ✓ Pay attention to detail. ✓ Alert appropriate personnel if required. ✓ Store documentation appropriately.
12	How to organize information to complete documentation?	Whether documents are one-off incident reports, or regular records of daily activities, it is necessary to ensure information is interpreted correctly and that the right person receives the right information.

2. PT=Practical Test

#	Practical Activity	Additional details related to the activity
1	Student Assignments	Students need to undertake assignments related test and maintain fire hydrant and hose reel installations in commercial and domestic situations, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Prepare for work ✓ Perform routine maintenance ✓ Repair and replace faulty components and test job ✓ Clean up
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Prepare for work ✓ Perform routine maintenance ✓ Repair and replace faulty components and test job ✓ Clean up
4	Demonstrate how to ensure as much of water has been drained in water ways such as O Ring Type.	The student is expected to follow the correct step-by step process to water ways. The elements which should be assessed are: <ol style="list-style-type: none"> 1. Remove Hose. 2. Remove drum and waterway assembly 3. Remove the three screw from the front plate behind the instruction label 4. Remove the waterway from the drum 5. Remove the circlip from the recess, and pull out the shaft 6. Remove the old "O" rings, and clean the shaft / body 7. Refit new "O" rings, lubricate, and refit shaft 8. Refit the circlip ensuring correctly site in the grove. (failure to do this, and the drum will fly off under pressure) 9. Refit waterway to the drum with the three screws 10. Use thread tape for the threaded part of the shaft, and refit to the header bracket 11. Refit hose, and slowly open the Control Valve.

3. OW =Observation at work Place

#	Activity to observe	Additional details
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Prepare for work ✓ Perform routine maintenance ✓ Repair and replace faulty components and test job ✓ Clean up
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to test and maintain fire hydrant and hose reel installations in commercial and domestic situations.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate how to attend leaking reel after service	As the students attend the practical test to check if they are able to identify problems of control valve washer and find solution before the inspection, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare for work	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Plans, specifications, maintenance manuals, previous maintenance reports and equipment data are obtained. ✓ Work health and safety (WHS) and environmental requirements associated with testing and maintaining fire hydrant and hose reel installations are adhered to throughout the work. ✓ Quality assurance requirements are identified and adhered to according to workplace requirements. ✓ Tasks are planned and sequenced in conjunction with others involved in or affected by the work. ✓ Tools, equipment and materials for testing and maintaining fire hydrant and hose reel installations, including personal protective equipment, are selected and checked for serviceability.

		<ul style="list-style-type: none"> ✓ Work area is prepared to support efficient testing and maintenance of fire hydrant and hose reel installations.
2	Perform routine maintenance	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Maintenance tasks detailed in maintenance schedule are performed to specification. ✓ Mechanical equipment and system components are checked with appropriate instruments according to standards and job specifications. ✓ Faulty items or components are identified and ✓ appropriate service procedure is selected
3	Repair and replace faulty components and test job	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Equipment is safely isolated according to regulations and health and safety requirements. ✓ Faulty items or components are removed using appropriate tools, equipment and procedures. ✓ Replaceable items are selected from manufacturers' catalogue. ✓ Replacement or service items are fitted according to manufacturer recommendations and site specifications. ✓ Adjustments are made to equipment or components to ensure specifications are met. ✓ Operational check of system is carried out to ensure compliance with job specifications. ✓ Maintenance report is documented in format required by maintenance specification. ✓ Sustainability principles and concepts are observed when preparing for and undertaking work process.
4	Clean up	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Work area is cleared and materials disposed of, reused or recycled according to legislation, regulation, codes of practice and job specification ✓ Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures ✓ Information is accessed and documentation completed according to workplace requirements

5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-14: Apply industrial electrical skills

Unit No 14
 Unit Title Apply industrial electrical skills
 Unit Code CONS09CR10V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Plan the installation							
Special work, hazard and safety requirements are determined and incorporated in plan.	✓		✓	✓	✓	✓	
Work plan/strategy is devised and confirmed in accordance with legislative and regulatory requirements and standard operating procedures.	✓	✓		✓	✓	✓	✓
2. Prepare for electrical installation							
All work is undertaken safely and to workplace procedures, State/Territory regulations and legislative requirements.	✓		✓	✓	✓	✓	
Materials are checked for correct specifications.	✓	✓		✓	✓	✓	✓
3. Install the wiring/enclosures and/or support systems							
Relevant information is exchanged in accordance with state/territory law and workplace procedures	✓		✓	✓	✓	✓	
Documentation and reports are completed and processed in accordance with workplace and relevant regulatory requirements	✓	✓		✓	✓	✓	✓
4. Commission and test the installed wiring system							
All completed wiring/systems and enclosures are tested for compliance with specifications, regulations, and legislative requirements, utilizing appropriate test procedures and equipment.	✓		✓	✓	✓	✓	
Where appropriate, the installation may be energized and tested for compliance with specifications.	✓	✓		✓	✓	✓	✓
Faults are rectified to specification.	✓		✓	✓	✓	✓	
Documentation is completed correctly to required specifications.	✓	✓		✓	✓	✓	✓

Note:

- ✓ “Other Sources” meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play.

1. Written Questions

#	Question	Answer
1	In order to make the work area safe before starting work and during work activities. What are the necessary actions to be taken?	<ul style="list-style-type: none"> ✓ use barriers or tapes to screen off potential hazards; ✓ place warning signs as appropriate; ✓ inform those who may be affected by any potential hazard; ✓ use a safe isolation procedure before working on live equipment or circuits; ✓ Obtain any necessary ‘permits to work’ before work begins. Get into the habit of always working safely and being aware of the potential hazards around you when you are working
2	If wiring system is damaged during installation. What should be prevented?	If the wiring system is damaged during installation it must be made good to prevent future corrosion. For example, where galvanized conduit trunking or tray is cut or damaged by pipe vices, it must be made good to prevent localized corrosion.
3	What are the responsibilities to comply with health and safety regulation in good housekeeping practices?	<ul style="list-style-type: none"> ✓ learn how to work safely and to follow company procedures of work; ✓ obey all safety rules, notices and signs; ✓ not interfere with or misuse anything provided for safety; ✓ report anything that seems damaged, faulty or dangerous; ✓ behave sensibly, not play practical jokes and not distract other people at work; ✓ walk sensibly and not run around the workplace; ✓ use the prescribed walkways; ✓ drive only those vehicles for which you have been properly trained and passed the necessary test; ✓ not wear jewelry which could become caught in moving parts if you are using machinery at work; ✓ always wear appropriate clothing and PPE if necessary
4	Explain about marking out the work on-site	When the electrician arrives on-site to begin the work, that is, installing the trunking, conduit or cables and boxes to the final fixing positions in the building, they will need to know what is being installed and exactly where it is being installed.
5	According to IEC standards what are the three classifications?	<ul style="list-style-type: none"> ✓ Category A: The earth fault must be cleared within 1 second ✓ Category B: Earth fault cleared within 1 hour for IEC-183 type cables, and cleared within 8 hours for IEC-502 type cables ✓ Category C: All systems not covered under A and B

6	Give an example of conductor and an insulation material.	Conductor material (Copper / Aluminium) and insulation type.
7	What are the different types of arrangements that can be kept in place while installation of electrical cables?	<ul style="list-style-type: none"> ✓ Installation of conduit piping ✓ Concealed installation ✓ Exposed installation ✓ Installation in concrete
8	Explain about installation of conduit piping.	Conduit Pipe are the two types of electrical conduit pipes. In the electrical installation, conduit pipes are used for the electrical cable protection. It is an enclosure type and most commonly used conduit pipes can be of hard and flexible conduits. They come in three sizes and are known to be of 20mm, 25mm and 32mm.
9	Explain briefly about concealed installation.	Concealed installation is used in interior spaces. With concealed electrical installation/cable laying requires the use of an electrical conduit in a number of European countries. Of course, you should not only consider mechanical characteristics but also bear in mind the replace ability of installed wires and cables.
10	Define fire stop.	Fire stop includes all protective measures preventing propagation of fire and smoke allowing the rescue of humans and animals and effective fire-fighting operations in case of fire.
11	Explain the testing of an installation.	The testing of an installation implies the use of instruments to obtain readings. All new installations must be inspected and tested during erection and upon completion before being put into service. All existing installations should be periodically inspected and tested to ensure that they are safe and meet the MEA regulations.
12	Explain the procedure to test an installation.	The method used to test an installation may inject a current into the system. This current must not cause danger to any person or equipment in contact with the installation, even if the circuit being tested is faulty. The test results must be compared with any relevant data, including the tables in the IET Regulations. This ensures that the protective conductors are correctly connected and secure before the circuit is energized.
13	Describe visual inspection in your own words.	The installation must be visually inspected before testing begins. The aim of the visual inspection is to confirm that all equipment and accessories are undamaged and comply with the relevant standards, and also that the installation has been securely and correctly erected.
14	What some examples of items that requires to inspect during the initial verification of the installation?	<ul style="list-style-type: none"> ✓ electrical intake equipment; ✓ parallel or switched alternative sources of supply; ✓ automatic disconnection of supply; ✓ other methods of protection; ✓ basic protection; ✓ fault protection; ✓ additional protection such as RCD and bonding; ✓ specific inspection examples as appropriate to the installation;

		<ul style="list-style-type: none"> ✓ distribution equipment; ✓ circuits; ✓ isolation and switching;
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2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related undertake inspection, diagnosis and repair of electrically operated equipment and systems, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Plan the installation ✓ Prepare for electrical installation ✓ Install the wiring/closures and/or support systems ✓ Commission and test the installed wiring system
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Plan the installation ✓ Prepare for electrical installation ✓ Install the wiring/closures and/or support systems ✓ Commission and test the installed wiring system
4	Demonstrate on how to break down and inspect specific sub tasks for circuits' inspection.	The student is expected to follow the correct step-by step to inspect circuits. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ identification of conductors ✓ cables correctly supported throughout ✓ examination of cables for damage during installation ✓ concealed cables adequately protected against damage ✓ provision of fire barriers and sealing arrangements to reduce spread of fire ✓ termination of cables at enclosures ✓ suitability of circuit accessories for external influences ✓ single-pole switching devices in line conductor ✓ circuit accessories not damaged during erection ✓ the quality or adequacy of connections within accessories and equipment

3. OW = Observation at work Place

#	Questions	Answers
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Plan the installation ✓ Prepare for electrical installation ✓ Install the wiring/closures and/or support systems ✓ Commission and test the installed wiring system
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to undertake inspection, diagnosis and repair of electrically operated equipment and systems.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate on practical test the procedure of testing installation.	As the students attend the practical test to examine an installation, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Plan the installation	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Special work, hazard and safety requirements are determined and incorporated in plan. ✓ Work plan/strategy is devised and confirmed in accordance with legislative and regulatory requirements and standard operating procedures.
2	Prepare for electrical installation	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ All work is undertaken safely and to workplace procedures, State/Territory regulations and legislative requirements. ✓ Materials are checked for correct specifications.
3	Install the wiring/closures and/or support systems	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ All cables/conductors/conduit/enclosures and support systems are installed to specifications using correct appropriate techniques, tools and equipment.

		<ul style="list-style-type: none"> ✓ Cabling is marked or labelled for identification and to specification.
4	Commission and test the installed wiring system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ All completed wiring/systems and enclosures are tested for compliance with specifications, regulations, and legislative requirements, utilising appropriate test procedures and equipment. ✓ Where appropriate, the installation may be energized and tested for compliance with specifications. ✓ Faults are rectified to specification. ✓ Documentation is completed correctly to required specifications.

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-15: Install industrial water pipe systems

Unit No	15
Unit Title	Install industrial water pipe systems
Unit Code	CONS09CR11V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Plan and prepare							
Work instructions and relevant information, including plans, specifications, quality requirements and operational details.	✓	✓		✓	✓	✓	✓
Signage requirements are identified and obtained from project traffic management plan and traffic conditions and are implemented.	✓		✓	✓	✓		✓
Plant, tools and equipment selected to carry out tasks are consistent with requirements of the job.	✓	✓	✓		✓	✓	✓
2. Set out and excavate.							
Work area and materials are prepared to support efficient installation of the pipe work.	✓	✓		✓	✓	✓	✓
Dewatering requirements are determined and applied.	✓		✓	✓	✓		✓
Location, alignment direction, level and grade of mains pipe system are determined from job drawings and specifications	✓	✓	✓		✓	✓	✓
Works are set out to specification.	✓	✓		✓	✓	✓	✓
Plant operator is advised of excavation requirements and levels are monitored.	✓		✓	✓	✓		✓
Mains pipe system support mechanism is installed according to plans, specifications and standards in compliance with statutory and regulatory authorities' requirements.	✓	✓	✓		✓	✓	✓
3. Install mains pipeline							
Pipes are lowered joined according to manufacturer specifications using pipe joining methods.	✓	✓		✓	✓	✓	✓
Pipes are placed and fittings, valves and flow control devices are fitted according to drawings, specifications and installation procedures.	✓		✓	✓	✓		✓
Alignment level and grade are checked continuously for conformance with design.	✓	✓	✓		✓	✓	✓

Mains pipe system support structure is checked completed to specification, where specified.	✓	✓		✓	✓	✓	✓
Backfill procedure is monitored to ensure work is	✓		✓	✓	✓		✓
Sustainability principles and concepts are observed and applied	✓	✓	✓		✓	✓	✓
4. Test mains pipe system.							
Testing is performed to relevant authorities' requirements as determined by specifications.	✓	✓		✓	✓	✓	✓
Mains pipe system test procedures are performed, establishing pressurization, functionality and serviceability	✓		✓	✓	✓		✓
Test results are recorded and reported	✓	✓	✓		✓	✓	✓
5. Clean up							
Work area is cleared and materials disposed.	✓	✓		✓	✓	✓	✓
Plant, tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and standard work practices.	✓		✓	✓	✓		✓

Note:

- ✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies, FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What are the following steps for installing industrial water pipe system? Explain the tasks prior to the commencement of the work.	<ul style="list-style-type: none"> ✓ Stream crossings, providing profiles with elevations of the stream bed and the normal and extreme high and low water levels ✓ Profiles having a horizontal scale of no more than 100 feet to the inch and a vertical scale of no more than 10 feet to the inch, with both scales clearly indicated ✓ Location of all existing and potential sources of pollution that may affect the water source or underground treated water storage facilities ✓ Size, length, and materials of proposed water mains ✓ Location of existing or proposed streets; water sources, ponds, lakes, and drains; storm, sanitary, combined, and house sewers; septic tanks, disposal fields, and cesspools ✓ All appurtenances, specific structures, equipment, water treatment plant waste disposal units, and points of discharge having any relationship to the plans for water mains and/or water works structures ✓ Locations of all sampling taps ✓ Adequate description of any features not otherwise covered by the specifications
2	How can you implement safety procedure in case of digging?	To implement safety of all involved, it is important to manage traffic, including all road users while the work takes place with a temporary traffic management plan. All work on a road or work that affects the normal operating condition of a road must

		<p>have an approval from local authorities and need to be informed to all the relevant stakeholders.</p> <p>Besides that, proper signage or boards need to be displayed on the site of digging</p>
3	What are number of factors to keep in mind before initiating the process; excavation?	<ul style="list-style-type: none"> ✓ Ground frost conditions ✓ Ground water conditions ✓ Traffic load that will be over the pipe ✓ Soil type ✓ Size of pipe to be installed ✓ Surface restoration requirement and ✓ Depth of other utility lines that must be crossed or paralleled by the water main.
4	What are factors to look out for the trench depth?	<p>The depth of a trench depends upon the climate, the size of the pipe, traffic and several other factors.</p> <p>In colder regions, severe winter frost can penetrate twice the average winter frost depth. Closed cell Styrofoam insulated board, 2 in. (50mm) thick and 2 to 4 ft (0.6 to 1.2 m) wide is considered fit, if adequate depth is not possible.</p> <p>In warmer regions, minimum depth of cover to protect it from any danger is usually 2.5 ft (0.8m) for water main.</p>
5	What are factors to look out for the trench width?	<p>The width of trench necessary for Water Main Installation is generally governed by the following conditions:</p> <p>Minimum depth to allow for proper joint assembly and compaction of soil around the pipe</p> <p>Safety considerations</p> <p>The need to minimize the external loading on the pipe</p>
6	Define bedding?	<p>Bedding means preparing a platform for placing the pipes (PVC).</p>
7	What are few things to keep in mind while bedding?	<ul style="list-style-type: none"> ✓ Bottom of the trench must be properly leveled and compacted so that the barrel of the pipe will have continuous, firm support along its full length. ✓ Leveling board should be used to ensure that there are no voids and high spots and that the grade is correct. ✓ In adverse soil situations (damp soil or solid rocks), special pipe bedding may be specified by the engineers. A clean, well graded granular material upto 1 in (25mm) in size. It should contain no lumps or frozen ground and have no more than 12% of clay and silt that can be sensitive to water. ✓ When natural trench bedding is unable to support the pipe, it is necessary to dig another 12 to 24 in (300 to 600 mm) deeper.
8	Define the process haunching.	<p>Haunching is a process of placing bedding material around the haunch of a pipe. It is necessary for increasing the load bearing capacity of the pipe.</p>
9	What are the general direction for laying pipe?	<ol style="list-style-type: none"> 1. Inspection- A pipe should be inspected for damage. Any unsatisfactory section should be removed. 2. Cleaning- Dirt, oil, grease, animals or any other foreign material should be removed before installation. The hypo

		<p>chloride solution is recommended for quick and proper cleaning</p> <p>3. Placement- The pipe should not be rolled, it should be lowered into the trench by hand or mechanical equipment</p> <ol style="list-style-type: none"> a. While placing, pipe is usually supported by a sling in the middle b. Installers should make a conscious effort to keep the inside of pipe clean during lying.
10	What are the four basic steps in making up ductile iron or PVC pipes push on joints?	<ol style="list-style-type: none"> 1. Clean the groove and bell socket of the pipe. 2. Apply lubricant to the gasket and plain end of the pipe. 3. Plain end should be beveled, sharp edges may damage or dislodge the gasket. 4. Small pipe can be pushed into bell socket with a long bar. A timber header should be used between the pipe and backhoe bucket to avoid damage to the pipe
11	What are the two possible ways to connect with existing main?	Installer can connect either by a new tee or by making a pressure tap.
12	What are the benefits of pressure taps?	<ul style="list-style-type: none"> ✓ Customers are not inconvenienced by having their water turned off ✓ Lower probability of contaminating the water system ✓ Fire protection in the area remains in service ✓ No water loss ✓ Based on the time required to close valves and notify customers before inserting a tee is taken into account making a pressure tap is much faster.
13	Once the excavation has been prepared. What are the steps to follow to complete a pressure tap?	<ol style="list-style-type: none"> 1. The surface of the existing main is cleaned. The tapping sleeve is installed on the main, with the face of the flange vertical. 2. The special tapping valve is attached to the sleeve's projecting flange. 3. The tapping machine is installed on the valve, with the shell cutter attached. The machine is supported on contemporary blocks. 4. With the tapping valve open, the cutter is advanced to cut a hole in the main. 5. The cutter is retracted to beyond the valve, and the valve is closed. 6. The tapping machine is removed, and the new main is connected.
14	The water main is put under pressure to ensure it was installed correctly. What are the following which are	To confirm the water main is properly disinfected and meets our water quality requirements, we conduct two rounds of testing that are performed by certified labs. Additional testing and flushing continue until passing results are achieved.

	checked after installation?	
15	Explain the restoration process.	All disturbed areas such as grass, concreted sidewalks or curbs are restored to existing conditions or better, and the trenched areas are re-paved. Once these items are completed the project area is swept and cleaned.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to install and test water pipes larger than DN65, or large water services, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Plan and prepare ✓ Set out and excavate ✓ Install mains pipeline ✓ Test mains pipe system ✓ Clean up
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Plan and prepare ✓ Set out and excavate ✓ Install mains pipeline ✓ Test mains pipe system ✓ Clean up
4	Demonstrate the procedure of making up ductile iron or PVC pipes push on joints	The student is expected to follow the correct step-by step process on making up ductile iron or PVC pipes push on joints. The elements which should be assessed are: <ol style="list-style-type: none"> 1. Clean the groove and bell socket of the pipe. 2. Apply lubricant to the gasket and plain end of the pipe. 3. Plain end should be beveled, sharp edges may damage or dislodge the gasket. 4. Small pipe can be pushed into bell socket with a long bar. A timber header should be used between the pipe and backhoe bucket to avoid damage to the pipe

3. OW = Observation at Work Place

#	Questions	Answers
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Plan and prepare ✓ Set out and excavate ✓ Install mains pipeline ✓ Test mains pipe system ✓ Clean up
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to install and test water pipes larger than DN65, or large water services.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate on the practical test the procedure of laying pipes	As the students attend the practical test to follow the procedure of laying pipes, make sure the student use the proper techniques and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Plan and prepare	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Work instructions and relevant information, including plans, specifications, quality requirements and operational details. ✓ Signage requirements are identified and obtained from project traffic management plan and traffic conditions and are implemented. ✓ Plant, tools and equipment selected to carry out tasks are consistent with requirements of the job.
2	Set out and excavate	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Work area and materials are prepared to support efficient installation of the pipe work. ✓ Dewatering requirements are determined and applied.

		<ul style="list-style-type: none"> ✓ Location, alignment direction, level and grade of mains pipe system are determined from job drawings and specifications. ✓ Works are set out to specification. ✓ Plant operator is advised of excavation requirements and levels are monitored. ✓ Mains pipe system support mechanism is installed according to plans, specifications and standards in compliance with statutory and regulatory authorities' requirements.
3	Install mains pipeline	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Pipes are lowered joined according to manufacturer specifications using pipe joining methods. ✓ Pipes are placed and fittings, valves and flow control devices are fitted according to drawings, specifications and installation procedures. ✓ Alignment level and grade are checked continuously for conformance with design. ✓ Mains pipe system support structure is checked. ✓ Backfill procedure is monitored to ensure work is completed to specification, where specified. ✓ Sustainability principles and concepts are observed and applied
4	Test main pipe system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Testing is performed to relevant authorities' requirements as determined by specifications. ✓ Mains pipe system test procedures are performed, establishing pressurization, functionality and serviceability ✓ Test results are recorded and reported
5	Clean up	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Work area is cleared and materials disposed. ✓ Plant, tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and standard work practices.

5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-16: Perform Install, commission and repair water pumps

Unit No	16
Unit Title	Perform Install, commission and repair water pumps
Unit Code	CONS09CR12V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Prepare to undertake test							
Confirm nature and scope of work requirements	✓	✓		✓	✓	✓	✓
Identify and source procedures, information and tooling required	✓		✓	✓	✓		✓
Analyze method options, select those most appropriate to the circumstances and make preparations	✓	✓	✓		✓	✓	✓
Source technical and/or calibration requirements for testing and prepare support equipment	✓	✓		✓	✓	✓	✓
Identify chemical cleaning agents, their safe handling and disposal methods with respect to environmental requirements	✓		✓	✓	✓		✓
2. Conduct test and analyse results							
Observe workplace health and safety (WHS) requirements, including individual state/territory regulatory requirements and personal protection needs, throughout the work	✓	✓		✓	✓	✓	✓
Carry out tests in accordance with workplace procedures and manufacturer/component supplier specifications	✓		✓	✓	✓		✓
Compare test results with specifications to indicate compliance or non-compliance	✓	✓	✓		✓	✓	✓
Document results with evidence and supporting information and make recommendations	✓	✓		✓	✓	✓	✓
Process report or forward to persons for action in accordance with workplace procedures	✓		✓	✓	✓		✓
3. Prepare for repair operation							
Confirm work to be carried out	✓	✓		✓	✓	✓	✓
Plan repair operation, including post-repair testing	✓		✓	✓	✓		✓
Access and interpret service procedures, workshop manuals and manufacturer information	✓	✓	✓		✓	✓	✓

Identify and prepare tools, equipment and materials required for servicing job	✓	✓		✓	✓	✓	✓
Set up work area	✓		✓	✓	✓		✓
4. Repair pumping system							
Identify and observe applicable WHS requirements, including state/territory regulatory requirements and personal protection needs	✓	✓		✓	✓	✓	✓
Select tooling and equipment to meet job requirements and check to ensure they are in good working order	✓		✓	✓	✓		✓
Repair pump system following manufacturer/component supplier recommended procedures and specifications	✓	✓	✓		✓	✓	✓
Complete repair operations without causing damage to any vehicle/machine or component	✓	✓		✓	✓	✓	✓
Make necessary adjustments in accordance with manufacturer/component supplier specifications	✓		✓	✓	✓		✓
5. Complete work and prepare relevant documents							
Complete repair schedule documentation and update customer and warranty information as required	✓	✓		✓	✓	✓	✓
Inspect repaired unit to ensure protective guards, cowlings and safety features are in place	✓		✓	✓	✓		✓
Clean unit to workplace expectations	✓	✓	✓		✓	✓	✓
Clean work area, dispose of waste, and store tools and equipment in accordance with workplace procedures	✓	✓		✓	✓	✓	✓
Provide customer report on repair and explain use and care of equipment and warranty requirements	✓		✓	✓	✓		✓

Note:

✓ "Other Sources" meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What are different types of pressure pumps?	<ul style="list-style-type: none"> ✓ Sewerage pump ✓ HVAC pump ✓ Fire pump ✓ Domestic Water pump
2	What is the purpose of pump performance?	A pump performance determines the flow rate the pump can produce for a given pressure head.
3	Define flow rates.	Flow rates are typically measured in gallons per minute (gpm), while pressure heads are measured in equivalent feet of water column.
4	How do these curves define the pump's operating state in terms of flow and head?	This occurs at the point where the system resistance curve intersects the pump performance curve. To maximize operational efficiency, it is best to choose a pump whose performance curve results in an operating point that coincides

		with the pump's recommended operating range (flow rate) as defined by the efficiency curve.
5	What are the major two types of pumps?	Centrifugal and positive displacement
6	What is centrifugal?	Centrifugal pumps use a set of rapidly spinning impellor blades. As these impellor blades spin around an axis, centrifugal force causes the water to travel along the surface of the blades to the outer rim of the impellor assembly. Water enters the impellor unit through a port in the axis, and in effect, the spinning blades fling the water outward. The force imparted by the rotation forces the water out of the impellor casing via a discharge port built into the pump's outer housing.
7	What is positive displacement pump?	Positive displacement pumps "push" instead of "fling." They utilize a reciprocating mechanical device, such as a piston inside of a cylinder, which pushes water out of a chamber and propels it out through the discharge pipelines. Other types of reciprocating mechanisms include bellow cavity, vibrating diaphragm, or drumhead squeezing a peristaltic with a pair of pinch rollers and syringes. This last type differs from pistons in that they operated at low flow rates but high-pressure heads.
8	What is the first step of proper maintenance?	Proper maintenance is setting up the pumping operations to prevent damage in the first place.
9	What is cavitation?	Cavitation is defined as "the formation of bubbles or cavities in liquid, developed in areas of relatively low pressure around an impeller.
10	How does cavitation occur?	Cavitation can occur at either the suction or discharge end of the pump. Suction cavitation results when the pump is left to operate in a low-pressure regime (caused by poor pipe system design, not meeting the pump's NPSHr standards, or partial or complete blockage of the intake and its filters) resulting in the pump not receiving enough water inflow.
11	What are active measures that can be taken to minimize the potential for cavitation?	First and foremost, the filters and strainers at the pump's intake should be checked and cleaned on a regular basis. Clogging of any kind can create the pressure imbalances that lead to cavitation. In many cases heavy filtration including mounds of filter stones and layers of geotextile are required in the field to prevent suspended solids from entering the pump. The pump's operation should be monitored to ensure that it is working within the acceptable zone and preferably at the pump's best efficiency point. Conversely, the piping system receiving discharge from the pump can be modified to eliminate the pressure differential that can lead to cavitation.
12	What is ice formation?	Ice formation, which can be considered to be a special type of floating debris. Ice clogging, either partial or complete plugging, can damage a pump during operation by preventing discharge and causing cavitation to reduced discharge flow rates.
13	What are routine inspections?	Routine inspections (weekly to monthly) should examine oil level and condition, noise and vibration, bearing temperatures, leaks from the pump housing, leaks from pipe connections, cracks in pipes or hoses, discharge pressure, intake pressure, seal integrity, and operating temperature.
14	What does quarterly inspections consist of?	Quarterly inspections include checking the mechanical seals, changing the oil, and shaft alignment.

15	What are set of standard procedures that requires maintenance regimes?	<ul style="list-style-type: none"> ✓ Lock-out and tag-out of all power sources, including shutting off of all power switches, removing electrical fuses, shutting down the control panel, closing off all valves, and disconnecting or otherwise shutting off any fuel or oil service lines to the pump. In other words, disconnect anything carrying any kind of electrical, hydraulic, or mechanical power from the pump. Rotating parts (couplings, belt pulleys, external fans, spinning axles, etc.) especially have to be shielded from contact by people or clothing. ✓ Examine the pump's foundation and ensure that the anchor bolts are tight and firmly in place. ✓ Make sure that pump vibration has not caused it to misalign with its power source, intake piping, or discharge piping. ✓ Key lubrication points (such as the ball bearing package) need to be inspected to ensure that they have sufficient lubricant and that their moving parts have not been subject to wear and tear along their contact points. Similarly, shaft seals need to be examined in order to ensure that there has been no leakage or loss of lubricants.
16	What is the step by step procedure for overhaul a centrifugal pump?	<ul style="list-style-type: none"> ✓ Check if the suction and discharge valves are closed. If not, close them manually. ✓ Switch off the power. Disconnect the pump from the main switch or distribution panel. ✓ Disconnect the electrical wire. Ensure that you note the rotation direction of the terminals (if you're using a three face connection). This will help you in connecting the pump the same way after the overhaul. ✓ Check if the pump has coupling bolts (beam, bellow, coupling, etc.) If yes, remove all coupling bolts. ✓ If the pump is mounted vertically, <ul style="list-style-type: none"> ▪ Connect the chain block and pull the motor up ▪ Check if water pressure is locked inside. ▪ And then open the pump. ✓ If the pump is mounted horizontally, <ul style="list-style-type: none"> ▪ Loosen the motor base bolt and remove the motor ▪ Then, follow the same procedures as mentioned above. ✓ Loosen the pump impeller joint and pump flanges. ✓ Bring out the pump for inspection.
17	What the purpose of filing the relevant documents after completion of work?	With the completion of the pump repair and repair of other equipment, make a habit of filling workplace documents as referred documents will help to maintain repair and maintenance history of the pump being repaired.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to carry out testing and repair of centrifugal and positive displacement pumping systems for outdoor power equipment, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Prepare to undertake test ✓ Conduct test and analyse results ✓ Prepare for repair operation ✓ Repair pumping system ✓ Complete work and prepare relevant documents
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Prepare to undertake test ✓ Conduct test and analyse results ✓ Prepare for repair operation ✓ Repair pumping system ✓ Complete work and prepare relevant documents
4	Demonstrate how to dismantle, inspect and reassemble a centrifugal pump.	The student is expected to follow the correct step-by step on how to dismantle, inspect and reassemble a centrifugal pump. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ Start from the impeller side. Loosen the washer and guide nut. ✓ Use a pulley to unscrew the impeller. ✓ Next, remove the mechanical seal on the impeller. ✓ Remove the lock ring/bearing guide pin behind the impeller. ✓ Tap gently on the shaft using a rubber or wooden hammer. ✓ Remove the bearings along with the shaft. ✓ Inspect if the bearings are in good condition. If they are worn out, replace them with new bearings. <ul style="list-style-type: none"> ▪ To change the bearings, first, clean the shaft. Then lubricate it and tap the behind of the bearing groove gently. ▪ Before you install the new bearings, clean the groove and lubricate it well. ▪ Install the new bearings at the small end, just like you removed it. ✓ Clean the housing of the bearing and grease it adequately. ✓ Install the shaft from the impeller's side. ✓ Install new mechanical seals, if needed. ✓ Install all removed washers. ✓ Replace removed nuts and washers and tighten them as needed. ✓ Rotate the shaft and check if it can move freely

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	<p>While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students.</p> <ul style="list-style-type: none"> ✓ Prepare to undertake test ✓ Conduct test and analyse results ✓ Prepare for repair operation ✓ Repair pumping system ✓ Complete work and prepare relevant documents
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to carry out testing and repair of centrifugal and positive displacement pumping systems for outdoor power equipment.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate on practical test on overhauling or repairing of centrifugal pump.	As the students attend the practical test to repair centrifugal pump make sure the student use the proper techniques (step-by step) procedure and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Prepare to undertake test	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Confirm nature and scope of work requirements ✓ Identify and source procedures, information and tooling required ✓ Analyse method options, select those most appropriate to the circumstances and make preparations ✓ Source technical and/or calibration requirements for testing and prepare support equipment ✓ Identify chemical cleaning agents, their safe handling and disposal methods with respect to environmental requirements
2	Conduct test and analyse results	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Observe workplace health and safety (WHS) requirements, including individual state/territory

		<p>regulatory requirements and personal protection needs, throughout the work</p> <ul style="list-style-type: none"> ✓ Carry out tests in accordance with workplace procedures and manufacturer/component supplier specifications ✓ Compare test results with specifications to indicate compliance or non-compliance ✓ Document results with evidence and supporting information and make recommendations ✓ Process report or forward to persons for action in accordance with workplace procedures
3	Prepare for repair operation	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Confirm work to be carried out ✓ Plan repair operation, including post-repair testing ✓ Access and interpret service procedures, workshop manuals and manufacturer information ✓ Identify and prepare tools, equipment and materials required for servicing job ✓ Set up work area
4	Repair pumping system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Identify and observe applicable WHS requirements, including state/territory regulatory requirements and personal protection needs ✓ Select tooling and equipment to meet job requirements and check to ensure they are in good working order ✓ Repair pump system following manufacturer/component supplier recommended procedures and specifications ✓ Complete repair operations without causing damage to any vehicle/machine or component ✓ Make necessary adjustments in accordance with manufacturer/component supplier specifications
5	Complete work and prepare relevant documents	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Complete repair schedule documentation and update customer and warranty information as required ✓ Inspect repaired unit to ensure protective guards, cowlings and safety features are in place ✓ Clean unit to workplace expectations ✓ Clean work area, dispose of waste, and store tools and equipment in accordance with workplace procedures ✓ Provide customer report on repair and explain use and care of equipment and warranty requirements

5. TRB/LB =Trainee’s Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee’s Record/Log Book	As training progresses, students need to be given “Trainee’s Record Book” or “Log Book”. Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, “TR-Trainer Report” or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the “Assessment Plan” including the “Different sources of evidence” to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>

Unit-17: Perform plumbing work to support storm water drainage system

Unit No	17
Unit Title	Perform plumbing work to support storm water drainage system
Unit Code	CONS09CR13V1/21

Evidence Matrix

Elements of Competence and Performance Criteria	WT = written Test	PT=Practical Test	OW =Observation at work Place	OQ= Oral questioning	TRB/LB= Trainee's Record / Log Book	TR= trainer report	Other Sources *
1. Evaluate design parameters.							
Scope of work is established for rainwater harvesting systems	✓	✓	✓	✓	✓		✓
Design requirements are determined from client brief.		✓	✓	✓			✓
Rainfall patterns analyzed and system is reviewed	✓	✓		✓	✓	✓	✓
Cost-benefit analysis is conducted comparing a range of pipe materials and system designs.		✓	✓		✓		✓
Manufacturer requirements and trade and technical manuals are interpreted.	✓	✓	✓	✓			✓
Additional research, including a desktop study, is conducted to outline design parameters.	✓	✓		✓	✓	✓	✓
Performance requirements are reviewed	✓		✓		✓	✓	
2. Plan and detail system components.							
Layout of pipework systems and type and location of fittings, valves and controls are planned	✓	✓	✓	✓	✓		✓
Pipe size calculations are completed for a range of applications.		✓	✓	✓			✓
Separation of services and backflow prevention devices are designed and detailed.	✓	✓		✓	✓	✓	✓
Pump and ancillary requirements are sized and detailed.		✓	✓		✓		✓
Installation requirements are specified.	✓	✓	✓	✓			✓
Allowance for expansion and contraction is provided	✓	✓		✓	✓	✓	✓
3. Install storm water system							
Lower pipes and place in position	✓	✓	✓	✓	✓		✓
Join pipes correctly		✓	✓	✓			✓
Continuously check alignment level and grade continuously for conformance	✓	✓		✓	✓	✓	✓
Position side support and/or overlay beside the pipes.		✓	✓		✓		✓

Fit inspection openings	✓	✓	✓	✓			✓
Monitor backfill procedure and ensure work is completed to requirements	✓	✓		✓	✓	✓	✓
4. Prepare documentation.							
Testing and commissioning schedule is prepared.	✓	✓	✓	✓	✓		✓
Operation and maintenance manual or instructions sheets are prepared and submitted		✓	✓	✓			✓

Note:

- ✓ “Other Sources” meant that Assessor can choose evidence from other sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play.

1. Written questions

#	Question	Answer
1	What is the objective of planning and investigation?	The objective of planning and investigation is to provide detailed information about the type and topography of the land, details of existing drains, land use pattern, networks of roads, culverts and railway lines etc. which required due consideration in planning / augmentation of drainage system in the city.
2	What are following aspects that needs to be considered while planning and investigating for development of a drainage system?	<ol style="list-style-type: none"> 1. Identification and marking of probable drainage zones, direction of gradients and selection of disposal points 2. Preparation of topographical layout of collection and conveyance. 3. Identification of locations for pumping stations 4. Strategy for rainwater storage and its recharge to ground water 5. Strategy for prevention of solid waste and C & D waste into storm water ways. 6. Strategy for arresting pollutants with urban runoff from entering into water bodies 7. Conserving the aesthetic, public safety and other social concerns of recreational open space and landscape to preserve the ecological nature of water ways; 8. Identification of existing storm water drains / drainage corridors including age-old drainage conduits for rehabilitation; 9. Non-structural measures should be studied and components designed accordingly to provide relief during occurrence of disasters due to flooding.
3	How is IDF curve drawn?	The IDF curve is drawn based on rainfall data analysis of the project area obtained from the daily rainfall charts of Self-recording Rain Gauge (SRRG) stations of Indian Meteorological Department (IMD).
4	What are the two types of gauges which rainfalls are measured?	<ol style="list-style-type: none"> 1. Self-recording type 2. Non-recording type

5	What is self-recording type of rain gauge?	Self-recording type rain gauges automatically record on a daily basis a continuous plot of rainfall depth against time down to 15 minutes interval or even less, whereas, non-recording rain gauges can only record cumulative rainfall for a day that is measured daily at site.
6	Describe use of non-recording gauges.	The data collected using non-recording gauges are of limited use for design purpose. Hence, non-recording gauges are being gradually replaced in Indian subcontinent.
7	What is weighing bucket type rain gauge?	Weighing bucket type rain gauge is most common self-recording rain gauge. It consists of a receiver bucket supported by a spring or lever balance or some other weighing mechanism.
8	What is floating or natural syphon type rain gauge?	The working of this type of rain gauge is similar to weighing bucket rain gauge. A funnel receives the water which is collected in a rectangular container. A float is provided at the bottom of container, and this float rises as the water level rises in the container. Its movement is recorded by a pen moving on a recording drum actuated by a clock work.
9	Describe briefly about rainfall analysis. Give an example as well.	Rainfall analysis is carried out to identify and sort out various magnitudes (intensities) of rainfall events and their corresponding durations occurring at a station from a continuous series of historic rainfall records taken for a fairly long period viz. last 25 - 30 years or more. IDF curves are not static as they are influenced by change in pattern of rainfall and therefore IDF curve should be prepared at an interval of 5 - 10 years for accurate results. The rainfall analysis helps to establish intensity-duration-frequency relationship for various frequencies which are used in estimation of runoff for design of storm water drains. The frequency or return period of a storm event may be defined as the average recurrence interval between events equal to and exceeding a specified magnitude. For example, if it is stated that a return period of a rainfall of magnitude 70 mm/hour at a station is 10 years that implies that on an average rainfall magnitude equals or exceeds 70 mm/hr once in 10 years.
10	What should be prevented while working with trench boxes?	When working with trench boxes, it is critical to prevent disruption of the pipe installation while moving the trench box. If the trench box cannot be dragged without disrupting the pipe or initial backfill, it must be lifted in sections.
11	What are the several methods of improving the foundation prior to installation depending on the soil condition?	Reinforce - Soft soils are reinforced by adding dry soil, stabilizing geotextile or geogrid materials, or lime and then compacting for stabilization. Displace - Soupy soils are displaced by placing an overburden material such as large aggregate in the bottom until the foundation is consolidated and stabilized. Restore - Loose soils can be restored by compacting to a greater density. Remove - Existing soils that are unusable should be completely excavated and replaced with a suitable material.
12	Explain about unyielding.	Unyielding materials, such as rock, in the trench bottom also pose a potential problem. To protect the pipe, bedding depth should be increased to 6"-10" as directed by a geotechnical engineer. Over-excavation of the trench may be required to

		accommodate the increased bedding while still achieving the desired line and grade.
13	Explain bedding about	The bedding material is placed in the bottom of the trench, between the foundation and the bottom of the pipe. The bedding allows for uniform longitudinal support and also distributes the load from the bottom of the pipe. The minimum bedding thickness should be a minimum of four inches for 4"-36" diameter pipe and a minimum of six inches for 42"-60" diameter pipe.
14	What the following factors to check prior laying pipe?	Before pipe is laid into the trench, re-inspect the pipe for any damage and clean any debris that may have accumulated on the inside of the pipe or sealing surfaces. Pipe should also be checked to ensure that it is the correct type and size. The pipe should be lowered into the trench using slings placed in a manner that evenly supports the pipe. It is good practice to use a "tag line" when moving the pipe into position; this is a line attached to the end of the pipe, used to prevent uncontrolled pipe movement.
15	What are the two way that can push the pipe together?	Smaller diameter pipe may be pushed together by hand or leveraged together using a spanner block and a lever
16	Explain backfilling process.	The backfilling process is critical to ensure long trouble free service. The backfill and pipe function together as a structural system, forming the pipe/soil envelope, to support the soil overburden and live vehicular loads. For this reason, the backfill material and level of compaction directly impacts the performance of the pipe/soil envelope. The backfill material must have a high density as well as a resistance to migration and degradation.
17	What is deflection testing?	Deflection testing is generally not required when using proper construction practices associated with initial backfill material selection, placement and compaction. However, if considered necessary, random deflection tests of pipe may be performed within 30 days of installation.
18	What is geotextiles?	To prevent the migration of fine soil particles into the pipe/soil envelope, the use of a geotextile may need to be considered. When the groundwater table is at or above the elevation of the pipe, fine particles from the in-situ soil have a tendency to migrate into the course backfill which can result in a loss of pipe support. The geotextile will act as a filter around the bedding, haunch and initial backfill and prevent this migration from occurring. Due to the wide variety of soil and site conditions, the use of a geotextile should be determined by a geotechnical engineer.
19	What are the factors to consider when maintaining your storm water management system?	<ul style="list-style-type: none"> ✓ Regulation ✓ Timing/Frequency ✓ Configuration
20	Explain about a routine maintenance	Proper and regular maintenance is required to ensure a healthy water source. Depending on the type of system you have, it's important to select a well-seasoned company or storm water

	of storm water management system	expert who is familiar with your local requirements and a variety of practices such as bio retention, infiltration, green roofs, detention vaults, storm drains, interceptors, and more. This will eliminate the guesswork on your end.
21	What the methods are of dewater?	Sump pumps, well points, deep wells, underdrains, stone blankets and diversion ditches.

2. PT=Practical Test

#	Questions	Answers
1	Student Assignments	Students need to undertake assignments related to to design systems for the collection, storage, distribution and re-use of rainwater for drinking and non- drinking uses, including irrigation, toilet flushing and other uses, as they continue with the unit. Referred assignment will be covering practical aspects related to the unit.
2	Review Log Book for practical activities	Review log books and examine participation of the students in relevant workplace activities and in particular of the following areas. <ul style="list-style-type: none"> ✓ Evaluate design parameters ✓ Plan and detail system components ✓ Install storm water system ✓ Prepare documentation
3	Review Assessment papers	Review unit and final assessment papers completed by the students and crosscheck their practical skills related to the following. <ul style="list-style-type: none"> ✓ Evaluate design parameters ✓ Plan and detail system components ✓ Install storm water system ✓ Prepare documentation
4	Demonstrate the procedure of backfilling	The student is expected to follow the correct step-by step backfill to ensure long trouble free service. The elements which should be assessed are: <ul style="list-style-type: none"> ✓ Bedding ✓ Haunch ✓ Initial backfill ✓ Final backfill ✓ Embedment

3. OW =Observation at work Place

#	Questions	Answers
1	Assessment papers	While reviewing the papers, make an assessment of the student knowledge and skills related to the various elements stipulated within the competency unit. Please make sure the observations and findings are compared to the theoretical knowledge and practical skills included within the following areas prior to making a judgment on the performance of the students. <ul style="list-style-type: none"> ✓ Evaluate design parameters ✓ Plan and detail system components ✓ Install storm water system

		✓ Prepare documentation
2	Log Books	Likewise, make sure log books are reviewed to assess and evaluate extent of student participation on practical activities related to the above areas or elements covered within the competency unit.
3	Student Assignments	<p>During the implementation of the training program, students would have completed assignments related to design systems for the collection, storage, distribution and re-use of rainwater for drinking and non- drinking uses, including irrigation, toilet flushing and other uses.</p> <p>Review the assignment reports carefully to ensure students' performance related to the elements of competencies are evaluated and judged.</p>
4	Demonstrate on practical test of installation of storm water system	As the students attend the practical test to install storm water system make sure the student use the proper techniques such as unyielding, bedding, laying pipe & backfilling and the information he shared is accurate.

4. OQ=Oral Questioning

#	Questions	Answers
1	Evaluate design parameters	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Scope of work is established for rainwater harvesting systems ✓ Design requirements are determined from client brief. ✓ Rainfall patterns analyzed and system is reviewed ✓ Cost-benefit analysis is conducted comparing a range of pipe materials and system designs. ✓ Manufacturer requirements and trade and technical manuals are interpreted. ✓ Additional research, including a desktop study, is conducted to outline design parameters. ✓ Performance requirements are reviewed
2	Plan and detail system components	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Layout of pipework systems and type and location of fittings, valves and controls are planned. ✓ Pipe size calculations are completed for a range of applications. ✓ Separation of services and backflow prevention devices are designed and detailed. ✓ Pump and ancillary requirements are sized and detailed. ✓ Installation requirements are specified. ✓ Allowance for expansion and contraction is provided
3	Install storm water system	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Lower pipes and place in position

		<ul style="list-style-type: none"> ✓ Join pipes correctly ✓ Continuously check alignment level and grade continuously for conformance ✓ Position side support and/or overlay beside the pipes. ✓ Fit inspection openings ✓ Monitor backfill procedure and ensure work is completed to requirements
4	Prepare documentation	<p>Make sure the students answer questions related to the following areas</p> <ul style="list-style-type: none"> ✓ Testing and commissioning schedule is prepared. ✓ Operation and maintenance manual or instructions sheets are prepared and submitted

5. TRB/LB =Trainee's Record/Log Book

#	Name of the Source	Information to be checked
1	TRB/LB =Trainee's Record/Log Book	As training progresses, students need to be given "Trainee's Record Book" or "Log Book". Referred book will be used to entry the daily classes and workplace activities and can play an important source of evidence for assessment.
2	TR=Trainer Report	It is expected that every training program will encourage establishment and proper management of all the training records. In this regard, "TR-Trainer Report" or daily training records will illustrate the various training activities being performed and hence can be another important source of information for the assessment.
3	Other Sources	<p>Competency Based Assessment (CBA) adopted for the assessment of this competency unit calls for gathering of evidences and can be from different sources such as S=supervisor/team leader report, C = Certificates, T=Testimonies, VD= Video, P= Photographs, PP= Product produced, S= Simulations, CS= Case Studies,FB= Feedback from Fellow Members and RP= Role Play, etc.</p> <p>Nominated assessor needs to communicate the "Assessment Plan" including the "Different sources of evidence" to the training institution with the commencement of the program to ensure evidence gathering is undertaken on timely manner with presentation of all the required evidence prior to undertaking Final Assessment.</p>



PLUMBING