STANDARD KEMAHIRAN PEKERJAAN KEBANGSAAN
(NATIONAL OCCUPATIONAL SKILLS STANDARD)

F432-002-3:2017

PLUMBING AND SANITARY INSTALLATION SUPERVISION

LEVEL 3

JPK

JABATAN PEMBANGUNAN KEMAHIRAN
KEMENTERIAN SUMBER MANUSIA, MALAYSIA

Department of Skills Development (DSD)
Federal Government Administrative Centre
62530 PUTRAJAYA, MALAYSIA

NATIONAL OCCUPATIONAL SKILLS STANDARD

F432-002-3: 2017

PLUMBING AND SANITARY INSTALLATION SUPERVISION LEVEL 3

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ABBREVIATION

CoCU	Curriculum of Competency Unit
CP	Competency Profile
CPC	Competency Profile Chart
CU	Competency Unit
CAPEX	Capital Expenditure
DKM	*Diploma Kemahiran Malaysia*
DLKM	*Diploma Lanjutan Kemahiran Malaysia*
DSD	Department of Skills Development
FAVAD	Fixed and Variable Area Discharges
GIS	Geographical Information System
IWA	International Water Association
JPK	*Jabatan Pembangunan Kemahiran*
JTPS	*Jawatankuasa Teknikal Penilaian Standard*
KPI	Key Performance Indicator
KETTHA	Ministry of Energy, Green Technology and Water
LNF	Legitimate night flow
MNF	Minimum Night Flow
NRW	Non-Revenue Water
NNF	Net Night Flow
NOSS	National Occupational Skills Standard
OPEX	Operational Expenditure
OSHA	Occupational Safety and Health Administration

OS	Occupational Structure
OAS	Occupational Area Structure
PPE	Personal Protective Equipment
SHE	Safety, Health Environmental
SOP	Standard Operating Procedure
SPAN	*Suruhanjaya Perkhidmatan Air Negara*
SKM	*Sijil Kemahiran Malaysia*
SP	Standard Practice
SPM	*Sijil Pelajaran Malaysia*
UTG	Uniformed Technical Guidelines

STANDARD PRACTICE

NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR;

PLUMBING AND SANITARY INSTALLATION SUPERVISION

LEVEL 3

1. INTRODUCTION

Two main laws passed in 2006 form the legal framework of the water and sanitation sector in peninsular Malaysia. Water Service Industry Act (WSIA) 2006 an act to provide for and regulate water supply services and sewerage services in Malaysia. The National Water Services Commission Act established a National Water Services Commission known under its Malay acronym as SPAN which issues licenses for water operators, mainly state water companies. These licenses can theoretically be revoked if key performance indicators are not met or other standards are not respected. As for plumbing works, SPAN issues plumbing licence or permit A1 and A2 for qualified plumbers.

A plumber will begin working for a plumbing service company or water supply provider and then perhaps start up their own business later, A plumber has to be someone happy working with their hands. A good plumber will be agile and fit and not mind getting their hands dirty. Working in cramped and sometimes risky conditions is quite likely, so a plumber needs to feel confident that they can manage any sort of environment.

A plumbing and sanitary installation supervision personnel main job functions are in installing, repairing and maintaining pipe, sanitary appliances and fixtures use in the piping system in a house or building premises. The main job areas are in the plumbing and sanitary drawing, plumbing and sanitary works preparation, water pipe installation, waste pipe installation, water tank installation and also plumbing and sanitary maintenance works. The personnel also need needs to know how to prepare drawings and understand all the symbols and legend, and figures to understand the layout of water supply, waste, and piping systems for a given job scope. The personnel also need to do testing and reports writing after completing a given job and comply with standards and regulations.

This is a new NOSS for Plumbing and Sanitary Installation Supervision. Based on discussion among the industry experts, in reference to industry practice, the plumbing and sanitary installation supervision is done at Level 3. As for Level 3 personnel of this level has different competencies with Level 2 and the scope of work has competitive units.

2. OCCUPATIONAL STRUCTURE (OS)

SECTOR	**Construction (F)**		
SUB-SECTOR	**Electrical, Plumbing and Other Construction Installation Activities (43)**		
AREA	**Installation Of Plumbing And Sanitary Equipment**		
	Sewerage	Plumbing and Sanitary	Water Reticulation
LEVEL 5	Water Services Manager		
LEVEL 4	Water Services Executive		
LEVEL 3	Supervisor/ Senior Technician	Supervisor/ Senior Technician	Supervisor/ Senior Technician
LEVEL 2	Technician	Technician	Technician
LEVEL 1	Fitter	Fitter	Fitter

Figure 1.2: Occupational Structure for Plumbing and Sanitary Installation Supervision

3. Occupational Area Structure (OAS)

SECTOR	**Construction (F)**		
SUB-SECTOR	**Electrical, Plumbing and Other Construction Installation Activities (43)**		
AREA	**Installation Of Plumbing And Sanitary Equipment**		
	Sewerage	Plumbing and Sanitary	Water Reticulation
LEVEL 5	Water Services Management		
LEVEL 4	Water Services Administration		
LEVEL 3	Supervisor/ Senior Technician	Plumbing and Sanitary Installation Supervision	Supervisor/ Senior Technician
LEVEL 2	Technician	Plumbing and Sanitary Installation Operation	Technician
LEVEL 1	Fitter	Embedded	Fitter

Figure 1.3: Occupational Area Structure for Plumbing and Sanitary Installation Supervision

Justification for Level 1 being embedded to Level 2 due to insufficient competency unit (CU) for Level 1for SKM certification purpose and industrial employability requirement

4. DEFINITION OF COMPETENCY LEVELS

The NOSS is developed for various occupational areas. Candidates for certification must be assessed and trained at certain levels to substantiate competencies. Below is a guideline of each NOSS Level as defined by the Department of Skills Development, Ministry of Human Resources, Malaysia.

Level 1: Competent in performing a range of varied work activities, most of which are routine and predictable.

Level 2: Competent in performing a significant range of varied work activities, performed in a variety of contexts. Some of the activities are non-routine and required individual responsibility and autonomy.

Level 3: Competent in performing a broad range of varied work activities, performed in a variety of contexts, most of which are complex and non-routine. There is considerable responsibility and autonomy and control or guidance of others is often required.

Level 4: Competent in performing a broad range of complex technical or professional work activities performed in a wide variety of contexts and with a substantial degree of personal responsibility and autonomy. Responsibility for the work of others and allocation of resources is often present.

Level 5: Competent in applying a significant range of fundamental principles and complex techniques across a wide and often unpredictable variety of contexts. Very substantial personal autonomy and often significant responsibility for the work of others and for the allocation of substantial resources features strongly, as do personal accountabilities for analysis, diagnosis, planning, execution and evaluation.

5. AWARD OF CERTIFICATE

The Director General shall award, to any person upon completing successfully the NOSS program following skills level qualifications as stipulated under the National Skills Development Act, 652:

- Malaysia Skills Certificate / *Sijil Kemahiran Malaysia* (SKM) Level 3
- Statement of Achievement / *Penyata Pencapaian* (PC)

6. JOB COMPETENCIES

The Plumbing and Sanitary Installation Supervision personnel is competent in performing the following core competencies:-

- Plumbing And Sanitary Technical Drawing Submission
- Water Main Tapping And Meter Installation
- Plumbing And Sanitary Work Inspection
- Plumbing And Sanitary Installation, Testing And Sterilization
- Service Pipe Maintenance
- Plumbing And Sanitary Works Administration
- Safety Health And Environment Compliance

7. Work Conditions

The working conditions can vary from job to job and with differing levels of experience and qualifications, but as a rule the vast majority of conditions will be within another person's private environment. This might take the form of a domestic home or it could be within a public area such as a school, shop or hospital.

The one thing that's consistent though is that you will be expected to appear presentable and not intimidating. You will be on the move all the time and won't be tied to the same space, like you would be in an office job. Good plumbers need to like moving around and adapting to new and challenging working environments all the time.

Plumbers need to have a good knowledge of the Water Regulations and Building Regulations too, if they are going to carry out their job effectively.

8. EMPLOYMENT PROSPECTS

There are excellent prospects in private sectors due to shortage of hands-on expert in plumbing and sanitary installation operation. L3 Personnel trained under this training program is eligible to be employed in water suppliers and service providers, installation contractors or training providers. This area has a very good job market potential due to shortage of such highly skilled personnel in Malaysia.

Employment opportunities in Malaysia

- Water Service Providers such as SYABAS, Lembaga Air Perak (LAP), Syarikat Air Johor (SAJ)
- Plumbing and Water Reticulation Contractors
- Trainer or Plumbing Instructor such as Akademi Binaan Malaysia, SYABAS, LAP and SAJ
- Professional Plumber

9. CAREER ADVANCEMENT

The career path in plumbing depend on the type and size of a particular organization. In general, there will be more career development opportunities with larger employer. There is no professional or specialization training advancement in this Plumbing And Sanitary Installation Supervision Level 3 but they can further their study to L4 (*Diploma Kemahiran Malaysia*) and L5 (*Diploma Lanjutan Kemahiran Malaysia*)

10. SOURCES OF ADDITIONAL INFORMATION

The following organisations can be referred as sources of additional information which can assist in defining the document's contents.

a. Suruhanjaya Perkhidmaan Air Negara (SPAN)
   Aras Bawah dan Aras Satu,
   Prima Avenue 7, Blok 3510,
   Jalan teknokrat 6,
   6300 Cyberjaya, Selangor
   Tel : 03-83179333
   Fax : 03- 83179336
   Email: span@span.gov.my

b. Kementerian Kesejahteraan Bandar, Perumahan dan KerajaanTempatan
No.51, Persiaran Perdana,
PERSINT 4,
62100, Putrajaya.
Tel: 03-8000 8000
Fax : 03-88915557

c. Lembaga Pembangunan Industri Pembinaan Malaysia
Tingkat 10, No 45, Menara Dato' Onn,
Pusat Dagangan Dunia Putra,
JalanTun Ismail
50480 Kuala Lumpur
Tel: 03-40477000
Fax 03 4047 7070
email: cidb@cidb.gov.my

d. Jabatan Bomba dan Penyelamat Malaysia
Lebuh Wawasan, Presint 7, 62250 Putrajaya PUTRAJAYA
Telephone: 03-8888 0036/37/38/40
Fax: 03-8888 0025
Website: http://www.bomba.gov.my

11. ACKNOWLEDGEMENT

The Director General of DSD would like to extend his gratitude to the organization and individuals who have been involved in developing this standard; especially the members of Standard Technical Evaluation Committee (STEC) for validation of this document

STANDARD TECHNICAL EVALUATION COMMITTEE (STEC)		
1.	En Thomas A/L Joseph Thomas	Director Suruhanjaya Perkhidmatan Air Negara (SPAN)
2.	En Izaidi bin Ahmad	Deputy Director Suruhanjaya Perkhidmatan Air Negara (SPAN)
3.	En Anizam Bin Shamsuddin	Assistant Manager Syarikat Bekalan Air Selangor (SYABAS)
4.	Ir Ishak Bin Hasnan	Director Lembaga Air Perak (LAP)

12. NOSS DEVELOPMENT COMMITTEE MEMBERS

PLUMBING AND SANITARY INSTALLATION SUPERVISION

LEVEL 3

STANDARD DEVELOPMENT COMMITTEE (SDC)		
1.	MAT RODZI BIN ABDUL RAOF	INSTRUCTOR PLUMBING AKADEMI BINAAN MALAYSIA WILAYAH TIMUR
2.	MAHAINDRAN A/L KRISTNAN	JURUTERA KANAN JABATAN KERJA RAYA MALAYSIA
3.	MOKHTAR BIN ATAN	PENGURUS KANAN SYARIKAT BEKALAN AIR SELANGOR SDN BHD
4.	ZAINUDDIN BIN TAIB	JURUTERA OPERASI LEMBAGA AIR PERAK
5.	ZULKIFLY BIN AHMAD	JURUTEKNIK KANAN PERBADANAN BEKALAN AIR PULAU PINANG SDN BHD
6.	MOHD AB.DUH BIN MOHD JAAFAR	PENGAJAR JURUREKA PAIP INSTITUT KEMAHIRAN BELIA NEGARA WAKAF TAPAI
7.	MAHMOD KHAIRI BIN SHAHMIN	PENGURUS OPERASI PANTAS TERAJU SDN BHD
8.	ISA BIN HJ ABU BAKAR	PENGARAH SAJ HOLDINGS SDN BHD JOHOR BARU
9.	KHITHOB BIN AHMAD	TIMBALAN PENGARAH SURUHANJAYA PERKHIDMATAN AIR NEGARA (SPAN)
FACILITATOR		
1.	SAIFUL ANWAR BIN ABU HASAN	FACILITATOR EDUSURE SDN BHD

STANDARD CONTENT

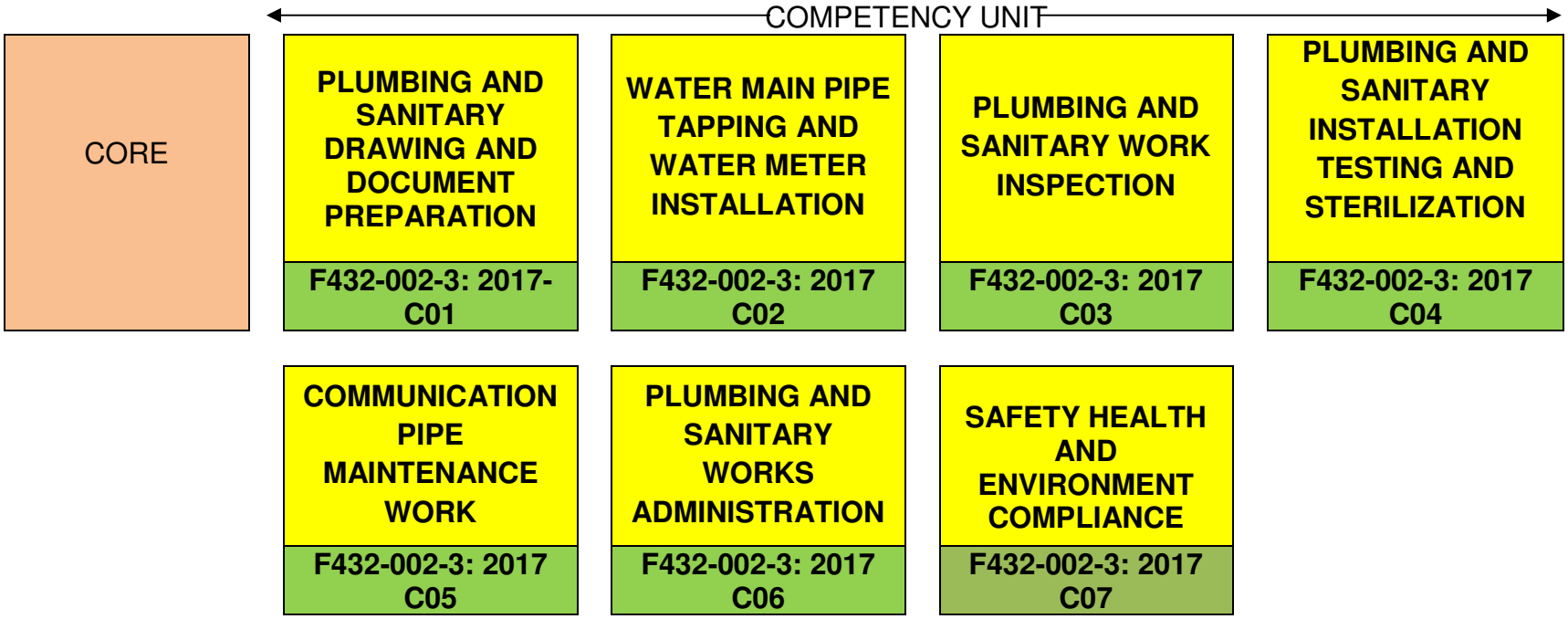
NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR;

PLUMBING AND SANITARY INSTALLATION SUPERVISION

LEVEL 3

13. COMPETENCY PROFILE CHART (CPC)

SECTOR	**CONSTRUCTION (F)**		
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**		
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**		
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**		
JOB LEVEL	**THREE (3)**	**NOSS CODE**	**F432-002-3: 2017**



14. COMPETENCY PROFILE (CP)

SECTOR	**CONSTRUCTION (F)**		
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**		
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT (43224)**		
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**		
JOB LEVEL	**LEVEL 3**	**NOSS CODE**	**F432-002-3: 2017**

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
1. Plumbing and Sanitary Technical Drawing Preparation	F432-002-3: 2017 C01	Plumbing and Sanitary Drawing Document Preparation involves in producing as-built drawing to indicate final pipe route, plumbing and sanitary installation, so it can be documented for the purpose of submission to Local Authority for approval A competent person in this CU shall be able to check plumbing drawing specification, interpret sanitary drawing specification, check waste water drawing specification, prepare	1. Check plumbing drawing specification	1.1 Correct symbol and legend for valve, pipe and fitting assessed as per standard plumbing specification 1.2 Technical drawing in isometric view, schematic view or diagrammatic illustration completeness assessed according to regulator body requirement 1.3 Incorrect drawing symbol and legend amended as per standard plumbing specification 1.4 Plumbing drawings are systematically compiled

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		rain water harvesting drawings prepare As-built drawing and update drawing submission and approval report		according to project title, plan, details and scope of work and timely submitted for approval
		Technical drawing must be produced in isometric view, schematic view or diagrammatic illustration. All symbol and legend must be drawn correctly as per standard plumbing specification The outcome of this competency is to produce drawings and specifications in accordance with Uniform Technical Guidelines (UTG) and Uniform Building By Law (UBBL) guidelines.	2. Check sanitary drawing specification	2.1 Correct symbol and legend for pipe, fitting and fixtures drawn assessed as per standard sanitary drawing specification 2.2 Technical drawing in isometric view, schematic view or diagrammatic illustration completeness assessed according to regulator body requirement 2.3 Incorrect drawing symbol and legend amended as per standard sanitary specification 2.4 Sanitary drawings are systematically compiled according to project title, plan, details and scope of

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				work and timely submitted for approval
			3. Check waste pipe drawing specification	3.1 Correct symbol and legend for valve, pipe and fitting are assessed as per standard waste pipe specification 3.2 Technical drawing in isometric view, schematic view or diagrammatic illustration completeness assessed according to regulator body requirement 3.3 Incorrect drawing symbol and legend amended as per standard waste pipe specification 3.4 Waste pipe drawings are systematically compiled according to project title, plan, details and scope of work and timely submitted for approval

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
			4. Prepare rain water harvesting drawings	4.1 Suitable drawing tools checked for good condition and functionality 4.2 Correct symbol, label and legend determined from rain water harvesting drawings guideline interpretation 4.3 Technical drawing for rain water harvesting drawing produced with accurate dimension, symbols and legends according to work requirement 4.4 Complete rain water harvesting drawing in Isometric view, schematic view or diagrammatic illustration are produced according to regulatory body requirement 4.5 Draft of rain water harvesting drawing timely submitted to superior prior submission to local authority for approval

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
			5. Prepare As-built drawing	5.1 Actual route, materials, specification, accessories and fittings of completed plumbing and sanitary installation supervision is compared against construction drawing 5.2 Changes of route, materials specification, accessories and fittings from construction drawing is amended into as built drawing 5.3 Draft of as-built drawing timely submitted to superior for verification 5.4 Final as built drawing document timely submitted to water operator and fire department for approval
			6. Update drawing submission and approval status	6.1 Status of drawing submission to regulatory bodies checked with required personnel/department 6.2 Status of drawing revision checked with

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				relevant subordinate 6.3 Approval status of drawing submission to regulatory bodies checked with required personnel/department 6.4 Approved drawings compiled systematically according to project title, type and drawing paper size for reference.
2. Water Main Pipe Tapping and Water Meter Installation	F432-002-3: 2017 C02	Water main tapping is the process of adding a branch line to a previously installed main pipe line so that water meter could be installed according to construction drawing at specified time frame Permit To Work (PTW) A competent person in this CU shall be able to, determine tapping work requirement, carry out pipe trenching work, lay communication pipe, carry out water mains	1. Determine tapping work requirement	1.1 Water main pipe routing determined from water main drawing interpretation 1.2 Water main pipe length determined from water main drawing interpretation 1.3 Water main pipe tapping location determined from water main drawing interpretation 1.4 Materials, tools, equipment and tapping process determined from water main drawing interpretation

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		tapping, perform water meter installation, prepare water main tapping installation check list and prepare installation work report Correct type and sizes of materials must be selected from the product listings approved by SPAN and Permit To Work (PTW)		

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		must be obtained from local authority prior to work commencement	2. Carry out pipe trenching work	2.1 Permit To Work (PTW) timely collected from relevant authority prior to work commencement 2.2 Tapping point location, material type and diameter of water main pipe checked by visual inspection 2.3 Details of tapping point location and specification submitted to water operator for tapping work approval 2.4 Existing utilities obstruction for tapping work checked from Geographic Information System (GIS) drawing interpretation 2.5 Water pipe route marked as per tapping drawing for smooth trenching work 2.6 Trenching tools conditions checked and equipment functionality tested according to manufacturer's manual 2.7 Trenching work carried out with proper depth and width as per tapping drawing specification and type of material used. 2.8 Pipe Bedding work is

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
			3. Lay communication pipe	3.1 Communication pipe route determined from communication pipe layout drawing interpretation 3.2 Material type and size of communication pipe selected as per pipe layout drawing specification 3.3 Type and size of pipe sleeve selected based on drain crossing or road crossing application 3.4 Correct tool and equipment selected to ensure quality of jointing work to meet standard specification 3.5 Pipe installation tools conditions checked and equipment functionality tested according to manufacturer's manual 3.6 Communication pipe is laid with required length and all joints are securely fastened. 3.7 Meter stand is installed with appropriate height,

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				vertically and horizontally alignment.
			4. Perform water mains tapping	4.1 Required size, type and material of tapping pit is prepared for smooth tapping work 4.2 Sufficient length and correct size of water connection pipe prepared according to tapping work requirement 4.3 Jointing, cutting and tapping tools conditions checked and equipment functionality tested according to manufacturer's manual 4.4 Required type and size of tapping accessories is prepared according tapping work requirement 4.5 Under pressure tapping is performed at required location

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				using drilling tools and selected tapping method 4.6 Communication pipe is connected to main pipe tapping point with free from leakage and good workmanship 4.7 Communication pipe flushed using flushing hydrant to remove debris in pipe system
			5. Perform water meter installation	5.1 Diameter and length meter stand pipe checked for water meter application requirement 5.2 Required type and model of water meter requested from water operator for water meter installation work 5.3 Relevant tools and equipment for water meter installation checked for condition and functionality 5.4 Water meter installed with free from leakage and good

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				workmanship according to water meter installation standard specification
			6. Conduct water meter post installation work	6.1 Work area, tools and equipment cleaned from dirt & debris and properly kept according to housekeeping and safety practices. 6.2 Tools and equipment inventory record updated accurately according to inventory procedure 6.3 Tools, equipment and material stored by sorting according to type, function and sizes as per storage procedure 6.4 Tapping and water meter installation report prepared with accurate information at required time according to report format 6.5 Tapping and water

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				meter installation reports are systematically compiled and timely submitted to superior
3. Plumbing and Sanitary Work Inspection	F432-002-3: 2017 C03	Plumbing and Sanitary Work Inspection describes the competency in ensuring all installation supervision are carried out to achieve expected quality and work standard on a specified time frame. A competent person in this CU shall be able to inspect water pipe installation, inspect waste pipe installation, inspect water tank installation, inspect sanitary fixture installation, inspect manhole construction and inspect water main tapping point Construction drawing	1. Inspect water pipe installation	1.1 Type and location of water pipe installation work determined from construction drawing interpretation 1.2 Type and scope of inspection work determined from inspection checklist interpretation. 1.3 Water pipe jointing specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 1.4 Valve fitting specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		and Installation Checklist must be referred and evaluated prior to inspection. Construction work guideline and inspection must be done in compliance with standard procedure mentioned in OSHA 1994		and guideline 1.5 Taps and bracket installation specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 1.6 Water pipe installation checked free from leakage and sign of leakage.
			2. Inspect waste pipe installation	2.1 Type and location of waste pipe installation work determined from construction drawing interpretation 2.2 Type and scope of inspection work determined from inspection checklist interpretation. 2.3 Waste pipe jointing specification assed within tolerance and good workmanship in accordance with plumbing and sanitary

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				installation drawing and guideline 2.4 Fixtures fitting specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 2.5 Waste pipe trap installation specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 2.6 Waste pipe installation checked free from leakage and sign of leakage
			3. Inspect water tank installation	3.1 Type and location of water tank installation work determined from construction drawing interpretation 3.2 Type and scope of inspection work determined from

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				inspection checklist interpretation. 3.3 Water tank base construction specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 3.4 Water tank part fittings specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 3.5 Water tank and cover installation specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 3.6 Water tank installation checked free from leakage and water tightness closed at

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				maximum level according to plumbing and sanitary installation guideline
			4. Inspect sanitary fixture installation	4.1 Type and location of sanitary fixture installation work determined from construction drawing interpretation 4.2 Type and scope of inspection work determined from inspection checklist interpretation. 4.3 Sanitary fixture installation specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 4.4 Sanitary fixture bracket fittings specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				guideline 4.5 Sanitary fixture installation checked free from leakage according to plumbing and sanitary installation guideline
			5. Inspect manhole construction	5.1 Manhole channel location determined from construction drawing interpretation 5.2 Scope of inspection work determined from inspection checklist interpretation. 5.3 Manhole pipe alignment specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 5.4 Manhole channel construction specification assed within tolerance and good workmanship in accordance with plumbing and sanitary

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				installation drawing and guideline 5.5 Manhole benching specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 5.6 Manhole wall and cover specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline
			6. Inspect water main tapping point	6.1 Water main tapping location determined from construction drawing interpretation 6.2 Scope of inspection work determined from inspection checklist interpretation. 6.3 Water main tapping point specification assed within tolerance and good workmanship

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				in accordance with plumbing and sanitary installation drawing and guideline 6.4 Water piping system checked free from leakage and sign of leak in accordance with plumbing and sanitary installation guideline
4. Plumbing and Sanitary Installation Testing and Sterilization	F432-002-3: 2017 C04	Plumbing And Sanitary Testing And Sterilization describes the competency in performing various tests on all completed installation supervision before it could be approved for usage A competent person in this CU shall be able to perform pipeline pressure test, perform pipeline leakage test, carry out water pipe sterilization, carry out water tank sterilization, perform waste pipe leakage test and carry	1. Perform pipeline pressure test	1.1 Size, diameter and length of pipeline to be tested determined from construction drawing interpretation 1.2 Scope of work and method statement to be used for pressure testing determined from work instruction 1.3 Location of pressure test to mobilise testing tools and equipment determined from work instruction 1.4 Relevant tools and equipment for pressure testing checked for good condition and

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		out waste pipe gradient test All testing must be done in compliance with standard testing procedure in a safe environment as per OSHA requirement		functionality as per manufacturer manual 1.5 Pressure testing instrument properly set to facilitate testing of the pipelines 1.6 Pressure test is carried out with no pressure drop as per testing procedure requirement 1.7 Pressure test report prepared with accurate information at required time according to report format 1.8 Pressure test reports are systematically compiled and timely submitted to superior
			2. Perform pipeline leakage test	2.1 Size, diameter and length of pipeline to be tested determined from construction drawing interpretation 2.2 Scope of work and method statement to be used for pressure testing determined from work instruction

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				2.3 Location of pipeline leakage test to mobilise testing tools and equipment determined from work instruction 2.4 Relevant tools and equipment for pipeline leakage testing checked for condition and functionality 2.5 Pipeline leakage tests is carried out with no leakage reading drop as per testing procedure requirement 2.6 Pipeline leakage test report prepared with accurate information at required time according to report format 2.7 Pipeline leakage test reports are systematically compiled and timely submitted to superior
			3. Carry out water pipe	3.1 Diameter and length of

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
			sterilization	pipeline to be sterilized determined from construction drawing interpretation 3.2 Scope of work and method statement to be used for water pipe sterilization determined from work instruction 3.3 Location of water pipe sterilization to mobilise testing tools and equipment determined from work instruction 3.4 Relevant tools and equipment for water pipe sterilization checked for good condition and functionality 3.5 Proper PPE worn for protection during handling, mixing and dosing of chlorine base chemical as per SHE requirement 3.6 Sterilization chemical prepared with proper mixing ratio according to sterilization preparation guideline

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				3.7 Water pipe sterilized for bacteria free and safe drinking as per piping sterilization procedure 3.8 Sterilized pipeline tested by filling with portable water according to pipe sterilization testing procedure 3.9 Required amount of water sample from sterilized pipeline collected and sent to accredited laboratory for testing 3.10 Sterilization test reports collected from accredited test laboratory within timeframe and timely submitted to water regulator
			4. Carry out water tank sterilization	4.1 Diameter and height of water tank to be sterilized determined from construction drawing interpretation 4.2 Scope of work and method statement to be used for water tank

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				sterilization determined from work instruction 4.3 Special tools and equipment for water tank sterilization and chlorine mixing checked for good condition and functionality 4.4 Proper PPE worn for protection during handling, mixing and dosing of chlorine base chemical as per SHE requirement 4.5 Sterilization chemical prepared with proper mixing ratio according to sterilization preparation guideline 4.6 Water tank sterilized for bacteria free and safe drinking as per piping sterilization procedure 4.7 Sterilized water tank tested by filling with portable water according to water tank sterilization testing procedure 4.8 Required amount of water sample from

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				sterilized water tank collected and sent to accredited laboratory for testing 4.9 Sterilization test reports collected from accredited test laboratory within timeframe and timely submitted to water regulator
			5. Perform water tank leakage test	5.1 Diameter and height of water tank to be tested determined from construction drawing interpretation 5.2 Scope of work and method statement to be used for water tank leakage testing determined from work instruction 5.3 Location of water tank leakage test to mobilise testing tools and equipment determined from work instruction 5.4 Relevant tools and equipment for leakage testing checked for

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				condition and functionality 5.5 Water tank leakage tests is carried out with no leakage drop as per testing procedure requirement 5.6 Water tank leakage test report prepared with accurate information at required time according to report format 5.7 Water tank leakage test reports are systematically compiled and timely submitted to superior
			6. Perform waste pipe leakage test	6.1 Size, diameter and length of waste pipe to be tested determined from construction drawing interpretation 6.2 Scope of work and method statement to be used for waste pipe leakage testing determined from work instruction 6.3 Location of waste pipe leakage test to mobilise

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				testing tools and equipment determined from work instruction 6.4 Relevant tools and equipment for waste pipe leakage testing checked for condition and functionality 6.5 Smoke test is carried out with no smoke leakage sign as per testing procedure requirement 6.6 Dye/ink test is carried out with no coloured water leakage sign as per testing procedure requirement 6.7 Waste pipe leakage test report prepared with accurate information at required time according to report format 6.8 Waste pipe leakage test reports are systematically compiled and timely submitted to superior

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
			7. Carry out waste pipe gradient test	7.1 Size, diameter and gradient of waste pipe to be tested determined from construction drawing interpretation 7.2 Scope of work and method statement to be used for waste pipe gradient testing determined from work instruction 7.3 Location of waste pipe gradient test to mobilise testing tools and equipment determined from work instruction 7.4 Relevant tools and equipment for waste pipe gradient testing checked for condition and functionality 7.5 Gradient test is carried out by smooth rotating of ping pong ball or ink and water velocity flow according to gradient testing procedure 7.6 Waste pipe gradient test report prepared with accurate information at required

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				time according to report format 7.7 Waste pipe gradient test reports are systematically compiled and timely submitted to superior
5. Communication Pipe Maintenance Work	F432-002-3: 2017 C05	Communication pipe maintenance work describes the competency in regular checking on the external pipe system to determine the work condition and performance are according to standard requirements A competent person in this CU shall be able to troubleshoot low pressure, repair tapping point leaks, and repair meter points leak. The outcome of this competency is to ensure all repair works checked	1. Troubleshoot low water pressure	1.1 Sign of faulty or leaking communication pipe inspected by visual check location upon receiving work instruction 1.2 Actual communication pipe routing interpreted from as built drawing 1.3 Required maintenance tools and materials conditions checked and equipment functionality tested according to manufacturer manual 1.4 Cause of low pressure determined by checking pressure level before and after water meter 1.5 Water flow isolated by

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		to confirm required water pressure using correct pressure gauge, tools and equipment as per standard guidelines.		closing water supply main valve 1.6 Defective gasket, piping parts and valve replaced during minor repair work 1.7 Defective piping system totally replaced during major repair work 1.8 Pressure of repaired communication pipe are tested using pressure gauge as per main supply pressure level 1.9 Repaired communication pipe inspected for good workmanship and free from leakage
			2. Repair tapping point leaks	2.1 Sign of faulty or leaking tapping point inspected by visual check location upon receiving work instruction 2.2 Actual pipe routing interpreted from as built drawing

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				2.3 Required maintenance tools and materials conditions checked and equipment functionality tested according to manufacturer manual 2.4 Water flow isolated by closing water supply main valve 2.5 Defective gasket, piping parts and valve replaced during minor repair work 2.6 Defective piping system totally replaced during major repair work 2.7 Pressure of repaired tapping point are tested using pressure gauge as per main supply pressure level 2.8 Repaired tapping point inspected for good workmanship and free from leakage
			3. Repair meter points leak	3.1 Sign of faulty or leaking meter points inspected by visual

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				check location upon receiving work instruction 3.2 Actual pipe routing interpreted from as built drawing 3.3 Required maintenance tools and materials conditions checked and equipment functionality tested according to manufacturer manual 3.4 Water flow isolated by closing water supply main valve 3.5 Defective gasket, piping parts and valve replaced during minor repair work 3.6 Defective piping system or meter unit replaced during major repair work 3.7 Pressure of repaired meter points are tested using pressure gauge as per main supply pressure level 3.8 Repaired meter points inspected for good

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				workmanship and free from leakage 3.9 Communication pipe troubleshooting report prepared with accurate information at required time according to report format 3.10 Communication pipe troubleshooting report are systematically compiled and timely submitted to superior
6. Plumbing and Sanitary Works Administration	F432-002-3: 2017 C06	Plumbing and sanitary works administration describes the competency in supervising and monitoring the work program from budgeting to handing over of work. A competent person in this CU shall be able to determine scope of work, determine work requirements, prepare cost estimation, perform plumbing and sanitary	1. Determine scope of work	1.1 Approved construction drawing interpreted to determine scope of work and work location 1.2 Client requirement determined from work instruction sheet 1.3 Local authorities and regulatory bodies requirement identified for licensing and permit approval 1.4 Work location inspected existing utilities, site boundaries, site

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		material purchasing, prepare work program, prepare plumbing and sanitary work handing over and perform supervisory function The outcome of this competency is to ensure that project achieve good performance and completed on time within the allocated budget		condition and accessibility confirmation.
			2. Determine work requirements	2.1 Actual type and quantity for required material determined from work instruction sheet and drawing 2.2 Competency and availability of manpower determined based on type and scope of work 2.3 Type and quantity of required tool, equipment and machinery for given work assignment determined based on type and scope of work 2.4 Work schedule is prepared including scope of work and the target completion time
			3. Prepare cost estimation	3.1 Cost on material usage determined based on estimation of quantity and quality of material required 3.2 Manpower cost is

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				estimated based on total man hour to complete the job 3.3 Tools, equipment and machinery cost estimated based on usage overhead cost and indirect cost for entire project duration 3.4 All cost systematically compiled into project budget format 3.5 Project costing budget timely submitted to superior
			4. Perform plumbing and sanitary material purchasing	4.1 Required plumbing and sanitary material accurately specified and listed for requisition purpose 4.2 Bill of material prepared and submitted to superior for approval 4.3 Quotation process coordinated based on company purchasing procedure 4.4 Received good inspected for quantity, quality and standard as per requested

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				specification
			5. Prepare work program	5.1 Approved construction drawing interpreted to determine duration and scope of work 5.2 Detail of work arranged with estimated time frame into proper schedule format 5.3 Total man power, material, machinery requirements and work gantt chart submitted to superior for approval 5.4 Project are kicked off and performance monitored according to work program.
			6. Prepare plumbing and sanitary work handing over	6.1 Pre handing over checklist prepared based on type and scope of works 6.2 Date and site of pre handing over inspection arranged with contractor and inspection personnel

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				6.3 As-built drawing, testing and commissioning record, product warranties, acceptance certificate, Certificate of Completion and Compliance (CCC) compiled for project handing over
			7. Perform supervisory function	7.1 Staff attendance at site is monitored by daily, weekly or monthly for work efficiency 7.2 Staff discipline is monitored timely to ensure work instruction, rules and regulations are followed at all time 7.3 Staff performance is evaluated for skill level assessment 7.4 Training program is coordinated for continuous improvement and skill upgrading 7.5 Administration record and reports are systematically compiled

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				according to office administration standard procedure
7. Safety Health and Environment Compliance	F432-002-3: 2017 C07	Safety Health And Environment describes the competency in ensuring that all plumbing and sanitary installation supervision is performed in a safe working condition and environment as per work requirement A competent person in this CU shall be able to adhere to safety and health regulation, perform tool box meeting, adhere environmental rules and regulation and monitor safety signage strategic placement The outcome of this competency is to ensure all SHE being practised are strictly in compliance with guiding	1. Adhere to safety and health regulation	1.1 Safety and health procedure and guideline are interpreted from regulatory bodies documents for working environment safety implementation and compliance 1.2 Employees are provided with correct type and adequate quantity of PPE for safety rules and regulation implementation 1.3 Safety and health regulation enforced for implementation at workplace in accordance to regulatory body requirement.
			2. Perform tool box meeting	2.1 Safety procedures are briefed regularly and stringent measures are taken to avoid accident

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
		standards rules and regulations such as in the OSHA and ISO 14000		at work site 2.2 Safety procedures implementation feedback compiled during toolbox meeting 2.3 Idea for safety improvement at site delivered for implementation 2.4 Positive health and safety culture reminded to staff for awareness as per company safety and health policy
			3. Adhere environmental rules and regulation	3.1 Environmental procedure and guideline are interpreted from regulatory bodies documents for environmental safety implementation and compliance 3.2 Work environment is preserved from any pollution through stringent control following the Environmental Act requirements

CU TITLE	CU CODE	CU DESCRIPTOR	WORK ACTIVITIES	PERFORMANCE CRITERIA
				3.3 Environmental regulation and guideline enforced for implementation at workplace in accordance with regulatory body requirement.
			4. Monitor safety signage strategic placement	4.1 Safety signage are strategically placed at potentially dangerous zones 4.2 Safety signage are allocated with simple and clear safety statement 4.3 Information regarding hazards at the work site is provided to prevent any potential dangers. 4.4 Implementation of safety signage enforced at workplace in accordance with regulatory body requirement.

CURRICULUM

NATIONAL OCCUPATIONAL SKILLS STANDARD (NOSS) FOR;

PLUMBING AND SANITARY INSTALLATION SUPERVISION

LEVEL 3

15. CURRICULUM OF COMPETENCY UNIT (COCU)

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**PLUMBING AND SANITARY TECHNICAL DRAWING AND DOCUMENT PREPARATION**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform plumbing and sanitary drawing and document preparation for submission and approval by regulatory body. Upon completion of this competency units, trainees will be able to:- 1. Check plumbing drawing specification 2. Check sanitary drawing specification 3. Check waste pipe drawing specification 4. Prepare rain water harvesting drawings 5. Prepare As-built drawing 6. Update drawing submission and approval status						
COMPETENCY UNIT ID	F432-002-3: 2017 C01	**LEVEL**	3	**TRAINING DURATION**	60 Hours	**SKILL CREDIT**	6

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
1. Check Plumbing Drawing Specification	1.1 Content of plumbing drawing and specification • Format • Description • Note • Symbol and Legend 1.2 Technical drawing	1.1 Check symbol and legend for valve, pipe and fitting 1.2 Check isometric, schematic and diagrammatic of plumbing	ATTITUDE • Precise in identifying symbol and legend • Details in interpretation of plumbing drawing and	Related Knowledge 3 Related Skill 3	Related Knowledge Lecture Related Skill Demonstration and	1.1 Content of plumbing drawing and specification described 1.2 Correct symbol and legend for valve, pipe and fitting assessed as per standard

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	details • Isometric • Schematic • Diagrammatic 1.3 Plumbing drawing technical information • Scale • Dimension • Quantity 1.4 Plumbing drawing submission procedure • Local authority regulation • Standard form • E-submission	technical drawing 1.3 Amend incorrect drawing 1.4 Compile plumbing drawing 1.5 Submit for approval	specification • Meticulous in identifying submission requirement		Observation	plumbing specification 1.3 Technical drawing in isometric view, schematic view or diagrammatic illustration completeness assessed according to regulator body requirement 1.4 Incorrect drawing symbol and legend amended as per standard plumbing specification 1.5 Plumbing drawings are systematically compiled according to project title, plan, details and scope of work and timely submitted for approval

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
2. Check Sanitary Drawing Specification	2.1 Content of sanitary drawing and specification • Standard • Description • Note • Symbol and Legend 2.2 Sanitary technical drawing details • Isometric • Schematic • Diagrammatic • Detail drawing 2.3 Sanitary drawing technical information • Scale • Dimension • Quantity 2.4 Sanitary drawing submission procedure • Local authority regulation • Standard form • E-submission	2.1 Check symbol and legend for pipe, fitting and fixtures 2.2 Check isometric, schematic and diagrammatic of Sanitary Technical Drawing 2.3 Amend incorrect drawing 2.4 Compile sanitary drawing 2.5 Submit for approval	ATTITUDE • Precise in identifying symbol and legend • Details in interpretation Sanitary drawing and specification • Meticulous in identifying submission requirement	Related Knowledge 3 Related Skill 3	Related Knowledge Lecture Related Skill Demonstration and Observation	2.1 Content of sanitary drawing and specification requirements described 2.2 Sanitary drawing submission procedure interpreted and explained 2.3 Correct symbol and legend for pipe, fitting and fixtures drawn assessed as per standard sanitary drawing specification 2.4 Technical drawing in isometric view, schematic view or diagrammatic illustration completeness assessed according to regulator body requirement 2.5 Incorrect drawing symbol and legend

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						amended as per standard sanitary specification 2.6 Sanitary drawings are systematically compiled according to project title, plan, details and scope of work and timely submitted for approval
3. Check Waste Pipe Drawing Specification	3.1 Waste pipe drawing and specification requirement • Standard • Description • Note • Symbol and legend 3.2 Waste pipe technical drawing details • Isometric • Schematic • Diagrammatic • Detail drawing 3.3 Waste pipe	3.1 Check symbol and legend for valve, pipe and fitting 3.2 Check isometric, schematic and diagrammatic drawings 3.3 Amend incorrect drawing 3.4 Compile waste pipe drawing 3.5 Submit for approval	ATTITUDE • Precise in identifying symbol and legend • Details in interpretation of Waste water drawing and specification • Meticulous in identifying submission requirement	Related Knowledge 3 Related Skill 3	Related Knowledge Lecture Related Skill Demonstration and Observation	3.1 Correct symbol and legend for valve, pipe and fitting are assessed as per standard waste pipe specification 3.2 Technical drawing in isometric view, schematic view or diagrammatic illustration completeness assessed according to regulator body requirement

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	drawing technical information • Scale • Dimension • Quantity 3.4 Sanitary drawing submission procedure • Local authority regulation • Standard form • E-submission					3.3 Incorrect drawing symbol and legend amended as per standard waste pipe specification 3.4 Waste pipe drawings are systematically compiled according to project title, plan, details and scope of work and timely submitted for approval
4. Prepare Rain Water Harvesting Drawings	4.1 Introduction to rain water harvesting • Guideline • Standard • Description • Note • Symbol and legend • Label (non-potable water) o Pipe o Fitting o Storage	4.1 Interpret rain water harvesting drawings guideline 4.2 Identify symbol, label (non-potable water) and legend 4.3 Produce rain water harvesting drawing	ATTITUDE • Details in interpretation of rain water harvesting drawings guideline • Precise in selecting type of tools. • Thorough in identifying submission requirement	Related Knowledge 6 Related Skill 18	Related Knowledge Lecture Related Skill Demonstration and Observation	4.1 Rain water harvesting drawings guideline requirement explained 4.2 Suitable drawing tools checked for good condition and functionality 4.3 Correct symbol, label and legend determined from rain water harvesting

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	Tank o Water Pump 4.2 Purpose of rain water harvesting drawing 4.3 Type of rain water harvesting technical drawing • Isometric • Schematic • Diagrammatic • Detail drawing 4.4 Rain Water Harvesting Drawing Technical Information • Scale • Dimension • Quantity 4.5 Rain water harvesting drawing method 4.6 Rain water harvesting drawing technique 4.7 Rain water harvesting	4.4 Submit rain water harvesting drawing for approval				drawings guideline interpretation 4.4 Technical drawing for rain water harvesting drawing produced with accurate dimension, symbols and legends according to work requirement 4.5 Complete rain water harvesting drawing in Isometric view, schematic view or diagrammatic illustration are produced according to regulatory body requirement 4.6 Draft of rain water harvesting drawing timely submitted to superior prior submission to local authority for approval

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	drawing submission procedure					
5. Prepare As-Built Drawing	5.1 Introduction to As-Built drawing • Purpose • Guideline • Future Reference 5.2 Type of As-Built drawing • Plumbing Installation • Waste Water Installation • Sanitary Installation • Rain Water Harvesting 5.3 As Built drawing method 5.4 As Built drawing technique 5.5 As Built drawing	5.1 Interpret drawing guideline 5.2 Produce as-built drawing 5.3 Submit to water operator 5.4 Submit to fire department	ATTITUDE • Details in interpretation of as-built drawing. • Precise in identifying type pipe route point marking • Precise in identifying submission requirement	Related Knowledge 4 Related Skill 8	Related Knowledge Lecture Related Skill Demonstration and Observation	5.1 Actual route, materials, specification, accessories and fittings of completed plumbing and sanitary installation supervision is compared against construction drawing 5.2 Changes of route, materials specification, accessories and fittings from construction drawing is amended into as

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	submission procedure • Fire department • Water operator					built drawing 5.3 Draft of as-built drawing timely submitted to superior for verification 5.4 Final as built drawing document timely submitted to water operator and fire department for approval
6. Update Drawing Submission And Approval Status	6.1 Drawing submission status checking procedure 6.2 Drawing revision procedure 6.3 Drawing compilation method 6.4 Reduce, Reuse and Recycle concept	6.1 Check drawing submission status 6.2 Check drawing revision status 6.3 Check approval status 6.4 Compile approved drawing	<u>ATTITUDE</u> • Details in checking drawing for revision • Precise in selecting compilation method and procedure • Responsive on report updating <u>SAFETY</u> • Adhere to safety	<u>Related Knowledge</u> 2 <u>Related Skill</u> 4	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	6.1 Drawings are Status of drawing submission to regulatory bodies checked with required personnel/ department 6.2 Status of drawing revision checked with relevant subordinate 6.3 Approval status of drawing submission to regulatory bodies

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			checked with required personnel/ department 6.4 Approved drawings compiled systematically according to project title, type and drawing paper size for reference.

Employability Skills

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

TOOLS, EQUIPMENT AND MATERIALS (TEM)

ITEMS	RATIO (TEM : Trainees)
1 Drawing Pens	1 1:1
2 Drawing Pencils	2 1:1
3 Drawing Board	3 1:1
4 T-Square	4 1:1
5 Sets Squares	5 1:1
6 Protractors	6 1:1
7 Rulers	7 1:1
8 Compass	8 1:1
9 Templates	9 1:1
10 Drafting Machines	10 1:5
11 Perspective Machines	11 1:5
12 Drafting Paper	12 As required
13 Thick Draft Paper	13 As required
14 Tracing Paper	14 As required
15 Sketching Paper	15 As required
16 Layout Pads	16 As required
17 Tracing Tube	17 1:1
18 Triangle Scale Rules	18 1:1
19 Oval Scale Rules	19 1:1
20 Modelling Wires	20 1:5
21 Cutting Mats	21 1:5
22 Craft Knives	22 1:5
23 Plumbing Symbols and Legend	23 1:5
24 CAD software	24 1:25
25 Portfolios	25 1:25
26 Storage Cabinet	26 1:25

REFERENCES

1. Glencoe McGraw-Hill (2003) Basic Technical Drawing, Student Edition 8th Edition, McGraw-Hill (Publisher) ISBN-13: 978-0078457487
2. David L. Goetsch (2005) Technical Drawing – Drafting and Design Series, Illustrated Edition. Cangage Learning (Publisher) ISBN 9781401857608
3. Mark W. Huth (2013) Understanding Construction Drawings, 6th Edition Publisher: Cengage Learning; 6th edition (February 12, 2013) ISBN-13: 978-1285061023
4. Paul Richard and Jim Fitzgerald (2014) Introduction to AutoCAD 2015: A Modern Perspective 1st Edition, Publisher: Peachpit Press ISBN-13: 978-0133144796
5. SPAN (2014) Uniform Technical Guidelines for Water Reticulation and Plumbing, First Edition February 2014, Published by Suruhanjaya Perkhidmatan Air Negara (SPAN) ISBN 978 983 44456 76
6. MDC Legal Advisor (2006) Laws of Malaysia- Uniform Building By-Laws ACTS 133, published by MDC Publisher, ISBN 967 7008013
7. Terry L Patterson (2008) Illustrated Guide to the 2006 International Plumbing and Sewage Codes, Illustrated Guide to the International Plumbing & Sewage Code Publisher: McGraw-Hill Education - Europe ISBN: 9780071455473
8. Dennis J Whistance and David R Sherwood (2009) The Piping Guide: For the Design and Drafting of Industrial Piping Systems Hardcover – 2nd Edition November 1, 2009 , Publisher: Construction Trades Press, ISBN-13: 978-0962419768
9. Ed Bausbacher and Roger Hunt (1993), Process Plant Layout and Piping Design 1st Edition ,Publisher: Prentice Hall; ISBN-13: 978-0131386297

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**WATER MAIN PIPE TAPPING AND WATER METER INSTALLATION**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform water main pipe tapping and water meter installation. Upon completion of this competency units, trainees will be able to:- 1. Determine tapping work requirement 2. Carry out pipe trenching work 3. Lay communication pipe 4. Perform water mains tapping 5. Perform water meter installation 6. Conduct water meter post installation work						
COMPETENCY UNIT ID	F432-002-3: 2017 C02	**LEVEL**	3	**TRAINING DURATION**	222 Hours	**SKILL CREDIT**	22

WORK ACTIVITIES	**RELATED KNOWLEDGE**	**RELATED SKILL**	**ATTITUDE/ SAFETY/ ENVIRONMENT**	**TRAINING HOURS**	**DELIVERY MODE**	**ASSESSMENT CRITERIA**
1. Determine Tapping Work Requirement	1.1 Purpose of water main tapping 1.2 Content of water main tapping drawing 1.3 Water main pipe routing specification 1.4 Type of	1.1 Interpret water main tapping drawing 1.2 Determine water main pipe routing 1.3 Determine water main pipe length 1.4 Determine	ATTITUDE • Details in interpretation of water main tapping drawing. • Precise in identifying water main pipe • Meticulous in interpreting	Related Knowledge 18 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	1.1 Purpose of water main tapping described 1.2 Content of water main tapping drawing explained 1.3 Water main pipe routing specification explained

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	communication pipe crossing • Road • Culvert • Stream • Drain	water main pipe tapping location 1.5 Determine tapping process	tapping process			1.4 Water main pipe routing determined from water main drawing interpretation 1.5 Water main pipe length determined from water main drawing interpretation 1.6 Water main pipe tapping location determined from water main drawing interpretation 1.7 Materials, tools, equipment and tapping process determined from water main drawing interpretation
2. Carry Out Pipe Trenching Work	2.1 Introduction to pipe trenching work 2.2 Type and	2.1 Apply permit to work (PTW) from local authority	ATTITUDE • Details in interpretation pipe trenching	Related Knowledge 18	Related Knowledge Lecture	2.1 Pipe, fitting and jointing materials to for trenching work listed out

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	usage of trenching tools, equipment and machinery 2.3 Permit To Work (PTW) application procedure 2.4 Main water tapping specification • Diameter • Type of material 2.5 Type of public utilities obstruction • Electricity • Telecommunication • Sewerage pipe • Gas pipe • Water pipe 2.6 Trenching work specification and requirement • Depth • Width	2.2 Apply approval for tapping point from water operator 2.3 Determine type of material 2.4 Determine water main pipe diameter 2.5 Identify existing utilities obstruction 2.6 Mark water pipe route 2.7 Select trenching tools and equipment 2.8 Carry out trenching work 2.9 Carry out pipe bedding work	work • Precise in identifying trenching tools, equipment and machinery • Precise in selecting type of tools. • Meticulous in identifying specification. <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle)	<u>Related Skill</u> 30	<u>Related Skill</u> Demonstration and Observation	and described. 2.2 Permit To Work (PTW) requirement by local authority explained 2.3 Permit To Work (PTW) timely collected from relevant authority prior to work commencement 2.4 Tapping point location, material type and diameter of water main pipe checked by visual inspection 2.5 Details of tapping point location and specification submitted to water operator for tapping work approval 2.6 Existing utilities obstruction for tapping work checked from

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Length • Bedding material • Backfill material • Compaction • Reinstate ment 2.7 Procedure of water pipe route marking 2.8 Trenching work procedure 2.9 Pipe bedding and backfilling process		practices			Geographic Information System (GIS) drawing interpretation 2.7 Water pipe route marked as per tapping drawing for smooth trenching work 2.8 Trenching tools conditions checked and equipment functionality tested according to manufacturer's manual 2.9 Trenching work carried out with proper depth and width as per tapping drawing specification and type of material used. 2.10 Pipe Bedding work is carried out with proper levelling and

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						required material as per drawing specification
3. Lay Communication Pipe	3.1 Type and usage of communication pipe 3.2 Type and usage of communication pipe material • Stainless steel • HDPE • Poly steel • Poly aluminium 3.3 Pipe sleeve condition • Drain crossing • Road crossing 3.4 Type and usage of tools, equipment and machinery 3.5 Communication pipe installation	3.1 Interpret communication pipe layout drawing 3.2 Select pipe material 3.3 Select pipe sleeve 3.4 Prepare pipe installation tools and equipment 3.5 Lay communication pipe 3.6 Install meter stand	<u>ATTITUDE</u> • Details in interpretation of communication pipe layout drawing. • Precise in identifying type of sleeves marking • Meticulous in selecting type of tools and equipment. <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of	<u>Related Knowledge</u> 18 <u>Related Skill</u> 42	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	3.1 Type and usage of communication pipe material 3.2 Communication pipe route determined from communication pipe layout drawing interpretation 3.3 Material type and size of communication pipe selected as per pipe layout drawing specification 3.4 Type and size of pipe sleeve selected based on drain crossing or road crossing application 3.5 Correct tool and equipment

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	procedure 3.6 Meter stand installation procedure 3.7 Meter stand installation specification • Height • Concrete base • Pipe material • Meter stand accessories • Type and size of water meter		Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			selected to ensure quality of jointing work to meet standard specification 3.6 Pipe installation tools conditions checked and equipment functionality tested according to manufacturer's manual 3.7 Communication pipe is laid with required length and all joints are securely fastened. 3.8 Meter stand is installed with appropriate height, vertically and horizontally alignment.

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
4. Perform Water Mains Tapping	4.1 Tapping pit specification • Size • Depth • Temporary tapping pit support • Type of soil 4.2 Water main pipe tapping process • Expose pipe • Clean surface of pipe • Tapping point marking 4.3 Type and usage of tapping tools, equipment and machine 4.4 Type of tapping and communication pipe connectors • Saddle	4.1 Prepare tapping pit 4.2 Prepare water main pipe for tapping 4.3 Select tools and equipment 4.4 Prepare tapping accessories 4.5 Perform under pressure tapping 4.6 Perform connection to communication pipe 4.7 Check leakage at tapping and communication 4.8 Flush communication pipe	ATTITUDE • Details in interpretation of construction drawings. • Precise in identifying type pipe route point marking • Precise in selecting type of tools. • Meticulous in identifying specification • Detailed and thorough in inspection SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to department of	Related Knowledge 18 Related Skill 36	Related Knowledge Lecture Related Skill Demonstration and Observation	4.1 Tapping pit requirement listed out and explained 4.2 Required size, type and material of tapping pit is prepared for smooth tapping work 4.3 Jointing, cutting and tapping tools conditions checked and equipment functionality tested according to manufacturer's manual 4.4 Required type and size of tapping accessories is prepared according tapping work requirement 4.5 Under pressure tapping is performed at

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Ferrule 4.5 Under pressure tapping procedure 4.6 Tapping and communication pipe leakage checking point 4.7 Method of inspection • Visual • Physical • Tools • Flushing		environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			required location using drilling tools and selected tapping method 4.6 Communication pipe is connected to main pipe tapping point with free from leakage and good workmanship 4.7 Communication pipe flushed using flushing hydrant to remove debris in pipe system
5. Perform Water Meter Installation	5.1 Type and function of water meter 5.2 Operation of water meter 5.3 Water meter installation procedure 5.4 Uniform Technical Guideline	5.1 Check size and length of pipe 5.2 Request water meter from water operator 5.3 Prepare installation tools 5.4 Install water meter	ATTITUDE • Details in interpretation water meter installation • Precise in identifying water meter tools SAFETY • Adhere to	Related Knowledge 6 Related Skill 18	Related Knowledge Lecture Related Skill Demonstration and Observation	5.1 Type of water meter listed out and function explained 5.2 Water meter installation procedure described 5.3 Diameter and length meter stand pipe

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	(UTG) for water meter installation 5.5 Type and usage of water meter installation tools	5.5 Check installation quality	safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			checked for water meter application requirement 5.4 Required type and model of water meter requested from water operator for water meter installation work 5.5 Relevant tools and equipment for water meter installation checked for condition and functionality 5.6 Water meter installed with free from leakage and good workmanship according to water meter installation standard specification

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
6. Conduct Water Meter Post Installation Work	6.1 Water meter report format 6.2 Summary of water meter testing report • Pressure test • Leakage test 6.3 Compilation of pipe installation report 6.4 House keeping practise 6.5 Reduce, Reuse and Recycle concept	6.1 Perform tool and equipment cleaning 6.2 Update tools and equipment inventory record 6.3 Practise housekeeping work 6.4 Prepare tapping and water meter installation reports	ATTITUDE • Details in interpretation of report format. • Precise in identifying type pressure test and leakage test • Responsive on housekeeping practise • Thorough and detailed in reporting SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's	Related Knowledge 2 Related Skill 4	Related Knowledge Lecture Related Skill Demonstration and Observation	6.1 Work area, tools and equipment cleaned from dirt & debris and properly kept according to housekeeping and safety practices. 6.2 Tools and equipment inventory record updated accurately according to inventory procedure 6.3 Tools, equipment and material stored by sorting according to type, function and sizes as per storage procedure 6.4 Tapping and water meter installation report prepared with accurate

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			(Reduce, Reuse and Recycle) practices			information at required time according to report format 6.5 Tapping and water meter installation reports are systematically compiled and timely submitted

Employability Skills

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

TOOLS, EQUIPMENT AND MATERIALS (TEM)

ITEMS	RATIO (TEM : Trainees)
1 Tapping Tools	As required
2 Tapping Equipment	As required
3 Trenching work tools	As required
4 Water meter	1:5
5 Meter stand	1:5
6 Tape Measure	1:1
7 Multi tip screw driver	1:1
8 Vise grip pliers	1:1
9 Allen keys	1:1
10 Shovels, long/short	1:5
11 Safety gloves	1:1
12 Goggles	1:1
13 Ear Plug	1:1

14 Trowel	1:1
15 Claw hammer	1:5
16 Ball peen hammer	1:5
17 Side cutters	1:5
18 Socket set	1:5
19 Tin snips	1:5
20 Sledge hammer	1:5
21 Hand saw	1:5
22 Hack saw	1:5
23 Regular screw driver	1:5
24 Stubby screw drivers	1:5
25 Cold/wood chisel	1:5
26 Step ladder	1:5
27 Flash light	1:5
28 Hole saw kit	1:5
29 Various adjustable wrenches	1:5
30 Needle-nose pliers	1:5
31 Crow bar	1:5
32 Caulking gun	1:5
33 Drywall knife	1:5
34 Box cutter	1:5
35 Wire strippers	1:5
36 Mini pipe cutter	1:5
37 PEX Crimpers	1:5
38 Steel pipe cutter	1:5
39 Spud wrench	1:5
40 Pipe wrenches 6”/10”/14”/18”/24”	1:5
41 Offset hex wrench	1:5
42 Cast iron snap cutter	1:5
43 Torpedo level	1:5
44 Pipe tapping tools	1:5
45 Internal pipe wrench	1:5
46 Internal pipe cutter	1:5

47 Pipe reamer	1:5
48 Medium copper pipe cutter 2"	1:5
49 PEX cinch ring crimper	1:5
50 PVC Hand saw	1:5
51 Flaring tool kit	1:5
52 Offset pipe wrench 14"	1:5
53 Strap wrench	1:5
54 Basin wrench / telescopic	1:5
55 Pipe extractors	1:5
56 Plastic tube cutter/ scissor type	1:5
57 Faucet seat extractor	1:5
58 Faucet handle puller	1:5
59 Sink plunger	1:5
60 Plunger	1:5
61 PO wrench	1:5
62 Reciprocating saw	1:5
63 Hammer drill	1:5
64 Welding equipment	1:5
65 Generator	1:25
66 Teflon Tape	1:25
67 50/50 solder	As required
68 Flux soldering paste	As required
69 Silicone	As required
70 Lead free solder	As required
71 Sand cloth	As required
72 Gasket material	As required
73 Fitting brush	As required
74 Copper strapping	As required
75 Plumbers putty	As required
76 Equipment manufacturer`s manual	1:5
77 Pipe materials	As required
78 Tools and equipment	As required
79 Tapping accessories	As required

REFERENCES

1. SPAN (2014) Uniform Technical Guidelines for Water Reticulation and Plumbing, First Edition February 2014, Published by Suruhanjaya Perkhidmatan Air Negara (SPAN) ISBN 978 983 44456 76
2. MDC Legal Advisor (2006) Laws of Malaysia- Uniform Building By-Laws ACTS 133, published by MDC Publisher, ISBN 967 7008013
3. Terry L Patterson (2008) Illustrated Guide to the 2006 International Plumbing and Sewage Codes, Illustrated Guide to the International Plumbing & Sewage Code Publisher: McGraw-Hill Education - Europe ISBN: 9780071455473
4. Peter Smith (2004) Piping Materials Guide, Published: 1st December 2004, Publisher: Elsevier Science & Technology , Country of Publication: GB, ISBN: 9780750677431
5. Peter Wenning (2010) Basic Plumbing Services Skills - Sanitary/Drainage , First Edition, Published: 10th May 2010, Publisher: Pearson Education Australia ISBN: 9781442508668
6. Tafe NSW (2013) Basic Plumbing Services Skills : Water Supply , Second Edition, Published: 16th October 2012 Publisher: Pearson Education Australia , ISBN: 9781442552364
7. Home Depot (2005) Plumbing 1-2-3 Hardcover – September 13, 2005, Publisher: The Home Depot; 2 edition (September 13, 2005) ISBN-13: 978-0696222474
8. Creative Homeowner (2010) Ultimate Guide: Plumbing, 3rd edition Paperback – February 1, 2010, Publisher: Creative Homeowner; Third edition (February 1, 2010), ISBN-13: 978-1580114851
9. Graham Fowles (1994) Flow, Level and Pressure Measurement in the Water Industry, Industrial Instrumentation Series. Published: 3rd March 1994, Publisher: Elsevier Science & Technology , ISBN: 9780750610476
10. Baniel Riordan (2013), Technical Report Writing Today 10th Edition, Publisher: Cengage Learning;ISBN-13: 978-1133607380

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**PLUMBING AND SANITARY WORK INSPECTION**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform plumbing and sanitary work inspection. Upon completion of this competency units, trainees will be able to:- 1. Inspect water pipe installation 2. Inspect waste pipe installation 3. Inspect water tank installation 4. Inspect sanitary fixture installation 5. Inspect manhole construction 6. Inspect water main tapping point						
COMPETENCY UNIT ID	F432-002-3: 2017 C03	**LEVEL**	3	**TRAINING DURATION**	132Hours	**SKILL CREDIT**	13

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
1. Inspect Water Pipe Installation	1.1 Water pipe installation inspection procedure 1.2 Water pipe inspection quality criteria • Workmanship ○ Joint quality ○ Pipe alignment	1.1 Interpret construction drawing 1.2 Interpret inspection checklist 1.3 Identify water pipe location 1.4 Determine scope of work	ATTITUDE • Details in interpretation inspection checklist. • Precise in selecting type of material defects. • Thorough in quality inspection	Related Knowledge 6 Related Skill 18	Related Knowledge Lecture Related Skill Demonstration and Observation	1.1 Type and location of water pipe installation work determined from construction drawing interpretation 1.2 Type and scope of inspection work determined from inspection checklist interpretation.

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	○ Finishing ○ Leakage • Material defect ○ Valve ○ Fitting ○ Pipes ○ Tap ○ Pipe bracket	1.5 Inspect water pipe jointing quality 1.6 Inspect valve fitting 1.7 Inspect taps and bracket installation quality 1.8 Inspect water pipe installation leakage	<u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to department of environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practice			1.3 Water pipe jointing specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 1.4 Valve fitting specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 1.5 Taps and bracket installation specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 1.6 Water pipe installation checked

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						free from leakage and sign of leakage.
2. Inspect Waste Pipe Installation	2.1 Waste pipe installation inspection procedure 2.2 Waste pipe inspection quality criteria • Workmanship ○ Joint quality ○ Pipe alignment ○ Finishing • Material defect ○ Valve ○ Fitting ○ Pipes ○ Tap ○ Pipe bracket	2.1 Interpret construction drawing 2.2 Interpret inspection checklist 2.3 Identify inspection location 2.4 Determine scope of work 2.5 Refer work schedule 2.6 Carry out quality inspection work	ATTITUDE • Details in interpretation waste pipe installation • Thorough in quality inspection SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	2.1 Type and location of waste pipe installation work determined from construction drawing interpretation 2.2 Type and scope of inspection work determined from inspection checklist interpretation. 2.3 Waste pipe jointing specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 2.4 Fixtures fitting specification assed within tolerance

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			Recycle) practices			and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 2.5 Waste pipe trap installation specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 2.6 Waste pipe installation checked free from leakage and sign of leakage
3. Inspect Water Tank Installation	3.1 Water tank installation inspection procedure 3.2 Water tank inspection quality criteria	3.1 Interpret tank detail drawing 3.2 Interpret inspection check list 3.3 Identify inspection	ATTITUDE • Responsiveness • Meticulous in determining water tank installation	Related Knowledge 6 Related Skill	Related Knowledge Lecture Related Skill	3.1 Type and location of water tank installation work determined from construction drawing interpretation

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	3.3 Water tank inspection on work quality • Workmanship ○ Joint quality ○ Connection component ○ Finishing • Material defect ○ Fitting ○ Pipes ○ Water tank base ○ Water tank cover ○ Water tank panel damage/ failure ○ Water tank bulging	location 3.4 Determine scope of work 3.5 Refer work schedule 3.6 Carry out quality inspection work	• Observant in identifying type • Details in interpretation of construction drawings. • Precise and detailed in quality inspections • Precise in determining defects • Analytical in inspection work <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements	18	Demonstration and Observation	3.2 Type and scope of inspection work determined from inspection checklist interpretation. 3.3 Water tank base construction specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 3.4 Water tank part fittings specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 3.5 Water tank and cover installation specification assed within tolerance and good workmanship

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			• Adhere to 3R's (Reduce, Reuse and Recycle) practices			in accordance with plumbing and sanitary installation drawing and guideline 3.6 Water tank installation checked free from leakage and water tightness closed at maximum level according to plumbing and sanitary installation guideline
4. Inspect Sanitary Fixture Installation	4.1 Procedure of sanitary fixture installation inspection 4.2 Sanitary fixture inspection quality criteria 4.3 Sanitary fixture inspection on work quality • Workmanship ○ Joint quality ○ Connection quality	4.1 Interpret sanitary fixture detail drawing 4.2 Interpret installation check list 4.3 Refer manufacturer's manual 4.4 Identify inspection location 4.5 Determine scope of work	ATTITUDE • Observant in identifying type • Details in interpretation of construction drawings. • Precise in identifying type pipe route point marking • Precise in selecting type of tools.	Related Knowledge 12 Related Skill 18	Related Knowledge Lecture Related Skill Demonstration and Observation	4.1 Type and location of sanitary fixture installation work determined from construction drawing interpretation 4.2 Type and scope of inspection work determined from inspection checklist interpretation. 4.3 Sanitary fixture installation specification assed

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	○ Plumb and level ○ Finishing • Material defect ○ Type of defect ○ Sanitary fixture ○ Fixture bracket ○ Accessories defect	4.6 Refer work schedule 4.7 Carry out inspection work	<u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 4.4 Sanitary fixture bracket fittings specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 4.5 Sanitary fixture installation checked free from leakage according to plumbing and sanitary installation guideline
5. Inspect Manhole Construction	5.1 Manhole construction inspection procedure 5.2 Manhole	5.1 Interpret waste pipe to manhole connection detail drawing	<u>ATTITUDE</u> • Details in interpretation of construction drawings.	<u>Related Knowledge</u> 6	<u>Related Knowledge</u> Lecture <u>Related</u>	5.1 Manhole channel location determined from construction drawing interpretation

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	construction inspection specification • Drawing • Guideline • Connection • Location • Scope of work • Work schedule • Type of manhole 5.3 Inspection on manhole work quality • Workmanship ○ Connection quality ○ Pipe alignment ○ Finishing ○ Manhole channel ○ Manhole benching • Material defect ○ Pipes	5.2 Interpret connection check list 5.3 Identify inspection location 5.4 Determine scope of work 5.5 Refer work schedule 5.6 Carry out manhole inspection work	• Precise in identifying manhole construction • Precise in identifying material defects SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices	Related Skill 12	Skill Demonstration and Observation	5.2 Scope of inspection work determined from inspection checklist interpretation. 5.3 Manhole pipe alignment specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 5.4 Manhole channel construction specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline 5.5 Manhole benching specification assed within tolerance and good workmanship in accordance with

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	○ Manhole wall ○ Manhole cover ○ Manhole channel					plumbing and sanitary installation drawing and guideline 5.6 Manhole wall and cover specification assed within tolerance and good workmanship in accordance with plumbing and sanitary installation drawing and guideline
6. Inspect Water Main Tapping Point	6.1 Water main tapping point inspection procedure 6.2 Water main tapping point inspection on water main tapping point • Workman ship ○ Joint quality ○ Tapping quality ○ Finishing	6.1 Interpret water main tapping detail drawing 6.2 Interpret water main tapping check list 6.3 Identify inspection location 6.4 Determine scope of work 6.5 Refer work schedule 6.6 Carry out inspection	ATTITUDE • Details in water main tapping point • Precise in identifying type pipe route point marking • Precise in identifying type of material defects. SAFETY • Adhere to	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	6.1 Water main tapping location determined from construction drawing interpretation 6.2 Scope of inspection work determined from inspection checklist interpretation. 6.3 Water main tapping point specification assed within tolerance and good workmanship in

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Material defect o Fitting o Pipes o Ferrule Saddle 6.3 Reduce, Reuse and Recycle concept	work	safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			accordance with plumbing and sanitary installation drawing and guideline 6.4 Water piping system checked free from leakage and sign of leak in accordance with plumbing and sanitary installation guideline

EMPLOYABILITY SKILLS

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

TOOLS, EQUIPMENT AND MATERIALS (TEM)

ITEMS	RATIO (TEM : Trainees)
1 Water tank material	As required
2 Water tank base	As required
3 Water tank accessories	As required
4 Tape Measure	1:1
5 Multi tip screw driver	1:1
6 Vise grip pliers	1:1
7 Allen keys	1:1
8 Shovels, long/short	1:5
9 Safety gloves	1:1
10 Goggles	1:1
11 Ear Plug	1:1

12 Trowel	1:1
13 Claw hammer	1:5
14 Ball peen hammer	1:5
15 Side cutters	1:5
16 Socket set	1:5
17 Tin snips	1:5
18 Sledge hammer	1:5
19 Hand saw	1:5
20 Hack saw	1:5
21 Regular screw driver	1:5
22 Stubby screw drivers	1:5
23 Cold/wood chisel	1:5
24 Step ladder	1:5
25 Flash light	1:5
26 Hole saw kit	1:5
27 Various adjustable wrenches	1:5
28 Needle-nose pliers	1:5
29 Crow bar	1:5
30 Caulking gun	1:5
31 Drywall knife	1:5
32 Box cutter	1:5
33 Wire strippers	1:5
34 Mini pipe cutter	1:5
35 PEX Crimpers	1:5
36 Steel pipe cutter	1:5
37 Spud wrench	1:5
38 Pipe wrenches 6”/10”/14”/18”/24”	1:5
39 Offset hex wrench	1:5
40 Cast iron snap cutter	1:5
41 Torpedo level	1:5
42 Pipe tapping tools	1:5
43 Internal pipe wrench	1:5
44 Internal pipe cutter	1:5

45	Pipe reamer	1:5
46	Medium copper pipe cutter 2"	1:5
47	PEX cinch ring crimper	1:5
48	PVC Hand saw	1:5
49	Flaring tool kit	1:5
50	Offset pipe wrench 14"	1:5
51	Strap wrench	1:5
52	Basin wrench / telescopic	1:5
53	Pipe extractors	1:5
54	Plastic tube cutter/ scissor type	1:5
55	Faucet seat extractor	1:5
56	Faucet handle puller	1:5
57	Sink plunger	1:5
58	Plunger	1:5
59	PO wrench	1:5
60	Reciprocating saw	1:5
61	Hammer drill	1:5
62	Welding equipment	1:5
63	Generator	1:25
64	PTFE Tape (White tape)	1:25
65	50/50 solder	As required
66	Flux soldering paste	As required
67	Silicone	As required
68	Lead free solder	As required
69	Sand cloth	As required
70	Gasket material	As required
71	Fitting brush	As required
72	Copper strapping	As required
73	Plumbers putty	As required
74	Equipment manufacturer`s manual	1:5
75	Joint	As required
76	Valve	As required
77	Fitting	As required

78	Pipes	As required
79	Tap	As required
80	Pipe bracket	As required

REFERENCES

1. SPAN (2014) Uniform Technical Guidelines for Water Reticulation and Plumbing, First Edition February 2014, Published by Suruhanjaya Perkhidmatan Air Negara (SPAN) ISBN 978 983 44456 76
2. MDC Legal Advisor (2006) Laws of Malaysia- Uniform Building By-Laws ACTS 133, published by MDC Publisher, ISBN 967 7008013
3. Terry L Patterson (2008) Illustrated Guide to the 2006 International Plumbing and Sewage Codes, Illustrated Guide to the International Plumbing & Sewage Code Publisher: McGraw-Hill Education - Europe ISBN: 9780071455473
4. Peter Smith (2004) Piping Materials Guide, Published: 1st December 2004, Publisher: Elsevier Science & Technology , Country of Publication: GB, ISBN: 9780750677431
5. Peter Wenning (2010) Basic Plumbing Services Skills - Sanitary/Drainage , First Edition, Published: 10th May 2010, Publisher: Pearson Education Australia ISBN: 9781442508668
6. Tafe NSW (2013) Basic Plumbing Services Skills : Water Supply , Second Edition, Published: 16th October 2012Publisher: Pearson Education Australia , ISBN: 9781442552364
7. Home Depot (2005) Plumbing 1-2-3 Hardcover – September 13, 2005, Publisher: The Home Depot; 2 edition (September 13, 2005) ISBN-13: 978-0696222474
8. Creative Homeowner (2010) Ultimate Guide: Plumbing, 3rd edition Paperback – February 1, 2010, Publisher: Creative Homeowner; Third edition (February 1, 2010), ISBN-13: 978-1580114851
9. Graham Fowles (1994) Flow, Level and Pressure Measurement in the Water Industry, Industrial Instrumentation Series. Published: 3rd March 1994, Publisher: Elsevier Science & Technology , ISBN: 9780750610476
10. Baniel Riordan (2013), Technical Report Writing Today 10th Edition, Publisher: Cengage Learning;ISBN-13: 978-1133607380

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**PLUMBING AND SANITARY INSTALLATION TESTING AND STERILIZATION**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform plumbing and sanitary installation testing and sterilization. Upon completion of this competency units, trainees will be able to:- 1. Perform pressure test 2. Perform leakage test 3. Carry out water pipe sterilization 4. Carry out water tank sterilization 5. Perform water tank leakage test 6. Perform waste pipe leakage test 7. Carry out waste pipe gradient test						
COMPETENCY UNIT ID	F432-002-3: 2017 C04	**LEVEL**	3	**TRAINING DURATION**	180 Hours	**SKILL CREDIT**	18.0

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
1. Perform Pressure Test	1.1 Type of tools and equipment for pressure testing • Pressure pump (electric, motor & manual)	1.1 Interpret construction drawing 1.2 Interpret work instruction/method statement 1.3 Determine location of pressure	ATTITUDE • Observant in identifying type • Details in interpretation of construction drawings. • Precise in identifying type	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and	1.1 Type of tools and equipment for pressure testing listed out and explained 1.2 Size, diameter and length of pipeline to be tested determined from

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Pipe stand • Gate valve / stop cock • Check valve / air valve • Pressure gauge • End cap • Storage tank • Pressure hose • Pressure recorder • Stop watch 1.2 Pressure testing procedure 1.3 Pressure test report writing 1.4 Pressure test result verification technique	testing 1.4 Prepare tools and equipment for pressure testing 1.5 Carry out pressure test 1.6 Prepare pressure test report	pipe route point marking • Precise in selecting type of tools. <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices		Observation	construction drawing interpretation 1.3 Scope of work and method statement to be used for pressure testing determined from work instruction 1.4 Location of pressure test to mobilise testing tools and equipment determined from work instruction 1.5 Relevant tools and equipment for pressure testing checked for good condition and functionality as per manufacturer manual 1.6 Pressure testing instrument properly set to facilitate testing of the pipelines 1.7 Pressure test is

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						carried out with no pressure drop as per testing procedure requirement 1.8 Pressure test report prepared with accurate information at required time according to report format 1.9 Pressure test reports are systematically compiled and timely submitted to superior
2. Perform Leakage Test	2.1 Tools and equipment for leakage test • Pressure pump (electric, motor & manual) • Pipe stand • Gate valve	2.1 Interpret construction drawing 2.2 Interpret work instruction/method statement 2.3 Determine location of leakage testing 2.4 Prepare	ATTITUDE • Details in interpretation of construction drawings. • Precise in identifying type pipe route point marking • Precise in	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	2.1 Size, diameter and length of pipeline to be tested determined from construction drawing interpretation 2.2 Scope of work and method statement to be

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	/ stop cock • Check valve / air valve • Pressure gauge • End cap • Storage tank • Pressure hose • Pressure recorder 2.2 Leakage test report writing 2.3 Leakage test verification technique	source of water for testing 2.5 Prepare tools and equipment for leakage test 2.6 Carry out leakage test 2.7 Prepare leakage test report	selecting type of tools. • Cautious in using test equipment • Thorough in testing. <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			used for pressure testing determined from work instruction 2.3 Location of pipeline leakage test to mobilise testing tools and equipment determined from work instruction 2.4 Relevant tools and equipment for pipeline leakage testing checked for condition and functionality 2.5 Pipeline leakage tests is carried out with no leakage reading drop as per testing procedure requirement 2.6 Pipeline leakage test report prepared with accurate information at required time

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						according to report format 2.7 Pipeline leakage test reports are systematically compiled and timely submitted
3. Carry Out Water Pipe Sterilization	3.1 Type and usage of special safety equipment for chlorine mixing • Goggles • Face mask • Breathing equipment • Safety rubber cloves 3.2 Type and usage of tools and equipment • Pressure pump (electric, motor & manual) • Pipe stand • Gate valve	3.1 Interpret construction drawing 3.2 Interpret work instruction/method statement 3.3 Prepare special safety equipment for chlorine mixing 3.4 Prepare tools and equipment 3.5 Prepare sterilisation chemical 3.6 Carry out sterilisation works for water pipeline 3.7 Carry out sterilisation works for	<u>ATTITUDE</u> • Details in interpretation of construction drawings. • Precise in identifying type pipe route point marking • Precise in selecting type of tools. • Cautious in sterilization process • Thorough and detailed in reporting <u>SAFETY</u> • Adhere to safety	<u>Related Knowledge</u> 12 <u>Related Skill</u> 30	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	3.1 Type and usage of special safety equipment for chlorine mixing explained 3.2 Diameter and length of pipeline to be sterilized determined from construction drawing interpretation 3.3 Scope of work and method statement to be used for water pipe sterilization determined from work instruction 3.4 Location of water pipe sterilization to mobilise testing

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	/ stop cock • Check valve / air valve • End cap • Water storage tank • Pressure hose • Chlorine measuring kit 3.3 Sterilisation chemical • Chloride of lime • Sodium hypochlorite 3.4 Sterilisation works for water pipeline • Mix chlorine chemical • Dose chlorine chemical into pipe	water tank 3.8 Prepare sterilisation test report	procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			tools and equipment determined from work instruction 3.5 Relevant tools and equipment for water pipe sterilization checked for good condition and functionality 3.6 Proper PPE worn for protection during handling, mixing and dosing of chlorine base chemical as per SHE requirement 3.7 Sterilization chemical prepared with proper mixing ratio according to sterilization preparation guideline 3.8 Water pipe sterilized for bacteria free and safe drinking as per piping

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	installation • Flushing of pipe line • Refill pipeline • Test residual chlorine in the pipeline • Commissio n pipeline 3.5 Sterilisation test report verification					sterilization procedure 3.9 Sterilized pipeline tested by filling with portable water according to pipe sterilization testing procedure 3.10 Required amount of water sample from sterilized pipeline collected and sent to accredited laboratory for testing 3.11 Sterilization test reports collected from accredited test laboratory within timeframe and timely submitted to water regulator

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
4. Carry Out Water Tank Sterilization	4.1 Special safety equipment for chlorine mixing • Goggles • Face mask • Breathing equipment • Safety rubber cloves 4.2 Tools and equipment • Water storage tank • Chlorine test kit • Water jet 4.3 Type of sterilisation chemical • Chloride of lime • Sodium hypochlorite 4.4 Sterilisation works for water tank • Mix	4.1 Interpret construction drawing 4.2 Interpret work instruction/method statement 4.3 Prepare special safety equipment for chlorine mixing 4.4 Prepare tools and equipment 4.5 Carry out sterilisation works for water tank 4.6 Prepare sterilisation test report	<u>ATTITUDE</u> • Details in interpretation of construction drawings. • Precise in identifying type pipe route point marking • Precise in selecting type of tools. • Cautious in using chemical • Thorough in reporting <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment	<u>Related Knowledge</u> 6 <u>Related Skill</u> 12	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	4.1 Type of sterilisation chemical listed and explained 4.2 Diameter and height of water tank to be sterilized determined from construction drawing interpretation 4.3 Scope of work and method statement to be used for water tank sterilization determined from work instruction 4.4 Special tools and equipment for water tank sterilization and chlorine mixing checked for good condition and functionality 4.5 Proper PPE worn for protection during handling,

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	required chlorine chemicals with water • Clean tank surface from debris and coarse dirt • Spray chlorine solution on the inner surface of the tank • Fill up water tank with water • Flush out water tank • Refill water tank with clean water. • Measure chlorine content in water • Repeat process if		requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			mixing and dosing of chlorine base chemical as per SHE requirement 4.6 Sterilization chemical prepared with proper mixing ratio according to sterilization preparation guideline 4.7 Water tank sterilized for bacteria free and safe drinking as per piping sterilization procedure 4.8 Sterilized water tank tested by filling with portable water according to water tank sterilization testing procedure 4.9 Required amount of water sample from sterilized water tank collected and sent

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	minimum chlorine does not meet required standards • Commission water tank 4.5 Sterilisation test report verification					to accredited laboratory for testing 4.10 Sterilization test reports collected from accredited test laboratory within timeframe and timely submitted to water regulator
5. Perform Water Tank Leakage Testing	5.1 Water tank leakage testing • Construction Drawing • Detail drawing • Location • Method statement 5.2 Leakage testing verification • At all tank outlets • At ball valve	5.1 Interpret construction drawing 5.2 Interpret work instruction/method statement 5.3 Determine location of water tank 5.4 Prepare source of water for testing 5.5 Prepare tools and equipment for leakage	ATTITUDE • Details in interpretation of construction drawings. • Precise in identifying leakage test • Meticulous and detailed in verifying test reports SAFETY • Adhere to safety	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	5.1 Diameter and height of water tank to be tested determined from construction drawing interpretation 5.2 Scope of work and method statement to be used for water tank leakage testing determined from work instruction 5.3 Location of water tank leakage test

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• At tank connectors 5.3 Water tank leakage report verification • Tank installation • Water tightness	testing 5.6 Carry out leakage testing 5.7 Prepare water tank leakage report	procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			to mobilise testing tools and equipment determined from work instruction 5.4 Relevant tools and equipment for leakage testing checked for condition and functionality 5.5 Water tank leakage tests is carried out with no leakage drop as per testing procedure requirement 5.6 Water tank leakage test report prepared with accurate information at required time according to report format 5.7 Water tank leakage test reports are systematically

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						compiled and timely submitted
6. Perform Waste Pipe Leakage Test	6.1 Waste pipe leakage testing • Construction drawing • Detail drawing • Scope of work • Method statement • Procedure • Location of leakage test 6.2 Leakage test report verification • Smoke test • Dye/ink test•	6.1 Interpret construction drawing 6.2 Interpret work instruction/method statement 6.3 Determine location of waste pipe leakage testing 6.4 Prepare tools and equipment 6.5 Carry put waste pipe leakage testing 6.6 Prepare waste pipe leakage report	ATTITUDE • Details in interpretation of leakage testing. • Precise in identifying method and procedures • Thorough and detailed in reporting SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's	Related Knowledge 12 Related Skill 30	Related Knowledge Lecture Related Skill Demonstration and Observation	6.1 Size, diameter and length of waste pipe to be tested determined from construction drawing interpretation 6.2 Scope of work and method statement to be used for waste pipe leakage testing determined from work instruction 6.3 Location of waste pipe leakage test to mobilise testing tools and equipment determined from work instruction 6.4 Relevant tools and equipment for waste pipe leakage testing checked for condition and

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			(Reduce, Reuse and Recycle) practices			functionality 6.5 Smoke test is carried out with no smoke leakage sign as per testing procedure requirement 6.6 Dye/ink test is carried out with no coloured water leakage sign as per testing procedure requirement 6.7 Waste pipe leakage test report prepared with accurate information at required time according to report format 6.8 Waste pipe leakage test reports are systematically compiled and timely submitted

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
7. Carry Out Waste Pipe Gradient Test	7.1 Waste pipe gradient testing • Construction drawing • Detail drawing • Scope of work • Method statement • Procedure • Location of gradient test 7.2 Waste pipe gradient test verification • Ping pong ball test • Ink and water test • Velocity of flow in waste pipe	7.1 Interpret construction drawing 7.2 Obtain work instruction/method statement 7.3 Determine location of waste pipe alignment 7.4 Prepare tools and equipment 7.5 Carry put waste pipe gradient test	<u>ATTITUDE</u> • Details in interpretation of gradient testing. • Precise in selecting test methods and procedures. • Cautious and detailed in carrying out test • Thorough in verifying gradient test <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's	<u>Related Knowledge</u> 6 <u>Related Skill</u> 18	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	7.1 Construction drawing interpreted to determine size, diameter and length of pipeline to be tested 7.2 Size, diameter and gradient of waste pipe to be tested determined from construction drawing interpretation 7.3 Scope of work and method statement to be used for waste pipe gradient testing determined from work instruction 7.4 Location of waste pipe gradient test to mobilise testing tools and equipment determined from work instruction 7.5 Relevant tools and equipment for

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			(Reduce, Reuse and Recycle) practices			waste pipe gradient testing checked for condition and functionality 7.6 Gradient test is carried out by smooth rotating of ping pong ball or ink and water velocity flow according to gradient testing procedure 7.7 Waste pipe gradient test report prepared with accurate information at required time according to report format 7.8 Waste pipe gradient test reports are systematically compiled and timely submitted

EMPLOYABILITY SKILLS

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

TOOLS, EQUIPMENT AND MATERIALS (TEM)

ITEMS	RATIO (TEM : Trainees)
1 Pressure pump (electric, motor & manual)	1:25
2 Pipe stand	1:5
3 Gate valve / stop cock	1:5
4 Check valve / air valve	1:5
5 End cap	1:5
6 Water storage tank	1:5
7 Pressure hose	1:5
8 Chlorine measuring kit	1:5
9 Pressure test equipment	1:5
10 Leakage test equipment	1:5
11 Testing manual	1:5
12 Safety gloves	1:1
13 Goggles	1:1
14 Ear plug	1:1
15 Tools	As required

REFERENCES

1. Lembaga Penyelidikan Undang-undang (2008), Akta Keselamatan dan Kesihatan Pekerjaan 1994 (Akta 514), International Law Book Services, ISBN 967-89-1494-8
2. Chandrashekara, K.V., (2002). Microbiological load analysis methods-qualitative and quantitative (focusing on emerging waterborne pathogens and consequences) In Water Quality Management: South Asian Perspective, Vision 2025. ILSI-India & UNICEF.
3. Guidelines for drinking - water quality, 3rd Edition - vol 1: Recommendations. WHO; 2004.
4. Standard Methods for the Examination of Water and Wastewater; 20th Edition, Ed. Pub. APHA, AWWA and WEF, 1998
5. Graham Fowles (1994) Flow, Level and Pressure Measurement in the Water Industry, Industrial Instrumentation Series, Published: 3rd March 1994 Publisher: Elsevier Science & Technology , Country of Publication: GB, ISBN: 9780750610476
6. Rick Curtis (1998) The Backpacker's Field Manual: OA Guide to Water Purification Publisher: Three Rivers Press; 1st edition (February 24, 1998), ISBN-13: 978-0517887837
7. Salah M. Aburawe (2015) Advanced Technique For Leak Detection and Location in Water Networks: Attempt to Build an Integrated System Among GIS, Hydraulic Modelling and SCADA to Solve the Problem of Water Leakage Paperback – November 30, 2015, Publisher: LAP LAMBERT Academic Publishing (November 30, 2015), ISBN-13: 978-3659804250
8. Larry Mays (2010) Water Transmission and Distribution WSO: Principles and Practices of Water Supply Operations 4th Edition Publisher: American Water Works Association; 4 edition (June 5, 2010) ISBN-13: 978-1583217818
9. Nicholas G. Pizzi (2010) Water Treatment WSO: Principles and Practices of Water Supply Operations Volume 1 (Water Supply Operations Series) 4th Edition by Series: Water Supply Operations Series, Publisher: American Water Works Association; 4 edition (June 5, 2010), ISBN-13: 978-1583217771
10. Joseph Ritter (2010) Water Quality WSO: Principles and Practices of Water Supply Operations, Volume 4 Hardcover – June 5, 2010, Series: Principles and Practices of Water Supply Operations, Publisher: American Water Works Association; 4 edition (June 5, 2010), ISBN-13: 978-1583217801

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**COMMUNICATION PIPE MAINTENANCE WORK**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform communication pipe maintenance work according to set schedule. Upon completion of this competency units, trainees will be able to:- 1. Troubleshoot low water pressure 2. Repair tapping point leaks 3. Repair meter points leaks						
COMPETENCY UNIT ID	F432-002-3: 2017 C05	**LEVEL**	3	**TRAINING DURATION**	90 Hours	**SKILL CREDIT**	9.0

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
1. Troubleshoot Low Water Pressure	1.1 Introduction to low water pressure 1.2 Low pressure identification • As-built drawing • Testing tools and equipment • Type and sign of fault 1.3 Low pressure troubleshooting	1.1 Identify faulty or leaking pipes 1.2 Interpret as built drawing 1.3 Prepare tools and materials 1.4 Isolate water supply 1.5 Carry out maintenance work 1.6 Carry out repair work	ATTITUDE • Details in interpretation low water pressure • Precise in identifying type faulty or leaking pipes • Precise in selecting type of maintenance method and procedure	Related Knowledge 18 Related Skill 36	Related Knowledge Lecture Related Skill Demonstration and Observation	1.1 Introduction to low water pressure explained 1.2 Low pressure identification described 1.3 Sign of faulty or leaking communication pipe inspected by visual check location upon receiving work instruction

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	procedure 1.4 Maintenance work method 1.5 Maintenance work procedure • Service • Repair • Replace 1.6 Isolate supply system procedure 1.7 Completed work verification • Visual check • Mechanical/ electronic testing equipment 1.8 Report preparation • Standard format • Update record • Analysis data • Conclusion	1.7 Carry out replacement work 1.8 Check completed work 1.9 Generate troubleshooting report	• Detailed in reporting <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			1.4 Actual communication pipe routing interpreted from as built drawing 1.5 Required maintenance tools and materials conditions checked and equipment functionality tested according to manufacturer manual 1.6 Cause of low pressure determined by checking pressure level before and after water meter 1.7 Water flow isolated by closing water supply main valve 1.8 Defective gasket, piping parts and valve replaced during minor repair work

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						1.9 Defective piping system totally replaced during major repair work 1.10 Pressure of repaired communication pipe are tested using pressure gauge as per main supply pressure level 1.11 Repaired communication pipe inspected for good workmanship and free from leakage
2. Repair Tapping Point Leaks	2.1 Introduction to tapping points leak 2.2 Tapping point faulty or leaking pipes identification • As-built drawing • Tapping	2.1 Identify faulty or leaking pipes 2.2 Interpret as built drawing 2.3 Prepare tools and materials 2.4 Isolate water supply 2.5 Carry out	ATTITUDE • Details in interpretation tapping points leak • Precise in identifying faulty or leaking pipes • Precise in	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	2.1 Sign of faulty or leaking tapping point inspected by visual check location upon receiving work instruction 2.2 Actual pipe routing interpreted from as built

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	detail drawing • Testing tools and equipment • Type and sign of fault 2.3 Tapping point leak troubleshooting procedure 2.4 Tapping point maintenance method 2.5 Tapping point maintenance procedure • Service • Repair • Replace 2.6 Method of checking tapping point maintenance completed work • Visual • Mechanical/ electronic equipment	maintenance work 2.6 Repair tapping point 2.7 Replace defective parts 2.8 Check completed work	selecting method and procedure. • Thorough and detailed in checking and repairing work <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			drawing 2.3 Required maintenance tools and materials conditions checked and equipment functionality tested according to manufacturer manual 2.4 Water flow isolated by closing water supply main valve 2.5 Defective gasket, piping parts and valve replaced during minor repair work 2.6 Defective piping system totally replaced during major repair work 2.7 Pressure of repaired tapping point are tested using pressure gauge as per main supply

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						pressure level 2.8 Repaired tapping point inspected for good workmanship and free from leakage
3. Repair Meter Points Leaks	3.1 Introduction to meter points leaking 3.2 Meter points faulty or leaking pipes identification • As-built drawing • Testing tools and equipment • Type and sign of fault 3.3 Meter point leak troubleshooting procedure 3.4 Meter points maintenance method 3.5 Tapping point maintenance procedure	3.1 Identify faulty or leaking pipes 3.2 Interpret as built drawing 3.3 Prepare tools and materials 3.4 Isolate the supply 3.5 Carry out maintenance work 3.6 Repair meter point 3.7 Replace defective parts 3.8 Check for completed work	<u>ATTITUDE</u> • Details in interpretation meter points leak • Precise in identifying faulty or leaking pipes • Meticulous in selecting method and procedures. • Thorough and detailed in verifying work <u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct	<u>Related Knowledge</u> 6 <u>Related Skill</u> 12	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	3.1 Sign of faulty or leaking meter points inspected by visual check location upon receiving work instruction 3.2 Actual pipe routing interpreted from as built drawing 3.3 Required maintenance tools and materials conditions checked and equipment functionality tested according to manufacturer manual 3.4 Water flow isolated by closing water supply main

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Service • Repair • Replace 3.6 Method of checking meter points maintenance completed work • Visual • Mechanical/ electronic equipment 3.7 Reduce, Reuse and Recycle concept		PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			valve 3.5 Defective gasket, piping parts and valve replaced during minor repair work 3.6 Defective piping system or meter unit replaced during major repair work 3.7 Pressure of repaired meter points are tested using pressure gauge as per main supply pressure level 3.8 Repaired meter points inspected for good workmanship and free from leakage 3.9 Communication pipe troubleshooting report prepared with accurate information at required time

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						according to report format 3.10 Communication pipe troubleshooting report are systematically compiled and timely submitted

EMPLOYABILITY SKILLS

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

Tools, Equipment and Materials (TEM)

ITEMS	RATIO (TEM : Trainees)
1 Pressure pump (electric, motor & manual)	1:25
2 Pipe stand	1:5
3 Gate valve / stop cock	1:5
4 Check valve / air valve	1:5
5 End cap	1:5
6 Water storage tank	1:5
7 Pressure Hose	1:5
8 Chlorine measuring kit	1:5
9 Pressure Test equipment	1:5
10 Leakage Test Equipment	1:5

11	Testing Manual	1:5
12	Safety gloves	1:1
13	Goggles	1:1
14	Ear Plug	1:1
15	Tools	As required

References for Learning Material Development

1. Lembaga Penyelidikan Undang-undang (2008), Akta Keselamatan dan Kesihatan Pekerjaan 1994 (Akta 514), International Law Book Services, ISBN 967-89-1494-8
2. Chandrashekara, K.V., (2002). Microbiological load analysis methods-qualitative and quantitative (focusing on emerging waterborne pathogens and consequences) In Water Quality Management: South Asian Perspective, Vision 2025. ILSI-India & UNICEF.
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4. Standard Methods for the Examination of Water and Wastewater; 20th Edition, Ed. Pub. APHA, AWWA and WEF, 1998
5. Graham Fowles (1994) Flow, Level and Pressure Measurement in the Water Industry, Industrial Instrumentation Series, Published: 3rd March 1994 Publisher: Elsevier Science & Technology , Country of Publication: GB, ISBN: 9780750610476
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8. Larry Mays (2010) Water Transmission and Distribution WSO: Principles and Practices of Water Supply Operations 4th Edition Publisher: American Water Works Association; 4 edition (June 5, 2010) ISBN-13: 978-1583217818
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SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**PLUMBING AND SANITARY WORKS ADMINISTRATION**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform plumbing and sanitary works administration. Upon completion of this competency units, trainees will be able to:- 1. Determine scope of work 2. Determine work requirements 3. Prepare cost estimation 4. Perform plumbing and sanitary material purchasing 5. Prepare work program 6. Perform plumbing and sanitary work handing over 7. Perform supervisory function						
COMPETENCY UNIT ID	F432-002-3: 2017 C06	**LEVEL**	3	**TRAINING DURATION**	186 Hours	**SKILL CREDIT**	9

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
1. Determine Scope Of Work	1.1 Introduction to plumbing and sanitary scope of work 1.2 Plumbing and sanitary installation and maintenance • Pipe • Sanitary fixture	1.1 Interpret plumbing construction drawing 1.2 Identify client requirement 1.3 Identify work location 1.4 Confirm work scope	ATTITUDE • Details in interpretation plumbing and sanitary work scope • Precise in identifying type pipe route point marking • Precise in	Related Knowledge 6 Related Skill 6	Related Knowledge Lecture Related Skill Demonstration and Observation, Simulation,	1.1 Introduction to plumbing and sanitary scope of work elaborated 1.2 Approved construction drawing interpreted to determine scope of work

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Pipe fitting • Meter position • Water tank • Tapping detail 1.3 Plumbing and sanitary scope of work references • Construction drawing • Detail drawing • Work Schedule • Client instruction		preparing work schedule			and work location 1.3 Client requirement determined from work instruction sheet 1.4 Local authorities and regulatory bodies requirement identified for licensing and permit approval 1.5 Work location inspected existing utilities, site boundaries, site condition and accessibility confirmation.
2. Determine Work Requirements	2.1 Selection of plumbing and sanitary materials 2.2 Arrangement of	2.1 Determine material requirement 2.2 Determine manpower	<u>ATTITUDE</u> • Meticulous in determining material requirement	<u>Related Knowledge</u> 12	<u>Related Knowledge</u> Lecture	2.1 Selection of plumbing and sanitary materials 2.2 Arrangement of

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	plumbing and sanitary work tools and equipment 2.3 Preparation of plumbing and sanitary work schedule 2.4 Arrangement of plumbing and sanitary work manpower 2.5 Introduction of contract administration	requirement 2.3 Select tool and equipment 2.4 Prepare Work schedule 2.5 Determine completion time	• Precise in identifying manpower requirement • Precise in selecting type of tools. • Thorough in contract administration	Related Skill 6	Related Skill Demonstration and Observation	plumbing and sanitary work tools and equipment 2.3 Actual type and quantity for required material determined from work instruction sheet and drawing 2.4 Competency and availability of manpower determined based on type and scope of work 2.5 Type and quantity of required tool, equipment and machinery for given work assignment determined based on type and scope of

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
						work 2.6 Work schedule is prepared including scope of work and the target completion time
3. Prepare Cost Estimation	3.1 Element of cost estimation • Material usage • Manpower/man hour cost • Tool, equipment and machinery o Purchase o Rental/ lease • Overhead cost o Utilities bill o Office administration 3.2 Method of cost estimation	3.1 Determine material usage 3.2 Determine Manpower/man hour cost 3.3 Determine tools and equipment usage/rental 3.4 Determine overhead cost	ATTITUDE • Details in cost estimation • Thorough and precise in calculation • Cost conscious SAFETY • Adhere to safety procedures and guidelines	Related Knowledge 12 Related Skill 30	Related Knowledge Lecture Related Skill Demonstration and Observation	3.1 Element of cost estimation described 3.2 Cost on material usage determined based on estimation of quantity and quality of material required 3.3 Manpower cost is estimated based on total man hour to complete the job 3.4 Tools, equipment and machinery cost estimated

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	3.3 Plumbing and sanitary work taking off • Quality • Measurement • Dimension • Size • Volume • Item • Standard form 3.4 Definition of profit margin 3.5 Method of profit margin calculation					based on usage overhead cost and indirect cost for entire project duration 3.5 All cost systematically compiled into project budget format 3.6 Project costing budget timely submitted to superior
4. Perform Plumbing And Sanitary Material Purchasing	4.1 Introduction to material purchasing process 4.2 Bill of material preparation method 4.3 Specification of plumbing and sanitary material for purchasing	4.1 Specify water main tapping material 4.2 Identify material supplier 4.3 Fill up purchase order form 4.4 Inspect receive good	ATTITUDE • Precise in identifying material requisition • Precise in identifying supplier • Thorough in inspection of goods	Related Knowledge 6 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	4.1 Required plumbing and sanitary material accurately specified and listed for requisition purpose 4.2 Bill of material prepared and

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Plumbing work • Waste pipe • Sanitary pipe • Sanitary fixture • Water tank • Rain water harvesting 4.4 Supplier selection • Manual • Catalogue • Specification • Track record 4.5 Delivery material inspection procedure • Quality • Quantity • Specification • Delivery order acknowledgement document	condition	<u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			submitted to superior for approval 4.3 Quotation process coordinated based on company purchasing procedure 4.4 Received good inspected for quantity, quality and standard as per requested specification

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
5. Prepare Work Program	5.1 Introduction to work program scheduling • Computerise software • Primavera • Gantt chart 5.2 Work program content Work breakdown structure • Resources o Man power o Machinery o Financial • Work program coordination method • Work program monitoring procedure	5.1 Assign work to team member 5.2 Monitor work progress 5.3 Inform client on work progress	ATTITUDE • Details in interpretation of work program. • Precise in identifying type of work program • Thorough and details in work coordination	Related Knowledge 12 Related Skill 30	Related Knowledge Lecture Related Skill Demonstration and Observation	5.1 Approved construction drawing interpreted to determine duration and scope of work 5.2 Detail of work arranged with estimated time frame into proper schedule format 5.3 Total man power, material, machinery requirements and project Gantt Chart submitted to superior for approval 5.4 Project is kicked off and performance monitored according to work program.

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
6. Prepare Plumbing And Sanitary Work Handing Over	6.1 Introduction to plumbing and sanitary work handing over document • Regulatory requirement • Standard format • Relevant document o Warranties o As-built drawing o Detail drawing o Testing record • Consultant verification 6.2 Plumbing and sanitary work handing over procedure • Water pipe installation • Waste pipe installation • Sanitary pipe	6.1 Perform waste pipe handling over 6.2 Perform water pipe handling over 6.3 Get acknowledgement received from client	ATTITUDE • Details in handing over documentations. • Meticulous and detailed in handing over requirements SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices	Related Knowledge 12 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	6.1 Pre handing over checklist prepared based on type and scope of works 6.2 Date and site of pre handing over inspection arranged with contractor and inspection personnel 6.3 As-built drawing, testing and commissioning record, product warranties, acceptance certificate, Certificate of Completion and Compliance (CCC) compiled for project handing over

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	installation • Sanitary fixture installation • Water tank installation • Acknowledgement from client					
7. Perform Supervisory Function	7.1 Plumbing and sanitary supervisory function • Organization chart • Staff attendance • Staff discipline • Staff performance 7.2 Plumbing and sanitary training requirement • Skill up grading • Employment • Deployment	7.1 Monitor staff attendance at site 7.2 Monitor staff discipline 7.3 Evaluate staff performance 7.4 Recommend solution 7.5 Prepare and compile report	ATTITUDE • Observant in monitoring staff discipline • Details and objective in evaluating Staff performance • Precise in identifying type pipe route point marking • Precise in recommending solution SAFETY • Adhere to safety	Related Knowledge 18 Related Skill 12	Related Knowledge Lecture Related Skill Demonstration and Observation	7.1 Staff attendance at site is monitored by daily, weekly or monthly for work efficiency 7.2 Staff discipline is monitored timely to ensure work instruction, rules and regulations are followed at all time 7.3 Staff performance is evaluated for

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Staff appraisal • Motivation 7.3 Staff performance appraisal evaluation		procedures and guidelines			skill level assessment 7.4 Training program is coordinated for continuous improvement and skill upgrading 7.5 Administration record and reports are systematically compiled according to office administration standard procedure

EMPLOYABILITY SKILLS

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

TOOLS, EQUIPMENT AND MATERIALS (TEM)

	ITEMS	RATIO (TEM : Trainees)
1	Training Manual	1:5
2	Performance Appraisal	1:5
3	Computer/Lap Top	1:1
4	LCD projector	1:25
5	Costing Manual	1:5
6	Calculators	1:1

REFERENCES

1. Lembaga Penyelidikan Undang-undang (2008), Akta Keselamatan dan Kesihatan Pekerjaan 1994 (Akta 514), International Law Book Services, ISBN 967-89-1494-8
2. Chandrashekara, K.V., (2002). Microbiological load analysis methods-qualitative and quantitative (focusing on emerging waterborne pathogens and consequences) In Water Quality Management: South Asian Perspective, Vision 2025. ILSI-India & UNICEF.
3. Guidelines for drinking - water quality, 3rd Edition - vol 1: Recommendations. WHO; 2004.
4. Standard Methods for the Examination of Water and Wastewater; 20th Edition, Ed. Pub. APHA, AWWA and WEF, 1998
5. Graham Fowles (1994) Flow, Level and Pressure Measurement in the Water Industry, Industrial Instrumentation Series, Published: 3rd March 1994 Publisher: Elsevier Science & Technology , Country of Publication: GB, ISBN: 9780750610476
6. Rick Curtis (1998) The Backpacker's Field Manual: OA Guide to Water Purification Publisher: Three Rivers Press; 1st edition (February 24, 1998), ISBN-13: 978-0517887837
7. Salah M. Aburawe (2015) Advanced Technique For Leak Detection and Location in Water Networks: Attempt to Build an Integrated System Among GIS, Hydraulic Modelling and SCADA to Solve the Problem of Water Leakage Paperback – November 30, 2015, Publisher: LAP LAMBERT Academic Publishing (November 30, 2015), ISBN-13: 978-3659804250
8. Larry Mays (2010) Water Transmission and Distribution WSO: Principles and Practices of Water Supply Operations 4th Edition Publisher: American Water Works Association; 4 edition (June 5, 2010) ISBN-13: 978-1583217818
9. Nicholas G. Pizzi (2010) Water Treatment WSO: Principles and Practices of Water Supply Operations Volume 1 (Water Supply Operations Series) 4th Edition by Series: Water Supply Operations Series, Publisher: American Water Works Association; 4 edition (June 5, 2010), ISBN-13: 978-1583217771
10. Joseph Ritter (2010) Water Quality WSO: Principles and Practices of Water Supply Operations, Volume 4 Hardcover – June 5, 2010, Series: Principles and Practices of Water Supply Operations, Publisher: American Water Works Association; 4 edition (June 5, 2010), ISBN-13: 978-1583217801

SECTOR	**CONSTRUCTION (F)**						
SUB SECTOR	**PLUMBING AND OTHER CONSTRUCTION INSTALLATION ACTIVITIES (43)**						
JOB AREA	**INSTALLATION OF PLUMBING AND SANITARY EQUIPMENT**						
NOSS TITLE	**PLUMBING AND SANITARY INSTALLATION SUPERVISION**						
COMPETENCY UNIT TITLE	**SAFETY HEALTH AND ENVIRONMENT COMPLIANCE**						
PRE-REQUISITE (If Applicable)							
LEARNING OUTCOME	The person who is competent in this CU shall be able to perform safety, health and environment compliance as being practised in the industry. Upon completion of this competency units, trainees will be able to:- 1. Adhere to safety and health regulation 2. Perform tool box meeting 3. Adhere environmental rules and regulation 4. Monitor safety signage strategic placement						
COMPETENCY UNIT ID	F432-002-3: 2017 C07	**LEVEL**	3	**TRAINING DURATION**	66 Hours	**SKILL CREDIT**	7

WORK ACTIVITIES	**RELATED KNOWLEDGE**	**RELATED SKILL**	**ATTITUDE/ SAFETY/ ENVIRONMENT**	**TRAINING HOURS**	**DELIVERY MODE**	**ASSESSMENT CRITERIA**
1. Adhere To Safety And Health Regulation	1.1 Definition of safety and health regulation 1.2 Introduction to safety and health regulation • Safety regulation • Staff duties arrangement • Healthy work place • PPE	1.1 Interpret safety documents on occupational safety and health 1.2 Provide PPE to workers 1.3 Enforce usage of PPE 1.4 Apply OSH regulations at the workplace	ATTITUDE • Observant in identifying safety and health regulations • Details in interpretation of emergency procedure SAFETY • Adhere to safety	Related Knowledge 12 Related Skill 6	Related Knowledge Lecture Related Skill Demonstration and Observation	1.1 Safety and health procedure and guideline are interpreted from regulatory bodies documents for working environment safety implementation and compliance

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	• Method and emergency procedure • Safety practice 1.3 Occupational safety and health reference document • Act • Guideline • ISO • SOP 1.4 Safety and health regulation implementation procedure		procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			1.2 Employees are provided with correct type and adequate quantity of PPE for safety rules and regulation implementation 1.3 Safety and health regulation enforced for implementation at workplace in accordance to regulatory body requirement.
2. Perform Tool Box Meeting	2.1 Definition to toolbox meeting 2.2 Introduction to tool box meeting • Purpose • Meeting agenda • Meeting venue • Method and procedure of conducting tool box meeting	2.1 Brief safety procedures 2.2 Brief awareness of safety regulations 2.3 Prevent personnel from injured or fall ill 2.4 Develop	<u>ATTITUDE</u> • Details in interpretation tool box meeting • Precise in identifying method and procedure	<u>Related Knowledge</u> 12 <u>Related Skill</u> 6	<u>Related Knowledge</u> Lecture <u>Related Skill</u> Demonstration and Observation	2.1 Safety procedures interpreted and explained 2.2 Injury or illness is prevention listed out and explained 2.3 Safety procedures are briefed

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
	2.3 Safety and health implementation guideline	positive health and safety culture	SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			regularly and stringent measures are taken to avoid accident at work site 2.4 Safety procedures implementation feedback compiled during toolbox meeting 2.5 Idea for safety improvement at site delivered for implementation 2.6 Positive health and safety culture reminded to staff for awareness as per company safety and health policy

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
3. Adhere Environmental Rules And Regulation	3.1 Introduction to Environment Act • Regulatory body • ISO 14000 • Staff duties arrangement • Environment work place • PPE • Method and emergency procedure • Health issues 3.2 Work area environmental safety implementation 3.3 Introduction to green environmental	3.1 Interpret environmental procedure and guideline 3.2 Adhere to environmental act requirements 3.3 Enforce environmental regulation and guideline at workplace	ATTITUDE • Observant in identifying Environment Act • Details in Method and emergency procedure • Responsive on health issues SAFETY • Adhere to safety procedures and guidelines • Use correct PPE ENVIRONMENT • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce,	Related Knowledge 12 Related Skill 6	Related Knowledge Lecture Related Skill Demonstration and Observation	3.1 Environment act related to plumbing and sanitary work explained 3.2 Purpose of employees are protected from any health threats at the work site elaborated 3.3 Environmental procedure and guideline are interpreted from regulatory bodies documents for environmental safety implementation and compliance 3.4 Work environment is preserved from any pollution through stringent control

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			Reuse and Recycle) practices			following the Environmental Act requirements 3.5 Environmental regulation and guideline enforced for implementation at workplace in accordance with regulatory body requirement.
4. Monitor Safety Signage Strategic Placement	4.1 Type and usage of safety signage 4.2 Type of hazards 4.3 Potential dangerous working zone 4.4 Method and procedure of handling dangerous chemical or equipment 4.5 Strategic place for safety signage	4.1 Put up safety signage 4.2 Allocate safety signage with simple and clear safety statement 4.3 Provides information on hazards at work area	ATTITUDE • Observant and detailed in interpretation of safety signage • Details in method and emergency procedure • Responsive on safety issues	Related Knowledge 6 Related Skill 6	Related Knowledge Lecture Related Skill Demonstration and Observation	4.1 Type and usage of safety signage explained 4.2 Function of safety signage listed out and explained 4.3 Purpose of putting safety signage in potentially dangerous zones explained

WORK ACTIVITIES	RELATED KNOWLEDGE	RELATED SKILL	ATTITUDE/ SAFETY/ ENVIRONMENT	TRAINING HOURS	DELIVERY MODE	ASSESSMENT CRITERIA
			<u>SAFETY</u> • Adhere to safety procedures and guidelines • Use correct PPE <u>ENVIRONMENT</u> • Adhere to Department Of Environment requirements • Adhere to 3R's (Reduce, Reuse and Recycle) practices			4.4 Safety signage are strategically placed at potentially dangerous zones 4.5 Safety signage are allocated with simple and clear safety statement 4.6 Information regarding hazards at the work site is provided to prevent any potential dangers. 4.7 Implementation of safety signage enforced at workplace in accordance with regulatory body requirement.

EMPLOYABILITY SKILLS

CORE ABILITIES	SOCIAL SKILLS
01.01 Identify and gather information. 01.02 Document information procedures or processes. 01.03 Utilize basic IT applications. 02.01 Interpret and follow manuals, instructions and SOP's. 02.03 Communicate clearly. 02.04 Prepare brief reports and checklist using standard forms. 02.05 Read/Interpret flowcharts and pictorial information. 03.01 Apply cultural requirement to the workplace. 03.02 Demonstrate integrity and apply practical practices. 03.03 Accept responsibility for own work and work area. 03.04 Seek and act constructively upon feedback about work performance. 03.05 Demonstrate safety skills. 03.06 Respond appropriately to people and situations.	1. Communication skills 2. Conceptual skills 3. Interpersonal skills 4. Learning skills 5. Leadership skills 6. Multitasking and prioritising 7. Self-discipline 8. Teamwork

TOOLS, EQUIPMENT AND MATERIALS (TEM)

	ITEMS	RATIO (TEM : Trainees)
1	Training Manual	1:5
2	Performance Appraisal	1:5
3	Computer/Lap Top	1:1
4	Environmental Act	1:25
5	Safety signage	1:5
6	Environment Act	1:5
7	ISO 9000 Manual	1:5
8	ISO 14000 Manual	1:5
9	PPE	1:1
10	Method and emergency procedure	1:5

References

1. Lembaga Penyelidikan Undang-undang (2008), Akta Keselamatan dan Kesihatan Pekerjaan 1994 (Akta 514), International Law Book Services, ISBN 967-89-1494-8
2. Chandrashekara, K.V., (2002). Microbiological load analysis methods-qualitative and quantitative (focusing on emerging waterborne pathogens and consequences) In Water Quality Management: South Asian Perspective, Vision 2025. ILSI-India & UNICEF.
3. Guidelines for drinking - water quality, 3rd Edition - vol 1: Recommendations. WHO; 2004.
4. Standard Methods for the Examination of Water and Wastewater; 20th Edition, Ed. Pub. APHA, AWWA and WEF, 1998
5. Graham Fowles (1994) Flow, Level and Pressure Measurement in the Water Industry, Industrial Instrumentation Series, Published: 3rd March 1994 Publisher: Elsevier Science & Technology , Country of Publication: GB, ISBN: 9780750610476
6. Rick Curtis (1998) The Backpacker's Field Manual: OA Guide to Water Purification Publisher: Three Rivers Press; 1st edition (February 24, 1998), ISBN-13: 978-0517887837
7. Salah M. Aburawe (2015) Advanced Technique For Leak Detection and Location in Water Networks: Attempt to Build an Integrated System Among GIS, Hydraulic Modelling and SCADA to Solve the Problem of Water Leakage Paperback – November 30, 2015, Publisher: LAP LAMBERT Academic Publishing (November 30, 2015), ISBN-13: 978-3659804250
8. Larry Mays (2010) Water Transmission and Distribution WSO: Principles and Practices of Water Supply Operations 4th Edition Publisher: American Water Works Association; 4 edition (June 5, 2010) ISBN-13: 978-1583217818
9. Nicholas G. Pizzi (2010) Water Treatment WSO: Principles and Practices of Water Supply Operations Volume 1 (Water Supply Operations Series) 4th Edition by Series: Water Supply Operations Series, Publisher: American Water Works Association; 4 edition (June 5, 2010), ISBN-13: 978-1583217771
10. Joseph Ritter (2010) Water Quality WSO: Principles and Practices of Water Supply Operations, Volume 4 Hardcover – June 5, 2010, Series: Principles and Practices of Water Supply Operations, Publisher: American Water Works Association; 4 edition (June 5, 2010), ISBN-13: 978-1583217801

22. TRAINING HOUR SUMMARY

CU CODE	COMPETENCY UNIT TITLE	WORK ACTIVITIES	RELATED KNOWLEDGE (A)	RELATED SKILL (B)	HOURS (C) = (A)+(B)	TOTAL (HOURS) ∑(C)
F432-002-3: 2017 C01	Plumbing and Sanitary Technical Drawing Document Preparation For Approval	Check plumbing drawing specification	3	3	6	60
		Check sanitary drawing specification	3	3	6	
		Check waste pipe drawing specification	3	3	6	
		Prepare rain water harvesting drawings	6	18	24	
		Prepare As-built drawing	4	8	12	
		Update drawing submission and approval report	2	4	6	
F432-002-3: 2017 C02	Water Main Pipe Tapping and Water Meter Installation	Determine tapping work requirement	18	12	30	222
		Carry out pipe trenching work	18	30	48	
		Lay communication pipe	18	42	60	
		Perform water mains tapping	18	36	54	
		Perform water meter installation	6	18	24	
		Conduct water meter post installation work	2	4	6	
F432-002-3: 2017 C03	Plumbing And Sanitary Work Inspection	Inspect water pipe installation	6	18	24	132
		Inspect waste pipe installation	6	12	18	
		Inspect water tank installation	6	18	24	
		Inspect sanitary fixture installation	12	18	30	
		Inspect manhole construction	6	12	18	
		Inspect water main tapping point	6	12	18	

F432-002-3: 2017 C04	Plumbing And Sanitary Installation Testing And Sterilization	Inspect pressure test	6	12	18	180
		Inspect leakage test	6	12	18	
		Carry out water pipe sterilization	12	30	42	
		Carry out water tank sterilization	6	12	18	
		Perform water tank leakage testing	6	12	18	
		Perform waste pipe leakage testing	12	30	42	
		Carry out waste pipe gradient test	6	18	24	
F432-002-3: 2017 C05	Communication Pipe Maintenance work	Troubleshooting low water pressure	18	36	54	90
		Repair tapping point leaks	6	12	18	
		Repair meter points leaks	6	12	18	
F432-002-3: 2017 C06	Plumbing And Sanitary Works Administration	Determine work scope	6	6	12	186
		Determine work requirements	12	6	18	
		Prepare cost estimation	12	30	42	
		Perform plumbing and sanitary material purchasing	6	12	18	
		Prepare work program	12	30	42	
		Prepare plumbing and sanitary work handing over	12	12	24	
		Perform supervisory function	18	12	30	
F432-002-3: 2017 C07	Safety Health And Environment Compliance	Adhere to safety and health regulation	12	6	18	66
		Perform tool box meeting	12	6	18	
		Adhere Environmental Act	12	6	18	
		Monitor safety signage strategic placement	6	6	12	
TOTAL HOURS (CORE COMPETENCY)			347	589		**936**