

▶ Harmonized minimum occupational standards for plumbing

Ghana, Nigeria and Togo



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► Contents

I.	Context and history of the development of the standards	7
II.	Members of the Tripartite Technical Skills Committee for Plumbing	9
III.	Description and scope of the plumbing profession	11
IV.	Map of minimum occupational standards map for the plumbing profession	12
V.	General data of harmonized minimum occupational standards for plumbing	14
Plumbing Level 1 — assistant plumber		14
Unit 1.1.	Perform basic plumbing operations	14
Element 1.1.1.	Identify materials, tools and equipment in the execution of plumbing work	15
Element 1.1.2.	Make simple estimates in plumbing work.....	16
Element 1.1.3.	Handle simple sanitary tools, materials and appliances	17
Unit 1.2.	Carry out basic piping work.....	18
Element 1.2.1.	Draw the path of the pipes.....	19
Element 1.2.2.	Lay pipes according to bill of materials or specifications.....	20
Element 1.2.3.	Carry out the functional test of the piping system.....	21
Unit 1.3.	Install basic equipment (appliances and accessories)	22
Element 1.3.1.	Identify the facilities	22
Element 1.3.2.	Carry out the work of installing and repairing.....	23
Element 1.3.3.	Carry out functional testing and commissioning of appliances and accessories	24
Unit 1.4.	Carry out preventive maintenance work on sanitary appliances	25
Element 1.4.1.	Consult the manufacturer's data sheet.....	25
Element 1.4.2.	Identify maintenance equipment and materials.....	26
Element 1.4.3.	Perform maintenance operations	27
Plumbing Level 2 — Plumber		28
Unit 2.1.	Carry out piping.....	28
Element 2.1.1.	Use materials, tools and equipment in plumbing work	29
Element 2.1.2.	Prepare estimates for plumbing work.....	30
Element 2.1.3.	Handle tools and materials according to safety standards in plumbing	31
Unit 2.2.	Lay pipe on the project site.....	32
Element 2.2.1.	Carry out excavation work.....	33
Element 2.2.2.	Install piping (pipes and fittings).....	34
Element 2.2.3.	Carry out a functional test on the piping system	35
Unit 2.3.	Installing complex equipment	37
Element 2.3.1.	Identify the different types of complex equipment	37
Element 2.3.2.	Installing complex equipment and accessories.....	38
Element 2.3.3.	Perform a functional test.....	39

Unit 2.4.	Carry out maintenance work on simple sanitary appliances.....	41
Element 2.4.1.	Identify faults in simple sanitary appliances.....	41
Element 2.4.2.	Identify equipment and materials for repair or replacement of plumbing components	42
Element 2.4.3.	Repair or replace a defective plumbing component.....	43
Element 2.4.4.	Carry out the function test	44
Plumbing Level 3 — Master Plumber		45
Unit 3.1.	Organize plumbing work.....	45
Element 3.1.1.	Plan human resources, materials, tools and equipment	46
Element 3.1.2.	Conduct teamwork communication.....	47
Element 3.1.3.	Prepare the cost estimate to be used for the plumbing work.....	49
Element 3.1.4.	Assign materials to be used in plumbing work	50
Unit 3.2.	Carry out remedial maintenance work on complex sanitary appliances	52
Element 3.2.1.	Identify faults in complex sanitary appliances.....	52
Element 3.2.2.	Identify equipment and materials for repair or replacement of plumbing components	53
Element 3.2.3.	Repair or replace defective plumbing components.....	54
Element 3.2.4.	Carry out the function test	55
VII.	General guidelines for assessment.....	56
VIII.	Glossary	57

I. Context and history of the development of the standards

In September 2016, Heads of States at the United Nations (UN) General Assembly adopted the New York Declaration for Refugees and Migrants. The Declaration sought to ensure fair migration for all and strengthen the global governance of migration through the development of a Global Compact for Migration and a Global Compact for Refugees. Subsequently, in 2017–18, a range of intergovernmental consultations occurred for the planned adoption of the Global Compact for Safe, Orderly, and Regular Migration, which was adopted by the UN General Assembly on 9 December 2018.

Notably, the highest incidence of low- and semi-skilled migration within the African continent is found in the West African, Central African, and Sahel regions. To ensure the context-sensitive design and genuine grounding of the global skills partnership at the country, corridor, and regional level, the International Labour Organization (ILO) conducted two tripartite regional workshops in close collaboration with the respective sub-regional economic communities (RECs) under the umbrella of its existing SKILL-UP project. These workshops, along with other suggested interventions, triggered tripartite constituents from Nigeria, Ghana and Togo to pledge to strengthen efforts for the mutual recognition of each other's training certificates, as well as harmonize curricula in sectors and occupations affected most strongly by migration amongst the three countries. Five occupations were selected in the agriculture and construction sectors as the most relevant to migrant workers. The selection was done through a participative and inclusive process that involved a tripartite group of national constituents in the three countries. Occupational standards and qualifications in the agriculture and construction sectors were then mapped and compared for commonalities and differences. Two phases were agreed upon with constituents ensuring the relevance of mutually recognized and harmonized education and training programmes in the context of migration between the three countries.

Occupational standards are a set of benchmarks that define the skills, knowledge, and attributes people need to perform a work role. They are developed in consultation with industry to ensure they reflect the needs of the workplace. This collaboration forms the basis upon which training and assessment can be implemented to a standard that industry sectors can recognize and trust. These standards are primarily used to develop and implement training, assess the outcomes of training, and to assess the level of a person's existing skills and competencies.

During the period 2021–2022, and with support from the ILO, tripartite technical committees in each country jointly developed minimal standards for “Plumbing” for Ghana, Nigeria, and Togo. The harmonized occupational minimal standards have been developed and validated based on the national occupational standards provided by the three countries, with a target of 70 to 80 per cent commonality. The present harmonized occupational minimal standards were designed as the evidence-based benchmark of competent performance in the construction sector which has been agreed by the three countries.

It will benefit those countries that are in the process of developing standards or reviewing existing national standards through comparison and consideration of similar standards available in the region. It can also be utilized in Vocational Education and Training (VET) for the development of standards-based curricula, and skill assessments for completers of training modules, etc. The harmonized minimal standards can provide a basis for developing national occupational standards and help to avoid duplication of efforts.

By providing a regional references for this occupation, the harmonized minimal standards can provide assistance to the integration of sub-regional economic communities (RECs) by facilitating skills recognition of migrant workers across borders.

This process was supported by the ILO as part of the SKILL-UP¹ Project financed by the Norwegian Agency for Development Cooperation.

¹ More information on this project can be found at: <https://www.ilo.org/skills/projects/skill-up/lang--en/index.htm>, and in ILO, Ghana, Nigeria and Togo: Towards mutual recognition of skills in the agriculture and construction sectors, 2021.

II. Members of the tripartite technical skills committee for plumbing²

First Name	Organization/Branch	Country
Theophilus Zogblah	Council of Technical and Vocational Education and Training (COTVET)	Ghana
Emmanuel Cherry	Ghana Chamber of Construction and Industry	Ghana
Prosper Ledi	Association of Building and Civil Engineering Contractors of Ghana (ABCECG)	Ghana
William Agyei-Manu	Vice Chairman of Agribusiness Sector of Association of Ghana Industries, General Secretary of the Agriculture and Agribusiness Sector Skills Council, Executive Director of Ghana Cassava Centre of Excellence	Ghana
Divine Morny	GSM Centre of Entrepreneurship and Technology – Chief Executive Officer	Ghana
Dr Charles Yaw Brempong-Yeboah	University College of Agriculture and Environmental Studies – Agricultural Rector	Ghana
Anthony S. K. Morrison	Chamber of Agribusiness Ghana (CAG) – CEO Chairman, Ghana Agriculture Sector Skills Council	Ghana
Edward Ekareweh	General Secretary – General Agricultural Workers' Union (GAWU)	Ghana
Kenneth Nii Addy	RMG Ghana Limited – Chief Technical Officer	Ghana
Anselme Afo	Directeur des Examens, Concours et Certifications, Ministère De l'Enseignement Technique de la Formation et de l'Insertion Professionnelles	Togo
Prosper Soou	Ministère De l'Enseignement Technique, de la Formation et de l'Insertion Professionnelles	Togo
Etienne Atcholadie	Directeur de la Pédagogie et des Programmes (DPP) au Togo	Togo
Atama Gnamkoulamba	Directeur des Études de l'Institut National de Formation Agricole (INFA)	Togo
Kokouvi Soedji	Directeur Général de l'INFA de Tove	Togo
Ambroise Fantchede	Directeur de la Formation Agricole/Ministère de l'Agriculture	Togo
Kokou Adomayakpor	Méthodologue	Togo
Komi Aziaba	Eleveur	Togo
Kamala Bidialou	Directeur Relations International	Togo
Enyoman Womitso	Directrice des Études de Population et Migration	Togo
Kwami Kpogo	Eleveur	Togo
Jacques Ayite	Ministre de l'Agriculture de la Production Animale et Halieutique	Togo

² Members of the Technical Skills Committee that reviewed and validated the harmonized minimum occupational standards.

First Name	Organization/Branch	Country
Kabassima Bararmna	Directeur, Adjoint Formation Professionnelle	Togo
Malalibè Koumayi	Eleveur	Togo
Kokou Senam Degli	Eleveur	Togo
Minga Sanan	Eleveur	Togo
Kokou Dokpo	Eleveur	Togo
Eustace A. Iyayi	Nigerian Institute of Animal Science (NIAS) Abuja	Nigeria
Peter Alike	NIAS Abuja	Nigeria
Ifeanyi H. Njoagwuani	NIAS Abuja	Nigeria
Saria Mohammed	NIAS Abuja	Nigeria
Samuel Soga	NIAS Abuja	Nigeria
Francis C. Elile	NIAS Abuja	Nigeria
Suliman M. Mobolaji	NIAS Abuja	Nigeria
Donald Odiyoma	National Bureau for Technical Education (NBTE) Kaduna, Nigeria	Nigeria
Olubode D. Majiyagbe	NBTE Kaduna	Nigeria
S.M. Yusuf	NBTE Kaduna	Nigeria

III. Description and scope of the plumbing profession

This training framework is intended for learners who wish to pursue a career in the plumbing profession. It is specifically designed for mastery of domestic/sanitary plumbing at three levels or grades: 1, 2 and 3 which are classified as Assistant Plumber, Plumber and Master Plumber, respectively. The job hierarchy ranges from Level 1 Assistant Plumber, which is the first step in the skill ladder, to Level 3, which is a Master Plumber in the profession.

Domestic plumbers or sanitary fitters install, repair and maintain pipes, valves, fittings, drainage systems and plumbing fixtures in commercial and residential buildings, and in most cases they work with other construction professionals.

Plumbers are either employed or self-employed and work in homes, offices and buildings. Paid plumbers are employed by plumbing/mechanical contractors, service companies and maintenance departments in manufacturing, commercial, health-care and educational facilities. This standard does not include industrial plumbing related to work on gas piping, central air conditioning piping, compressed air piping, etc.

There is currently a shortage of qualified plumbers and this shortage is expected to create employment opportunities due to growth in the construction industry. It is hoped that Levels 4 and 5 plumbing systems will be developed to meet the needs of industrial plumbing in the future. However, existing plumbing systems in the residential and commercial sectors will continue to provide repair and maintenance jobs for plumbers.

IV. Mapping of minimum occupational standards for the plumbing profession

Main objective	Units of competence	Elements of the competence
Level 1		
Install, repair and maintain pipes, valves, fittings, drainage systems and accessories in commercial and residential buildings under supervision, in accordance with industry, safety and environmental standards	1.1 Perform basic plumbing operations	1.1.1. Identify materials, tools and equipment in the execution of plumbing work 1.1.2. Make simple estimates in plumbing work 1.1.3. Handle simple sanitary tools, materials and appliances
	1.2 Carry out basic piping work	1.2.1. Draw the trajectory of the pipes 1.2.2. Lay pipes according to the bill of materials or specifications 1.2.3. Carry out the functional test of the piping system
	1.3 Install basic equipment (appliances and accessories)	1.3.1. Identify the facilities 1.3.2. Carry out the work of installing and fixing equipment 1.3.3. Carry out functional testing and commissioning of equipment
	1.4 Carry out preventive maintenance work on sanitary appliances	1.4.1. Consult the manufacturer's data sheet 1.4.2. Identify maintenance equipment and materials 1.4.3. Carry out maintenance operations
Level 2		
Install, repair and maintain pipes, valves, fittings, drainage systems and accessories in commercial and residential buildings under minimal supervision, in compliance with industry, safety and environmental standards	2.1. Execute the piping	2.1.1. Use materials, tools and equipment used in plumbing 2.1.2. Draw up estimates for plumbing work
	2.2. Lay the pipe on the project site	2.2.1. Carry out excavation work 2.2.2. Install the pipework (pipes and fittings) 2.2.3. Perform a functional test on the piping system
	2.3 Install complex equipment	2.3.1. Identify the different types of complex equipment (wall-hung toilets, water heaters, mixer taps, pumps, etc.) 2.3.2. Install complex equipment and accessories 2.3.3. Carry out the function test
	2.4. Carry out corrective maintenance work on simple sanitary appliances	2.4.1. Identify faults in simple sanitary appliances 2.4.2. Identify equipment and materials for repair or replacement of plumbing components 2.4.3. Repair or replace a defective plumbing component 2.4.4. Carry out the function test

Main objective	Units of competence	Elements of the competence
Level 3		
Install, repair and maintain pipes, valves, fittings, drainage systems and appliances in commercial and residential buildings, in accordance with industry, safety and environmental standards	3.1 Organize the plumbing work	3.1.1. Plan human resources, materials, tools and equipment 3.1.2. Conduct teamwork communication 3.1.3. Prepare the estimate to be used for the plumbing work 3.1.4. Assign materials to be used in plumbing work
	3.2 Carry out remedial maintenance work on complex sanitary appliances	3.2.1. Identify faults in complex sanitary appliances 3.2.2. Identify the equipment and materials for the repair or replacement of plumbing components 3.2.3. Repair or replace a defective plumbing component 3.2.4. Carry out the function test

V. General data of harmonized minimum occupational standards for plumbing

Plumbing Level 1 - Assistant Plumber

► Unit 1.1. Perform basic plumbing operations

Profession	Plumber
Title of the unit	Perform basic plumbing operations
Description (Objective) of the unit	The Plumber's Assistant participates in the preparation of materials, tools, equipment and specifications to perform basic plumbing work according to the requirements of the project under supervision

Elements of competence within the unit of competence

1. Identify materials, tools and equipment in the execution of plumbing work
2. Making simple estimates in plumbing work
3. Handle simple sanitary tools, materials and appliance

General guidelines for evaluation

1. Evidence of safety measures taken in the preparation of materials by means of a checklist/questions and answers
2. Evidence of the process described in this element of competence is assessed by means of an observation checklist
3. Deduce compliance with attitudinal evidence from compliance with product and performance evidence
4. Setting up conditions for assessing cooperation between learners of the same level
5. Evidence by identified knowledge is assessed by means of questions and answers/personal statement
6. The evidence per identified product is assessed using a checklist

Element 1.1.1. Identify materials, tools and equipment in the execution of plumbing work

Level of competence	1
Performance indicator: The plumber is competent when:	
1.	Materials, tools and equipment are listed in accordance with the industry standards
2.	The properties of the basic plumbing materials are described according to their manufacture
3.	Personal safety measures are applied in accordance with technical instructions and occupational health and safety (OSH) standards
4.	Safety symbol, signs and measures in the work site are understood, and in accordance with OSH standards
5.	Materials, tools and equipment are distributed according to the requirements of the workplace
6.	Tools, materials and equipment are maintained in accordance with technical instructions
7.	Tools, materials and equipment are prepared in accordance with OSH and environmental protection standards
8.	Plumbing workshop/site risks are described according to environmental standards
9.	The items in the first aid box are identified according to OSH standards
Evidence by process:	
1.	The listing of materials, tools and equipment in the domestic/sanitary plumbing system is consistent with the work to be done
2.	The description of the properties of basic plumbing materials is adequate
3.	The application of personal security measures is effective
4.	The identification of safety symbols/signs and measures in the workplace/site is effective
5.	The distribution of materials, tools and equipment is ensured
6.	Maintenance of tools, materials and equipment is effective
7.	Tools, materials and equipment are prepared in accordance with the work to be done
8.	The description of the risks in the plumbing workshop/site is accurate
9.	The identification of the items in the first aid kit is in accordance with OSH standards
Evidence by product:	
1.	Personal safety measures are applied in accordance with technical instructions and OSH standards
2.	Safety symbols/signs and measures in the workplace/site are identified in accordance with OSH standards
3.	Materials, tools and equipment are distributed according to the requirements of the workplace
4.	Tools, materials and equipment are maintained in accordance with technical instructions
5.	Tools, materials and equipment are prepared in accordance with safety, occupational health and environmental protection standards
6.	The items in the first aid box are identified according to OSH standards
Evidence through knowledge:	
1.	Materials, tools and equipment are listed in accordance with the technical instructions
2.	Properties of the basic plumbing materials are described according to their manufacture
3.	Plumbing workshop/site risks are described according to environmental standards

The evidence of the attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 1.1.2. Make simple estimates in plumbing work

Level of competence

1

Performance indicator: The plumber is competent when:

1. The construction plan is read under control and supervision
2. The four signs of addition, subtraction, multiplication and division for solving mathematical problems are identified
3. Safety measures are applied when taking measurements in accordance with industry standards
4. The British/French system of units of measurement is identified in accordance with technical instructions
5. The system of metric units is identified according to the technical drawing
6. Volume measurements (internal and external) are carried out using appropriate equipment in accordance with technical recommendations
7. The conversion from British/French units to metric units is in accordance with technical specifications

Evidence by process:

1. The reading of the building plan is effective
2. The identification of the four signs of mathematical problem solving is effective
3. The application of safety measures is ensured when taking measurement
4. The identification of the British/French system of measurement is effective
5. The identification of the metric system of units is effective
6. Volume measurement (internal and external) is provided
7. The conversion of British/French units is done into the corresponding metric system

Evidence by product:

1. Safety measures are applied when taking measurements in accordance with industry standards
2. Volume measurements (internal and external) are carried out using appropriate equipment in accordance with technical recommendations
3. The conversion from British/French units to metric units is done in accordance with technical specifications

Evidence through knowledge:

1. The building plan is read in accordance with the technical instructions
2. The four signs for solving mathematical problems are applied
3. The British/French system of units of measurement is identified in accordance with technical instructions
4. The system of metric units is identified according to the technical drawing

Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of plumbing work
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 1.1.3. Handle simple sanitary tools, materials and appliances

Level of competence	1
Performance indicator: The plumber is competent when:	
1.	The necessary tools, materials and equipment are selected in accordance with safety and environmental protection standards under supervision
2.	The sanitary appliances are selected according to OSH and environmental protection standards under supervision
3.	Tools and equipment are stored in accordance with safety and environmental standards under supervision
4.	Materials are stored in accordance with safety and environmental standards under supervision
5.	Materials and equipment are transported according to safety and environmental standards under supervision
6.	Tools and equipment are maintained in accordance with safety and environmental standards and manufacturers' recommendations, under supervision
7.	The work area is cleaned in accordance with safety and environmental standards
8.	Waste is disposed of, reused or recycled in accordance with safety and environmental standards, under supervision
Evidence by process:	
1.	The choice of tools and equipment is appropriate
2.	The choice of materials and accessories is appropriate
3.	Tools and equipment are stored in accordance with technical requirements
4.	The storage of materials complies with the relevant technical conditions
5.	Transport of materials/equipment is carried out in accordance with safety standards
6.	Maintenance of materials and equipment are carried out according to technical instructions
7.	The cleaning of the work area is effective
8.	Disposal/reuse of materials meets technical requirements
Evidence by product:	
1.	The necessary tools, materials and equipment are selected in accordance with safety and environmental standards under supervision
2.	The sanitary appliances are selected according to OSH and environmental protection standards under supervision
3.	Tools and equipment are stored according to OSH environmental standards under supervision
4.	Materials are stored in accordance with safety and environmental standards under supervision

5.	Materials and equipment are transported according to safety and environmental standards under supervision
6.	Tools and equipment are maintained in accordance with safety and environmental standards and manufacturers' recommendations, under supervision
7.	The work area is cleaned in accordance with safety and environmental standards
8.	Waste is disposed of, reused or recycled in accordance with safety and environmental standards, under supervision
Evidence through knowledge:	
1.	Not required
Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of works
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or respects priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

► Unit 1.2. Carry out basic piping work

Profession	Plumber
Title of the unit	Carry out basic pipework
Description (Objective) of the unit	The Plumber's Assistant plots the route, marks the positions, cuts, lays the pipes and performs the function test of the piping system under supervision
Elements of competence within the unit of competence:	
1.	Identify and interpret simple sketches of technical drawings/specifications
2.	Lay the pipes according to the bill of materials or specifications
3.	Carry out the function test of the piping system
General guidelines for evaluation	
1.	The evidence per identified product is assessed using a checklist for the required level
2.	Evidence of the process described is assessed by means of an observation checklist
3.	Deduce compliance with attitudinal evidence from compliance with product and performance evidence
4.	Setting up conditions for evaluating the cooperation between the plumber and the Master Plumber and with their counterparts
5.	Evidence of identified knowledge is assessed through questions and answers/personal statements

Element 1.2.1. Draw the path of the pipes

Level of competence	1
Performance indicator: The plumber is competent when:	
1.	The tools and equipment needed for marking are selected according to technical instructions (drawings) under supervision
2.	The piping plan is prepared in accordance with the technical instructions
3.	Standard units and symbols are interpreted in actual measurements according to the technical instructions, under supervision
4.	Positions on the site/work area are measured according to the supervisor's instructions
5.	The positions of the devices and accessories are indicated in accordance with the technical instruction under supervision
6.	Layouts for pipes (internal and/or external) are identified in accordance with the technical instruction under supervision
7.	The positions of the pipes (internal and/or external) are indicated in accordance with the programme and the technical instruction under supervision
8.	Tools and equipment are used according to technical instructions and under supervision
Evidence by process:	
1.	The choice of tools and equipment is appropriate
2.	The use of tools and equipment is correct
3.	Interpretation of standard units and symbols is in accordance with the technical instructions
4.	Measurement of the positions on the site/work area follows the technical instructions
5.	The identification of pipe positions is effective
6.	The indication of the pipe positions follows the technical instructions
Evidence by product:	
1.	The tools and equipment needed for marking are selected according to technical instructions (drawings) under supervision
2.	Standard units and symbols are interpreted in actual measurements according to the technical instructions, under supervision
3.	Positions on the site/work area are measured according to the supervisor's instructions
4.	The positions of the pipes (internal and/or external) are indicated in accordance with the work plan and the technical instruction under supervision
5.	Tools and equipment are used according to technical instructions and under supervision
Evidence through knowledge:	
1.	The positions for the pipes (internal and/or external) are identified in accordance with the technical instruction under supervision
Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of works
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, to share information, to listen and understand, points out dangers and follows instructions

Element 1.2.2. Lay pipes according to bill of materials or specifications

Element 1.2.2.	Lay pipes according to the bill of materials or specifications
Unit 1.2.	Carry out basic piping work
Level of competence	1

Performance indicator: The plumber is competent when:

1. The basic tools and equipment needed for pipe laying are selected according to the supervisor's instructions
2. The basic system of laying pipes according to plumbing standards is discussed
3. The materials for laying the pipes are selected according to the supervisor's instructions
4. Materials are prepared according to the supervisor's instructions
5. The pipes are laid under supervision in accordance with the technical instruction

Evidence by process:

1. The choice of tools, equipment and materials is judicious
2. The discussion on the basic system of pipe laying is effective
3. The choice of materials for laying the pipes is appropriate
4. The preparation of the material for laying the pipes is adequate
5. The pipes are laid in accordance with the technical instructions

Evidence by product:

1. The basic tools and equipment needed for pipe laying are selected according to the supervisor's instructions
2. The materials for laying pipes are selected according to the supervisor's instructions
3. Materials are prepared according to the supervisor's instructions
4. The pipes are laid under supervision in accordance with the technical instruction

Evidence through knowledge:

1. The basic system of pipe laying according to plumbing standards is discussed

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 1.2.3. Carry out the functional test of the piping system

Element 1.2.3.	Carry out the functional test of the piping system
Unit 1.2.	Carry out basic piping work
Level of competence	1

Performance indicator: The plumber is competent when:

1. The preventive maintenance procedure is carried out under supervision
2. The fault diagnosis procedure is described in the standard
3. The procedure for disassembling/assembling parts is applied
4. Basic safety measures are applied to test the plumbing system diagnostics in accordance with the supervisor's instructions
5. Tools and equipment used in diagnostic testing are listed in accordance with technical instruction
6. The tools and equipment for the diagnostic test are selected according to the supervisor's instructions
7. The materials for the diagnostic test are listed in the standard
8. Selection of materials for diagnostic tests follows the supervisor's instructions
9. The functional test is carried out in accordance with the technical instructions

Evidence by process:

1. The description of the fault diagnosis procedure is effective
2. The description of the disassembly/assembly procedure of the parts is applied
3. The application of basic safety measures during the diagnostic testing of the plumbing system is ensured
4. The list of tools and equipment required for the diagnostic test is drawn up in accordance with the specifications
5. The selection of tools/and equipment for the diagnostic test is accurate
6. The list of materials for the functional test is established in accordance with the technical instructions
7. The selection of materials for the functional test is carried out in accordance with the technical instructions

Evidence by product:

1. Basic safety measures are applied to test the plumbing system diagnostics as instructed by the supervisor
2. Tools and equipment for diagnostic tests are selected according to the supervisor's instructions
3. Selection of materials for diagnostic tests follows the supervisor's instructions

Evidence through knowledge:

1. The diagnostic procedure is described in the standard
2. The procedure for dismantling/assembling the components is described in the standard
3. The tools and equipment for the diagnostic test are listed in accordance with the technical instruction
4. The materials for the diagnostic test are listed in the standard

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

► Unit 1.3. Install basic equipment (appliances and accessories)

Profession	Plumber
Title of the unit	Install basic appliances and accessories
Description of the unit	The Plumber's Assistant identifies installations, carries out the work of installing and fixing equipment (appliances and simple fittings) and carries out the functional test and commissioning of equipment in a plumbing system

Elements of competence within the unit of competence:

1. Identify the facilities
2. Carry out the installation and fixing of equipment
3. Carry out functional testing and commissioning of equipment

General guidelines for evaluation

1. Evidence per identified product is assessed using a checklist for the required level
2. Evidence of the process described is assessed by means of an observation checklist
3. Deduce compliance with attitudinal evidence from compliance with product and performance evidence
4. Setting up the conditions for evaluating the cooperation between learners of the same level and the Master Plumber
5. Evidence by identified knowledge is assessed through questions and answers/personal statements

Element 1.3.1. Identify the facilities

Element 1.3.1.	Identify the facilities
Unit 1.3.	Install basic equipment (appliances and accessories)
Level of competence	1

Performance indicator: The plumber is competent when:

1. The necessary equipment (devices and accessories) are listed according to the supervisor's instructions
2. The basic equipment of the design is identified according to the standard
3. The types of equipment and accessories are identified according to the drawings/specifications

Evidence by process:

1. The list of facilities is established according to the technical instructions
2. The identification of equipment (simple appliances and accessories)
3. The list of simple appliances (hand-washing basin, single toilet, tap, etc.) is drawn up in accordance with the specifications, under supervision

Evidence by product:

1. Not required

Evidence through knowledge:

1. The necessary equipment (simple devices and accessories) are listed according to the supervisor's instructions
2. The basic equipment of the design is identified according to the standard
3. The types of equipment (simple appliances and accessories) are identified according to the drawings/specifications

Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of works
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or respects priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out hazards and follows instructions; uses and interprets non-verbal communication, such as hand signals; uses culturally appropriate language and concepts

Element 1.3.2. Carry out the work of installing and repairing

Element 1.3.2.	Carry out the work of installing and repairing simple appliances and accessories
Unit 1.3.	Install basic equipment (appliances and accessories)
Level of competence	1

Performance indicator: The plumber is competent when:	
1.	The necessary materials, tools and equipment are listed according to technical instruction
2.	Materials are selected according to technical requirements under supervision
3.	Materials, tools and equipment are maintained under supervision according to technical instructions
4.	Materials, tools and equipment are prepared under supervision in accordance with OSH standards
5.	Pipe fittings and accessories are fixed under supervision, in accordance with safety and environmental standards

Evidence by process:	
1.	The list of materials, tools and equipment is established in accordance with the supervisor's instructions
2.	The selection of furnishing materials and equipment is effective
3.	Tools, materials and equipment are maintained in accordance with technical instructions
4.	The preparation of tools, materials and equipment is adequate
5.	The attachment of pipe fittings and accessories is effective

Evidence by product:	
1.	Materials are selected according to technical requirements under supervision
2.	Materials, tools and equipment are maintained under supervision according to technical instructions
3.	Materials, tools and equipment are prepared under supervision in accordance with OSH standards
4.	Pipe fittings and accessories are fixed under supervision, in accordance with safety and environmental standards

Evidence through knowledge:	
1.	The necessary materials, tools and equipment are listed according to technical instruction

Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of works
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or respects priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 1.3.3. Carry out functional testing and commissioning of appliances and accessories

Element 1.3.3.	Carry out functional testing and commissioning of appliances and accessories
Unit 1.3.	Install basic equipment (appliances and accessories)
Level of competence	1

Performance indicator: The plumber is competent when:

1. The necessary materials, tools and equipment are listed in accordance with safety and environmental standards
2. Work control procedures are discussed according to the standard
3. Potential flaws and problems are identified
4. Problem solving/rectification of defects after testing are identified in accordance with the standard
5. The commissioning of the plumbing works is in accordance with the project objectives and specifications

Evidence by process:

1. The list of materials, tools and test equipment is established in accordance with the specifications
2. The discussion of work verification procedures is effective
3. The identification of potential problems and defects is ensured
4. The resolution of problems after the test is effective
5. The correction of potential defects is effective
6. The commissioning of the plumbing works is carried out in accordance with the technical instructions

Evidence by product:

1. Not required

Evidence through knowledge:

1. The necessary materials, tools and equipment are listed in accordance with safety and environmental standards
2. Work control procedures are discussed according to the standard
3. Potential flaws and problems are identified
4. Post-test problem solving/defect rectification is identified in accordance with the standard
5. The commissioning of the plumbing works is identified in accordance with the project objectives and specifications

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

► Unit 1.4. Carry out preventive maintenance work on sanitary appliances

Profession	Plumber
Title of the unit	Carry out preventive maintenance work on sanitary appliances
Description of the unit	The Plumber's Assistant consults the manufacturer's technical data sheet, identifies the maintenance equipment and materials and carries out the maintenance operations

Elements of competence within the unit of competence

1. Consult the manufacturer's technical data sheet
2. Identify maintenance equipment and materials
3. Carry out maintenance operations

General guidelines for evaluation

1. The evidence per identified product is assessed by means of a checklist for the required level
2. The evidence of the process described is assessed by means of an observation checklist
3. The deduction of attitudinal evidence from product and performance evidence is effective
4. The conditions for evaluating the cooperation between the learners and the Master Plumber on the one hand and the latter with their counterparts on the other hand are set up
5. Evidence by identified knowledge is assessed through questions and answers/personal statements

Element 1.4.1. Consult the manufacturer's data sheet

Element 1.4.1.	Consult the manufacturer's data sheet
Unit 1.4.	Carry out preventive maintenance work on sanitary appliances
Level of competence	1

Performance indicator: The plumber is competent when:

1. Tools, equipment and materials for carrying out maintenance are listed under supervision
2. Tools, materials and equipment for maintenance are selected
3. The cleaning products are well identified under the control of the supervisor
4. The use of safety protocols in the workplace complies with safety standards

Evidence by process:

1. The list of tools, equipment and materials for carrying out maintenance is established according to the supervisor's instructions
2. The choice of tools, materials and equipment for the maintenance of sanitary appliances is in accordance with the supervisor's instructions
3. Cleaning products are identified under the supervision of the supervisor
4. The application of workplace safety protocols is ensured

Evidence by product:

1. Tools, equipment and materials for carrying out maintenance are listed under/without supervision
2. The choice of tools, equipment and materials for the maintenance of sanitary appliances is made in accordance with the supervisor's instructions
3. Use of workplace safety protocols complies with OSH standards

Evidence through knowledge:
1. Tools, equipment and materials for carrying out maintenance are listed under/without supervision
Evidence of attitude:
1. Responsibility: Assists in the planning and implementation of works
2. Cooperation: Participates and works with others in the execution of a task in a team
3. Order: Establishes and/or maintains priorities and order in carrying out tasks
4. Appreciation: Values the contribution of other team members for improving productivity
5. Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 1.4.2. Identify maintenance equipment and materials

Element 1.4.2.	Identify maintenance equipment and materials
Unit 1.4.	Carry out preventive maintenance work on sanitary appliances
Level of competence	1

Performance indicator: The plumber is competent when:

1. The list of tools, materials and equipment required is in accordance with the supervisor's instructions
2. The choice of tools, equipment and materials is made according to the specifications
3. Tools, equipment and materials are selected in accordance with standard practice
4. The maintenance schedule is planned in accordance with standard practice

Evidence by process:

1. The material list for the maintenance of plumbing components is established according to the supervisor's instructions
2. The choice of materials for maintenance is made in accordance with the technical instructions
3. The planning of the maintenance schedule is carried out in accordance with standard practice

Evidence by product:

1. Tools, equipment and materials are selected in accordance with standard practice
2. The maintenance schedule is planned according to standard practice

Evidence through knowledge:

1. The list of tools, materials and equipment required is in accordance with the supervisor's instructions
2. The choice of tools, equipment and materials is made according to the specifications

Evidence of attitude:

1. Responsibility: Assists in the planning and implementation of works
2. Cooperation: Participates and works with others in the execution of a task in a team
3. Order: Establishes and/or maintains priorities and order in carrying out tasks
4. Appreciation: Values the contribution of other team members for improving productivity
5. Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 1.4.3. Perform maintenance operations

Element 1.4.3.	Carry out maintenance operations
Unit 1.4.	Carry out preventive maintenance work on sanitary appliances
Level of competence	1

Performance indicator: The plumber is competent when:

1. The necessary tools, equipment and materials are listed in accordance with the supervisor's instructions
2. The necessary tools, materials and equipment are used in accordance with the supervisor's instructions
3. The maintenance of a component in the plumbing system is carried out under supervision
4. The maintenance of a sanitary appliance is carried out under supervision
5. The use of workplace safety protocols according to OSH standards

Evidence by process:

1. The list of tools, equipment and materials for the maintenance of sanitary appliances is drawn up in accordance with the supervisor's instructions
2. The use of tools, equipment and materials for maintenance is adequate
3. The application of workplace safety protocols is ensure

Evidence by product:

1. The necessary tools, materials and equipment are used in accordance with the supervisor's instructions
2. The maintenance of sanitary appliances in the plumbing system is carried out under/without supervision
3. The use of workplace safety protocols meets OSH standards

Evidence through knowledge:

1. The necessary tools, materials and equipment are listed in accordance with the supervisor's instructions

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with others in the execution of a task in a team
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Plumbing level 2 – Plumber

► Unit 2.1. Carry out piping

Profession	Plumber
Title of the unit	Carrying out piping
Description of the unit	The plumber prepares estimates, uses tools, materials and equipment to complete the piping according to the project requirements

Elements of competence within the unit of competence

1. Use materials, tools and equipment used in plumbing work
2. Preparing quotations for plumbing work

General guidelines for evaluation

1. Evidence of safety measures taken in the preparation of materials is assessed by means of a checklist
 2. Evidence of the process described is assessed by means of an observation checklist or questions and answers
 3. The evidence of the identified product is assessed by means of a checklist
 4. Deduce compliance with attitudinal evidence from compliance with product and performance evidence
 5. Establishing the conditions for evaluating the cooperation between the Assistant Plumber and the Master Plumber
 6. Evidence by identified knowledge is assessed by means of questions and answers, and/or a personal statement
-

Element 2.1.1. Use materials, tools and equipment in plumbing work

Element 2.1.1.	Use materials, tools and equipment used in plumbing work
Unit 2.1..	Carrying out the piping
Level of competence	2

Performance indicator: The plumber is competent when:

1. The pipe materials are selected in accordance with the technical instructions
2. Tools and equipment for piping are selected according to the technical instructions
3. Personal safety measures are applied in accordance with the technical instructions
4. Materials, tools and equipment are distributed according to workplace requirements
5. Materials, tools and equipment are prepared in accordance with safety, occupational hygiene and environmental protection standards
6. Tools and equipment are maintained in accordance with the maintenance manual
7. The use of tools, materials and equipment to perform the task meets safety, occupational health and environmental standards, with less supervision
8. The various tools and equipment for cutting, bending and threading are chosen according to the job specification
9. The pipe materials are cut, bent and threaded according to the technical instructions

Evidence by process:

1. The selection of piping materials is in accordance with the requirements
2. The selection of tools and equipment for piping is effective
3. The application of personal security measures is effective
4. The distribution of materials, tools and equipment is ensured
5. Materials, tools and equipment are prepared in accordance with the work to be done
6. Maintenance of tools and materials and equipment is effective
7. The use of tools, materials and equipment to carry out the task is compliant
8. The choice of tools and equipment for cutting, bending and threading is appropriate

Evidence by product:

1. The pipe materials are selected in accordance with the technical instructions
2. Tools and equipment for piping are selected according to the technical instructions
3. Personal safety measures are applied in accordance with the technical instructions
4. Materials, tools and equipment are distributed according to workplace requirements
5. Materials, tools and equipment are prepared in accordance with safety, occupational health and environmental standards, with less supervision
6. Tools, materials and equipment are maintained according to a maintenance manual
7. The use of tools, materials and equipment to carry out the task meets safety, occupational health and environmental standards with less supervision
8. Tools and equipment for cutting, bending and threading are chosen according to job specifications

Evidence through knowledge:

1. Not required

Evidence of attitude:	
1.	Responsibility: Plans and organizes work
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and to follows instruction
6.	Problem solving and decision-making: Approaches a problem from different angles and proposes appropriate responses to situations

Element 2.1.2. Prepare estimates for plumbing work

Element 2.1.2.	Prepare estimates for plumbing work
Unit 2.1.	Carrying out piping
Level of competence	2

Performance indicator: The plumber is competent when:	
1.	The reading of the building plan is analysed and understood
2.	The selection and use of materials, tools and equipment is based on the requirements of the location and type of work
3.	Pipeline/gas line measurements (internal and external) are carried out using appropriate tools and equipment under less supervision
4.	Surface measurements (internal and external) are carried out in accordance with technical standards and recommendations under lesser supervision
5.	Volume measurements (internal and external) are carried out in accordance with technical standards and recommendations
6.	Safety measurements are applied according to technical standards
7.	The estimation/calculation of quantities is understandable, legible and reasonable, in accordance with technical standards

Evidence by process:	
1.	The interpretation of the building design is realistic
2.	The choice of materials, tools and equipment is judicious
3.	The pipeline/gas pipeline measure applies
4.	The measurement of areas (internal and external) is effective
5.	The measurement of volumes (internal and external) applies
6.	The application of security measures is effective
7.	The calculation of quantities and costs is carried out

Evidence by product:	
1.	The selection of materials, tools and equipment is made according to the requirements of the workplace
2.	Safety measurements are applied in accordance with technical standards
3.	Pipeline/gas line measurements (internal and external) are carried out using appropriate equipment

4. Surface measurements (internal and external) are carried out in accordance with technical standards and recommendation
5. Volume measurements (internal and external) are carried out in accordance with technical standards and recommendations
6. The estimation/calculation of quantities is understandable, legible and reasonable, in accordance with technical standards

Evidence through knowledge:

1. The reading of the building plan is analysed and communicated with less supervision

Evidence of attitude:

1. **Responsibility:** Plans and organizes work
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Completes written documentation in the workplace, enables clear and direct communication, uses questioning to identify and confirm requirements, shares information, listens and understands, points out hazards and follows instructions; uses and interprets non-verbal communication, such as hand signals; uses culturally appropriate language and concepts
6. **Problem solving and decision-making:** Approaches a problem from different angles and finds unique answers to situations
7. **Numeracy:** Uses data and arithmetic to support evidence or demonstrate a point

Element 2.1.3. Handle tools and materials according to OSH standards in plumbing

Element 2.1.3.	Handle tools and materials according to OSH standards in plumbing
Unit 2.1.	Carrying out piping
Level of competence	2

Performance indicator: The plumber is competent when:

1. The necessary tools, materials, equipment and accessories are selected in accordance with safety and environmental protection standards
2. Tools and equipment are stored in accordance with safety standards
3. Materials are stored in accordance with safety and environmental standards
4. Materials and equipment are transported in accordance with safety and environmental standards
5. Tools and equipment are maintained in accordance with safety and environmental standards and manufacturers' recommendations
6. The work area is cleaned in accordance with safety and environmental standards
7. Waste is disposed of, reused or recycled in accordance with safety and environmental standards

Evidence by process:

1. Choose tools and equipment
2. Choose materials and accessories
3. Store tools and equipment
4. Store materials
5. Transporting materials and equipment
6. Maintain tools and equipment

7.	Clean the work area
8.	Dispose of/reuse materials
Evidence by product:	
1.	The necessary tools and equipment are selected in accordance with safety and environmental standards
2.	Materials and accessories are selected in accordance with safety and environmental standards
3.	Materials and equipment are transported according to safety/environmental standards
4.	Work equipment and materials are maintained in accordance with safety and environmental standards
5.	Tools and equipment are stored in accordance with safety and environmental standard
6.	Materials are stored in accordance with safety and environmental standards
7.	Materials are disposed of, reused or recycled in accordance with safety and environmental standards
8.	The work area is cleaned in accordance with safety and environmental standards
Evidence through knowledge:	
1.	Not required
Evidence of attitude:	
1.	Responsibility: Plans and organizes work
2.	Cooperation: Supports and works with other team members in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Completes written documentation in the workplace, enables clear and direct communication, uses questioning to identify and confirm requirements, shares information, listens and understands, points out hazards and follows instructions; uses and interprets non-verbal communication, such as hand signals; uses culturally appropriate language and concepts
6.	Problem solving and decision-making: Approaches a problem from different angles and finds unique answers to situations

► Unit 2.2. Lay pipe on the project site

Profession	Plumber
Title of the unit	Lay the pipe on the project site
Description of the unit	The plumber carries out the excavation work, installs the pipework and carries out a functional test on the pipework system

Elements of competence within the unit of competence

1.	Carry out the excavation work
2.	Install the piping (pipes and fittings)
3.	Conduct a functional test on the piping system

General guidelines for evaluation

1.	The evidence per identified product is assessed using a checklist
2.	Evidence of the process described is assessed using an observation guide
3.	Evidence by identified knowledge is assessed by means of questions and answers/personal statement
4.	Deduce compliance with attitudinal evidence from compliance with product and performance evidence
5.	Setting up the conditions for evaluating the cooperation between the plumber and the Master Plumber

Element 2.2.1. Carry out excavation work

Element 2.2.1.	Carrying out the excavation work
Unit 2.2.	Lay the pipe on the project site
Level of competence	2

Performance indicator: The plumber is competent when:

1. Work instructions given by the supervisor are followed
2. The tools and materials required for marking the excavation are selected according to work requirements
3. Standard units and symbols are interpreted as actual measurements according to technical instructions
4. The positions of the excavations on the site/work area are measured according to the supervisor's instructions
5. The excavation work is carried out in accordance with technical standards and instructions
6. The positions of the pipes (internal and/or external) are identified according to the drawing and technical instructions
7. Tools and materials are used in accordance with the technical instructions

Evidence by process:

1. Compliance with work instructions is observed
2. The choice of tools and equipment is judicious
3. The use of tools and equipment is consistent
4. The interpretation of standard units and symbols is adequate
5. The measurement of positions on the site/work area is observed
6. The identification of the pipes is respected
7. The location of the pipe positions can be observed
8. The excavation work is carried out in accordance with the technical standards and instructions

Evidence by product:

1. The tools and materials' required for marking are selected according to the technical instructions (drawings)
2. Tools and equipment are used in accordance with the technical instructions
3. Standard units and symbols are interpreted as actual measurements according to the standards and technical instructions
4. The digging positions on the site/work area are measured according to the supervisor's instructions
5. The positions of the pipes are indicated (inside and/or outside) according to the drawing and the technical instruction
6. The excavation work is carried out in accordance with the plan and the technical instructions

Evidence through knowledge:

1. Work instructions given by the supervisor are followed
2. The positions of the pipes (internal and/or external) are identified according to the technical instruction

Evidence of attitude:

1. **Responsibility:** Performs work to the required quality standards; carries out the tasks of handling plumbing measuring tools, materials in accordance with the requirements of the technical instruction and maintaining tools and materials and equipment in accordance with safety, occupational health and environmental standards

2.	Cooperation: Participates in the execution of a task and working together to perform a function that involves a work process such as taking measurements internally and externally, according to technical requirements
3.	Order: Observes priorities and order in carrying out tasks, such as taking measurements and marking the position of pipes in a clear and understandable way according to established principles; lists and maintains the materials, tools and equipment needed according to technical instructions and quality, safety and environmental standards
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Completes written documentation in the workplace, enables clear and direct communication, uses questioning to identify and confirm requirements, shares information, listens and understands, points out hazards and follows instructions; uses and interprets non-verbal communication, such as hand signals; uses culturally appropriate language and concepts
6.	Problem solving and decision-making: Approaches a problem from different angles and finds unique answers to situations
7.	Numeracy: Uses data and arithmetic to support evidence or demonstrate a point

Element 2.2.2. Install piping (pipes and fittings)

Element 2.2.2.	Install the piping (pipes and fittings)
Unit 2.2.	Lay the pipe on the project site
Level of competence	2

Performance indicator: The plumber is competent when:

1.	The plumbing drawing is interpreted in accordance with the technical instruction
2.	The different types of pipes and fittings are recognized from the technical instruction
3.	The material for laying the pipes is selected according to the technical specifications
4.	The assembly of the fittings is done according to the technical specifications under lesser supervision
5.	The selection of pipes for laying is in accordance with the technical specification
6.	The tools and materials for laying the piping are selected in accordance with the technical specifications
7.	The pipes are cut, bent and threaded according to the technical instructions
8.	Piping is positioned according to technical standards and specifications under less supervision

Evidence by process:

1.	The interpretation of the building design is adequate
2.	Recognition of the different types of pipes and fittings is correct
3.	The choice of pipe-laying materials is a good one
4.	The selection of pipes for the laying of the pipeline is effective
5.	The choice of tools and materials for the installation of piping is important
6.	The cutting, bending and threading of the pipes is carried out
7.	Materials preparation is carried out in accordance with the technical instructions
8.	The positioning of the piping is carried out in accordance with the standards and technical specifications under less supervision

Evidence by product:	
1.	The material for laying the pipes is selected according to the technical specifications
2.	The selection of pipes for laying is in accordance with the technical specification
3.	Tools and materials for laying piping are selected according to technical specifications
4.	The materials are prepared in accordance with the technical instructions
5.	The pipes are cut, bent and threaded according to the technical instructions
6.	The pipes are positioned in accordance with OSH technical specifications under less supervision
7.	The piping work is completed
Evidence through knowledge:	
1.	The different types of pipes are recognized from the technical instruction
2.	The construction drawing is interpreted in accordance with the technical instruction
Evidence of attitude:	
1.	Responsibility: Plans and executes the work
2.	Cooperation: Participates and works with others in the execution of a task
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions
6.	Problem solving and decision-making: Approaches a problem from different angles and finds appropriate responses to situations
7.	Numeracy: Uses data and arithmetic to support evidence or demonstrate a point

Element 2.2.3. Carry out a functional test on the piping system

Element 2.2.3.	Carry out a functional test on the piping system
Unit 2.2.	Lay the pipe on the project site
Level of competence	2

Performance indicator: The plumber is competent when:	
1.	The tools and materials for the functional test are selected according to the technical instructions under lesser supervision
2.	The procedure of the functional test is established according to the technical instructions and under supervision
3.	The pressure is applied during the function test according to the technical instructions
4.	Safety measures are applied to the functional testing of the plumbing system in accordance with the technical requirements
5.	Testing of installed equipment is carried out in accordance with the standards and work specifications with minimal supervision
6.	Hydrostatic testing of the installed pipe network is carried out to check for leak
7.	The fault during diagnosis for effective repair is detected according to technical specifications with minimal supervision
8.	Checking the installed pipework for joint losses and repairing the fault in a work specification area is carried out with minimal supervision

Evidence by process:

1. The use of tools and equipment for functional testing is correct
2. The operational test procedure is effective
3. The application of pressure during the function test is in accordance with instructions
4. The application of security measures is effective
5. the test on the installed devices is carried out
6. The hydrostatic test of the installed pipe network is carried out
7. Detection of the fault during the test is done
8. Inspection and correction of the defect is carried out

Evidence by product:

1. The tools and materials for the functional test are selected according to the technical instructions and the level
2. The procedure of the functional test is established according to the technical instructions and under supervision
3. The pressure is applied during the function test according to the technical instructions
4. Safety measures are applied to the functional testing of the plumbing system in accordance with the technical requirements
5. Testing of installed equipment is carried out in accordance with the standards and work specifications with minimal supervision
6. Hydrostatic testing of the installed pipe network is carried out to check for leaks
7. The fault in the functional test for effective repair is detected according to the technical specifications with minimal supervision
8. Checking the installed pipework for joint losses and repairing the fault in a work specification area is carried out with minimal supervision

Evidence through knowledge:

1. Not required

Evidence of attitude:

1. **Responsibility:** Plans and executes work
2. **Cooperation:** Participates and works with other members in the execution of tasks
3. **Order:** Establishes and/or respects priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions
6. **Problem solving and decision-making:** Approaches a problem from different angles and finds appropriate responses to situations
7. **Numeracy:** Uses data and arithmetic to support evidence or demonstrate a point

► Unit 2.3. Installing complex equipment

Profession	Plumber
Title of the unit	Installing complex equipment
Description of the unit	The plumber identifies the different types of complex equipment, installs them and carries out the functional test

Elements of competence within the unit of competence

1. Identify the different types of complex equipment (wall-hung toilets, water heaters, mixer taps, pumps, etc.)
2. Installing complex equipment and accessories
3. Carry out the function test

General guidelines for evaluation

1. The evidence per identified product is assessed using a checklist for the required level
2. Evidence of the process described is assessed by means of an observation checklist
3. Deduce compliance with attitudinal evidence from compliance with product and performance evidence
4. The establishment of conditions for the evaluation of the cooperation between the plumber and the Master Plumber
5. Evidence of identified knowledge is assessed through questions and answers/personal statements

Element 2.3.1. Identify the different types of complex appliances

Element 2.3.1.	Identify the different types of complex appliances (wall-hung toilets, water heaters, mixer taps, pumps, etc.)
Unit 2.3.	Installing complex equipment
Level of competence	2

Performance indicator: The plumber is competent when:

1. The classifications of the fittings are made according to the specifications
2. The necessary facilities and equipment are identified in accordance with the technical instructions
3. Devices and accessories in the design are selected according to the relevant standards
4. Distribution of equipment and accessories based on workplace requirements

Evidence by process:

1. Identification of equipment (complex appliances and accessories) from the drawing is respected
2. The selection of complex devices and accessories is effective
3. The distribution of complex equipment and accessories is carried out
4. Installation of the complex devices and the attachment of the accessories are effective

Evidence by product:

1. The design equipment is selected according to the standards
2. The installation of complex devices and the attachment of accessories is carried out

Evidence through knowledge:	
1.	The necessary facilities and equipment are identified according to technical instructions
2.	Complex equipment and accessories distribution is based on workplace requirements
Evidence of attitude:	
1.	Responsibility: Plans and executes the work
2.	Cooperation: Participates and works with others in the execution of a task
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions
6.	Problem solving and decision-making: Approaches a problem from different angles and finds appropriate responses to situations

Element 2.3.2. Installing complex equipment and accessories

Element 2.3.2.	Installing complex equipment and accessories
Unit 2.3.	Installing complex equipment
Level of competence	2

Performance indicator: The plumber is competent when:

1.	The necessary complex tools and equipment are selected according to the technical instructions
2.	Materials are selected according to technical requirements
3.	Complex materials, tools and equipment are maintained in accordance with technical instructions
4.	Complex materials, tools and equipment are prepared in accordance with OSH standards
5.	The locations of complex devices and accessories are identified according to the technical instructions with less supervision
6.	Complex devices and accessories are installed according to the technical instructions with little supervision
7.	The copper tubes are joined using copper tube fittings, in accordance with safety and environmental standards, with little supervision
8.	Workplace safety measures are followed in accordance with technical standards with less supervision

Evidence by process:

1.	The choice of complex tools and equipment is wise
2.	The selection of materials is consistent with the work to be done
3.	Maintenance of complex materials, tools and equipment is effective
4.	Preparation of materials, tools and complex equipment is carried out in accordance with the work to be done
5.	The identification of the locations of complex devices and accessories is respected
6.	The installation of complex devices is effective
7.	The attachment of accessories is adequate
8.	Copper tubes are joined together with appropriate fittings
9.	Compliance with safety measures in the workplace

Evidence by product:	
1.	The necessary complex tools and equipment are selected according to the technical instructions
2.	Materials are selected according to technical requirements
3.	Materials, tools and equipment are maintained in accordance with technical instructions
4.	Complex materials, tools and equipment are prepared according to technical instructions
5.	The location of complex devices and accessories is identified
6.	Complex devices are installed in accordance with standards and technical instructions
7.	The fittings are fixed in accordance with the standards and technical instructions
8.	The copper tubes are assembled with appropriate fittings, respectively, in accordance with safety and environmental standards, with little supervision
9.	Workplace safety measures are followed in accordance with technical standards with less supervision
Evidence through knowledge:	
1.	Not required
Evidence of attitude:	
1.	Responsibility: Plans and executes the work
2.	Cooperation: Participates and works with other team members in the execution of tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions
6.	Problem solving and decision-making: Approaches a problem from different angles and finds appropriate responses to situations

Element 2.3.3. Perform a functional test

Element 2.3.3.	Carry out a function test
Unit 2.3.	Installing complex equipment
Level of competence	2

Performance indicator: The plumber is competent when:	
1.	The materials, tools and complex equipment needed to carry out the test are selected in accordance with the technical standards and instructions
2.	Work control procedures are established according to technical standards and instructions with less supervision
3.	The safety measures are applied to the function test of complex devices in accordance with the technical standards and requirements
4.	Testing of installed equipment is carried out in accordance with the standards and work specifications with minimal supervision
5.	The resolution of problems/correction of defects detected after the tests are carried out in accordance with the technical requirements under the least supervision
6.	The results of the tests are verified and recorded at the end of the work, in accordance with the requirements of the work
7.	The commissioning of the installation is carried out in accordance with the project objectives and specifications, under little supervision

Evidence by process:

1. The choice of materials and test tools is judicious
2. The procedure for testing the operation of complex equipment is carried out properly
3. The application of security measures is effective
4. Correct/rectify problems after testing
5. The recording of test results is underway

Evidence by product:

1. The necessary materials, tools and equipment are selected in accordance with safety and environmental standards
2. Safety measures are applied to the functional testing of complex devices in accordance with technical standards and requirements
3. Testing of installed equipment is carried out in accordance with the standards and work specifications with minimal supervision
4. The correction of defects detected after the tests are carried out in accordance with the technical requirements under the least supervision
5. The results of the tests are verified and recorded at the end of the work, in accordance with the requirements of the work
6. The commissioning of the installation is carried out under lesser supervision

Evidence through knowledge:

1. The procedures for controlling the work are established in accordance with the standards and technical instructions
2. The commissioning of the installation is carried out in accordance with the project objectives and specifications, under the supervision of the company

Evidence of attitude:

1. **Responsibility:** Plans and executes the work
2. **Cooperation:** Participates and works with others in the execution of a task
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions
6. **Problem solving and decision-making:** Approaches a problem from different angles and finds appropriate responses to situations

► Unit 2.4. Carry out maintenance work on simple sanitary appliances

Profession	Plumber
Title of the unit	Carry out maintenance work on simple sanitary appliances
Description of the unit	The plumber identifies faults in plumbing fixtures, identifies equipment and materials for the repair or replacement of plumbing components, repairs/replaces a faulty plumbing component and carries out functional testing

Elements of competence within the unit of competence

1. Identify faults in simple sanitary appliances
2. Identify equipment and materials for repair or replacement of plumbing components
3. Repair or replace a defective plumbing component
4. Carry out the function test

General guidelines for evaluation

1. The evidence per identified product is assessed using a checklist for the required level
2. Evidence of the process described is assessed by means of an observation checklist
3. Deduce compliance with attitudinal evidence from compliance with product and performance evidence
4. Setting up conditions for evaluating the cooperation between the plumber and the Master Plumber and with their counterparts
5. Evidence of identified knowledge is assessed through questions and answers/personal statements

Element 2.4.1. Identify faults in simple sanitary appliances

Element 2.4.1.	Identify faults in simple sanitary appliances
Unit 2.4.	Carry out maintenance work on simple sanitary appliances
Level of competence	2

Performance indicator: The plumber is competent when:

1. The tools, materials and equipment for carrying out the repair are:
2. Tools, equipment and materials for detecting faults are identified according to work requirements
3. Tools, equipment and materials for detecting faults are selected According to work requirements
4. Faults are diagnosed according to work requirements
5. Fault location is carried out according to work requirements

Evidence by process:

1. The list of tools, equipment and materials for detecting faults is drawn up according to the supervisor's instructions
2. The choice of tools, equipment and materials for detecting faults follows the supervisor's instructions
3. Fault diagnosis is carried out in accordance with the standards
4. The location of the fault is effective
5. The application of workplace safety protocols is ensured

Evidence by product:

1. Tools, equipment and materials for detecting faults are selected
2. Tools, equipment and materials for detecting faults are listed under supervision
3. Faults are diagnosed according to the supervisor's instructions
4. Fault location is carried out according to the supervisor's instructions
5. The use of safety protocols in the workplace complies with OSH standards

Evidence through knowledge:

1. Tools, equipment and materials for detecting faults are listed under/without supervision

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with others in the execution of a teamwork task
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 2.4.2. Identify equipment and materials for repair or replacement of plumbing components

Element 2.4.2.	Identify equipment and materials for repair or replacement of plumbing components
Unit 2.4.	Carry out maintenance work on simple sanitary appliances
Level of competence	2

Performance indicator: The plumber is competent when:

1. The list of equipment and materials required is in accordance with the supervisor's instructions
2. The choice of equipment and materials is determined according to the specifications
3. Materials are selected in accordance with standard practice
4. A replacement schedule is planned in accordance with standard practice

Evidence by process:

1. The list of equipment and materials for the repair or replacement of plumbing components is established according to the supervisor's instructions
2. The choice of material for the repair or replacement is made in accordance with the technical instructions
3. The preparation of equipment and materials is ensured
4. The planning of the repair or replacement schedule is carried out in accordance with standard practice

Evidence by product:

1. Materials are selected in accordance with standard practice
2. Materials and equipment are prepared in accordance with personal and environmental safety standards, under less supervision
3. Equipment and materials are maintained in accordance with technical instructions

Evidence through knowledge:

1. The choice of materials selected is in accordance with the job specification and the supervisor's instructions

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with others in the execution of a teamwork task
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 2.4.3. Repair or replace a defective plumbing component

Element 2.4.3.	Repair or replace a defective plumbing component
Unit 2.4.	Carry out maintenance work on simple sanitary appliances
Level of competence	2

Performance indicator: The plumber is competent when:

1. The necessary tools, equipment and materials are listed according to supervisor's instructions
2. The necessary tools, equipment and materials are used in accordance with the supervisor's instructions
3. The replacement of a defective component in the plumbing is carried out under supervision
4. The repair of a defective plumbing component is carried out under supervision
5. Use workplace safety protocols according to OSH standards

Evidence by process:

1. The list of tools, equipment and materials for detecting faults is established in accordance with the supervisor's instructions
2. The use of tools, equipment and materials to detect faults is adequate
3. Defective components are replaced in accordance with the technical instructions
4. The repair of minor faults is carried out according to the supervisor's instructions
5. The application of workplace safety protocols is ensured

Evidence by product:

1. Necessary materials, tools and equipment are selected according to the supervisor's instructions
2. The necessary tools, equipment and materials are used in accordance with the supervisor's instructions
3. Replacement of defective plumbing components is carried out under supervision
4. The repair of a defective plumbing component is carried out under supervision
5. The use of workplace safety protocols meets OSH standards

Evidence through knowledge:

1. The necessary tools, equipment and materials are listed according to the supervisor's instructions

Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of works
2.	Cooperation: Participates and works with the team in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 2.4.4. Carry out the function test

Element 2.4.4.	Carry out the function test
Unit 2.4.	Carry out maintenance work on simple sanitary appliances
Level of competence	2

Performance indicator: The plumber is competent when:	
1.	The necessary tools, equipment and materials are selected according to the supervisor's instructions
2.	Selected tools, equipment and materials are used in accordance with the relevant safety and environmental protection standards
3.	The test execution procedure is carried out in accordance with standard practices under reduced supervision
4.	The test schedule is determined in accordance with the standard

Evidence by process:	
1.	The list of tools, equipment and materials for the rehearsal of the tests is established under supervision
2.	Identification of tools, equipment and materials for carrying out the tests is effective
3.	Testing of the work is carried out
4.	The planning of the test execution schedule is effective

Evidence by product:	
1.	The necessary tools, equipment and materials are selected according to the supervisor's instructions
2.	The selected tools, equipment and materials are used in accordance with the required safety and environmental standards, under less supervision
3.	The test execution procedure is carried out in accordance with standard practices under little supervision
4.	The test schedule is determined in accordance with the standards

Evidence through knowledge:	
1.	Not required

Evidence of attitude:	
1.	Responsibility: Assists in the planning and implementation of works
2.	Cooperation: Participates and works with the team in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Plumbing level 3 – Master Plumber

▶ Unit 3.1. Organize plumbing work

Profession	Plumber
Title of the unit	Organizing unsupervised plumbing work
Description of the unit	The plumber plans human resources, conducts teamwork communication, prepares estimates to be used in plumbing work and allocates materials to be used in plumbing work according to project requirements

Elements of competence within the unit of competence

1. Plan human resources, materials, tools and equipment
2. Leading communication on teamwork
3. Prepare the estimate to be used for the plumbing work
4. Assign materials to be used in plumbing work

General guidelines for evaluation

1. The evidence by performance indicator identified in this element of competence is assessed through the evaluation of the product
2. Evidence of the process described in this element of competence is assessed by means of a checklist of observations, knowledge and products
3. Deduce compliance with attitudinal evidence by compliance with the material management checklist and the personal statement
4. The establishment of conditions for evaluating the cooperation between the plumber and the Master Plumber on the basis of the testimony of their peers
5. Evidence by identified knowledge is assessed by means of questions and answers/personal statement
6. The evidence of the identified product is assessed by means of a checklist

Element 3.1.1. Plan human resources, materials, tools and equipment

Element 3.1.1.	Plan human resources, materials, tools and equipment
Unit 3.1.	Organizing plumbing work
Level of competence	3

Performance indicator: The plumber is competent when:

1. The technical instruction/drawing for preparing the necessary human resources, materials, tools and equipment is interpreted in accordance with work specifications
2. The schedule of works is prepared in accordance with the specification of works
3. The materials, tools and equipment required for each team activity are selected according to job specifications
4. Human resources, materials, tools and equipment are organized according to the project's technical instruction, OSH and environmental protection standards
5. Human resources, materials, tools and equipment are distributed in accordance with the project's technical instruction, OSH and environmental protection standards
6. Materials, tools and equipment are maintained in accordance with the technical instructions
7. Staff safety is implemented in accordance with technical instructions/sanitary standards
8. Workplace safety signs and symbols are located in accordance with occupational OSH standards
9. The communication and responsibilities of each team are indicated in accordance with the terms of reference

Evidence by process:

1. The interpretation of technical instructions/drawings is consistent with the work to be done
2. The preparation of the work schedule is effective
3. The choice of materials, tools and equipment is in accordance with technical specifications
4. The organization of people, materials, tools and equipment is effective
5. The allocation of human resources is consistent with the work to be done
6. The distribution of materials, tools and equipment is consistent with the work to be done
7. Maintenance of materials, tools and equipment is effective
8. Staff relations are maintained
9. The implementation of staff security is effective
10. The marking of safety signs and symbols at the workplace is carried out in accordance with the standards of the construction site
11. The indication of the roles of each team is effective

Evidence by product:

1. The schedule of works is prepared in accordance with the specification of works
2. The materials, tools and equipment required for each team activity are selected according to the job specification
3. Human resources, materials, tools and equipment are organized in accordance with the project's technical instruction, safety, occupational health and environmental protection standards
4. Human resources, materials, tools and equipment are distributed in accordance with the project's technical instruction, OSH and environmental protection standards
5. Materials, tools and equipment are maintained according to technical instructions

6.	Staff safety is implemented in accordance with technical instructions/sanitary standards
7.	Workplace safety signs and symbols are located in accordance with occupational OSH standards
Evidence through knowledge:	
1.	The technical instruction/drawing for preparing the necessary human resources, materials, tools and equipment is interpreted in accordance with the work specification
2.	The communication and responsibilities of each team are indicated in accordance with the terms of reference
Evidence of attitude:	
1.	Responsibility: Plans and organizes work
2.	Cooperation: Participates and works with other team members in carrying out tasks
3.	Order: Establishes and/or maintains priorities and order in carrying out tasks
4.	Appreciation: Values the contribution of other team members for improving productivity
5.	Communication: Completes written documentation in the workplace, establishes clear and direct communication, uses questioning to identify and confirm requirements, shares information, listens and understands, points out hazards and follows instructions, uses and interprets non-verbal communication, such as hand signals, and uses culturally appropriate language and concepts
6.	Problem solving and decision-making: Approaches a problem from different angles and proposes unique responses to situations
7.	Numeracy: Uses data and arithmetic to support evidence or demonstrate a point

Element 3.1.2. Conduct teamwork communication

Element 3.1.2.	Lead communication on teamwork
Unit 3.1.	Organizing plumbing work
Level of competence	3

Performance indicator: The plumber is competent when:

1.	The different teams (pipe benders, fitters, etc.) are assigned according to the needs of the site
2.	The duties of each team are allocated according to job specifications
3.	The materials, tools and equipment required for each team activity are provided according to the job specifications
4.	The workload/activities of each team are distributed and supervised in accordance with the work specifications
5.	Work instructions and messages are received and followed to complete tasks
6.	The complex communication system in a working environment is applied according to the job specification
7.	Information from a range of sources is accessed and interpreted using a variety of communication modalities
8.	The attention of other parties is obtained and the intention of the visual communication is confirmed at every stage

Evidence by process:

1. The assignment of work teams is carried out in accordance with the workload to be performed
2. The distinction between the functions of each team is effective
3. The supply of materials, tools and equipment required for the activities of each team is ensured in accordance with the specifications of the work to be done
4. The distribution of workload/activities to each team is ensured
5. Compliance with work instructions and orientations complies with the specifications
6. The application of a complex communication system in a working environment is ensured
7. Access to information from a range of sources is provided
8. The visual communication is carried out

Evidence by product:

1. The different teams (pipe benders, fitters, etc.) are assigned according to site needs
2. The duties of each team are allocated according to the job specification
3. The materials, tools and equipment required for each team activity are provided in accordance with the job specifications
4. The workload/activities of each team are distributed and supervised in accordance with the work specifications
5. Work instructions and guidance are received and followed to complete tasks
6. The complex communication system in a working environment is applied according to the job specification

Evidence through knowledge:

1. Information from a range of sources is interpreted using a variety of communication modalities
2. The attention of other parties is obtained and the intention of the visual communication is confirmed at every stage

Evidence of attitude:

1. **Responsibility:** Plans and organizes work
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Establishes clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, and points out hazards and follows instructions
6. **Problem solving and decision-making:** Approaches a problem from different angles and proposes unique responses to situations

Element 3.1.3. Prepare the cost estimate to be used for the plumbing work

Element 3.1.3.	Prepare the estimate to be used for the plumbing work
Unit 3.1.	Organizing plumbing work
Level of competence	3

Performance indicator: The plumber is competent when:

1.	The complex building plans were correctly and professionally analysed and communicated
2.	The human and material resources required are analysed and quantified on the basis of the drawing
3.	The necessary materials, tools and equipment are selected and used in accordance with technical instructions/recommendations
4.	The measurement of water or gas pipes (internal and external) is carried out using appropriate and advanced equipment
5.	The measurement of surfaces (internal and external) is carried out using appropriate equipment in accordance with technical recommendations
6.	Volume measurement (internal and external) is carried out using appropriate equipment in accordance with technical recommendations
7.	The estimation/calculation of quantities is understandable, readable and reasonable, in accordance with quality standards
8.	Appropriate safety measures are taken when taking measurements, in accordance with industry standards

Evidence by process :

1.	Interpretation of complex building designs is done
2.	The analysis and quantification of human and material resources is effective
3.	The choice and use of materials, tools and equipment are appropriate to the work to be done
4.	The measurement of water/gas pipes is carried out
5.	The measurement of the zones (internal and external) is effective and consistent with the dimensions of the structure
6.	The measurement of volumes (internal and external) is effective and in accordance with the dimensions of the structure
7.	The calculation of quantities and costs is carried out in accordance with the plan of the work
8.	The application of safety measures is effective and complies with health safety and environment (HSE) standards

Evidence by product:

1.	The human and material resources required are analysed and quantified on the basis of the drawing
2.	The necessary materials, tools and equipment are selected and used in accordance with technical instructions/recommendations
3.	The measurement of water or gas pipes (internal and external) is carried out using appropriate and advanced equipment
4.	The measurement of surfaces (internal and external) is carried out using appropriate equipment in accordance with technical recommendations
5.	Volume measurement (internal and external) is carried out using appropriate equipment in accordance with technical recommendations
6.	The estimation/calculation of quantities is understandable, readable and reasonable, in accordance with quality standards

Evidence through knowledge:	
1.	The reading of the building plan is analysed and communicated with less supervision
2.	Safety measures are applied when taking measurements in accordance with industry standards
Evidence of attitude:	
1.	Responsibility: Plans and organizes work
2.	Cooperation: Participates and works with others in the execution of a teamwork task
3.	Order: Establishes and/or maintains priorities and order in the procedures for carrying out a task
4.	Appreciation: Values the contribution of other team members to improve productivity
5.	Communication: Completes written documentation in the workplace, establishes clear and direct communication, uses questioning to identify and confirm requirements, shares information, listens and understands, points out hazards and follow instructions, uses and interprets non-verbal communication, such as hand signals, to use culturally appropriate language and concepts
6.	Problem solving and decision-making: Approaches a problem from different angles and finds unique answers to situations
7.	Numeracy: Uses data and arithmetic to support evidence or demonstrate a point

Element 3.1.4. Assign materials to be used in plumbing work

Element 3.1.4.	Assign materials to be used in plumbing work
Unit 3.1.	Organizing plumbing work
Level of competence	3

Performance indicator: The plumber is competent when:	
1.	The installation plan is interpreted in accordance with the technical instruction
2.	Materials, accessories, tools and equipment are selected in accordance with safety and environmental standards
3.	The specifications of the required materials are confirmed in accordance with the technical instructions
4.	Materials are sorted and categorised according to technical instructions and safety and environmental standards
5.	Materials, tools and equipment are transported according to safety and environmental standards
6.	Materials and accessories are installed in accordance with technical instructions and safety and environmental standards
7.	Materials, tools and equipment are used in accordance with safety and environmental standards
8.	Materials, tools and equipment are stored in accordance with safety and environmental standards
9.	Materials, tools and equipment are maintained in accordance with safety and environmental standards and manufacturers' recommendations
10.	The work area is cleaned in accordance with safety and environmental standards
11.	Materials are disposed of, reused or recycled in accordance with safety and environmental standards
Evidence by process:	
1.	The interpretation of the building design is effective
2.	The choice of materials, accessories, tools and equipment is effective in accordance with the job specification

- | | |
|-----|---|
| 3. | The material specification is confirmed |
| 4. | The sorting and classification of materials is ensured |
| 5. | The transport of materials, tools and equipment to the work areas is ensured |
| 6. | The installation of materials and accessories is carried out in accordance with the installation plan |
| 7. | The use of materials, tools and equipment is appropriate to the tasks to be performed |
| 8. | Materials, tools and equipment are stored in accordance with safety and environmental protection standards |
| 9. | The maintenance of materials, tools and equipment is carried out in compliance with safety and environmental protection standards |
| 10. | The cleaning of a work area is done in compliance with safety and environmental protection standards |
| 11. | The disposal and recycling of materials are carried out in accordance with health, safety and environmental protection standards |

Evidence by product:

- | | |
|----|--|
| 1. | Materials, accessories, tools and equipment are selected in accordance with safety and environmental standards |
| 2. | Materials are sorted and categorised according to technical instructions and safety and environmental standards |
| 3. | Materials, tools and equipment are transported in accordance with safety and environmental standards |
| 4. | Materials and accessories are installed in accordance with technical instructions and safety and environmental standards |
| 5. | Materials, tools and equipment are used according to safety and environmental standards |
| 6. | Materials, tools and equipment are stored according to safety and environmental standards |
| 7. | Materials, tools and equipment are maintained in accordance with safety and environmental standards and manufacturers' recommendations |
| 8. | The work area is cleaned in accordance with safety and environmental standards |
| 9. | Materials are disposed of, reused or recycled in accordance with safety and environmental standards |

Evidence through knowledge:

- | | |
|----|---|
| 1. | The construction drawing is interpreted in accordance with the technical instruction |
| 2. | Specifications for required materials are confirmed according to technical instructions |

Evidence of attitude:

- | | |
|----|--|
| 1. | Responsibility: Plans and organizes work |
| 2. | Cooperation: Participates and works with other team members in carrying out tasks |
| 3. | Order: Establishes and/or maintains priorities and order in carrying out tasks |
| 4. | Appreciation: Values the contribution of other team members for improving productivity |
| 5. | Communication: Completes written documentation in the workplace, establishes clear and direct communication; uses questioning to identify and confirm requirements; shares information; listens and understands; points out hazards and follows instructions; uses and interprets non-verbal communication, such as hand signals; uses culturally appropriate language and concepts |
| 6. | Problem solving and decision-making: Approaches a problem from different angles and finds unique answers to situations |

► Unit 3.2. Carry out remedial maintenance work on complex sanitary appliances

Profession	Plumber
Title of the unit	Carry out remedial maintenance work on complex sanitary appliances
Description of the unit	The plumber identifies faults in complex plumbing fixtures, identifies equipment and materials for the repair or replacement of plumbing components, repairs/ replaces a faulty plumbing component and carries out functional testing
Elements of competence within the unit of competence	
1.	Identify faults in complex sanitary appliances
2.	Identify equipment and materials for repair or replacement of plumbing components
3.	Repair or replace a defective plumbing component
4.	Carry out the function test
General guidelines for evaluation	
1.	The evidence per identified product is assessed by means of a checklist for the required level
2.	The evidence of the process described is assessed by means of an observation checklist
3.	Deduce compliance with attitudinal evidence from compliance with product and performance evidence
4.	Setting up conditions for evaluating the cooperation between the plumber and the Master Plumber and with their counterparts
5.	Evidence of identified knowledge is assessed through questions and answers/personal statements

Element 3.2.1. Identify faults in complex sanitary appliances

Element 3.2.1.	Identify faults in sanitary appliances
Unit 3.2.	Carry out curative maintenance work on complex sanitary appliances
Level of competence	3
Performance indicator: The plumber is competent when:	
1.	The tools, materials and equipment for carrying out the repair are:
2.	Tools, equipment and materials for detecting faults are according to standards
3.	Tools, equipment and materials for detecting faults are according to standards
4.	Faults are diagnosed according to standards
5.	Fault location is carried out according to standards
Evidence by process:	
1.	The list of tools, equipment and materials for detecting faults is drawn up according to the supervisor's instruction
2.	The choice of tools, equipment and materials for detecting faults follows the supervisor's instructions
3.	Fault diagnosis is carried out in accordance with the standards
4.	The location of the fault is effective
5.	The application of workplace safety protocols is ensured

Evidence by product:
1. Tools, equipment and materials for detecting faults are selected
2. Tools, equipment and materials for detecting faults are listed under supervision
3. Faults are diagnosed according to the supervisor's instructions
4. Fault location is carried out according to the supervisor's instructions
5. The use of safety protocols in the workplace complies with OSH standards
Evidence through knowledge:
1. Tools, equipment and materials for detecting faults are listed under/without supervision
Evidence of attitude:
1. Responsibility: Assists in the planning and implementation of works
2. Cooperation: Participates and works with the team in the execution of a task
3. Order: Establishes and/or maintains priorities and order in carrying out tasks
4. Appreciation: Values the contribution of other team members for improving productivity
5. Communication: Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 3.2.2. Identify equipment and materials for repair or replacement of plumbing components

Element 3.2.2.	Identify equipment and materials for repair or replacement of plumbing components
Unit 3.2.	Carry out curative maintenance work on complex sanitary appliances
Level of competence	3

Performance indicator: The plumber is competent when:
1. The list of equipment and materials required is in accordance with the supervisor's instructions
2. The choice of equipment and materials is determined according to the specifications
3. Materials are selected in accordance with standard practice
4. The repair or replacement schedule is planned in accordance with standard practice
Evidence by process:
1. The list of equipment and materials for the repair or replacement of plumbing components is established according to the supervisor's instructions
2. The choice of material for the repair or replacement is made in accordance with the technical instructions
3. The preparation of equipment and materials is ensured
4. The planning of the repair or replacement schedule is carried out in accordance with standard practice
Evidence by product:
1. Materials are selected in accordance with standard practice
2. Materials and equipment are prepared in accordance with personal and environmental safety standards, under less supervision
3. Equipment and materials are maintained in accordance with technical instructions
Evidence through knowledge:
1. The choice of materials selected is in accordance with the job specification and the supervisor's instructions

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with others in the execution of teamwork tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 3.2.3. Repair or replace defective plumbing components

Element 3.2.3.	Repair or replace defective plumbing components
Unit 3.2.	Carry out curative maintenance work on complex sanitary appliances
Level of competence	3

Performance indicator: The plumber is competent when:

1. The necessary tools, equipment and materials are listed according to the supervisor's instructions
2. The necessary tools, equipment and materials are used in accordance with the supervisor's instructions
3. Defective component replacements are carried out under supervision
4. The repair of a defective plumbing component is carried out under supervision
5. The use of workplace safety protocols according to OSH standards

Evidence by process:

1. The list of tools, equipment and materials for detecting faults is established in accordance with the supervisor's instructions
2. The use of tools, equipment and materials to detect faults is adequate
3. Defective components are replaced in accordance with the technical instructions
4. The repair of minor faults is carried out according to the supervisor's instructions
5. The application of workplace safety protocols is ensured

Evidence by product:

1. The necessary materials, tools and equipment are selected in accordance with the supervisor's instructions
2. The necessary tools, equipment and materials are used in accordance with the supervisor's instructions
3. Replacement of defective plumbing component is carried out under supervision
4. The repair of a defective plumbing component is carried out under supervision
5. The use of workplace safety protocols meets OSH standards

Evidence through knowledge:

1. The necessary tools, equipment and materials are listed according to the supervisor's instructions

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with other team members in carrying out tasks
3. **Order:** Establishes and/or maintains priorities and order in carrying out tasks
4. **Appreciation:** Values the contribution of other team members for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

Element 3.2.4. Carry out the function test

Element 3.2.4.	Carry out the function test
Unit 3.2.	Carry out curative maintenance work on complex sanitary appliances
Level of competence	3

Performance indicator: The plumber is competent when:

1. The necessary tools, equipment and materials are selected in accordance with the supervisor's instruction
2. The selected tools, equipment and materials are used in accordance with the required safety and environmental protection standards, under less supervision
3. The test execution procedure is carried out in accordance with standard practices, under reduced supervision
4. The test schedule is determined in accordance with the standard

Evidence by process:

1. The list of tools, equipment and materials for the rehearsal of the tests is established under supervision
2. Identification of tools, equipment and materials for carrying out the tests is effective
3. Testing of the work is carried out
4. The planning of the test execution schedule is effective

Evidence by product:

1. The necessary tools, equipment and materials are selected according to the supervisor's instructions
2. The selected tools, equipment and materials are used in accordance with the required safety and environmental standards, under less supervision
3. The test execution procedure is carried out in accordance with standard practices under little supervision
4. The test schedule is determined in accordance with the standard

Evidence through knowledge:

1. Not required

Evidence of attitude:

1. **Responsibility:** Assists in the planning and implementation of works
2. **Cooperation:** Participates and works with others team members in carrying out tasks
3. **Order:** Establishes and/or respects priorities and order in carrying out tasks
4. **Appreciation:** Values team members contributions for improving productivity
5. **Communication:** Enables clear and direct communication, uses questioning to identify and confirm needs, shares information, listens and understands, points out dangers and follows instructions

VII. General guidelines for assessment

Knowledge

Questions and answers, multiple choice, interviews, assignments, personal statements, witness testimony, RPL

Skills⁴

Direct observation, work product, RPL, witness testimony, personal statements

Attitude

Direct observation, work product, witness testimony, personal statements

VIII. Glossary

Area of application	The industry’s area of expertise, specialization or function associated with the unit
Category	Specifies the area of training to be provided
Class	The grouping and classifying of jobs and occupations
Competence	The ability to perform tasks and duties to the level expected in the workplace, applying all relevant skills, knowledge and attitudes consistently over time in the required work situations
Competence standards	They consist of several units of competences, each of which describes a key function or role in a particular job or profession
Description of the competence elements	A competency element can be described by its title, the task to be performed, the performance criteria and the underlying knowledge and skills
Description of the units of competence	A brief statement giving a more detailed description of the job function covered by the unit which helps clarify the title of the unit and links with other units of competence
Elements of the competence	These are the main functions and tasks that make up the competence
Evidence of attitude	<ul style="list-style-type: none"> ▶ This enables people to work more effectively in all jobs/occupations and sectors, regardless of the content of the job ▶ These may include: <ul style="list-style-type: none"> basic skills – reading, writing and basic numeracy interpersonal skills – teamwork, communication, planning and organizing, problem solving thinking skills – learning, and computer skills personal skills – autonomy and integrity
Evidence of knowledge	<ul style="list-style-type: none"> ▶ Knowledge identifies what a person needs to know in order to do their job in an informed and effective manner ▶ Knowledge can be theoretical and/or factual Underlying knowledge may involve knowledge of theory, processes, technologies, codes of practice, legislation, etc.
Evidence of the process	<ul style="list-style-type: none"> ▶ Knowledge and skills and responsibilities required for the competent performance of job functions ▶ The demonstration of performance criteria
General guidelines for assessment	<ul style="list-style-type: none"> ▶ Evidence guidelines which provide information to the assessor on how competences are demonstrated, such as the conditions and context of the assessment, appropriate assessment methods and resource implications ▶ It should be read in conjunction with the performance criteria, the range statement and the unit content
Performance criteria	<ul style="list-style-type: none"> ▶ The performance standard or tasks that are involved in each relevant job function ▶ Critical terms or phrases may be written in bold italics and then defined in a range statement in the order in which they appear in the performance criteria
Product evidence	<ul style="list-style-type: none"> ▶ How knowledge is converted into results in the workplace ▶ Demonstrates how abilities lead to the competent use of know-how, operational guidelines, machines, working and communication methods, techniques, etc.
Title of the item	A short title that summarises the tasks to be performed, the performance criteria and the underlying knowledge and skills
Title of the unit of competence	A short title that summarises the main occupational function covered by the unit and accompanied by an alphanumeric code that follows ILO guidelines
Unit of competence	An agreed statement of the skills and knowledge required for the effective performance of a particular job or function



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