

OCCUPATIONAL SKILLS PROGRAMME DOCUMENT

IN LINE WITH QQSF POLICY (2021) OCCUPATIONAL QUALIFICATION TYPE (NOMENCLATURE)

SKILLS PROGRAMME	SKILLS PROGRAMME ID	TITLE (DESCRIPTOR)	NQF LEVEL	CREDITS
Skills Programme	SP-250404	Green Hydrogen Storage and Transfer	4	28
START DATE	END DATE	LAST DATE FOR ENROLMENT	LAST DATE FOR ACHIEVEMENT	
30 April 2025	30 April 2030	30 April 2031	30 April 2034	
CURRICULUM CODE	900519-000-00-00			
PARTNER DETAILS	ORGANISATION NAME	WEBSITE ADDRESS	TELEPHONE NUMBER	LOGO
QUALITY PARTNER - DEVELOPMENT	CHIETA	www.chieta.org.za	011 628 7000	

Contents

1. SKILLS PROGRAMME DETAILS	4
1.1 Sub-Framework: Occupational Qualifications Sub-Framework	4
1.2 Type (Nomenclature):	4
1.2.1 Specify if this is a Qualification/Part-Qualification/Skills Programme	4
1.2.2 Type: (Nomenclature) e.g. Advanced Occupational Certificate)	4
1.3 Title Descriptor:	4
1.4 NQF Level:	4
1.5 Credits:	4
1.6. Organising Field and Sub-field:.....	4
1.6.1 Organising Field:	4
1.6.2 Sub-field:.....	4
1.7 QCTO Curriculum Code:	4
1.8 Originator/Quality Partner (QP) – Development/Assessment.....	4
1.8.1 Quality Partner (Qualifications Development):.....	4
1.8.2 Quality Partner (Assessment):.....	4
1.9 Replacement	4
2. RATIONALE.....	5
2.1 The need for the Skills Programmes.....	5
2.2 Similar Qualification(s), Part-Qualifications/Skills Programmes.....	5
2.3 Benefit to the sector, society and the economy:.....	5
2.4 Typical learners:	6
2.5 Relation to Occupation(s) and/or Profession(s).....	6
2.5.1 Occupation(s) related:	6
2.5.2 Profession(s) related:	6
3. PURPOSE	7
3.1 Benefit the learners:	7
3.2 What the qualification or part-qualification intends to achieve:	7
3.3 Typical Graduate attributes.....	7
4. ENTRY REQUIREMENTS	7
5. RECOGNITION OF PRIOR LEARNING (RPL)	8
5.1 RPL for Access to Training:	8
5.2 RPL for Access to the External Integrated Summative Assessment (EISA) or Final Integrated Supervised Assessment (FISA):	8
6. RULES OF COMBINATION	8
6.1 Components:	8

6.2 Soft Skills Included:	9
6.3. Foundational Learning:	9
7. EXIT LEVEL OUTCOMES (ELO) AND ASSOCIATED ASSESSMENT CRITERIA (AAC). 9	
7.1 Exit Level Outcomes (ELO) 1:	9
Associated Assessment Criteria (AAC) for ELO 1:	9
7.2 Exit Level Outcomes (ELO) 2:	9
Associated Assessment Criteria (AAC) for ELO 2:	9
7.3 Exit Level Outcomes (ELO) 3:	10
Associated Assessment Criteria (AAC) for ELO 3:	10
8. INTEGRATED ASSESSMENT	10
8.1 Formative Assessments conducted internally	10
8.2 Integrated Summative Assessments conducted Internally	10
8.3 De-centralised Final Integrated Supervised Assessment (FISA) for Skills Programmes	11
10. ARTICULATION	15
10.2 Articulation for Skills programmes.....	15
10.2.1 Work Opportunities:	15
10.2.2 Learning Opportunities:	15
11. NOTES	15
11.1 Additional Legal or Physical Entry Requirements.....	15
11.2 Criteria for Accreditation	15
11.3 Encompassed Trades (where applicable)	15
12. ASSOCIATED QUALIFICATION(S)/PART-QUALIFICATION(S):	15

1. SKILLS PROGRAMME DETAILS

1.1 Sub-Framework: Occupational Qualifications Sub-Framework

1.2 Type (Nomenclature):

1.2.1 Specify if this is a Qualification/Part-Qualification/Skills Programme
Skills Programme

1.2.2 Type: (Nomenclature) e.g. Advanced Occupational Certificate)
Skills Programme

1.3 Title Descriptor:

State the Occupation, Specialisation, context or Skills Programme context
Green Hydrogen Storage and Transfer

1.4 NQF Level:

4

1.5 Credits:

28

1.6. Organising Field and Sub-field:

1.6.1 Organising Field:
Field 06: Manufacturing, Engineering and Technology

1.6.2 Sub-field:
Engineering and Related Design

1.7 QCTO Curriculum Code:

900519-000-00-00

1.8 Originator/Quality Partner (QP) – Development/Assessment

1.8.1 Quality Partner (Qualifications Development):
CHIETA

1.8.2 Quality Partner (Assessment):
Not applicable

1.9 Replacement

This qualification replaces:

This skills programme does not replace any other skills programme.

2. RATIONALE

2.1 The need for the Skills Programmes

The Hydrogen Society Roadmap for South Africa (HSRM), which serves as a national coordinating framework to facilitate the integration of hydrogen-related technologies, underscores the importance of developing a skilled workforce capable of driving South Africa's hydrogen economy forward. (2021)

Furthermore, a Comprehensive Study on the Hydrogen Economy in South Africa conducted by CHIETA 2023, identified the need to adopt new programmes in training on the identified skill needs, such as green hydrogen production.

Amid the rapidly evolving global hydrogen value chain, as well as the increasing emphasis on decarbonisation, this skills programme addresses the need to develop a workforce with the knowledge and skills required to participate in the emerging green hydrogen industry.

This skills programme will play a critical role in South Africa's efforts to transition towards an "innovation economy" by utilising green hydrogen.

2.2 Similar Qualification(s), Part-Qualifications/Skills Programmes

There are no other qualifications/part qualifications or skills programmes similar to this curriculum.

2.3 Benefit to the sector, society and the economy:

This skills programme will bridge a sector gap in the hydrogen value chain, empowering industry to reskill or upskill staff and deploy them into newly created jobs as various industrial processes, using green hydrogen as a clean fuel source, are being designed and implemented.

Green Hydrogen, derived from renewable sources such as solar and wind, offers significant benefits to society, including providing a versatile energy carrier for transportation, industry, and heating. This skills programme has the potential to contribute towards achieving global decarbonisation targets

As industry sectors work to reduce carbon emissions, especially in areas where electrification is challenging, such as heavy industry, transport, and high-heat applications, domestic production of green hydrogen becomes essential.

Skills development in green hydrogen plays a significant role in driving economic growth and development. Investing in green hydrogen skills development will provide multiple economic benefits, from job creation and technological innovation to energy security and sustainable growth.

This skills programme will support professional development by reskilling and/or upskilling the workforce, helping to prevent job losses and positioning the country as leaders in the green economy, driving both local and global economic development.

In addition, this skills programme will ensure a skilled workforce to grow hydrogen exports, encouraging inward investment and will foster the growth of startups and new businesses, which will drive innovation and create new economic opportunities in the clean energy sector.

2.4 Typical learners:

This skills programme is designed to include learners who are at post schooling levels, employees already involved in the logistical arrangements associated with hydrogen production and those who are already involved in renewable energy, energy management or energy efficiency sectors and are wanting to expand their knowledge and skills in the renewable energy sector.

2.5 Relation to Occupation(s) and/or Profession(s)

2.5.1 Occupation(s) related:

2.5.1.1 Collaboration with relevant stakeholders:

During the development various stakeholders were collaborated with such as:

- Workplace practitioners
- Higher Education Institutions
- Employers
- Private SDP's
- TVET Colleges
- Various SETA's

2.5.1.2 List typical occupations in which the qualifying learner will operate (if relevant)

Chemical Plant Operators, Electricians, Fitters, Process Technicians, Instrument Artisans, Storage and Transfer Facilities within the Green Hydrogen environment

2.5.2 Profession(s) related:

2.5.2.1 Collaboration with relevant stakeholders:

Not applicable

2.5.2.2 List typical professions in which the qualifying learner will operate (if relevant)

Not applicable

3. PURPOSE

3.1 Benefit the learners:

Completing the Green Hydrogen Storage and Transfer Skills Programme will provide the learner the opportunity to:

- enhance their skills and career prospects in the renewable energy sector
- gain hands-on experience in planning, storing and transferring hydrogen in a gaseous form
- remain relevant with skills required in the emerging Green Hydrogen value chain
- equip themselves with the knowledge and skills required to fill jobs being created in the emerging Green Hydrogen value chain

The qualified learner will have a solid understanding of the potential hazards associated with working with or around hydrogen, hydrogen-related regulations, standards, and codes, and the hydrogen production processes.

As the green hydrogen sector grows, it will create a wide range of jobs in the production, distribution, and uses of hydrogen. The knowledge and skills acquired in this skills programme will enable the learner to seek gainful employment in fields such as research and development, renewable energy firms, engineering, manufacturing, project management, and operations.

3.2 What the qualification or part-qualification intends to achieve:

The purpose of this skills programme is to prepare a learner to function in the Green Hydrogen Storage and Transfer environment,

The successful learner will be able to facilitate the safe and efficient storage and transfer of green hydrogen and coordinate the transportation via transport vehicles or into pipelines, to ensure the hydrogen reaches its destination safely and sustainably.

The qualified learner will be able to:

- Plan and prepare for green hydrogen storage
- Store green hydrogen in a gaseous form
- Plan for green hydrogen transportation
- Transfer green hydrogen into transport vehicles or pipelines
- Inspect storage and transport systems

3.3 Typical Graduate attributes

- Health and safety awareness
- Attention to detail
- Communication
- Analytical
- Reliability
- Effective Communication

4. ENTRY REQUIREMENTS

NQF Level 4 qualification with Mathematics and Physical Science

5. RECOGNITION OF PRIOR LEARNING (RPL)

5.1 RPL for Access to Training:

Learners may use the RPL process to gain access to training opportunities for a programme of learning, or skills programme if they do not meet the formal, minimum entry requirements for admission. RPL assessment provides an alternative access route into a programme of learning, or skills programme.

Such an RPL assessment may be developed, moderated and conducted by the accredited Skills Development Provider which offers that specific skills programme. Such an assessment must ensure that the learner is able to display the equivalent level of competencies required for access, based on the NQF level descriptors.

For exemption from modules through RPL, learners who have gained the stipulated competencies of the modules of a programme of learning, or skills programme through any means of formal, informal or non-formal learning and/or work experience, may be awarded credits towards relevant modules, and gaps identified for training, which is then concluded.

5.2 RPL for Access to the Final Integrated Supervised Assessment (FISA):

Learners who have gained the stipulated competencies of the modules of a programme of learning, or skills programme through any means of formal, informal or non-formal learning and/or work experience, may be awarded credits towards relevant modules, and gaps identified for training, which is then concluded.

For a Skills Programme, the accredited Skills Development Provider (SDP) must ensure all modular competency requirements are met prior to the FISA and keep record of such evidence.

Upon successful completion of the FISA, RPL learners will be issued with the QCTO certificate for the skills programme. Quality Partners are responsible for ensuring the RPL mechanism and process for the skills programme is approved by the QCTO.

6. RULES OF COMBINATION

6.1 Components:

KNOWLEDGE/THEORY COMPONENT

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900519-000-00-KM-01	Introduction to hydrogen energy	4	3	Blended
900519-000-00-KM-02	Green hydrogen storage legislation, regulations and compliance	4	2	Blended
900519-000-00-KM-03	Green hydrogen storage	4	2	Blended
900519-000-00-KM-04	Green hydrogen transfers ready for transporting	4	6	Blended

Total Credits = 13 credits

APPLICATION COMPONENT

The Application Component includes the following Practical Skills Modules

PRACTICAL SKILLS MODULE(S)

State compulsory modules:

MODULE CODE	MODULE TITLE	NQF LEVEL	CREDITS	MODE OF DELIVERY
900519-000-00-PM-01	Store green hydrogen	4	5	Face to Face
900519-000-00-PM-02	Prepare to transport green hydrogen	4	5	Face to Face
900519-000-00-PM-03	Transfer green hydrogen onto tube trailer or pipeline	4	5	Face to Face

Total credits of the selected modules = 15 credits

6.2 Soft Skills Included:

Indicate if 5% -10% of soft skills is included and give location notes on the modules where this is found:

5% of soft skill(s) are included in:

PM-02-PS02-PA0201

6.3. Foundational Learning:

Components of foundational learning included in Curriculum specifications

7. EXIT LEVEL OUTCOMES (ELO) AND ASSOCIATED ASSESSMENT CRITERIA (AAC)

7.1 Exit Level Outcomes (ELO) 1:

Operate systems to store green hydrogen

Associated Assessment Criteria (AAC) for ELO 1:

- Green hydrogen storage systems are identified
- Green hydrogen container and tank safety standards are determined
- Safety regulations for green hydrogen storage are identified
- Leak detection technologies are identified
- Green hydrogen volumes and storage conditions are recorded

7.2 Exit Level Outcomes (ELO) 2:

Apply knowledge of loading procedures to transfer green hydrogen

Associated Assessment Criteria (AAC) for ELO 2:

- Green hydrogen filling and dispensing standards are adhered to
- Green hydrogen temperature and pressure are determined using monitoring equipment

- Loading procedures to transfer green hydrogen to pipelines and/or vehicles are followed
- Emergency response plans required in the event of hydrogen leaks and/or systems malfunctions are identified

7.3 Exit Level Outcomes (ELO) 3:

Determine logistics for transporting Hydrogen

Associated Assessment Criteria (AAC) for ELO 3:

- Green hydrogen road transportation plans are developed
- Green hydrogen transportation risks are identified
- Transportation laws and regulations relevant to green hydrogen transportation are identified
- Despatch arrangements between operator, transporter and client are communicated
- Post-delivery inspections are conducted
- Hydrogen transfer requirements are complied with and all relevant documentation is completed

8. INTEGRATED ASSESSMENT

8.1 Formative Assessments conducted internally

Formative assessments are conducted throughout the training. A range of formal, non-formal, and informal ongoing assessment activities are used to focus on teaching and learning outcomes to improve learner attainment.

Formative assessments are conducted continuously by the facilitator to feed into further learning, to identify strengths and weakness, and to ensure the learner's ability to apply the knowledge and skills gained.

Formative Assessments are conducted by the accredited Skills Development Provider (SDP), using a variety of ongoing assessment methods, for example, quizzes, assignments, tests, scenarios, role play, interviews.

Continuous feedback must be provided

8.2 Integrated Summative Assessments conducted Internally

Integrated Assessment involves all the different types of assessment tasks required for a particular skills programme, such as written assessment of theory and practical demonstration of competence. To achieve this, the Internal Assessment Criteria (IAC) for all modules as found in the QCTO curriculum document must be followed.

An accredited SDP should implement a well-designed, formal, relevant, final internal Summative Assessment strategy for all modules to prepare learner for the FISA. These assessments evaluate learning achievements relating to the achievement of each module of the relevant components of the skills programme.

Internal Summative Assessments are developed, moderated and conducted by the SDP at the end of each module or after integration of relevant modules, e.g. applied knowledge

tests, workplace tasks, practical demonstrations, simulated tasks/demonstrations, projects, case studies, etc.

8.3 De-centralised Final Integrated Supervised Assessment (FISA) for Skills Programmes

The FISA is de-centralised, and the assessment standards set by the QCTO must be implemented by the accredited SDP in the development, moderation, and implementation of all FISA for skills programmes.

The accredited SDP manages and conducts the FISA and submits learner results for QCTO approval for certification, according to QCTO required compliance standards.

For entrance into the FISA, the learner must have completed the skills programme successfully and be found competent in all modules, recorded internally by the SDP.

Continuous Assessment

The SDP must ensure that all learners are enrolled with the QCTO at the start of training (within 5 days) in the format required by the QCTO.

Continuous assessments are set by the SDP in accordance with the outcomes provided.

This may consist of a variety of methods, e.g. practical or written assessments, assignments, projects, demonstrations, presentations or any other form of assessment to assist the learner in the learning process.

During training, it is mandatory for formal summative assessments to take place at the end of each module/topic. These results must be formally recorded and be available for monitoring and/or evaluation by the QCTO.

Final Integrated Supervised Assessment (FISA)

All learners gain entrance to the Final Integrated Supervised Assessment by successfully completing all formal summative assessments conducted by the SDP.

Format of FISA:

A **Practical and Written assessment** integrating the relevant Exit Level Outcomes, with short answer theory assessments and simulated practical assessments.

All FISAs must be supervised, and virtual FISA's must be recorded, and camera monitored throughout the assessment.

All Exit Level Outcomes and associated assessment criteria must be covered in the FISA. In the FISA, the learner must demonstrate applied knowledge and skills to prove that the competencies of the Green Hydrogen Storage and Transfer skills programme have been achieved.

Standards for Final Integrated Supervised Assessment (FISA):

The FISA INSTRUMENT (Written case study, scenario) must be developed and moderated by the SDP and conducted in a supervised environment. It is assessed by means of an **INSTRUMENT** and a **MEMORANDUM** developed by the SDP for this purpose.

In the **Written Component**, learners must be given real-life scenarios in which they must demonstrate that they have applied knowledge for all the Exit Level Outcomes:

1. Operate systems to store green hydrogen

- Outline different types of green hydrogen storage systems.
- Elaborate on the safety standards for hydrogen containers and tanks
- Evaluate applicable local and international safety regulations for green hydrogen storage.
- Apply knowledge of technologies used for detecting hydrogen leaks.
- Evaluate how to monitor and record hydrogen volumes, pressure, and temperature under specified storage conditions

2. Apply knowledge of loading procedures to transfer green hydrogen

- Apply knowledge of hydrogen filling and dispensing standards and procedures.
- Evaluate how to determine and monitor hydrogen temperature and pressure using standard equipment.
- Outline safe loading procedures for transferring green hydrogen to pipelines, cylinders, or vehicles.
- Apply knowledge on emergency response procedures in the event of leaks or system malfunctions during transfer operations.

3. Determine logistics for transporting hydrogen

- Apply knowledge on the develop of a road transportation plan for green hydrogen delivery.
- Outline transportation risks specific to hydrogen.
- Analyse national and international laws and regulations for hydrogen transportation.
- Outline communication procedures among the operator, transporter, and client for dispatch coordination.
- Apply the steps involved in post-delivery inspections of hydrogen storage and transport equipment.
- Apply knowledge on documentation requirements and compliance procedures related to hydrogen transfer logistics.

To be deemed competent the student must achieve a minimum score of 60% of 100 marks for the written assessment.

The written assessment should be a maximum of two (2) hours.

Learners who do not meet the pass mark will be allowed up to two re-assessment opportunities.

A computer-based assessment may be administered so that the above evidence can be created using document processing applications such as word, excel etc.

Learners who complete this skills programme will accumulate credits towards the relevant full or part qualification. The Credit Accumulation and Transfer (CAT) Policy may apply to
SP Doc Green Hydrogen Storage and Transfer 4 28

these learners.

Standards for Practical Final Integrated Supervised Assessment (FISA):

In the **Practical Component**, the learner should be provided with a brief/job card/task to demonstrate what the learner should show, know or produce in a product, relevant to the Exit Level Outcomes and the purpose of the Skills Programme.

This is the section where the learner must show applied competency (what the learner must be able to do, and to what expected standard). The learner must prove that he/she can work competently in a simulated, controlled Green Hydrogen Storage and Transfer environment.

The FISA INSTRUMENT brief/task [similar to a job card]) must be developed and moderated by the SDP and conducted in a supervised environment. It is assessed by means of an **INSTRUMENT** and **RUBRIC** developed by the SDP for this purpose

In a simulated or real environment, the candidates must be given a brief in which they must be required to practically demonstrate their ability to perform tasks related to Hydrogen Storage and Transfer

1. Operate systems to store green hydrogen

- Identify and select appropriate hydrogen storage systems for a given operational task.
- Conduct a pre-operation inspection on hydrogen tanks or containers in line with safety standards.
- Use leak detection tools or sensors to ensure system integrity.
- Accurately measure and record hydrogen volume, pressure, and temperature during storage.
- Apply all required safety regulations and personal protective equipment protocols while operating storage systems.

2. Apply knowledge of loading procedures to transfer green hydrogen

- Follow correct filling and dispensing procedures in accordance with standard operating procedures.
- Use monitoring tools to determine hydrogen temperature and pressure during transfer.
- Perform a loading operation to transfer green hydrogen into a pipeline or vehicle.
- Perform in an emergency response drill for a hydrogen leak or malfunction.
- Complete relevant safety and operational checklists post-transfer.

3. Determine logistics for transporting hydrogen

- Develop a sample hydrogen transportation plan including route, vehicle, and safety measures.

- Identify and log transport-related hazards for a specific delivery task.
- Apply transportation regulations using case-study-based documentation.
- Simulate communication between dispatch, transporter, and client using templates or communication logs.
- Conduct a post-delivery inspection and complete all required transfer documentation.
- Ensure hydrogen transfer procedures comply with legal and safety requirements through evidence-based demonstration

Please take note of the following:

- a. Candidates must have clear guidelines and instructions on completing the assessment tasks/job, including the assessment criteria and expected outcomes.
- b. The duration of the assessment is 4 hours.
- c. Candidates must be declared C/NYC.
- d. No FISA instrument is allowed to be used verbatim for re-assessment or for a different cohort of learners.

NOTE: Should a learner be found to be competent in all of the above areas, they should be declared “Competent”. If not yet competent in any of the above areas, they should be declared “NYC”, re-trained and then be re-assessed with different applicable tasks/scenarios.

The marking rubric/compliance checklist used to assess these competencies must include a section for the assessor/facilitator used in this session to make a note of competencies shown, (or not shown), as well as the questions that were asked, and a summary of the learner's answers, and state whether these are of the acceptable standard or not.

The marking rubric/compliance checklist compiled should contain specific areas marked with an asterisk (*) as compulsory sections in order for the learner to be declared C (Competent). Compulsory sections are when the safety of the candidate or others would be affected if incorrectly completed.

Learners who complete this skills programme will accumulate credits towards the relevant full or part qualification. The Credit Accumulation and Transfer (CAT) Policy may apply to these learners.

Submission of final results

Final results must be submitted to the QCTO in the required format, within 21 days of the date of the FISA, together with the following:

- Completed QA Verification Report on the FISA (QCTO template: relevant sections).
- A copy of the final Assessment Instrument used, as well as the marking guideline / rubric.
- Learner results spreadsheet

10. ARTICULATION

10.2 Articulation for Skills programmes

10.2.1 Work Opportunities:

Storage and Transfer Facilities within the Green Hydrogen environment, such as:

Chemical Plant Operators, Electricians, Fitters, Process Technicians, Instrument Artisans-

10.2.2 Learning Opportunities:

Qualified learners may further their studies by enrolling in other related skills programmes and qualifications, subject to meeting minimum entry requirements of such skills programmes such as

- Skills Programme: Green Hydrogen Production, NQF Level 04, 29 credits
- Skills Programme Green Hydrogen Technology, NQF Level 04, 29 credits
- Skills Programme Hydrogen Fuel Cell System Practitioner, NQF Level 05, 39 credits

11. NOTES

11.1 Additional Legal or Physical Entry Requirements

None

11.2 Criteria for Accreditation

Accreditation requirements, against which Skills Development Providers (SDP) and Assessment Centres, will be accredited, is found in the Curriculum Document, as listed below.

Curriculum Code:

900519-000-00-00

11.3 Encompassed Trades (where applicable)

None

12. ASSOCIATED QUALIFICATION(S)/PART-QUALIFICATION(S):

None