Qualification Pack

Green Hydrogen Storage Hub Senior Operator

QP Code: LSC/Q3902

Version: 1.0

NSQF Level: 4

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LSC/Q3902: Green Hydrogen Storage Hub Senior Operator

Brief Job Description

The Green Hydrogen Storage Hub Senior Operator plays a pivotal role in the safe and efficient operation of the Green Hydrogen Storage Facility. The individual in this role is responsible for overseeing loading, unloading, and dispatch activities, ensuring seamless flow of the hub operations. The individual will also be responsible for monitoring the storage tanks and infrastructure, implementing preventive maintenance schedules for optimal functionality, and contributing to the reliability of the sustainable energy hub.

Personal Attributes

This job requires the individual to demonstrate a strong commitment to safety, prioritising the well-being of personnel and the environment in all hub operations. The individual should exhibit flexibility and a proactive approach to changing situations, efficiently adjusting to evolving operational demands and unexpected challenges. The individual should also possess a keen attention to detail and effective communication skills to collaborate with team members, suppliers, and emergency services for seamless hub operations.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. LSC/N3912: Assist in installing green hydrogen storage systems
2. LSC/N3913: Execute loading and unloading operations
3. LSC/N3914: Manage green hydrogen weight distribution
4. LSC/N3915: Comply with green hydrogen storage parameters
5. LSC/N3916: Handle cryogenic hydrogen vessels
6. LSC/N3917: Coordinate efficient green hydrogen dispatch
7. LSC/N3918: Follow health, safety & emergency protocols at green hydrogen storage hubs
8. DGT/VSQ/N0101: Employability Skills (30 Hours)

Qualification Pack (QP) Parameters

Sector	Logistics

Qualification Pack

Sub-Sector	Port Terminals, ICD and CFS, Liquid Logistics, Warehousing (Storage & Packaging)
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
Country	India
NSQF Level	4
Credits	16
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3133, 3134
Minimum Educational Qualification & Experience	12th grade Pass (Chemistry) with 1 Year of experience in handling DG/ Chemicals OR Completed 2nd year of the 3-year diploma after 10 (in chemical engineering) with 1 Year of experience in handling DG/ Chemicals OR 10th grade pass (with 2 Years of ITI in relevant field) with 1 Year of experience in handling DG/ Chemicals OR 9th grade pass with 4 Years of experience (4.5 Years of relevant experience in handling DG/ Chemicals) OR Previous relevant Qualification of NSQF Level (3) with 3 Years of experience in handling DG/ Chemicals
Minimum Level of Education for Training in School	
Pre-Requisite License or Training	NA
Minimum Job Entry Age	19 Years
Last Reviewed On	NA
Next Review Date	30/04/2027
NSQC Approval Date	30/04/2024
Version	1.0
Reference code on NQR	QG-04-TW-02475-2024-V1-LSC
NQR Version	1.0

Qualification Pack

LSC/N3912: Assist in installing green hydrogen storage systems

Description

This unit involves developing competencies for assisting in installing green hydrogen storage systems and testing the installed units before commissioning.

Scope

The scope covers the following :

- Support in installing compressed hydrogen storage system
- Conduct testing of the installed unit

Elements and Performance Criteria

Support in installing compressed hydrogen storage systems

To be competent, the user/individual on the job must be able to:

PC1. Interpret layout drawings and installation manuals for the specific hydrogen storage unit.

PC2. Select and gather necessary tools and equipment based on technical specifications and safety protocols.

PC3. Observe and assist with the safe unloading, transport, and lifting of high-pressure cylinders.

PC4. Assist in securing cylinders in designated locations using appropriate restraints and anchoring methods.

PC5. Ensure individual cylinders or cylinder bundles are installed according to the manufacturer's instructions and industry standards.

PC6. Ensure that the hydrogen components and systems are placed away from heat sources and ignition hazards.

PC7. Ensure appropriate labelling of each cylinder, including content, pressure rating, and safety information.

PC8. Observe and assist with the correct installation of safety relief devices (PRDs/TPRDs) with proper venting and discharge lines, following designated procedures and ensuring compliance with safety regulations.

PC9. Verify that the piping and tubing are secured using designated materials and techniques, ensuring leak-tightness.

PC10. Help with installing various protective valves on cylinders (check valves, automatic shut-off valves, etc.) following manufacturer instructions and under the guidance of the team leader.

PC11. Assist in the installation of pressure indicators, pressure regulators, manual cylinder valves, pressure regulators, excess flow valves, filters, pressure/temperature/hydrogen/flow sensors, and hydrogen leakage detection sensors, ensuring proper placement and functionality.

PC12. Assist in the installation and configuration of overpressure protection devices according to design specifications and safety regulations.

PC13. Contribute to the installation of a leak detection and fire alarm system for the hydrogen storage system.

Conduct testing of the installed unit

To be competent, the user/individual on the job must be able to:

PC14. Perform visual inspections and leak detection tests to ensure system integrity.

PC15. Assist in conducting storage tank testing procedures like Bonfire testing, Hydrostatic burst, Ambient pressure cycling, Penetration, and Leak-before-break tests, adhering to safety protocols and regulations.

PC16. Report any observations or potential issues to the concerned authority for further evaluation and action.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. properties of hydrogen under pressure and at cryogenic temperatures

KU2. principles of compressed hydrogen storage, including pressure-volume relationships, gas behaviour at high pressures

KU3. different types of compressed hydrogen storage systems (e.g., individual cylinders, bundles, tube trailers) and their application areas

KU4. potential hazards associated with hydrogen leaks, fires, and explosions

KU5. principles of pressure relief and safety systems in hydrogen storage

KU6. functions and specifications of high-pressure cylinders

KU7. working of pressure gauges, regulators, valves, filters, sensors, and other relevant components

KU8. principles of piping and tubing design and installation for hydrogen service

KU9. safe handling and installation procedures for high-pressure cylinders

KU10. role of overpressure protection devices in maintaining system safety

KU11. proper use of personal protective equipment (PPE) and adherence to safety protocols

KU12. purpose and procedures for various pressure testing methods (e.g., hydrostatic, pneumatic)

KU13. relevant national and international codes and standards for hydrogen storage

KU14. potential fouling and erosion issues in hydrogen storage systems

KU15. industry best practices for safe and efficient installation of hydrogen storage systems

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate effectively with colleagues, supervisors, and other stakeholders (written, verbal, visual)

GS2. actively listen to instructions, feedback, and concerns from team members and supervisors

GS3. read and interpret technical drawings, schematics, and installation manuals

GS4. work effectively with team members to achieve common goals and overcome challenges

GS5. adapt to changing circumstances and unexpected situations during installation

GS6. remain calm and focused under pressure

GS7. prioritise tasks based on urgency and importance to ensure efficient workflow

GS8. take responsibility for assigned tasks and strive for continuous improvement

GS9. uphold ethical standards and ensure professional conduct in all interactions

GS10. learn and adapt to new technologies and procedures related to hydrogen storage systems

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Support in installing compressed hydrogen storage systems	**24**	**49**	**-**	**8**
PC1. Interpret layout drawings and installation manuals for the specific hydrogen storage unit.	2	4	-	1
PC2. Select and gather necessary tools and equipment based on technical specifications and safety protocols.	2	4	-	1
PC3. Observe and assist with the safe unloading, transport, and lifting of high-pressure cylinders.	1	4	-	-
PC4. Assist in securing cylinders in designated locations using appropriate restraints and anchoring methods.	2	4	-	1
PC5. Ensure individual cylinders or cylinder bundles are installed according to the manufacturer's instructions and industry standards.	2	4	-	-
PC6. Ensure that the hydrogen components and systems are placed away from heat sources and ignition hazards.	2	4	-	-
PC7. Ensure appropriate labelling of each cylinder, including content, pressure rating, and safety information.	2	3	-	1
PC8. Observe and assist with the correct installation of safety relief devices (PRDs/TPRDs) with proper venting and discharge lines, following designated procedures and ensuring compliance with safety regulations.	2	4	-	-
PC9. Verify that the piping and tubing are secured using designated materials and techniques, ensuring leak-tightness.	2	4	-	1
PC10. Help with installing various protective valves on cylinders (check valves, automatic shut-off valves, etc.) following manufacturer instructions and under the guidance of the team leader.	1	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Assist in the installation of pressure indicators, pressure regulators, manual cylinder valves, pressure regulators, excess flow valves, filters, pressure/temperature/hydrogen/flow sensors, and hydrogen leakage detection sensors, ensuring proper placement and functionality.	2	4	-	1
PC12. Assist in the installation and configuration of overpressure protection devices according to design specifications and safety regulations.	2	3	-	1
PC13. Contribute to the installation of a leak detection and fire alarm system for the hydrogen storage system.	2	4	-	1
Conduct testing of the installed unit	**6**	**11**	**-**	**2**
PC14. Perform visual inspections and leak detection tests to ensure system integrity.	2	4	-	1
PC15. Assist in conducting storage tank testing procedures like Bonfire testing, Hydrostatic burst, Ambient pressure cycling, Penetration, and Leak-before-break tests, adhering to safety protocols and regulations.	2	3	-	-
PC16. Report any observations or potential issues to the concerned authority for further evaluation and action.	2	4	-	1
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3912
NOS Name	Assist in installing green hydrogen storage systems
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

LSC/N3913: Execute loading and unloading operations

Description

This unit encompasses the knowledge and skills needed for individuals responsible for coordinating green hydrogen loading and unloading activities at the storage hub.

Scope

The scope covers the following :

- Prepare the hub for loading and unloading green hydrogen
- Execute loading activities
- Coordinate unloading operations
- Communicate progress status and document activities

Elements and Performance Criteria

Prepare the hub for loading and unloading green hydrogen

To be competent, the user/individual on the job must be able to:

PC1. Receive and interpret the job sheet to understand the transportation schedules and loading/unloading plan.

PC2. Coordinate with internal teams (production, transportation, safety) and external partners (transport providers, customers) to ensure smooth execution.

PC3. Ensure the designated loading/unloading area is clear and free of obstructions with proper equipment, signage, and personnel in place.

PC4. Inspect storage infrastructure components for structural integrity and compliance with weight distribution guidelines.

PC5. Allocate appropriate loading and unloading equipment based on hydrogen type, quantity, and transportation mode (pipelines, trucks, ships).

PC6. Verify the operational readiness of loading/unloading equipment (pumps, compressors, hoses, valves) based on specific procedures.

PC7. Monitor weather conditions and suggest alternations to the loading/unloading plans.

Execute loading activities

To be competent, the user/individual on the job must be able to:

PC8. Oversee the alignment, connection, and disconnection of equipment during loading.

PC9. Implement proper sequencing of loading processes based on hydrogen quantity, pressure, and vessel compatibility.

PC10. Continuously monitor pressure, temperature, and other relevant operational parameters while loading green hydrogen.

PC11. Utilise load cells or scales to measure and verify the weight of green hydrogen during loading.

PC12. Utilise appropriate weight measurement tools, such as weight cells or scales, to quantify and verify the weight of the green hydrogen being loaded or unloaded.

Coordinate Unloading Operations

To be competent, the user/individual on the job must be able to:

PC13. Coordinate unloading processes, considering factors such as storage vessel type, pressure, and safety protocols.

PC14. Verify the accuracy of unloading equipment and make necessary adjustments to optimise efficiency.

PC15. Monitor and control flow rates during unloading to prevent overpressure and ensure safe handling.

PC16. Troubleshoot and resolve operational issues during loading and unloading to minimise downtime.

Communicate Progress Status and Document Activities

To be competent, the user/individual on the job must be able to:

PC17. Communicate relevant information to supervisors, colleagues, and stakeholders regarding the progress, status of loading and unloading operations and any issues or deviations.

PC18. Verify the accuracy and completeness of loaded/unloaded quantities against invoice/receipts and documentation.

PC19. Communicate any deviations from the planned weight distribution and proposed solutions.

PC20. Ensure comprehensive documentation of loading and unloading activities, including quantity, time logs, safety checklists, and handover documents, maintaining accurate records for regulatory compliance and audit purposes.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. various colour code nomenclature of hydrogen

KU2. end use applications of Green hydrogen in industry, transport and power production

KU3. physical and chemical properties of hydrogen, including its flammability range, ignition sources, and potential hazards

KU4. regulations and standards for hydrogen storage and transportation (e.g., NFPA 2, ISO 14226)

KU5. types of loading and unloading equipment used for pipelines, trucks, and ships (e.g., compressors, pumps, cryogenic tanks)

KU6. strategies for dynamic adjustment of loading sequences to maintain planned weight distribution

KU7. capabilities and limitations of different loading and unloading equipment

KU8. principles of conducting risk assessments related to loading and unloading operations

KU9. safety protocols to prevent accidents, spills, and other hazards during the operation

KU10. personal protective equipment (PPE) requirements for different hydrogen handling tasks

KU11. factors affecting the quantity, type, and scheduling of green hydrogen loading and unloading

KU12. key performance indicators (KPIs) for loading and unloading operations

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read manuals, job sheets, delivery notes, health and safety instructions, etc.
GS2. convey information and instructions to colleagues, supervisors, and external partners
GS3. organise and analyse information relevant to the work
GS4. actively listen and understand concerns and feedback from others
GS5. work cohesively with team members towards shared goals
GS6. think critically and creatively to identify potential solutions
GS7. efficiently manage time during loading and unloading operations to meet planned schedules
GS8. multitask effectively and prioritise critical tasks

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Prepare the hub for loading and unloading green hydrogen	**11**	**21**	**-**	**4**
PC1. Receive and interpret the job sheet to understand the transportation schedules and loading/unloading plan.	1	3	-	-
PC2. Coordinate with internal teams (production, transportation, safety) and external partners (transport providers, customers) to ensure smooth execution.	1	3	-	1
PC3. Ensure the designated loading/unloading area is clear and free of obstructions with proper equipment, signage, and personnel in place.	1	3	-	-
PC4. Inspect storage infrastructure components for structural integrity and compliance with weight distribution guidelines.	2	3	-	1
PC5. Allocate appropriate loading and unloading equipment based on hydrogen type, quantity, and transportation mode (pipelines, trucks, ships).	2	3	-	1
PC6. Verify the operational readiness of loading/unloading equipment (pumps, compressors, hoses, valves) based on specific procedures.	2	3	-	1
PC7. Monitor weather conditions and suggest alternations to the loading/unloading plans.	2	3	-	-
Execute loading activities	**7**	**15**	**-**	**2**
PC8. Oversee the alignment, connection, and disconnection of equipment during loading.	1	3	-	-
PC9. Implement proper sequencing of loading processes based on hydrogen quantity, pressure, and vessel compatibility.	1	3	-	1
PC10. Continuously monitor pressure, temperature, and other relevant operational parameters while loading green hydrogen.	1	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Utilise load cells or scales to measure and verify the weight of green hydrogen during loading.	2	3	-	-
PC12. Utilise appropriate weight measurement tools, such as weight cells or scales, to quantify and verify the weight of the green hydrogen being loaded or unloaded.	2	3	-	1
Coordinate Unloading Operations	**6**	**12**	**-**	**2**
PC13. Coordinate unloading processes, considering factors such as storage vessel type, pressure, and safety protocols.	1	3	-	-
PC14. Verify the accuracy of unloading equipment and make necessary adjustments to optimise efficiency.	2	3	-	1
PC15. Monitor and control flow rates during unloading to prevent overpressure and ensure safe handling.	1	3	-	-
PC16. Troubleshoot and resolve operational issues during loading and unloading to minimise downtime.	2	3	-	1
Communicate Progress Status and Document Activities	**6**	**12**	**-**	**2**
PC17. Communicate relevant information to supervisors, colleagues, and stakeholders regarding the progress, status of loading and unloading operations and any issues or deviations.	2	3	-	-
PC18. Verify the accuracy and completeness of loaded/unloaded quantities against invoice/receipts and documentation.	2	3	-	1
PC19. Communicate any deviations from the planned weight distribution and proposed solutions.	1	3	-	-
PC20. Ensure comprehensive documentation of loading and unloading activities, including quantity, time logs, safety checklists, and handover documents, maintaining accurate records for regulatory compliance and audit purposes.	1	3	-	1

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3913
NOS Name	Execute loading and unloading operations
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

LSC/N3914: Manage green hydrogen weight distribution

Description

This unit encompasses the knowledge and skills needed to optimise the weight distribution of the green hydrogen storage infrastructure during loading and unloading operations.

Scope

The scope covers the following :

- Analyse weight distribution
- Calculate the actual weight distribution
- Adjust loading sequence for planned weight distribution
- Verify final weight distribution

Elements and Performance Criteria

Analyse weight distribution

To be competent, the user/individual on the job must be able to:

PC1. Obtain weight distribution guidelines and review relevance to the storage infrastructure (e.g., pipelines, tanks, platforms, foundations).

PC2. Consult inventory records and equipment manuals, or conduct physical measurements to collect information on the weight of stored hydrogen, equipment, and any additional objects placed on the storage infrastructure.

PC3. Verify collected information to ensure completeness and accuracy.

Calculate the actual weight distribution

To be competent, the user/individual on the job must be able to:

PC4. Apply relevant formulas and methodologies based on the guidelines to calculate the actual weight distribution across the storage infrastructure.

PC5. Identify and consider variables such as hydrogen quantity, equipment weight, and storage infrastructure dimensions during weight distribution calculation.

PC6. Verify the accuracy and calibration of the weight measurement tools before and after use.

Adjust loading sequence for planned weight distribution

To be competent, the user/individual on the job must be able to:

PC7. Monitor loading processes and adjust sequence or flow rates dynamically to achieve and maintain the planned weight distribution.

PC8. Implement corrective actions in real time to prevent any exceedance of weight distribution limits.

Verify final weight distribution

To be competent, the user/individual on the job must be able to:

PC9. Conduct post-loading checks using weight measurement tools to verify the final weight distribution.

PC10. Compare the actual weight distribution with the planned values and identify any discrepancies.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. various colour code nomenclature of hydrogen
KU2. physical and chemical properties of hydrogen, including its flammability range, ignition sources, and potential hazards
KU3. principles and theories of weight distribution in hydrogen storage infrastructure
KU4. regulations and standards for hydrogen storage and transportation (e.g., NFPA 2, ISO 14226)
KU5. types of loading and unloading equipment used for pipelines, trucks, and ships (e.g., compressors, pumps, cryogenic tanks)
KU6. key principles behind the weight distribution guidelines, such as the center of gravity calculations, maximum allowable loads, and stress limits for different components
KU7. various loading scenarios (total capacity, partial loads, uneven distribution) and their impact on weight distribution
KU8. calibration procedures for weight measurement tools
KU9. Importance of effective communication and documentation in ensuring safe and efficient loading and unloading operations
KU10. regulatory requirements and safety standards applicable to green hydrogen storage operations

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read manuals, job sheets, delivery notes, health and safety instructions, etc.
GS2. effectively communicate progress, deviations, and proposed solutions to supervisors and stakeholders
GS3. organise and analyse information relevant to the work
GS4. foster a collaborative and constructive approach to resolving conflicts within the team
GS5. think critically and creatively to identify potential solutions
GS6. act decisively in time-sensitive situations
GS7. multitask effectively and prioritise critical tasks
GS8. actively seek opportunities for professional development to enhance skills

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Analyse weight distribution	**9**	**18**	**-**	**3**
PC1. Obtain weight distribution guidelines and review relevance to the storage infrastructure (e.g., pipelines, tanks, platforms, foundations).	3	6	-	1
PC2. Consult inventory records and equipment manuals, or conduct physical measurements to collect information on the weight of stored hydrogen, equipment, and any additional objects placed on the storage infrastructure.	3	6	-	1
PC3. Verify collected information to ensure completeness and accuracy.	3	6	-	1
Calculate the actual weight distribution	**9**	**18**	**-**	**3**
PC4. Apply relevant formulas and methodologies based on the guidelines to calculate the actual weight distribution across the storage infrastructure.	3	6	-	1
PC5. Identify and consider variables such as hydrogen quantity, equipment weight, and storage infrastructure dimensions during weight distribution calculation.	3	6	-	1
PC6. Verify the accuracy and calibration of the weight measurement tools before and after use.	3	6	-	1
Adjust loading sequence for planned weight distribution	**6**	**12**	**-**	**2**
PC7. Monitor loading processes and adjust sequence or flow rates dynamically to achieve and maintain the planned weight distribution.	3	6	-	1
PC8. Implement corrective actions in real time to prevent any exceedance of weight distribution limits.	3	6	-	1
Verify final weight distribution	**6**	**12**	**-**	**2**
PC9. Conduct post-loading checks using weight measurement tools to verify the final weight distribution.	3	6	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Compare the actual weight distribution with the planned values and identify any discrepancies.	3	6	-	1
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3914
NOS Name	Manage green hydrogen weight distribution
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

LSC/N3915: Comply with green hydrogen storage parameters

Description

This unit focuses on maintaining optimal conditions while handling compressed gaseous hydrogen pressure vessels, operating and maintaining green hydrogen storage units, and monitoring and analysing storage performance for efficiency.

Scope

The scope covers the following :

- Maintain optimal storage conditions
- Handle Compressed Gaseous Hydrogen (CGH2) pressure vessels
- Operate and maintain the green hydrogen storage units
- Monitor and analyse storage performance

Elements and Performance Criteria

Maintain optimal storage conditions

To be competent, the user/individual on the job must be able to:

PC1. Analyse the storage capacity and conditions of the facility to determine optimal storage configurations.

PC2. Adhere to the storage plans based on the characteristics and quantity of green hydrogen to be stored.

PC3. Monitor and control key storage parameters (e.g., pressure, temperature, humidity) based on system specifications and safety regulations.

PC4. Set and monitor inventory capacity limits to avoid overfilling and potential safety hazards.

PC5. Monitor and analyse hydrogen purity levels, taking corrective actions as needed to maintain quality standards.

PC6. Implement relevant regulations and standards applicable to green hydrogen storage facilities (e.g., NFPA 2, ISO 14687, local regulations).

Handle Compressed Gaseous Hydrogen (CGH2) pressure vessels

To be competent, the user/individual on the job must be able to:

PC7. Conduct regular inspections of CGH2 (Compressed Gaseous Hydrogen) pressure vessels for leaks, corrosion, damage, and wear.

PC8. Adhere to relevant pressure vessel codes and standards (e.g., ISO, ISI) for safe operation and maintenance.

PC9. Implement pressure relief and safety interlock systems and monitor their functionality.

PC10. Respond promptly and effectively to pressure deviations, leaks, or other emergencies involving CGH2 vessels.

Operate and maintain the green hydrogen storage units

To be competent, the user/individual on the job must be able to:

PC11. Follow operation and maintenance manuals for the specific hydrogen storage system.

PC12. Conduct routine inspections according to established procedures, documenting findings in an event logbook.

PC13. Implement the preventive maintenance plan, performing scheduled activities with accuracy and attention to detail.

PC14. Utilise appropriate tools and equipment safely and effectively for performing maintenance tasks.

PC15. Safely purge hydrogen from equipment during maintenance procedures using designated protocols.

PC16. Perform inspections, repairs, and replacements of equipment according to established procedures and safety standards.

PC17. Conduct leak tests after equipment repairs or replacements to ensure system integrity.

Monitor and analyse storage performance

To be competent, the user/individual on the job must be able to:

PC18. Track and monitor KPIs related to storage efficiency, such as capacity utilisation, loading/unloading times, energy consumption, and safety incidents.

PC19. Analyse performance data (e.g., pressure, temperature, boil-off rates) to identify potential issues and optimise storage efficiency.

PC20. Benchmark storage performance against industry standards and best practices.

PC21. Prepare and submit required reports to relevant authorities as per stipulated deadlines.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. physical and chemical properties of green hydrogen, including its behaviour under various storage conditions

KU2. difference between Compressed Gas Hydrogen Storage (CGH2), Liquid Hydrogen Storage (LH2), and Cryo-compressed Hydrogen Storage (CcH2) based on their principles and applications

KU3. advantages and limitations of each technology based on factors like energy density, safety considerations, infrastructure requirements, and cost

KU4. type-I, II, III, & IV cylinders used in green

KU5. characteristics and specifications of Vessel Types I, II, III, & IV used in green hydrogen storage

KU6. properties and characteristics of carbon fibre material used in Type-IV cylinders

KU7. emerging storage technologies and their potential impact on the industry

KU8. safety regulations and industry standards governing the storage of green hydrogen

KU9. functions, maintenance needs, and potential failure modes of different types of storage tanks, pipelines, valves, and other equipment used in green hydrogen storage

KU10. relevant standards and regulations for hydrogen equipment maintenance (e.g., API, ASME)

KU11. how to conduct risk assessments related to equipment maintenance

KU12. emergency response procedures specific to equipment failures or malfunctions during storage

KU13. benchmarking practices and industry standards for hydrogen storage performance

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate clearly and effectively with team members, supervisors, and relevant stakeholders

GS2. actively listen to concerns and feedback from technicians, engineers, and safety personnel

GS3. set priorities and manage time effectively

GS4. make timely and informed decisions in diverse situations

GS5. build rapport and maintain positive relationships with colleagues and stakeholders

GS6. resolve conflicts constructively and collaboratively when addressing differing opinions or concerns

GS7. work cohesively with maintenance technicians, engineers, and safety professionals

GS8. show respect and appreciation for the diverse skills and expertise of others

GS9. continuously learn new skills and knowledge

GS10. mentor and guide less experienced team members

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Maintain optimal storage conditions	**8**	**17**	**-**	**3**
PC1. Analyse the storage capacity and conditions of the facility to determine optimal storage configurations.	1	2	-	-
PC2. Adhere to the storage plans based on the characteristics and quantity of green hydrogen to be stored.	1	3	-	-
PC3. Monitor and control key storage parameters (e.g., pressure, temperature, humidity) based on system specifications and safety regulations.	1	3	-	1
PC4. Set and monitor inventory capacity limits to avoid overfilling and potential safety hazards.	1	3	-	1
PC5. Monitor and analyse hydrogen purity levels, taking corrective actions as needed to maintain quality standards.	2	3	-	1
PC6. Implement relevant regulations and standards applicable to green hydrogen storage facilities (e.g., NFPA 2, ISO 14687, local regulations).	2	3	-	-
Handle Compressed Gaseous Hydrogen (CGH2) pressure vessels	**5**	**10**	**-**	**2**
PC7. Conduct regular inspections of CGH2 (Compressed Gaseous Hydrogen) pressure vessels for leaks, corrosion, damage, and wear.	1	3	-	1
PC8. Adhere to relevant pressure vessel codes and standards (e.g., ISO, ISI) for safe operation and maintenance.	1	2	-	-
PC9. Implement pressure relief and safety interlock systems and monitor their functionality.	2	3	-	1
PC10. Respond promptly and effectively to pressure deviations, leaks, or other emergencies involving CGH2 vessels.	1	2	-	-
Operate and maintain the green hydrogen storage units	**10**	**21**	**-**	**2**

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Follow operation and maintenance manuals for the specific hydrogen storage system.	1	3	-	-
PC12. Conduct routine inspections according to established procedures, documenting findings in an event logbook.	1	3	-	1
PC13. Implement the preventive maintenance plan, performing scheduled activities with accuracy and attention to detail.	2	3	-	1
PC14. Utilise appropriate tools and equipment safely and effectively for performing maintenance tasks.	1	3	-	-
PC15. Safely purge hydrogen from equipment during maintenance procedures using designated protocols.	1	3	-	-
PC16. Perform inspections, repairs, and replacements of equipment according to established procedures and safety standards.	2	3	-	-
PC17. Conduct leak tests after equipment repairs or replacements to ensure system integrity.	2	3	-	-
Monitor and analyse storage performance	**7**	**12**	**-**	**3**
PC18. Track and monitor KPIs related to storage efficiency, such as capacity utilisation, loading/unloading times, energy consumption, and safety incidents.	2	3	-	1
PC19. Analyse performance data (e.g., pressure, temperature, boil-off rates) to identify potential issues and optimise storage efficiency.	1	3	-	-
PC20. Benchmark storage performance against industry standards and best practices.	2	3	-	1
PC21. Prepare and submit required reports to relevant authorities as per stipulated deadlines.	2	3	-	1
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3915
NOS Name	Comply with green hydrogen storage parameters
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

LSC/N3916: Handle cryogenic hydrogen vessels

Description

This unit specifies the knowledge, skills and competencies to handle Cryogenic Vessels for Liquid Hydrogen (LH2) and Cryo-compressed Hydrogen (CcH2), emphasising safe operation and maintenance.

Scope

The scope covers the following :

- Manage cryogenic vessels for LH2 and CcH2
- Operate and maintain CcH2 vessels

Elements and Performance Criteria

Manage cryogenic vessels for LH2 and CcH2

To be competent, the user/individual on the job must be able to:

PC1. Follow cryogenic safety protocols for handling and operating LH2 (Liquid dihydrogen) and CcH2 (Cryo-compressed Hydrogen) vessels.

PC2. Perform safe storage and handling of LH2 in dedicated insulated tanks, ensuring proper ventilation and adherence to safety distances.

PC3. Inspect insulated and rated transfer lines and hoses specifically designed for LH2 compatibility and pressure ratings before each use.

PC4. Implement proper grounding procedures to prevent static electricity discharge during LH2 handling.

PC5. Monitor and maintain cryogenic vessel insulation systems to minimise boil-off losses.

PC6. Use specific cryogenic safety protocols for LH2 handling, including Personal Protective Equipment (PPE) requirements, hazard zones, and emergency response procedures.

PC7. Respond promptly to potential LH2 spills, utilising established procedures and designated equipment for containment, clean-up, and personnel safety.

Operate and maintain CcH2 vessels

To be competent, the user/individual on the job must be able to:

PC8. Operate CcH2 vessels within established pressure and temperature limits as per pressure vessel regulations and manufacturer specifications.

PC9. Conduct routine inspections of CcH2 vessels, including valves, pressure relief devices, safety interlocks, and external surfaces, for leaks, damage, or signs of wear.

PC10. Ensure proper functioning of cooling systems for CcH2 vessels to maintain desired pressure and temperature conditions.

PC11. utilise sensitive leak detection systems specifically designed for hydrogen to identify and address leaks in CcH2 vessels promptly.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. principles of cryogenic safety, including properties of LH2 and CcH2, potential hazards, and risk assessment

KU2. relevant national and international regulations and standards for cryogenic hydrogen storage and handling (e.g., NFPA 505, ISO 14687)

KU3. emergency response procedures for LH2 and CcH2 incidents

KU4. properties of LH2 (boiling point, flammability, autoignition temperature)

KU5. design and operation of dedicated insulated tanks for LH2 storage

KU6. concept of boil-off losses in LH2 storage

KU7. principles of cryogenic insulation systems

KU8. pressure vessel regulations and standards applicable to CcH2 vessels

KU9. pressure and temperature limits for specific CcH2 vessel models

KU10. working of valves, safety devices, and external surfaces

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate clearly and effectively with team members, supervisors, and relevant stakeholders

GS2. actively listen to concerns and feedback from technicians, engineers, and safety personnel

GS3. set priorities and manage time effectively

GS4. make timely and informed decisions in diverse situations

GS5. build rapport and maintain positive relationships with colleagues and stakeholders

GS6. resolve conflicts constructively and collaboratively when addressing differing opinions or concerns

GS7. work cohesively with maintenance technicians, engineers, and safety professionals

GS8. show respect and appreciation for the diverse skills and expertise of others

GS9. continuously learn new skills and knowledge

GS10. mentor and guide less experienced team members

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Manage cryogenic vessels for LH2 and CcH2	**19**	**39**	**-**	**6**
PC1. Follow cryogenic safety protocols for handling and operating LH2 (Liquid dihydrogen) and CcH2 (Cryo-compressed Hydrogen) vessels.	2	5	-	-
PC2. Perform safe storage and handling of LH2 in dedicated insulated tanks, ensuring proper ventilation and adherence to safety distances.	3	6	-	1
PC3. Inspect insulated and rated transfer lines and hoses specifically designed for LH2 compatibility and pressure ratings before each use.	3	6	-	1
PC4. Implement proper grounding procedures to prevent static electricity discharge during LH2 handling.	3	5	-	1
PC5. Monitor and maintain cryogenic vessel insulation systems to minimise boil-off losses.	3	6	-	1
PC6. Use specific cryogenic safety protocols for LH2 handling, including Personal Protective Equipment (PPE) requirements, hazard zones, and emergency response procedures.	3	6	-	1
PC7. Respond promptly to potential LH2 spills, utilising established procedures and designated equipment for containment, clean-up, and personnel safety.	2	5	-	1
Operate and maintain CcH2 vessels	**11**	**21**	**-**	**4**
PC8. Operate CcH2 vessels within established pressure and temperature limits as per pressure vessel regulations and manufacturer specifications.	3	5	-	1
PC9. Conduct routine inspections of CcH2 vessels, including valves, pressure relief devices, safety interlocks, and external surfaces, for leaks, damage, or signs of wear.	3	5	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. Ensure proper functioning of cooling systems for CcH2 vessels to maintain desired pressure and temperature conditions.	3	5	-	1
PC11. utilise sensitive leak detection systems specifically designed for hydrogen to identify and address leaks in CcH2 vessels promptly.	2	6	-	1
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3916
NOS Name	Handle cryogenic hydrogen vessels
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

LSC/N3917: Coordinate efficient green hydrogen dispatch

Description

This unit is about developing the skills and competencies required to coordinate green hydrogen dispatch activities efficiently.

Scope

The scope covers the following :

- Adhere to scheduled green hydrogen dispatch plans
- Coordinate and monitor dispatch execution

Elements and Performance Criteria

Adhere to scheduled green hydrogen dispatch plans

To be competent, the user/individual on the job must be able to:

PC1. Check green hydrogen inventory levels and provide the data to the concerned authority for developing dispatch plans.

PC2. Receive and interpret dispatch plans (quantity, purity, pressure, delivery time, destination) and transportation modes (pipelines, trucks, ships).

PC3. Assess the compatibility of green hydrogen grade with transportation mode, evaluate potential hazards based on route and weather conditions, and ensure compliance with safety regulations.

PC4. Communicate dispatch plans clearly to internal teams (production, logistics, safety) and relevant external stakeholders (customers, transporters).

PC5. Implement dispatch plans that optimise resource utilisation, minimise costs, and meet delivery requirements.

PC6. Ensure the availability of necessary equipment, documentation, and resources for efficient dispatch operations.

Coordinate and monitor dispatch execution

To be competent, the user/individual on the job must be able to:

PC7. Verify delivery quantities and documentation against delivery orders and dispatch plans.

PC8. Utilise real-time tracking systems and communication with transporters to monitor dispatch progress.

PC9. Implement contingency plans to address disruptions and minimise impact on deliveries.

PC10. Work closely with maintenance teams to address equipment issues, with safety teams to manage potential incidents, and with logistics teams to manage loading/unloading delays.

PC11. Verify compliance with safety regulations and procedures for hydrogen transportation in chosen modes (pipelines, trucks, ships).

PC12. Maintain accurate and detailed records of each dispatch, including date, quantity, transportation mode, customer/party, and delivery confirmation.

PC13. Establish communication protocols to disseminate information about dispatch-related emergencies to relevant stakeholders quickly.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. physical and chemical properties of hydrogen gas, its associated risks, and safety protocols for handling and transporting it

KU2. potential hazards associated with hydrogen leaks, fires, and explosions

KU3. factors influencing inventory fluctuations (production, dispatch, external factors)

KU4. different transportation modes used for hydrogen dispatch (pipelines, trucks, ships) and their capabilities

KU5. different types of compressed hydrogen storage systems (e.g., individual cylinders, bundles, tube trailers)

KU6. compatibility of various hydrogen grades with varying modes of transportation

KU7. roles and responsibilities of different teams involved in dispatch operations (production, logistics, safety, customers, transporters)

KU8. tracking systems used for monitoring hydrogen dispatch progress (GPS, telemetry)

KU9. safety regulations and procedures specific to hydrogen transportation in different modes (pipelines, trucks, ships)

KU10. recent advancements and best practices in hydrogen transportation technologies and dispatch management

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate effectively with colleagues and stakeholders

GS2. actively listen to concerns and feedback from stakeholders and address them effectively

GS3. adapt to changing priorities and workloads while maintaining composure and focus

GS4. conduct oneself with courtesy and professionalism when interacting with authorities and stakeholders

GS5. communicate and cooperate with others in the team for better results

GS6. work in a team to achieve better results

GS7. identify immediate or temporary solutions to resolve delays and crisis situations

GS8. foster a collaborative and service-oriented approach

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Adhere to scheduled green hydrogen dispatch plans	**14**	**28**	**-**	**4**
PC1. Check green hydrogen inventory levels and provide the data to the concerned authority for developing dispatch plans.	2	4	-	-
PC2. Receive and interpret dispatch plans (quantity, purity, pressure, delivery time, destination) and transportation modes (pipelines, trucks, ships).	3	5	-	1
PC3. Assess the compatibility of green hydrogen grade with transportation mode, evaluate potential hazards based on route and weather conditions, and ensure compliance with safety regulations.	3	5	-	1
PC4. Communicate dispatch plans clearly to internal teams (production, logistics, safety) and relevant external stakeholders (customers, transporters).	2	4	-	-
PC5. Implement dispatch plans that optimise resource utilisation, minimise costs, and meet delivery requirements.	2	5	-	1
PC6. Ensure the availability of necessary equipment, documentation, and resources for efficient dispatch operations.	2	5	-	1
Coordinate and monitor dispatch execution	**16**	**32**	**-**	**6**
PC7. Verify delivery quantities and documentation against delivery orders and dispatch plans.	2	4	-	1
PC8. Utilise real-time tracking systems and communication with transporters to monitor dispatch progress.	2	5	-	-
PC9. Implement contingency plans to address disruptions and minimise impact on deliveries.	3	5	-	1
PC10. Work closely with maintenance teams to address equipment issues, with safety teams to manage potential incidents, and with logistics teams to manage loading/unloading delays.	2	4	-	1

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Verify compliance with safety regulations and procedures for hydrogen transportation in chosen modes (pipelines, trucks, ships).	3	5	-	1
PC12. Maintain accurate and detailed records of each dispatch, including date, quantity, transportation mode, customer/party, and delivery confirmation.	2	4	-	1
PC13. Establish communication protocols to disseminate information about dispatch-related emergencies to relevant stakeholders quickly.	2	5	-	1
NOS Total	**30**	**60**	**-**	**10**

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3917
NOS Name	Coordinate efficient green hydrogen dispatch
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

LSC/N3918: Follow health, safety & emergency protocols at green hydrogen storage hubs

Description

This unit is about knowledge and practices relating to health, safety and emergency protocols followed at a green hydrogen storage hub.

Scope

The scope covers the following :

- Implement health and safety practices
- Respond to emergencies

Elements and Performance Criteria

Implement health and safety practices

To be competent, the user/individual on the job must be able to:

PC1. Wear appropriate PPE for specific tasks and risk assessments, considering hydrogen hazards such as flame-resistant clothing, gas-tight suits, cryogenic gloves, goggles, face shields, protective footwear, etc.

PC2. Inspect and maintain PPE for proper functionality and integrity, replacing damaged equipment promptly.

PC3. Follow established safety procedures for working with hydrogen, including permit systems, lockout/tagout procedures, and access controls.

PC4. Adhere to hazard communication protocols, understanding safety data sheets (SDS) and warning signs.

PC5. Maintain a clean and organised work environment free of clutter and potential hazards.

PC6. Properly handle and store hazardous materials (e.g., lubricants, cleaning agents) according to safety regulations.

PC7. Report any unsafe work conditions or practices to supervisors or safety personnel immediately.

Respond to Emergencies

To be competent, the user/individual on the job must be able to:

PC8. Follow emergency response plans and procedures for various scenarios (e.g., hydrogen leaks, fires, equipment failures).

PC9. Activate alarms and evacuate personnel according to emergency plans, ensuring everyone's safety.

PC10. Assist colleagues during emergency evacuations, ensuring everyone follows established routes and assembly points.

PC11. Isolate the source of the emergency if safe and possible, utilising appropriate equipment and protocols.

PC12. Use different types of fire extinguishers suitable for hydrogen fires (e.g., dry powder, water mist).

PC13. Perform routine inspections of fire extinguishers and report any discrepancies or maintenance needs.

PC14. Provide clear and concise information about the incident to the emergency responders and rescue personnel.

PC15. Assist injured personnel and provide first aid if trained and qualified to do so.

PC16. Maintain first-aid kits and medical supplies in designated locations and ensure their proper functioning and restocking.

PC17. Participate in regular emergency response drills and training, demonstrating competence and composure in simulated scenarios.

PC18. Report near misses and safety incidents promptly, contributing to continuous improvement of safety procedures.

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. importance of health and hygiene practices

KU2. properties and characteristics of hydrogen, including its flammability and potential risks

KU3. importance of personal protective equipment (PPE) selection, use, and maintenance

KU4. different types of fire hazards associated with hydrogen operations (e.g., leaks, electrical faults) and their potential consequences

KU5. occupational health and safety (OHS) standards to be followed in the facility

KU6. emergency response plan for the specific Green Hydrogen storage hub

KU7. operation and limitations of the fire detection system

KU8. roles and responsibilities during emergency response situations

KU9. functions and operation of emergency equipment and systems (e.g., fire extinguishers, alarms)

KU10. possess basic knowledge of first aid and CPR to handle minor injuries or emergencies if necessary

KU11. protocols for reporting hazards, incidents, and near misses

KU12. evacuation procedures and assembly points for different emergency scenarios

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. effectively communicate safety concerns, incidents, and information to team members, supervisors, and relevant authorities

GS2. read safety instructions, guidelines/procedures and manuals

GS3. foster a safety-conscious mind set among team members

GS4. complete tasks efficiently and accurately within the stipulated time

GS5. adapt to changing conditions or unexpected safety-related situations

GS6. assess the problem, evaluate the possible solution(s) and use an best possible solution

GS7. work with supervisors and team members to carry out work related tasks

GS8. identify immediate or temporary solutions to resolve delays and crisis situations

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Implement health and safety practices	**11**	**24**	**-**	**4**
PC1. Wear appropriate PPE for specific tasks and risk assessments, considering hydrogen hazards such as flame-resistant clothing, gas-tight suits, cryogenic gloves, goggles, face shields, protective footwear, etc.	1	3	-	1
PC2. Inspect and maintain PPE for proper functionality and integrity, replacing damaged equipment promptly.	2	3	-	1
PC3. Follow established safety procedures for working with hydrogen, including permit systems, lockout/tagout procedures, and access controls.	1	3	-	-
PC4. Adhere to hazard communication protocols, understanding safety data sheets (SDS) and warning signs.	2	4	-	1
PC5. Maintain a clean and organised work environment free of clutter and potential hazards.	1	3	-	1
PC6. Properly handle and store hazardous materials (e.g., lubricants, cleaning agents) according to safety regulations.	2	4	-	-
PC7. Report any unsafe work conditions or practices to supervisors or safety personnel immediately.	2	4	-	-
Respond to Emergencies	**19**	**36**	**-**	**6**
PC8. Follow emergency response plans and procedures for various scenarios (e.g., hydrogen leaks, fires, equipment failures).	1	3	-	-
PC9. Activate alarms and evacuate personnel according to emergency plans, ensuring everyone's safety.	2	3	-	1
PC10. Assist colleagues during emergency evacuations, ensuring everyone follows established routes and assembly points.	2	3	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC11. Isolate the source of the emergency if safe and possible, utilising appropriate equipment and protocols.	2	3	-	1
PC12. Use different types of fire extinguishers suitable for hydrogen fires (e.g., dry powder, water mist).	1	4	-	1
PC13. Perform routine inspections of fire extinguishers and report any discrepancies or maintenance needs.	2	3	-	1
PC14. Provide clear and concise information about the incident to the emergency responders and rescue personnel.	2	4	-	-
PC15. Assist injured personnel and provide first aid if trained and qualified to do so.	1	3	-	1
PC16. Maintain first-aid kits and medical supplies in designated locations and ensure their proper functioning and restocking.	2	4	-	-
PC17. Participate in regular emergency response drills and training, demonstrating competence and composure in simulated scenarios.	2	3	-	-
PC18. Report near misses and safety incidents promptly, contributing to continuous improvement of safety procedures.	2	3	-	1
NOS Total	**30**	**60**	**-**	**10**

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	LSC/N3918
NOS Name	Follow health, safety & emergency protocols at green hydrogen storage hubs
Sector	Logistics
Sub-Sector	Port Terminals, ICD and CFS
Occupation	Green Hydrogen Operations/ Handling, Hub Operations
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

DGT/VSQ/N0101: Employability Skills (30 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

PC1. understand the significance of employability skills in meeting the job requirements

Constitutional values – Citizenship

To be competent, the user/individual on the job must be able to:

PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.

Basic English Skills

To be competent, the user/individual on the job must be able to:

PC4. speak with others using some basic English phrases or sentences

Communication Skills

To be competent, the user/individual on the job must be able to:

PC5. follow good manners while communicating with others

PC6. work with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

PC7. communicate and behave appropriately with all genders and PwD

PC8. report any issues related to sexual harassment

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

PC9. use various financial products and services safely and securely

PC10. calculate income, expenses, savings etc.

PC11. approach the concerned authorities for any exploitation as per legal rights and laws

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

PC12. operate digital devices and use its features and applications securely and safely

PC13. use internet and social media platforms securely and safely

Entrepreneurship

To be competent, the user/individual on the job must be able to:

PC14. identify and assess opportunities for potential business

PC15. identify sources for arranging money and associated financial and legal challenges

Customer Service

To be competent, the user/individual on the job must be able to:

PC16. identify different types of customers

PC17. identify customer needs and address them appropriately

PC18. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC19. create a basic biodata

PC20. search for suitable jobs and apply

PC21. identify and register apprenticeship opportunities as per requirement

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use basic spoken English language

KU6. Do and dont of effective communication

KU7. inclusivity and its importance

KU8. different types of disabilities and appropriate communication and behaviour towards PwD

KU9. different types of financial products and services

KU10. how to compute income and expenses
KU11. importance of maintaining safety and security in financial transactions
KU12. different legal rights and laws
KU13. how to operate digital devices and applications safely and securely
KU14. ways to identify business opportunities
KU15. types of customers and their needs
KU16. how to apply for a job and prepare for an interview
KU17. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. communicate effectively using appropriate language
GS2. behave politely and appropriately with all
GS3. perform basic calculations
GS4. solve problems effectively
GS5. be careful and attentive at work
GS6. use time effectively
GS7. maintain hygiene and sanitisation to avoid infection

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
Introduction to Employability Skills	**1**	**1**	**-**	**-**
PC1. understand the significance of employability skills in meeting the job requirements	-	-	-	-
Constitutional values – Citizenship	**1**	**1**	**-**	**-**
PC2. identify constitutional values, civic rights, duties, personal values and ethics and environmentally sustainable practices	-	-	-	-
Becoming a Professional in the 21st Century	**1**	**3**	**-**	**-**
PC3. explain 21st Century Skills such as Self-Awareness, Behavior Skills, Positive attitude, self-motivation, problem-solving, creative thinking, time management, social and cultural awareness, emotional awareness, continuous learning mindset etc.	-	-	-	-
Basic English Skills	**2**	**3**	**-**	**-**
PC4. speak with others using some basic English phrases or sentences	-	-	-	-
Communication Skills	**1**	**1**	**-**	**-**
PC5. follow good manners while communicating with others	-	-	-	-
PC6. work with others in a team	-	-	-	-
Diversity & Inclusion	**1**	**1**	**-**	**-**
PC7. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC8. report any issues related to sexual harassment	-	-	-	-
Financial and Legal Literacy	**3**	**4**	**-**	**-**
PC9. use various financial products and services safely and securely	-	-	-	-

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. calculate income, expenses, savings etc.	-	-	-	-
PC11. approach the concerned authorities for any exploitation as per legal rights and laws	-	-	-	-
Essential Digital Skills	**4**	**6**	**-**	**-**
PC12. operate digital devices and use its features and applications securely and safely	-	-	-	-
PC13. use internet and social media platforms securely and safely	-	-	-	-
Entrepreneurship	**3**	**5**	**-**	**-**
PC14. identify and assess opportunities for potential business	-	-	-	-
PC15. identify sources for arranging money and associated financial and legal challenges	-	-	-	-
Customer Service	**2**	**2**	**-**	**-**
PC16. identify different types of customers	-	-	-	-
PC17. identify customer needs and address them appropriately	-	-	-	-
PC18. follow appropriate hygiene and grooming standards	-	-	-	-
Getting ready for apprenticeship & Jobs	**1**	**3**	**-**	**-**
PC19. create a basic biodata	-	-	-	-
PC20. search for suitable jobs and apply	-	-	-	-
PC21. identify and register apprenticeship opportunities as per requirement	-	-	-	-
NOS Total	**20**	**30**	**-**	**-**

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0101
NOS Name	Employability Skills (30 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	2
Credits	1
Version	1.0
Last Reviewed Date	30/04/2024
Next Review Date	30/04/2027
NSQC Clearance Date	30/04/2024

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC

2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC

3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)

4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion

5. To pass the Qualification Pack, every trainee should score a minimum of 70% for NSQF level 4 & above job roles and 50% for NSQF level 1 to 3 job roles

6. In case of unsuccessful completion, the trainee may seek re-assessment on the Qualification Pack

Minimum Aggregate Passing % at QP Level : 70

(**Please note**: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Minimum Passing % at NOS Level: 50

(**Please note**: A Trainee must score the minimum percentage for each NOS separately as well as on the QP as a whole.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
LSC/N3912.Assist in installing green hydrogen storage systems	30	60	-	10	100	15
LSC/N3913.Execute loading and unloading operations	30	60	-	10	100	15
LSC/N3914.Manage green hydrogen weight distribution	30	60	-	10	100	15
LSC/N3915.Comply with green hydrogen storage parameters	30	60	-	10	100	15
LSC/N3916.Handle cryogenic hydrogen vessels	30	60	-	10	100	15
LSC/N3917.Coordinate efficient green hydrogen dispatch	30	60	-	10	100	10
LSC/N3918.Follow health, safety & emergency protocols at green hydrogen storage hubs	30	60	-	10	100	10
DGT/VSQ/N0101.Employability Skills (30 Hours)	20	30	-	-	50	5
Total	**230**	**450**	**-**	**70**	**750**	**100**

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.