APPRENTICESHIP CURRICULUM (OPTIONAL TRADE)

Hydrocarbon Sector Skill Council

Compressed Biogas Plant Operator

Course Code: CO022400031

☒**NAPS** ☐Non-NAPS

NSQF Level: 3.5

Table of Contents

1.	**Course Name**	Compressed Biogas Plant Operator		
2.	**Course Code**	CO022400031		
3.	**Apprenticeship Training Duration:** *(2 to 4 weeks of BT is embedded in this duration as per the requirement of the establishment)*	Months: 12 months		
	Remarks			
4.	**Credit**	14		
5.	**NSQF Level** (*Mandatory for NAPS*)	3.5 **NSQC Approval Date: 31-08-2023**		
6.	**Related NSQF aligned qualification details**	**S. No.**	**QP/ Qualification/ NOS Name (As applicable)**	**QP/ NOS Code & Version**	**NQR Code**
		1	Compressed Biogas Plant Operator	HYC/Q4401 & Version 1.0	QG-3.5-ES-00769-2023-V1-HSSCI
7.	**Brief Job Role Description**	In the oil and gas sector, compressed biogas (CBG) operator is responsible for operating and maintaining a CBG production facility. His/her responsibilities include managing plant operations, maintaining equipment, ensuring compliance with safety regulations, keeping an eye on quality control, resolving problems, keeping records, working with the team, ensuring compliance with environmental regulations, seeking continuous improvement and taking part in training and development.		
8.	**NCO-2015 Code & Occupation** (*Access the NCO 2015 volumes from:*	NCO/ 2015 3134		
9.	**Minimum Eligibility Criteria** *(Educational and/ or Technical Qualification)*	Completed 1st year of 3-year Diploma after 10th OR 8th Grade pass with 2-year of NTC and 1-year of NAC OR 11th Grade Pass OR 10th Grade pass with 1-year of relevant experience Or 8th Grade pass with 3-year of relevant experience		

		Or Previous relevant qualification of NSQF level 3 with 1.5 year of relevant experience
10.	**Entry Age for Apprenticeship**	18 Years
11.	**Any Licensing Requirements** (*wherever applicable*)	NA
12.	**Is the Job Role amenable to Persons with Disability**	☐ **Yes** ☒ **No** **If yes, check the applicable type of Disability** ☐ **Locomotor Disability** ☐ **Leprosy Cured Person** ☐ **Cerebral Palsy** ☐ **Dwarfism** ☐ **Muscular Dystrophy** ☐ **Acid Attack Victims** ☐ **Blindness** ☐ **Low Vision** ☐ **Deaf** ☐ **Hard of Hearing** ☐ **Speech and Language Disability** ☐ **Intellectual Disability** ☐ **Specific Learning Disabilities** ☐ **Autism Spectrum Disorder** ☐ **Mental Illness** ☐ **Multiple Sclerosis** ☐ **Parkinson's Disease** ☐ **Haemophilia** ☐ **Thalassemia** ☐ **Sickle Cell Disease** ☐ **Multiple Disabilities**
13.	**Submitting Body Details**	**Name: Hydrocarbon Sector Skill Council** **E-mail ID: ceo@hsscindia.in** **Contact Number: 9872176558**
14.	**Certifying Body**	Hydrocarbon Sector Skills Council
15.	**Employment Avenues/Opportunities**	Oil & Gas sector
16.	**Career Progression**	Compressed Bio Gas Plant Supervisor

17.	Trainer's Qualification & Experience:	Completed 3 years Diploma in engineering trade after 10th with 2 years of relevant experience and 1 year of training experience in relevant field. Or ITI pass (Two year after class X) with 3 years of relevant experience and 1 year of training experience in relevant field. Or CITS Certified Trainers for relevant CITS course
18.	Curriculum Creation Date	21/02/2024
19.	Curriculum Valid up to Date	20/02/2027

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
1.	**NOS Name –** Compressed biogas plant operations and equipment preparation **NOS Code -** HYC/N4401 **Version –** 1.0	**Bridge Module -** Introduction to the Hydrocarbon Sector • Describe the oil and natural gas sector and its subsectors. • Explain the importance of Energy Transition and usage of clean fuel • Explain the importance of a compressed biogas plant operator. • Explain the roles and responsibilities of compressed biogas plant operator. • Explain general discipline in the classroom (Do's & Don'ts) **Identification and maintenance of Compressed Biogas Equipments** • Describe the check proper positioning and accessibility of Personal Protectives Equipment (PPE) at the site • Describe the prepare and maintain checklist to monitor CBG regulation by CBG plant at their work site around CBG sites. • Describe the identify different types of Checklists, tools, sample feeders, pumps, working of agitators, etc. • Explain the inspect machines, controls and equipment such as Digester heating system, mixer systems and discharge Piping Systems of a CBG plant for proper functioning. • Explain the fix small issues with a CBG plant's gear or equipment. • Describe the Identify the various substrates and its right consistency required to make up compressed biogas.	10	20	50	50

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Transforming the skill landscape

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Describe the create and apply a thorough operational standard procedures that addresses the handling of equipments used in digestion, gas purification, compression, storage, and distribution of feedstock. • Explain the check that the anaerobic digestion should be optimised for effective biogas production. • Describe the schedule equipment maintenance and carry out regular inspection • Describe the prepare and maintain daily inspection report and submit it to the reporting authority responsible for health, safety and environment of department				
2.	**NOS Name-** Carry out the CBG plant operations **NOS Code** - HYC/N4402 **Version -** 1.0	• Describe the coordinate with Waste storage handler to collect feedstock for the preparation of organic waste materials that serve as the input for the anaerobic digestion process • Describe the apply pre-treatment techniques like maceration or thermal processing, grinding or shredding if needed for the sorted feedstock • Explain the adjust feedstock input rates to optimize gas production • Describe the operate the mechanical mixing system and start/ stop the mixers as required and adjust the speed and intensity of mixing based on the characteristics of the feedstock and the operational requirements • Describe the regularly monitor digester temperature, pressure, and pH levels to promote the growth and activity of anaerobic bacteria, which are responsible for the biogas production	20	40		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Explain the optimizing digester temperature and pH for efficient digestion • Explain the conducting routine inspections of pumps, valves and other equipments to check and maintain proper flow rates throughout the plant system. • Perform preventive maintenance tasks such as lubrication and filter changes. • Describe the monitor and maintain desired gas purity levels by activating gas purification units to remove impurities • Describe the initializing compressors to increase gas pressure to reduce the volume of the biogas produced for Storage and transportation purpose • Explain the sampling and analyzing biogas for key parameters (e.g., methane content, moisture). • Explain the adjusting purification settings to ensure compliance with quality standards. • Describe the monitor and control gas storage conditions • Describe the apply emergency shutdown procedures. • Explain the respond promptly to alarms or abnormal conditions. • Describe the coordinate with the team to resolve any safety or operational issues. • Describe the maintaining accurate records of operational parameters (e.g., gas flow, temperature). • Describe the document any incidents, maintenance activities, or safety-related observations • Describe the participate in shift handovers to ensure smooth continuity of operations.				

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Explain the stay updated on new technologies and best practices in CBG plant operations. • Explain the seeking opportunities to improve operational efficiency and safety • Describe the prepare and maintain daily inspection report and submit it to the reporting authority responsible for CBG plant • Perform to follow standard operating procedures for reviewing safety procedures and protocols				
3.	**NOS Name-Working effectively in a team** **NOS Code** - HYC/N9301 **Version -** 3.0	**Effective team work** • Describe methods to communicate clearly with the colleagues, supervisor and reporting authorities • Explain how to share information in line with organizational requirements • Explain the importance of supporting and respecting colleagues and other members of the organization without any bias based on gender, culture, disability etc. • Demonstrate ways to handle interpersonal conflict at the workplace • Explain how to inform team members timely, if timelines can't be met • Describe ways/methods to resolve interpersonal conflict • Explain the importance of gender-neutral behavior while interacting with others	20	30		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
3	**NOS Name-Maintain health, safety and security procedures** **NOS Code** - HYC/N9302 **Version -** 3.0	**Practice health and safety measures** • Explain importance of using PPE like face mask, hand gloves, goggle, protective clothing/equipment, etc. at workplace. • Explain how to monitor the health and safety of self and other team members • Explain how to identify possible causes of risk or accident in the workplace • Explain the hazard and risk associated with mishandling various tools and equipment. • Show the correct way to lift heavy objects. • Demonstrate how to follow safety signages **Follow fire safety procedures** • Demonstrate how to use fire extinguishers • Demonstrate various rescue techniques • Explain the good housekeeping practices to prevent any hazard • Describe list issues concerning the safety in work place • Explain how to record and report all incidents, damages or injury • Explain how to follow the applicable regulations and codes as per safety standard • Describe how to prepare incident reports. **Follow emergencies, rescue and first-aid procedures** • Explain how to provide appropriate first aid to victims in an emergency situation	20	30		

S. No	Module/NOS Name, Code, Version	Outcomes	Assessment Marks		Passing Percentage	
			Th.	Pr.	Th.	Pr.
		• Demonstrate basic techniques of bandaging • Demonstrate how to respond promptly and appropriately to an accident • Perform rescue activity during an accident in real or simulated environments • Demonstrate correct method to rescue injured people and others during an emergency				
	NOS Name- Employability Skills **NOS Code** - *DGT/VSQ/N0101* **Version -** 1.0	• Introduction to Employability Skills • Constitutional Values – Citizenship • Becoming a Professional in the 21st Century • Basic English Skills • Communication Skills • Financial and Legal Literacy • Essential Digital Skills • Diversity & Inclusion • Career Development & Goal Setting • Customer Service • Getting Ready for Apprenticeship & Jobs	20	30		
	Total Marks		90	150	50	50

Glossary

Term	Description
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 andinterests.
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 organization.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in theworkplace, 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 toperform 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 adatabase 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 that together specify the technical, generic, professional and organizational specific knowledge that an individual need in order to perform to the required standard.
Organizational Context	Organizational context includes the way the organization 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 atleast 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.

Acronyms

Acronym	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training
OS	Occupational Standard(s)
QP	Qualifications Pack
KU	Knowledge and understanding
GS	Generic Skills
DMA	Direct Marketing Agent
PNG	Piped Natural Gas
FAQ	Frequently Asked Questions
BP	Business Partner
KYC	Know Your Consumer
FAB	Feature Advantage Benefit

Annexure 1: Tools and Equipment

List of Tools and Equipment

The tools and equipment required are:

S. No.	Tool / Equipment Name	Specification
1	Gas Analyzer	NA
2	Gas Compressor	NA
3	Gas Flow Meter	NA
4	Pressure Gauges	NA
5	Temperature Gauges	NA
6	Safety Equipment (PPE)	NA
7	Valves and Regulators	NA
8	Biogas Storage Containers	NA
9	Biogas Generator	NA
10	Gas Scrubber	NA
11	Pipes and Fittings	NA
12	Cleaning and Maintenance Tools	NA
13	Welding Equipment	NA
14	Monitoring and Control Systems	NA

Classroom Aids

The aids required to conduct sessions in the classroom are:

1   Projector
2   Computer/laptops
3   Internet connectivity
4   Whiteboard

Annexure 2: Assessment Strategy

 This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the apprentice on the requiredcompetencies of the program.

The overall assessment strategy and specific arrangements, which have put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.

The assessment of candidates/trainees will be on the basis on assessment outcome/assessment criteria of the Qualification. In the assessment criteria for each NOS marks have been defined for theoretical and practical skills, on which the candidate will be assessed. The emphasis is on 'learning-by-doing' and performance criteria is based on the practical demonstration of skills and knowledge.

 Theory/Knowledge test – This section will test the trainee on his/her knowledge on the subject/trade. The test will be carried out online/offline with a set of random Question paper that include multiple choice questions in multilingual, True/False Statement, audio-video question etc. The Question Bank will be developed by Subject Matter Experts (SME) of the hydrocarbon sector and these questions again be vetted by the Industry Experts, each performance criteria have its marks for theory based on the level of question i.e. easy, medium and difficult.

Practical/Demonstration Test – This stage involves the face-to-face interaction between Assessor and each trainee. The practical knowledge will be tested through trade test which demonstrates the skill required for the job, by which assessor would be able to evaluate the trainee for his/her practical knowledge on respective Qualification.

To ensure the maximum possible consistency in the assessment by different assessors at different locations, orientation of the assessors is also required about the stages involved in the assessment and the assessor role in the assessment process. The assessor must have knowledge of the following concepts before assessment:

- Qualification Pack Structure
- Guidance for the assessor to conduct theory and practical assessments
- Guidance for trainees to be given by assessor before the start of the assessments.
- Guidance on assessments process, practical brief with steps of operations practical observation checklist

- Practical/Demonstration Test guidance for uniformity and consistency.
- Guidance on assessment evidence collection (signed attendance copy, verification of the authenticity of the candidate by checking the photo IDcard, Photographs-while assessment undergoing etc.)

The empaneled assessment agencies will be instructed to hire assessors with integrity, reliability and fairness. Each assessor shall sign a document withits assessment agency by which they commit themselves to comply with the rules of confidentiality and conflict of interest, independence from commercial and other interests that would compromise impartiality of the assessments. The assessment agencies are instructed to ideally have assessor with sufficient amount of relevant industry experience related to Qualification. The assessors will also have scrutinized and have to undergo orientation of assessment framework, competency-based assessments etc.

Annexure 3: Mode of Training

The following Modules/NOS may also be delivered online for which the resources are provided in the given table.

S. No.	Module Name/NOS Name (As Per Curriculum)	Name of Mapped Online Component	URL of Mapped Online Component
	NA	NA	NA

Infra requirement:

- **NA**