



QUALIFICATION FILE

Electrolyzer Manufacturing Plant Supervisor

Short Term Training (STT) Long Term Training (LTT) Apprenticeship

Upskilling Dual/Flexi Qualification For ToT For ToA

General Multi-skill (MS) Cross Sectoral (CS) Future Skills OEM

NCrF/NSQF Level: 5

Submitted By:

Skill Council for Green Jobs

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1. Qualification Name	Electrolyzer Manufacturing Plant Supervisor											
2. Sector/s	Environmental Science											
3. Type of Qualification: <input checked="" type="checkbox"/> New <input type="checkbox"/> Revised <input type="checkbox"/> Has Electives/Options <input type="checkbox"/> OEM	NQR Code & version of existing/previous qualification: Not Applicable	Qualification Name of existing/previous version: Not Applicable										
4. a. OEM Name b. Qualification Name (Wherever applicable)												
5. National Qualification Register (NQR) Code &Version	QG-05-ES-02028-2024-V1-SCGJ & version 1	6. NCrF/NSQF Level: 5										
7. Award (Certificate/Diploma/Advance Diploma/ Any Other)	Certificate											
8. Brief Description of the Qualification	Electrolyzer manufacturing Plant Supervisor responsibility involves overseeing various aspects of the electrolyzer manufacturing process to ensure efficiency, safety, and quality. Their work is essential to maintaining the manufacturing process and meeting production goals while adhering to safety and environmental standards. He/She plays a vital role in ensuring the efficient and safe production of high-quality electrolyzer for green hydrogen production for various industrial applications. They play a pivotal role in managing the manufacturing process and contributing to the success of the plant.											
9. Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	<p>a. Entry Qualification & Relevant Experience:</p> <table border="1" data-bbox="835 983 1904 1369"> <thead> <tr> <th data-bbox="835 983 929 1098">S. No.</th> <th data-bbox="929 983 1344 1098">Academic/Skill Qualification (with Specialization - if applicable)</th> <th data-bbox="1344 983 1904 1098">Required Experience (with Specialization - if applicable)</th> </tr> </thead> <tbody> <tr> <td data-bbox="835 1098 929 1222">1.</td> <td data-bbox="929 1098 1344 1222">12th grade pass or equivalent</td> <td data-bbox="1344 1098 1904 1222">3.5 years of experience in renewable energy/ power sector/ energy sector/ hydrogen</td> </tr> <tr> <td data-bbox="835 1222 929 1369">2..</td> <td data-bbox="929 1222 1344 1369">12th grade pass</td> <td data-bbox="1344 1222 1904 1369">1-year NTC/NAC and 3 years of relevant experience in renewable energy/ power sector/ energy sector/ hydrogen</td> </tr> </tbody> </table>			S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1.	12th grade pass or equivalent	3.5 years of experience in renewable energy/ power sector/ energy sector/ hydrogen	2..	12th grade pass	1-year NTC/NAC and 3 years of relevant experience in renewable energy/ power sector/ energy sector/ hydrogen
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)										
1.	12th grade pass or equivalent	3.5 years of experience in renewable energy/ power sector/ energy sector/ hydrogen										
2..	12th grade pass	1-year NTC/NAC and 3 years of relevant experience in renewable energy/ power sector/ energy sector/ hydrogen										

			3.	10th grade pass + 3-year Diploma in relevant field	3 years of relevant experience in renewable energy/ power sector/ energy sector/ hydrogen																			
		b. Age: 18	4.	Previous relevant qualification of level 4.5	1.5 years of relevant experience in renewable energy/ power sector/ energy sector/ hydrogen																			
			5.	Previous relevant qualification of level 3	4.5 years of relevant experience in renewable energy/ power sector/ energy sector/ hydrogen																			
10	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))		17	10. Common Cost Norm Category: I																				
11	Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)	NA																						
12	Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)	<input checked="" type="checkbox"/> Offline <input type="checkbox"/> Online <input type="checkbox"/> Blended <table border="1"> <thead> <tr> <th>Training Delivery Modes</th> <th>Theory (Hours)</th> <th>Practical (Hours)</th> <th>OJT Mandatory (Hours)</th> <th>OJT Recommended (Hours)</th> <th>Total (Hours)</th> </tr> </thead> <tbody> <tr> <td>Classroom (offline)</td> <td>250</td> <td>170</td> <td>90</td> <td></td> <td>510</td> </tr> <tr> <td>Online</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> (Refer Blended Learning Annexure for details)					Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)	Classroom (offline)	250	170	90		510	Online					
Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)																			
Classroom (offline)	250	170	90		510																			
Online																								
13	Aligned to NCO/ISCO Code/s (if no code is available mention the same)	NCO-3122.0601 Assembly line Supervisor																						

14 Progression path after attaining the qualification (Please show Professional and Academic progression)	Vertical Progression: Process or Project Engineer- for Electrolyser manufacturing or Green Hydrogen Production
15 Other Indian languages in which the Qualification & Model Curriculum are being submitted	Nil
16 Is similar Qualification(s) available on NQR-if yes, justification for this qualification	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
17 Is the Job Role Amenable to Persons with Disability	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If "Yes", specify applicable type of Disability: <input checked="" type="checkbox"/> Deaf <input checked="" type="checkbox"/> Hard of Hearing <input checked="" type="checkbox"/> Acid Attack Victims <input checked="" type="checkbox"/> Dwarfism
18 How Participation of Women will be Encouraged	TPs shall be encouraged to onboard at least a certain number of female candidates in each batch.
19 Are Greening/ Environment Sustainability Aspects Covered (Specify the NOS/Module which covers it)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
20 Is Qualification Suitable to be Offered in Schools/Colleges	Schools <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Colleges <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
21 Name and Contact Details of Submitting / Awarding Body SPOC (In case of CS or MS, provide details of both Lead AB & Supporting ABs)	Name: Dr. Praveen Saxena Email: ceo@sscgi.in Contact No.: 9871119101 Website: https://sscgi.in/

22	Final Approval Date by NSQC: 31.01.2024 during 35 th NSQC	23. Validity Duration: 3 years	24. Next Review Date: 31.01.2027
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S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/Non-Core	NCrF/N SQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.	Introduction to the Electrolyzer and its types.	SGJ/N4324 Version 1	Core	5	1	20	10			30	30	20			50	15
2.	Identify Electrolyzer Components and Materials for manufacturing of Electrolyzer	SGJ/N5202 Version 1	Core	5	1	20	10			30	30	20			50	15
3.	Perform Manufacturing Process of Electrolyzer in Electrolyzer manufacturing unit.	SGJ/N5203 Version 1	Core	5	3	50	40			90	60	40			100	15
4.	Perform Production Planning and Resource Management in Electrolyzer manufacturing facility	SGJ/N5205 Version 1	Core	5	2	30	30			60	35	15			50	15
5.	Manufacturing and efficiency principles for the Electrolyzer production unit.	SGJ/N5201 Version 1	Core	5	4	60	60			120	60	40			100	15
6.	Maintain Health and safety measures in Electrolyzer manufacturing facility.	SGJ/N5204 Version 1	Core	5	1	10	20			30	24	26			50	10
7.	Employability Skills (ES)	DGT/VSQ/ N0102			2	60				60						10
8.	On the Job Training				3					90						
Duration (in Hours) / Total Marks						250	170	90		510					400	100

NOS/s of Qualifications*(In exceptional cases these could be described as components)*

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

Th.-Theory Pr.-Practical OJT-On the Job Man.-Mandatory Training Rec.-Recommended Proj.-Project

Assessment - Minimum Qualifying Percentage

Minimum Pass Percentage – Aggregate at qualification level: 70% (Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)

Section 3: Training Related

1.	Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	ITI /Diploma Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation With a minimum 3 years of relevant industry/training experience in renewable energy/power/energy/hydrogen sector OR BE/B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) OR M.Sc With a minimum 2 years of relevant industry/training experience in renewable energy/power/energy/hydrogen sector Or Certified under relevant Craft Instructor Training Scheme (CITS) course
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	Engineering Graduate/M.Sc a minimum 5 years of relevant industry/training experience in renewable energy/power/energy/hydrogen sector
3.	Tools and Equipment Required for Training	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (If "Yes", details to be provided in Annexure)
4.	In Case of Revised Qualification, Details of Any Upskilling Required for Trainer	Not Applicable

1.	Assessor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	<p>ITI /Diploma Electrical, Electronics, Civil, Mechanical, Fitter, Instrumentation With Minimum 4 years of relevant industry experience or training & assessment experience in renewable energy/power/energy/hydrogen sector</p> <p>OR</p> <p>B.Tech (Civil/Mechanical /Electrical/ Instrumentation / Electronics / Electrical and Electronics Eng.) or MSc With Minimum 3 years of relevant industry experience or training & assessment experience in renewable energy/power/energy/hydrogen sector</p> <p>The education qualification can be relaxed in case of extraordinary relevant field experience.</p> <p>Or Certified under relevant Craft Instructor Training Scheme (CITS) course</p>
2.	Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Engineering Graduate or Post Graduate with 5 years of relevant industry or training/assessment experience in Hydrogen/energy/power sector
3.	Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	Engineering Graduate or Post Graduate with 10 years of relevant industry or training/assessment experience in Hydrogen/energy/power sector Hydrogen/energy/power sector
4.	Assessment Mode (Specify the assessment mode)	Online and offline both
5.	Tools and Equipment Required for Assessment	<input checked="" type="checkbox"/> Same as for training <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (details to be provided in Annexure-if it is different for Assessment)

Section 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	Latest Skill Gap Study (not older than 2 years) (Yes/No): No. As Electrolyzer is the main part of Green Hydrogen Sector and published skills gap study is available across the green hydrogen value chain as this is relatively a new technology segment however a detailed training needs assessment study is planned
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	to be implemented by SCGJ in coordination with The South Asia Regional Energy Partnership (SAREP) which is the flagship regional energy program of the United States Agency for International Development (USAID).
2.	<p>Latest Market Research Reports or any other source (not older than 2 years) (Yes/No): Yes following key documents are available in the public domain</p> <p>a. National Green Hydrogen Mission: https://mnre.gov.in/img/documents/uploads/file_f-1673581748609.pdf</p> <p>b. https://powermin.gov.in/sites/default/files/Green_Hydrogen_Policy.pdf</p> <p>c. Harnessing Green Hydrogen, NITI Aayog: https://www.niti.gov.in/sites/default/files/2022-06/Harnessing_Green_Hydrogen_V21_DIGITAL_29062022.pdf</p> <p>d. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Dec/IRENA_Green_hydrogen_cost_2020.pdf?rev=4ce868aa69b54674a789f990e85a3f00</p>
3.	<p>Government /Industry initiatives/ requirement (Yes/No): Yes, The global energy sector is on a path of rapid decarbonization and green hydrogen along with electrolyzer manufacturing is poised to play a vital role for this transformation in energy systems, Scaling up green hydrogen production and utilisation across multiple sectors like power generation, transportation and other hard to abate sectors will be essential to helping global economies achieve net zero emissions and limit global temperature rises to 1.5C. Many major economies including India have declared Green Hydrogen roadmap as part of the climate and clean energy related actions. These measures largely seek to address the technical and financial challenges in scaling up Green Hydrogen generation, enhancing Green Hydrogen use across focus sectors, developing scalable technologies supported by enabling policies and regulations.</p> <p>After the announcement of the National Green Hydrogen Mission by the Prime Minister in August 2021, there has been a serious push on both policy and industry actions on green hydrogen. Leading energy companies including NTPC, Reliance and Adani Group along with several other major companies have forayed into this segment and have already announced mega green hydrogen projects. Cabinet has very recently approved the National Green Hydrogen mission with an aim to make India a leading producer and supplier of Green Hydrogen in the world. Government of India is set to provide a fillip to the renewable energy sector by making green hydrogen significantly cheaper while also supporting the nascent industry to establish global supply chains. With the National Mission, there is clear focus on government funding and support for R&D, measures for demand creation, financial support for manufacturing and infrastructure development along with creating opportunities for employment and economic development. The Mission targets setting up of at least 5 MMT (Million Metric Tonne) per annum of green hydrogen capacity with an associated renewable energy capacity of about 125 GW by 2030. This will require a domestic electrolyzer manufacturing capacity of 60-100 GW. The targeted production capacity as per mission outcomes will bring over ₹8 lakh crore in total investments and will result in creation of over 6 lakh clean jobs. Implementation of the Mission is expected to create a large-scale ecosystem for domestic electrolyzer manufacturing, Green Hydrogen production and use in the country which would also provide a huge opportunity for skilling and jobs creation. In alignment with the Mission targets, SCGJ is actively consulting with Key stakeholders like Green hydrogen industry which includes renewable</p>

	energy developers, electrolyzer manufacturers, Green hydrogen generators etc to identify their evolving skilling requirement and accordingly designing and implementing skilling interventions to ensure that trained and certified candidates are readily available for the industry.
4.	<p>Number of Industry validation provided: As a future job role, 5 industry validations are received for the qualification.</p> <p>The energy transition towards sustainable solutions has put the burgeoning hydrogen economy in the spotlight. Hydrogen is essentially the key to our sustainable future as it will become a decisive factor for ensuring a steady energy supply globally. However, to be successful in delivering on its decarbonization potential while meeting the growing energy needs of the country, the domestic hydrogen sector needs a skilled workforce.</p> <p>National Green Hydrogen Mission (NGHM) present a significant boost for the production, transport, distribution, and use of Green Hydrogen.</p>
5.	<p>Estimated nos. of persons to be trained and employed: By 2030, the Green Hydrogen Mission anticipates the creation of up to 6 lakhs new jobs throughout the green hydrogen value chain. Qualifications across key segments of this value chain will be developed to meet industry demands. Approximately 5000 junior technicians, technicians, and supervisors are expected to undergo training annually for employment in new electrolyzer manufacturing projects. Moreover, a substantial number of jobs will be generated in green hydrogen production.</p> <p>Given the nascent stage of the domestic industry and the planning phase of many green hydrogen generation units, targeted skilling activities will focus on priority job roles, particularly for technicians involved in setting up and operating green hydrogen production systems.</p> <p>Over 3 lakhs jobs are projected to be created to meet the renewable energy capacity requirement of 125 GW, necessary for powering green hydrogen facilities producing at least 5 MT per annum by 2030. Skilling and employment opportunities across the renewable energy domain will be further catalyzed by new green hydrogen investments.</p> <p>In the short to medium term, the industry will drive job creation in green hydrogen production plants, including installation, commissioning, and operations, alongside technical and non-technical roles for domestic Electrolyzer and various other key components manufacturing. Downstream processes such as storage, handling, and distribution will also contribute to job generation, supported by robust policy frameworks and regulations. In the medium to long term, innovative business models in transport and power sectors will emerge, leading to additional job opportunities across various industry clusters. Oil refineries, ammonia production, chemical industries, and steel industries will be key markets for green hydrogen, creating significant skilling and employment prospects in the short to medium term. Furthermore, green hydrogen technologies as alternate energy carriers for industrial processes, transportation, and long-duration energy storage will drive future opportunities for skilling and employment.</p>
6.	<p>Evidence of Concurrence/Consultation with Line Ministry/State Departments:</p> <p>Concurrence has been requested from the Ministry of New and Renewable Energy</p>

Section 6: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	Annexure: NCrf/NSQF level justification based on NCrf level/NSQF descriptors (<i>Mandatory</i>)	Annexure: Evidence of Level
2.	Annexure: List of tools and equipment relevant for qualification (<i>Mandatory, except in case of online course</i>)	Annexure: Tools and Equipment (Lab Set-Up)
3.	Annexure: Detailed Assessment Criteria (<i>Mandatory</i>)	Annexure: Detailed Assessment Criteria (<i>Mandatory</i>)
4.	Annexure: Assessment Strategy (<i>Mandatory</i>)	Annexure: Assessment Strategy
5.	Annexure: Acronym and Glossary (<i>Optional</i>)	Annexure: Acronym and Glossary
6.	Supporting Document: Model Curriculum (<i>Mandatory – Public view</i>)	Attached
7.	Supporting Document: Career Progression (<i>Mandatory - Public view</i>)	Annexure: Career progression and OM
8.	Supporting Document: Occupational Map (<i>Mandatory</i>)	Annexure: Career progression and OM
9.	Supporting Document: Assessment SOP (<i>Mandatory</i>)	Annexure: Assessment Strategy

Annexure: Evidence of Level

Title/Name of qualification/component: Electrolyzer Manufacturing Plant Supervisor			Level: 5
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
Professional Theoretical Knowledge	The individual has a broad understanding of various disciplines within their chosen field, allowing them to comprehend diverse contexts related to technology, skills, and job roles. Additionally, they possess a deep knowledge of the specialized area pertinent to their job role, including its fundamental principles. They have acquired specialized knowledge and a wide range of cognitive and practical skills, enabling them to undertake tasks such as basic design, prototyping, and testing.	<p>The Electrolyzer Manufacturing Plant Supervisor possesses multidisciplinary knowledge by understanding various aspects of engineering, manufacturing processes, safety regulations, and other standards. This includes familiarity with mechanical, electrical, and chemical engineering principles, as well as environmental and industrial health standards.</p> <p>In addition, they have a deeper understanding of the specialized field of electrolyzer technology, including its design, operation, and maintenance. They are well-versed in the underlying principles of electrolysis, hydrogen production, and relevant technologies such as membrane technologies, catalysts, and control systems.</p> <p>Furthermore, the Electrolyzer Manufacturing Plant Supervisor is proficient in analysing and troubleshooting complex technical issues, optimizing manufacturing</p>	5

Title/Name of qualification/component: Electrolyzer Manufacturing Plant Supervisor		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
		processes, and ensuring the efficient and safe operation of electrolyzer production lines. Their expertise extends to staying updated with the latest advancements and best practices in the field to continually improve production efficiency and product quality	
Professional and Technical Skills/ Expertise	The individual showcases advanced cognitive, specialized professional, and technical skills necessary for tackling challenging tasks within their chosen field of technology, skills, or job role. They adeptly apply techniques, whether routine or non-routine, to achieve successful outcomes. Furthermore, they possess a diverse set of professional and technical skills, demonstrating clear knowledge and proficiency across a wide spectrum of activities and tasks within their field.	The job holder is expected to exhibit knowledge of facts such as properties of hydrogen, functioning of electrolyzer, gas piping, storage etc. The electrolyzer manufacturing plant supervisor demonstrates advanced cognitive, specialized professional, and technical skills essential for addressing complex challenges with electrolyzer system. They adeptly apply techniques, whether routine or non-routine, to ensure successful outcomes during electrolyzer manufacturing and operation. Additionally, they possess a diverse array of professional and technical skills, showcasing clear knowledge and proficiency across a broad spectrum of activities and tasks related to electrolyzer manufacturing, hence pegged at level 5.	5
Employment Readiness & Entrepreneurship Skills & Mind-set	The individual demonstrates excellent oral and written communication as well as collaboration skills, effectively conveying the vision of leaders to the shop floor workforce. They possess strong digital, financial, and legal literacy, utilizing these competencies proficiently. Moreover, they exhibit a solid understanding of constitutional, humanistic, ethical, and moral values.	The electrolyzer manufacturing plant supervisor effectively communicates and collaborates, conveying leadership vision to the shop floor. They possess strong digital, financial, and legal literacy, utilizing these skills proficiently. Additionally, they demonstrate a solid grasp of constitutional, humanistic, ethical, and moral values. Their organizational and time management abilities are	5

Title/Name of qualification/component: Electrolyzer Manufacturing Plant Supervisor		Level: 5	
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
	They excel in organization and time management. Additionally, they display proficiency in complex calculations, mathematical, and financial analysis, enabling them to provide applied solutions effectively.	exceptional. Moreover, they excel in complex calculations, mathematical, and financial analysis, enabling them to provide effective solutions in manufacturing and operating electrolyzer systems. Hence it is pegged at level 5.	
Broad Learning Outcomes	The individual applies specialized knowledge and various cognitive and practical skills to complete tasks such as basic design, prototyping, and testing, effectively solving problems by selecting appropriate information, methods, tools, and materials. They possess communication and collaboration skills necessary to bridge senior management and the shop floor workforce. Additionally, they can listen attentively, understand complex information, and present it clearly and concisely. They make informed judgments and decisions based on thorough analysis and evaluation of information, tackling a variety of unpredictable problems within their chosen fields of expertise.	The electrolyzer manufacturing plant supervisor adeptly applies specialized knowledge and diverse cognitive and practical skills in tasks such as basic design, prototyping, and testing. They solve problems by meticulously selecting appropriate information, methods, tools, and materials tailored to each task's requirements. Additionally, they possess strong communication and collaboration skills, bridging senior management and the shop floor workforce effectively. Hence it is pegged at level 5.	5
Responsibility	The individual is responsible for setting and attaining both personal and group objectives effectively. They handle and adapt to change requirements, implementing change management strategies at the ground or shop floor level. Additionally, they excel in team building and effectively manage processes and procedures within established parameters for defined activities. They supervise the routine work of others and	The electrolyzer manufacturing plant supervisor demonstrates accountability in setting and achieving personal and group objectives efficiently. They adeptly manage and adapt to change requirements, implementing change management strategies at the ground or shop floor level. Additionally, they excel in team building, effectively managing processes and procedures within established parameters for defined activities. They supervise the	5

Title/Name of qualification/component: Electrolyzer Manufacturing Plant Supervisor			Level: 5
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
	take responsibility for evaluating and enhancing work or study activities as required.	routine work of others and assume responsibility for evaluating and enhancing work or study activities as necessary.	

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	Small size/demonstration of electrolyzer.	Standard Make	1

.			
2	Personnel Protective Equipment, First aid kit,	Standard Make	30
3	Material Safety Data Sheet, Gas leakage detector, Tool kit, IR Thermometer ,Barometer, Double ended flat spanner, Double ended ring spanner, Wrenches, Combination pliers, Side cutting pliers, Nose pliers, Screw driver, Vanier caliper, hammer, Cutters, Tweezers, Stripping & Crimping Tools, Safety helmet, electronic pressure gauge, clamp meter, multimeter, gas leakage detector, Nose mask, Safety goggles, Ear plug, PVC hand glove, Cotton hand glove, Reflective jacket, Safety Gloves ,Chemical Mask, Leather gloves, flame proof aprons, Flame proof overalls buttoned to neck, Helmets/hard hats, Full body harness, Hand shields, , fire extinguishers, First aid equipment, Safety instruments	Standard Make	2

Classroom Aids

The aids required to conduct sessions in the classroom are:

Marker, chart and visual aid, Projector, Laptop;

Annexure: Industry Validations Summary

Provide the summary information of all the industry validations in table. This is not required for OEM qualifications.

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile (if available)
1	Urja Sathi	Anurag Srivastava	CEO	Lucknow	8887521779	ayodhyawaslcorp@gmail.com	
2	Vacen Engineering and Solution Private Ltd.	Vibhuti Nath Pandey	Director	New Delhi	7532086255	Vibhuti.vacen@gmail.com	
3	Danao Green Tech Pvt. Ltd.	Sanjay Danao	Director	Nagpur	9545648496	director@danao.in	

4	Solar Tech Saarthi Pvt. Ltd.	Lucky Aggarwal	MD	Delhi	9711851306	solarsaarthi@gmail.com	
5	Innodust Marketing Pvt. Ltd.	Gourab	CEO	Bhubaneswar	7894412588	Gourab.innodust@gmail.com	

Annexure: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

Refer NCVET “Guidelines for Blended Learning for Vocational Education, Training & Skilling” available on:

<https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education,%20Training%20&%20Skilling.pdf>

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline : Online Ratio
1	<input checked="" type="checkbox"/> Theory/ Lectures - Imparting theoretical and conceptual knowledge	Not Applicable	

2	<input checked="" type="checkbox"/> Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners		
3	<input checked="" type="checkbox"/> Showing Practical Demonstrations to the learners		
4	<input checked="" type="checkbox"/> Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training		
5	<input checked="" type="checkbox"/> Tutorials/ Assignments/ Drill/ Practice		
6	<input checked="" type="checkbox"/> Proctored Monitoring/ Assessment/ Evaluation/ Examinations		
7	<input checked="" type="checkbox"/> On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training		

Annexure: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N4324: Introduction to the Electrolyzer and its types	<i>Basics of electrolysis and Electrolyzer technology</i>	30	2	-	-
	PC1. describe and demonstrate Electrolysis	2	2	-	-
	PC2. explain and demonstrate laws related to electrolysis	2	2	-	-

PC3. discuss in brief various terms associated with Electrolysis Process.	2	-	-	-
PC4. discuss and illustrate about electrolyzer technologies through pictures and videos.	2	2	-	-
PC5. discuss and illustrate the classification of	2	3	-	-
PC6. discuss and illustrate about alkaline electrolyzer technology the classification of Electrolyzer with technical specifications through pictures or videos.	2	3	-	-
PC7. discuss and illustrate about Proton exchange membrane (PEM) electrolyzer with technical specifications	2	3	-	-
PC8. discuss and illustrate the technical specifications of Solid oxide electrolysis cell (SOEC) electrolyser.	2	3	-	-
PC9. discuss Anion exchange membrane (AEM) electrolyzer with technical specifications	2	-	-	-
PC10. discuss Pros and Cons of different Electrolyzer types.	2	-	-	-
PC11. discuss about advancement in Electrolyzer Technology and Future of Electrolyzers.	2	-	-	-
PC12. discuss key advantages of Electrolyzer technology.	2	-	-	-

	PC13. discuss key aspects and challenges related to electrolyzer manufacturing in India.	2	-	-	-
	PC14. discuss about the factors affecting electrolysis.	2	-	-	-
	PC15. discuss and demonstrate roles of Supervisor in a green Electrolyzer Manufacturing facility	2	2	-	-
NOS Total		30	20		

NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N5202: Identify Electrolyzer Components and Materials for manufacturing of Electrolyzer	Materials and components required for Manufacturing Electrolyzer	30	20	-	-
	PC1. explain and illustrate the basic materials and components required for manufacturing Electrolyzer and different types of Materials required for Electrolyzer manufacturing and their key specification through Pictures, videos, product data sheet etc.	5	5	-	-
	PC2. explain the major components required for Alkaline type Electrolyzer. and discuss about each component.	5	-	-	-

	PC3. explain the major components required for PEM type Electrolyzer and discuss about each component.	5	-	-	-
	PC4. explain the major components required for (SOEC) type Electrolyzer and discuss about each component.	5	-	-	-
	PC5. prepare and Identify Bill of material for materials and components of Electrolyzer manufacturing set up and show how to identify Bill of material for materials and components of Electrolyzer manufacturing set up.	5	5	-	-
	PC6. explain the major components required for (AEM) type Electrolyzer and discuss about each component	5	-	-	-
	PC7. outline differences in PEM, AE, Electrolyzer Materials and components.	-	5	-	-
	PC8. showcase the successful case studies of Electrolyzer technology for Green Hydrogen generation in India and overseas.	-	5	-	-
	NOS Total	30	20	-	-

NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N5203 Perform Manufacturing Process of Electrolyzer in Electrolyzer manufacturing unit	Fundamental techniques and process for manufacturing electrolyzers	30	20	-	-
	PC1. identify and show Identify different types of materials used in manufacturing electrolyzer.	3	5	-	-
	PC2. discuss and show them the electrolyzer cell components and its types through pictures and videos.	3	5	-	-
	PC3. discuss the process for Formulation of Electrolyte Solutions.	3	-	-	-
	PC4. discuss about the stacking techniques for electrolyzer manufacturing.	3	-	-	-
	PC5. discuss about Emerging Manufacturing Technologies for Electrolyzer	3	-	-	-
	PC6. explain electrode fabrication techniques of Electrolyzer	3	-	-	-
	PC7. discuss Membrane Fabrication Techniques of Electrolyzer and show how to select appropriate membrane for Electrolyzer manufacturing.	3	5	-	-
	PC8. discuss and show them the scaling up and automation in electrolyzer manufacturing through pictures and videos.	4	5	-	-

PC9. discuss about the progress and Challenges in Electrolyzer Manufacturing industry.	5	-	-	-
Assembling and Disassembling of Electrolyzer	30	20	-	-
PC10. explain and show how to read and interpret drawings of electrolyzer manufacturing facility.	2	4	-	-
PC11. discuss the Process Integration and Assembly of Electrolyzer.	4	-	-	-
PC12. discuss step-by-step process for assembly/Installation of Electrolyzer- Bipolar plate, separator(membrane), Porous Transport layer, electrodes, etc.	4	-	-	-
PC13. explain and show different types of Machining Techniques used in Electrolyzer Manufacturing through pictures or videos.	4	4	-	-
PC14. discuss and show how to implement the procedure for Electrolyzer stack assembly.	4	4	-	-
PC15. explain the sealing methods for Electrolyzer	2	-	-	-
PC16. discuss the importance of Manifold and sealing in Electrolyzer Manufacturing.	2	-	-	-

	PC17. discuss and show how to perform Cleaning and inspection of components of Electrolyzer for wear and tear.	2	4	-	-
	PC18. discuss the Inspection Procedures for electrolyzer manufacturing	2	-	-	-
	PC19. discuss about the progress and Challenges in Electrolyzer Manufacturing industry.	2	-	-	-
	PC20. identify and showcase the key aspects of successful cases studies of Electrolyzer manufacturing plants in India and abroad.	2	4	-	-
NOS Total		60	40	-	-

NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory	Practical	Project	Viva
SGJ/N5205.Perform Production Planning and Resource Management in Electrolyzer manufacturing facility	<i>Electrolyzer Production Planning and Resource Management.</i>	35	15	-	-
	PC1. explain and show how to do production planning in electrolyzer manufacturing	2	5	-	-

<p>PC2. determining and show how to determine the production capacity of the facility and assess its alignment with market demand.</p>	2	5	-	-
<p>PC3. discuss and prepare a list of Factors affecting production capacity, including equipment, workforce, and process efficiency in Electrolyzer Manufacturing facility</p>	2	5	-	-
<p>PC4. discuss about the procedure to make production schedule that outlines the timing and sequence of tasks and orders of Electrolyzer manufacturing facility and</p>	3	-	-	-
<p>PC5. discuss about allocation of Resources such as materials, equipment, and labor to meet production targets.</p>	3	-	-	-
<p>PC6. discuss about Managing resource constraints and resource allocation in electrolyzer manufacturing facility</p>	3	-	-	-
<p>PC7. discuss about techniques for forecasting demand for electrolyzers, considering market trends, customer orders, and projected growth.</p>	3	-	-	-
<p>PC8. explain inventory control methods to minimize excess stock and stockouts</p>	3	-	-	-
<p>PC9. explain the procedure for developing maintenance schedules and Show how to prepare procedures to make production schedule that outlines the timing and sequence of tasks and orders of Electrolyzer manufacturing facility</p>	3	-	-	-

	PC10. discuss the Importance of regular equipment maintenance and preventive measures to avoid unplanned downtime.	3	-	-	-
	PC11. discuss about implementing technological advancements to improve production.	2	-	-	-
	PC12. discuss about reports on production progress, resource utilization, and key performance indicators (KPIs).	2	-	-	-
	PC13. discuss how to develop a culture of continuous improvement within the electrolyzer production facility.	2	-	-	-
	PC14. examining successful electrolyzer	2	-	-	-
NOS Total		35	15	-	-

NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory	Practical	Project	Viva
SGJ/N5201.Manufacturing and efficiency principles for the Electrolyzer production unit	<i>Quality assurance and product testing of Electrolyzer manufacturing facility</i>	30	20	-	-

<p>PC1. discuss the document outlining the overall quality assurance strategy, including objectives, standards, and responsibilities in electrolyzer manufacturing facility and illustrate the schematic of Electrolyzer manufacturing Unit</p>	2	5	-	-
<p>PC2. explain the Detailed processes for inspecting, monitoring, and verifying the quality of materials, components, and assemblies at various stages of production and perform the Quality Assurance Processes in Electrolyzer Manufacturing unit</p>	2	5	-	-
<p>PC3. discuss about the specifications for electrolyzer components, materials, and finished products, including tolerances and acceptance criteria</p>	4	-	-	-
<p>PC4. discuss about the Specific procedures and protocols for product testing, including in-process testing and final product testing and illustrate Product Testing Procedures in Electrolyzer manufacturing facility</p>	3	5	-	-
<p>PC5. explain Test Requirements and Specifications for electrolyzer manufacturing facility and</p>	3	-	-	-
<p>PC6. explain Guidelines for the calibration and testing of equipment to ensure accurate and reliable results.</p>	4	-	-	-
<p>PC7. discuss the list of certifications and compliance requirements specific to electrolyzer manufacturing, such as ISO standards and industry-specific regulations.</p>	4	-	-	-

	<p>PC8. discuss about In-process testing and final product testing of Electrolyzer.</p>	4	-	-	-
	<p>PC9. discuss how to evaluate and manage the quality of materials and components supplied by external vendors.</p>	4	-	-	-
	<p>PC10. showcase Future Trends in Quality Assurance and Product Testing in Electrolyzer Manufacturing facility</p>	-	5	-	-
	<p><i>Electrolyzer manufacturing process optimization and Understanding Regulatory compliances.</i></p>	30	20	-	-
	<p>PC11. discuss about the process mapping and identify areas for improvement in our manufacturing process and Prepare the list of Regulatory Requirements for Product Testing in Electrolyzer manufacturing facility</p>	3	5	-	-
	<p>PC12. discuss Overview of Regulatory Landscape of Electrolyzer manufacturing facility and illustrate Objectives of Process Optimization in Electrolyzer Manufacturing</p>	3	5	-	-
	<p>PC13. discuss how to optimize the workflow in Electrolyzer manufacturing facility, and what tools or methods have been employed to streamline processes and showcase Optimization Strategies for</p>	3	5	-	-

	PC14. explain steps taken to minimize excess inventory and waste in materials and components	4	-	-	-
	PC15. discuss about the developing a system to track and ensure compliance with relevant regulations.	5	-	-	-
	PC16. explain Compliance Requirements for	4	-	-	-
	PC17. discuss how to Optimize the procurement of materials and components and prepare list of Performance Improvement Techniques in Electrolyzer manufacturing facility.	3	5	-	-
	PC18. discuss and show an Overview of national and international regulatory standards and certifications relevant to electrolyzer manufacturing through pictures and videos.	5	-	-	-
NOS Total		60	40	-	-

NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
SGJ/N5204: Maintain Health and safety measures in Electrolyzer manufacturing facility	Maintain Health and safety measures in Electrolyzer manufacturing facility.	24	26	-	-

<p>PC1. explain the requirements for safe work area at Electrolyzer in Manufacturing facility.</p>	<p>2</p>	<p>-</p>	<p>-</p>	<p>-</p>
<p>PC2. explain the importance of Occupational health& Safety standards and regulations for Basic considerations for the safety of Electrolyzer Manufacturing plant facility.</p>	<p>2</p>	<p>-</p>	<p>-</p>	<p>-</p>
<p>PC3. describe potential causes of emergency suchas gas leaks, fire, explosion, bomb threatening, natural calamities etc.</p>	<p>2</p>	<p>-</p>	<p>-</p>	<p>-</p>
<p>PC4. discuss importance of different detectors and safety tools used in Electrolyzer Manufacturing facility</p>	<p>2</p>	<p>-</p>	<p>-</p>	<p>-</p>
<p>PC5. review the Material Safety Data Sheet and labels of chemicals contained in cylinders in order to be aware of their hazards and precautionary measures</p>	<p>2</p>	<p>-</p>	<p>-</p>	<p>-</p>
<p>PC6. explain and demonstrate how to administer first aid and the importance of first aid.</p>	<p>-</p>	<p>4</p>	<p>-</p>	<p>-</p>
<p>PC7. identify and demonstrate the usage of personal protective equipment for ensuring safety during manufacturing of Electrolyzer.</p>	<p>2</p>	<p>4</p>	<p>-</p>	<p>-</p>
<p>PC8. identify the hazards associated with Electrolyzer Manufacturing and demonstrate how to follow necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident at electrolyzer manufacturing site.</p>	<p>2</p>	<p>4</p>	<p>-</p>	<p>-</p>

	PC9. identify work safety procedures and instructions for working at Electrolyzer Manufacturing facility	2	-	-	-
	PC10. discuss Mock testing of firefighting system and demonstrate the use of fire extinguishers, fire detection and alarm system.	2	4	-	-
	PC11. discuss all applicable statutory requirements along with safety regulations in terms of fire protection and show how to comply with all applicable statutory requirements along with safety regulations in terms of fire protection.	2	4	-	-
	PC12. Incorporate and demonstrate good housekeeping practices and infection control guidelines.	2	4	-	-
	PC13. identify and showcase best practices for implementing health and safety measures in manufacturing of Electrolyzer in India and overseas.	2	2	-	-
NOS Total		24	26	-	-
NOS/Module Name	Assessment Criteria for Performance criteria/Outcomes	Theory	Practical	Project	Viva
DGT/VSQ/N0102.Employability Skills (60 Hours)	<i>Introduction to Employability Skills</i>	1	1	-	-
	PC1. identify employability skills required for jobs in various industries	-	-	-	-
	PC2. identify and explore learning and employability portals	-	-	-	-

<i>Constitutional values – Citizenship</i>	1	1	-	-
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others etc	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
PC5. recognize the significance of 21st Century	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-

	PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
	<i>Career Development & Goal Setting</i>	1	2	-	-
	PC10. understand the difference between job and career	-	-	-	-
	PC11. prepare a career development plan with short- and long-term goals. based on aptitude	-	-	-	-
	<i>Communication Skills</i>	2	2	-	-
	PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
	PC13. work collaboratively with others in a team	-	-	-	-
	<i>Diversity & Inclusion</i>	1	2	-	-
	PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
	PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
	<i>Financial and Legal Literacy</i>	2	3	-	-
	PC16. select financial institutions, products and services as per requirement	-	-	-	-
	PC17. carry out offline and online financial transactions. safely and securely	-	-	-	-

	PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
	PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
	<i>Essential Digital Skills</i>	3	4	-	-
	PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
	PC21. use e-mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
	PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-
	<i>Entrepreneurship</i>	2	3	-	-
	PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
	PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
	PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
	<i>Customer Service</i>	1	2	-	-

	PC26. identify different types of customers	-	-	-	-
	PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
	PC28. follow appropriate hygiene and grooming standards	-	-	-	-
	<i>Getting ready for apprenticeship & Jobs</i>	2	3	-	-
	PC29. create a professional Curriculum vitae	-	-	-	-
	PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and	-	-	-	-
	PC31. apply to identified job openings using offline	-	-	-	-
	PC32. answer questions politely, with clarity and confidence. during recruitment and selection	-	-	-	-
	PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
	NOS Total	20	30	-	-

This section includes the processes involved in identifying, gathering and interpreting information to evaluate the learner on the required competencies of the program.

1. Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SDSM/SID or email
- Assessment agencies send the assessment confirmation to VTP/TC looping SCGJ
- Assessment agency deploys the ToA certified Assessor for executing the assessment
- SCGJ monitors the assessment process & records
- If the batch size is more than 30, then there should be 2 Assessors.

2. Testing Environment: Assessor must:

- Confirm that the centre is available at the same address as mentioned on SDMS or SID
- Check the duration of the training.
- Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
- Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
- Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
- Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:

- Question papers created by the Subject Matter Experts (SME)
- Question papers created by the SME verified by the other subject Matter Experts
- Questions are mapped with NOS and PC
- Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
- Assessor must be ToA certified & trainer must be ToT Certified.

4. Types of evidence or evidence-gathering protocol:

- Time-stamped & geotagged reporting of the assessor from assessment location
- Centre photographs with signboards and scheme specific branding
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period

- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:

- Surprise visit to the assessment location
- Random audit of the batch
- Random audit of any candidate

6. Method for assessment documentation, archiving, and access

- Hard copies of the documents are stored
- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage and are stored in the Hard Drives

Annexure: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency

AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf

Annexure: Career Progression and OM

