QUALIFICATION FILE – Micro Credentials

Basics of Pot Room Operations in Aluminium Industry

☒ Public ☐ Private

☒ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

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

NCrF/NSQF Level: 4

Submitted By:

Indian Iron and Steel Sector Skill Council (IISSSC)

Karigari Bhawan, 5th Floor, Room No-509, Plot No-B/7,
Action Area-III, New Town, Rajarhat, Kolkata-700160

Table of Contents

Section 1: Basic Details

1.	**Micro Credential-Qualification Name**	Basics of Pot Room Operations in Aluminium Industry
2.	**Sector/s**	Iron & Steel
3.	**National Qualification Register (NQR) Code & Version** *(Will be issued after NSQC approval.)*	NM-04-IS-03842-2025-V1-IISSSC **4. NCrF/NSQF Level:** 4
5.	**Brief Description of the Micro Credential**	This micro credential provides a comprehensive overview of Pot Room Operations, covering Fundamentals, Equipment and Maintenance, Crust Management, Bath Chemistry, and Safety Procedures. Participants gain expertise in managing operations, maintaining equipment, optimizing bath chemistry, ensuring metal quality, and responding effectively to emergencies, preparing them for roles in aluminum smelting and Pot Room management.
6.	**Eligibility Criteria for Entry for Students/Trainee/Learner/Employee**	**a. Entry Qualification & Relevant Experience**

S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)
1.	12th grade Pass (In science)	6 Months of experience In relevant field
2.	11th Class (In science)	1.5 years of experience In relevant field
3.	10th Class	3 Years of experience in relevant field
4.	10th Class (2 years of NTC / NAC / CTS in Fitter, Machinist, Electrical)	
5.	Pursuing 2nd year of 3-year regular Diploma Engineering (in Metallurgy / Mechanical / Production / Electrical/ Chemical) (after 10th)	

		b. Age <Please specify age only in case of any legal restrictions>: **18**	
7.	**Credits Assigned to this Qualification, Subject to Assessment** *(as per National Credit Framework (NCrF))*	1	**8. Common Cost Norm Category (I/II/III)** *(wherever applicable)***: I**
9.	**Any Licensing Requirements/ Pre-requisites for Undertaking Training** *(wherever applicable)*	No Licensing	
10.	**Expected Outcomes of the Micro Credential**	**Terminal learning outcomes are:** • Explain the fundamental principles of electrolysis as applied to aluminum smelting pots. • Describe the electrolytic reduction process and its role in converting alumina (Al_2O_3) into aluminum metal. • Explain the functions of the anode and cathode in the electrolytic reduction process. • Analyze the relationships between these control parameters and factors such as pot life, metal production efficiency, and energy consumption. • Identify various equipment used in the Pot Room, including their functions and purposes. • Demonstrate safe and efficient techniques for crust breaking and metal tapping under supervision. • Identify various hazards, including electrical hazards, molten metal spills, toxic fumes, and heat stress. • Describe the proper selection, use, and maintenance of personal protective equipment (PPE) for different Pot Room activities.	

<table>
<tr><td>11.</td><td>Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="2">☒ Offline Only ☐ Online Only ☐ Blended
<table><tr><th>Training Delivery Mode</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>Total (Hours)</th></tr><tr><td>Classroom (offline)</td><td>20</td><td>10</td><td>30</td></tr><tr><td>Online</td><td>0</td><td>0</td><td>0</td></tr></table>(Refer Blended Learning Annexure for Details)</td></tr>
<tr><td>12.</td><td>Assessment Criteria</td><td colspan="2"><table><tr><th>Theory (Marks)</th><th>Practical (Marks)</th><th>Project (Marks)</th><th>Viva (Marks)</th><th>Total (Marks)</th><th>Passing %age</th></tr><tr><td>40</td><td>60</td><td>0</td><td>0</td><td>100</td><td>70</td></tr></table></td></tr>
<tr><td>13.</td><td>Is the Qualification Amenable to Persons with Disability</td><td colspan="2">☒ Yes ☐ No If “Yes”, specify applicable type of Disability: Partial hearing disability
Candidate should be able to communicate properly with/without aids.</td></tr>
<tr><td>14.</td><td>How participation of women will be encouraged?</td><td colspan="2">Equal employment opportunity is being given in the industry.</td></tr>
<tr><td>15.</td><td>Other Indian Languages in which the Micro Credential will be implemented.</td><td colspan="2">English only and Vernacular language</td></tr>
<tr><td>16.</td><td>Is similar Micro Credential Qualification(s) available on NQR-if yes, justification for this qualification</td><td colspan="2">☐ Yes ☒ No URLs of similar Qualifications:</td></tr>
<tr><td>17.</td><td>Name and Contact Details Submitting / Awarding Body SPOC</td><td colspan="2">Name: Mr. Sushim Banerjee
Email: ceo@iisssc.org/ sushim_banerjee@yahoo.com Contact No.: 033-23247559
Website: https://www.iisssc.org/</td></tr>
<tr><td>18.</td><td>Final Approval Date by NSQC: 18/02/2025</td><td>19. Validity Duration: 3 Years</td><td>20. Next Review Date: 18/02/2028</td></tr>
</table>

Section 2: Training Related

1.	**Trainer's Qualification and experience in relevant sector (in years)** *(as per requirement and NCVET guidelines)*	ITI (Mechanical Engineering and any other related discipline) in the relevant discipline with minimum 3 years of experience in their professional fields (including minimum 2 years of relevant industry experience) Or Diploma (Mechanical Engineering and any other related discipline) in the relevant discipline with minimum 2 years of experience in their professional fields (including minimum 2 years of relevant industry experience) Or BE/BTECH (Mechanical Engineering and any other related discipline) or higher with minimum 2 years of experience in their professional fields with 1 year of relevant industry experience
2.	**Master Trainer's Qualification and experience in relevant sector (in years)** *(as per requirement and NCVET guidelines)*	B.Tech (Mechanical/Metallurgical Engineering) with 6 years of industry and 2 year of training experience in metal casting
3.	**Tools and Equipment Required for Training**	☒ **Yes** ☐ **No** (*If "Yes", details to be provided in Annexure)*

Section 3: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per requirement and NCVET guidelines)*	ITI (Mechanical Engineering and any other related discipline) in the relevant discipline with minimum 4 years of experience in their professional fields (including minimum 2 years of relevant industry experience) Or Diploma (Mechanical Engineering and any other related discipline) in the relevant discipline with minimum 3 years of experience in their professional fields with 2 years of relevant industry experience Or BE/BTECH (Mechanical Engineering and any other related discipline) or higher with minimum 3 years of experience in their professional fields with 1 year of relevant industry experience
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per requirement and NCVET guidelines)*	B.Tech (Mechanical/Metallurgical Engineering) with 5 years of industry and 2 year of assessment experience in metal casting

3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per requirement and NCVET guidelines)*	Diploma in the relevant discipline with a minimum of 10 years of experience in their professional fields with 3 years of relevant industry experience Or BE/BTECH or higher with minimum 7 years of experience in their professional fields with 5 year of relevant industry experience
4.	**Assessment Mode** *(Specify the assessment mode)*	**Mode: ☐ Online Only ☒ Offline Only ☐ Blended**
5.	**Tools and Equipment Required for Assessment**	☒ **Same as for training** ☐ **Yes** ☐ **No** *(details to be provided in Annexure-if it is different for Assessment)*

Section 4: Evidence of Need of the Micro Credential

As per the NCVET Guidelines for evidence of need, provide the required Annexure/Supporting documents.

1.	Government /Industry initiatives/ requirement (Yes/No): Yes
2.	Number of Industry validation provided: 5
3.	Estimated number of people to be trained: 500

Section 5: Annexure Check List

Specify Annexure Number and Name.

1.	**Annexure:** NCrF/NSQF level justification based on NCrF Level/NSQF descriptors *(Mandatory)*	Attached
2.	**Annexure:** Learning Outcomes and Assessment Criteria *(Mandatory)*	Attached
3.	**Annexure:** Assessment Strategy *(Mandatory)*	Attached
4.	**Annexure:** List of tools and equipment relevant for qualification	Attached

	(Mandatory – Except in case of online course)	
5.	**Annexure:** Blended Learning *(Mandatory in case selected mode of delivery is "Blended Learning")*	Attached
6.	**Annexure:** Acronym and Glossary *(Optional)*	Attached

Annexure: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	• Advanced understanding of electrolysis principles in aluminum smelting. • Proficiency in control parameter optimization for efficient Pot Room operations. • Mastery of material handling techniques and spill containment procedures. • In-depth knowledge of Pot Room equipment maintenance. • Expertise in bath chemistry management and metal quality control. • Comprehensive understanding of safety protocols and emergency response procedures.	At NSQF Level 4, professional theoretical knowledge for Pot Room Operators encompasses advanced understanding of electrolysis principles, equipment maintenance, bath chemistry, and safety protocols. Operators analyze complex data, optimize processes, and make informed decisions to ensure efficient aluminum production. They demonstrate mastery in problem-solving, aligning with Level 4 descriptors for skilled tasks and advanced theoretical comprehension in industrial operations.	4
Professional and Technical Skills/ Expertise/ Professional Knowledge	• Proficiency in electrolysis principles and aluminum smelting processes • Advanced understanding of control parameters optimization • Expertise in material handling and transport procedures • Skill in Pot Room equipment maintenance and upkeep • Knowledge of crust management and tapping procedures	At NSQF Level 4, Pot Room Operations in Aluminium industry demonstrate advanced professional and technical skills in aluminum smelting. They possess expertise in electrolysis principles, control parameter optimization, equipment maintenance, and emergency response. Their professional knowledge encompasses crust management, bath chemistry, and safety protocols, enabling them to	4

	• Understanding of bath chemistry and metal quality control • Familiarity with Pot Room safety procedures and emergency response protocols	efficiently operate Pot Rooms, ensure metal quality, and mitigate risks, aligning with Level 4 descriptors for skilled tasks and problem-solving.	
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	• Strong problem-solving abilities to address complex challenges in Pot Room operations. • Effective communication skills for collaborating with team members and supervisors. • Attention to detail for monitoring equipment and processes accurately. • Ability to work efficiently under pressure and adhere to safety protocols. • Adaptability to quickly respond to changing production demands and emergencies. • Basic understanding of mathematical concepts for interpreting data and measurements. • Willingness to continuously learn and improve technical skills related to Pot Room operations. • Entrepreneurial mindset to identify opportunities for process optimization and efficiency improvements. • Leadership qualities to guide and support team members in achieving production targets.	At NSQF Level 4, Employment Readiness & Entrepreneurship skills for Pot Room Operators entail fostering a proactive mindset and adaptability to evolving industry demands. Operators develop problem-solving skills, teamwork, and communication abilities crucial for efficient Pot Room operations. They cultivate resilience and entrepreneurial spirit, enhancing their readiness to tackle challenges and explore innovative solutions in the aluminum smelting industry.	4
Broad Learning Outcomes/Core Skill	• Proficiency in electrolysis principles and processes related to aluminum smelting • Mastery of control parameter optimization for efficient Pot Room operations • Expertise in material handling, including proper containment procedures for spills • Skill in traffic management and scheduling for safe and efficient Pot Room operations • Competence in vehicle maintenance and	At NSQF Level 4, Pot Room Operators develop core skills encompassing advanced understanding and application of electrolysis principles, equipment maintenance, bath chemistry management, and emergency response protocols. They demonstrate proficiency in optimizing operations, ensuring product quality, and maintaining safety standards,	4

	upkeep to ensure reliability and safety • Ability to respond effectively to emergencies and implement proper safety protocols • Understanding of bath chemistry and metal quality control for optimal production outcomes	preparing them for supervisory roles and contributing to efficient and safe aluminum smelting processes.	
Responsibility	• Communicate with Pot Room personnel using visual signals and radio protocols. • Conduct pre- and post-shift inspections of Pot Room vehicles. • Perform basic maintenance tasks under supervision. • Address unsafe practices through clear communication. • Ensure proper selection and use of PPE. • Participate in emergency response drills effectively.	At NSQF Level 4, Pot Room Operators are entrusted with advanced responsibilities in aluminum smelting operations. They demonstrate expertise in electrolysis principles, equipment maintenance, bath chemistry management, and emergency response. Job outcomes align with Level 4 descriptors, requiring skilled problem-solving, decision-making, and adherence to safety protocols to ensure efficient Pot Room operations and high-quality aluminum production.	4

Annexure: Learning Outcomes and Assessment Criteria

Detailed learning outcomes and assessment criteria for the qualification are as follows:

S. No.	Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC 1.	Safely operate Pot Room equipment (e.g., cranes, tapping systems) under supervision, demonstrating proficiency in handling tools and following safety protocols.	4	6	0	0
PC 2.	Perform preventive maintenance tasks on equipment following established procedures, including lubrication and visual inspections.	4	6	0	0
PC 3.	Execute crust breaking techniques considering crust types and equipment limitations.	4	6	0	0
PC 4.	Demonstrate proper metal tapping procedures, including volume control and molten metal handling.	4	6	0	0
PC 5.	Participate in simulated dross removal scenarios during tapping operations.	2	3	0	0
PC 6.	Execute anode replacement, detailing the tools, techniques, and safety precautions required for	2	3	-	-

	efficient operation.				
PC 7.	Practice sample handling techniques to maintain sample integrity and minimize contamination risks.	4	6	0	0
PC 8.	Identify deviations in bath chemistry and recommend corrective actions, prioritizing safety and production efficiency.	4	6	0	0
PC 9.	Utilize control charts to monitor bath chemistry trends and address potential issues proactively.	4	6	0	0
PC 10.	Demonstrate proper selection, donning, and doffing of PPE for Pot Room activities.	2	3	0	0
PC 11.	Participate in emergency response drills, including fire extinguisher use, metal spill containment, and evacuation procedures, utilizing training simulators and simulated materials.	2	3	0	0
PC 12.	Assess the environmental impact of emissions and waste generated in pot room operations, identifying sources and proposing strategies for mitigation.	2	3	0	0
PC 13.	Operate advanced technologies and equipment designed to optimize energy consumption and enhance sustainability in pot room processes.	2	3	0	0
Total Marks		**40**	**60**	**0**	**0**

Annexure: Assessment Strategy

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

Mention the detailed assessment strategy in the provided template.

1. Assessment System Overview:
   - Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
   - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
   - Assessment agency deploys the ToA certified Assessor for executing the assessment
   - SSC monitors the assessment process & records

2. Testing Environment:
   - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
   - Check the duration of the training.
   - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
   - Metal Casting the batch size is more than 30, then there should be 2 Assessors.
   - 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 is 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
   - Assessment agency must follow the assessment guidelines to conduct the assessment

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
   - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

Annexure: Tools and Equipment

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1.	Heat-Resistant Gloves	As per requirement	30
2.	Face Shields	All	30
3.	Protective Clothing	As per requirement	30
4.	Torque Wrenches	As per requirement	10
5.	Calibration Tools	As per requirement	10
6.	Grease Guns	As per requirement	10
7.	Oil Cans	As per requirement	10
8.	Flashlights	As per requirement	15
9.	Magnifying Glasses	As per requirement	10
10.	Brushes	As per requirement	10
11.	Cleaning Solvents	As per requirement	10
12.	Calipers	As per requirement	10
13.	Micrometers	As per requirement	10
14.	Fire Extinguishers	As per requirement	5
15.	First Aid Kits	As per requirement	5
16.	Manufacturer's Guidelines	As per requirement	30
17.	Pen	As per requirement	30
18.	Notebook	As per requirement	30
19.	Trainer	As per requirement	30
20.	Guide,	As per requirement	30
21.	Presentations,	As per requirement	5
22.	Whiteboard,	As per requirement	1
23.	Marker,	As per requirement	2
24.	Projector,	As per requirement	1
25.	Laptop,	As per requirement	30
26.	Video Films	As per requirement	1
27.	Siphon tapping tools	As per requirement	1

28.	Skimmers	As per requirement	1
29.	Cryolite (Na_3AlF_6)	As per requirement	1
30.	Calcium fluoride (CaF_2)	As per requirement	1
31.	X-ray Fluorescence (XRF) Analyzer	As per requirement	1
32.	Potentiometric titrators	As per requirement	1

Classroom Aids:

The aids required to conduct sessions in the classroom are:

1. Whiteboard and marker
2. Projector
3. Laptop
4. Internet

Annexure: Industry Validations Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile *(if available)*
1	Bokaro Steel Plant	B.K Singh	GM		8986871504	Basant.singh@sail.in	
2	Thinkway Industries Pvt Ltd.	Mrs. Swati Kumar	Director	Flat No. 33, Block-B, Pocket-C, Loknayak Puram, DDA Flat Nangloi, Delhi-110041	9999751120	operations.zita@gmail.com	
3	Bhalotia Auto Products Pvt. Ltd.	Kanchan Patra	AGM	H.0 Muneshwari Bhawan, Jamshedpur - 831001	9830019700		
4	Rourkela Steel Plant	H. Pati	GM	Rourkela - 769011	8895500593		
5	ESL Steel Limited	G L Karna	Head – L&D	Siyalijori, P.O – Jogidih, O.P – Bangaria, P.S – Chandankyari, Bokaro Pin – 828303	9004974233	Govindlal.karna@vadanta.co.in	

Annexure: Training Details

Training Projections:

Year	Estimated Training # of Total Candidates	Estimated training # of Women	Estimated training # of People with Disability
2024-25	500	200	50
2025-26	1000	400	100
2026-27	1500	600	150

Data to be provided year-wise for next 3 years.

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	☒ Theory/ Lectures - Imparting theoretical and conceptual knowledge	• Books/ e-books • Presentations • Reference Material • Audio / Video Modules	
2	☒ Imparting Soft Skills, Life Skills and Employability Skills /Mentorship to Learners	• Self-Learning Videos • Broadcasts • Mobile Learning • Curated Digital content	
3	☒ Showing Practical Demonstrations to the learners	• Video Content • E-Resource library • AR/VR/XR	

4	☒ Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	• Training tools (tools list attached) • Video Play • Presentations	
5	☒ Tutorials/ Assignments/ Drill/ Practice	• Online Question Bank • Mobile Quick test app • MCQ based tests	
6	☒ Proctored Monitoring/ Assessment/ Evaluation/ Examinations	• Assessment engine for Essays • Up-loadable file examinations • Mock test sessions	
7	☒ On the Job Training (OJT)/ Project Work Internship	• Online tests • Offline assessments	

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
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training
CAD/CAM	Computer-aided design and computer-aided manufacturing
CAE	Computer-aided engineering

Glossary

Term	Description
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 based on their main economic function, product, service or technology.