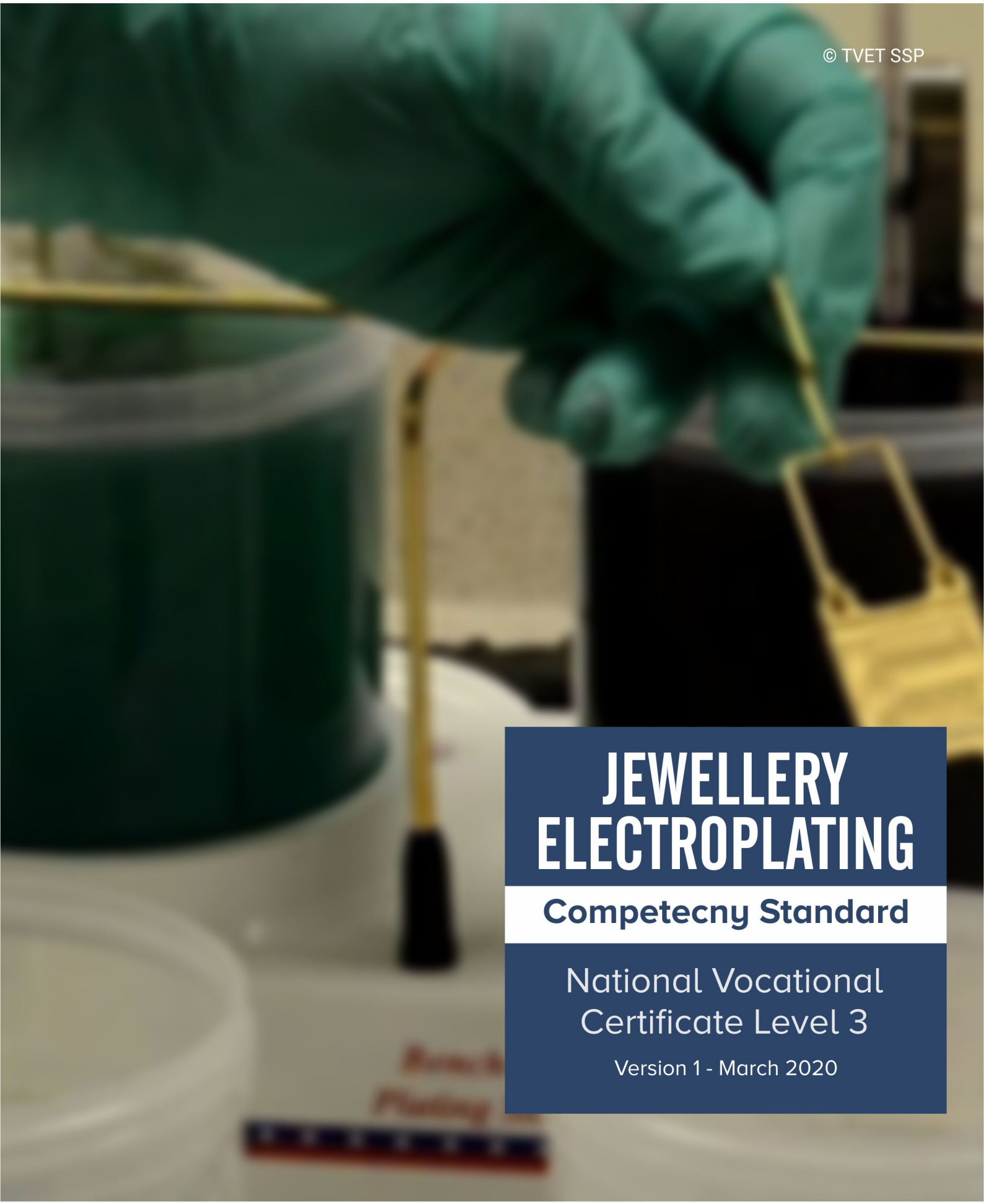

JEWELLERY ELECTROPLATING

Competecny Standard

National Vocational Certificate Level 3

Version 1 - March 2020

Co-funded by the European Union
german cooperation DEUTSCHE ZUSAMMENARBEIT
Norwegian Embassy Islamabad
NAVTTC
Implemented by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Published by
National Vocational and Technical Training Commission
Government of Pakistan

Headquarter
Plot 38, Kirthar Road, Sector H-9/4, Islamabad, Pakistan
www.navttc.org

Responsible
Director General Skills Standard and Curricula, National Vocational and Technical Training Commission
National Deputy Head, TVET Sector Support Programme, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Layout & design
SAP Communications

Photo Credits
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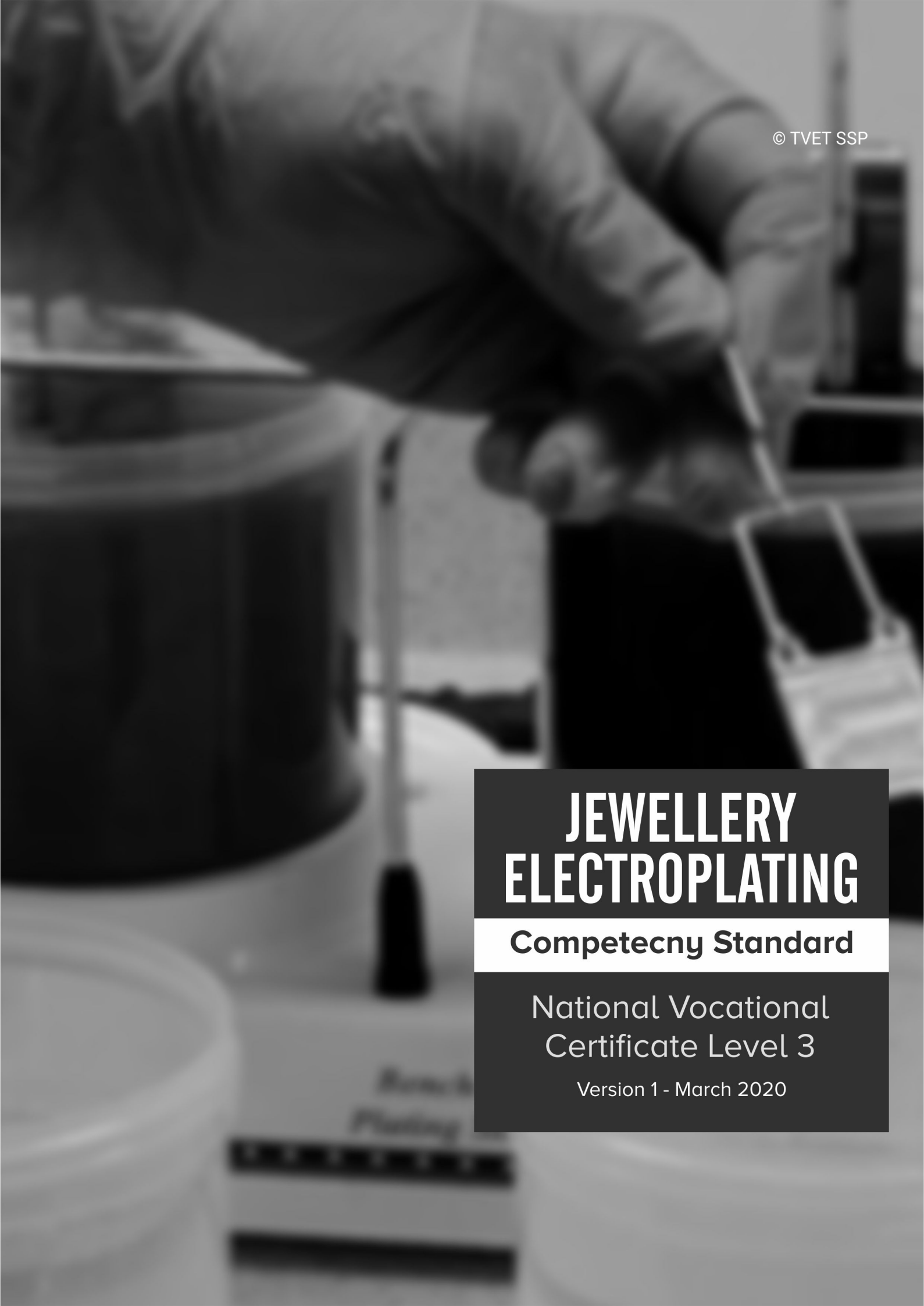
This document has been produced with the technical assistance of the TVET Sector Support Programme, which is funded by the European Union, the Federal Republic of Germany and the Royal Norwegian Embassy and has been commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in close collaboration with the National Vocational and Technical Training Commission (NAVTTC) as well as provincial Technical Education and Vocational Training Authorities (TEVTAs), Punjab Vocational Training Council (PVTC), Qualification Awarding Bodies (QABs)s and private sector organizations.

Document Version
March, 2020
Islamabad, Pakistan



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Contents

INTRODUCTION

The National Competency Standards are written specifications of skill and knowledge competencies required in a particular trade. Industry experts from the relevant industries from different geographical locations across Pakistan were consulted during the development process of these competency standards to ensure input and ownership of all the stakeholders. The National Competency Standards shall be used as a referral document for the development of curricula to be used by training institutions.

This standard shall help providing skilled manpower for the value addition on Gemstone and Jewellery of the existing Gems and Jewellery sector and related industry. This will improve the abilities and accreditation of Jewellery Electroplating in terms of national and international standards applicable in the field of Gems and Jewellery. The availability of quality Jewellery Electroplating expert in the local and international markets will ultimately bring economic benefits to the producers and processors. In addition this qualification will prepare youth to be employee in industry or work as an entrepreneur. Main purpose is to prepare and train students through skill training and enable them to earn their living either through employment in industry or to be self-employed.

PURPOSE OF THE QUALIFICATION

The purpose of this qualification is to set high professional standards for Jewellery Electroplating trade. The specific objectives of developing these qualifications are as under:

- Fulfil workforce needs of Gems and Jewellery sector
- Improve the personal and professional competence
- Provide opportunities for recognition of skills attained through formal or informal pathways
- Improve the quality and effectiveness of training and assessment
- Provide opportunities to reduce unemployment ratio through aforesaid skills set

DATE OF VALIDATION

The National vocational qualification Level-3 on Jewellery Electroplating has been validated by the Qualifications Validation Committee on March 9 -10, 2020.

CODES OF QUALIFICATIONS

The International Standard Classification of Education (ISCED) is a framework for assembling, compiling and analysing cross-nationally comparable statistics on education and training. ISCED codes for these qualifications are assigned as follows:

CODE	DESCRIPTION
0214JE005	National Vocational Certificate level 3 in “Jewellery Electroplating”

ENTRY REQUIREMENTS

The entry for National Vocational Certificate level 3, in Jewellery Electroplating is Middle grade or equivalent. Entry to assessment for this qualification is open.

QUALIFICATIONS DEVELOPMENT COMMITTEE

The Qualifications Development Committee consisted of following members:

S. No.	NAME	DESIGNATION	ORGANIZATION
1.	Bashir Agha	DACUM Facilitator, Principal	GJTMC, Quetta
2.	Hafiz M. Shoaib	Research Assistant	LUMS, Lahore
3.	Muhammad Umar	Course Coordinator Gem & Jewellery	PIFD-Lahore
4.	Farheen Agha	Lapidary In-Charge	GJTMC, Quetta
5.	Muhammad Shoaib	Jewellery Instructor	GJTMC, Lahore
6.	Abdul Sattar Ahmed	Electroplating expert	Roop Nikhar
7.	Muhammad Abdullah	Electroplating expert	Roop Nikhar
8.	Rehan Sami	Director	Cardix, Karachi
9.	Aftab Ahmed	Instructor Jewellery Electroplating	GJTMC, Lahore
10.	Tauseef Ahmed	Instructor Jewellery Electroplating	GJTMC, Lahore
11.	Muhammad Usman	Research Assistant	LUMS, Lahore
12.	Dr. Salman Noshear	Assistant Professor	LUMS, Lahore
13.	Rasheed Ray	President	APGMJA, Lahore
14.	Taufeeque Ahmed	Master Trainer	Meeno's Collection
15.	Muhammad Yasir	Deputy Director (Skills Standard & Curricula),	NAVTTC
16.	Muhammad Ishaq	Deputy Director (HR),	NAVTTC
17.	Muhammad Salman Butt	Executive Director	Espire Consult
18.	Munazza Tanveer	Freelance Consultant	

QUALIFICATIONS VALIDATION COMMITTEE

The Qualifications Validation Committee consisted of following members:

Sr. No.	Name	Designation	Organization
1.	Bashir Agha	DACUM Facilitator	GJTMC, Quetta
2.	Aftab Ahmed	Technical Instructor	GJTMC, Lahore
3.	M. Rehan Sami	Master Trainer	PGJDC, Cadrix, Karachi
4.	Tanzeel ur Rehman	3D Consortium	3D Consortium
5.	Sanaullah Durrani	CEO/ Consultant	Innovative Pioneers
6.	Rasheed Ray	Director	RAY Gold Pakistan
7.	Muhammad Shoaib	Instructor,	GJTMC, Lahore
8.	Hafiz M. Shoaib	Research Assistant,	LUMS, Lahore
9.	Muhammad Umer	Course Coordinator	PIFD, Lahore
10.	Taufeeque Ahmed	Director	Meemo's Collection
11.	Khurram Riaz	CAD/CAM Trainer	GJTMC, Lahore
12.	M. Usman Yousaf	Research Assistant	LUMS, Lahore
13.	Abdul Sattar Ahmed	Electroplating expert	Roof Nikhar
14.	M. Abdullah Sattar	CEO, Roop Nikhar	Roof Nikhar
15.	M. Hussain Memon	Director	Memon Gems & Jewellery
16.	Akhtar Amin	CEO	Amin Goldsmith & Gems
19.	Muhammad Salman Butt	Executive Director	Espire Consult
20.	Munazza Tanveer	Freelance Consultant	
17.	Sabeel Asghar Kiani	Technical Advisor	TVET Sector Support Programme

18.	Muhammad Naeem Akhtar	Senior Technical Advisor	TVET Sector Support Programme

REGULATIONS FOR THE QUALIFICATION AND SCHEDULE OF UNITS

CATEGORIZATION AND LEVELLING OF THE COMPETENCY STANDARDS

Code	Competency Standards	Level	Credits	Category
102200843	Comply with personal health and safety guidelines	2	2	Generic
0214JE005A	Perform pre-treatment of jewellery article	3	38	Technical
0214JE005B	Perform electroplating of jewellery article	3	13	Technical
0214JE005C	Perform post-treatment of plated article	3	7	Technical
0214JE005D	Recover precious metals	3	9	Technical
041300860	Develop entrepreneurial skills	3	11	Generic

PACKAGING OF QUALIFICATIONS

The national vocational qualifications are packaged as per following:

National Vocational Qualification Level-3 in Jewellery Electroplating
Comply with personal health and safety guidelines
Perform pre-treatment of jewellery article
Perform electroplating of jewellery article
Perform post-treatment of plated article
Recover precious metals
Develop entrepreneurial skills

102200843 Comply with Personal Health and Safety Guidelines

Overview

This competency standard covers the skills and knowledge required to identify personal hazards at work place, apply personal protective equipment (PPE), Comply occupational safety and health (OSH), Dispose hazardous waste/material(s) from the designated area.

Competency Units	**Performance Criteria**
CU1: Identify personal hazards at workplace	**P1.** Identify risk to personal health **P2.** Identify hygiene and safety at workplace **P3.** Identify tools, equipment and consumable **P4.** Report identified risk to health, hygiene and safety to concerned
CU2: Apply personal protective equipment (PPE)	**P1.** List the Personal protective equipment (PPE) **P2.** Select personal protective equipment in terms of type and quantity according to work orders**.** **P3.** Wear PPE according to job requirements. **P4**. Clean Personal protective equipment (PPE). **P5**. Store PPE in proper place after use.
CU3: Comply occupational safety and health (OSH)	**P1.** Maintain cleanliness and hygiene as per organizational policy. **P2.** Comply with health, hygiene and safety precautions before starting work. **P4.** Deal with resolvable problems according to prescribed procedures. **P5.** Report unresolved problems to concerned person.
CU4: Dispose hazardous	**P1.** Identify hazardous waste materials that need to be

waste/ material(s) from the designated area.	disposed off **P2.** Segregate hazardous or non-hazardous waste carefully from the designated area as per approved procedure. **P3.** Use proper disposal hazardous containers for dispose-off hazardous waste as per procedure **P4.** Take necessary precaution like putting masks and gloves while disposing hazardous like waste/materials as per standard operating procedure.

Knowledge and Understanding

- Explain safety rules and regulations of organization
- List personal protection and safety equipment.
- Describe meaning of safety signs and symbols
- Demonstrate understanding of safety related standards operating procedures/guidelines.
- Describe waste disposal SOP's
- Explain best practices relating to clean and safe work environment.
- Understand the safety signs charts

Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to comply with Personal Health and Safety Guidelines.

They must also complete a knowledge assessment test (written or oral) together with a portfolio of evidence that shows their knowledge and understanding needed to Comply with Personal Health and Safety Guidelines. Further guidance is provided in the Assessment Evidence Guide for this Competency Standard.

List of Tools and Equipment

Sr. No.	Items
1.	Safety glasses
2.	Fume mask

3.	Safety Apparel
4.	Gloves
5.	Long rubber shoes
6.	First Aid Box

0214JE005A Perform Pre-Treatment of Jewellery Article

Overview

This competency standard covers the skills and knowledge required to assess surface quality of the jewellery article and performing steam cleaning, ultrasonic cleaning, alkali cleaning, acidic cleaning and performing the electrolytic cleaning. The competency will also help in performing electroless plating on complex jewellery article and perform masking for multi-tone plating.

Competency Units	Performance Criteria
CU1: Assess surface quality of the Jewellery article	**P1**. Check for any surface defects including marks, scratches and roughness **P2**. Segregate jewellery articles according to quality **P3**. Perform buffing to polish the surface of the jewellery article **P4**. Inspect for faulty hinges and soldered joints.
CU2: Perform steam cleaning	**P1**. Setup steamer for cleaning process. **P2**. Clean jewellery article with steam ensuring the articles are free of any deposits
CU3: Perform ultrasonic cleaning	**P1.** Prepare solution for ultrasonic cleaning. **P2.** Adjust temperature and frequency parameters. **P3.** Fix the article in jig and clean jewellery article using ultrasonic machine for required time **P4.** Rinse article with water to remove cleaning media. **P6.** Inspect cleaned surface of the article.
CU4: Perform alkali cleaning	**P1.** Prepare recipe of the alkali cleaning solution as per jewellery metal.

	P2. Mix ingredients to make alkaline solution for cleaning **P3.** Label solution container mentioning the ingredients and hazards of the solution. **P4.** Fix the article in jig and clean jewellery article using alkali cleaning bath for required time **P5.** Rinse article with distilled water to remove cleaning media.
CU5: Perform electrolytic cleaning	**P1.** Prepare electrolytic cleaning solution as per recipe. **P2.** Connect jewellery article with electrode in electrolytic cleaning apparatus. **P3.** Adjust electric current and voltage parameters. **P4.** Clean article for required time **P5.** Rinse article with distilled water to remove cleaning media.
CU6: Perform acid activation of the surface	**P1.** Prepare recipe of the acidic cleaning solution as per jewellery metal. **P2.** Mix ingredients to make acidic solution for cleaning **P3.** Label solution container mentioning the ingredients and hazards of the solution. **P4.** Fix the article in jig and clean jewellery article using acidic cleaning bath for required time **P5.** Rinse article with distilled water to remove cleaning media.

CU7: Perform electroless plating on complex jewellery article	**P1.** Prepare recipe of the electroless plating solution as per jewellery metal. **P2.** Mix ingredients to make electroless solution for plating. **P3.** Label solution container mentioning the ingredients and hazards of the solution. **P4.** Fix the article in jig and perform electroless plating of jewellery article as per requirement. **P5.** Rinse article with distilled water to remove cleaning media
CU8: Perform masking for multi-tone plating	**P1.** Prepare masking paint as per requirement of the jewellery article. **P2.** Perform masking on required portion of jewellery article. **P3.** Hang the article for drying after masking.

Knowledge and Understanding

- Types and use of polishing media as per jewellery article requirements.
- Types of surface defects
- Physical properties of Metals (both precious & non-precious)
- pH value, temperature maintenance and measuring units.
- Time duration required for article in cleaning media.
- Reactivity of Acid/ base with base metal
- The sequence of cleaning process of article for acidic/ basic treatment.
- Understanding of Electroless compositions and parameters.

Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to perform pre-treatment of jewellery article.

They must also complete a knowledge assessment test (written or oral) together with a portfolio of evidence that shows their knowledge and understanding needed to perform pre-

treatment of jewellery article. Further guidance is provided in the Assessment Evidence Guide for this Competency Standard.

List of Tools and Equipment

Sr. No.	Items
1.	Graded Beakers
2.	Stirrers
3.	Digital weighting balance
4.	Specific gravity meters
5.	Measuring cylinders
6.	Magnifying glass
7.	Tweezers & pliers
8.	Buffing machine
9.	Buffing cloth
10.	Buffing polishing bar
11.	Plastic buckets for washing
12.	Jigs
13.	Steam cleaner
14.	Ultrasonic cleaner
15.	Electrolytic cleaning apparatus
16.	Barrel polishing/ tumbler

0214JE005B Perform Electroplating of Jewellery Article

Overview

This competency standard covers the skills and knowledge required to setup electroplating workstation and perform electroplating of jewellery article.

Competency Units	Performance Criteria
CU1: Perform electroplating of jewellery article	**P1.** Set operating parameters (temperature, pH, voltage, and current density) as per requirement of the article. **P2**. Adjust anode/cathode surface area ratio. **P3**. Connect electrodes with power supply. **P4**. Immerse jewellery article in electroplating bath. **P5**. Perform electroplating (Copper, Nickel, Silver, Gold, Rhodium) **P6**. Rinse article with distilled water to remove electrolyte.
CU2: Perform alloy plating	**P1.** Set operating parameters (temperature, pH, voltage, and current density) as per requirement of the article. **P2**. Adjust anode/cathode surface area ratio **P3**. Connect electrodes with power supply **P4**. Immerse jewellery article in alloy plating bath. **P5**. Perform alloy plating (22K, 21K, 18K, 14K, 12K, 9K, rose red gold, pink gold, green gold, dead leaves coloured gold, and brass plating). **P6**. Rinse article with distilled water to remove electrolyte.

CU3: Perform pen plating	**P1.** Set operating parameters of pen plating unit. **P2.** Dip the tip of plating pen into electroplating solution. **P3.** Mark the parts of jewellery article with the help of plating pen's tip where plating is required. **P4.** Rinse article with distilled water to remove electrolyte.

Knowledge and Understanding

- Use and functions of various parts of the electroplating machine.
- Electrolytes and additives (levellers, brighteners, complexing agents)
- The basic knowledge/ principles of electrochemistry and parameters (temperature, pH, voltage, and current density).
- Karat and alloy electroplating bath
- Metal alloys and their properties
- Thickness control of plating layer
- Pen plating process

Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to Perform Electroplating of Jewellery Article.

They must also complete a knowledge assessment test (written or oral) together with a portfolio of evidence that shows their knowledge and understanding needed to Perform Electroplating of Jewellery Article. Further guidance is provided in the Assessment Evidence Guide for this Competency Standard.

List of Tools and Equipment

Sr. No.	Items
1.	Power Supply
2.	Connection wires
3.	Graded beakers
4.	Tweezer

5.	Thermometers
6.	pH strips
7.	Electrode(s)
8.	Stove/ Immersion heater
9.	Electrolytic solutions
10.	Additives
11.	Thickness gauge
12.	Plastic buckets for washing

0214JE005C Perform Post-Treatment of Plated Article

Overview

This competency standard covers the skills and knowledge required to perform post-treatment of electroplated article by applying inorganic, organic and electrophoretic composite protective coating.

Competency Units	Performance Criteria
CU1: Apply inorganic protective coating	**P1**. Remove masking by solvent and perform ultrasonic cleaning if required. **P2.** Prepare inorganic protective coating solution as per recipe **P3**. Apply protective coating when article is gold, rhodium, nickel, copper, or silver electroplated if required. **P4**. Cure protective coating by air drying / heat drying
CU2: Apply organic protective coating	**P1**. Remove masking by solvent and perform ultrasonic cleaning if required. **P2.** Prepare organic protective coating solution as per recipe **P3**. Apply protective coating when article is gold, rhodium, nickel, copper, or silver electroplated if required. **P4**. Cure protective coating by Ultra Violet/ heat drying
CU3: Apply electrophoretic composite coating	**P1**. Remove masking by solvent and perform ultrasonic cleaning if required. **P2.** Prepare electrophoretic composite coating solution as per recipe **P3**. Setup workstation for electrophoretic composite coating **P4**. Perform electrophoretic protective coating when article is gold, rhodium, nickel, copper, or silver electroplated if required. **P5**. Cure protective coating by heat drying

Knowledge and Understanding

- Use of lacquers, electrophoretic coatings, commercial anti-tarnish chromate coating.
- Safety requirements of the finishing processed

Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to Perform Post-Treatment of Plated Article.

They must also complete a knowledge assessment test (written or oral) together with a portfolio of evidence that shows their knowledge and understanding needed to Perform Post-Treatment of Plated Article. Further guidance is provided in the Assessment Evidence Guide for this Competency Standard.

List of Tools and Equipment

Sr. No.	Items
1.	Air dryer
2.	Towels and soft tissues
3.	Saw-dust
4.	Protective coatings
5.	Spray gun and cabin.
6.	UV cabin
7.	Convection Oven
8.	Electrophoretic composite coating apparatus

0214JE005D Recover Precious Metals

Overview

This competency standard covers the skills and knowledge required to recover precious metals (gold, silver and rhodium) from used electroplating solutions and recover precious metals (gold, silver and rhodium) from used electroplating solutions

Competency Units	Performance Criteria
CU1: Recover precious metals (Gold, silver, rhodium) from used electroplating solutions	**P1.** Neutralize waste solution **P2.** Perform metal precipitation **P3.** Filter and dry metal residue **P4.** Perform melting of metal residue **P5.** Submit ingot for refining
CU2: Recover precious metals (Gold, silver, rhodium) from jigs' waste.	**P1.** Perform melting of jigs' waste into single metallic bar/ingot **P2**. Submit metallic bar for refining

Knowledge and Understanding

- Acid/Base neutralisation.
- Understanding of metal precipitants
- Melting fluxes, crucibles, melting furnace

Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to Recover Precious Metals.

They must also complete a knowledge assessment test (written or oral) together with a portfolio of evidence that shows their knowledge and understanding needed to Recover Precious Metals. Further guidance is provided in the Assessment Evidence Guide for this Competency Standard.

List of Tools and Equipment

Sr. No.	Items
1.	Melting Furnace
2.	Melting fluxes

041300860 DEVELOP ENTREPRENEURIAL SKILLS

Overview

This Competency Standard identifies the competencies required to Develop Entrepreneurial Skills. This section is crafted to develop knowledge and skills required to Develop Entrepreneurial Skills and present the business ideas to potential support providers. The content will be useful for learners who intend to start a business, become self-employed or want to get prerequisite knowledge before starting a business.

Competency Units	**Performance Criteria**
CU1: Develop self against skills and attributes required for entrepreneurship	**P1**. Set personal objectives for pursuing entrepreneurship **P2**. Document gaps in self for skills and attributes required for an entrepreneur **P3**. Take appropriate actions to cover identified gaps
CU2: Collect information on viable business ideas	**P1**. Conduct an elementary market survey to collect basic information on business ideas relevant to own interests **P2**. Compile the information collected through the market survey **P3**. Gather customer needs for identified business ideas **P4**. Shortlist the best option in terms of cost, service, quality, sales, profit margin, overall expenses
CU3: Collect information on various funding sources	**P1**. Identify the available funding sources based on their terms and conditions, maximum loan limit, payback time, interest rate **P2**. Choose the best available option according to investment requirement

CU4: Finalize the business idea	**P1**. Estimate the available resources **P2**. Identify relevant customer segments and their needs **P3**. Identify existing solutions in the market **P4**. Devise the business idea for specific customer needs **P5**. Identify key resources required for execution of business idea

Knowledge and Understanding

The candidate must possess underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes;

- The fundamentals of entrepreneurship.
- The characteristics, skills and attributes possessed by successful entrepreneurs.
- Risks and rewards for an entrepreneur.
- Identifying personal strengths and weaknesses
- Techniques to conduct self-assessment for entrepreneurial skills
- Deming cycle (Plan do check act).
- Basics of market segmentation
- Concept of the business value chain.
- Developing an action plan
- Business Communication
- Effective presentation techniques
- The characteristics, skills and attributes possessed by successful entrepreneurs.
- Elementary market survey techniques and their constituents e.g.
    a. Customer /demand
    b. Tools, equipment, machinery and furniture with rates
    c. Raw material
    d. Supplier
    e. Credit / funding sources
    f. Market trends
    g. Overall expenses

Critical Evidence(s) Required

The candidate must present evidence of practical observations showing their ability to Develop Entrepreneurial Skills.

They must also complete a knowledge assessment test (written or oral) together with a portfolio of evidence that shows their knowledge and understanding needed to Develop Entrepreneurial Skills. Further guidance is provided in the Assessment Evidence Guide for this Competency Standard.

List of Tools and Equipment

Sr. No.	Items
1.	Computer
2.	Internet
3.	Printer

LIST OF TOOLS AND EQUIPMENT

Sr. No.	Items
1.	First Aid Box
2.	Fire extinguishers
3.	Eye loupes/ optivisor
4.	Table lamp
5.	Buffing machine
6.	Steam cleaning unit
7.	Laminated tweezers
8.	Spot light
9.	Ultrasonic cleaning unit
10.	Hanging jigs
11.	Rectifier
12.	Electric hot plate
13.	Hot air dryer
14.	Plier cutters, nose pliers
15.	Stirrers
16.	Digital weighing balance
17.	Graduated beakers
18.	Measuring cylinders
19.	Thermometer

20.	Gravity meter
21.	Polishing/ tumbler
22.	UV light cabin
23.	Convective oven
24.	Conical flask
25.	Buchner funnel
26.	Electric vacuum pump
27.	Hot plate with magnetic stirrer
28.	Spray wash bottle
29.	Tongs
30.	Ingot mould
31.	Melting furnace
32.	Drying oven
33.	Computer
34.	White board,
35.	Printer

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