



**NATIONAL QUALIFICATION**

**12UY0075-5**

**ELECTRICAL PANEL INSTALLER**

**LEVEL 5**

**REVISION NO: 02**

**AMENDMENT NO: 01**

**VOCATIONAL QUALIFICATIONS AUTHORITY**

**Ankara, 2019**

## **PREFACE**

Electrical Panel Installer (Level 5) National Qualification was prepared by the Ankara Chamber of Industry (ASO) assigned by the VQA in accordance with the provisions of the Regulation on the Development of National Occupational Standards and National Qualifications published in the Official Gazette No. 29507 and dated 19/10/2015, and the Regulation on the Procedures and Principles for the Establishment, Duties, and Operation of the Vocational Qualifications Authority Sector Committees published in the Official Gazette No. 26713 and dated 27/11/2007 and evaluated after receiving the opinions of relevant institutions and organizations in the sector, and approved by the VQA's Executive Board upon being examined by the VQA's Electrics and Electronics Sector Committee.

Electrical Panel Installer (Level 5) National Qualification has been amended by the Presidential Decree dated 10.06.2020 and no. 1570.

Vocational Qualifications Authority

## INTRODUCTION

The basic criteria for the development of national qualification, its exam by the sector committees, and its approval by the VQA Executive Board are specified in the Regulation on the Development of National Occupational Standards and National Qualifications.

The basic criteria for national qualifications are defined as follows:

- a) National qualifications shall be developed on the basis of national occupational standards or international standards.
- b) National qualifications shall be developed with a participatory approach and the opinions and contributions of relevant parties shall be received.
- c) National qualifications cover matters related to occupational health and safety, environmental safety and quality, regarding the occupational field.
- d) National qualifications shall be written to be understood by users.
- e) National qualifications encourage individuals to develop themselves and make progress in the occupation, within the framework of the lifelong learning principle.
- f) National qualifications do not contain any discriminative components, either explicit or implicit.
- g) National qualifications include components that ensure measuring the knowledge, skills, and competency of individuals within the scope of quality assurance.

**12UY0075-5 ELECTRICAL PANEL INSTALLER NATIONAL QUALIFICATION**

<b>1</b>	<b>NAME OF THE QUALIFICATION UNIT</b>	Electrical Panel Installer
<b>2</b>	<b>REFERENCE CODE</b>	12UY0075-5
<b>3</b>	<b>LEVEL</b>	5
<b>4</b>	<b>PLACE IN THE INTERNATIONAL CLASSIFICATION</b>	ISCO 08: 3113
<b>5</b>	<b>TYPE</b>	-
<b>6</b>	<b>CREDIT VALUE</b>	-
<b>7</b>	<b>A) PUBLICATION DATE</b>	20/11/2019
	<b>B) REVISION / AMENDMENT NO</b>	Revision No: 02 Amendment No: 01
	<b>C) REVISION / AMENDMENT DATE</b>	Revision No. 02 20/11/2019 -2019/149 Amendment No. 01 10/06/2020-1570
<b>8</b>	<b>AIM</b>	<p>The qualification has been prepared to ensure the supply of skilled personnel in the Electrical Panel Installer (Level 5) occupation, to carry out field studies by trained and skilled people, and to increase the quality of the studies towards the purposes defined below;</p> <ul style="list-style-type: none"> <li>Defining the qualifications, knowledge, skills, and competencies that the candidates should possess,</li> <li>Providing the candidates with the opportunity to prove their vocational qualification with a valid and reliable certificate,</li> <li>Providing a reference and resource for the education system, and the testing and awarding bodies</li> </ul>
<b>9</b>	<b>OCCUPATIONAL STANDARD(S) THAT FORM(S) THE BASIS FOR THE QUALIFICATION UNIT</b>	<p>12UMS0217-3 Electrical Panel Installer National Occupational Standard 12UMS0217-4 Electrical Panel Installer National Occupational Standard 12UMS0217-5 Electrical Panel Installer National Occupational Standard</p>
<b>10</b>	<b>REQUIREMENT(S) FOR ENTERING THE QUALIFICATION EXAM</b>	-
<b>11</b>	<b>STRUCTURE OF QUALIFICATION</b>	
<b>11-a) Mandatory Units</b>		
12UY0075- 5/A1 Occupational Health and Safety, Quality and Environment 12UY0075-5/A2 Electrical Panel Installation Operations		
<b>11-b) Elective Units</b>		
-		
<b>11-c) Alternatives for Grouping Units and Additional Learning Outcomes</b>		

In order for the candidate to be considered skilled, they must be successful in all qualification units	
<b>12</b>	<b>ASSESSMENT AND EVALUATION</b>
<p>Candidates willing to achieve the Electrical Panel Installer (Level 5) Vocational Qualification Certificate are subjected to the exams defined in the units. Candidates must be successful in the exams defined in the units in order to achieve their vocational qualification certificates.</p> <p>Theoretical and practical exams in the qualification units can be held separately or jointly for each unit. However, each unit must be assessed independently.</p> <p>The validity period of qualification units is 2 years from the date of achievement of the unit. In order to achieve a qualification by combining the qualification units, all units must remain valid.</p>	
<b>13</b>	<b>VALIDITY PERIOD OF THE CERTIFICATE</b>
	The validity period of the qualification certificate is 5 years.
<b>14</b>	<b>OBSERVANCE FREQUENCY</b>
	-
<b>15</b>	<b>ASSESSMENT AND EVALUATION METHOD TO BE USED IN CERTIFICATE RENEWAL</b>
	<p>At the end of the validity period of five (5) years, the performance of the certificate holder shall be assessed using at least one of the methods defined below;</p> <p>a) Submitting records indicating that they worked in the relevant field for at least two years in total or for the last six months within the 5-year document validity period (such as service transcript, reference letter, contract, invoice, portfolio),</p> <p>b) Taking the practical exams defined for the qualification units within the scope of qualification.</p> <p>For the candidates with a positive assessment result, the validity period of the certificate shall be extended for another 5 years.</p>
<b>16</b>	<b>ORGANIZATION(S) DEVELOPING THE QUALIFICATION</b>
	Ankara Chamber of Industry (ASO)
<b>17</b>	<b>SECTOR COMMITTEE VERIFYING THE QUALIFICATION</b>
	Electric-Electronic Sector Committee of VQA
<b>18</b>	<b>VQA EXECUTIVE BOARD'S APPROVAL DATE and NUMBER</b>
	22.08.2012/2012-61 Rev 02: 20/11/2019 – 2019/149

**18UY0378-5/A1: OCCUPATIONAL HEALTH AND SAFETY, ENVIRONMENTAL PROTECTION, QUALITY AND WORK ORGANIZATION QUALIFICATION UNIT**

<b>1</b>	<b>NAME OF THE QUALIFICATION UNIT</b>	Occupational health and safety, environmental protection, quality and business organization
<b>2</b>	<b>REFERENCE CODE</b>	12UY0075-3/A1
<b>3</b>	<b>LEVEL</b>	3
<b>4</b>	<b>CREDIT VALUE</b>	-
<b>5</b>	<b>A) PUBLICATION DATE</b>	20/11/2019
	<b>B) REVISION / AMENDMENT NO</b>	Revision No: 02 Amendment No: 01
	<b>C) REVISION / AMENDMENT DATE</b>	Revision No. 02 20/11/2019 -2019/149 Amendment No. 01 10/06/2020-1570
<b>6</b>	<b>THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT</b>	
12UMS0217-3 Electrical Panel Installer National Occupational Standard		
<b>7</b>	<b>LEARNING OUTCOMES</b>	
<b><u>Learning Outcome 1: Explaining occupational health and safety, and environmental protection measures.</u></b>		
<b>Performance Criteria:</b>		
1.1: Defines legal and workplace rules regarding occupational health and safety.		
1.2: Explains mitigation of risk factors related to occupational health and safety.		
1.3: Explains the emergency procedures to be applied in case of danger.		
1.4: Explains environmental protection measures.		
<b><u>Learning Outcome 2: Describes the quality requirements of work processes and work environment.</u></b>		
<b>Performance Criteria:</b>		
2.1: Explains the quality assurance techniques.		
2.2: Describes the works for correcting errors and faults detected while working.		
<b><u>Learning Outcome 3: Explains work organization processes.</u></b>		
<b>Performance Criteria</b>		
3.1: Explains the processes for preparing the work program.		
3.2: Lists the processes regarding the arrangement of the work area and inspection of the material.		
3.3: Lists the processes regarding the keeping business records.		
<b>8</b>	<b>ASSESSMENT AND EVALUATION</b>	
<b>8 a) Theoretical Exam</b>		
(T1) Multiple Choice Exam: The theoretical exam for the A1 unit shall be applied as per the "Information" checklist in Annex A1-2. The theoretical exam should be applied in the form of multiple-choice questions with at least 4 choices and a minimum of 30 questions with equal weight per exam. No points shall be deducted from the overall score for wrong answers to any of the questions and an average of 1,5 minutes time shall be granted for candidates for each question. A candidate who answers at least 60% of the questions correctly in the written exam shall succeed. The questions in the exam should		

measure all knowledge statements (ANNEX A1-2) intended to be measured by the theoretical exam in this unit.

### 8 b) Practical Exam

The expressions of skill and competency for this unit are defined in the skills and competencies checklists of other units and, in this context, the mentioned expressions of skill and competency will be assessed and evaluated.

### 8 c) Other Conditions Regarding Assessment and Evaluation

The validity period of the qualification unit is 2 years from the date of achievement of the unit.

<b>9</b>	<b>INSTITUTIONS / ORGANIZATIONS THAT DEVELOPED THE QUALIFICATION UNIT</b>	Ankara Chamber of Industry (ASO)
<b>10</b>	<b>SECTOR COMMITTEE THAT VERIFIED THE QUALIFICATION UNIT</b>	Electric-Electronic Sector Committee of VQA
<b>11</b>	<b>VQA EXECUTIVE BOARD'S APPROVAL DATE and NUMBER</b>	22.08.2012/2012-61 Rev 02: 20/11/2019 – 2019/149

## QUALIFICATION UNIT ANNEXES

### ANNEX A1-1: Information on Recommended Training for the Acquisition of the Qualification Unit

Candidates shall be recommended to complete a program with the below-described training content for this unit.

#### Training Content:

#### 1. Occupational health and safety and environmental protection

- 1.1. Occupational health and safety rules and their application in business processes
- 1.2. Personal protective equipment and their usage
- 1.3. Protection and intervention tools and their usage features
- 1.4. Warning Signs and Plates
- 1.5. Hazardous and risky situations
- 1.6. Precautions to be taken against dangerous and risky situations
- 1.7. Emergency procedures
- 1.8. Effects of the performed operations on the environment
- 1.9. Recyclable materials and the processes regarding these materials
- 1.10. Hazardous and harmful wastes and the processes regarding these materials
- 1.11. Flammable and combustible materials and the processes regarding these materials
- 1.12. Methods of using business resources economically and efficiently

#### 2. Quality requirements

- 2.1. Protective and preventive maintenance tasks for the Electrical Panel
- 2.2. Quality requirements
- 2.3. Tolerances and deviations
- 2.4 Errors and malfunctions and methods for detecting and eliminating them

#### 3. Work Organization Processes

- 3.1 Work plan preparation
- 3.2 Distribution of tasks
- 3.3 Preparation, development and analysis of processes
- 3.4 Professional development activities

**ANNEX A1-2:** Checklist to be Used in the Assessment and Evaluation of the Qualifications Unit**a) INFORMATION**

No.	Knowledge Statement	National Occupational Standards Related Section	Qualification Unit Performance Criteria	Assessment Tool
INFO.1	Lists the norms of occupational health and safety.	A.1.1	1.1	T1
INFO.2	Lists the personal protective equipment suitable for the job.	A.1.2	1.1 1.2	T1
INFO.3	Lists the rules on keeping the workstation and equipment in order.	A.1.3	1.1	T1
INFO.4	Lists the occupational health and safety protection and intervention tools.	A.1.3	1.1 1.2	T1
INFO.5	Lists the usage characteristics for occupational health and safety protection and intervention tools.	A.1.3	1.1 1.2	T1
INFO.6	Lists the warning signs and plates suitable for the performed work.	A.1.4	1.2	T1
INFO.7	List the hazards and risks associated with the work they carry out.	A.1.6	1.1 1.2	T1
INFO.8	Lists the measures to be taken for reducing the risk factors.	A.1.6	1.1 1.2	T1
INFO.9	Lists the potentially hazardous situations.	A.1.6	1.3	T1
INFO.10	Matches the dangerous situations that cannot be immediately averted with the relevant agencies that must be contacted.	A.1.8	1.3	T1
INFO.11	Lists the emergency procedures specific to the devices used and the task performed.	A.1.8	1.3	T1
INFO.12	Lists the exiting or escaping procedures in cases of emergency.	A.1.9	1.3	T1
INFO.13	Lists the environmental impacts related to the conducted tasks.	A.2.1	1.4	T1
INFO.14	Lists the recyclable materials.	A.2.4	1.4	T1
INFO.15	Lists the sorting and classification of recyclable materials.	A.2.4	1.4	T1
INFO.16	Lists the dangerous and hazardous wastes.	A.2.5	1.4	T1
INFO.17	Lists the principles for the separation of dangerous and hazardous wastes from other materials.	A.2.2	1.4	T1
INFO.18	Lists the safe storage requirements for combustible and flammable materials.	A.2.3	1.4	T1



No.	Knowledge Statement	National Occupational Standards Related Section	Qualification Unit Performance Criteria	Assessment Tool
INFO.19	Lists the proper hardware, materials and equipment to be used against spills and leaks.	A.2.4	1.4	T1
INFO.20	Lists the principles for using business resources economically and efficiently.	A.2.4	1.4	T1
INFO.21	Lists the protective and preventive maintenance tasks for the used equipment.	C.1.3	2.1	T1
INFO.22	Lists the quality system requirements set forth in the instructions.	A.3.1	2.1	T1
INFO.23	Lists the tolerances and deviations allowed in practice.	A.3.2	2.1	T1
INFO.24	Defines the quality standards of operations.	A.3.2	2.2	T1
INFO.25	Lists the errors and faults that are likely to occur while working.	A.3.1	2.2	T1
INFO.26	Explains the work program processes.		3.1	T1
INFO.27	List the processes regarding the arrangement of the workspace and inspection of materials.		3.2	T1
INFO.28	Lists the processes regarding keeping work records.		3.3	T1

**12UY0075-5/A2 ELECTRICAL PANEL INSTALLATION OPERATIONS**

<b>1</b>	<b>NAME OF THE QUALIFICATION UNIT</b>	Electrical Panel Installation Operations
<b>2</b>	<b>REFERENCE CODE</b>	12UY0075-5/A2
<b>3</b>	<b>LEVEL</b>	5
<b>4</b>	<b>CREDIT VALUE</b>	-
<b>5</b>	<b>A) PUBLICATION DATE</b>	20/11/2019
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	<b>C) REVISION / AMENDMENT DATE</b>	Revision No. 02 20/11/2019 -2019/149 Amendment No. 01 10/06/2020-1570
<b>6</b>	<b>THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT</b>	12UMS0217-5 Electrical Panel Installer National Occupational Standard
<b>7</b>	<b>LEARNING OUTCOMES</b>	<p><b><u>Learning Outcome 1: Makes pre-work preparations.</u></b>  <b>Performance Criteria:</b>  1.1 Reviews the relevant instructions and the project.  1.2 Divides the tasks among the employees according to the work schedule.</p> <p><b><u>Learning Outcome 2: Examines the project.</u></b>  <b>Performance Criteria:</b>  2.1 Examines the panel layout and determines the panel dimensions.  2.2 Examines the project and reports nonconformities.</p> <p><b><u>Learning Outcome 3: Performs panel installation preparation tasks.</u></b>  <b>Performance Criteria:</b>  3.1 Provides and checks the materials.  3.2 Checks the measurement and control tools.  3.3 Conducts the marking operations.  3.4 Requests work from other units.</p> <p><b><u>Learning Outcome 4: Assembles the panel frame and panel electrical materials.</u></b>  <b>Performance Criteria:</b>  4.1 Assembles panel frame, busbars and isolators.  4.2 Assembles power, control and measuring circuit materials.  4.3 Explains how to make the internal installation of the panel.</p> <p><b><u>Learning Outcome 5: Processes the busbars.</u></b>  <b>Performance Criteria:</b>  5.1 Performs busbar cutting operations.  5.2 Performs busbar drilling operations.  5.3 Performs busbar forming operations.</p> <p><b><u>Learning Outcome 6: Assembles cable duct, rail and terminal box.</u></b>  <b>Performance Criteria:</b>  6.1 Assembles cable duct.  6.2 Assembles rails and terminal boxes.</p> <p><b><u>Learning Outcome 7: Assembles cables.</u></b></p>

**Performance Criteria:**

- 7.1 Prepares the cables for connection.
- 7.2 Makes the cable connections and places the cables.

**Learning Outcome 8: Inspects the panel operation (cold and hot test).****Performance Criteria:**

- 8.1 Inspects the cable connections of the panel (cold test).
- 8.2 Inspects the panel function (hot test).

**Learning Outcome 9: Inspects the panel.****Performance Criteria:**

- 9.1 Performs panel visual check and cleanliness inspection.
- 9.2 Checks the moving parts of the board.
- 9.3 Prepares the panel for dispatch.

**Learning Outcome 10: Applies the OHS, environment and quality requirements.****Performance Criteria:**

- 10.1 Applies the OHS rules in the works carried out.
- 10.2 Applies the quality requirements in the works carried out.
- 10.3 Applies the environmental protection measures in the works carried out.

**8 ASSESSMENT AND EVALUATION****8 a) Theoretical Exam**

(T1) Multiple Choice Exam: The theoretical exam for the A2 qualification unit is realized as per the "Information" checklist given in Annex A2-2. In the theoretical exam, candidates should be applied a written exam with 4 multiple choice and at least 25 questions, each of which is worth equal points. No points shall be deducted from the overall score for wrong answers to any of the questions and an average of 1,5 minutes time shall be granted for candidates for each question. A candidate who answers at least 60% of the questions correctly in the written exam shall succeed. The questions in the exam should cover all knowledge statements (Annex A2-2) intended to be assessed through the theoretical exam in this unit.

**8 b) Practical Exam**

P1: The practical exam for A2 unit is realized as per the "Skills and Competencies" checklist given in Annex A2-2. The critical steps that must be accomplished by the candidate shall be specified in the skills and competencies checklist. In order for a candidate to succeed in the practical exam, they should score at least 80 out of 100 points (80%) provided that they succeed in all the critical steps. The duration of the practical exam should correspond to the time under actual practical conditions. The practical exam shall be carried out in a real or realistically arranged work environment. All expressions of skill and competency (Annex A2-2) should be measured with a practical exam.

**8 c) Other Conditions Regarding Assessment and Evaluation**

The validity period of the exams foreseen for the unit shall be 1 year from the date of achievement of the exam. In order to achieve the unit, the time between achieved exam dates cannot exceed one year. The validity period of qualification units is 2 years from the date of achievement of the unit. If the candidate displays behavior that could jeopardize their own safety and the safety of others, the exam shall be terminated.

<b>9</b>	<b>INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT</b>	Ankara Chamber of Industry (ASO)
<b>10</b>	<b>SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT</b>	Electric-Electronic Sector Committee of VQA

<b>11</b>	<b>VQA EXECUTIVE BOARD'S APPROVAL DATE and NUMBER</b>	22.08.2012/2012-61 Rev 02: 20/11/2019 – 2019/149
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## QUALIFICATION UNIT ANNEXES

### ANNEX A2-1: Information on Recommended Training for Acquisition of a Qualification Unit

Candidates are recommended to complete a program with the below-described training content for the awarding of this unit.

#### Training Content:

#### 1. Project

- 1.1. Work order
- 1.2. Work schedule and work distribution
- 1.3. Electrical project reading and review
- 1.4. Electrical materials

#### 2. Installation

- 2.1. Use of equipment, tools and instruments
- 2.2. Provision and inspection of materials
- 2.3. Measuring and control instruments and their inspection
- 2.4. Panel size determination
- 2.5. Metal sheet installation
- 2.6. Panel design
- 2.7. Panel electrical material installation
- 2.8. Installation of busbars and isolators
- 2.9. Copper busbar selection, processing and installation
- 2.10. Cable duct selection and installation
- 2.11. Determination of rail dimensions and rail installation
- 2.12. Terminal box selection and installation
- 2.13. Determining the cable cross-section, and preparing and installing the cable
- 2.14. Copper processing

#### 3. Testing and dispatch

- 3.1. Cold test
- 3.2. Hot test
- 3.3. Panel cleaning operations
- 3.4. Panel dispatch preparations

#### 4. Occupational Health and Safety, Quality and Environment

- 4.1. Rules of OHS and their implementation in work processes
- 4.2. Personal protective equipment and their usage
- 4.3. Instructions, plans and quality requirements
- 4.4. Nonconformities detected during operations and the methods to eliminate them
- 4.5. Environmental protection measures and their implementation
- 4.6. Waste management

### ANNEX A2-2: Checklist to be Used in the Assessment and Evaluation of the Qualification Unit

## a) INFORMATION

No.	Knowledge Statement	NOS-Related Department	Qualification Unit Performance Criteria:	Assessment Tools
INFO.1	Explains the features of the equipment to be used in accordance with the work to be performed.	E.2.1	2.1	T1
INFO.2	Explains busbar cross-sections according to current carrying capacities.	E.3.1	2.2	T1
INFO.3	Explains cable cross-sections according to current carrying capacities and types.	E.3.2	2.2	T1
INFO.4	Explains the assembly process suitable for the project.	E.4.1 E.4.2 E.4.3	2.2	T1
INFO.5	Explains how to check power and control circuit materials.	F.2.3 F.2.4	3.1	T1
INFO.6	Explains the inspection process of measuring circuit materials.	F.2.5 F.2.6	3.1	T1
INFO.7	Explains the calibration process for measuring and control instruments.	F.3.1 F.3.2 F.3.3	3.1	T1
INFO.8	Describes the marking operations in cutting and drilling processes.	F.4.1 F.4.3 F.4.4	3.2	T1
INFO.9	Explains in which situations they can request work from other units.	F.5.1 F.5.2	3.3	T1
INFO.10	Explains the assembly processes of copper busbars and isolators.	G.3.1 G.3.2 G.3.3	4.1	T1
INFO.11	Explains the assembly process of power and control circuit materials.	G.2.1 G.2.2	4.2	T1
INFO.12	Explains the assembly process of measuring circuit materials.	G.2.3	4.2	T1
INFO.13	Explains how to make the internal installation of the panel.	G.4.1 G.4.2	4.3	T1
INFO.14	Explains the busbar processing process.	H.1.1 H.1.2 H.1.3 H.2.1 H.2.2 H.2.3 H.3.1 H.3.2 H.3.3	5.1 5.2 5.3	T1
INFO.15	Explains how to determine the cable ducts.	I.1.1 I.1.2 I.1.3	6.1	T1
INFO.16	Explains how to determine the dimensions of the rails.	I.2.1 I.2.2 I.2.3	6.2	T1
INFO.17	Explains the process of determining and assembling appropriate terminal boxes.	I.3.1 I.3.2 I.3.3	6.2	T1

No.	Knowledge Statement	NOS-Related Department	Qualification Unit Performance Criteria:	Assessment Tools
INFO.18	Explains the cable preparation process.	J.1.1 J.1.2 J.1.3 J.1.4 J.1.5 J.1.6	7.1	T1
INFO.19	Explains the cable labeling process.	J.1.7	7.1	T1
INFO.20	Explains the cable connection process.	J.2.1 J.2.2 J.2.3	7.2	T1
INFO.21	Explains the cable placement process.	J.3.1 J.3.2	7.2	T1
INFO.22	Explains the cold testing process.	L.1.1 L.1.2 L.1.3	8.1	T1
INFO.23	Explains the hot testing process.	L.2.1 L.2.2 L.2.3	8.2	T1
INFO.24	Explains panel inspection methods.	K.1.2 K.1.3 K.1.4 K.2.1 K.2.2 K.2.3 K.2.6	9.1	T1
INFO.25	Explains the process of preparing the panel for dispatch.	M.1.2 M.1.3 M.2.5 M.3.1 M.3.2 M.3.4	9.3	T1

#### b) SKILLS AND COMPETENCIES

No.	Statement of Skills and Competencies	NVS Relevant Department	Qualification Unit Success Criteria	Assessment Tools
SC.1	Reviews the relevant instructions and the project.	C.2.2	1.1	P1
SC.2	Divides the tasks among the employees according to the work schedule.	D.1.8	1.2	P1
SC.3	Examines the panel layout and determines the panel dimensions.	C.1.1	2.1	P1
SC.4	Examines the electrical wiring diagrams from the project, determines the busbars and reports them in case of nonconformity.	C.3.1	2.2	P1

No.	Statement of Skills and Competencies	NVS Relevant Department	Qualification Unit Success Criteria	Assessment Tools
SC.5	Examines the electrical wiring diagrams from the project, determines the cable cross-sections and reports them in case of nonconformity.	C.3.1	2.2	P1
SC.6	Examines the electrical wiring diagrams from the project, determines the isolators and reports them in case of nonconformity.	C.3.1	2.2	P1
*SC.7	Prepares the panel frame parts.	E.1.1 E.1.2	3.1	P1
SC.8	Brings the power and control circuit materials and consumables related to automation system needed according to the project to the working area.	D.1.2	3.1	P1
SC.9	Brings the programmable circuit elements (PLC/Smart Relay) and measuring circuit materials needed according to the project to the working area.	D.1.3	3.1	P1
SC.10	Brings the output elements (engine, piston, valve, lamp, siren and similar) and rails and assembly plates in the project to the working area.	D.1.4	3.1	P1
SC.11	Brings the fasteners to be used in assembly to the work area.	D.1.5	3.1	P1
SC.12	Checks the materials of the power, control and automation system circuits according to the project and reports in case of nonconformity.	D.2.3	3.1	P1
SC.13	Checks the technical features of programmable circuit elements (Input-Output numbers and supply types) and measuring circuit materials according to the project and reports in case of nonconformity.	D.2.5	3.1	P1
SC.14	Performs marking operations for cutting and drilling processes.	D.4.3	3.2	P1
SC.15	Assembles the panel frame.	E.1.1 E.1.2	4.1	P1
*SC.16	Assembles isolator bases, isolators and assembly plate bases.	E.1.3	4.1	P1
*SC.17	Performs the assembly of circuit output elements (engine, valve, lamp, siren and similar) and power circuit materials to assembly plates according to the project.	E.2.1	4.2	P1
*SC.18	Performs the assembly of the input materials (button group, switching elements, sensors etc.) and control circuit materials that will send signals to the programmable device according to the project.	E.2.2	4.2	P1
*SC.19	Performs the assembly of programmable circuit elements (PLC, Smart Relay and similar) and measuring circuit materials according to the project.	E.2.3	4.2	P1
SC.20	Performs busbar cutting operations.	F.1.1 F.1.2 F.1.3	5.1	P1



No.	Statement of Skills and Competencies	NVS Relevant Department	Qualification Unit Success Criteria	Assessment Tools
SC.21	Performs busbar forming operations.	F.2.1 F.2.2 F.2.3	5.2	P1
SC.22	Performs busbar drilling operations.	F.3.1 F.3.2 F.3.3	5.3	P1
SC.23	Installs the prepared busbars according to the project.	E.3.2	4.1	P1
*SC.24	Determines the dimensions of the cable ducts and assembles them according to the project.	G.1.1	6.1	P1
*SC.25	Determines the dimensions of the rails and assembles them according to the project.	G.2.1	6.2	P1
*SC.26	Assembles terminal boxes, intermediate terminal plates and arresters.	G.3.3	6.2	P1
*SC.27	Determines cable types, colors and cross-sections.	H.1.1 H.1.2 H.1.3	7.1	P1
*SC.28	Attaches the ferrule and lugs to the cable terminals and tightens them with crimping pliers.	H.1.5	7.1	P1
*SC.29	Prepares the labels of the cables and attaches them to the cables according to the project.	H.1.7	7.1	P1
*SC.30	Makes the connections of the automation system circuit cables according to the project.	H.2.1	7.2	P1
*SC.31	Makes the connections of the power circuit cables according to the project.	H.2.1	7.2	P1
*SC.32	Makes the connections of the circuit output elements (engine, valve, lamp, siren and similar) according to the project.	H.2.2	7.2	P1
*SC.33	Makes the connections of the control circuit cables according to the project.	H.2.2	7.2	P1
*SC.34	Makes the connections of the cables between the metal surfaces and the grounding busbar.	H.2.3	7.2	P1
*SC.35	Places the connected cables into the cable duct.	H.3.1	7.2	P1
SC.36	Cleans the panel.	I.1.2 I.1.3 I.1.4	9.1	P1
SC.37	Performs visual check of the panel materials and reports in case of nonconformity.	I.2.6	9.1	P1
SC.38	Puts the used hand tools and instruments back in their places.	I.1.1	9.1	P1
*SC.39	Reports the errors detected, if any, after checking the cable connections of the panel (cold test).	J.1.1 J.1.2 J.1.3 J.1.4	8.1	P1

No.	Statement of Skills and Competencies	NVS Relevant Department	Qualification Unit Success Criteria	Assessment Tools
*SC.40	Reports the errors detected, if any, after checking the functioning of the panel (hot test).	J.2.1 J.2.2 J.2.3	8.2	P1
SC.41	Checks the panel prior to dispatch and reports any defects detected.	K.3.5	9.1 9.2 9.3	P1
*SC.42	Applies the OHS rules in the works they carry out.		10.1	P1
*SC.43	Applies the quality requirements in the works carried out.		10.2	P1
*SC.44	Applies the environmental protection measures in the works carried out.		10.3	P1

\*Critical steps that must be accomplished in the practical exam

## QUALIFICATION ANNEXES

### ANNEX 1: Qualification Units

12UY0075-3/A1 Occupational Health and Safety, Quality and Environment

12UY0075-5/A2 Electrical Panel Installation Operations

### ANNEX 2: Terms, Symbols and Abbreviations

**TRIP OPENING COIL:** Circuit element used to open the circuit breaker remotely.

**OVER/UNDER CURRENT RELAY:** Circuit element that protects the circuit against over/under currents by adjusting the upper and lower current limits.

**OVER/UNDER VOLTAGE RELAY:** Circuit element that protects the circuit against over/under voltages by adjusting the upper and lower voltage limits.

**BUSBAR:** Aluminum or copper plate that is used to distribute and transmit energy,

**STEPPING RELAY:** A circuit element of which contacts change their position when the instantaneous operating voltage is applied and maintain their position until the instantaneous operating voltage is applied again.

**LOW VOLTAGE COIL:** The circuit element that enables the circuit breaker to open in case of voltage drops.

**LABEL:** An instructional notification that contains all kinds of written or printed information, brands, stamps and signs that describe the products produced, and is presented with the products or printed on the package,

**PHASE CONTROL RELAY:** The circuit element that controls phase loss, phase sequence, phase imbalance, and extremely low voltage values in 3-phase systems.

**VOLTAGE TRANSFORMER:** A special transformer that reduces the primary voltage in the circuit they are connected to at the desired rate, feeds the devices connected to the secondary ends with this voltage and isolates them from high voltage.

**POWER CIRCUIT:** The circuit that carries the current of the load,

**POWER CABLE:** The cable through which the receiver operating current passes.

**POWER SUPPLY:** The circuit element used to obtain the required control voltage.

**POWER CONTACTOR:** A switching element that opens and closes the circuit in power circuits.

**HEAT GUN:** A device that works by blowing heat, which is used to shrink the heat shrink tubing.

**OHS:** Occupational Health and Safety

**ISOLATION TRANSFORMER:** Circuit element used to isolate the control circuit energy from fluctuations in the mains voltage.

**ISOLATOR:** The material that insulates and carries the conductors used in the transmission of electrical energy from the conductive parts,

**CABLE HOLDER:** An insulating material used for fixing and separating power cables with cross-sections over 25 mm<sup>2</sup>.

**STRAY CURRENT PROTECTION RELAY:** The element that detects the ground stray current level in electrical circuits and opens the circuit if it is above the detection threshold value.

**CALIBRATION:** The task of comparing a reliable and accurate (traceable) reference measuring device with an unreliable and inaccurate measuring device and reporting the results of measurement.

**TRIP CLOSING COIL:** Circuit element used to close the circuit breaker remotely.

**FRAME:** The sheet metal body on which the assembly plates and materials used in the panel installation are mounted.

**CARTRIDGE FUSE:** A protective circuit element attached to a cylindrical, melting wire carrier chassis.

**PERSONAL PROTECTIVE EQUIPMENT (PPE):** All tools, equipment, instruments, and devices that are either dressed, worn, or held to protect the workers against one or multiple risks which may arise during work or which may affect their health and safety.

**COMPENSATION CAPACITOR:** A capacitive reactive circuit element used to keep the inductive reactive energy level in the system at the desired level according to the regulations.

**COMPENSATION CONTACTOR:** A contactor produced to be used in switching compensation stages.

**COMPENSATION THYRISTOR:** An electronic circuit element that makes switching stages faster and more reliable compared to compensation contactors.

**ADDITIONAL CONTACTOR CONTACTS:** Contacts that can be added when the number of auxiliary contacts in the contactor is not sufficient.

**UNPROTECTED LOAD DISCONNECTOR TRANSFER SWITCH:** A circuit element that does not have a protection feature and allows to select the energy transmission path between two lines.

**CONTROL BUTTON:** A control element that functions as an on/off switch in the control circuit.

**CONTROL CIRCUIT:** An electrical circuit used to control power circuit switchgear.

**CONTROL PACK SWITCH:** A control element that functions as an on/off switch in the control circuit.

**INSTALLATION:** Installation/assembly process.

**MOTOR PROTECTION SWITCH:** A circuit element that provides protection against short circuits and overcurrent in motor circuits.

**NH BLADE FUSE:** Low voltage protective circuit element with fusible wire.

**LUGS:** Metal parts inserted into the cable terminals for bolted connections of the cables,

**PANEL:** The section that is used in the transfer of energy to the end user and contains the switchgear materials and control components,

**PLC (PROGRAMMABLE LOGIC CONTROLLER):** Programmable logical controller,

**RISK:** Composition of the probability of occurrence of a dangerous incident and its consequences.

**SENSOR:** Sensing equipment.

**LIMIT SWITCH:** A control element in mobile devices that stops a movement and starts another movement and is operated by the moving element of the device.

**FUSED LOAD DISCONNECTOR:** Circuit protection element used with NH blade fuses.

**UNFUSED LOAD DISCONNECTOR:** A circuit element that does not have a protection feature and is used to open and close the circuit without load.

**SIGNAL LAMP:** The circuit element used to show whether there is energy in the system and the status of the circuit elements as a light warning.

**SWITCHGEAR:** A circuit element that makes on-off in electrical power circuits.

**SWITCH MOTOR MECHANISM:** The mechanism used for remote opening and closing of the switches or for the establishment of the switch closing spring, mounted on or inside the switch.

**SWITCH:** A circuit element that is used to open and close the electric current in a circuit.

**TRAY, CONSOLE, RAIL, TENSIONER:** System elements used to carry the cable.

**HAZARD:** The potential of damage or harm which exists at the workplace or may be caused by an external factor and affect the employees or the workplace,

**SINGLE LINE DIAGRAM:** A single line diagram of detailed drawing lines.

**THERMAL RELAY:** A circuit element that provides heat-sensitive protection in motor circuits.

**THERMISTOR MOTOR PROTECTION RELAY:** The circuit element that detects when the motor winding temperature exceeds the threshold value and cuts the energy of the motor.

**AUXILIARY CONTACTOR:** A circuit element of which contacts are not suitable for working under load, used in control circuits.

**AUXILIARY RELAY:** A circuit element with open and closed contacts, used in control circuits, not suitable for working under load.

**SOFT STARTER:** A motor starting device that prevents the fluctuations that will occur in the grid during the starting process by limiting the motor starting current.

**FERRULE:** Metal parts inserted into the cable terminals for the connection of the cables to the terminal boxes.

**TIMER RELAY:** Automatic control circuit element that activates or deactivates a mechanism, a circuit or a machine after a set time.

**TIME CLOCK:** The circuit element that controls and commands the energy passing through the circuit according to the set time.

**ANNEX 3:** Pathways to Horizontal and Vertical Advancement in the Occupation

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**ANNEX 4:** Evaluator Criteria

Persons who will serve as evaluators must meet one of the following conditions.

- a) Having received a bachelor's degree in Electricity, Electrical-Electronics, Electronics and Communication, Control and Automation or Mechatronics and Mechatronics Systems and having at least three (3) years of experience in the relevant field,

- b) Having worked at least for three (3) years as an instructor in vocational associate schools or universities, in one of the electricity, electrical-electronics and electronics branches,
- c) Having an associate degree in Electricity or Electric-Electronics and having at least five (5) years of experience in the related field.
- d) Having worked at least for three (3) years as an instructor in institutions providing vocational and technical education, in one of the electricity, electrical-electronics and electronics branches,

Evaluators who possess the above-mentioned characteristics and who will participate in the assessment and evaluation process should be trained in vocational qualification system, relevant national qualification(s), relevant national occupational standard(s), assessment and evaluation and quality assurance and OHS in assessment and evaluation by institutions authorized in the relevant field.