# NATIONAL QUALIFICATION

# 12UY0075-4

# ELECTRICAL PANEL INSTALLER

# LEVEL 4

**REVISION NO: 02**

**AMENDMENT NO: 01**

**VOCATIONAL QUALIFICATIONS AUTHORITY**

**Ankara, 2019**

# PREFACE

Electrical Panel Installer (Level 4) 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 4) 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.

# 12UY0075-4 ELECTRICAL PANEL INSTALLER NATIONAL QUALIFICATION

| | | |
|---|---|---|
| **1** | **NAME OF THE QUALIFICATION UNIT** | Electrical Panel Installer |
| **2** | **REFERENCE CODE** | 12UY0075-4 |
| **3** | **LEVEL** | 4 |
| **4** | **PLACE IN THE INTERNATIONAL CLASSIFICATION** | ISCO 08: 3113 |
| **5** | **TYPE** | - |
| **6** | **CREDIT VALUE** | - |
| **7** | **A) PUBLICATION DATE** | 20/11/2019 |
| | **B) REVISION / AMENDMENT NO** | Revision No: 02<br>Amendment No: 01 |
| | **C) REVISION / AMENDMENT DATE** | Revision No. 02 20/11/2019 -2019/149<br>Amendment No. 01 10/06/2020-1570 |
| **8** | **AIM** | The qualification has been prepared to ensure the supply of skilled personnel in the Electrical Panel Installer (Level 4) occupation, to carry out field studies by trained and skilled people, and to increase the quality of the studies towards the purposes defined below;<br>• Defining the qualifications, knowledge, skills, and competencies that the candidates should possess,<br>• Providing the candidates with the opportunity to prove their vocational qualification with a valid and reliable certificate,<br>• Providing a reference and resource for the education system, and the testing and certification bodies<br>. |
| **9** | **OCCUPATIONAL STANDARD(S) THAT FORM(S) THE BASIS FOR THE QUALIFICATION UNIT** | |
| 12UMS0217-3 Electrical Panel Installer National Occupational Standard<br>12UMS0217-4 Electrical Panel Installer National Occupational Standard | | |
| **10** | **REQUIREMENT(S) FOR ENTERING THE QUALIFICATION EXAM** | |
| - | | |
| **11** | **STRUCTURE OF QUALIFICATION** | |
| **11-a) Mandatory Units** | | |
| 12UY0075-4/A1 Occupational Health and Safety, Quality and Environment<br>12UY0075-4/A2 Electrical Panel Installation Operations | | |
| **11-b) Elective Units** | | |
| - | | |
| **11-c) Alternatives for Grouping Units and Additional Learning Outcomes** | | |
| In order for the candidate to be considered skilled, they must be successful in all qualification units | | |
| **12** | **ASSESSMENT AND EVALUATION** | |

Candidates willing to achieve the Electrical Panel Installer (Level 4) 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.

Theoretical and practical exams in the qualification units can be held separately or jointly for each unit. However, each unit must be assessed independently.

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.

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| **13** | **VALIDITY PERIOD OF THE CERTIFICATE** | The validity period of the qualification certificate is 5 years. |
| **14** | **OBSERVANCE FREQUENCY** | - |
| **15** | **ASSESSMENT AND EVALUATION METHOD TO BE USED IN CERTIFICATE RENEWAL** | 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;<br>a) Submitting records (service document, reference/recommendation letter, contract, invoice, portfolio, etc.) proving that they have worked in the relevant site for at least two years in total or for the last six months within the 5-year validity period of the certificate.<br>b) Taking the practical exams defined for the qualification units within the scope of qualification.<br>For the candidates with a positive assessment result, the validity period of the certificate shall be extended for another 5 years. |
| **16** | **ORGANIZATION(S) DEVELOPING THE QUALIFICATION** | Ankara Chamber of Industry (ASO) |
| **17** | **SECTOR COMMITTEE VERIFYING THE QUALIFICATION** | VQA Electric-Electronic Sector Committee |
| **18** | **VQA EXECUTIVE BOARD'S APPROVAL DATE and NUMBER** | 22.08.2012/2012-61<br>Rev 02: 20/11/2019 – 2019/149 |

# 12UY0075-3/A1 OCCUPATIONAL HEALTH AND SAFETY, QUALITY AND ENVIRONMENT QUALIFICATION UNIT

| | | |
|---|---|---|
| **1** | **NAME OF THE QUALIFICATION UNIT** | Occupational Health and Safety, Quality and Environment |
| **2** | **REFERENCE CODE** | 12UY0075-3/A1 |
| **3** | **LEVEL** | 3 |
| **4** | **CREDIT VALUE** | - |
| **5** | **A) PUBLICATION DATE** | 20/11/2019 |
| | **B) REVISION / AMENDMENT NO** | Revision No: 02<br>Amendment No: 01 |
| | **C) REVISION / AMENDMENT DATE** | Revision No. 02 20/11/2019 -2019/149<br>Amendment No. 01 10/06/2020-1570 |
| **6** | **THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT** | |
| 12UMS0217-3 Electrical Panel Installer National Occupational Standard | | |
| **7** | **LEARNING OUTCOMES** | |

**Learning Outcome 1: Explaining occupational health and safety, and environmental protection measures.**

**Performance Criteria:**

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.

**Learning Outcome 2: Describes the quality requirements of work processes and work environment.**

**Performance Criteria:**

2.1: Explains the quality assurance techniques.
2.2: Describes the works for correcting errors and faults detected while working.

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| **8** | **ASSESSMENT AND EVALUATION** |
| **8 a) Theoretical Exam** | |
| (T1) Multiple Choice Exam: The theoretical exam for the A1 unit shall be applied as per the "Information" checklist in Annex A1-2. In the theoretical exam, candidates should take a written exam consisting of at least 25 four-option multiple-choice questions, each one with an equal point value. No points shall be deducted for wrong answers in the exam consisting of multiple-choice questions. Candidates shall be given at least 1.5 minutes per question during the exam. A candidate who answers at least 60% of the questions correctly in the written exam shall be deemed successful. The questions in the exam should cover all knowledge statements (Annex A1-2) intended to be assessed through the theoretical exam in this unit. | |
| **8 b) Practical Exam** | |
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| **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. | |

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| **9** | **INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT** | Ankara Chamber of Industry (ASO) |

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| **10** | **SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT** | Electric-Electronic Sector Committee of VQA |
| **11** | **VQA EXECUTIVE BOARD'S APPROVAL DATE and NUMBER** | 22.08.2012/2012-61<br>Rev 02: 20/11/2019 – 2019/149 |

## QUALIFICATION UNIT ANNEXES

**ANNEX A1-1:** Information on the Recommended Training for the Awarding 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

**ANNEX A1-2:** 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 | 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<br>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<br>1.2 | T1 |
| INFO.5 | Lists the usage characteristics for occupational health and safety protection and intervention tools. | A.1.3 | 1.1<br>1.2 | T1 |

| No. | Knowledge Statement | NOS-Related Department | Qualification Unit Performance Criteria: | Assessment Tools |
|---|---|---|---|---|
| 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<br>1.2 | T1 |
| INFO.8 | Lists the measures to be taken for reducing the risk factors. | A.1.6 | 1.1<br>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 |
| 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 |

**12UY0075-4/A2 ELECTRICAL PANEL INSTALLATION OPERATIONS QUALIFICATION UNIT**

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|---|---|---|
| **1** | **NAME OF THE QUALIFICATION UNIT** | Electrical Panel Installation Operations |
| **2** | **REFERENCE CODE** | 12UY0075-4/A2 |
| **3** | **LEVEL** | 4 |
| **4** | **CREDIT VALUE** | - |
| **5** | **A) PUBLICATION DATE** | 20/11/2019 |
| | **B) REVISION / AMENDMENT NO** | Revision No: 02<br>Amendment No: 01 |
| | **C) REVISION / AMENDMENT DATE** | Revision No. 02 20/11/2019 -2019/149<br>Amendment No. 01 10/06/2020-1570 |
| **6** | **THE OCCUPATIONAL STANDARD THAT FORMS THE BASIS FOR THE QUALIFICATION UNIT** | |
| 12UMS0217-4 Electrical Panel Installer National Occupational Standard | | |
| **7** | **LEARNING OUTCOMES** | |

**Learning Outcome 1: Makes pre-work preparations.**
**Performance Criteria:**
**1.1** Receives the work order and examines the production schedule for the work to be performed.
**1.2** Prepares the tools, apparatus and equipment to be used.

**Learning Outcome 2: Examines the project.**
**Performance Criteria:**
**2.1** Examines the dimensions of the panel and the placement of the materials.
**2.2** Examines electrical line diagrams.

**Learning Outcome 3: Performs panel installation preparation tasks.**
**Performance Criteria:**
**3.1** Provides and checks the materials.
**3.2** Checks the measurement and control tools.
**3.3** Conducts the marking operations.

**Learning Outcome 4: Assembles the panel frame and panel materials.**
**Performance Criteria:**
**4.1** Assembles panel frame, busbars and isolators.
**4.2** Assembles power, control and measuring circuit materials.
**4.3** Prepares the internal installation of the panel.

**Learning Outcome 5: Assembles cable duct, rail and terminal box.**
**Performance Criteria:**
**5.1** Assembles cable duct.
**5.2** Assembles rails and terminal boxes.

**Learning Outcome 6: Assembles cables.**
**Performance Criteria:**
**6.1** Prepares the cables for connection.
**6.2** Makes the cable connections and places them.

 

**Learning Outcome 7: Processes the busbars.**
**Performance Criteria:**
**7.1** Performs busbar cutting operations.
**7.2** Performs busbar forming operations.
**7.3** Performs busbar drilling operations.

**Learning Outcome 8: Inspects the panel.**
**Performance Criteria:**
**8.1** Inspects the cable connections of the panel (cold test).
**8.2** Performs panel visual check and cleanliness inspection.

**Learning Outcome 9: Applies the OHS, environment and quality requirements.**
**Performance Criteria:**
**9.1** Applies the OHS rules in the works carried out.
**9.2** Applies the quality requirements in the works carried out.
**9.3** Applies the environmental protection measures in the works carried out.

| 8 | ASSESSMENT AND EVALUATION |
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**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. The theoretical exam should be applied in the form of multiple-choice questions with at least 4 choices and minimum of 20 questions with equal score values 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 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 a behavior that could jeopardize their own safety and the safety of others, the exam shall be terminated.

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| **9** | **INSTITUTION/ORGANIZATION(S) DEVELOPING THE QUALIFICATION UNIT** | Ankara Chamber of Industry (ASO) |
| **10** | **SECTOR COMMITTEE VERIFYING THE QUALIFICATION UNIT** | Electric-Electronic Sector Committee of VQA |
| **11** | **VQA EXECUTIVE BOARD APPROVAL** | 22.08.2012/2012-61 |

| | | |
|---|---|---|
| | **DATE and NUMBER** | Rev 02: 20/11/2019 – 2019/149 |

## QUALIFICATION UNIT ANNEXES

**ANNEX A2-1:** Information on the Recommended Training for Acquisition of the 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 program
   - 1.3. Electrical project reading and review
   - 1.4. Electrical materials
2. **Installation**
   - 2.1. Selection, preparation and use of tools, equipment and instruments
   - 2.2. Material provision and inspection
   - 2.3. Metal sheet installation
   - 2.4. Panel electrical material installation
   - 2.5. Installation of power and control circuit materials
   - 2.6. Installation of busbars and isolators
   - 2.7. Copper busbar selection, processing and installation
   - 2.8. Cable duct selection and installation
   - 2.9. Determination of rail dimensions and rail installation
   - 2.10. Terminal box selection and installation
   - 2.11. Determining the cable cross-section, and preparing and installing the cable
   - 2.12. Copper processing operation
3. **Testing and dispatch**
   - 3.1. Cold test
   - 3.2. Panel cleaning operations
   - 3.3. 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 | Defines the appropriate equipment to be used in accordance with the work to be performed. | E.2.1 | 1.2 | T1 |
| INFO.2 | Explains the aspects to consider when deciding on the panel size. | E.1.1<br>E.2.2<br>E.2.3 | 2.1 | T1 |

 

| No. | Knowledge Statement | NOS-Related Department | Qualification Unit Performance Criteria: | Assessment Tools |
|---|---|---|---|---|
| INFO.3 | Explains busbar cross-sections according to current carrying capacities. | E.3.1 | 2.2 | T1 |
| INFO.4 | Explains cable cross-sections according to current carrying capacities and types. | E.3.2 | 2.2 | T1 |
| INFO.5 | Explains how to check power and control circuit materials. | F.2.3<br>F.2.4 | 3.1 | T1 |
| INFO.6 | Explains how to check measuring circuit materials. | F.2.5<br>F.2.6 | 3.1 | T1 |
| INFO.7 | Explains how to calibrate measuring and control instruments. | F.3.1<br>F.3.2<br>F.3.3 | 3.2 | T1 |
| INFO.8 | Describes the marking operations in cutting and drilling processes. | F.4.1<br>F.4.3<br>F.4.4 | 3.3 | T1 |
| INFO.9 | Explains the assembly processes of copper busbars and isolators. | G.3.1<br>G.3.2<br>G.3.3 | 4.1 | T1 |
| INFO.10 | Explains the assembly of power, control and measuring circuit materials. | G.2.1<br>G.2.2<br>G.2.3 | 4.2 | T1 |
| INFO.11 | Explains the panel interior installation process. | G.4.1<br>G.4.2 | 4.3 | T1 |
| INFO.12 | Explains how to determine the cable ducts. | H.1.1<br>H.1.2<br>H.1.3 | 5.1 | T1 |
| INFO.13 | Explains how to determine the dimensions of the rails. | H.2.1<br>H.2.2<br>H.2.3 | 5.2 | T1 |
| INFO.14 | Explains the process of determining and assembling appropriate terminal boxes. | H.3.1<br>H.3.2<br>H.3.3 | 5.2 | T1 |
| INFO.15 | Explains the cable preparation process. | I.1.1<br>I.1.2<br>I.1.3<br>I.1.4<br>I.1.5<br>I.1.6 | 6.1 | T1 |
| INFO.16 | Explains the cable labeling process. | I.1.7 | 6.1 | T1 |
| INFO.17 | Explains the cable connection process. | I.2.1<br>I.2.2<br>I.2.3 | 6.2 | T1 |
| INFO.18 | Explains the cable placement process. | I.3.1<br>I.3.2 | 6.2 | T1 |

| No. | Knowledge Statement | NOS-Related Department | Qualification Unit Performance Criteria: | Assessment Tools |
|---|---|---|---|---|
| INFO.19 | Explains the busbar processing process. | J.1.1<br>J.1.2<br>J.1.3<br>J.2.1<br>J.2.2<br>J.2.3<br>J.3.1<br>J.3.2<br>J.3.3 | 7.1<br>7.2<br>7.3 | T1 |
| INFO.20 | Explains how the cold test is performed. | K.3.1<br>K.3.2<br>K.3.3 | 8.1 | T1 |
| INFO.21 | Explains how to clean the panel. | K.1.3<br>K.1.4<br>K.1.5 | 8.2 | T1 |
| INFO.22 | Explains the methods of packaging the panel. | L.3.1<br>L.3.2<br>L.3.3 | 8.2 | T1 |

**b) SKILLS AND COMPETENCIES**

| No. | Statement of Skills and Competencies | NOS-Related Department | Qualification Unit Performance Criteria: | Assessment Tools |
|---|---|---|---|---|
| SC.1 | Receives the work order and examines the production schedule for the work to be performed. | D.1.1<br>D.1.3<br>D.2.1 | 1.1 | P1 |
| SC.2 | Selects the materials and tools to be used in accordance with the work to be performed. | E.2.1 | 1.2 | P1 |
| SC.3 | Examines the layout of the panel and selects the panel in the appropriate dimensions for the project. | E.1.1<br>E.2.2<br>E.2.3 | 2.1 | P1 |
| SC.4 | Examines the electrical line diagrams of the project and brings the busbars, cables and isolators to the working area. | E.3.1<br>E.3.2 | 2.2 | P1 |
| *SC.5 | Assembles the panel frame. | F.1.1 | 3.1 | P1 |
| SC.6 | Brings the power and control circuit materials and consumables needed according to the project to the working area. | F.1.2 | 3.1 | P1 |
| SC.7 | Brings the measuring circuit materials needed according to the project to the working area. | F.1.3 | 3.1 | P1 |
| SC.8 | Brings the rails and assembly plates to the work area. | F.1.4 | 3.1 | P1 |
| SC.9 | Brings the terminal boxes, labels, interim terminal plates and arresters to the work area. | F.1.5 | 3.1 | P1 |
| SC.10 | Selects power, control and measuring circuit materials according to the project and brings them to the work area. | F.2.3 | 3.2 | P1 |

| No. | Statement of Skills and Competencies | NOS-Related Department | Qualification Unit Performance Criteria: | Assessment Tools |
|---|---|---|---|---|
| SC.11 | Performs marking operations for cutting and drilling processes. | F.4.1<br>F.4.2<br>F.4.3<br>F.4.4 | 3.3 | P1 |
| *SC.12 | Assembles isolator bases, isolators and assembly plate bases. | G.1.3<br>G.3.1 | 4.1 | P1 |
| *SC.13 | Assembles the power circuit materials on the assembly plates according to the project. | G.2.1 | 4.2 | P1 |
| *SC.14 | Assembles control circuit materials according to the project. | G.2.2 | 4.2 | P1 |
| *SC.15 | Assembles measuring circuit materials according to the project. | G.2.3 | 4.2 | P1 |
| *SC.16 | Performs the panel internal installation according to the project. | G.4.1<br>G.4.2 | 4.3 | P1 |
| *SC.17 | Determines the dimensions of the cable ducts and assembles them according to the project. | H.1.1<br>H.1.2<br>H.1.3 | 5.1 | P1 |
| *SC.18 | Determines the dimensions of the rails and assembles them according to the project. | H.2.1<br>H.2.2<br>H.2.3 | 5.2 | P1 |
| *SC.19 | Assembles power and control circuit terminal boxes according to the project. | F.3.1<br>F.3.2 | 5.2 | P1 |
| *SC.20 | Assembles power and control circuit interim terminal plates according to the project. | F.3.3 | 5.2 | P1 |
| *SC.21 | Assembles power and control circuit arresters according to the project. | F.3.3 | 5.2 | P1 |
| *SC.22 | Prepares the cables according to the project. | I.1.1<br>I.1.2<br>I.1.3 | 6.1 | P1 |
| *SC.23 | Attaches the ferrule and lugs to the cable terminals and tightens them with crimping pliers. | I.1.4<br>I.1.5 | 6.1 | P1 |
| *SC.21 | Prepares the labels of the cables and attaches them to the cables according to the project. | I.1.7 | 6.2 | P1 |
| *SC.24 | Makes the connections of the power circuit cables according to the project. | I.2.1 | 6.2 | P1 |
| *SC.25 | Makes the connections of the control circuit cables according to the project. | I.2.2 | 6.2 | P1 |
| *SC.26 | Makes the connections of the cables between the metal surfaces and the grounding busbar. | I.2.3 | 6.2 | P1 |
| *SC.27 | Places the connected cables into the cable duct. | I.3.1<br>I.3.2 | 6.2 | P1 |
| SC.28 | Performs busbar cutting operations. | J.1.1 | 7.1 | P1 |
| SC.29 | Performs busbar forming operations. | J.2.1 | 7.2 | P1 |
| SC.30 | Performs busbar drilling operations. | J.3.1 | 7.3 | P1 |
| SC.31 | Installs the prepared busbars according to the project. | G.3.2 | 4.1 | P1 |
| *SC.32 | Corrects the errors detected, if any, after checking the cable connections of the panel (cold test). | K.3.1<br>K.3.2<br>K.3.3 | 8.1 | P1 |
| SC.33 | Cleans the panel. | K.1.2<br>K.1.3<br>K.1.4 | 8.2 | P1 |

| No. | Statement of Skills and Competencies | NOS-Related Department | Qualification Unit Performance Criteria: | Assessment Tools |
|---|---|---|---|---|
| SC.34 | Performs visual inspection of the panel and records any nonconformities. | K.2.1<br>K.2.4 | 8.2 | P1 |
| SC.35 | Puts the used hand tools and instruments back in their places. | K.1.1 | 8.2 | P1 |
| SC.36 | Checks the paint of the panel. | L.1.1 | 8.2 | P1 |
| SC.37 | Checks the moving parts of the panel. | L.2.1<br>L.2.2<br>L.2.5 | 8.2 | P1 |
| *SC.38 | Applie the OHS rules in the works they carry out. | | 9.1 | P1 |
| *SC.39 | Applies the quality requirements in the works carried out. | | 9.2 | P1 |
| *SC.40 | Applies the environmental protection measures in the works carried out. | | 9.3 | 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

12UY0075-4/A2 Electrical Panel Installation Operations

**ANNEX2:** 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.

**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 $mm^2$.

**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.

 

**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,

**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

Vertical Progression Path: Electrical Panel Installer (Level 5)

**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, Electric-Electronics, Electronics and Communication, Control and Automation or Mechatronics and Mechatronics Systems and having at least three (3) years of experience in the Electric-Electronics field,

b) Having worked at least for three (3) years as an instructor in vocational associate schools or universities, in one of the electric, electrical-electronics and electronics branches,

c) Having an associate degree in Electric or Electric-Electronics and having at least five (5) years of experience in the related field.

 

d) Having worked at least for seven (7) years as an instructor in institutions providing vocational and technical education, in one of the electric, electric-electronics and electronics branches,

e) Having a valid 12UY0075-Electrical Panel Installer Level 5 Vocational Qualification Certificate and having at least seven (7) years of experience.

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.