

# **Technical Personnel course for maintenance of wind energy plants Summarized guideline for GWO & ISO/IEC 17024**

## **3.Workgroup**

**Tarih / Date**  
**15/04/2023**



## **Contents**

1.	Introduction	3
2.	Proof of qualifications	4
3.	GWO & 17024 /The content of the education	5
3.1.	GWO & 17024 /The Theoretical Part	7
3.2.	GWO Basic Safety Training (BST)	8
3.2.1.	GWO Scope of Training	9
3.2.2.	GWO Training	9
3.2.3.	GWO Duration of Training	9
3.2.4.	GWO Training and Certification	10
3.2.5.	GWO Training Conditions	10
3.3.	17024 /The Self-Learning and Mentoring Part ( Practical & Thesis-Work)	11
3.4.	17024 / The Preparation of a Thesis- Work	11
3.5.	17024 / The Exam Part	11
3.5.1.	The Written Exam	12
3.5.2.	Presentation of the Practical and theoretical Thesis- Work (Live Sequence)	13
3.5.3.	Expert Discussion about checklist-sequence	13

## **1. INTRODUCTION**

TECHNICAL PERSONNEL COURSE FOR MAINTENANCE OF WIND ENERGY PLANTS BY RENEWAC CERTIFICATION ( May -September 2023) / GWO & ISO 17024 Certified / Izmir, Turkey

RENEWAC Project, funded by the Austrian Development Agency (ADA), is run by a consortium of Austrian and Turkish partners and aims to develop internationally recognized training programs for the service and maintenance operations in the renewable energy sector.

RENEWAC's main objectives are to train and accredit wind power plant Technical Personnel s in its first phase, and holds its main training operations in Izmir (Turkey), a regional hub for wind turbine manufacturing and service industries.

The first course of ISO 17024 Certified Training Program Full comprehensive modular adult training will be held between 08 May and 06 September 2023. Depending on the number of participants we run several classes in parallel, to provide quality training environment for each trainee. It will be blended learning approach which is also possible to attend beside being employed. (in service compatible)

**Our GWO & 17024 exam-training-program participation-sponsorship fee is 10.000 ₺ (500 €)**

The course entitled "TECHNICAL PERSONNEL COURSE FOR MAINTENANCE OF WIND ENERGY PLANTS" aims to attract new Technical Personnel s for maintenance and service work, in order to build a pool of wind park Technical Personnel s who can perform this work on site.

The concept of our training is to learn basic so called 7 Topics by introducing the basics of wind turbine maintenance Technical Personnel s and to deepen them by practical sequences. Through this course, the participants will learn step by step the necessary basics and techniques to work as maintenance Technical Personnel s for wind park systems.

## **2 PROOF OF QUALIFICATIONS**

Participants have to meet the following requirements to attend and complete the training successfully.

- Worked in wind power plants (in the sector) for at least 6 Months, Vocational high school (machinery, electricity) and high school graduate, (Completed vocational training or equivalent recognized training or high school diploma or higher-quality training or a professional experience equivalent to a final apprenticeship examination of 6 Months on the basis of employment of at least 20 hours per week)
- University student (Energy, mechanical, electrical, industrial and metallurgical engineering) who has worked or practiced at least 3 months in wind power plants (in the sector),
- University graduates (energy, mechanical, electrical, industrial and metallurgical engineering)

Generally , Working experience of at least min 3 months until max. 6 Months on the basis of employment of at least 20 hours per week.

### **Practical Experience:**

If the course is held **face-to-face**, a Technical Personnel 's practice of at least 10 training days/ 60 units must be held in a group setting (from 5 participants).

If the course is held **online**, a Technical Personnel 's practice of at least 10 training days/60 units must be held in a group setting (from 5 participants).

In any type of course, participants are expected to complete practical experience within the program.

After meeting these criteria and completing the course, the participants can attend the exam according to GWO & 17024.

Note: 1 unit consists of 45 minutes of education and 15 minutes of break.

### 3 THE CONTENT OF THE EDUCATION / GWO& 17024

The course is designed within 3 main parts:

- The theoretical part,
- the self-learning and performing this work on site part and
- the exam part, including both practical and theoretical evaluation.

The theoretical part, which includes 7 modules, is carried out online and face to face. The four-week practice part (operative) and the exam part is conducted face to face. Hereby, 60 percent of the training process takes place **online**, while 40 percent of it takes place **face-to-face**.

The Self-Learning and Mentoring Part (Practical / thesis work) of the training will be held within groups. Each of the groups have at least 5 members. Technical Personnel practice, including a five-week self-learning for gain in practical experience and practical part constitutes 10 days/60 units educational process.

Besides that, the practical and written exam will held face to face in order to evaluate the participants' theoretical and practical skills. Hereby, GWO & 17024 Certification guarantees that Technical Personnel s have enough practical experience within the Training of Technical Personnel s program:

**The timeline and schedule of the education are as follows:**

Haftalar/ Weeks	Modules	Tarih / Date	Eğitim Süresi [ Saat / Gün] Duration [hours / Day]
<b>Hafta 1</b>	Rüzgar Enerjisinin Temelleri	<b>08.05.2023</b>	18 saat (6 saat/gün)
<b>Week 1</b>	<b>Basic of Wind Energy</b>	<b>10.05.2023</b>	
<b>Online</b>		<b>12.05.2023</b>	
<b>Hafta 2</b>	Hidrolik	<b>15.05.2023</b>	18 saat (6 saat/gün)
<b>Week 2</b>	<b>hydraulic</b>	<b>17.05.2023</b>	
<b>Online</b>		<b>18.05.2023</b>	
<b>Hafta 3</b>	İSG	<b>22.05.2023</b>	18 saat (6 saat/gün)
<b>Week 3</b>	<b>H&amp;S</b>	<b>24.05.2023</b>	
<b>Online</b>		<b>26.05.2023</b>	

**Technical Personnel course for maintenance of  
wind energy plants  
Guideline for GWO & ISO/IEC 17024 (CURRICULUM)**



<b>Hafta 4</b>	İSG /GWO Temelleri	<b>29.05.2023</b>	18 saat (6 saat/gün)
<b>Week 4</b>	<b>H&amp;S / GWO Basic</b>	<b>31.05.2023</b>	
<b>Online</b>		<b>02.06.2023</b>	
<b>Hafta 5</b>	Rüzgar Türbini Elektriği	<b>05.06.2023</b>	18 saat (6 saat/gün)
<b>Week 5</b>	<b>WT Electrical</b>	<b>07.06.2023</b>	
<b>Online</b>		<b>09.06.2023</b>	
<b>Hafta 6</b>	Rüzgar Türbini Mekaniği	<b>12.06.2023</b>	18 saat (6 saat/gün)
<b>Week 6</b>	WT Mechanic	<b>14.06.2023</b>	
<b>Online</b>		<b>16.06.2023</b>	
<b>Hafta 7</b>	Kule ve Rotor Yapıları	<b>19.06.2023</b>	18 saat (6 saat/gün)
<b>Week 7</b>	<b>Tower and Rotor Structures</b>	<b>21.06.2023</b>	
<b>Online</b>		<b>23.06.2023</b>	
<b>Hafta 8</b>	Rüzgar Türbini Temel Bakımı	<b>03.07.2023</b>	18 saat (6 saat/gün)
<b>Week 8</b>	Basic Maintenance of Wind Turbine	<b>05.07.2023</b>	
<b>Online</b>		<b>07.07.2023</b>	
<b>Hafta 9</b>	Deniz-üstü Rüzgar Santralleri	<b>10.07.2023</b>	12 saat (6 saat/gün)
<b>Week 9</b>	<b>Off shore WT</b>	<b>12.07.2023</b>	
<b>Online</b>			
<b>Hafta 10</b>	Hidrolik / Labor	<b>17.07.2023</b>	30 saat (6 saat/gün)
<b>Week 10</b>	<b>hydraulic / Labor</b>	<b>18.07.2023</b>	
<b>Face to Face</b>	Rüzgar Türbini Mekaniği / Labor	<b>19.07.2023</b>	
<b>yerinde</b>	<b>WT Mechanic / Labor</b>	<b>20.07.2023</b>	
		<b>21.07.2023</b>	
<b>Hafta 11</b>	Rüzgar Türbini Elektriği / Labor	<b>24.07.2023</b>	30 saat (6 saat/gün)
<b>Week 11</b>	<b>WT Electrical / Labor</b>	<b>25.07.2023</b>	
<b>Face to Face</b>	Rüzgar Türbini Temel Bakımı	<b>26.07.2023</b>	
<b>yerinde</b>	<b>Basic Maintenance of Wind Turbine</b>	<b>27.07.2023</b>	
		<b>28.07.2023</b>	
<b>Hafta 12</b>	Rüzgar Türbini Temel Bakımı	<b>31.07.2023</b>	30 saat (6 saat/gün)
<b>Week 12</b>	<b>Basic Maintenance of Wind Turbine</b>	<b>01.08.2023</b>	
<b>Face to Face</b>		<b>02.08.2023</b>	
<b>yerinde</b>		<b>03.08.2023</b>	
		<b>04.08.2023</b>	
<b>Hafta 13</b>	GWO BST & GWO sertifika Sınav Haftası	<b>07.08.2023</b>	30 saat (6 saat/gün)
<b>Week 13</b>	<b>GWO?BST&amp;Certifiş Exam Week</b>	<b>08.08.2023</b>	
<b>Face to Face</b>		<b>09.08.2023</b>	
<b>yerinde</b>		<b>10.08.2023</b>	
		<b>11.08.2023</b>	

**Technical Personnel course for maintenance of  
wind energy plants  
Guideline for GWO & ISO/IEC 17024 (CURRICULUM)**



<b>Hafta 14</b>	Uygulama / Tez Çalışması	<b>14.08.2023</b>	18 saat (6 saat/gün)
<b>Week 14</b>	<b>Practical / thesis work</b>	<b>15.08.2023</b>	
		<b>16.08.2023</b>	
<b>Hafta 15</b>	Uygulama / Tez Çalışması	<b>21.08.2023</b>	18 saat (6 saat/gün)
<b>Week 15</b>	<b>Practical / thesis work</b>	<b>22.08.2023</b>	
		<b>23.08.2023</b>	
<b>Hafta 16</b>	Uygulama / Tez Çalışması	<b>28.08.2023</b>	24 saat (6 saat/gün)
<b>Week 16</b>	<b>Practical / thesis work</b>	<b>29.08.2023</b>	
		<b>30.08.2023</b>	
		<b>31.08.2023</b>	
<b>Hafta 17</b>	Uygulama / Tez Çalışması	<b>04.09.2023</b>	24 saat (6 saat/gün)
<b>Week 17</b>	<b>Practical / thesis work</b>	<b>05.09.2023</b>	
		<b>06.09.2023</b>	
		<b>07.09.2023</b>	
<b>Hafta 18</b>	17024 Sınav Haftası	<b>11.09.2023</b>	30 saat (6 saat/gün)
<b>Week 18</b>	17024 Exam Week	<b>12.09.2023</b>	
		<b>13.09.2023</b>	
		<b>14.09.2023</b>	
		<b>15.09.2023</b>	

168 [h] 39% Online

150 [h] 35% Face to Face

84 [h] 19% Thesis Work

30 [h] 7% Exam

**432 Totaly Hours 100%**

### **3.1 GWO& 17024 The Theoretical Part and 7 Module (Topics)**

The theoretical part includes 7 modules which aim to deepen basic theoretical knowledge of the participants about Basics of Wind Energy, Wind Turbine Hydraulics, Health & Safety, GWO Basic, Wind Turbine Electrics & Electronics, Wind Turbine Mechanics, Tower and Rotor Structures and Basic Maintenance of Wind Turbine. These modules are chosen to develop training and Technical Personnel 's skills of the participants in many ways.

**Module 1 - Health & Safety / GWO Basic Safety Training** (RENEWAC participants will be trained and certified for GWO at the facilities of two GWO authorized companies in Izmir)

**(Erdoğan Tezcan) / (Engin Akşehirlioğlu) / (Ahmet Ercan Bakırcı)**

Module1-1 / Lifting and Fastening of Loads on Wind Turbines

Module1-2 / Personal, environmental and operational safety for wind turbines

Module1-3 / Fire Safety Awareness from Wind Tribunes (in accordance with GWO standards)

Module1-4 / Manual Handling (in accordance with GWO standards)

Module1-5 / Hazardous Substances Handling Module

Module1-6 / Electrical Safety Module

Module1-7 / First Aid (in accordance with GWO standards)

Module1-8 / occupational health and safety training

Module1-9 / Occupational health and safety training at work at height  
(in accordance with GWO standards) I

Module1-10 / occupational health and safety at work at height training  
II (in accordance with GWO standards)

**Module 2 - Basics of Wind Energy (Erman Kaya / Erdoğan Tezcan / Seyhan Sahiner )**

Modul2-1 / Wind Turbines from the past to the present and Global Wind Industry

Module2-2 / Wind Turbine Components & Virtual Tour of Wind Turbine

Module2-3 / Wind Turbine Aerodynamics

Module2-4 / Offshore Wind Plants

Module2-5 / Fundamentals of Wind Power

Module2-6 / Software Packages in Wind Energy

Module2-7 / Wind Power Plant Maintenance Legislation and Regulation



**Module 3 - Basic Maintenance of Wind Turbine (Mahmut Cura / Nihat Tonguc)**

Module3.1. / Basic Electrotechnical Skills and OHS Requirements

Module3-2 / Cables Used in Wind Power Plants

Module3-3 / Lightning Protection System, Aircraft Warning Lights

**Module 4 - Wind Turbine Electrics & Electronics (Mahmut Cura)**

Modul4-1 / Wind Turbine Inspection and Maintenance

**Module 5- Wind Turbine Mechanics (Erman Kaya & Nihat Tonguc & Berkant Özel)**

Module5-1 / Mechanical System Components

Modul5-2 / The Driveline Variants

**Module 6 - Tower and Rotor Structures (Erman Kaya & Nihat Tonguc & Berkant Özel)**

Modul6-1 / Rotor brake and Rotor lock

Modul6-2 / Rotor Bearings

Module6-3 / Couplings and Rotor Shafts

Module6-4 / Yaw Systems

Module6-5 / Gearboxes

Module6-6 / Bolting and Welded Joints

Module6-7 / Cooling Systems

Module6-8 / Pitch System

**Module 7- Wind Turbine Hydraulics (Numan Özgüler)**

Modul7-1 / Hydraulic systems in wind turbines

Modul7-2 / Hydraulic Pumps and Valves, Hydraulic Systems and Field applications

**3.2. GWO Basic Safety Training (BST)**

GWO Trainings Specific to Wind Turbine Employees, which can be given within the framework of International Accreditation; It aims to raise awareness and increase the skills of the personnel working in Wind Turbines as a result of their work on "Working at Height, Fire Awareness, Manual Transportation and First Aid". During the GWO Trainings, participants are given theoretical and practical information about what are the possible hazards and risks when working in Wind Turbines and how to follow a path when these hazards are encountered.

### **3.2.1. GWO Scope of Training**

GWO BST (Basic Safety Training) covers 4 Training modules. Theoretical and practical training are intertwined.

1. WORKING AT HEIGHT
2. FIRE AWARENESS
3. MANUAL HANDLING
4. FIRST AID

### **3.2.2. GWO Training**

In order to participate in GWO BST Trainings, the "Participant Health Declaration Form" must be submitted to the Renewac "info@renewac.com" before the training.

Participants who do not sign the approval to participate in the medical training specified in the health declaration form are not taken to the training. The financial damages that may arise from the employers and participants who have a chronic illness before the training and do not specify it are the responsibility of the employer company.

GWO Trainings are given in "Turkish" by instructors with internationally valid certificates. If the training modules meet the Minimum Number of Participants / Trainers specified in the GWO BST Scope, the trainings can be given in "English" or "German".

In order to enter the training area of the GWO authorized organization contracted for the Renewac project , it is obligatory for the participants to bring occupational safety shoes and work clothes that they can be comfortable with during the practical trainings before the training.

Continuous participation in trainings is mandatory. In case of not coming to the training on time or leaving the training, the participant is not taken to the next module and loses the right to the course and certificate.

### **3.2.3. GWO Duration of Training**

1. WORKING AT HEIGHT	16 H	2 Day
2. FIRE AWARENESS	4 H	½ Day
3. MANUAL HANDLING	4 H	½ Day
4. FIRST AID	7 H	1 Day

### **3.2.4. GWO Training and Certification**

GWO BST Trainings are given by experienced instructors who have internationally valid certificates. Participants are evaluated separately for each training module during the training. Candidates with a low participant evaluation grade under GWO BST are entitled to receive the certificate.

Participants are required to fill out the "Training and Trainer Evaluation Form" at the end of the training within the scope of RENEWAC GWO BST Continuous Improvement.

Participants who succeed in the training modules and the exam are awarded the GWO BST Certificate and ID CARD. GWO Certificate is valid for 2 years as in the standard. Training applications made before the expiry of the certificate period are registered as "GWO Renewal Training".

### **3.2.5. GWO Training Conditions**

1. Acceptance of participatory training; The pre-training documents required under the GWO BST are made after the Renewac official is submitted.
2. Training equipment is covered by Renewac.
3. Training is planned according to the balance of Participant and Instructor ratio. If the participant who is added to the training planning list does not attend or cannot continue the training, the participant will not be refunded and a certificate will not be issued.
4. During the training period of the participants, the " Renewac project contracted GWO authorized institution Training CENTER" Transportation and Accommodation Expenses are covered by the participant.

### **Our partners, authorized and certified training provider by GWO Global Centre**

- **AVRASYA RUZGAR TEK.MUH.DAN.URT.INS.ENJ.SAN.TIC.LTD (EAWIND)**
- **EXTREME JOBS ENERGY INS. TEM. PAZ. DAN. EGITIM**

### **3.3. 17024 /The Self-Learning and Mentoring Part (Practical & Thesis-Work)**

This part is designed for offering the possibility to put the acquired basic competences into practice and to reflect through the feedback process. The participants work within a group of at least five (5) people.

In this part, participants choose topics according to their expertized areas and start to prepare their presentation and seminar with their group. During the preparation, the instructor of the course give support through mentoring all of the participants. In this process, the instructor acts as a mentor to ensure that the participants can provide their best training in practice. It is also a preparation time for the practical exam.

### **3.4. 17024 / The Preparation of a Thesis- Work**

The participants are expected to submit a thesis work (a well-designed lesson) as a part of the practical exam. The scope of the practical work is at least 10 DIN A4 pages or 30 PowerPoint slides – no film design.

The preparation of the practical work must necessarily follow the following structure:

- Description / Creation of a “presentation” - Topic description
- Description of the target group
- Definition of goals & objects
- Description of topics and contents
- Timing / Procedure
- Measures to monitor operative success / goals
- Detailed planning of a practical sequence / **Checklist-sequence**

### **3.5. 17024 / The Exam Part**

The exam part aims to measure both practical and theoretical knowledge of the participants. In this regard, the participants are expected to success both practical and written examination. Besides this, they are expected to prepare a practical work and your Checklist.

The final assessment of written exam , the practical work & Checklist is carried out by an examiner approved and commissioned by the certification body (17024) , on the basis of uniformly defined assessment criteria and a harmonized scaling of the assessment.

17024 testing is required and is to be performed by Renewac.

GWO examination is voluntary and is performed by an external authorized testing body.

### **3.5.1. The Written Exam**

The written examination will be held in the form of a multiple-choice test. For the written test, 17024 Certification provides a questionnaire 35 questions / area which is 140 questions in total. (Please refer to Appendix 2 for the Questionnaire). On a case-by-case basis, 35 questions are generated from this questionnaire for the examination and evenly distributed among the areas described below (5 questions/area) For a positive assessment, the correct answer to at least 3 out of 5 questions is required.

Test is to be divided into the following categories / areas:

- 1 - Health & Safety / GWO basic
- 2 - Basics of Wind Energy
- 3 - Basic Maintenance of Wind Turbine
- 4 - Wind Turbine Electrics & Electronics
- 5- Wind Turbine Mechanics
- 6 -Tower and Rotor Structures
- 7- Wind Turbine Hydraulics

**\*) This part constitutes 50 percent of the overall score.**

The supervision and assessment of written Exam is carried out by an examiner approved and commissioned by the certification body, on the basis of uniformly defined assessment criteria and a harmonized scaling of the evaluation.

### **3.5.2. Presentation of the Practical and Thesis- Work (Live Sequence)**

In the course of the oral examination, the specialized part of the created practical work is presented as a visualized presentation. In addition, the presentation of a planned practical sequence / Checklist-sequence takes place. For the presentation, about 15 to 20 minutes are to be set as time expenditure / participants.

The supervision and assessment of the presentation and practical sequence is carried out by an examiner approved and commissioned by the certification body, based on uniformly defined assessment criteria and a harmonized scaling of the evaluation.

**\*\* ) This part constitutes 25 percent of the overall score.**

### **3.5.3. Expert Discussion about checklist-sequence**

Oral examination in the form of an expert discussion about the practical & checklist sequence. In-depth questions about the presented concept and the presentation based on the course contents.

The supervision and assessment of the expert discussion about checklist-sequence is carried out by an examiner approved and commissioned by the certification body, based on uniformly defined assessment criteria and a harmonized scaling of the assessment.

**\*\*\*) This part constitutes 25 percent of the overall score.**