



Improve Skills and Qualifications in the
Building Workforce in Cyprus

Develop the training methodology

**Document on the components of the training methodology
(WP2 –D2.8, Document)**



Co-funded by the Intelligent Energy Europe
Programme of the European Union

BUILD UP Skills We-Qualify: The We-Qualify project will utilize the findings of the national roadmap (Build up skills I) and will facilitate the target of reducing the skills gap between the current situation and the skills needs for 2020, by developing a training and/or qualification scheme for blue-collar workers/installers, which will focus on the most critical skills identified in the roadmap. The critical skills selected to be included in WE-Qualify based on the roadmap developed under CY-Pillar I, are:

- Skill 1: Placement of thermal insulation
 - Skill 1.1: Placement of conventional insulation/thermal insulation plaster
 - Skill 1.2: Placement of external insulation
- Skill 2: Installation of thermopanes and exterior sunshades
 - Skill 2.1: Installation of high energy efficient thermopanes
 - Skill 2.2: Installation of exterior sunshades
- Skill 3: Installation and maintenance of Biomass heating systems

These critical fields were selected based on the existing structure of the building industry, the limited qualification of the installers and the limited available training programmes and material. Although skills 1 and 2 are categorised as high and medium priority, they are not regulated by either any national legislation or Standards of Vocational Qualifications (SVQ) thus, it is considered very important to be included in the WE-Qualify. Moreover, although skill 3 is to be regulated by legislation N210(I)/2012) and is planned to be included in further RES legislations there is a currently a severe lack of experience for the installation of the systems, thus resulting to low efficiency and not sound practices.

The outcomes of WE-Qualify are expected to provide the key components for the upgrading of existing or drafting of new SVQs to be included in the future National Qualification Framework (NQF), an appropriate training methodology and a transparent and clearly defined qualification route. The ambition is to configure a competent workforce specialized on the Energy Performance of Buildings according to European criteria and standards, to encourage a greater number of blue-collar workers to advance their professional skills and knowledge and to help achieve the target for the construction of near zero energy buildings by 2020.

PROJECT COORDINATOR

Mrs Anthi Charalambous, CYPRUS ENERGY AGENCY (CEA)

PROJECT PARTNERS

| | |
|---|--------|
| Cyprus Energy Agency (CEA) | Cyprus |
| Cyprus Productivity Centre (CPC) | Cyprus |
| Cyprus Organization for Standardisation (CYS) | Cyprus |
| Human Resource Development Authority (HRDA) | Cyprus |
| Technical Chamber of Cyprus (ETEK) | Cyprus |
| Cyprus Institute of Energy (CIE) | Cyprus |

WP2 LEADER

Technical chamber of Cyprus (ETEK)

DELIVERABLE EDITOR

Technical chamber of Cyprus (ETEK)

Work Team: Christos Maxoulis

LEGAL NOTICE

The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained therein.

Reproduction is authorised provided the source is acknowledged.

Table of Contents

| | | |
|--------|---|----|
| 1. | Introduction | 4 |
| 2. | Development of the training methodology | 4 |
| 3. | Skill 1: Placement of thermal insulation | 6 |
| 3.1. | Design of the program | 6 |
| 3.1.1. | Eligibility criteria for participation | 6 |
| 3.1.2. | Structure of the program - MODULES | 6 |
| 3.1.3. | Contents of training modules | 7 |
| 3.1.4. | Methods and Techniques of Training | 9 |
| 3.1.5. | Educational Tools - Tools and Training Materials | 9 |
| | The tools that will be used in the presentation of the each module are: | 9 |
| 3.1.6. | Requirements of the training providers - theoretical part | 10 |
| 3.1.7. | Training area requirements - practical part | 10 |
| 3.1.8. | Training Evaluation | 10 |
| 3.2. | Contents of Training modules and expected results | 12 |
| 4. | Skill 2: Thermopane and external sunshade installers | 17 |
| 4.1. | Design of the program | 17 |
| 4.1.1. | Eligibility criteria for participation | 17 |
| 4.1.2. | Structure of the program - MODULES | 17 |
| 4.1.3. | Contents of Training Modules..... | 18 |
| 4.1.4. | Methods and Techniques of Training | 20 |
| 4.1.5. | Educational Tools - Tools and Training Materials | 21 |
| 4.1.6. | Requirements of the training providers - theoretical part | 21 |
| 4.1.7. | Training area requirements - practical part | 21 |
| 4.1.8. | Training Evaluation | 21 |
| 4.2. | Contents of training modules and expected results | 23 |
| 5. | Trainers and training providers..... | 28 |
| 5.1. | Trainers qualifications..... | 28 |
| 5.2. | Training centers – Training providers | 28 |

1. Introduction

The present document explains the training methodology to be followed for the three Skills of the We-Qualify project. The training methodology defines the structure and content of the training, taking into account the specificities of each skill in the framework of energy savings in buildings.

The development of training methodology implemented is based on the areas described in Directive 2009/28 / EC. In the methodology, the theoretical and practical parts of each Skill are analyzed and interrelated to the objectives of the project as well as the knowledge and Skills of the trainees after the successful completion of the training.

Specifically, for each Skill the training material, the contents and the duration of the training course, including the structure is analyzed. In addition the training methods and techniques for each module are explained in detail. Also a detailed description of the work and the learning objectives are documented. The time framework covering the theoretical and practical training, the proposed educational tools and materials used during the courses are also included.

Furthermore, the required criteria for the trainers as well as the training centers are elaborated. In this context, an overview of the layout of the training area and requirements needed are referenced in this deliverable.

2. Development of the training methodology

For the development of training methodology the following material is used:

- The Guide of the Human Resource Development Authority: "Providing educational training"
- The legal framework governing the organization and operation of training programs and certification.
- The criteria laid down by Directive 2009/28 / EC on the certification schemes for the skill of Biomass (PI 19/2014). Corresponding criteria were used for the other two skills.
- Previous training programs related to the subject of the We-Qualify program, as developed in deliverable 2.1, which can be applied (or be the basis) for the objectives of the project.
- Suggestions from stakeholders.

The basic principles that were taken into account for each of the three Skills are:

- Training courses should provide theoretical and practical knowledge to trainees, in order to reach the expected level required for certification, taking into consideration the existing level of knowledge and skills of the trainees.
- After the training course, trainees should be able to put in practice the material learned during the courses.
- Training should be conducted by a training center that is reliable and has previous experience on the organization and implementation of similar programs in order to offer optimal training conditions.
- During the theoretical training all necessary rules concerning the safety and health requirements of the construction site should be mentioned. All these rules will be implemented during the practical training.
- The theoretical and especially the practical training should be implemented in an appropriate environment (facilities, tools and safety).
- The structure of the training should be clear and the theoretical and practical parts should be separated.
- The techniques of evaluation should also be defined.

The training methodology for each Skill consists of four stages:

1. Analysis of objectives
2. Design of the course that includes the following elements:
 - 2.1. The curriculum of the training course
 - 2.2. The outline of the training, where the training structure is presented (modules, themes, sub-targets, activities)
 - 2.3. Design of the training program (methods, techniques, tools and training materials)
3. Preparation of training materials (manuals, slides, presentations) and assessment tools that will be given to trainers and trainees. This phase also includes a pilot testing of the training material developed. In this test, a simulation of the training is conducted, in order to give the necessary feedback to improve the training material.
4. Quality Assurance. Upon completion of each phase, the material developed will be subject to internal evaluation by project partners to ensure that they are appropriate and meet the objectives of the course. Following their approval, the first training courses will be implemented.

3. Skill 1: Placement of thermal insulation

3.1. Design of the program

3.1.1. Eligibility criteria for participation

The training course is intended for employees in the construction industry who have the basic knowledge and skills required for entering the training. An applicant should be able to fulfill one of the following admission criteria in order to be eligible to the program:

- No certificate or diploma or Elementary Education or School certificate and three years of experience
- Six-year School Certificate of Secondary Education (High school) and 2 years of experience
- Certificate of NMA and 2 years of experience
- Technical School Diploma and 1 year of experience
- Diploma or post-secondary vocational training diploma and 1 year of experience.

All participants eligible for the program should have :

- Good knowledge of the Greek language

The qualifications should be proved by official certificates proving academic qualifications (diploma) and professional experience.

A detailed list of the necessary qualifications of the trainees is presented in Deliverable 4.2.

3.1.2. Structure of the program - MODULES

The training program "Thermal insulation Installers' covers seven theoretical modules, which are implemented in practical part of the training. The total duration of the training course is 30 hours, of which 24 hours are theoretical and 6 hours are practical.

The theoretical part of the training begins with an introduction to the Energy Principles which will include the transfer of heat in order to present the basic knowledge needed to understand the theory behind the insulating materials. Also the legal framework on minimum requirements of thermal insulation in buildings will be analyzed in order make clear the importance of thermal insulation of the buildings. The thermal insulation materials and their implementations in the buildings will be demonstrated. Finally, the training course is completed with a reference to the health and safety rules in the construction site.

The structure of the training course and the training hours are listed below.

| MODULE | Theory | Practise |
|--|----------|----------|
| 1. Introduction – Heat transfer | 2 | |

| | | |
|---|---|---|
| 2. Legal Framework | 1 | |
| 3. Characteristics of insulating materials | 3 | |
| 4. Insulating materials | 6 | |
| 5. Application of insulating materials to the construction site | 6 | 3 |
| 6. Structural details. Facade - construction material | 3 | 3 |
| 7. Health and safety rules to the construction site | 3 | |

3.1.3. Contents of training modules

The contents of the training modules were developed based on the Handbook for thermal insulation installer, which has been prepared for the purposes of the project (Deliverable 2.2).

| TRAINING MODULES FOR INSULATION INSTALLERS |
|---|
| MODULES |
| <p>1. Introduction – Thermal Transmission</p> <p>1.1. Energy Performance of Buildings Thermal Comfort, Energy Conservation for Buildings need. Thermal Transmission (conduction, convection, radiation) ,Thermal Transmittance Coefficient</p> <p>1.2. Calculation of Thermal Transmittance Coefficient Calculations</p> <p>1.3. Thermal Bridges Losses, Thermal Bridges, Problems</p> <p>1.4. Exercises</p> |
| <p>2. Introduction – Legislation Framework</p> <p>2.1. Cyprus Legislation and European Directives National Action plan, Objectives in building Sector</p> <p>2.2. Minimum requirements for Energy Performance Minimum requirements, Buildings types, obligations, Exceptions</p> <p>2.3. Zero Energy Consumption buildings Requirements and obligations</p> <p>2.4. Exercises</p> |
| <p>3. Properties and characteristics of thermal insulation materials</p> <p>3.1. Classification of thermal insulation materials What are thermal insulation materials, Main categories of thermal insulation materials</p> <p>3.2. Physicochemical properties</p> |

Density, thermal conductivity resistance, radiation, environment, dimensions, mechanical strength, fire resistance, sound insulation, cost

3.3. Environmental properties

Energy impacts, ecological impacts

3.4. Certification

CE Marking, Declaration of Conformity, Certificate of Compliance, Fireproofing Category

3.5. Exercises

4. Main Thermal insulation materials

4.1. Light thermal Insulation Materials

Expanded polystyrene, extruded polystyrene, rigid polyurethane foam, fiberglass, phenolic foam, foam glass, wood wool, expanded perlite, expanded cork, wood fiber

4.2. Heavy thermal insulation Materials

Insulating bricks, lightweight concrete blocks

4.3. Mortar plasters

Mortar, plaster

4.4. Accessories

Support pads, fiberglass, guide

Corner beads, frame, tape, vapor barrier, drainage membrane, ventilators

4.5. Exercises

5. Use of thermal insulation materials in construction

5.1. Apply of thermal insulation

Walls, floor, roof

5.2. Thermal facade

Existing, new walls, floor, conventional and inverted roof, roof

5.3. Heavy materials and plasters

Existing, new, application of framework support, walls, floor, ceiling, roof

5.4. Heavy materials and plasters

Bricks, concrete blocks and plaster

5.5. Installation services

Electrical and water supply facilities

5.6. Load suspension

5.7. Exercises

6. Construction details: Thermal facade - Construction Materials

6.1. Construction site control

Site cleaning, surface preparation, weather conditions

6.2. Stages of installation of thermal insulation materials

6.3. Checklist

6.4. Guide of existing insulation problems

6.5. Exercises

7. Health & Safety at construction site

7.1. Legislation

Safety and health laws and regulations, employer liability

7.2. Risk assessment – Cautions

General rules, Cargo transport, work at height, vibration

7.3. Personal Protective equipment

Helmet, earplugs, ear protection, safety shoes, gloves, respiratory mask, protective suits, belts

7.4. Exercises

3.1.4. Methods and Techniques of Training

The training method that will be used in the Training course is the face-to-face training, which is necessary to demonstrate the practical exercises. Alternative methods such as e-learning, self-learning it would be impossible to train the trainees successfully, mainly because of the level of their knowledge. During training, different training techniques should be used to maintain the interest of the participants and simultaneously to improve the creative thinking and interactive learning. The training techniques will be alternated during the lectures according to the capabilities and experience of the trainees. During the training course the following techniques will be used:

- **Lecture / presentation:** Presentation of the theoretical part of the module
- **Demonstration:** Demonstration of thermal insulation application
- **Practice:** Application of thermal insulation
- **Multimedia:** Demonstration of good and bad practices insulation
- **Questions and answers:** Ability to put the trainees questions about the issues that concern them.

3.1.5. Educational Tools - Tools and Training Materials

The tools that will be used in the presentation of the each module are:

- Computer and projector
- Flipchart.
- Educational handbook will be given to trainees.
- Standard equipment for the purposes of practical exercises
- Personal Safety Equipment.

The handbook, which was given to the trainees, contains numerous pictures, diagrams and additional literature. The exercises at the end of each chapter include the basic elements of each module and are equivalent to those in which the trainees will be examined.

The materials that will be used during the training course are:

- Slides.
- Markers.
- Thermal insulation materials

3.1.6. Requirements of the training providers - theoretical part

The training will take place in a training centre which is certified by the Human Resource Development Authority. The necessary requirements of the training centres are presented in Deliverable 4.2 in detail.

3.1.7. Training area requirements - practical part

The training will take place in a training centre which is certified by the Human Resource Development Authority. The necessary requirements of the training centres are presented in Deliverable 4.2 in detail.

3.1.8. Training Evaluation

We-Qualify project includes theoretical and practical exams which follow the completion of each training course. Success in these exams is a prerequisite for the completion of the course and the certification of trainees. The evaluation will be done internally by the consortium of the project according to the requirements of certification.

The theoretical examination consists of “multiple choice questions”, “True / False” questions, relevant with the exercises at the end of each MODULE of the Handbook. The aim of the training course is not to memorize the Handbook but to be used as an advisory tool. Therefore the trainees can use the Handbook during the exam. Each MODULE has a different weight on examination according to teaching hours. The examination essay consists of two parts, Part A and Part B. The questions in Part A are graded with 3 points while the questions in Part B scored with 4 points. The minimum success rate for both parts is 70%.

In practical examination the candidates must achieve a score at least 80%. It should also be noted that the trainees are obligated to attend the training seminars with a participation rate of 80% in order to have the opportunity to participate in the examinations.

3.2. Contents of Training modules and expected results

| Skill 1: Insulation installers | | |
|---|---|--|
| Module 1: Introduction –Thermal transmission | | |
| Submodule | Knowledge Level To be in position to know... | Skill level To be in position to..... |
| 1.1 Building Energy Performance | <ul style="list-style-type: none"> The methods applied for the improvement of Building Energy Performance. What is the thermal comfort and the variations according to the activity Basic principles of Green house design | <ul style="list-style-type: none"> Evaluate the Building Energy Performance. |
| 1.2 Thermal Transmission | <ul style="list-style-type: none"> The methods of Thermal Transmission The definition of Thermal Transmittance coefficient The definition of Thermal conductance coefficient | <ul style="list-style-type: none"> Characterize thermal sources according to the transmission method |
| 1.3 Calculation of Thermal Transmittance coefficient | <ul style="list-style-type: none"> What is the internal and external surface resistance What is the air layer resistance Identify the thermal flow direction | <ul style="list-style-type: none"> Calculate the thermal Transmittance coefficient for building elements |
| 1.4 Thermal Bridges | <ul style="list-style-type: none"> The reasons of thermal losses Faults involved to the design Problems due to Thermal Bridges | <ul style="list-style-type: none"> Indicate possible thermal bridges locations Solve possible problems |
| 1.5 Condensation | <ul style="list-style-type: none"> Causes of humidity Methods of dealing with it | <ul style="list-style-type: none"> Identify the cause of the problems Tackle the problems identified |
| Module 2: Legal Framework | | |
| 2.1 Cyprus Legislation and European directives | <ul style="list-style-type: none"> Information about the Cyprus Legislation and European Directives Legislation about Energy Conservation for buildings Information about Energy Conservation schemes for buildings | <ul style="list-style-type: none"> Understand the legislation definition for energy conservation for buildings. |

| | | |
|---|--|---|
| 2.2 Minimum requirements for energy performance. | <ul style="list-style-type: none"> The requirements for Energy Performance of buildings The legislations exceptions | <ul style="list-style-type: none"> Consult possible clients about the legislation requirements. |
| 2.3 Nearly Zero energy buildings | <ul style="list-style-type: none"> What are the nearly zero energy buildings The additional requirements for the nearly zero energy buildings. | <ul style="list-style-type: none"> Consult possible clients about the legislation requirements for zero energy consumption buildings |
| Module 3: Properties and characteristics of thermal insulation materials | | |
| 3.1 Classification of thermal insulation materials | <ul style="list-style-type: none"> What are the thermal insulation materials Able to classify insulating materials to the main categories | <ul style="list-style-type: none"> identify in practice the categories of insulation materials |
| 3.2 Physicochemical properties | <ul style="list-style-type: none"> The physicochemical properties of thermal insulation materials What is heat reflective insulation and how it is used What is the soundproofing What should be the yield stress of the material depending on the applications What is resistance to water vapor diffusion | <ul style="list-style-type: none"> Correlate each property of insulation materials with its intended use Apply the correct heat-reflective insulation that may have a material |
| 3.3 Environmental properties | <ul style="list-style-type: none"> The environmental properties of thermal insulation materials What is the content of primary energy | <ul style="list-style-type: none"> Correlate each property of insulation materials with its intended use |
| 3.4 Certification | <ul style="list-style-type: none"> What is CE marking What is a declaration of conformity What is the certificate of conformity What is the fireproofing category | <ul style="list-style-type: none"> Utilize the declaration of conformity of the insulation material to determine its properties |
| Module 4: Main insulation materials | | |
| 4.1 Light thermal insulation materials | <ul style="list-style-type: none"> What are light insulation materials How does the thermal capacity is achieved in every material What are the characteristics of each kind What are the applications of each kind When to use roll or plate | <ul style="list-style-type: none"> Compare different insulation materials and propose the optimal option depending on the intended use associate performance of each insulation material regarding to its cost and its lifetime Identify the U-value of for the use of each material |
| 4.2 Heavy thermal insulation materials | <ul style="list-style-type: none"> What are the heavy insulation materials What are the characteristics of each kind What are the applications of each kind How thermal resistance is achieved in heavy insulation materials | <ul style="list-style-type: none"> Compares different materials together and propose the optimal option depending on the indented use associate performance of each material regarding to its cost and its lifetime Identify the U-value of each material |

| | | |
|--|---|---|
| 4.3 Mortars | <ul style="list-style-type: none"> • What mortars are used in thermal insulation • What is the contain of the thermal insulation plaster | <ul style="list-style-type: none"> • Select what mortar is suitable for each application • Identify the U-value of building elements for the use of each material |
| 4.4 Accessories | <ul style="list-style-type: none"> • What are the accessories used in thermal insulation • What different kinds of backing pads are used and when are being used • How do the mounting frame applies to the internal insulation • When the mounting frame used in external insulation • What is the vapor barrier • Why to use ventilators • How many square meters can cover each ventilator | <ul style="list-style-type: none"> • Figure out the quantities of materials needed for an application • Figure out the cost of materials for each application • Suggest when a vapor barrier, drainage membrane and ventilators are required to be used |
| Module 5: Use of thermal insulation materials in construction | | |
| 5.1 Application of thermal insulation | <ul style="list-style-type: none"> • Ways that masonry of the building envelope can be thermal insulated • Ways that floor of the building can be thermal insulated • Ways that the roof of the building can be thermal insulated • The advantages and disadvantages of various options • The technical specifications and requirements of each application • Separation of the heated space from the unheated space • The proper ambient conditions for every application | <ul style="list-style-type: none"> • Choose the optimal option for the thermal insulation technique according to the needs of the building • When insulation is required in the floor • Distinguish thermal bridges during construction and to insulate them properly • Protect the thermal insulation materials before their installation • To calculate the cost of materials • To calculate the cost of the installation • Explain the use of the guarantee |
| 5.2 Thermal facade | <ul style="list-style-type: none"> • Methods used for the thermal facade of the building • The correct position of the thermal insulation when underfloor heating is being used in the building | <ul style="list-style-type: none"> • Choose the appropriate insulating material for the installation of thermal insulation • Suggest the better thermal method which can be applied depending upon the use of the building |

| | | |
|---|---|---|
| <p>5.3 Conventional thermal insulation</p> | <ul style="list-style-type: none"> • Methods used for conventional thermal insulation of the building • How insulation is applied to masonry • How insulation is applied to floor • The precautions to take in order to avoid the vapour condensation • The materials used in construction of double shell masonry | <ul style="list-style-type: none"> • Implement conventional thermal insulation in a building • Properly positioning the mounting frame • Choose the appropriate insulating material for the application of thermal insulation • Advise the suitable method for thermal insulation depending upon the use of the building • Implement floor insulation on wooden parquet • Install thermal insulation in existing and new double shell masonry. • Properly place the heat-reflective insulation |
| <p>5.4 Heavy materials and plasters</p> | <ul style="list-style-type: none"> • The options available in thermal insulation materials • Any additional insulation that must be installed in the building's columns and roof • The maximum strength of lightweight concrete blocks when used as masonry | <ul style="list-style-type: none"> • Figure out the thickness of the wall required to achieve the required heat transfer coefficient of shell. • Figure out the maximum U value that may be achieved by thermal plaster on the basis of its characteristics • Figure out the thickness of the heat insulating plaster • Implement (if required) fiberglass mesh to hold the plaster |
| <p>5.5 Installation services</p> | <ul style="list-style-type: none"> • The techniques used to install electricity and water in heat insulated components • How we will separate heated space from unheated space | <ul style="list-style-type: none"> • Protect the insulation material from heat sources (fireplace, hot water) if needed • Distinguishes the position of provisional services in existing building and place them after insulation |
| <p>5.6 Load suspension</p> | <ul style="list-style-type: none"> • Identify the maximum load that each material can support | <ul style="list-style-type: none"> • Inform customers about the maximum load that the material can support |
| <p>Module 6: Construction details: Thermal facade - Construction Materials</p> | | |
| <p>6.1 Control of Construction site</p> | <ul style="list-style-type: none"> • The main points needed to be checked during the inspection on site • How to properly prepare the surfaces for the installation of thermal insulation • What weather conditions required for the installation of thermal insulation in the building | <ul style="list-style-type: none"> • Identify the necessary tools and equipment for the application of thermal insulation • Check the location and operation of the electrical power and water supplies of the building • Organize the area of the construction site • Prepare the work area before applying thermal insulation |
| <p>6.2 Stages of installation of thermal insulation materials</p> | <ul style="list-style-type: none"> • All required stages for the placement of thermal insulation materials | <ul style="list-style-type: none"> • implement thermal insulation to an existing or new building in practice |

| | | |
|---|--|---|
| | <ul style="list-style-type: none"> The correct application of thermal insulation materials Stages required for the placement of thermal insulation materials The correct application of thermal insulation materials The proper use of equipment and accessories for the insulation | <ul style="list-style-type: none"> find solutions to every problem occur during the installation of thermal insulation in buildings Take the necessary measures to protect the thermal insulation material if required before the plastering |
| 6.3 Checklist | <ul style="list-style-type: none"> How to use checklist | <ul style="list-style-type: none"> Use correct the checklist in order to check whether he has implemented each stage of thermal insulation and if all the necessary instructions have been met |
| 6.4 Guide of existing insulation problems | <ul style="list-style-type: none"> How to use the guide of existing insulation problems | <ul style="list-style-type: none"> identify the cause of each problem that occurred Use the Handbook as an advisory tool for proposing troubleshooting |
| MODULE 7: Health & Safety at construction site | | |
| 7.1 Legislation | <ul style="list-style-type: none"> The laws and regulations governing safety and health at work What are the employer's responsibilities What are the installer's responsibilities What markings used at the workplace | <ul style="list-style-type: none"> Comply with the prohibitory signs Install the appropriate signs at work Give the correct instructions to other people at the workplace |
| 7.2 Risk assessment – Cautions | <ul style="list-style-type: none"> What are the risks at the construction site How is the correct handling of loads Working safely at height, fall prevention and protection against falls What problems caused by the vibrations - what is the hand vibration syndrome - arm | <ul style="list-style-type: none"> Prepare a documented risk assessment Take measures to minimize the risks or reduce them to acceptable levels Create a protection area around the construction site Take prevention and protection measures against falls Apply a variable work schedule if percussive tools used Apply floating work schedule if percussive tools used |
| 7.3 Personal Protective equipment (PPE) | <ul style="list-style-type: none"> The safety equipment for head The safety equipment for eyes The safety equipment for the ears The safety equipment for the legs The safety equipment for hands The safety equipment for breathing The safety equipment for the body The safety equipment for work at height | <ul style="list-style-type: none"> Use the appropriate safety equipment Keep clean the safety equipments Maintains the safety Equipments |

4. Skill 2: Thermopane and external sunshade installers

4.1. Design of the program

4.1.1. Eligibility criteria for participation

The training course is intended for employees in the construction industry who have the basic knowledge and skills required for entering the training. An applicant should be able to fulfill one of the following admission criteria in order to be eligible to the program:

- No certificate or diploma or Elementary Education or School certificate and three years of experience
- Six-year School Certificate of Secondary Education (High school) and 2 years of experience
- Certificate of NMA and 2 years of experience
- Technical School Diploma and 1 year of experience
- Diploma or post-secondary vocational training diploma and 1 year of experience.

All participants eligible for the program should have :

- Good knowledge of the Greek language

The qualifications should be proved by official certificates proving academic qualifications (diploma) and professional experience.

A detailed list of the necessary qualifications of the trainees is presented in Deliverable 4.2.

4.1.2. Structure of the program - MODULES

The training program "Installation of thermopanels and exterior sunshades" covers eight theoretical modules, which are implemented in practical part of the training. The total duration of training program is 30 hours, of which 24 hours are theoretical and 6 hours are practical.

The theoretical part of the training begins with an introduction to the Energy Principles which will include the transfer of heat in order to present the basic knowledge needed to understand the theory behind the insulating materials. Also the legal framework on minimum requirements of thermal insulation in buildings will be analyzed in order to make clear the importance of thermal insulation of the buildings. Afterwards, the characteristics of thermopanels and the different types of panes and window panes are presented. In addition, their construction details are demonstrated. The following is the design of green buildings and solar protection systems. Finally, the training is completed with a reference to the health and safety rules in the construction site.

The structure of the course and the training hours are listed below:

| Module | Theoretical | Practise |
|---|-------------|----------|
| 1. Introduction – Heat transfer | 2 | |
| 2. Legal Framework | 1 | |
| 3. Characteristics of thermopanens | 3 | |
| 4. Thermopanens – curtain walling - glazing | 6 | |
| 5. Structural details. Wood, aluminium, PVC | 3 | 4 |
| 6. Green building design | 3 | |
| 7. External sunshading systems | 3 | 2 |
| 8. Health & Safety to the construction site | 3 | |

4.1.3. Contents of Training Modules

The contents of training modules based on the draft manual for thermopane installers and sun shading systems has been prepared for the purposes of the program (Deliverable 2.2).

| TRAINING MODULES FOR THERMOPANES AND SUNSHADES INSTALLERS | |
|---|---|
| MODULES | |
| 1. Introduction – Thermal Transmission | <ul style="list-style-type: none"> 1.1. Energy Performance of Buildings Thermal Comfort, Energy Conservation for Buildings need. Thermal Transmission (conduction, convection, radiation) ,Thermal Transmittance Coefficient 1.2. Calculation of Thermal Transmittance Coefficient Calculations 1.3. Thermal Bridges Losses, Thermal Bridges, Problems 1.4. Exercises |
| 2. Introduction – Legislation Framework | <ul style="list-style-type: none"> 2.1. Cyprus Legislation and European Directives National Action plan Εθνικό Σχέδιο Δράσης, Objectives in building Sector 2.2. Minimum requirements for Energy Performance Minimum requirements, Buildings types, obligations , Exceptions |

2.3. Zero Energy Consumption buildings
Requirements and obligations

2.4. Exercises

3. Thermopane Properties and Characteristics

3.1. Selection Criteria

Lighting, view, αερισμός, Thermal insulation, Acoustic insulation, aesthetic, durability, protection, cost, maintenance

3.2. Thermopane

Opening, Sliding, Fixed. Basics Characteristics

3.3. Certification

CE Marking, Declaration of Conformity, Certification of Conformity, Fire Rating

3.4. Environmental Properties

Environmental impact, Ecological impact

3.5. Exercises

4. Thermopanes – Curtain Walling - Glazing

4.1. Aluminium thermopanes

Physical and Mechanical properties, frames, connection parts, elastic gaskets, colours, parts-modules, maintenance and protection

4.2. Wooden Thermopanes

Physical ND mechanical properties, manufacture Timber types, parts maintenance and protection

4.3 PVC Thermopanes

Physical and Mechanical properties PVC production, dimensions, parts, maintenance and protection

4.4 Curtain Walling

Curtain Walling elements, Curtain walling types

4.5 Glazing

Energy Characteristics, physical and technical characteristics, double and triple glazing filling gases, weight calculation

4.6 Exercises

5. Construction Details Wood, Aluminium, PVC

5.1. Construction Site Check

Site clearance, Surface preparation

5.2. Installation stages for thermopanes and glazing

- 5.3. Checklist
- 5.4. Guide for problems for existing thermopanes
- 5.5. Exercises

6. Design of Green Buildings

- 6.1. Principles of green building design
 - Environment, energy, human needs, economic, traditional and modern architecture
- 6.2. Shading for green buildings
 - Climate, sunlight, ogkoplasia, orientation.
- 6.3. Exercises

7. Sun shading systems

- 7.1. Outdoor sun shading systems
 - Cantilever, shutters, canopy, awnings, external blinds - fins, photovoltaic systems
- 7.2. Indoor sun shading systems
 - Performance and safety requirements to protect infants and young children
- 7.3. Exercises

8. Health & Safety at construction site

- 8.1. Legislation
 - Health & Safety laws and regulations, employer liability
- 8.2. Risk Assessment - Caution
 - General regulations, transportation of weights, working at heights, vibrations.
- 8.3. Personal Protective equipment
 - Helmet, goggles, ear protection, safety shoes, gloves, respiratory mask, protective suits, belts
- 8.4. Exercises

4.1.4. Methods and Techniques of Training

The training method that will be used in the Training course is the face-to-face training, which is necessary to demonstrate the practical exercises. Alternative methods such as e-learning, self-learning it would be impossible to train the trainees successfully, mainly because of the level of their knowledge. During training, different training techniques should be used to maintain the interest of the participants and simultaneously to improve the creative thinking and interactive learning. The training techniques will be alternated during the lectures according to the capabilities and experience of the trainees. During the training course the following techniques will be used:

- **Lecture / presentation:** Presentation of the theoretical part of the module
- **Demonstration:** Demonstration of thermopanes and exterior sunshades installation
- **Practice:** Installation of thermopanes and exterior sunshades
- **Multimedia:** Demonstration of good and bad practices for installing of thermopanes and exterior sunshades
- **Questions and answers:** Ability to put the trainees questions about the issues that concern them.

4.1.5. Educational Tools - Tools and Training Materials

The tools that will be used in the presentation of the each module are:

- Computer and projector
- Flipchart.
- Educational handbook will be given to trainees.
- Standard equipment for the purposes of practical exercises
- Personal Safety Equipment.

The handbook, which was given to the trainees, contains numerous pictures, diagrams and additional literature. The exercises at the end of each chapter include the basic elements of each module and are equivalent to those in which the trainees will be examined.

The materials that will be used during the training course are:

- Slides.
- Markers.
- Thermopanes and glazing accessories
- Shades

4.1.6. Requirements of the training providers - theoretical part

The training will take place in a training centre which is certified by the Human Resource Development Authority. The necessary requirements of the training centres are presented in Deliverable 4.2 in detail.

4.1.7. Training area requirements - practical part

The training will take place in a training centre which is certified by the Human Resource Development Authority. The necessary requirements of the training centers are presented in Deliverable 4.2 in detail.

4.1.8. Training Evaluation

We-Qualify project includes theoretical and practical exams which follow the completion of each training course. Success in these exams is a prerequisite for the completion of the course and the

certification of trainees. The evaluation will be done internally by the consortium of the project according to the requirements of certification.

The theoretical examination consists of “multiple choice questions”, “True / False” questions, relevant with the exercises at the end of each MODULE of the Handbook. The aim of the training course is not to memorize the Handbook but to be used as an advisory tool. Therefore the trainees can use the Handbook during the exam. Each MODULE has a different weight on examination according to teaching hours. The examination essay consists of two parts, Part A and Part B. The questions in Part A are graded with 3 points while the questions in Part B scored with 4 points. The minimum success rate for both parts is 70%.

In practical examination the candidates must achieve a score at least 80%. It should also be noted that the trainees are obligated to attend the training seminars with a participation rate of 80% in order to have the opportunity to participate in the examinations.

4.2. Contents of training modules and expected results

| SKILL 2: Thermopanes and Sunshades Systems Installers | | |
|---|--|---|
| Module 1: Introduction– Thermal Transmission | | |
| Submodule | Knowledge Level To be in position to know... | Skill level To be in position to..... |
| 1.1 Building Energy Performance | <ul style="list-style-type: none"> The methods applied for the improvement of Building Energy Performance. What is the thermal comfort and the variations according to the activity | <ul style="list-style-type: none"> Evaluate the Building Energy Performance. |
| 1.2 Thermal Transmission | <ul style="list-style-type: none"> The methods of Thermal Transmission The definition of Thermal Transmittance coefficient The definition of Thermal conductance coefficient | <ul style="list-style-type: none"> Characterize thermal sources according to the transmission method |
| 1.3 Calculation of Thermal Transmittance coefficient | <ul style="list-style-type: none"> What is the internal and external surface resistance What is the air layer resistance Identify the thermal flow direction | <ul style="list-style-type: none"> Calculate the thermal Transmittance coefficient for building elements |
| 1.4 Thermal Bridges | <ul style="list-style-type: none"> The reasons of thermal losses Faults involved to the design Problems due to Thermal Bridges | <ul style="list-style-type: none"> Indicate possible thermal bridges locations Solve possible problems |
| Module 2: Legal Framework | | |
| 2.1 Cyprus Legislation and European directives | <ul style="list-style-type: none"> Information about the Cyprus Legislation and European Directives Legislation about Energy Conservation for buildings Information about Energy Conservation schemes for buildings | <ul style="list-style-type: none"> Understand the legislation definition for energy conservation for buildings. |
| 2.2 Minimum requirements for energy performance. | <ul style="list-style-type: none"> The requirements for Energy Performance of buildings The legislations exceptions | <ul style="list-style-type: none"> Consult possible clients about the legislation requirements. |
| 2.3 Nearly Zero energy buildings | <ul style="list-style-type: none"> What are the nearly zero energy buildings The additional requirements for the nearly zero energy buildings. | <ul style="list-style-type: none"> Consult possible clients about the legislation requirements for zero energy consumption buildings |

| Module 3: Properties and characteristics of Thermopanés | | |
|---|--|---|
| 3.1 Selection Criteria | <ul style="list-style-type: none"> • What are the basic criteria for the correct selection of thermopanés • How the climate conditions affect the selection of thermopanés | <ul style="list-style-type: none"> • Correlate the material properties with its usage • Advice and recommend the suitable thermopane according to the user's needs. |
| 3.2 Types of Thermopanés | <ul style="list-style-type: none"> • Categorise the different types of thermopanés • What are the types of thermopanés in accordance with their opening type • What are the basic characteristics of the thermopanés | <ul style="list-style-type: none"> • Understand the architectural drawing related to the thermopanés information. • Use the appropriate parts for each type of thermopane. |
| 3.3 Certification | <ul style="list-style-type: none"> • What is CE marking • What is the Declaration of Conformity • What is the Certification of Conformity • What is the Fire Rating Category | <ul style="list-style-type: none"> • Use the Declaration of Conformity of the thermoplane to clarify its properties. • Explain the use of Guarantee. |
| 3.4 Environmental Properties | <ul style="list-style-type: none"> • The environmental impact of thermopanés in accordance with their construction material. • What is the primary embodied energy | |
| Module 4: Thermopanés – Curtain Walling - Glazing | | |
| 4.1 Aluminium Thermopanés | <ul style="list-style-type: none"> • The physical and mechanical properties of aluminium thermopanés. • The basic information of the aluminium frame. • What is the multi compartment profile and the thermal break • What are the various connectivity parts and what are the spare parts. • Why the drainage holes and sealing plugs are used. • What are the possible colours • What are the protection and maintenance requirements | <ul style="list-style-type: none"> • Select the correct aluminium profile according to its use. • Specify the Thermal Transmittance coefficient of the thermopane according it its characteristics • Use the correct parts, connectivity parts for each type of thermopane. • Advice about the protection and maintenance methods. |
| 4.2 Wooden Thermopanés | <ul style="list-style-type: none"> • The physical and mechanical properties of Wooden thermopanés • The basic information of the wooden frame • How a wooden thermopane manufactured • The wood types that are used. Properties and advantages. • The dimensions restrictions • What are the various connectivity parts and what are the spare parts • What are the protection and maintenance requirements | <ul style="list-style-type: none"> • Select the correct material for wood profile according to its use. • Specify the Thermal Transmittance coefficient of the thermopane according its characteristics • Use the correct parts, connectivity parts for each type of thermopane. • Advice about the protection and maintenance methods. |

| | | |
|---|--|--|
| <p>4.3 PVC Thermopanes</p> | <ul style="list-style-type: none"> • The physical and mechanical properties of PVC thermopanes • The basic information of the PVC frame • What is the multi compartment profile and the thermal break • The dimensions restrictions • What are the various connectivity parts and what are the spare parts. • What are the protection and maintenance requirements | <ul style="list-style-type: none"> • Select the correct PVC profile according to its use. • Specify the Thermal Transmittance coefficient of the thermopane according its characteristics • Use the correct parts, connectivity parts for the type of thermopane. • Advice about the protection and maintenance methods. |
| <p>4.4 Curtain Wallings</p> | <ul style="list-style-type: none"> • Types of Curtain Walling • The basic elements of Curtain Walling | <ul style="list-style-type: none"> • Select the correct profile according to its use. • Specify the Thermal Transmittance coefficient of the thermopane according it its characteristics • Use the correct parts, connectivity parts for the type of thermopane. • Advice about the protection and maintenance methods. |
| <p>4.5 Glazing</p> | <ul style="list-style-type: none"> • What are the energy characteristics of Glazing • The physical and mechanical properties of Glazing • Which filling gases are used? • Why silicate is used and what is the life expectance. | <ul style="list-style-type: none"> • Select the correct profile according to its use. • Specify the glazing properties according its characteristics. • Use the correct parts, gas, silicates according to building's needs. • Calculate the glazing weight and compare it with thermopane durability. |
| <p>Module 5: Construction Details. Wood,Aluminium, PVC</p> | | |
| <p>5.1 Construction Site Check</p> | <ul style="list-style-type: none"> • The main points needed to be checked during the inspection on site • How to properly prepare the surfaces for the installation of thermopane . | <ul style="list-style-type: none"> • Measure the thermopane dimensions. • Calculate the materials needed. • Identify the typical tools and equipment needed for the installation of thermopane and glazing. • Organize the area of the construction site for the delivery of goods • Calculate the material cost • Calculate the cost of the installation. |
| <p>5.2 Thermopanes and Glazing Installation Stages.</p> | <ul style="list-style-type: none"> • The installation stages of Thermopanes and Glazing • The correct installation of Thermopanes • The correct installation of glazing • The use of rubber gaskets • The correct use of equipment and extra parts | <ul style="list-style-type: none"> • Install each thermopane and glazing at existing or new building. • Select appropriate fastening and sealing materials. • Installation of suitable elastic gaskets. • Inspect the operation and alignment of thermopane sheet. • Fill the glazing with the gas and sealing it properly |

| | | |
|---|--|--|
| | | <ul style="list-style-type: none"> Solve problems relating to the thermopanes. Fix any manufacture defect and correct any thermal bridges may present between thermopanes and building components. |
| 5.3 Checklist | <ul style="list-style-type: none"> How to use checklist | <ul style="list-style-type: none"> Use the checklist to check the installation stages. |
| 5.4 Guide for problems for Existing Thermopanes. | <ul style="list-style-type: none"> How to use the Guide. | <ul style="list-style-type: none"> Correlate the reason with the probable problem that has created it. Use the guide as an advisory tool for proposing problems solutions |
| Module 6: Design of Green buildings | | |
| 6.1 Principle of green building design | <ul style="list-style-type: none"> The principles of bioclimatic design The elements that determine the design in an area | |
| 6.2 Shading for green buildings | <ul style="list-style-type: none"> The sun course during the day The shading needs | <ul style="list-style-type: none"> Calculate the sun's position over time and how influences the building The length of the cantilever The need for shades |
| Module 7: Sun shading Systems | | |
| 7.1 External sun shading system | <ul style="list-style-type: none"> What systems are used in the outdoor sun shading Standards which define the performance and safety requirements | <ul style="list-style-type: none"> Figure out the weight and static needs support systems Implement common sun shading systems in a building Implement systems with motor and simple automations To calculate the cost of materials To calculate the cost of the work |
| 7.2 Indoor sun shading system | <ul style="list-style-type: none"> What systems are used in the indoor sun shading Standards which define the performance and safety requirements What are the protections that exist for children and infants | <ul style="list-style-type: none"> Figure out the weight and static needs support systems Implement common sun shading systems in a building To calculate the cost of materials To calculate the cost of the work |
| Module 8: Health & Safety at construction site | | |
| 8.1 Legislation | <ul style="list-style-type: none"> The laws and regulations governing safety and health at work What are the employer's responsibilities What are the installer's responsibilities What markings used at the workplace | <ul style="list-style-type: none"> Comply with the prohibitory signs Install the appropriate signs at work Give the correct instructions to other people at the workplace |

| | | |
|---|--|---|
| <p>8.2 Risk assessment – Cautions</p> | <ul style="list-style-type: none"> • What are the risks at the construction site • How is the correct handling of loads • Working safely at height, fall prevention and protection against falls • What problems caused by the vibrations - what is the hand vibration syndrome - arm | <ul style="list-style-type: none"> • Prepare a documented risk assessment • Take measures to minimize the risks or reduce them to acceptable levels • Create a protection area around the construction site • Take prevention and protection measures against falls • Apply a variable work schedule if percussive tools used • Apply floating work schedule if percussive tools used |
| <p>8.3 Personal Protective equipment (PPE)</p> | <ul style="list-style-type: none"> • The safety equipment for head • The safety equipment for eyes • The safety equipment for the ears • The safety equipment for the legs • The safety equipment for hands • The safety equipment for breathing • The safety equipment for the body • The safety equipment for work at height | <ul style="list-style-type: none"> • Use the appropriate safety equipment • Keep clean the safety equipments • Maintains the safety Equipments |

5. Trainers and training providers

5.1. Trainers qualifications

Trainers must meet the requirements of We-Qualify project. To ensure that the training process is carried out effectively and uniformly, the qualifications of persons involved in the training process (theoretical and practical) must be approved by the Monitoring Committee of the project.

The trainers of the We-Qualify should have appropriate training or qualifications for the Skills to participate, which are recognized by the appropriate national authority. They also need to have verifiable experience and knowledge of the skill systems and their installation. This can include qualifications or training courses/seminars which were acquired by the industry or by an approved body. For the practical part, the trainers of the We-Qualify should have relevant experience in the installation of the skill system they will participate. Experience can be gained from prior work or supervise work at construction site as supervisors of the work in this skill.

The qualifications of trainers are presented in detail in Deliverable 4.2. In general, the prerequisites of the trainers are:

To have appropriate professional experience in the relevant skill (theory and practice) at least five (5) years

- Be familiar with the We-Qualify education curriculum
- Be certified trainers from the national body (HRDA)
- Be able to communicate effectively both in writing and verbally
- Have an excellent knowledge of the Greek language

5.2. Training centers – Training providers

The training providers must be certified by the HRDA as Vocational Training Centres (KEK), which means that they have the capacity, resources and administrative capacity for the provision of vocational training as part of lifelong learning. In addition, the KEK it is recommended to comply with the requirements of standard ISO / IEC 17024 and have a management system that ensures that the requirements of this standard are applied correctly. At the same time, they must be carried out internal audits to ensure firstly that the management system is properly implemented and secondly to achieve continuous improvement across all sectors and to identify areas requiring corrective or preventive actions.

The KEK must have sufficient number of suitably qualified and experienced trainers and assessors. It is important to have policies and procedures to ensure that candidates are treated fairly and equitably. The policy will ensure that the KEK managed the certification of trainees appropriate, including suspension and revocation of certification, when appropriate. The center must also ensure that the training program coincides with the scope of accreditation. Finally, the KEK should have policies and procedures for the resolution of complaints and appeals on certification decision.

Detailed requirements of the KEK determined by the certification body (HRDA) and reported in Deliverable 4.2, while in Deliverable 4.5 presents guide to training bodies.