

SKILLS

D

2.1
2.2
2.3



METVET

JOINT HIGHER VET

COURSE IN THE METAL SECTOR

WP2 - Definition of Joint skills demands-Need Analysis



Co-funded by the
Erasmus+ Programme
of the European Union



Erasmus+ KA3 Joint Qualifications in VET
597806-EPP-1-2018-1-EL-EPPKA3-VET-JQ

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained there

ABOUT METVET

Metal, machinery and related trades workers are engaged in a range of skilled activities. Those workers need to understand work organization, and the specialist materials and tools to be used in their jobs, as well as of the nature and purpose the final product they are engaged in making.

According to Cedefop's European skills and jobs survey (ESJS), the **5 key skills** for metal, machinery and related trades workers are job-specific skills, problem solving, teamwork, learning and communication. These skills will support employees in this occupation to also tackle anticipated future skill challenges.

METVET project aims at a competence-based professional generic profile served as a basis for designing competence-based training programs. The underlying idea is that vocational education should enable trainees to acquire the competences needed in their future professions. While working as professionals, they should continue to develop competences in order to be able to react to and anticipate future developments in their work.

The project specifically aims at one hand designing, for **Aluminium & Metal Constructions technicians** including:

- **a professional (qualification) profile & a core curriculum (EQF 5)**
- **a corresponding VET program, including innovative teaching methods**
- **a qualification standard (according to ISO/IEC17024) for evaluation & certification.**

All the above will be achieved through the strengthening of the exchange of knowledge and practice between education and training institutions and the labor market. The METVET consortium complementarity will ensure a strong collaboration between the labor market (sectoral organizations) and the education and training institutions. The role of the sectoral organizations will be of ensuring that the developed training is in total adequacy with the employer's needs, supporting the implementation of the training for workers. The role of VET providers will be to develop an adapted, attractive and innovative VET program. The EU umbrella organization will promote the training in the other EU countries.

The purposes of this volume are to present all tasks carried out in Greece, Germany and Italy (according to deliverables 2.1, 2.2 and 2.3) in terms of existing and finally required (joint) skills at technician level, as much as to identify differences and geographical characteristics among the participating countries.

The Project Partners

September 2019

TABLE OF CONTENTS

ABOUT METVET	2
1 ABOUT WP2 DEFINITION OF JOINT SKILLS DEMANDS-NEED ANALYSIS.....	6
1.1 Description.....	6
2 WP2 METHODOLOGY TO BE FOLLOWED	9
2.1 Introduction	9
2.2 Definition of Joint Skills Demands - Need Analysis	11
2.2.1 Target group's training needs identification	11
2.2.2 Labor skill needs identification	12
2.2.3 Regional characteristics	13
2.3 Identification of existing skills in Germany	14
2.4 Identification of existing skills in Italy	16
2.5 Identification of existing skills in Greece	18
2.6 Identification of characteristics in Italy	20
2.7 Identification of characteristics in Italy	21
2.7.1 Regional and national repositories in Italy	21
2.8 Identification of characteristics in Greece	25
2.9 Method – type of research	26
2.10 Main research questions	27
2.11 Creation of the questionnaire.....	27
2.11.1 Initial phase.....	27
2.11.2 Pilot Implementation	28
2.11.3 Finalization and dissemination	28
2.12 Results' presentation - list of existing skills	28
3 WP2 LIST OF EXISTING SKILLS FOR ALUMINIUM & METAL CONSTRUCTIONS TECHNICIANS	31
3.1 Background material.....	32
3.2 Skill categories	32
3.3 List of existing skills per category	33
3.3.1 Theoretical Skills	33

3.3.2	Practical Skills.....	34
3.3.3	Green Skills.....	36
3.3.4	Transversal Skills	36
3.4	Clusters of skills.....	37
3.4.1	Basic technical skills in metal construction.....	37
3.4.2	Special technical skills for metal construction	38
3.4.3	Use of ICT-, CAD- and 3D-Equipment.....	38
3.4.4	Green Skills – Environment protection	39
3.4.5	Transversal skills	39
3.5	Conclusions	40
4	WP2 ALUMINIUM & METAL CONSTRUCTIONS TECHNICIANS QUALIFICATIONS & SKILLS IDENTIFICATION QUESTIONNAIRE	43
4.1	A few words to the participants	43
4.2	The questionnaire	45
5	WP2 LIST OF JOINT SKILLS FOR ALUMINIUM & METAL CONSTRUCTIONS TECHNICIANS	49
5.1	Comparative Analysis for the creation of the list summary	49
5.2	Analysis Results and Discussions	50
5.3	Analysis Conclusions	75
5.4	The List of Joint Skills	76
5.4.1	Theoretical Skills	80
5.4.2	Practical Skills.....	81
5.4.3	Green Skills.....	83
5.4.4	Transversal Skills	83
5.5	Conclusions	85
6	WP2 Final Remarks – Connection with other WP's	87
6.1	Exploitation of WP2 results in WP3 “Creation of Professional Profile”	88
6.2	Exploitation of WP2 results in WP4 “Creation of Curriculum and Syllabus, Qualification standard, evaluation and certification”	89



Wp2

SKILLS

Demands - needs analysis

1 ABOUT WP2 | DEFINITION OF JOINT SKILLS DEMANDS-NEED ANALYSIS

The aim of this work package (METVET WP2) is to define the list of **Joint skills** needed that are not currently met by existing trainings concerning **Aluminium & Metal Constructions technicians**. As will be presented below these skills have been categorized in order to be easier to be used in the Occupational (or Professional) Profile development phase and in the Curriculum development phase. The list of joint skills that will be presented herein correspond to the Aluminium & Metal Constructions technicians with an EQF level 5 and include green skills.

1.1 Description

Initially, the consortium carried out a desktop and internet-based analysis to collect data, statistics derived from professional associations, industry research and training sector from the partner countries, in order to identify existing:

- target group's training needs,
- labor skill needs and
- regional characteristics of each participating country.

All information was included in the first project deliverable, **List of Existing Skills** (D2.1).

As a result of the above task, an **online questionnaire** (D2.2) was designed, to make a comparative analysis and identify the qualifications and skills required in Aluminium & Metal Constructions technicians, as well as, geographical characteristics of each participating country.

The questionnaire was implemented in **two phases, pilot and final** one. In the first phase, the pretesting and piloting phase, the questionnaires were sent to five (5) relevant companies and stakeholders and a short sample was acquired to identify questions that need to be rephrased for clarity reasons, or problems that might lead to biased answers.

After pilot testing and necessary revisions, the questionnaire was distributed in all partners' countries stakeholders, including end-users such as companies and employers involved in the metal sector etc. A questionnaire's data analysis was later performed in order to create a **Draft Skills Catalogue**.

All results and conclusions were presented during the project's 1st thematic workshop in Karlsruhe, Germany, leading to the final skills definition and update of the existing skills list, the **List of Joint Skills** (D2.3).

A crucial critical point in this process is to encompass skills not only for EQF level 5 but also to include new green skills, with which the EU objectives in terms of energy sustainability will be supported.



Identification **SKILLS**

Methodology

2 WP2|METHODOLOGY TO BE FOLLOWED

The main objective of WP2 is to define the List of Joint Skills needed that are not currently met by existing trainings concerning Aluminium & Metal Constructions technicians. Based on this list, other WP's outputs (Professional Profile, Curricula, Syllabus, Qualification standard, etc.) will be developed. Therefore, a working methodology for achieving the above-mentioned aim was created so as to specify the details for all steps to be followed.

2.1 Introduction

Methodology constitutes the introductory task of WP2, and it is divided into two main parts. The first part presents the methodology that will be followed under the framework of WP2 ("Definition of Joint skills demands-Need Analysis") and all related tasks. In detail, it describes the directives and prerequisites followed for the on-line research and it covers issues such as the:

- type and duration of the research methodology,
- main research questions that needs to be answered through the research,
- survey sampling method,
- data collection
- involved partners and target groups
- building of questionnaire
- pilot implementation of questionnaire
- dissemination of questionnaire
- evaluation, presentation and further usage of the findings

The **second part** aimed at gathering and evaluating already existing researches, professional profiles, industries data, related with skills identification in Metal Construction sector in order to present a list of existing skills identified for Aluminium & Metal Construction technicians. The specific activity resulted in the definition of specific skills that were evaluated in order to be included in the **questionnaire**.

To find out skills demands, and skills needs in the Metal Construction Sector for the consortium started from analyses, already done by important organizations of VET research - such as, CEDEFOP, the European Vocational Training development center-, as much as descriptions of development in the world of work and detailed reasons and demands for skills needed and future projection of skills needs. Therefore, it was assured that an excellent basis had been gained for the development of joint VET courses on **level 5 EQF** by evaluating this scientific literature, available on the Web.

Afterwards, partners went forward by asking a preselected representative number of companies and experts from the field of Aluminium and Metal Constructions to realize their very specific sight of skills demand and skills needs. This specific action was used to corroborate the desktop analysis findings that will be presented hereafter, in this Report.

Regional characteristics of each participating country (DE, GR, IT) were also important. The shape of occupations was very different as well as the way to achieve a qualification/diploma. These differences made it difficult to identify “target group’s training needs” as well as “Skill needs identification”.

The best way to find out the training needs to upgrade from a certain level (Level 4 EQF) to the next (Level 5 EQF) was the identification of a level 4 **benchmark**. Partners’ final decision was to choose an occupation of the German system of occupations on this level, as it was very general and widespread, having in mind that it would be easier afterwards to explore and add gaps and variations from other systems. Namely, the challenge treated here was to identify the special skills and requirements to up skill to Level 5 EQF.

2.2 Definition of Joint Skills Demands - Need Analysis

Initially, the target group of employees was identified in order to clarify the requirements for joint skills. These skills will also determine the educational needs for the creation of a transnational educational program.

Identifying the skills needed by the labor market also played an important role in the initial analysis, since the professions are transformed and influenced by changes in the labor market, policies etc.

New skills emerge (e.g. green skills) and affect all occupations. In addition, central EU policies are defining future skills needs. As an example, we could mention EU policy for climate change, which is going to induce drastic interventions (renovations) for energy saving in the building sector.

Finally, the specificities and characteristics of the profession in each involved country were considered in order to analyze the possible impact on the existing skills framework referred to an up-to-date job profile of Aluminium and Metal Constructions technician with an EQF5 qualification.

2.2.1 Target group's training needs identification

The target group can be defined as “Persons with some formal qualification and/or with good experience in the field” of metal constructions. This means, that special requirements, going beyond routine and standard work and that higher requirements must be trained, particularly concerning autonomy and responsibility for work processes and decisions. Purpose is to find out and to describe these training needs.

2.2.2 Labor skill needs identification

Modernization, technological development and environmental requirements produce continuously new demands for new skills. This means, that lifelong learning is a standard in all fields of work.

Labor skill needs in the framework of this project will concentrate on the sector of metal constructions, construction of windows, doors, shutters, facade coverings and static constructions, as well as the processing of Aluminium and Steel. The working field is defined as window-, door-, shutter-, and facade-construction and installation. Companies in the focus in Greece are mostly small and very small enterprises. This is a regional feature together with a focus on the Aluminium material.

To bring it to a common result and to an affordable outcome of this limited project, partners had to decide on the items and fields they were considering. Carried-out Interviews with experts (national authority for vocational training, VET providers, entrepreneurs etc.) highlighted the following fields of skills for training:

- Advanced skills in welding, especially concerning health & safety
- Advanced skills in new techniques of fixing, connecting and surface protection
- Advanced skills in assembling energy efficient constructions
- Advanced skills in new techniques of energy efficient installation in buildings in order to minimize thermal bridges
- Digitization:
 - Reading, understanding & evaluation of engineering CAD drawings
 - Calculation of constructions thermal properties (U value) by using appropriate software
 - Reading, understanding and evaluation of engineering drawings in 3D
 - Basic skills in 3D-printing
 - Digital networks
 - Data protection and security

- Environmental protection:
 - Knowledge of Climate goals
 - Effective use of energy
 - Use of renewable energy resources
 - Minimizing energy consumption
 - K-value: heat transfer coefficient, constant of transmission
 - Avoiding waste and environmental pollution
 - Recycling and reuse of material (circular economy aspects)

Considering the wide variety of skills, training courses to be delivered in field targeted by the project ought to not only address employees or apprentices, but also professionals, trainers, teachers and owners themselves.

2.2.3 Regional characteristics

The systems of vocational training and skills building in the partner countries of this project vary from country to country. In Germany, as well as in Austria, there is an advanced system of joint apprenticeship as form of vocational education and training, with a sophisticated system of occupations, established in a system of parity of social partners and scientists. This system is valid for the whole nation and qualifications are valid all over the nation. Most of them are also recognized in countries with similarly structured systems of VET. Apprenticeship means that young people learn by working in a company (i.e. 3 days a week), which shall be accredited by a state's authority for a time and parallel they go to vocational schools.

In Italy, the system is also advanced in its way. Authority for VET are the regions, so some occupations may differ within the country from region to region. Nevertheless, it is a very elaborated system giving a deep training in the framework of vocational schools or VET centers, completed with internships in local or regional companies.

The system in Greece appears to be more like the Italian system. However, in contrast to the Italian system, the Greek one presents an extremely centralized procedure in terms of differentiation of specialties' content and curricula. The same holds also for the different systems of apprenticeship, although small improvements to a more decentralized system with a higher level of independence for VET schools has been adopted although not necessarily implemented so far.

The crucial difference between the social estimation of occupations in different countries is the extremely high appreciation of University degrees in some countries like Greece. It leads also to an underestimation of crafts-occupations and to a lack of high-quality workforce in these occupations.

As a result, in those countries there is to find a large mismatch between occupational degrees and the needs of the labor market (will be explicitly described below).

2.3 Identification of existing skills in Germany

The below added list of skills is from the description of the German occupation "Construction Mechanic" – an occupation in the field of crafts occupations. The list shows the skills and competences which are taught during the 40 months of apprenticeship. They are also subject of the final practical and theoretical exams to achieve the diploma. Therefore, everybody having this certificate will be able to fulfill what is included in this profile. The certificate is agreed in Germany as well as in Austria and France.

The job profile includes the following List of occupational actionability. This list represents the basis for the definition of "Learning outcomes" for the curriculum.

- Plan tasks based on technical documentation
- Manufacture parts, assemblies, and metal constructions from sheets, tubes or profiles by means of manual and mechanical production methods
- Carry out welding processes, taking work safety and environmental protection into account

- Install and uninstall metal constructions and use various jointing techniques
- Create auxiliary structures, devices, templates and flat patterns
- Select testing devices and methods and apply the company's quality assurance system
- Carry out required maintenance work on systems, machines and tools
- Coordinate work with upstream and downstream departments
- Work on complex projects as part of team
- Act autonomously in carrying out activities, taking relevant regulations and safety provisions into account
- Use IT systems, including in digitalized processes
- Apply regulations relating to data protection and information security

The name of the occupation in the German system that is most close to the subject of this work in METVET Project as well as to the case in Greece, is the “Metalworker in structural engineering”.

Metalworkers in structural engineering find employment opportunities in the construction technology sector, particularly in metal working companies specializing in the manufacture, assembly and repair of steel and light-metal constructions. These include e.g. companies producing metal doors, metal windows, locking and security systems, metal roofing and metal facades. This is an occupation in the field of industrial occupations. For this case the following list of skills are needed.

- Carry out work assignments autonomously and work as part of a team according due consideration to the relevant regulations and safety provisions and based on technical documentation and work orders
- Procure information
- Plan coordinate and agree work with line managers, with colleagues and with other work divisions using German and English language technical terminology
- Document work and initiate quality assurances measures and measures for health and safety at work and environmental protection

- Plan and control work processes, check, protocol and evaluate work results
- Apply standards and guidelines to ensure product quality and continuous improvement of work processes in the company
- Measure and test mechanical and physical values
- Make separable and inseparable connections
- Manufacture work pieces and components using various manual and machine production processes
- Treat and protect surfaces
- Secure loads, transport components and sub-assemblies and use lifting gear
- Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results
- Set up workplaces at building sites
- Produce components and construction elements and assemble and dismantle metal and steel constructions
- Maintain metal and steel constructions

2.4 Identification of existing skills in Italy

Job skills are usually described in repositories which are referred to regional contexts. The following were identified as the most relevant for the purposes of the project:

- STEELWORKING sector (FORMEDIL¹ repository, 2011, ver. 2.0)
 - Identification, cut and steel shaping for reinforcement points
 - Positioning and assembling of steelwork for reinforcement points
 - Cutting and welding of steel constructions for reinforcement points
 - Being able to organize the steel workings for reinforcement points

¹ National entity for vocational training in the construction sector.

- WELDING CARPENTER (Friuli Venezia Giulia regional repository of qualifications)
 - Realization of workmanships on metal sheets
 - Carrying out manual metal arc (MMA) welding with coated electrode
 - Carrying out metal arc welding in Metal Inert Gas (MIG) or Metal Active Gas (MAG)
 - Carrying out manual metal arc (MMA) welding with Tungsten Inert Gas procedure (TIG)
 - Welding of metal materials with flame processes (i.e. oxy-acetylene welding, brazing)
 - Assembling welded structures of metal carpentry

- BUILDING CARPENTER (Veneto regional repository of professional standards)
 - Setting up logistics and operational aspects of a construction site to realize structural/construction works in reinforced concrete
 - Controlling and monitoring supplies of the construction site
 - Dismantling reinforced-concrete structures
 - Carrying out layout on the framework site, using the suitable tools
 - Ensuring the quality and the safety of the construction site during the realization of the carpentry work
 - Supervising the carpentry works carried out in the construction site, coordinating the activities of the labor force
 - Pouring concrete inside the slip forming
 - Realizing metal reinforcements as explained in the structural drawing
 - Realizing necessary preliminary operations for the construction of forms and reinforcements

2.5 Identification of existing skills in Greece

In Greece the occupation is analyzed in the profile of “Aluminium and Metal Constructor”. The specific occupation deals with the processing of Aluminium architectural profile in order to manufacture and place in buildings frames and other custom made Aluminium alloy constructions for the energy performance, the exterior appearance as well as the interior arrangement of a building. The scope of the specific occupation also includes the manufacture and placing of custom-made metal constructions, mainly out of ferrous metal, intended to be used in buildings for architectural purposes.

LIST OF SKILLS FROM THE EXISTING PROFESSIONAL PROFILE (EOPPEP)

- Understand and choose the most appropriate techno-economic & energy-efficient solution
- Organize and apply the appropriate measurement and construction techniques
- Understand the requirements for energy saving in buildings through aluminum constructions
- Choose the right combinations of materials (profiles, glass, etc.)
- Understand the legal and regulatory requirements for aluminum constructions (CE marking, Regulations for Energy Saving in Buildings etc.)
- Implement good working practices (working field, equipment, etc.)
- Organize collaboration with external partners (specifications, times, costs, etc.)
- Handle equipment properly (machine tools, presses, pantographs, hand tools)
- Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes

- Implement good working practices (suitable vehicle, appropriate means of support, customer loyalty etc.)
- Recognize and apply the requirements of technical guidelines during product installation, in order to achieve maximum energy outcomes
- Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer
- Handle software for calculating thermal properties
- Handle software to calculate constructions cost
- Handle the measuring equipment correctly
- Calculate dimensions from construction drawings, sketches
- Organize and select the appropriate legal and regulatory requirements for each construction
- Handle technical catalogs and profile specifications
- Handle technical manuals for the manufacture of aluminum systems
- Apply good practices for raw materials and final products storage
- Implement health and safety rules at work
- Manage the recyclable materials correctly
- Explain the information contained in the Declaration of Performance and CE products Marking
- Organize the file of each completed project
- Handle welding machines and hand tools
- Implement the appropriate measurement techniques for quality control

2.6 Identification of characteristics in Italy

The German VET system is based on a general Vocational Training Act, actual version from 2005, valid on national level.

Occupations in the German system are developed and decided in parity among three groups of stakeholders: Employers, Workers and Government. They jointly shape the “Dual VET” system by developing and maintaining the National one. Co-decision and cooperation are promoted through formal mechanisms and secured by laws, institutions and committees. Important national interlocking frame is the “National Committee for VET”, a system to develop & modernize Dual VET standards.

Employers are represented by different business associations concerned by the occupation, such as Chambers of commerce & industry, chambers of crafts, etc. Workers are represented by unions and other social associations. Government develops legal and policy framework pursuing regulative interests.

Monitoring and implementation of the Dual VET system is done on local (regional) level organized in local VET boards all over the country:

- Companies train based on national in-company training standard
- Work councils (in large companies) monitor training
- The public sector monitors and finances VET school education.
- Assessment and certification are done by a common joint Examination Board
- Employers can be sure, to gain skilled and proved workforce
- Workers attain a certification of acquired competencies for entering a professional career.
- Government sets examination regulations as a cornerstone of Dual VET.
- Mechanism by which VET stakeholders jointly implement independent examinations & certify Dual VET trainees. Certificates are recognized by employers & employees within the formal education system.

In consequence this system is well-coordinated, quality-ensured and recognized by all stakeholders.

2.7 Identification of characteristics in Italy

In March 2019, the Office for Economics Studies of UNICMI (the National Union of Metal Construction and Building Envelope Industries) published a Report on the Italian market of the metallic frames and curtain walls. Despite the recovery of the beginning of the 2016 year, 2018 has been characterized by a severe economic crisis in Italy. The economic slowdown has led to a reduction in the investments in the building sector that are expected to improve of 1.6% in 2019.

In fact, 2018 registered a moderate increase in the demand of frames and curtain walls. Indeed, the total demand of the last year overcame the 4.5 billion, of which 2.8 coming from the residential area and 1.7 from the non-residential one.

It is important to mention that the tax incentives for financial interventions of energy upgrading of buildings have substantially contributed to support the window/door frames' request for 2018. The tax incentives determined the 39% of the total request of Aluminium frames in Italy, with a volume of 580 million of Euros. Indeed, Aluminium-manufacturing companies have proved to have good penetration skills in the market segment referring to existing buildings and their renovation thanks to the sales policies and the tailored services developed so far.

For the forthcoming years, the companies of the construction sector will continue working and expanding in the residential area, more specifically in the replacement of frames, thus having to invest in marketing and communication services with a client-centered approach and being able to diversify their offer from other national/international competitors.

2.7.1 Regional and national repositories in Italy

With the Law Decree n° 13 of 16th January 2013, the “National Repository of education and training job titles and of professional qualifications” was created in Italy. This repository represents the framework reference for the certification of

skills, based on the standardization of education and training job titles – including also those for vocational education and training (VET) – and of professional qualifications, which are indeed interrelated as they share a common system for recognition of course credits to be assigned in line with European standards. The national repository includes four different sections, although only two are currently available in the web, namely:

1. The Vocational Education and Training (VET) section, which includes three-year and four-year Vocational Education and Training (IeFP), Higher Technical Education and Training (IFTTS) and Higher Technical Education (ITS).
2. The national framework of regional qualifications section (at the present, 18 Regions' directories/ repository can be consulted).

In the national repository (<https://inapp.org/it>), the ISTA codes associated with each professional qualification are also listed. From the consultation of the repository, it emerges that the profiles with skills related with the METVET project are associated with the mechanic sector. Analytically, the identified profiles are:

CARPENTERS OR METAL FRAMING FITTERS (code ISTAT CP2011 / 6.2.1.4.0), whose ADA (Area of Activity) of reference are the following:

ADA.7.49.150 Processing by strain / removal with traditional machines

Activities to be carried out:

- Preparation of machinery and equipment for the realization of the product
- Positioning of raw & semi-finished parts on the machinery for processes execution
- Working with traditional machine tools (cutting, stamping, drilling, milling, turning, forging, grinding of possible imperfection in the components) according to the technical specifications

- Identification of the solutions to improve the processed part (strain / removal)
- Preparation of requests for supplies
- Verification of the functionality of the equipment and mechanical instruments
- Drafting of reports, production sheets and testing

ADA.7.49.151 Processing for strain / removal with automated machine tools

Activities to be carried out:

- Preparation of machinery for product realization (mold change, press adjustment, tool change operations, machine parameter adjustment, program change)
- Realization of work with automated machine tools (cutting, molding, drilling, milling, turning, forging, grinding of the components) according to the technical specifications
- Verification of materials subject to consumption during production: raw materials (sheet metal, semi-finished parts), tools
- Verification of the functionality of the equipment and mechanical instruments
- Drafting of reports, production and test sheets with statistical control

AT NATIONAL LEVEL

Job title : MECHANICAL OPERATOR

EQF level : 3

Sector : Mechanical, production and maintenance of machinery, plant engineering

VET Repository: Three-year VET course

AT REGIONAL LEVEL

Job title : PRODUCTION PROCESS ORGANIZATION IN THE MECHANICAL FIELD

EQF level : 4

Sector : Mechanical, production and maintenance of machinery, plant engineering

Repository of : Friuli Venezia Giulia

Job title : METAL CARPENTER

EQF level : not available

Sector : Mechanics sector, production & maintenance of machinery, plant engineer

Repository of : Veneto

Job title : OPERATOR ASSIGNED TO PROCESSING METAL PRODUCTS

EQF Level : 2

Sector : Mechanical field, production & machinery maintenance, plant engineering

Repository of : Liguria

Job title : METAL CARPENTER

EQF Level : 3

Sector : Mechanical field, production & maintenance of machinery, plant engineer

Repository of : Liguria

Job title : METAL CARPENTER

EQF Level : 3

Sector : Mechanical field, production & maintenance of machinery, plant engineer

Repository of : Lombardi

Job title : MECHANICAL OPERATOR – WELDING OPERATOR

EQF level : not available

Sector : Mechanical field, production & maintenance of machinery, plant engineer

Repository of : Piedmont

Job title : METALLIC CARPENTRY MANUFACTURER

EQF Level : 4
Sector : Mechanical field, production & maintenance of machinery, plant engineer
Repository of : Emilia- Romagna

Job title : METALLIC CARPENTRY MANUFACTURER
EQF level : 4
Sector : Mechanical field, production & maintenance of machinery, plant engineer
Repository of : Lazio

Job title : METALLIC CARPENTRY OPERATOR
EQF level : 3
Sector : Mechanical field, production & maintenance of machinery, plant engineer
Repository of : Basilicata

Job title : TURNING OPERATOR
EQF level : 3
Sector : Mechanical field, production & maintenance of machinery, plant engineer
Repository of : Basilicata

2.8 Identification of characteristics in Greece

Most of the companies in the Metal Construction Sector are very small size and self-employed people.

Although there is a statutory professional profile, there is no level 4 or 5 training program that leads to a qualification for the profession. In addition, there is a lack of linking technical education with existing companies in the sector.

There is no requirement for a qualification to start a business in the aluminum and steel constructions sector. Most of the companies do not implement a proper training procedure for their employees.

The only organized efforts to train human resources in the sector are done by the Federation (POVAS), in co-operation with other organizations (IME GSEVEE etc.).

Over the past five years there has been a sharp shift in energy-saving issues in the building sector. This trend is expected to be strengthened in order to achieve the country's energy saving targets by 2030. It is estimated that 50.000 energy savings interventions will be made each year in existing buildings.

Most of them are going to take place in residential buildings and will include replacement of existing windows and doors.

2.9 Method – type of research

The method chosen for this study is an on-line quantitative survey, based on a closed-ended questionnaire. The aim of the research is to gather a relatively large sample from the countries participating in the project (Germany, Italy, Greece). This result will help to choose the corner points for the development of a curriculum to be developed within the projects lifetime.

As main target groups of the survey are defined:

- Companies and employees of the metal sector,
- Employers and employees' organizations involved in the sector

The online survey was published in an online tool (<https://www.questionstar.com/>), as the EU survey platform that was initially selected was not available, targeting all participating partners' countries. The field period was for around a month.

For the participation to be enhanced, project's partners disseminated and invited representatives of the targeted groups to participate in the survey.

2.10 Main research questions

The conduction of the research aims at answering several questions directly related with the overall scopes of the project such as:

- Identifying skill needs for Metal Construction technicians (green skills, digital skills, special technical skills, transversal skills etc.),
- Mapping potential differentiations between participating countries,
- Identifying training needs,
- Presenting possible trajectories for achieving necessary competencies
- Existing certification and validation schemes
- Evaluating potential differentiations between participating countries

2.11 Creation of the questionnaire

2.11.1 Initial phase

Initially, the creation of the questionnaire was based on the findings of task 2.1 of the METVET project “Presentation of the directives and prerequisites of the on line research (i.e. duration, main variables, involved partners, ways of dissemination, means of enhancing participation) in order to follow the real identified needs of the sector. Task 2.1 presented a list of existing skills for Aluminium Metal Construction technicians, based on already conducted researches, created curricula, professional profiles and data referring to the main characteristics of the sector.

Among others the questionnaire included and monitored issues such as needed skills, training needs, as well as the sectorial differentiations based on the region. Finally, the questionnaire included the demographic characteristics of the participating members such as the field of activity as well as the staff occupied in the company.

2.11.2 Pilot Implementation

The pilot implementation of the questionnaire helped in identifying potential problems such as questions needed to be redefined, biased questions or even parameters not included in the questionnaire.

In order to have a holistic evaluation of the proposed questionnaire, it was completed by 5 representative companies and/or employers, forming a pool of 15 questionnaires in total, from each participating country, belonging in the metal construction sector, in order to end up to a common set of questions.

The procedure also assured that the questionnaire was adjusted to real conditions & realities of different markets that characterize all participant countries.

2.11.3 Finalization and dissemination

After implementing all the necessary revisions, the questionnaire was finalized and agreed between the partners. Subsequently, the questionnaire was uploaded to QUESTIONSTAR e-survey tool and companies from the targeted countries were invited to participate in the research. Moreover, project's partners invited companies from their countries to fill in the questionnaire. Under this precondition, 50 questionnaires were distributed in companies and employers involved in the metal construction sector of each country for at least 20 filled questionnaires to be gathered from each participating country (60 in total).

2.12 Results' presentation - list of existing skills

As a final step of the METVET WP2 "Definition of Joint skills demands-Need Analysis", all results were analyzed and evaluated by the WP leader and the associated expert team. Main findings and skills defined were presented in the first thematic workshop (in Germany) in order to be evaluated by experts of the sector.

Finally, the produced deliverable presented the **list of joined skills** definition, updating the existing skills catalogue, on which the Deliverable and the action of the next WP are based e.g. Creation of Professional Profile, Creation of Curriculum & syllabus.



Existing SKILLS List

3 WP2 | LIST OF EXISTING SKILLS FOR ALUMINIUM & METAL CONSTRUCTIONS TECHNICIANS

The central purpose of this deliverable is to provide a list of already identified skills that will be used as base for the creation and launching of a multilingual survey (available in Greek/ English/ Italian and German) so as to identify the overall Skills' demands for Aluminium & metal constructions technicians (List of Joint Skills).

The list of existing skills is set up to give an overview about the skills already identified for **Aluminium & metal constructions technicians** having successfully completed a minimum EQF level 4 education or apprenticeship. It is a collection of skills described in Italian, German and Greek vocational educational programs, as much as other important published documents (qualification profiles, similar project outputs, etc.).

Why explicitly mentioning “Aluminium”:

In the German and Italian professional profiles “Metal” means all kinds of metal, this is steel, iron, high-grade-steel as well as Aluminium or Copper. In Germany, it is familiar to distinguish “Iron- “and “Non-iron-metal”. For the purpose of the Greek side it was important to include Aluminium explicitly. There are good reasons for this choice, because there are important differences between the categories of metal used in the building sector, concerning stability, flexibility, durability and reaction in i.e. welding processes. By these reasons the consortium decided to mention explicitly “Aluminium” in the name of the profile.

3.1 Background material

For the Greek part, the skills described in the occupational profile of “Aluminium and Metal Constructor” were taken. This profile was established in 2009 and updated in 2016 within the UPSWING - BUILD UP SKILLS project that funded by Intelligent Energy – Europe (IEE). In the updated version new knowledge, skills and competences for energy saving & energy efficiency were developed and added.

For the German part, the skills described in the occupational profiles “State-recognized training occupation construction mechanic” and “state-recognized training occupation Metalworker – specialized in structural engineering” both on Level 4 EQF, were collected.

As the Italian part the profiles of “Steel worker”, “Welding Carpenter” and “Building Carpenter” where the most appropriate to be considered for comparison and completion to this purpose.

3.2 Skill categories

After examining and analyzing the professional profiles in the three participating countries, it was considered appropriate to create skills categories. This was done to facilitate the study of skills and to identify any overlaps between the skills reflected in existing professional profiles.

Four key skill categories were created to incorporate the skills included in the existing professional profiles. The first three categories are mostly used in related projects, while the fourth one contains skills that will emerge in the future.

The first category includes the skills that are relevant to the profession and require a theoretical background.

The second category includes the practical skills required to practice the profession. This is the most important category, as we are considering a technical job profile.

The third category focuses on the transversal (horizontal) skills described in existing occupational profiles, which are needed by employees regardless of the sector of their profession.

Finally, the fourth category aims to highlight green skills, which have begun to emerge in recent years and therefore are to be developed. This category was considered, these skills will be crucial for EU green policies in the next future and have to be developed over the next few years in this profession as well.

3.3 List of existing skills per category

Following are the skills listed in the existing professional profiles for each of the key categories mentioned above.

3.3.1 Theoretical Skills

- Understand the legal and regulatory requirements for aluminum constructions (CE marking, Regulations for Energy Saving in Buildings etc.)
- Organize collaboration with external partners (specifications, times, costs, etc.)
- Organize and select the appropriate legal and regulatory requirements for each construction
- Handle technical catalogs and profile specifications
- Procure information
- Realization of workmanships on metal sheets

3.3.2 Practical Skills

- Organize and apply the appropriate measurement and construction techniques
- Choose the right combinations of materials (profiles, glass, etc.)
- Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes
- Recognize and apply the requirements of technical guidelines during product installation, in order to achieve maximum energy outcomes
- Handle equipment properly (machine tools, presses, pantographs, hand tools)
- Handle the measuring equipment correctly
- Calculate dimensions from construction drawings, sketches
- Handle welding machines and hand tools
- Implement the appropriate measurement techniques for quality control
- Apply good practices for raw materials and final products storage
- Handle technical manuals for the manufacture of aluminum systems
- Measure and test mechanical and physical values
- Make separable and inseparable connections
- Manufacture workpieces and components using various manual and machine production processes
- Treat and protect surfaces
- Secure loads, transport components and sub-assemblies and use lifting gear
- Produce components and construction elements and assemble and dismantle metal and steel constructions
- Plan and control work processes, check, protocol and evaluate work results
- Maintain metal and steel constructions

- Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results
- Apply standards and guidelines to ensure product quality and continuous improvement of work processes in the company
- Manufacture parts, assemblies, and metal constructions from sheets, tubes or profiles by means of manual and mechanical production methods
- Carry out welding processes, taking work safety and environmental protection into account
- Install and uninstall metal constructions and use various jointing techniques
- Create auxiliary structures, devices, templates and flat patterns
- Select testing devices and methods and apply the company's quality assurance system
- Carry out required maintenance work on systems, machines and tools
- Identification, cut and steel shaping for reinforcement points
- Positioning and assembling of steelwork for reinforcement points
- Cutting and welding of steel constructions for reinforcement points
- Carrying out manual metal arc (MMA) welding with coated electrode
- Carrying out metal arc welding in Metal Inert Gas (MIG) or Metal Active Gas (MAG)
- Carrying out manual metal arc (MMA) welding with Tungsten Inert Gas procedure (TIG)
- Welding of metal materials with flame processes (i.e. oxy-acetylene welding, brazing)
- Assembling welded structures of metal carpentry

3.3.3 Green Skills

- Understand and choose the most appropriate techno-economic & energy-efficient solution
- Understand the requirements for energy saving in buildings through aluminum constructions
- Manage the recyclable materials correctly

3.3.4 Transversal Skills

- Implement good working practices (working field, equipment, etc.)
- Implement good working practices (suitable vehicle, appropriate means of support, customer loyalty etc.)
- Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer
- Handle software for calculating thermal properties
- Handle software to calculate constructions cost
- Implement health and safety rules at work
- Explain the information contained in the Declaration of Performance and CE products Marking
- Organize the file of each completed project
- Carry out work assignments autonomously and work as part of a team according due consideration to the relevant regulations and safety provisions and on the basis of technical documentation and work orders
- Plan coordinate and agree work with line managers, with colleagues and with other work divisions using German and English language technical terminology

- Document work and initiate quality assurances measures and measures for health and safety at work and environmental protection
- Set up workplaces at building sites
- Use IT systems, including in digitalized processes
- Apply regulations relating to data protection and information security
- Being able to organize the steel workings for reinforcement points

3.4 Clusters of skills

In order to use the entity of “existing skills” for creation of a questionnaire about missing skills and future skills needs, they were categorized and concentrated in some clusters. The questionnaire used these cluster’s headlines to ask for feedback about skills needed. Concentration to clusters is also important to avoid losing track for the questionnaire, which shall be brief enough not to discourage the addressees. These clusters will also be helpful to find out, in which field there will be the special needs in the different concerned countries.

Clusters enable respondents to express their views on skills that are lacking or will emerge in the near future.

Moreover, clusters of skills are useful to develop learning outcomes at different levels or to map them against existing program learning outcomes.

Clusters reflect the identified skills categories. In the following paragraphs, we provide the lists.

3.4.1 Basic technical skills in metal construction

- Choose the right combinations of materials (profiles, glass, etc.)
- Appropriate use of tools and machines at work
- Organize & apply the appropriate measurement and construction techniques

- Install and uninstall metal constructions and use various jointing techniques
- Manufacture parts, assemblies, and metal constructions from sheets, tubes or profiles by means of manual and mechanical production methods
- Handle technical manuals for the manufacture of aluminum systems
- Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve max energy outcomes

3.4.2 Special technical skills for metal construction

- Realization of workmanships on metal sheets
- Set up workplaces at building sites
- Cutting and welding of metal constructions for reinforcement points
- Carry out welding processes practicing different technical solutions
- Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results

3.4.3 Use of ICT-, CAD- and 3D-Equipment

- Use IT systems, including in digitalized processes
- Apply regulations relating to data protection and information security
- Handle software for calculating thermal properties
- Handle software to calculate constructions cost
- Read, understand & apply CAD-produced and presented descriptions & work orders

3.4.4 Green Skills – Environment protection

- Understand and choose the most appropriate techno-economic & energy-efficient solution
- Understand the requirements for energy saving in buildings through aluminum constructions
- Calculate thermal properties (e.g. U value) for various construction products by using appropriate software tools
- To assemble products in energy-efficient ways according to the assembly designer's requirements
- To identify critical checkpoints, pertinent to construction quality which can affect thermal energy losses
- Manage the recyclable materials correctly
- Economical handling of raw material
- To avoid waste of raw material

3.4.5 Transversal skills

- Safety and Health protection
 - Implement health protective and safety rules at work
 - Use safety and health protection equipment properly
- Practicing quality insurance
 - Implement good working practices (working field, equipment, etc.)
 - Carry out required maintenance work on systems, machines and tools
 - Select testing devices and methods and apply the company's quality assurance system
 - Organize the file of each completed project

- Organizational and technical communication
 - Understand the legal and regulatory requirements for aluminum constructions (CE marking, Regulations for Energy Saving in Buildings etc.)
 - Plan coordinate and agree work with line managers, with colleagues and with other work divisions
 - Organize collaboration with external partners (specifications, times, costs, etc.)
 - Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer
 - Organize and select the appropriate legal and regulatory requirements for each construction
 - Handle technical catalogs and profile specifications
 - Handle the measuring equipment correctly
 - Calculate dimensions from construction drawings, sketches
 - Procure information
 - Handle the measuring equipment correctly
 - Calculate dimensions from construction drawings, sketches
 - Procure information

3.5 Conclusions

The following professional profiles were studied and analyzed to identify existing skills in the three countries.

- Greece: “Aluminium and Metal Constructor”
- Germany: “State-recognized training occupation construction mechanic” and “State-recognized training occupation Metalworker – specialized in structural engineering”
- Italy: “Steel worker”, “Welding Carpenter” and “Building Carpenter”

The existing skills from the above-mentioned professional profiles were divided into four categories:

- Theoretical Skills
- Practical Skills
- Green Skills
- Transversal Skills

In order to use the entity of “existing skills” for creation of a questionnaire about missing skills and future skills needs, they were categorized and concentrated in some clusters. For that reason, five cluster of skills were created:

- Basic technical skills in metal construction
- Special technical skills for metal construction
- Use of ICT-, CAD- and 3D-Equipment
- Green Skills – Environment protection
- Transversal skills

The above-mentioned clusters of skills formed the basis for the creation of a questionnaire that was distributed to stakeholders in the three countries, with the aim of extracting the list of joint skills.



Questionnaire SKILLS

List

4 WP2 | ALUMINIUM & METAL CONSTRUCTIONS TECHNICIANS QUALIFICATIONS & SKILLS IDENTIFICATION QUESTIONNAIRE

Aluminium & Metal Constructions Technicians Qualifications & Skills Identification Questionnaire was based on the list of existing skills deliverable, to identify the overall Skills' demands for Aluminium & metal constructions technicians (List of Joint Skills).

The questionnaire was designed to run through an online tool (QuestionStar), to make a comparative analysis and identify the qualifications and skills required in Aluminium & Metal Constructions technicians, as well as, geographical characteristics of each participating country.

4.1 A few words to the participants

A transnational partnership of VET-providers and stakeholders is running a European project in the framework of ERASMUS+, called:

“METVET – Creating a joint higher VET course in the Metal Construction Sector”

Partner's from Belgium, Germany, Greece and Italy pursue the goal to upgrade qualifications of metal workers in small and medium sized enterprises (SME) to the capacity to help to achieve the European Climate goals. “Metal Construction Sector” in this context means companies, which manufacture, assembly and repair Aluminium and other metal-constructions. It includes manufacturing and applying doors, windows, locking and security systems, metal roofing and metal facades etc. as part of the construction sector.

The following questionnaire is prepared to rank the knowledge and skills needed for working in the metal construction sector as a skilled worker with a considerable responsibility and autonomy in work with respect to customer and environment, looking to fulfill European climate goals the best as possible:

- Avoid production of greenhouse gas,
- use of renewable energy and
- save energy.

As result the METVET-partnership will create a “Joint Higher VET course” consisting of short joint modules for qualification, with prepared materials and guidelines for realization, to be used by companies as well as by VET providers to upgrade worker’s qualifications.

“Higher VET- course” means, the upgrading of skilled experienced workers from European Qualifications framework (EQF) level 4 to level 5. (EQF-levels indicate the degree of autonomy, responsibility, personal and social competence an employee can realize by executing his tasks at work. A qualification on EQF level 4 means, that this person is a skilled worker with the capacity to act autonomously in a range of situations and tasks and to supervise persons in their work. Level 5 means deepened knowledge and skills and more autonomy and responsibility and very specialized skills and competences in one or more fields on his workplace - But still below bachelor’s degrees, which are on level 6).*

We kindly ask you for a feedback, if ever and in which topics and level the proposed skills could be useful for your company. It will help us to find the right focus for this development.

Finally, you will benefit from the results of this project, because you will receive the material for the courses to use it for your employees also.

Thank you very much for your cooperation.

The METVET Team

** Find more information about the European qualification framework EQF:*

<http://www.cedefop.europa.eu/de/events-and-projects/projects/european-qualifications-framework-efq>

4.2 The questionnaire

SECTION A

PLEASE MARK WITH A CROSS				
	Question	Yes	No	Comments
1.	You are owner / executive manager of a company in metal construction sector			
2.	You are employee in a company of the metal construction sector			
3.	You agree that there is a need for such a joint higher VET course?			

SECTION B

Please mark with a cross, how important you estimate the mentioned skills (level 4) Please fill in the lines below, which skills you estimate to be important but not mentioned in the list (level 5) If you estimate for one or more skills important to be trained (for you or in general) please mark with a cross in the last column "Training needed"							
	SKILLS	Very Important	Important	Neutral	Not very important	Not important at all	Training needed
TECHNICAL SKILLS IN METAL CONSTRUCTION EQF Level 4 "Skilled worker"	Choose the right materials' combinations (profiles, glass, etc.)						
	Install and uninstall metal constructions, choose and use the most appropriate of various jointing techniques						
	Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes						
	Realization of workmanships on metal sheets						
	Set up workplaces at building sites						
	Cutting and welding of metal constructions for reinforcement points						
	Carry out welding processes practicing different technical solutions						
	Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results						
	TECHNICAL SKILLS IN METAL CONSTRUCTION Going beyond to EQF Level 5	Else:					
Else:							
Else:							

USE OF ICT-, CAD- AND 3D-EQUIPMENT EQF Level 4	SKILLS	Very Important	Important	Neutral	Not very important	Not important at all	Training needed
	Use IT systems, including in digitalized processes						
	Apply regulations relating to data protection and information security						
	Handle software for calculating thermal properties						
	Read, understand and apply CAD-produced and presented descriptions and work orders						
	Understand and use 3D-Equipment for production of tools, parts etc.						
SKILLS NEEDED going beyond to EQF Level 5	Else:						
	Else:						
	Else:						

GREEN SKILLS – ENVIRONMENTAL PROTECTION EQF Level 4	SKILLS	Very Important	Important	Neutral	Not very important	Not important at all	Training needed
	Understand and choose the most appropriate techno-economic & energy-efficient solution						
	Understand the requirements for energy saving in buildings through aluminum constructions						
	Calculate thermal properties (e.g. U-value) for various construction products by using appropriate software tools						
	Assemble products in energy-efficient ways according to the assembly designer's requirements						
	Identify critical check-points, pertinent to construction quality which can affect thermal energy losses						
	Understand & calculate the energy performance of products (energy labeling)						
	Understand the environmental performance of products (environmental product declaration)						
	Manage recyclable materials correctly						
SKILLS NEEDED going beyond to EQF Level 5	Else:						
	Else:						
	Else:						

TRANSVERSAL SKILLS	PRACTICING QUALITY ASSURANCE	Very Important	Important	Neutral	Not very important	Not important at all	Training needed
EQF Level 4	Implement good working practices (working field, equipment, etc.)						
	Select testing devices and methods and apply the company's quality assurance system						
SKILLS NEEDED going beyond to	Else:						
EQF Level 5	Else:						
TRANSVERSAL SKILLS	ORGANIZATIONAL & TECHNICAL COMMUNICATION	Very Important	Important	Neutral	Not very important	Not important at all	Training needed
EQF Level 4	Understand, organize and select the appropriate legal and regulatory requirements for each construction (CE marking, Regulations for Energy Saving in Buildings etc.)						
	Plan coordinate and agree work with line managers, with colleagues and with other work divisions						
	Organize collaboration with external partners (specifications, times, costs, etc.)						
	Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer						
	Handle technical catalogs and profile specifications						
	Handle the measuring equipment correctly						
	Calculate dimensions from construction drawings, sketches						
	Procure information						
SKILLS NEEDED going beyond to	Else:						
EQF Level 5	Else:						
	Else:						

SECTION C

Please give some information on you and your company, so we will better be able to evaluate the questionnaire. Thank you			
Question	YES	NO	Comments
Are you interested in the results of this project and do you allow us to send you further information to keep you up-to-date?			
If YES please provide email-address			

Your enterprise / the company you are working for is (please mark with x)	Production plant	Handicraft business	VET provider	School	Other (specify)

Your enterprise / the company you are working for has (please mark with x)	1 to 9 employees	10 to 49 employees	50 to 249 employees	≥ 250 employees

Which sector of the Metal Construction industry does your company belong to (according to your products and services)	Building sector (windows, doors, roller shutters, etc)	Mechanical sector (machines, metallic parts etc)	Other (please specify in the field below)

Where is your company based?	Germany	Greece	Italy	Other Country Please specify

Thank you for your cooperation



Joint
SKILLS
List

5 WP2 | LIST OF JOINT SKILLS FOR ALUMINIUM & METAL CONSTRUCTIONS TECHNICIANS

5.1 Comparative Analysis for the creation of the list summary

After pilot testing and necessary revisions, the questionnaire was distributed in all partners' countries, mainly in end-users (companies and employers involved in the metal sector). In the following Table the questionnaire summary is presented.

Table 1 Report Summary.

General	
Report Name	METVET-first
Survey Title	METVET-survey-2019
Date	Sunday, June 23, 2019 10:52 AM
Completed Responses	60
Not Completed Responses	12
Completion Rate	83.3%
Distribution Channels	Completed (Not Completed)
Link	60 (12)

The METVET survey was open for 41 days (QuestionStar online tool). This report presents the results available on 23rd June 2019. The number of completed responses were 60, while the non-completed responses were 12 of most which were trials from the questionnaire developer, or the key partners from METVET project to check the platform performance. In general, the process to fill-in the fields and answer the questions were easy and smooth, as per the feedback we gathered from those who participated. This enabled the smooth and sincere interaction with the participants.

The questionnaire's data analysis took place in order to create a Draft Skills Catalogue. The desktop research results are going to feed the deliverable of METVET

WP2 “List of Joint skills”, which will be the base for the creation of the Professional Profile in METVET WP3. Based on this list, other WP’s outputs such as curricula, Syllabus, Qualification standard, etc. in METVET WP4 will be developed. Therefore, the result from this analysis are of outmost importance for the design and implementation of the upcoming METVET tasks.

The objective and the targets of this survey were open to the individuals who filled in the questionnaire. This description is given below.

5.2 Analysis Results and Discussions

In the question “You are owner / executive manager of a company in metal construction sector” most of the individuals answered YES, indicating the high creditability of the results, since the owners are expected to be more engaged and with high level of experience.

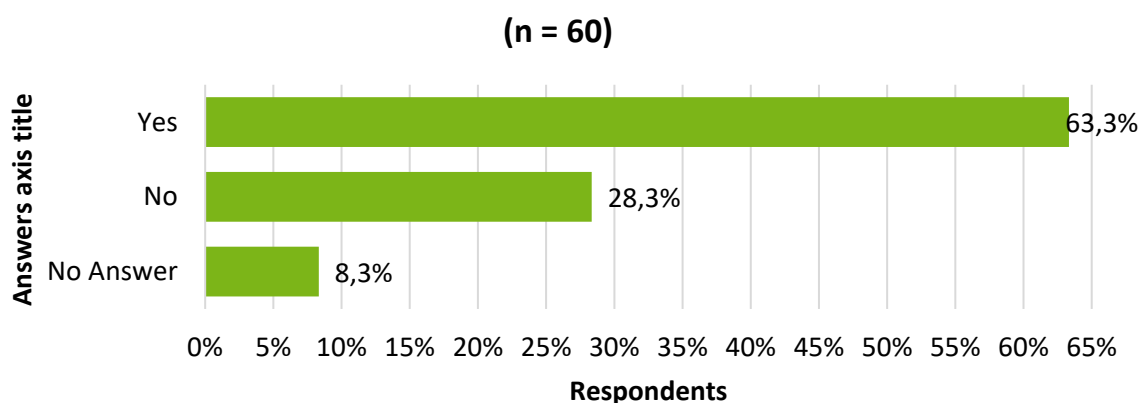


Figure 1: Results from Q3 You are owner / executive manager of a metal construction company

The remaining 28.3% and 8.3% represents either experienced workers or other stakeholders, not owners of a company.

The breakdown of the profiles of the individuals who participated is given in the next figures.

Most of the enterprises is working for/as “Handicraft business”, reaching a percentage of around 57%, and then as production plant. This indicates a strong confidence of this analysis study regarding the skills in the sector. An accumulative 17% of the answers were from schools and VET providers, namely the organizations that will be responsible to apply the Curriculum provided from METVET project and teach the material that will be produced from METVET project.

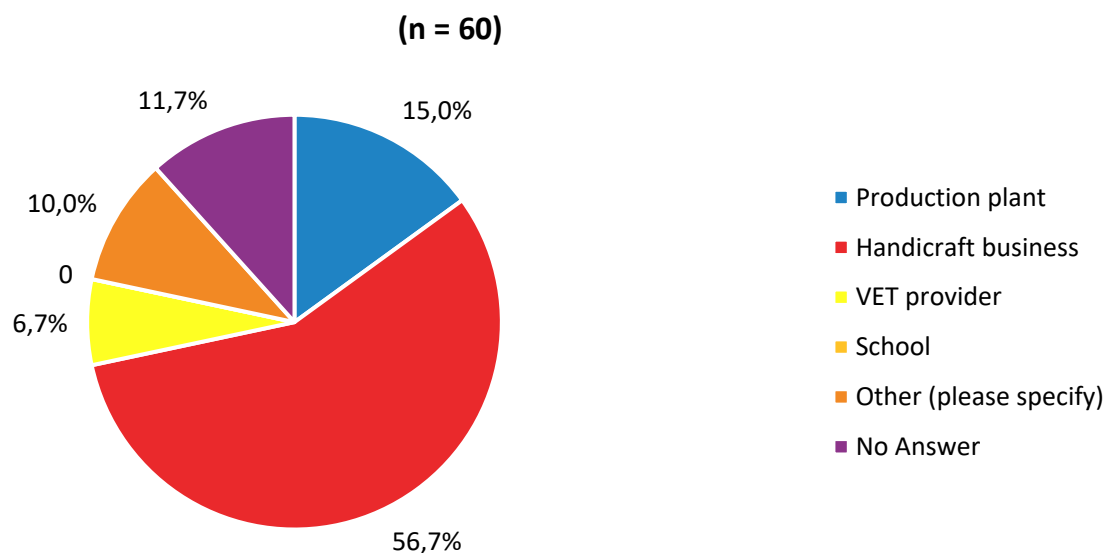


Figure 2: Results from Q50 Your enterprise / the company you are working for is (please mark with x)

The vast majority of those who answered come from of the companies are small with less than 9 employees (60%). Only the 5%, i.e. three companies are large with more than 250 employees. This reflects the scale of the companies with employees for which METVET project targets, and indicates that the technician with EQF level 5 in such a company shall have a generic and holistic overview of the processes, since he/she will need to execute parallel tasks far and beyond the strict framework of a typical technician in a large company, such as to use design software, to measure on site, to issue an offer, to discuss with the engineer responsible, to produce, install and

uninstall constructions, to provide maintenance services for older products, to check the compatibility with laws and legislations, to be responsible for a team etc.

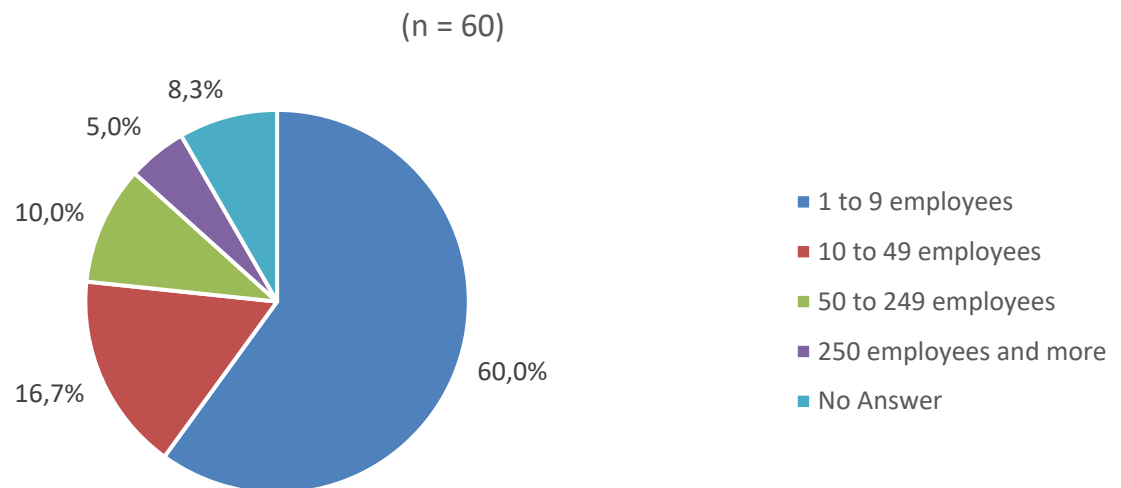


Figure 3: Results from Q51 Your enterprise / the company you are working for has (please mark with x)

Half of the companies is with the Building sector, and the 18% is with the mechanical sector (machines metallic parts etc.).

Indeed, an Aluminium and Metals Construction Technician mainly works for the Building sector. For the pure mechanical sector, the technicians are more focused on forming, joining and processing of metals, mainly steels, with constructions that typically have structural loads. Even though companies from the mechanical sector collaborate with those of the Building sector, the needs and the qualifications in the Building sector are typically different, as already mentioned.

Identifying this gap, is of crucial importance for the concept followed within METVET project. As will be clear in the next Reports of the METVET Project this difference, between the strict technician of the mechanical sector and the building sector reflects

in a series of variations in the adequate knowledge, skills and competences, and requires a different educational/training concept.

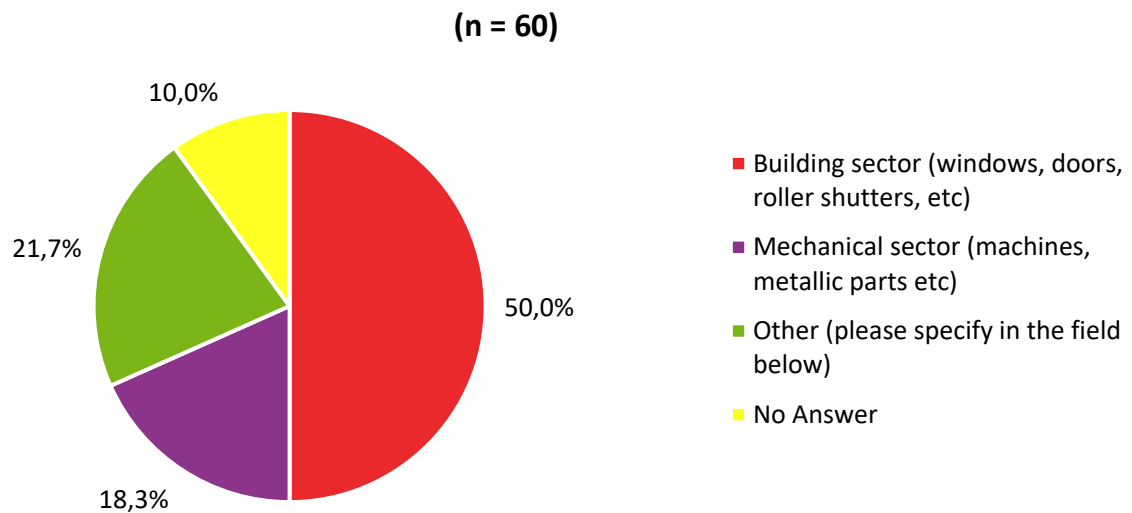


Figure 4: Results from Q52 Which sector of the Metal Construction industry does your company belong to (according to your products and services)

The questionnaire was filled in from companies based in Greece (46.7%), Italy (38.3%) and Germany (13.3%).

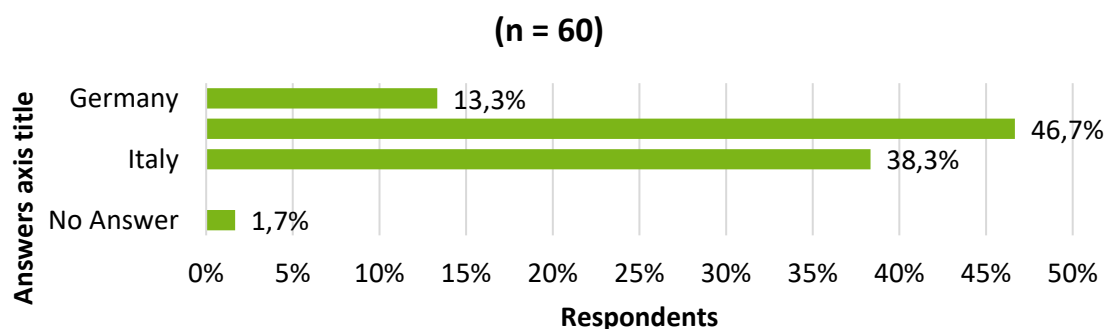


Figure 5: Country from which the person who answered is based on.

For most of the individuals the reply to the question “You agree that there is a need for such a joint higher VET course” the answer was Yes.

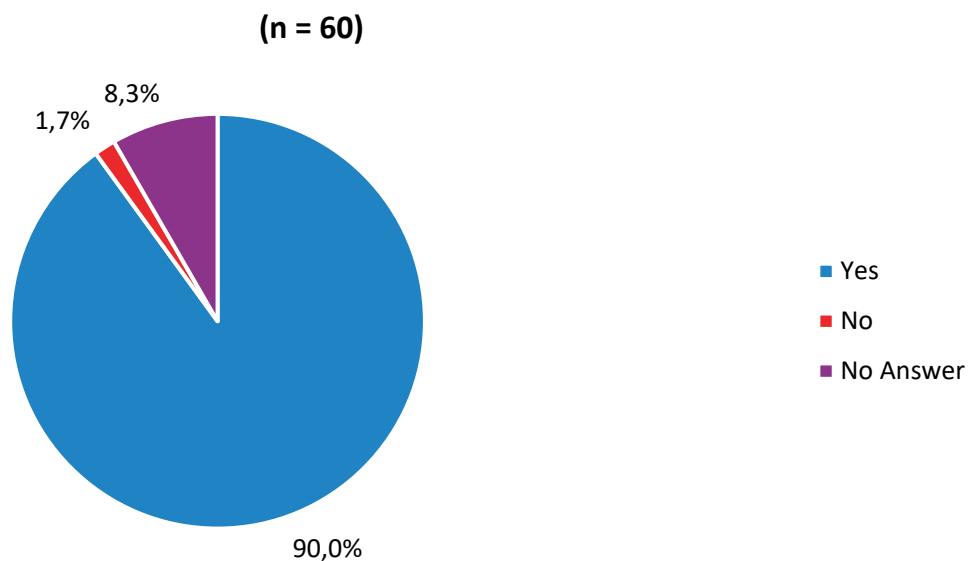


Figure 6: Results from Q5 You agree that there is a need for such a joint higher VET course?

As a follow-up of the above-mentioned need, the responses indicated some of the most important tentative issues to be covered in such a course.

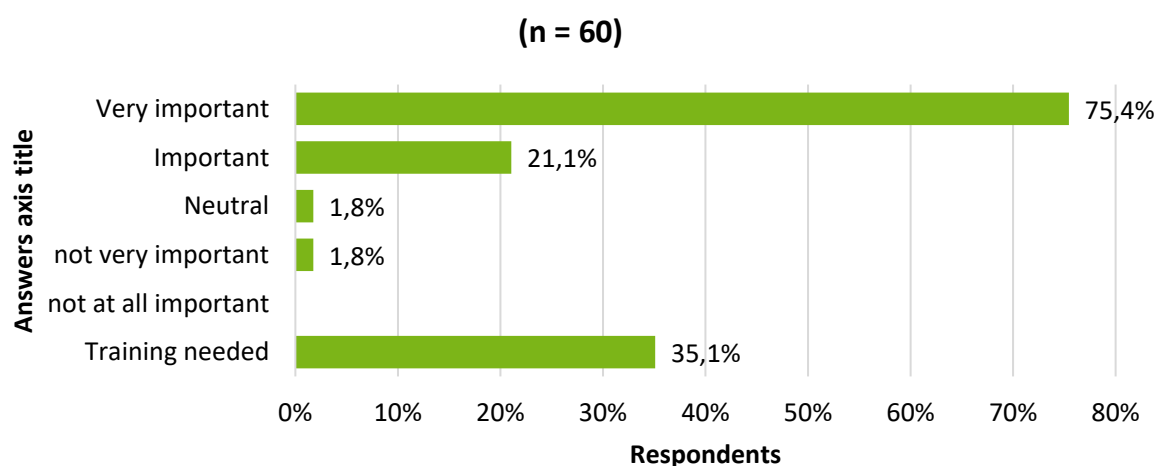


Figure 7: Results from Q7 Choose the right materials' combinations (profiles, glass, etc.)

In the question “Choose the right materials’ combinations (profiles, glass, etc.)” the vast majority replies that this is very important. The “very important” answer

together with the “important: yields more than 95%. In order to choose the right materials combination, some knowledge, skills and competences are needed, as a following section in this report will show.

The answers of the “Installing and uninstalling metal constructions, choose and use the most appropriate of various jointing techniques” was selected as either “Important” or “very important” for more than ca. 92%.

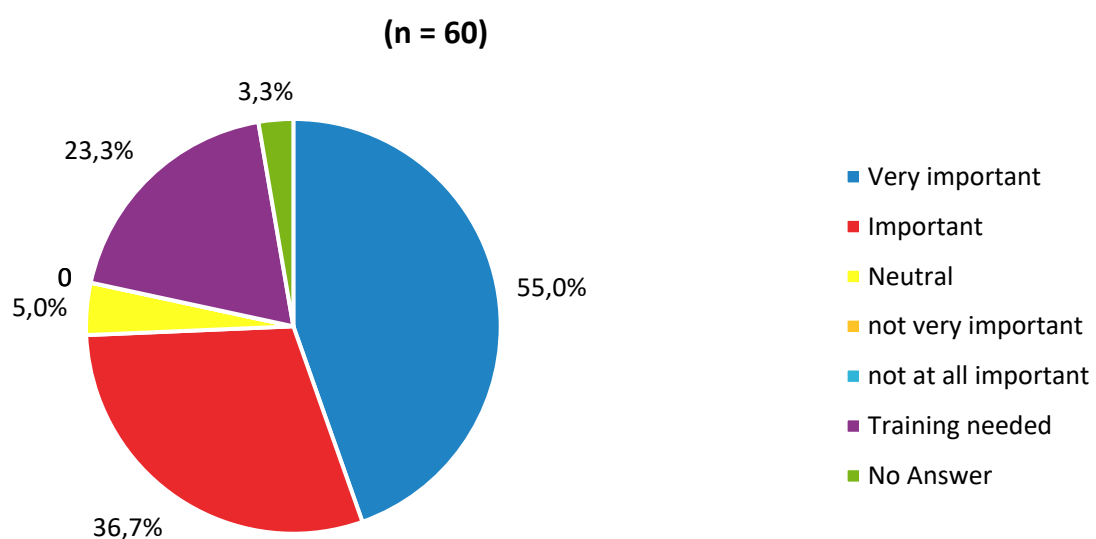


Figure 8: Results from Q8 Install and uninstall metal constructions, choose and use the most appropriate of various jointing techniques

Approximately the same result (ca. 93%) was also for the question “Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes”. An Aluminium and Metal Construction Technician is typically works following strictly the guidelines from the system designer, and therefore the respective manuals are being treated as master guidelines. This is one of the most significant differences from the pure metal sector technician.

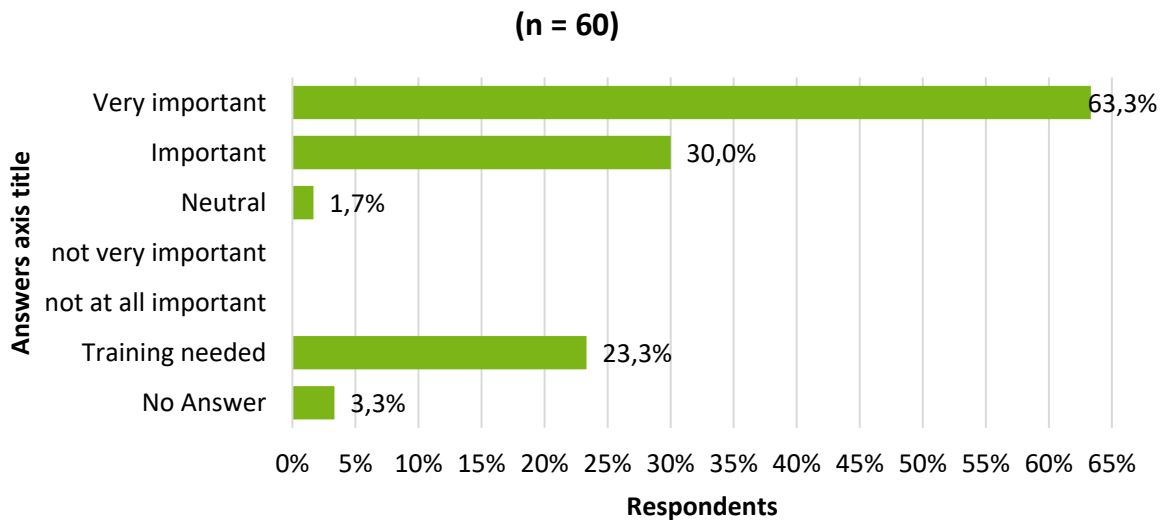


Figure 9: Results from Q9 Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes

Less important compared to the above, is the “Realization of workmanships on metal sheets”. However, the “Important” and “Very Important” yields more than 65%. Even though the Aluminium and Metal Construction Technician handles metals and performs workmanship on metals, these processes are typically different compared to the conventional workmanship needed for the pure mechanical sector. The workmanship on metal sheets for the Aluminium and Metal Construction Technician is limited to conventional cutting, drilling joining etc., following the guidelines from the system’s designer manual. It is therefore expected for the Aluminium and Metal Construction Technician to have this skill, but according to the results from this study these skills are quite different compared to the typical technician of the mechanical sector.

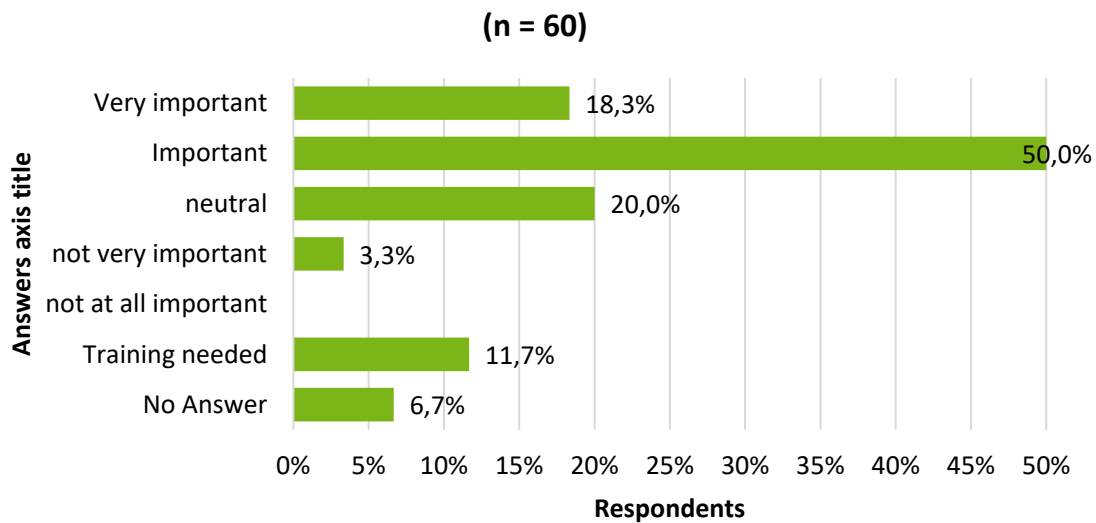


Figure 10: Results from Q10 Realization of workmanships on metal sheets

Comparable responses were also for the question “Set up workplaces at building sites”. This skill is very important for the Aluminium and Metal Construction Technician, since the typical process entails installing the constructions in the building site and therefore the this requires to setup workplaces on-site. However, these workplaces are typical small and with minor capabilities.

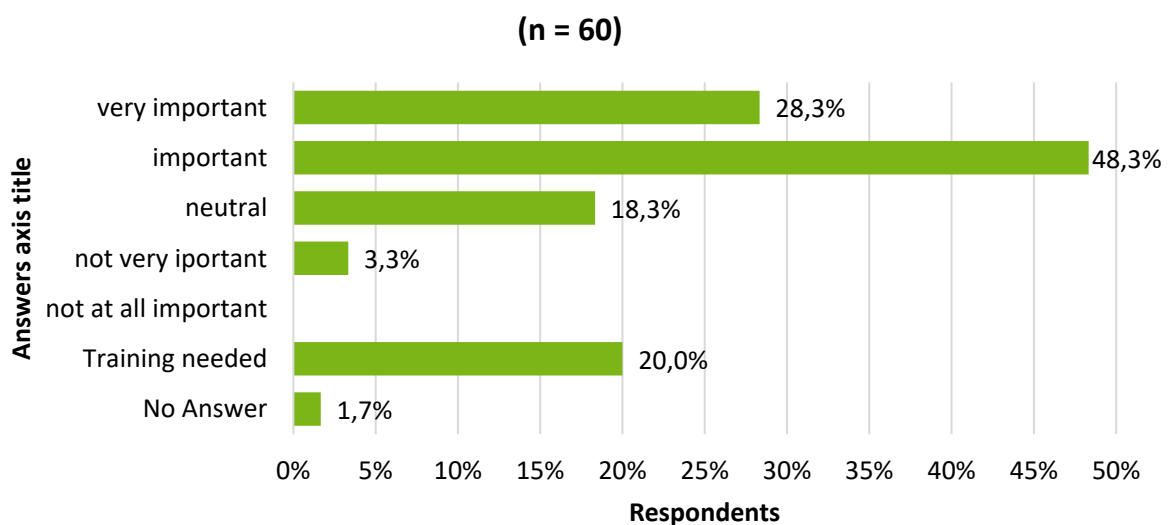


Figure 11: Results from Q11 Set up workplaces at building sites

Approximately 80-85% of the responses evaluated as “Important” or “Very Important” the “Cutting and welding of metal constructions for reinforcement points” (Q12), to “Carry out welding processes practicing different technical solutions” (Q13) and to “Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results” (Q14).

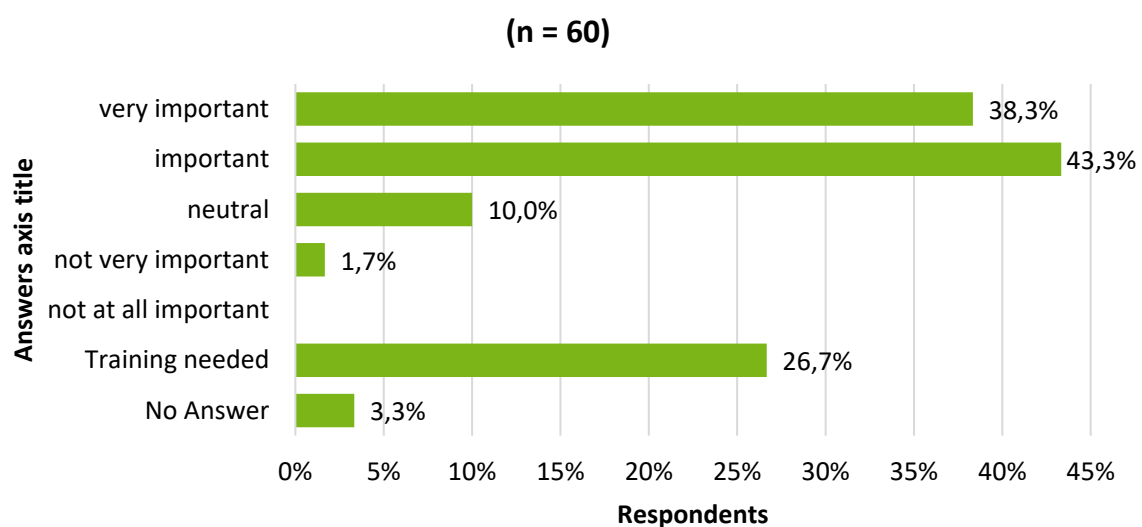


Figure 12: Results from Q12 Cutting & welding of metal constructions for reinforcement points

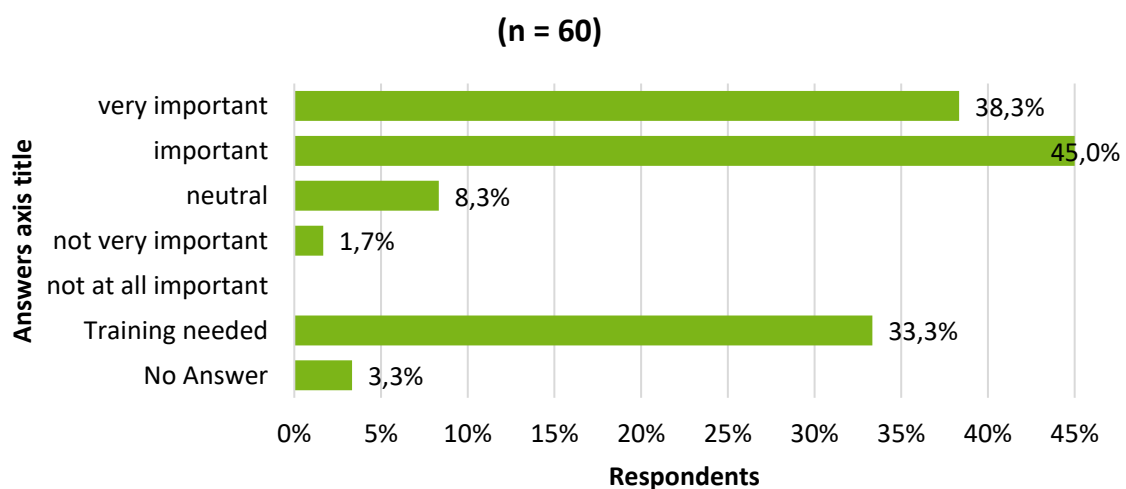


Figure 13: Results from Q13 Carry out welding processes practicing different technical solutions

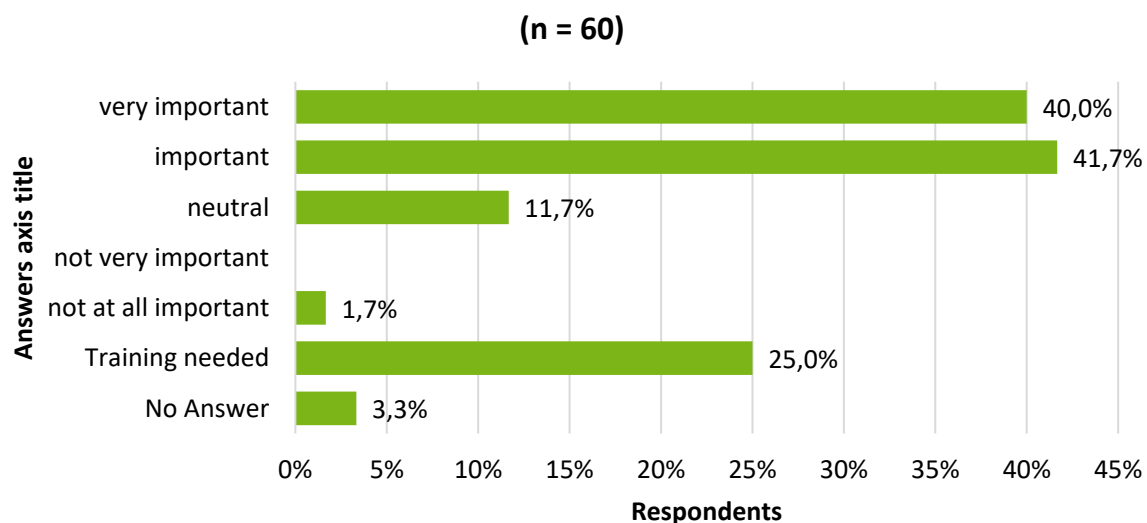


Figure 14: Results from Q14 Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components & document results

Table 2: Q15 Technical Skills in Metal Construction Going beyond to EQF Level 5
(Please fill in Skills you estimate important for higher qualification)

Answers	Respondents	Percent
Basic Knowledge of Statics and Load stress Dynamic load, Wind load Corrosion	1	20.0%
Processing procedure appropriate to the material used	1	20.0%
Practical knowledge of construction methods	1	20.0%
Reading technical drawing	1	20.0%
A technician chooses the right materials' combinations, install and uninstall metal constructions, chooses and use the most appropriate of various jointing techniques and recognizes and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes. A specialist worker takes care of the realization of workmanship on metal sheets, the cutting and welding of metal constructions for reinforcement points. He carries out welding processes practicing different technical solutions, dismantles and assembles components and sub-assemblies; check, monitors and remedies errors and malfunctions; carries out routine repairs to control systems and components and document results. A worksite technician sets up workplaces at building sites.	1	20.0%
Total	5	100.0%

The responses to the question Q15 Technical Skills in Metal Construction Going beyond to EQF Level 5 (Please fill in Skills you estimate important for higher qualification) are demonstrated below.

Regarding IT skills, and specifically to the question “Q17 Use IT systems, including in digitalized processes” and “Q18 Apply regulations relating to data protection and information security”, the responses are provided below.

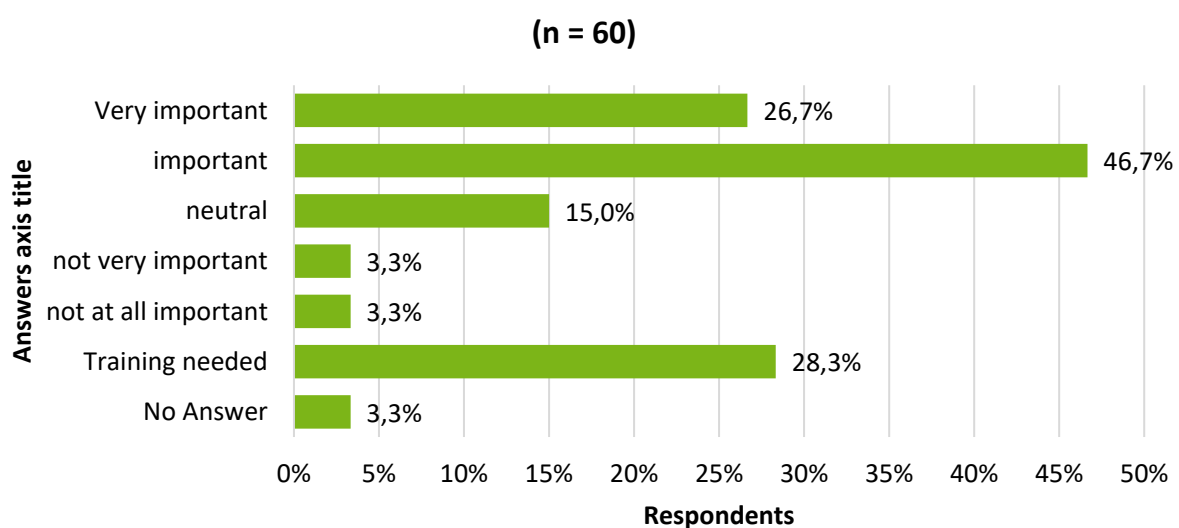


Figure 15: Results from Q17 Use IT systems, including in digitalized processes

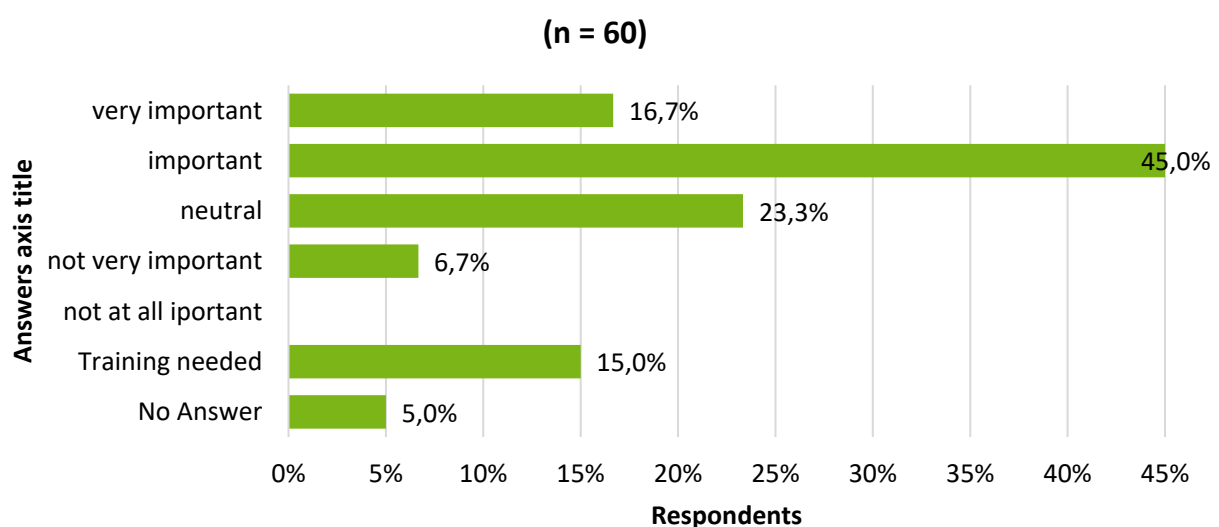


Figure 16: Results from Q18 Apply regulations relating to data protection and information security

The “Neutral” to “not at all important” responses for the question Q19 Handle software for calculating thermal properties, are given from the companies in the machining sector. This, in turn, is quite important for the building sector, since this will define if the construction is eligible for installation.

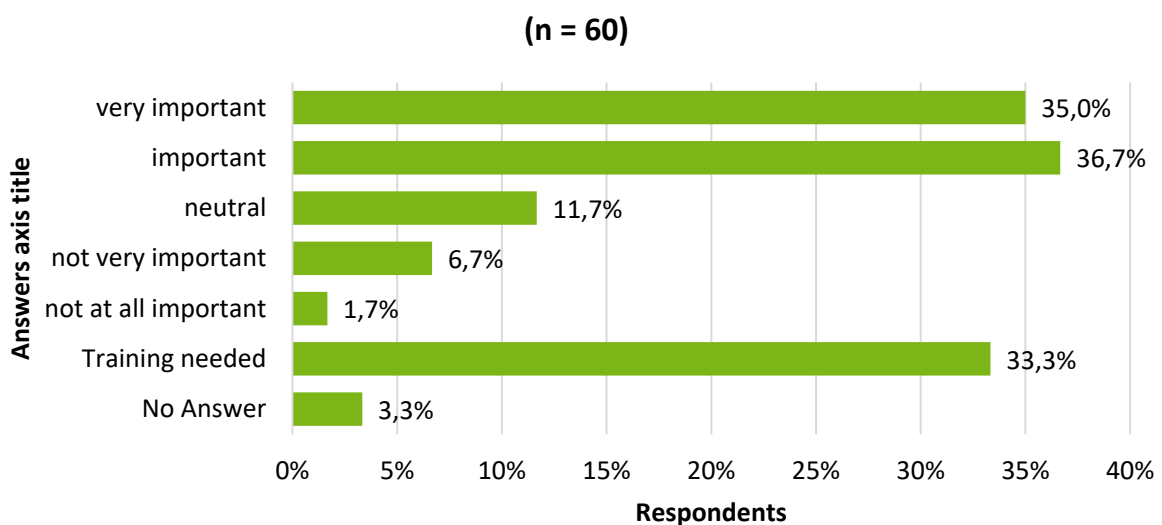


Figure 17: Results from Q19 Handle software for calculating thermal properties

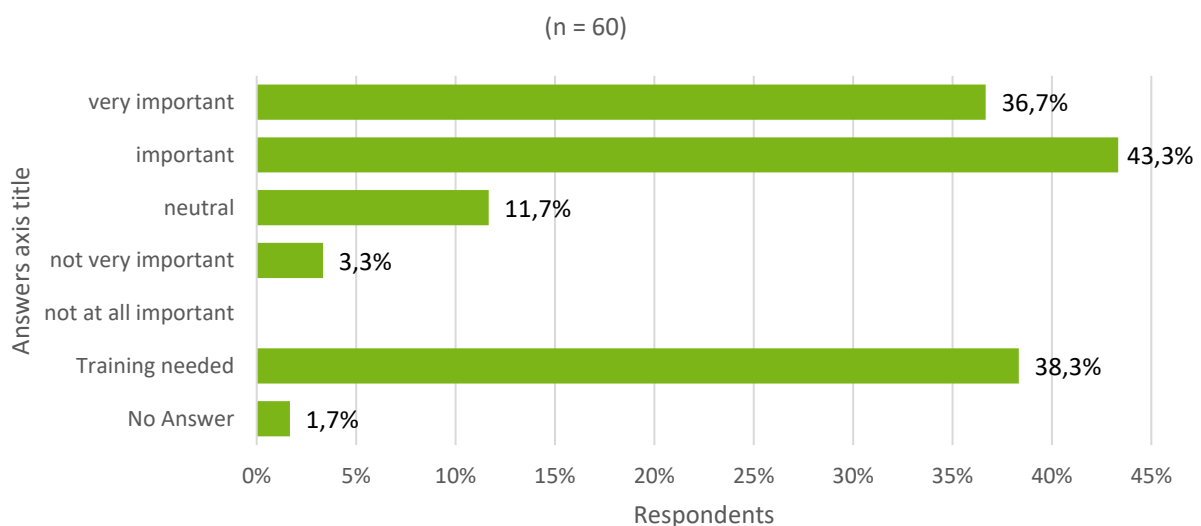


Figure 18: Results from Q20 Read, understand and apply CAD-produced and presented descriptions and work orders

More than 80% of the responses evaluated to “Read, understand and apply CAD-produced and presented descriptions and work orders” (Q20) as Important or Very important. Such blueprints are typically used in the Building sector and are the base over the discussions with the responsible engineer.

Regarding the “Understand and use 3D-Equipment for production of tools, parts etc.” (Q21) the responses are given below.

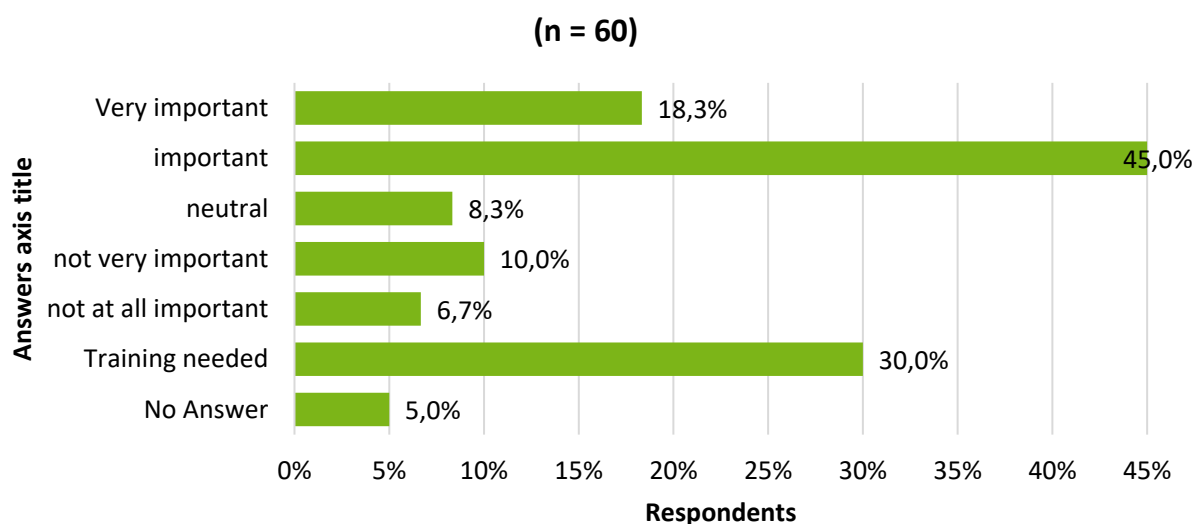


Figure 19: Results from Q21 Understand and use 3D-Equipment for production of tools, parts etc.

Non-prefilled answers regarding “Skills needed going beyond to EQF Level 5 (please fill in skills you estimate important for higher VET on level 5)” are summarized below.

Table 3: Answers given on Skills needed going beyond to EQF Level 5 (Q22).

Answers	Respondents	Percent
Calculation of density Planning of time and flow Disposition of material	1	33.3%
knowledge of production methods	1	33.3%
The technical department uses IT systems, including in digitalized processes. A technician applies regulations relating to data protection and information security, reads, understands and applies CAD-produced and presented descriptions and work orders. External resources handle software for calculating thermal properties	1	33.3%
Total	3	100.0%

Virtually half of the responses evaluated as Very important to “Understand and choose the most appropriate techno-economic energy-efficient solution” (Q24) and “Understand the requirements for energy saving in buildings through aluminum constructions” (Q25).

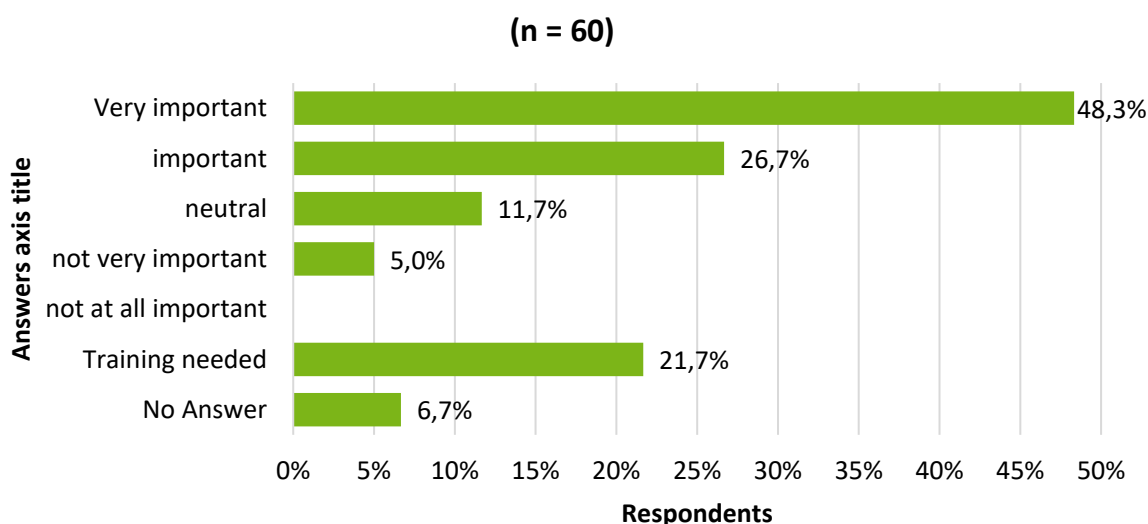


Figure 20: Results from Q24 Understand and choose the most appropriate techno-economic energy-efficient solution

Both of these skills relate not only to the quality of the final product but also to meeting the law and the legislation and making them eligible for installation and potential funding.

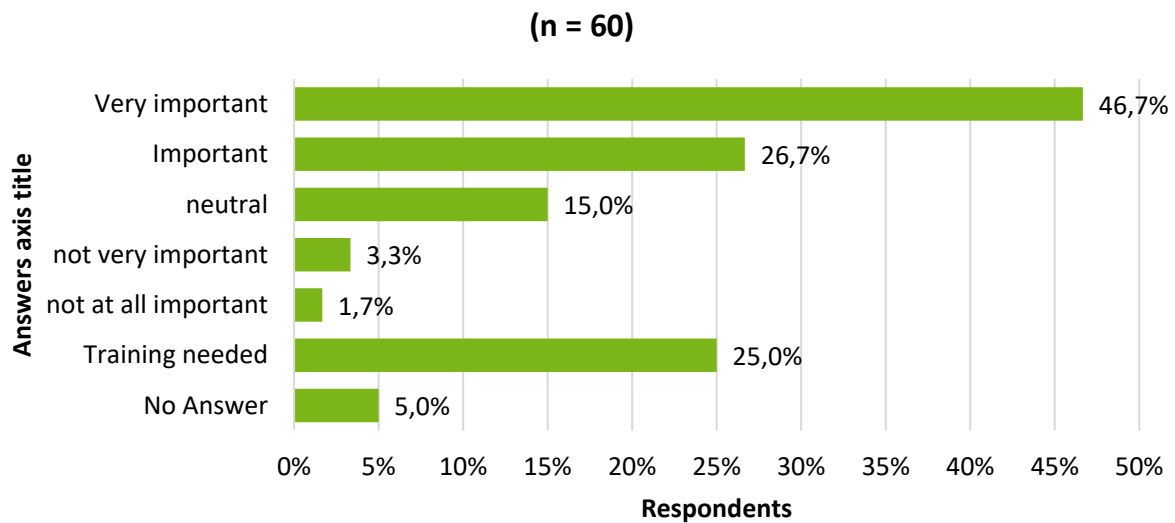


Figure 21: Results from Q25 Understand the requirements for energy saving in buildings through aluminum constructions

The results for the question Q26 “Calculate thermal properties (e.g. U value) for various construction products by using appropriate software tools”, Q27 “Assembly products in energy-efficient ways according to the assembly designer’s requirements” and Q28 “Identify critical check-points, pertinent to construction quality which can affect thermal energy losses” are illustrated below.

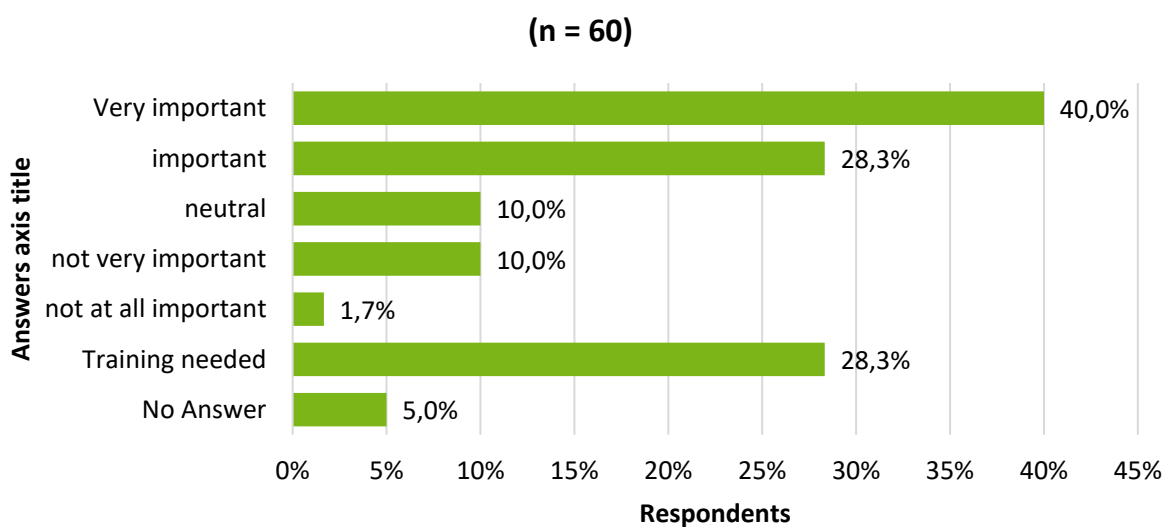


Figure 22: Results from Q26 Calculate thermal properties (e.g. U value) for various construction products by using appropriate software tools

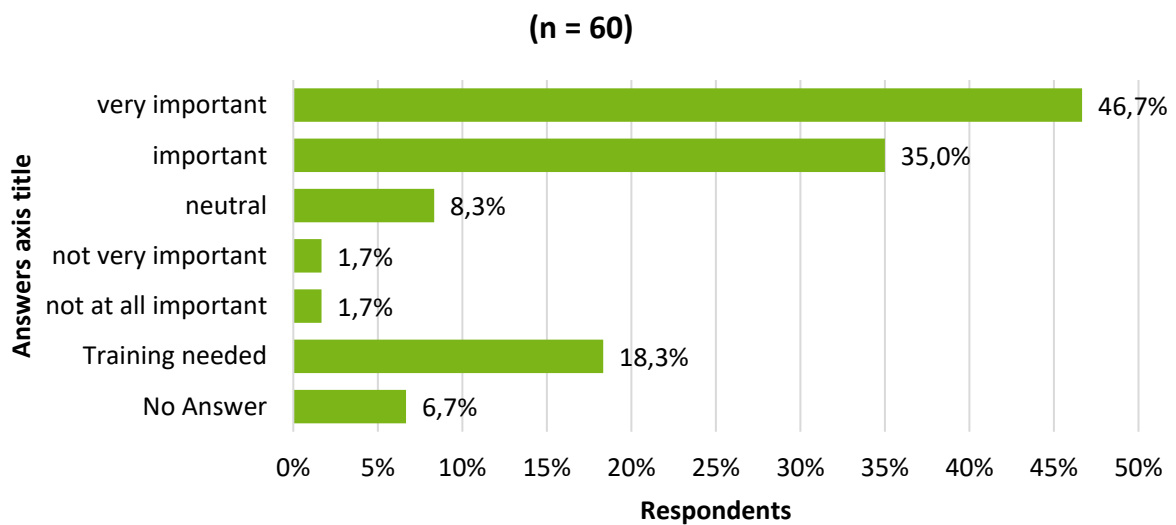


Figure 23: Results from Q27 Assembly products in energy-efficient ways according to the assembly designer's requirements

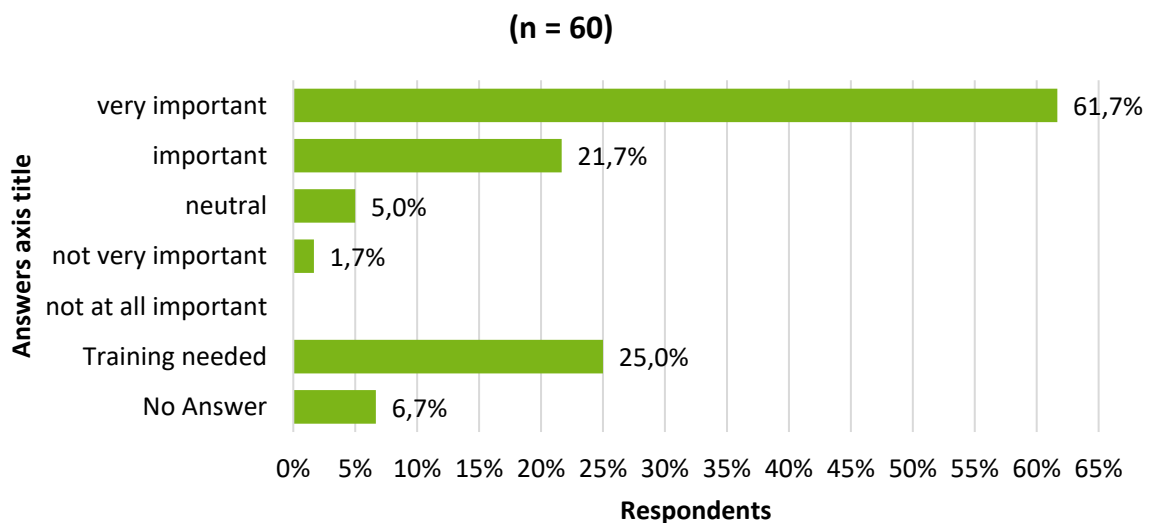


Figure 24: Results from Q28 Identify critical checkpoints, pertinent to construction quality which can affect thermal energy losses

Virtually the 80% of the responses evaluated the Understanding and calculation of the energy performance of products (energy labeling)" as Important or Very important.

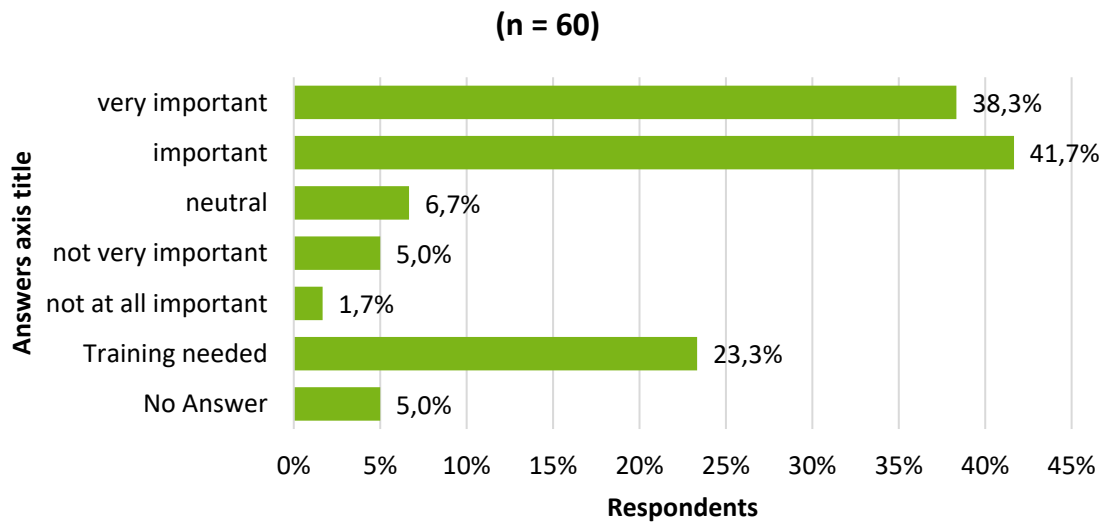


Figure 25: Results from Q29 Understand calculate the energy performance of products (energy labeling)

Responses to the question Q30 Understand the environmental performance of products (environmental product declaration) and Q31 Manage recyclable materials correctly are provided below.

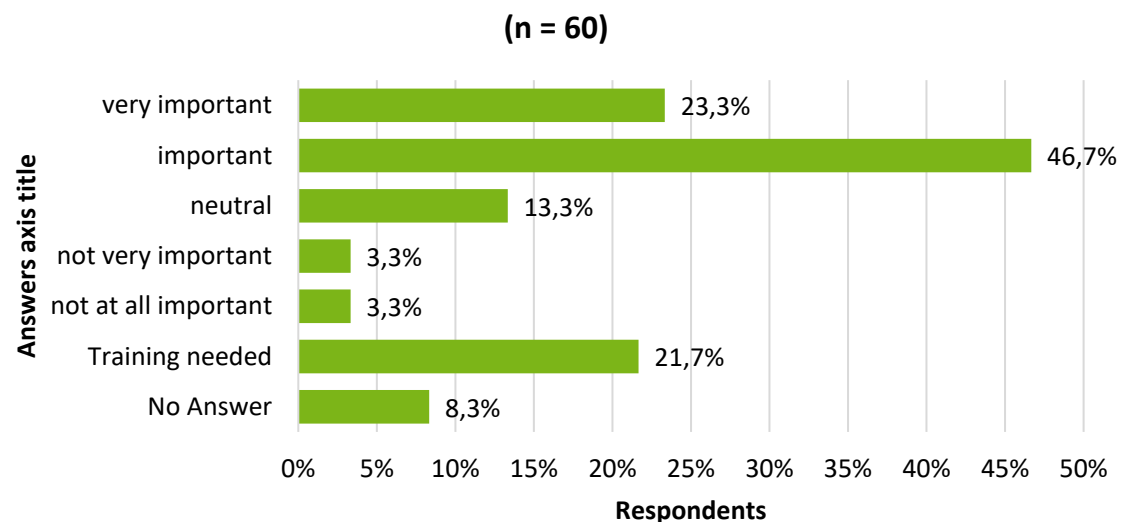


Figure 26: Results from Q30 Understand the environmental performance of products (environmental product declaration)

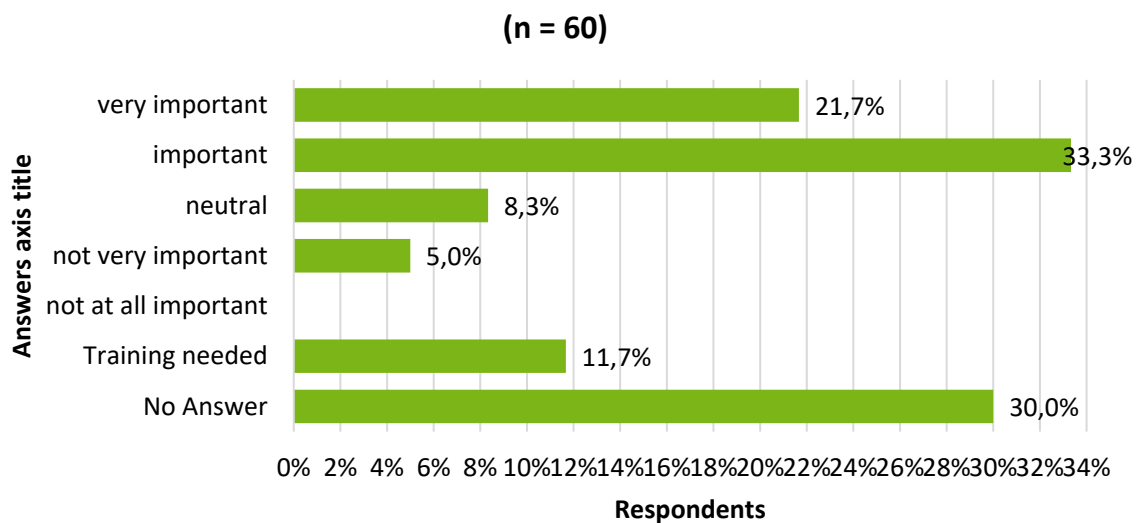


Figure 27: Results from Q31 Manage recyclable materials correctly

Table 4 Skills needed going beyond to EQF Level 5 (please fill in skills you estimate important for higher VET on level 5).

Answers	Respondents	Percent
Avoid waste Holistic view on processes	1	33.3%
knowledge of mechanical-qualitative materials behavior	1	33.3%
sales engineers understand and choose the most appropriate techno-economic & energy-efficient solution and understand the requirements for energy saving in buildings through aluminum constructions. technicians identify critical checkpoints, pertinent to construction quality which can affect thermal energy losses, understand & calculate the energy performance of products (energy labeling), understand the environmental performance of products	1	33.3%
Total	3	100.0%

The implementation of good working practices (working field, equipment, etc.) (Q34) yielded rather high importance of 95% (important and very important).

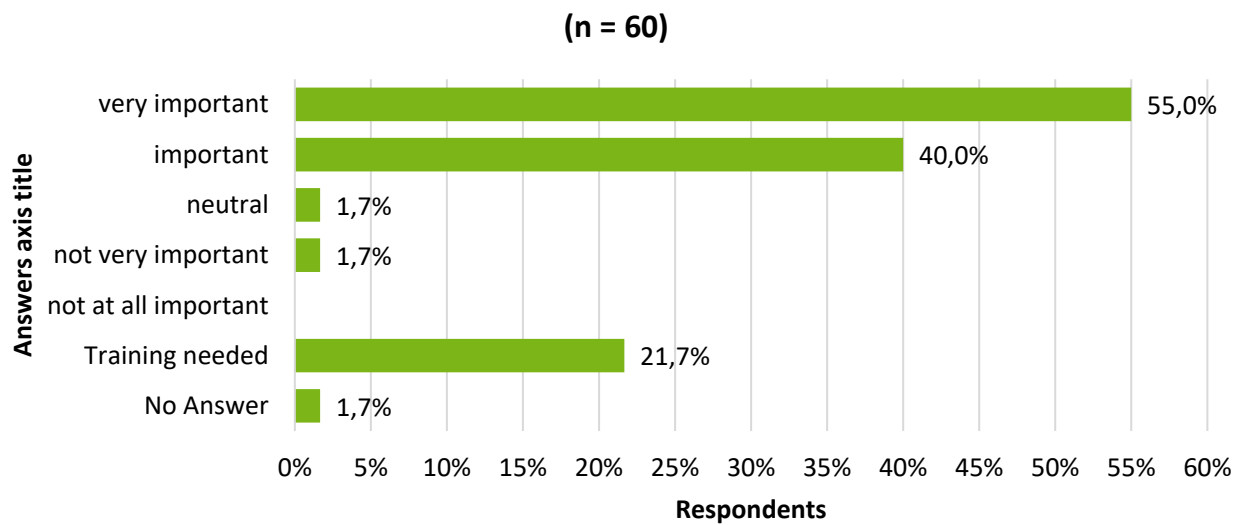


Figure 28: Results from Q34 Implement good working practices (working field, equipment, etc.)

Virtually 85% was also the sum of the important and Very important responses to the question Q35 Select testing devices and methods and apply the company's quality assurance system.

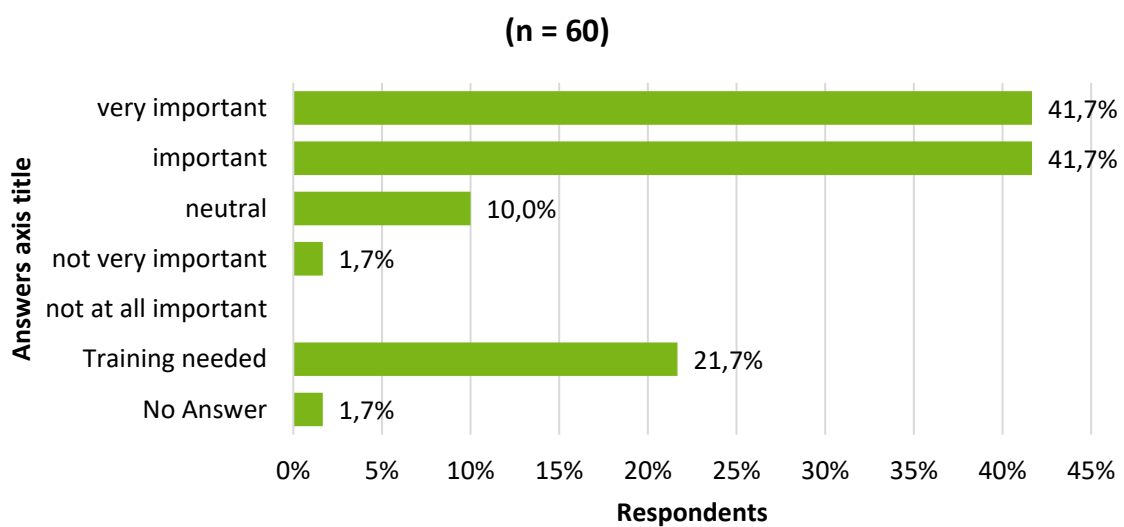


Figure 29: Results from Q35 Select testing devices and methods and apply the company's quality assurance system

Table 5: Skills needed going beyond to EQF Level 5 (please fill in skills you estimate important for higher VET on level 5)

Answers	Respondents	Percent
Induce and evaluate production plates	1	25.0%
Practical and productive knowledge	1	25.0%
Waste reduction culture continuous improvement mindset	1	25.0%
External figures Implement good working practices and select testing devices and methods and apply the company's quality assurance	1	25.0%
Total	4	100.0%

With regards to issues like CE marking, Regulations for Energy Saving in Buildings etc. the responses to the question Q38 Understand, organize and select the appropriate legal and regulatory requirements for each construction are given below.

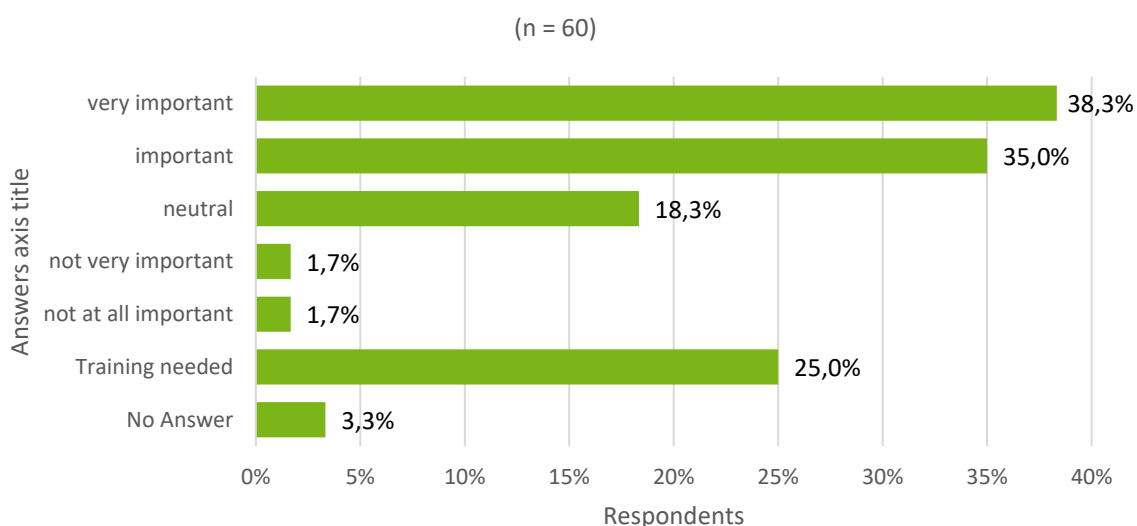


Figure 30: Results from Q38 Understand, organize and select the appropriate legal and regulatory requirements for each construction (CE marking, Regulations for Energy Saving in Buildings etc.)

Coordination actions and work in line with managers, with colleagues and with other work divisions(Q39) is at least important for more than 80% of the responses.

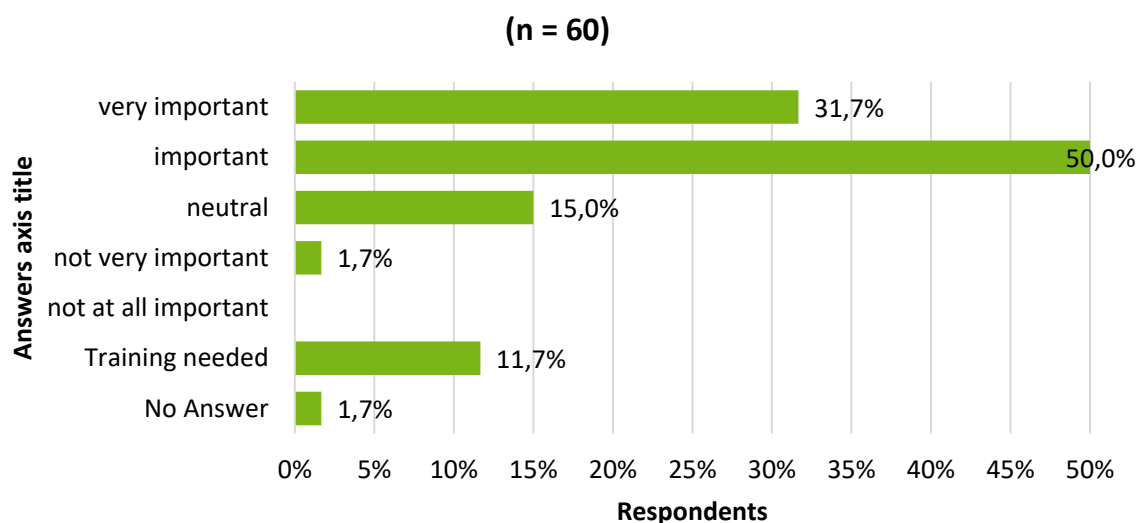


Figure 31: Results from Q39 Plan coordinate and agree work with line managers, with colleagues and with other work divisions

Soft skills such as “organize collaborations with external partners” (Q40) were evaluated as Important or Very Important from the 75% or the responders.

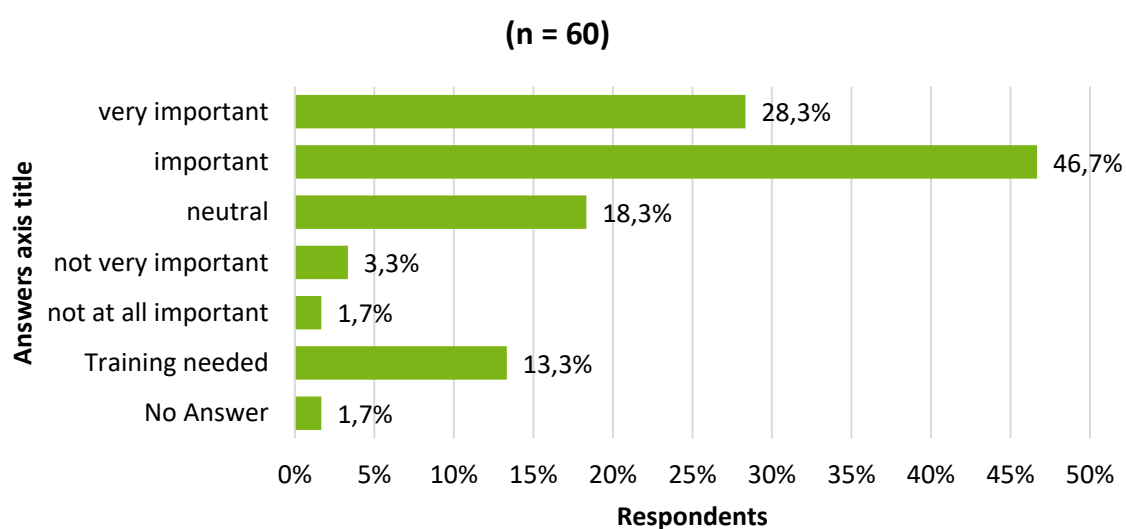


Figure 32: Results from Q40 Organize collaboration with external partners (specifications, times, costs, etc.)

Communication skills along with technical expertise needed to “Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer” (Q41) attracted significant attention since only 5% of the responses evaluated it as “Not very important” or “Not at all important”. It is a prerequisite for most of the quality systems in this sector, that the technician, before leaving the installation site to first explain the operating and maintenance instructions for the products installed. This entails a series of knowledges and skills to meet this, some of which are typically technical and some of which are horizontal/transversal/soft skills.

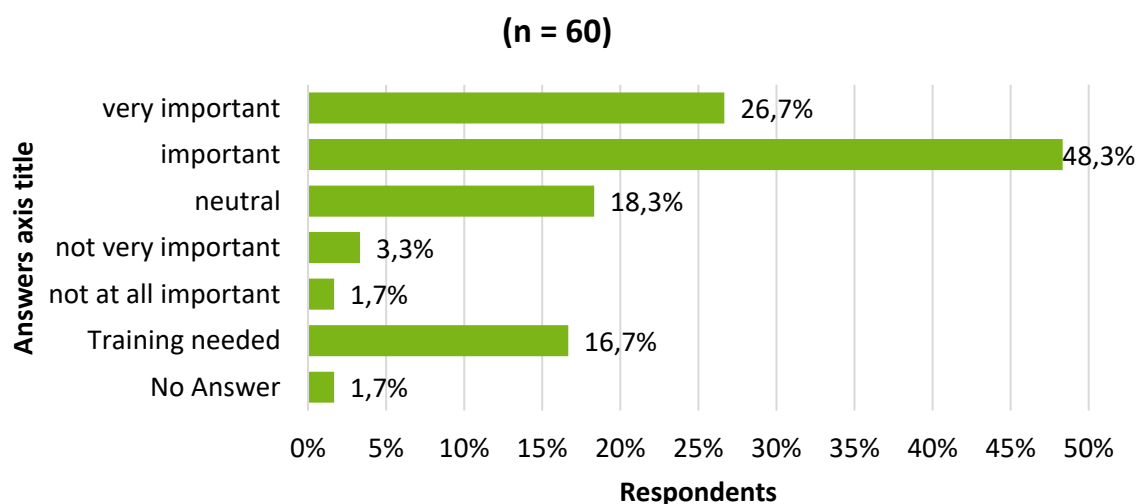


Figure 33: Results from Q41 Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer

Handling technical catalogs and profile specifications reached ca 80% as important or Very important. For all kind of companies this skill is important. To meet this skill a combination of technical and marketing expertise is prerequisite.

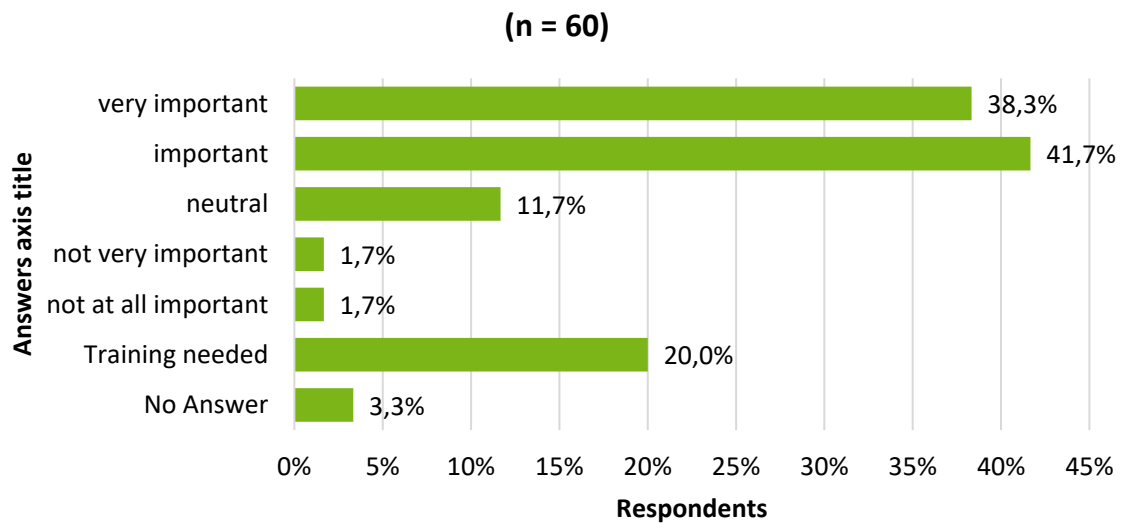


Figure 34: Results from Q42 Handle technical catalogs and profile specifications

The results to the question Q43 Handle the measuring equipment correctly, yielded at least important ca. 90%. This basic technical skill is directly linked with the quality performance of the final product.

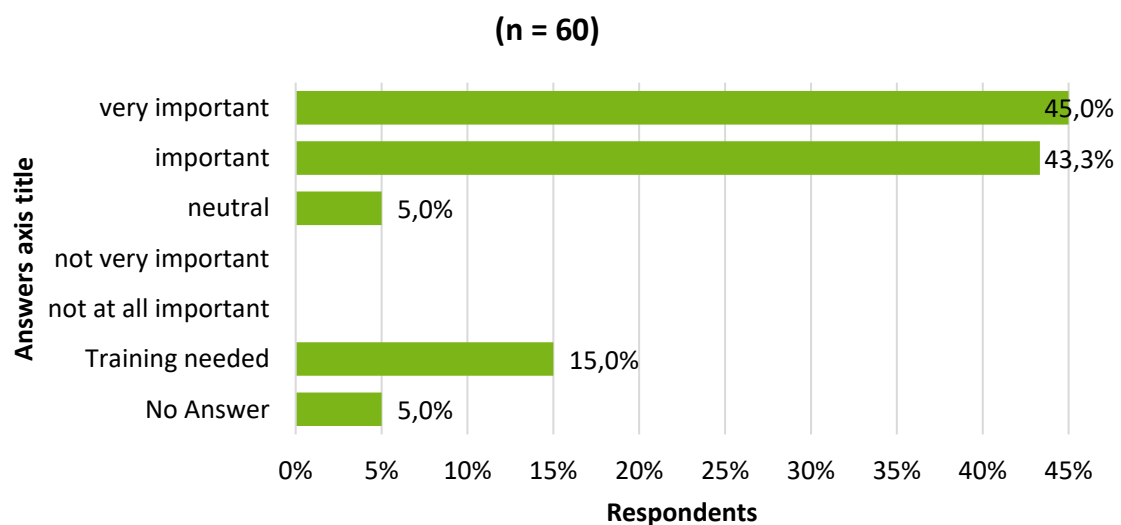


Figure 35: Results from Q43 Handle the measuring equipment correctly

Calculate dimensions from construction drawings (Q44), sketches reached ca 80% as important or Very important.

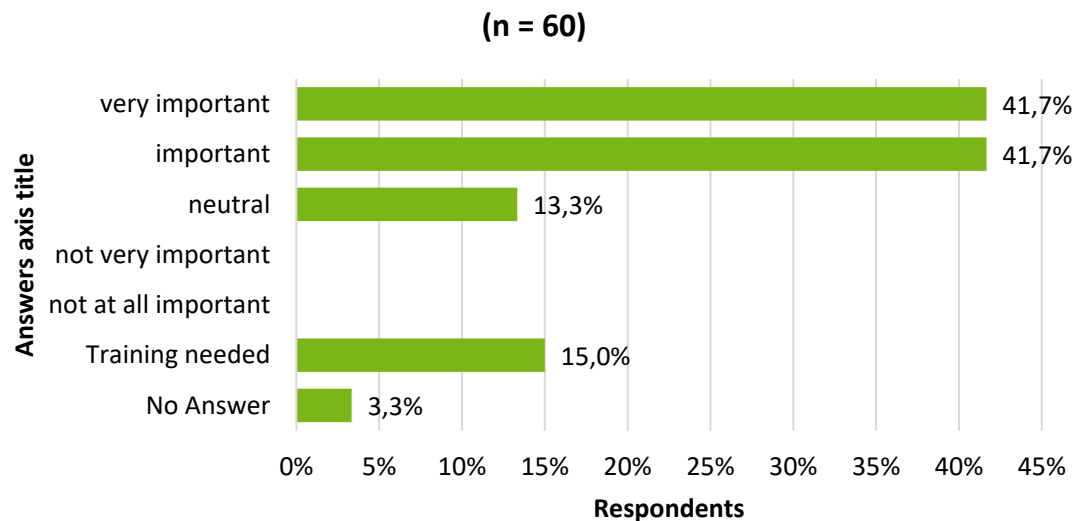


Figure 36: Results from Q44 Calculate dimensions from construction drawings, sketches

The results to the question Q45 Procure information, yielded at least important ca. 75%.

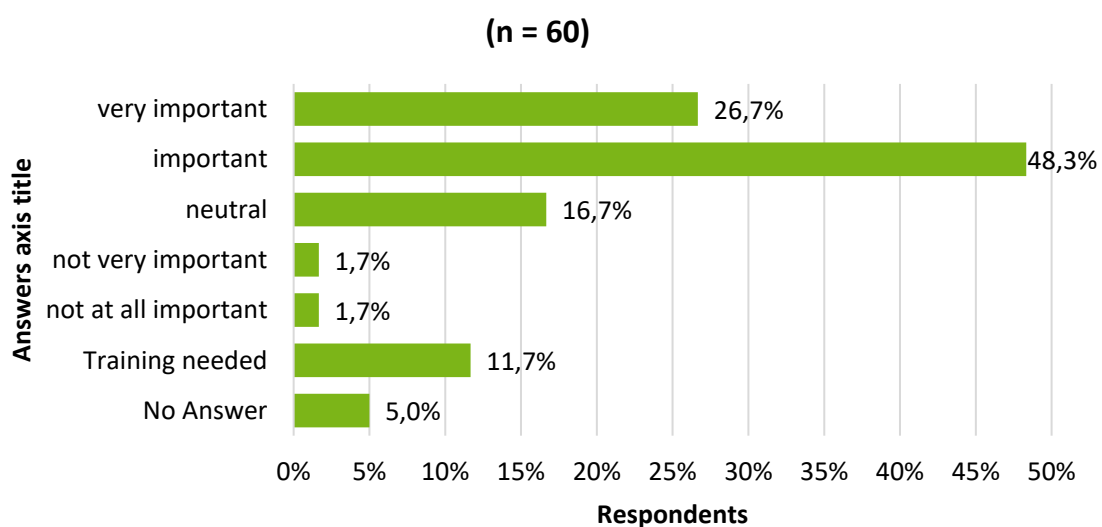


Figure 37: Results from Q45 Procure information

Table 6: Q46 Skills needed going beyond to EQF Level 5 (please fill in skills you estimate important for higher VET on level 5)

Answers	Respondents	Percent
Basic knowledge of air-conditioning technology	1	33.3%
Sharing knowledge	1	33.3%
Technicians understand, organize and select the appropriate legal and regulatory requirements for each construction, organize collaboration with external partners, explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer, handle technical catalogs and profile specifications, handle the measuring equipment correctly, calculate dimensions from construction drawings, sketches, procure information. the head of the Production Department plans, coordinates and agrees work with line managers, with colleagues and with other work divisions.	1	33.3%
Total	3	100.0%

More than 70% of the responders, expressed their interest on the results of this project and allowed for further information.

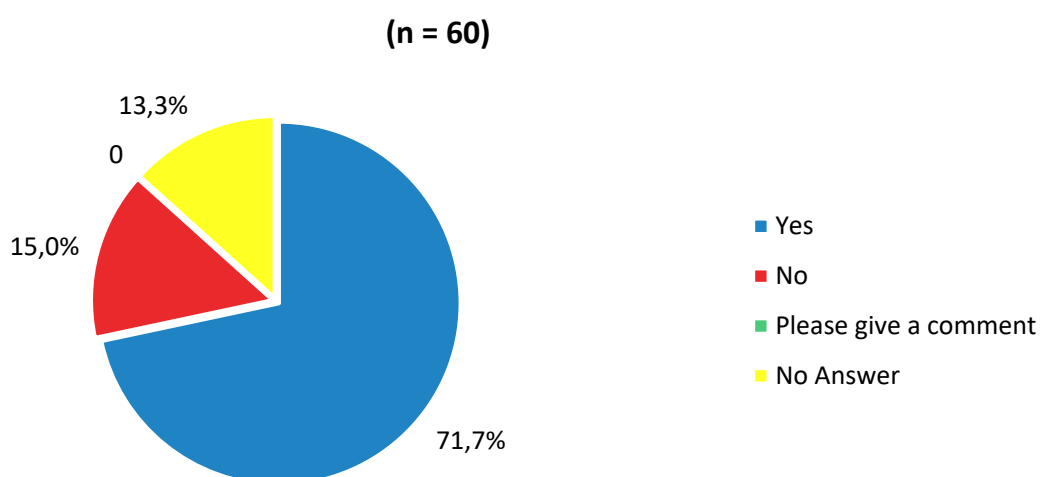


Figure 38: Results from Q48 Are you interested in the results of this project and do you allow us to send you further information to keep you up-to-date?

5.3 Analysis Conclusions

A series of useful conclusions may be drawn out of this questionnaire.

The first conclusion is based on the answers of Q5 “Q5 You agree that there is a need for such a joint higher VET course?”. The answer Yes received 90%, which is something that leads us to the conclusion that there is an actual need for such a joint higher VET course.

Skills that have been evaluated as at least important (sum of “Important” and “Very Important”), from most of the individuals (percentage higher than 80%) are listed below.

Table 7: Skills evaluated as at least important, from most of the individuals attaining a minimum percentage of 80%

	Skills	% Important and Very important
Q7	Choose the right materials’ combinations (profiles, glass, etc.)	96.5
Q34	Implement good working practices (working field, equipment, etc.)	95
Q9	Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes	93.3
Q8	Install and uninstall metal constructions, choose and use the most appropriate of various jointing techniques	91.7
Q43	Handle the measuring equipment correctly	88.3
Q28	Identify critical checkpoints, pertinent to construction quality which can affect thermal energy losses	83.4
Q35	Select testing devices and methods and apply the company’s quality assurance system	83.4
Q44	Calculate dimensions from construction drawings, sketches	83.4
Q13	Carry out welding processes practicing different technical solutions	83.3
Q14	Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results	81.7
Q27	Assembly products in energy-efficient ways according to the assembly designer’s requirements	81.7
Q39	Plan coordinate and agree work with line managers, with colleagues and with other work divisions	81.7

Q12	Cutting and welding of metal constructions for reinforcement points	81.6
Q20	Read, understand and apply CAD-produced and presented descriptions and work orders	80
Q29	Understand calculate the energy performance of products (energy labeling)	80
Q42	Handle technical catalogs and profile specifications	80

In most cases “Training needed” yielded percentages between 20-40%. This reflects the necessity of hands-on training in the envisioned joint course.

5.4 The List of Joint Skills

The following Joint Skills List is the final deliverable of WP2 and will be used to develop the Professional Profile in WP3.

The skill list emerged after the previous data analysis of the questionnaires distributed in Italy, Germany and Greece.

The results of the data analysis were used to enrich the existing skills list and to produce the joint skills list. Based on the results from each question one or more specific joint skills were extracted and additionally, suggestions for new skills that did not exist in the questionnaires were considered. The suggestions came from people that filled in the questionnaires, as well as during the 2nd Transnational Meeting and 1st Thematic Workshop in Germany.

Below the conceptual process for the extraction of the list of joint skills is explicitly described.

More specifically, hereafter we correlate point by point the answers from the questionnaire with the list of joint skill suggested:

In order to meet the skill from Question 7: Choose the right materials’ combinations (profiles, glass, etc.), which received 96.5% as at least important, a set of different skills need to co-exist. To extract theses skills the following concept has been encountered:

In order to *choose the right combination of materials (profiles glass, etc.)*, the technician shall first *understand the legal and regulatory requirements for aluminum constructions (CE marking, Regulations for Energy Saving in Buildings etc.)*, *identify critical check-points, pertinent to construction quality which can affect thermal energy losses* and *understand and choose the most appropriate techno-economic & energy-efficient solution* and *understand the requirements for energy saving in buildings through aluminum constructions*. Having a deep knowledge and understanding on these requirements will dictate the right combination in collaboration with the responsible engineer. In this collaboration both shall discuss and agree over a *technical drawing*, which entails for the technician to know *reading of a technical drawing and to calculate dimensions from construction drawings, sketches*. In several cases the choice of the right materials is subject to peculiarities of the constructions, regarding *Statics and Load stresses, Dynamic loads, Wind loads, and Corrosion problems* for which he/she will need to have some basic knowledge for. The peculiarities of the construction are combined not only to the right choice of the materials but also to *special construction methods*, for which he/she will need to *organize and apply the appropriate measurement and construction techniques*.

In order to meet the skill from Question 34: Implement good working practices (working field, equipment, etc.), which received 95% as at least important, a set of different skills need to co-exist. To extract these skills the following concept has been encountered:

In order *implement good working practices (working field, equipment, etc.)*, the technician shall first be capable to gather all necessary *procure information*, to ensure that he/she has all the hardware and parts available on-time. Then the total series of the production line shall be known. From the *realization of workmanships on metal sheets, the Knowledge of mechanical-qualitative materials behavior, to practical productive methods*. Again, *reading technical drawing and calculate dimensions from construction drawings, sketches*, is a prerequisite. Throughout the processing procedures of metals *basic Knowledge*

of Statics and Load stress, Dynamic load, Wind load, Corrosion problems, handle equipment properly (machine tools, presses, pantographs, hand tools) and handle the measuring equipment correctly is needed. Since in most cases for the aluminum constructions the system designer's technical instructions are followed, he/she shall be capable to recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes and handle technical manuals for the manufacture of aluminum systems. In many cases some joining shall be done and therefore the technician shall make separable and inseparable connections, carry out welding processes practicing different technical solutions. The final products shall be surface treated and protected shall undergo quality control, and therefore he/she shall be capable to implement the appropriate measurement techniques for quality control. Finally, good working practices necessitate also apply good practices for raw materials and final products storage. For maintenance working practices the technician shall measure and test mechanical and physical values, install and uninstall metal constructions and use various jointing techniques, manufacture parts, assemblies, and metal constructions from sheets, tubes or profiles by means of manual and mechanical production methods and create auxiliary structures, devices, templates and flat patterns. In all cases he/she shall be capable to manufacture workpieces and components using various manual and machine production processes, secure loads, transport components and sub-assemblies and use lifting gear, produce components and construction elements and assemble and dismantle metal and steel constructions and plan and control work processes, check, protocol and evaluate work results. On top of that good working practices entails management recyclable materials correctly, implement holistic view on processes. The technician shall secure a continuous improvement mindset.

In order to meet the skill from Question 9: Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes, which received 93.3% as at least important, a set of

different skills need to co-exist. To extract these skills the following concept has been encountered:

First the technical shall *Understand the legal and regulatory requirements for aluminum constructions (CE marking, Regulations for Energy Saving in Buildings etc.)* and have *practical and productive knowledge*. He/she shall *understand and choose the most appropriate techno-economic & energy-efficient solution and the requirements for energy saving in buildings through aluminum constructions*. To know and target the maximum energy outcomes the technician shall be capable to *calculate thermal properties (e.g. U value) for various construction products by using appropriate software tools*, for the various combinations. The energy saving requirements for near to Zero Energy Buildings (nZEB) are stricter and shall be followed whenever required.

In order to meet the skill from Question 8: Install and uninstall metal constructions, choose and use the most appropriate of various jointing techniques, which received 91.7% as at least important, a set of different skills need to co-exist. To extract these skills the following concept has been encountered:

The *realization of workmanships on metal sheets* is of prime importance during installation and uninstallation of the metal constructions. Basic *knowledge of mechanical-qualitative materials behavior* is needed, and *practical knowledge of construction methods* shall be applied. *Identification, cut and steel shaping for reinforcement points, Positioning and assembling of steelwork for reinforcement points, Cutting and welding of steel constructions for reinforcement points, carrying out manual metal arc (MMA) welding with coated electrode, carrying out metal arc welding in Metal Inert Gas (MIG) or Metal Active Gas (MAG), carrying out manual metal arc (MMA) welding with Tungsten Inert Gas procedure (TIG), and Welding of metal materials with flame processes (i.e. oxy-acetylene welding, brazing)* are typical prerequisites to meet this skill.

Based on the analysis described above and the corollary skills for each case the list was formed. The list of joint skills was significantly enriched especially in the field of green skills; these skills are explicitly listed in the pertaining section.

Several transversal skills were also adopted from various technical-related list of joint skills found in literature.

In the next sections the list of joint skills has been categorized in *Theoretical Skills*, *Practical Skills*, *Green Skills* and *Transversal Skills*.

5.4.1 Theoretical Skills

- Understand the legal and regulatory requirements for aluminum constructions (CE marking, Regulations for Energy Saving in Buildings etc.)
- Organize and select the appropriate legal and regulatory requirements for each construction
- Procure information
- Realization of workmanships on metal sheets
- Knowledge of mechanical-qualitative materials behavior
- Practical and productive knowledge
- Knowledge of production methods
- Reading of technical drawing
- Basic Knowledge of Statics and Load stress, Dynamic load, Wind load, Corrosion problems
- Processing procedure appropriate to the material used
- Practical knowledge of construction methods
- Understand basic circular economy aspects
- Understand basic corporate finances

5.4.2 Practical Skills

- Organize and apply the appropriate measurement and construction techniques
- Choose the right combinations of materials (profiles, glass, etc.)
- Recognize and apply the requirements of the system designer's technical manuals when assembling frames, in order to achieve maximum energy outcomes
- Recognize and apply the requirements of technical guidelines during product installation, in order to achieve maximum energy outcomes
- Handle equipment properly (machine tools, presses, pantographs, hand tools)
- Handle the measuring equipment correctly
- Calculate dimensions from construction drawings, sketches
- Handle welding machines and hand tools
- Implement the appropriate measurement techniques for quality control
- Apply good practices for raw materials and final products storage
- Handle technical manuals for the manufacture of aluminum systems
- Measure and test mechanical and physical values
- Make separable and inseparable connections
- Manufacture work pieces and components using various manual and machine production processes
- Treat and protect surfaces
- Secure loads, transport components and sub-assemblies and use lifting gear
- Produce components and construction elements and assemble and dismantle metal and steel constructions
- Plan and control work processes, check, protocol and evaluate work results
- Maintain metal and steel constructions
- Carry out welding processes practicing different technical solutions

- Dismantle and assemble components and sub-assemblies; check, monitor and remedy errors and malfunctions; carry out routine repairs to control systems and components and document results
- Apply standards and guidelines to ensure product quality and continuous improvement of work processes in the company
- Manufacture parts, assemblies, and metal constructions from sheets, tubes or profiles by means of manual and mechanical production methods
- Carry out welding processes, taking work safety and environmental protection into account
- Install and uninstall metal constructions and use various jointing techniques
- Create auxiliary structures, devices, templates and flat patterns
- Select testing devices and methods and apply the company's quality assurance system
- Carry out required maintenance work on systems, machines and tools
- Identification, cut and steel shaping for reinforcement points
- Positioning and assembling of steelwork for reinforcement points
- Cutting and welding of steel constructions for reinforcement points
- Carrying out manual metal arc (MMA) welding with coated electrode
- Carrying out metal arc welding in Metal Inert Gas (MIG) or Metal Active Gas (MAG)
- Carrying out manual metal arc (MMA) welding with Tungsten Inert Gas procedure (TIG)
- Welding of metal materials with flame processes (i.e. oxy-acetylene welding, brazing)
- Assembling welded structures of metal carpentry
- Induce and evaluate production plates

5.4.3 Green Skills

- Understand and choose the most appropriate techno-economic & energy-efficient solution
- Understand the requirements for energy saving in buildings through aluminum constructions
- Manage the recyclable materials correctly
- Calculate thermal properties (e.g. U value) for various construction products by using appropriate software tools
- Assemble products in energy-efficient ways according to the assembly designer's requirements
- Identify critical checkpoints, pertinent to construction quality which can affect thermal energy losses
- Understand & calculate the energy performance of products (energy labeling)
- Understand the environmental performance of products (environmental product declaration)
- Implement waste reduction culture
- Implement holistic view on processes
- Understand and implement Near Zero

5.4.4 Transversal Skills

- Implement good working practices (working field, equipment, etc.)
- Implement good working practices (suitable vehicle, appropriate means of support, customer loyalty etc.)
- Explain the operating and maintenance instructions for the products, the rules of the warranty and its obligations as a manufacturer
- Handle software for calculating thermal properties
- Handle software to calculate constructions cost
- Implement health and safety rules at work

- Explain the information contained in the Declaration of Performance and CE products Marking
- Organize the file of each completed project
- Carry out work assignments autonomously and work as part of a team according due consideration to the relevant regulations and safety provisions and on the basis of technical documentation and work orders
- Plan coordinate and agree work with line managers, with colleagues and with other work divisions using technical terminology
- Document work and initiate quality assurances measures and measures for health and safety at work and environmental protection
- Set up workplaces at building sites
- Use IT systems, including in digitalized processes
- Apply regulations relating to data protection and information security
- Being able to organize the steel workings for reinforcement points
- Read, understand and apply CAD-produced and presented descriptions and work orders
- Understand and use 3D-Equipment for production of tools, parts etc.
- Organize collaboration with external partners (specifications, times, costs, etc.)
- Sharing knowledge
- Continuous improvement mindset
- Planning of time
- Implement logistics and warehouse good practices

5.5 Conclusions

Basis for this list of joint skills was deliverable 2.1.1, the list of existing skills. This list was significantly enriched especially in the field of **green skills** and other **future oriented skills**:

Green skills deal with energy saving, energy efficiency and energy consumption up to ambitious goals as “Understand near Zero Energy Building techniques”. They also go about correct “management of recyclable materials” up to “establishing a waste reduction culture”.

Future oriented skills touch practical skills as well as theoretical as also especially transversal skills. Mostly they aim on digitization of processes and activities. They require good knowledge and handling of digital equipment and automation, but also planning and programming of workflow and tools. Examples are skills like “handle digitalized processes” or “use 3D Equipment”.

Leading to Level 5- EQF, there are specially defined transversal skills such as the “Implementing”-skills, the capability to “carry out assignments autonomously”, “organize collaboration with external partners”, to foster “Continuous improvement mindset”, and also theoretical skills as “Understand basic circular economy aspects” and “Understand basic corporate finances”.



After
SKILLS
What

6 WP2| Final Remarks – Connection with other WP's

The outcomes of METVET's WP2 is crucial for the continuation of the METVET Project since these will be used in both METVET WP3 "Creation of Professional Profile" and in METVET WP4 "Creation of Curriculum and Syllabus, Qualification standard, evaluation and certification". In this WP the list of existing skills was first identified. Based on the analysis presented above it became clear that there is a gap between the existing list of skills with the current market demands in order to meet the EU energy-related objectives. This gap is filled with the list of joint skills that was identified in WP2, in which current skills were updated to reach EQF level 5, as well as new skills were introduced. As described in this report new green skills were also introduced with which the overall energy efficiency of the products from the Aluminium and Metal Construction sector was improved. With these green skills the processes from the construction phase, to the installation phase will become energy efficient. Moreover, these green skills support the energy efficiency enhancement throughout the life cycle of the products, up to the point of usage, maintenance, uninstallation, disassembly and up to the end-of-life.

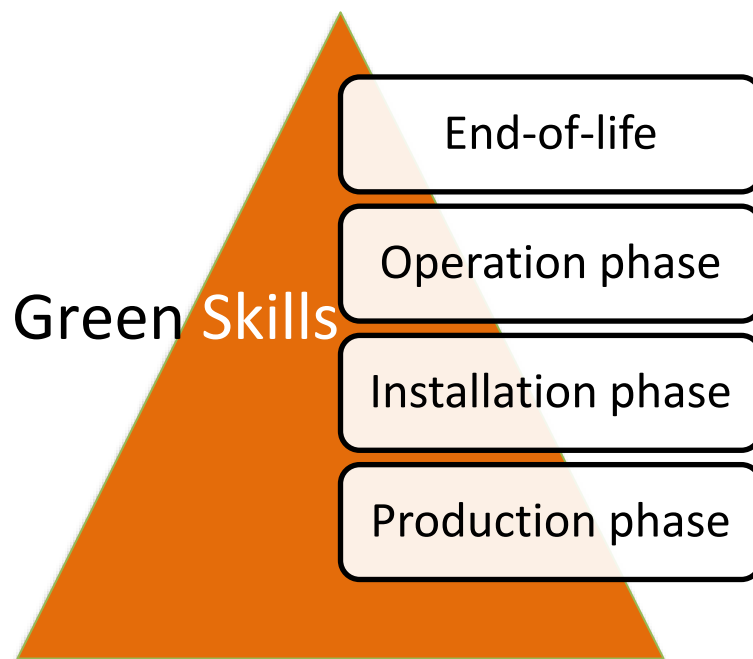


Figure 39: Green skills support the Aluminium and Metal Constructions from the production phase to the end-of-life.

An overview of the process with which the results of METVET WP2 are being used in METVET WP3 “Creation of Professional Profile” and in METVET WP4 “Creation of Curriculum and Syllabus, Qualification standard, evaluation and certification” are illustrated below.

6.1 Exploitation of WP2 results in WP3 “Creation of Professional Profile”

The list of joint skills produced in METVET WP2, will enable to create a specialized joint qualifications (professional) profile for Aluminium & Metal Constructions Technicians on EQF Level 5, in which the qualification profile will meet the real market needs and consequently to support the development of the pertaining educative prerequisites.

One of the main objectives of the qualification (professional) profile is to explicitly provide the Knowledge, Skills and Competences for this occupation.

In the Figure below we illustrate how the outcomes of METVET WP2 will interfere to METVET WP3 results, namely how the list of joint skills that has been produced in this WP will provide feed to the development of qualification (professional) profile. This skills in turn have been used to identify the respective knowledges and competences as will be described in the Qualification (Professional) Profile.

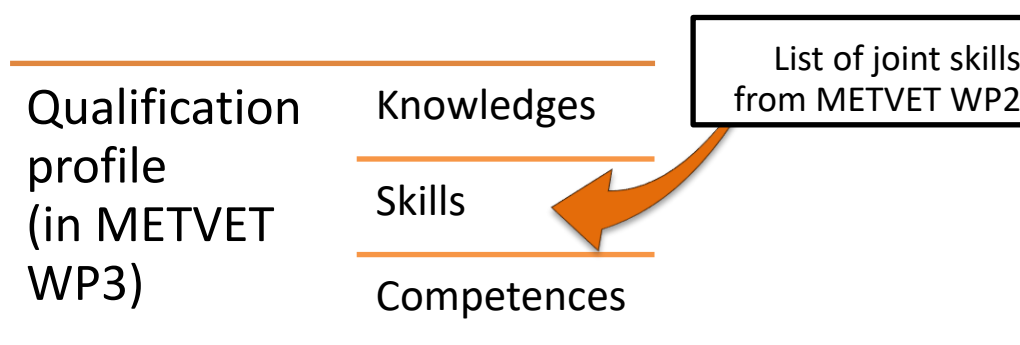


Figure 40: The skills that are reported in the Qualification Profile have been based on the results from the analysis in the METVET WP2.

6.2 Exploitation of WP2 results in WP4 “Creation of Curriculum and Syllabus, Qualification standard, evaluation and certification”

The qualification (or professional) profile is going to be used as a base for establishing a common Curriculum among the participating countries for Aluminium & Metal Constructions Technicians.

In this curriculum the “learning outcomes” shall correspond to the skills defined in this METVET WP2 report, providing means for the students to acquire the respective set of knowledge, skills and competences. The learning units shall be broken down in such a way to facilitate the attainment of these skills. This methodology will be described in more detail in the Report of METVET WP3.

METVET PARTNERS

Joint Venture Networking

