

Technical Description

Refrigeration and Air Conditioning



1	Introduction.....	3
2	The Occupational Standards.....	5
3	The assessment approach & principles.....	12
4	The Marking Scheme.....	13
5	The Test Project.....	17
6	Skill management and communication.....	20
7	Skill specific safety requirements.....	21
8	Materials and equipment.....	22
9	Skill-specific rules.....	24
10	Visitor and media engagement.....	25
11	Sustainability.....	26

1 Introduction

1.1 Name and description of the skill competition

1.1.1 The name of the skill competition is

Refrigeration and Air Conditioning

1.1.2 Description of the associated work role(s) or occupation(s)

A refrigeration and air conditioning engineer works on commercial, residential, public and industrial projects, including transportation and storage. There is a direct relationship between the nature and quality of the product and service required and the resulting cost and price; therefore this branch of engineering covers a wide range of products and services. It is also essential for the refrigeration and air conditioning engineer to meet high and growing standards of service in order to comply with the requirements of the customer and maintain and grow the business. Refrigeration and air conditioning is closely associated with other parts of the construction and transportation industries at all stages, and is equally affected by rapid change in these sectors, including growing environmental trends and requirements.

The refrigeration and air conditioning engineer generally works inside domestic, commercial or public buildings during and after construction and production, and on projects of all sizes and types. He or she will plan and design, install, test, commission, report, maintain, fault find and repair systems to a high standard. Work organisation and self-management, communication and interpersonal skills, problem solving, flexibility and a deep body of knowledge are the universal attributes of the outstanding practitioner.

Whether the refrigeration and air conditioning engineer is working alone or in a team the individual takes on a high level of personal responsibility and autonomy. From ensuring a safe and reliable installation and maintenance service, in accordance with relevant standards, through to diagnosing malfunctions, upgrading and commissioning, and fault finding and correction, the skills of concentration, precision, accuracy and attention to detail at every step in the process are crucial. Mistakes may be very expensive and damaging, while substandard work will significantly undermine the performance of the building or equipment that it is intended to serve.

In broad terms, the most talented and skilled refrigeration and air conditioning engineers will work on larger and more complex projects, and the most challenging refrigeration and air conditioning issues. These personnel are most likely to help lead the industry in resolving issues relating to climate and environment. Affecting economies and community well-being and development, including health, the modern refrigeration and air conditioning engineer has immense scope for make a positive impact locally and globally.

1.2 The content, relevance and significance of this document

This document incorporates a Role Description and Occupational Standards which follow the principles and some or all of the content of the WorldSkills Occupational Standards. In doing so WSE acknowledges WorldSkills International's (WSI's) copyright. WSE also acknowledges WSI's intellectual property rights regarding the assessment principles, methods and procedures that govern the competition.

Every Expert and Competitor must know and understand this Technical Description.

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

1.3 Associated documents

Since this Technical Description contains only skill-specific information it must be used in association with the following:

- WSE – Competition Rules
- WSI – WorldSkills Occupational Standard framework
- WSE – WorldSkills Europe Assessment Strategy
- WSE – Online resources as referenced in this document
- WSE – Code of Ethics and Conduct
- Host Country – Health and Safety regulations

2 The Occupational Standards

2.1 General notes regarding WSOS / WSEOS

Where appropriate WSE has utilised some, or all, of the WorldSkills International Occupational Standards (WSOS) for those Skills Competitions that naturally align between the two international competitions. Where the Skill is exclusive to the EuroSkills Competition, WorldSkills Europe has developed its own Occupational Standards (WSEOS) using the same principles and framework to that used for the development of the WSOS. For the purposes of this document the use of the words “Occupational Standards” will refer to both WSOS and WSEOS.

The Occupational Standards specifies the knowledge, understanding and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business. Helpfully, for the global consultation on the WSOS in 2014-2021, around 50 percent of responses came from European industry and business.

Each Skill Competition is intended to reflect international best practice as described by the Occupational Standards, and to the extent that it is able to. The Occupational Standards is therefore a guide to the required training and preparation for the Skill Competition.

In the Skill Competition the assessment of knowledge and understanding will take place through the assessment of performance. There will not be separate tests of knowledge and understanding.

The Occupational Standards are divided into distinct sections with headings and reference numbers added.

Each section is assigned a percentage of the total marks to indicate its relative importance within the Occupational Standards. The sum of all the percentage marks is 100.

The Marking Scheme and Test Project will assess only those Skills that are set out in the Occupational Standards. They will reflect the Occupational Standards as comprehensively as possible within the constraints of the Skill Competition.

The Marking Scheme and Test Project will follow the allocation of marks within the Occupational Standards to the extent practically possible. A variation of five percent is allowed, provided that this does not distort the weightings assigned by the Occupational Standards.

2.2 Occupational Standards

Section		Relative importance (%)
1	Work organization and self-management	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The health and safety standards that apply to the RAC industry • How to recognise and respond to hazardous situations while working in the RAC industry • The safe personal protection measures while working in the RAC industry • How to apply manual handling techniques 	

Section		Relative importance (%)
	<ul style="list-style-type: none"> • How to respond to accidents that occur while working in the RAC industry • The procedures for electrical safety when working in the RAC industry • How to apply basic electrical safety measures in the RAC industry • The methods of working safely with heat producing equipment in the RAC industry • How to safely work with gas heating equipment • The methods of safely using access equipment • The methods of working safely in excavations and confined spaces • The purposes, uses, maintenance and care of all equipment, together with their safety implications • The purposes, uses, care and potential risks associated with materials and chemicals • The first aid requirements and actions required when both minor and major injury • The use of new technologies as a work aid • The working time associated with each activity • The parameters within which work needs to be scheduled • Principles and their application to good housekeeping within the work environment • How to apply environmental protection measures within the RAC industry • The applications of energy sources used in the RAC industry • The importance of energy conservation when commissioning RAC systems • The methods of reducing waste, and safe disposal of materials in the RAC industry 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Apply the respective health & safety legislation for the RAC industry • Take responsibility for those working in the RAC industry • Identify hazards and dangers to the workforce and members of public where RAC work is carried out • Identify and implement methods to control common hazardous substances and prevent accidents or dangerous situations occurring in the RAC industry • Plan and perform safe manual handling of heavy and bulky items including mechanical lifting aids • Prepare and maintain a safe and tidy work area at all times • Select and use appropriate personal protective equipment in all RAC activities • Select and use appropriate hand tools to complete RAC tasks safely and efficiently • Apply first aid procedures for dealing with minor and major injuries in the RAC industry Record near misses and accidents at work safely use access equipment such as step ladders, extension ladders and mobile towers 	

Section		Relative importance (%)
	<ul style="list-style-type: none"> • Demonstrate safe working practice for working with electrically powered tools • Identify how bottled gases and equipment should be transported in the RAC industry • Identify types of energy sources and uses in RAC • Identify and apply basic operating principles • Plan work within time limits to maximise work efficiency and minimise disruption • Restore the work area to an appropriate condition 	
2	Communication and interpersonal skills	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The identities and roles of the members of the construction team and the building services industry • How to apply information sources • How to communicate the technical language associated with the skill with others in the building services industry • The dynamics of working in a team and collaboration with other related skill groups and teams to achieve task completion • The working requirements of other trades either operating in the immediate area or affected by the installation works • The range and purposes of documentation, including text, graphical, paper based and electronic • The standards required for routine and exceptional reporting in oral, handwritten and electronic form • The nature of the reports provided by measuring equipment, together with their interpretation • The required standards for health & safety, environment, customer service and care 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Read, interpret and extract technical data and instructions from manuals and other documentation • Communicate in the workshop by oral, written and electronic means using standard formats with clarity, effectiveness and efficiency • Use a standard range of communications technology • Respond to legislative requirements, customers' needs face to face and indirectly • Use search methods to obtain specific and non-specific information, specifications and guidance 	
3	Design Refrigeration and Air Conditioning systems	25
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • The standard units of measurement used in the RAC industry 	

Section		Relative importance (%)
	<ul style="list-style-type: none"> • The properties of materials in the RAC industry • The relationship and interactions of energy, heat and power • Principles of force and pressure and their application to RAC industry • Principles of electricity and control circuits as related to RAC industry • The detailed properties of fluids used in RAC industry • The refrigeration and heat pump cycle • Condensate drainage and secondary refrigerant circuits • The information requirements for the design of a refrigeration or air conditioning system • The principles and conventions used in specifications and drawings • The range of specifications and drawings in use, and their purposes • The uses and limitations of the generally available drawing tools • The types and use of electrical cables & devices for different applications 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Evaluate the purposes of the required systems • Evaluate the feasibility of locating the system within designated areas • Calculate relative density to air and water • Apply specialist knowledge of the principal applications, detailed properties and reasons why solid materials break down • Apply the principal applications and basic properties of fluids used in the RAC industry • Use the terminology associated with latent, sensible heat and fluid change of state • Carry out simple heat energy and power, force and pressure calculations • Carry out simple electrical calculations i.e. Ohms law, power consumption, voltage, current and resistance circuits • Design an efficient refrigeration system that includes a range of heat exchangers & refrigerant types; HFC, HC, CO² and those with low or zero ODP & GWP • Design an air conditioning system that would serve a comfort cooling application and also a full building application • Produce simple drawings and specifications including 3D and scale, using standard conventions and symbols • Estimate the cost/budget requirement for equipment and materials • Select the required equipment and materials according to given criteria, including price and environmental considerations • Check the price and either order the equipment and materials or amend the design of the system to maintain the budget 	
4		30

Section		Relative importance (%)
	Installation and Maintenance of Refrigeration and Air Conditioning	
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Specific health & safety requirements that apply to fitting and fixing, servicing, maintaining and decommissioning RAC systems • The working principles and layouts of RAC and heat pump systems • The procedure for fitting, fixing and testing materials, equipment and components in RAC systems • The service and maintenance procedures for RAC systems, equipment and components 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Interpret diagrams, plans and specifications for piping and electricity routes • Work safely with gas heating equipment in the RAC industry • Prepare and if need be improving the area and surfaces which the installation depends upon • Itemise the required tools, components and materials required for installation • Take and transfer measurements and angles from given drawings to surfaces and piping materials • Identify, check and use various types of gases and equipment used for joining materials in the RAC industry • Join similar and dissimilar materials commonly found in refrigeration and air conditioning systems using a range of permanent and accessible jointing methods • Fabricate and install mechanical materials and components according to drawings and specifications • Install electrical materials components and control devices according to drawings and specifications • Install ancillary components & systems found in refrigeration and air conditioning systems such as condensate drainage, and leak detection systems • Use tools and equipment to pressure test the system and ensure no leaks • Use tools and equipment to evacuate the system of non-condensable fluids 	
5	Commission refrigeration and air conditioning systems.	15
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • How to interpret the design parameters of the given systems • Safety standards relating to the handling and application of refrigerants • Safe procedures for applying electrical supply to RAC systems 	

Section		Relative importance (%)
	<ul style="list-style-type: none"> • How to set up safety controls and devices to satisfy design requirements • How to ensure the integrity of RAC systems • How to ensure efficient operation of a system 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Charge the system with the correct type and quantity of refrigerant for efficient operation • Assess the refrigeration system for correct operation • Assess the air conditioning system for correct operation • Assess any secondary refrigerant or cooling system for correct operation • Assess the refrigeration or air conditioning system electrical installation for correct operation • Adjust refrigerant controls and flow devices for optimal system performance • Adjust electrical and electronic controls for optimal system performance • Balance the air distribution systems • Measure and record the RAC system operating parameters • Ensure the availability of essential client documentation • Demonstrate the safe functioning and care of the system to the client • Hand over the system to the client, while responding to all relevant queries 	
6	Fault finding refrigeration and air conditioning systems	20
	<p>The individual needs to know and understand</p> <ul style="list-style-type: none"> • The electrical standards that apply to the RAC industry • The inspection and testing requirements of electrically operated RAC services and components • The procedures for safely diagnosing and rectifying faults in electrically operated RAC services and components • The layout and features of electrical circuits in RAC systems • The procedure for safe isolation of the specific systems • The procedure for carrying out a risk assessment prior to investigating RAC systems • The importance of the original design and operational parameters • The impact of system isolation on client operations 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Inspect and test electrically operated RAC system components • Safely diagnose and rectify faults in electrically operated RAC services and components • Prepare and safeguard the area of work and its surroundings • Carry out safe isolation of electrical systems 	

Section		Relative importance (%)
	<ul style="list-style-type: none"> • Assess the refrigerant system for integrity and correct operation • Replace faulty refrigerant system components • Assess the air distribution system for integrity and correct operation • Replace faulty air distribution components • Evaluate electrical wiring integrity prior to energising • Assess the electrical installation for correct operation • Reclaim HFC, HC and CO² refrigerant from systems • Drain and refill compressor lubricant • Restore the work area and its surroundings to its prior state • Explain, advise and report on findings, actions and matters requiring further attention 	
	Total	100

3 The assessment approach & principles

3.1 General guidance

Note: this Section and Section 4 summarize a great deal of new information and guidance regarding assessment. Please refer to the Competition Rules for greater detail.

The Competition Committee (CC) establishes the principles and techniques to which assessment at the EuroSkills Competition must conform.

Expert assessment practice lies at the heart of the EuroSkills Competition. For this reason it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the EuroSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the EuroSkills Competition falls into two broad types: measurement and judgement. All assessments will be governed by explicit benchmarks, referenced to best practice in industry and business.

The Marking Scheme must include these benchmarks and follow the weightings within the Occupational Standards. The Test Project is the assessment vehicle for the Skill Competition, and also follows the Occupational Standards. The CIS enables the timely and accurate recording of marks, and has expanding supportive capacity.

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed and developed through an iterative process, to ensure that both together optimize their relationship with the Technical Description and the principles for assessment as set out in the WSE Assessment Strategy. They will be agreed by the Experts and submitted to WSE for approval together, in order to demonstrate their quality and conformity with the Occupational Standards.

Prior to submission for approval to WSE, the Marking Scheme and Test Project will be reviewed by the WSE Skill Advisors in order to benefit from the capabilities of the CIS.

4 The Marking Scheme

4.1 General guidance

This section describes the role and place of the Marking Scheme, how the Experts will assess Competitors' work as demonstrated through the Test Project, and the procedures and requirements for marking.

The Marking Scheme is the pivotal instrument of the WorldSkills Competition, in that it ties assessment to the standard that represents each skill competition, which itself represents a global occupation. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards.

By reflecting the weightings in the Standards, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill competition and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, initial Test Project design can be based on the outline Marking Scheme. From this point onwards the Marking Scheme and Test Project should be developed together.

Section 2.1 above indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards, if there is no practicable alternative.

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more Independent Test Project Designer(s) with relevant expertise. In these instances, the Marking Scheme and Test Project are unseen by Experts until immediately before the start of the skill competition, or competition module. Where the detailed and final Marking Scheme and Test Project are designed by Experts, they must be approved by the whole Expert group prior to submission for independent validation and quality assurance. Please see the Competition Rules for further details.

Experts and Independent Test Project Designers are required to submit their Marking Schemes and Test Projects for review, verification, and validation well in advance of completion. They are also expected to work with their Skill Advisor, reviewers, and verifiers, throughout the design and development process, for quality assurance and in order to take full advantage of the CIS's features.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition. Skill Advisors actively facilitate this process.

4.2 Assessment criteria

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived before, or in conjunction with, the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards; in others they may be different. There will normally be between five and nine Assessment Criteria. Whether or not the headings match, the Marking Scheme as a whole must reflect the weightings in the Standards.

Assessment Criteria are created by the person or people developing the Marking Scheme, who are free to define the Criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). **The Assessment Criteria, the allocation of marks, and the assessment methods, should not be set out within this Technical Description. This is because the Criteria, allocation of marks, and assessment**

methods all depend on the nature of the Marking Scheme and Test Project, which is decided after this Technical Description is published.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria and Sub Criteria.

The marks allocated to each Criterion will be calculated by the CIS. These will be the cumulative sum of marks given to each Aspect within that Assessment Criterion.

4.3 Sub criteria

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a WorldSkills marking form. Each marking form (Sub Criterion) contains Aspects to be assessed and marked by Measurement or Judgement, or both Measurement and Judgement.

Each marking form (Sub Criterion) specifies both the day on which it will be marked, and the identity of the marking team.

4.4 Aspects

Each Aspect defines, in detail, a single item to be assessed and marked, together with the marks, and detailed descriptors or instructions as a guide to marking. Each Aspect is assessed either by Measurement or by Judgement.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it. The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the Standards. This will be displayed in the Mark Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1 refers.)

	CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE	
	A	B	C	D	E	F	G	H				
STANDARDS SPECIFICATION SECTION	1	5.00								5.00	5.00	0.00
	2		2.00					7.50		9.50	10.00	0.50
	3								11.00	11.00	10.00	1.00
	4			5.00						5.00	5.00	0.00
	5				10.00	10.00	10.00			30.00	30.00	0.00
	6		8.00	5.00				2.50	9.00	24.50	25.00	0.50
	7			10.00				5.00		15.00	15.00	0.00
TOTAL MARKS	5.00	10.00	20.00	10.00	10.00	10.00	15.00	20.00	100.00	100.00	2.00	

4.5 Assessment and marking

There is to be one marking team for each Sub Criterion, whether it is assessed and marked by Judgement, Measurement, or both. The same marking team must assess and mark all Competitors. Where this is impracticable (for example where an action must be done by every Competitor simultaneously, and must be observed doing so), a second tier of assessment and marking will be put in place, with the approval of the Competitions Committee Management Team. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (Section 4.6 refers.)

4.6 Assessment and marking using judgement

Judgement uses a scale of 0-3. To apply the scale with rigour and consistency, Judgement must be conducted using:

- benchmarks (criteria) for detailed guidance for each Aspect (in words, images, artefacts, or separate guidance notes). This is documented in the Standards and Assessment Guide.
- the 0-3 scale to indicate:
 - 0: performance below industry standard
 - 1: performance meets industry standard
 - 2: performance meets and, in specific respects, exceeds industry standard
 - 3: performance wholly exceeds industry standard and is judged as excellent

Three Experts will judge each Aspect, normally simultaneously, and record their scores. A fourth Expert coordinates and supervises the scoring, and checks their validity. They also act as a judge when required to prevent compatriot marking.

4.7 Assessment and marking using measurement

Normally three Experts will be used to assess each Aspect, with a fourth Expert supervising. In some circumstances the team may organize itself as two pairs, for dual marking. Unless otherwise stated, only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect. To avoid errors in calculation or transmission, the CIS provides a large number of automated calculation options, the use of which is mandated.

4.8 Assessment overview

Decisions regarding the choice of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test Project.

4.9 Skill Assessment Strategy

The Skill Assessment Strategy will be based on the Standard Assessment Guide for Refrigeration and Air Conditioning, develop on the Forum with all of the Experts before the competition.

4.10 Skill Assessment Procedures - Mark distribution

This section defines the assessment criteria and the number of marks (judgement and measurement) awarded. The total number of marks for all assessment criteria must be 100. The table below is advisory only for the development of the Test Project and Marking Scheme.

	CRITERION	MARKS		
		Judgement	Measurement	Total
A	Pre-assembly, positioning, unit installing	0	10	10
B	Pipe mounting and connecting	10	10	20
C	Pressure and evacuation tests	0	10	10

D	Refrigerant actions and procedures	0	15	15
E	Electrical preassembly, wiring and connecting	0	15	15
F	Commissioning, adjustments, measuring	0	9	9
G	Logbook documents	0	5	5
H	Health and Safety (control of accessories needed and working conditions)	0	6	6
I	Environment load (used material optimization, lost refrigerant, proper commissioning: as optimal superheat-refrigerant charge, Ampere..., defrost, temperatures, heat recovery, logbook for operator, TEWI calculation)	0	10	10
Total =		10	90	100

5 The Test Project

5.1 General notes

Sections 3 and 4 govern the development of the Test Project. These notes are supplementary.

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the skills in each section of the Occupational Standards.

The purpose of the Test Project is to provide full and balanced opportunities for assessment and marking across the Occupational Standards, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme and Occupational Standards will be a key indicator of quality.

The Test Project will not cover areas outside the Occupational Standards, or affect the balance of marks within the Occupational Standards other than in the circumstances indicated by Section 2.1.

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work.

The Test Project will not assess knowledge of the EuroSkills Competition's rules and regulations.

This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standard Specification. Section 2.1 refers.

5.2 Format/ structure of the Test Project

- Test Project assessed in stages

5.3 Test Project design requirements

The Test Project should be designed in a way that attracts spectators. The application selected for the competition concerns, for example, the installation of a certain equipment.

The competition consists of individual performance. For example:

- Task 1: Component Fabrication and different kind of fitting and fixing - 4 hours
- Task 2: Refrigeration system installation - 12 hours
- Task 3: Fault finding and repair - 2 hours

It's forbidden to end the competition by the fault finding module, all of the competitors need to finish the competition at the same time

5.4 Test Project development

The Test Project MUST be submitted using the templates provided by WSE. Use the Word template for text documents and DWG template for drawings. Please contact jordy.degroot@worldskillseurope.org for guidance.

If the Test Project is designed by an Independent Test Project designer, then the Test Project must be designed in accordance with the WSE Independent Test Project Guide v1.1.

If your Skill wishes to have an Independent Test Project designer, you must ensure that WorldSkills Europe is made aware of this, so that it can be assured that there is proper

funding in place, or that the Independent Test Project designer is aware that he/she will do this task free of charge.

5.4.1 Who develops the Test Projects or modules

The Test Project / modules are developed under the supervision of:

- All Experts
- Some Experts
- Nominated Experts
- Independent Test Project designer/ Third party
- Chief Expert, Deputy Chief Expert

All experts have the opportunity to take part in the development of the test project by proposing test projects. Experts will vote the test project on the discussion forum.

All experts have the opportunity to take part in the development of the 30% change of test project on the forum.

Unless if it's an External Designer

5.4.2 How and where is the Test Projects or modules developed

The Test Project or modules are developed in the following manner:

- The Test Project is developed jointly on the Discussion Forums by all Experts
- Unless if it's an External Designer

5.4.3 When is the Test Project developed

The Test Project is developed according to the following timeline:

TIME	ACTIVITY
At the previous Competition	TP was developed by DCE and CE, or External Designer, some components (without dimensions) were circulated on the Discussion Forum and questions/doubts were answered
3 months prior to the Competition	3 months prior to the Competition all components must be defined after Forum Discussions (without dimensions or components layout).
At the Competition	C-2, CE and DCE will make a 30% proposal change based on the suggestions made by the Experts on the forum and all Experts will vote on it. Unless if it's an External Designer.

5.5 Test Project validation

3 months prior to the Competition all components must be defined (without dimensions nor components layout) and the 30% change will be voted day C-2. Unless if it's an External Designer.

5.6 Test Project selection

- By vote of Experts on the Discussion Forums

Note: TP will be agreed by all Experts on the Discussion Forums 3 months before the Competition. The 30% change will be voted on C-2.

- Unless if it's an External Designer

5.7 Test Project circulation

Please note that if a Test Project is known by the Chief- and/or Deputy Chief Experts, and/or any of the other Experts, it must be shared via the forums before the start of the Competition. This also means that this Test Project is subject to a 30% change before the start of the Competition.

The Test Project is circulated via the website as follows:

- Other:

Note: The TP (without dimensions or components layout) will be circulated 3 months before the current competition. 30% changes will be decided C-2.

- In the case of an external designer, the circulation of the TP needs to be done at the same time (C-3 months)

5.8 Test Project coordination (preparation for competition)

Coordination of the Test Project will be undertaken by:

- Skill Management Team or External Designer if it's applicable

5.9 Test Project change at the competition

C-2, CE and DCE will make a 30% proposal change based on the suggestions made by the Experts on the forum and all Experts will vote on it. Unless if it's an External Designer.

5.10 Material or manufacturer specifications

Specific material and/or manufacturer specifications required to allow the Competitors to complete the Test Project will be supplied by the Host Organization and are available via the forums. However, note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These items may include those for fault finding modules or modules not circulated.

Not applicable.

5.11 Software specifications

Not applicable.

6 Skill management and communication

6.1 Discussion forum

Prior to the EuroSkills Competition, all discussion, communication, collaboration, and decision making regarding the Skill Competition must take place on the skill specific Discussion Forum, which can be reached via www.worldskillseurope.org. Skill related decisions and communication are only valid if they take place on the forum. The Chief Expert (or an Expert nominated by the Chief Expert) will be the moderator for this Forum. Refer to Competition Rules for the timeline of communication and competition development requirements.

6.2 Competitor information

All information for registered Competitors is available from the WorldSkills Europe website www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

The information includes:

- Competition Rules
- Technical Descriptions
- Test Projects
- Infrastructure List
- EuroSkills Health, Safety, and Environment Policy and Regulations
- Other Competition-related information

6.3 Test Projects and Marking Schemes

Circulated Test Projects will be available at the WorldSkills Europe website from www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

6.4 Day-To-Day management

The day-to-day management of the Skill Competition during the EuroSkills Competition is defined in the Skill Management Plan that is created by the Skill Management Team led by the Chief Expert. The Skill Management Team comprises the Jury President, Chief Expert and Deputy Chief Expert. The Skill Management Plan is progressively developed in the six months prior to the Competition and finalized at the Competition by agreement of the Experts. The Skill Management Plan can be viewed at www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

7 Skill specific safety requirements

7.1 Requirements

Refer to Host Country/Region Health and Safety documentation for Host Country/Region regulations. This document will be shared via the forums. One overall Health and Safety document will be published, as well as Skill specific safety requirements.

8 Materials and equipment

8.1 Infrastructure List

The Infrastructure List details all equipment, materials and facilities provided by the Competition Organizer.

The Infrastructure Lists will be available at the WorldSkills Europe website from www.worldskillseurope.org. Please contact jordy.degroot@worldskillseurope.org for guidance.

The Infrastructure List specifies the items and quantities requested by the Experts for the next Competition. The Host Organization will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items.

At each Competition, the Experts must advise the Competition Manager of any increases in space and/or equipment.

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition.

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring – they are specified below.

8.2 Competitors toolbox

WorldSkills Europe aims to minimize the sending of toolboxes as much as possible. We therefore ask you to keep this in mind when writing the section below. Please be advised that competitors should bring as little as possible and what they do bring **MUST** be true hand tools. Only items are allowed that would significantly affect their ability to perform the task and deliver the Test Project to a high standard.

Competitors are not allowed to send a toolbox to the Competition. All tools are provided by the Competition Organizer.

8.3 Materials, equipment and tools supplied by Competitors in their toolbox

It is not applicable for Competitors to bring materials, equipment, and tools to the Competition.

However, Competitors are required to supply their own Personal Protective Equipment listed below :

- Insulated safety shoes with protective cap
- Tight fitting non-combustible work clothes (long sleeves and long trousers)
- Ear protection without electronic sound regulation
- Eyes protection
- Gloves

8.4 Materials, equipment and tools supplied by the Experts

Experts are required to supply their own Personal Protective Equipment listed below :

- Insulated safety shoes with protective cap

- Tight fitting non-combustible work clothes (long sleeves and long trousers)
- Ear protection without electronic sound regulation
- Eyes protection
- Gloves

8.5 Materials, equipment and tools prohibited in the Skill area

Competitors are not permitted to bring any kind of electronic devices to the competition, except a basic calculator.

8.6 Workshop Layout

Workshop layouts from previous competitions are available by contacting the Competition and IT Coordinator at: jordy.degroot@worldskillseurope.org. New Workshop Layouts will be communicated via the forums when completed.

Please be advised that you will have the opportunity to discuss your Workshop Layout proposal with the Host Organization during the Skills Development Workshop (SDW) and the Competition Preparation Meetings (CPM).

For workshop layout development, please refer to the forums.

9 Skill-specific rules

9.1 Introduction

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from Skill Competition to Skill Competition. This includes but is not limited to personal IT equipment, data storage devices, Internet access, procedures and workflow, and documentation management and distribution. Breaches of these rules will be solved according to the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System.

9.2 Personal laptops – USB – memory sticks – mobile phones

Not allowed during the competition time.

9.3 Personal photo cameras – video taking devices

Not allowed during competition days.

9.4 Communication between compatriot experts and competitors

It is only allowed during Open communication time and lunch.

9.5 Other

Templates, aids, etc

Competitors are not allowed to bring templates and aids to the competition that may give them an unfair advantage.

10 Visitor and media engagement

10.1 Engagement

Following is a list of possible ways to maximize visitor and media engagement, within the remit of the Competition Rules:

- Competitors must be visible to visitors at all times while working
- Design the main component of TP with something typical of the host city
- Interactive media display of trade
- Posters and information bulletin boards in prominent locations
- Display screens with footage of all Competitors
- A working demonstration project be put on display during Competition to engage the visitor's interest.

11 Sustainability

11.1 Sustainability

This Skill Competition will focus on the sustainable practices below:

- Energy reduction and innovation
- Recycling
- Use of 'green' materials when possible
- Use of completed Test Projects after Competition
- Use refrigerants that have a low GWP value that results in less than 750 equivalent CO² level
- Use alternative metal for heat exchanger fabrication e.g. Aluminium
- Minimize brazing fluid loss
- If possible, reuse test project in local training center