worldskills

Technical Description

Water Technology

Skill 55

WorldSkills International, by a resolution of the Competitions Committee and in accordance with the Constitution, the Standing Orders, and the Competition Rules, has adopted the following minimum requirements for this skill for the WorldSkills Competition.

The Technical Description consists of the following:

1 Introduction

1.1 Name and description of the skill competition

1.1.1 The name of the skill competition is

Water Technology

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

Water Technicians may work on the supply of water, or the treatment of wastewater. They may work as Water Supply Technicians or Wastewater Technicians.

Water Supply Technicians work in local water supply facilities and industrial water treatment plants. They carry out their work independently based on technical documents, rules, and legal requirements. Water Supply Technicians collect information, plan and coordinate their own work. They document their work and take measures to ensure quality assurance, safety, health, and environmental protection. They may work in large or small facilities for processing drinking water, performing a range of technical duties or management roles in the plants.

Wastewater Technicians work within sewer networks, for wastewater and sludge treatment in local or industrial wastewater treatment plants. Like Water Supply Technicians, they carry out their work independently based on technical documents, regulations, and legal requirements. They collect information, plan and coordinate their work. They document their work and take measures to ensure quality assurance, safety, health and environmental protection at work. They may be electro-technically qualified personnel. They may work in local or industrial wastewater treatment facilities in a wide range of technical roles, or as the manager.

Whether working in water supply or wastewater treatment facilities, the role of the Water Technician is to observe, identify, report, maintain, control, and repair equipment and maintain the processes at the plant and across the networks. They must have knowledge and expertise in mechanics, chemistry, biology, electrical, automation, and environmental protection. Above all, health and safety are utmost important.

Water Technicians may help on stormwater management by designing and implementing systems like retention basins and green roofs, using models to predict hydraulic flow, ensuring regulatory compliance, and improving water quality. Their work aims to minimize flooding, protect water quality, and promote sustainability.

Irrespective of where Water Technicians work or what their responsibilities are, their role is driven by the absolute requirements for quality in many respects, including:

- Continuity, consistency, and safety of water supply.
- Safe removal, treatment, and recycling of wastewater.
- Environmental protection.

Water is the earth’s most critical resource, the importance of this occupation and the quality of those fulfilling it, is second to none.

1.1.3 Number of Competitors per team

Water Technology is a single Competitor skill competition.

1.1.4 Age limit of Competitors

The Competitors must not be older than 25 years in the year of the Competition.

1.2 The relevance and significance of this document

This document contains information about the standards required to compete in this skill competition, and 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:

- WSI – Code of Ethics and Conduct
- WSI – Competition Rules
- WSI – WorldSkills Occupational Standards framework
- WSI – WorldSkills Assessment Strategy
- WSI online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations
- WorldSkills Standards and Assessment Guide (skill-specific)

2 The WorldSkills Occupational Standards (WSOS)

2.1 General notes on the WSOS

The WSOS specifies the knowledge, understanding, skills, and capabilities that underpin international best practice in technical and vocational performance. These are both specific to an occupational role and also transversal. Together they should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business (www.worldskills.org/WSOS).

The skill competition is intended to reflect international best practice as described by the WSOS, to the extent that it can. The Standard 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 only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

The Standard is 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 Standards. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

Through the Test Project, the Marking Scheme will assess only those skills and capabilities that are set out in the WorldSkills Occupational Standards. They will reflect the Standards as comprehensively as possible within the constraints of the skill competition.

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, if this does not distort the weightings assigned by the Standards.

2.2 WorldSkills Occupational Standards

Section		Relative importance (%)
1	**Work organization and management**	**10**
	The individual needs to know and understand: • Principles and applications of safe working in general and for water and wastewater treatment, as well as the operation in the networks and solid waste management • The purposes, uses, care, calibration and maintenance of all equipment and materials, together with their safety implications • Environmental and safety principles and their application to good housekeeping in the work environment • Principles and methods for work organization, control, and management • The parameters within which activities need to be scheduled.	

Section		Relative importance (%)
	The individual shall be able to: • Prepare and maintain safe, tidy, and efficient work areas • Manage and dispose of the refuse produced in the work area • Prepare for the tasks in hand, with full regard to health and safety • Schedule work to maximize efficiency and minimize disruption • Select and use all equipment and materials safely and in compliance with manufacturers' instructions • Restore work areas to an appropriate state and condition • Give and take feedback and support.	
2	**Communication and interpersonal skills**	**5**
	The individual needs to know and understand: • The technical language associated with the occupation and the industry • The standards required for routine and exception reporting in oral, written, and electronic form (e.g. values, figures, units, minimal information, and recommendations) • The required standards for communication with clients, team members and others • Documentation and records of communication with clients, regulatory bodies, and the public, including feedback and decisions • The purposes and techniques for generating, maintaining, and presenting records • The personal skills, strengths and needs that relate to the roles, responsibilities, and duties of others, individually and collectively • Principles of team working and their applications.	
	The individual shall be able to: • Read, interpret, and extract technical data and instructions from documentation in any available format • Communicate by oral, written, and electronic means to ensure clarity, effectiveness, and efficiency • Communicate with the defined target groups, in order to give the correct information about water distribution systems, its possible flaws, water quality and shortage periods • Communicate with defined target groups, in order to give the correct information about the types of refuse that can be disposed of in wastewater collection systems • Use a standard range of communication technologies • Discuss complex technical principles and applications with others • Complete reports and respond to issues and questions arising • Respond to clients' needs face-to-face and indirectly • Gather information and prepare documentation targeted to and as required by clients or client groups.	
3		**10**

Section		Relative importance (%)
	Application of health, safety and environment measures, and sustainability	
	The individual needs to know and understand: • Basic principles and practices of hygiene • Risk assessment (biological, chemical, electrical, thermal and mechanical operations) • Health and work-related regulations • The meaning of relevant danger and safety symbols/signage • Health maintaining regulations, and personal protection equipment (PPE) • The hazardous aspects/points for the environment (danger/risk analysis) • New trends in environmental processes and protection • Dangers of relevant hazardous substances used on the networks and plants • The different potential hazardous sources in the vicinity, their potential contents, and their possible effects • Different mitigation methods • Contingency plans • Sustainable practices which support human, ecological, economic health and vitality.	
	The individual shall be able to: • Apply safety requirements in water or wastewater network and treatment plants • Apply or exceed health and safety standards applying to the environment, equipment, and materials • Execute proper preventive or correction actions in order to maintain efficiency within all treatment processes • Identify potential problem zones and devise remedies accordingly • Work in a cost, environmental and hygiene-conscious manner • Avoid the use of hazardous substances and make proposals for their replacement • Create and evaluate contingency plans • Implement sustainable practices, e.g. reducing consumption of resources like water, energy, or materials • Reduce, reuse, and recycle resources if possible.	
4	**Chemical and biological skills**	**25**
	The individual needs to know and understand: • Basic principles and procedures for solvents and solution preparation, mixing and dilution, including basic calculation • The proper use of glassware, analytical equipment, or instruments • How to read and execute standard analytical assay protocols • Basic principles and procedures for sample pre-treatment, storage, sample preserving and sample taking	

Section		Relative importance (%)
	• Basic principles and procedures for measuring samples using different techniques (classical and instrumental analysis) • Basic principles and procedures for chemical analysis for quality assurance • Basic principles and procedures for biological analysis for quality assurance • Basic principles and procedures for statistical analyses that concern specific samples (e.g. standard calibration curves, quantification limit, and standard deviation) • Basic operations/functions of laboratory equipment.	
	The individual shall be able to: • Prepare any kind of chemical reactants or solutions • Execute analytical measurement using the proper glassware, equipment, and instrument, according to specific assay protocols • Clean and calibrate equipment and instruments before starting an assay protocol • Take samples, including their preservation and pre-treatment • Select and use laboratory equipment according to their function • Follow chemical and biological analysis protocols and quality assurance • Clean and store the equipment and instruments used • Estimate the concentration of unknown samples, using proper analytical methods, protocols, and statistical analysis • Document results/findings • Provide information about water or wastewater quality, in order to identify any kind of problems within the water or wastewater treatment • Acquire information about water or wastewater quality, in order to identify and execute preventative or corrective actions along the treatment processes • Provide information about water or wastewater quality in order to fulfil laws and regulations, aiming to keep the population safe and healthy.	

Section		Relative importance (%)
5	**Electrical skills**	**15**
	The individual needs to know and understand: • The basic principles of electricity • The basic principles of electrical systems • The basics of electrical control of machines and actuators • Circuit and P&I diagrams as well as operating manuals and/or instruction manuals • The protection methods of electrical systems • The dangers/hazards of electrical systems • Analytical techniques for fault finding • Strategies for problem solving • Methods and procedures for identifying high energy consumers • Strategies for energy efficiency.	
	The individual shall be able to: • Disengage electrical equipment commonly used in water and wastewater treatment plants • Identify and resolve areas of uncertainty within the briefs or specifications • Identify the different components within control cabinets and their functionality • Exchange defective components within control cabinets • Take electrical measurements and interpret/verify the results • Connect wires/cables according to industrial practices/standards • Install, set up and adjust/calibrate electrical systems as required • Ensure connection of all wiring according to circuit diagrams • Ensure the functionality of electrical systems (i.e. rotation direction).	
6	**Mechanical skills**	**15**
	The individual needs to know and understand: • The basics of materials (metals, composites, and plastics) • The basics in processing methods of different materials • The basics of connection techniques • The basics of mechanical engineering (mechanics, sealing methods, gear technology, etc.) • The basics of fluids • Criteria and methods for testing equipment and systems • Analytical techniques for fault finding • Techniques and options for making mechanical repairs • Strategies for problem solving • Principles and techniques for generating creative and innovative solutions • Water loss and leakage, as well as its potential causes and potential prevention solutions.	

Section		Relative importance (%)
	The individual shall be able to: • Repair components (up to systems) efficiently • Monitor and control relevant process equipment • Adjust and/or calibrate systems where necessary, according to instruction manuals • Use accessories efficiently • Ensure the correct function of components and systems • Adjust process parameters • Identify cost drivers and define methods for their minimization • Work in a professional manner • Identify equipment that requires preventive maintenance and develop/take appropriate measures • Create quick and reliable makeshift solutions as an interim in emergencies.	
7	**Automation and digitalization**	**15**
	The individual needs to know and understand: • The basic principles of sensor technology • The basic principles and functionality of closed loop technology • The basic principles of actuators • The basic principles of control technology • Analytical techniques for fault finding and solving • Digitization and internet of thing (IOT) application in water and wastewater facilities • Digital twin for water and wastewater facilities • Computer simulation of processes	

Section		Relative importance (%)
	The individual shall be able to: • Identify cost drivers and define methods for its minimization • Interpret and differentiate circuit diagrams • Regulate and adjust components for efficient use • Identify different automation components within systems and make qualified adjustments • Identify elements within process control, together with their functionality • Take measurements and carry out process analyses • Monitor, control and regulate systems manually and by using control and communication systems • Use different energy forms (electricity, oil, gas, air, water, and steam) • Review the possibilities of economical energy use (i.e. mitigation of leakage or usage of heat) • Apply internet of thing (IOT) for water and wastewater treatment plants • Apply and use digital twin and digitization for water and wastewater treatment • Simulate water and wastewater treatment process and control	
8	**Documentation**	**5**
	The individual needs to know and understand: • System specifications of design details, operation, and components of the systems • The basic calculations required within water and wastewater network and treatment processes • Regulatory requirements to comply with laws and standards, including documentation needed for permits and inspections • Data collection and analysis on hydrological, hydraulic, water quality, and processes • Procedures and records for routine maintenance, repairs, and system performance checks • Documentation of testing protocols, results, and any corrective actions taken to ensure system reliability for quality control	
	The individual shall be able to: • Create detailed documentation for system designs, specifications, and operational procedures. • Perform calculations based on given facts/information • Monitor and document information and data in compliance with legal requirements • Document adherence to regulatory requirements, including permits, inspections, and compliance reports • Record and organize hydrological, hydraulic, and water quality data for analysis and reporting	

Section		Relative importance (%)
	• Keep maintenance and repair logs, including schedules, procedures, and outcomes • Document testing protocols, results, and any corrective measures to ensure system quality and performance. • Track and document system performance, generate regular reports, and evaluate the effectiveness of management strategies • Maintain records of interactions with clients, regulatory agencies, and the public, including feedback and decisions.	
	Total	**100**

3 The Assessment Strategy and Specification

3.1 General guidance

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform.

Expert assessment practice lies at the heart of the WorldSkills 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 WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the WorldSkills Competition falls into two broad types: Measurement and Judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding.

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, to demonstrate their quality and conformity with the Standards.

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

4 Assessment Design and Practice

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
STANDARDS SPECIFICATION SECTION		A	B	C	D	E	F	G	H			
	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 The use of Measurement and Judgement

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 and procedures

WorldSkills is committed to continuous improvement including reviewing past limitations and building on good practice. The following skill assessment strategy and procedures for this skill competition take this into account and explain how the marking process will be managed.

The Assessment Criteria is completed once the Test Project modules have been drafted. Both measurement marking and judgement marking are used. The choice of measurement or judgment marking will depend on the Aspects to be marked.

There is daily marking. Each Sub Criterion is marked on a daily basis. Subject to Expert's expertise, the rules and quality requirements, there is a reasonable balance of marking by each expert.

Each Test Project module will be developed with reference to the relevant standards. The Assessment Criteria will mostly follow the sections of the WorldSkills Occupational Standards.

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 applied knowledge, skills, and behaviours set out in each section of the WSOS.

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

The Test Project will not cover areas outside the Standards or affect the balance of marks within the Standards other than in the circumstances indicated by Section 2. This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards. Section 2.1 refers.

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 WorldSkills rules and regulations.

Most Test Projects and Marking Schemes are now designed and developed independently of the Experts. They are designed and developed either by the Skill Competition Manager, or an Independent Test Project Designer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

The information provided below will be subject to what is known at the time of completing this Technical Description, and the requirement for confidentiality.

Please refer to the current version of the Competition Rules for further details.

5.2 Format/structure of the Test Project

The Test Project is a series of modules of either independent or integrated with other modules.

5.3 Test Project design requirements

Test Projects should reflect the purposes, structures, processes, and outcomes of the occupational role they are based on. They should aim to be a small-scale version of that role. Before focusing on practicalities, SMTs should show how the Test Project design will provide full, balanced, and authentic opportunities for assessment and marking across the Standards, as set out in Section 5.1.

The Test Project shall be:

- modular;
- prepared in accordance with the Section 2 WorldSkills Occupational Standards (WSOS);
- validated according to section 5.6 Test Project validation.

Test Project may be designed in a way that it can be conducted in a rotation by different groups of Competitor, in order to save the quantity of equipment to be prepared for the competition.

The recommended structure below may be followed:

Time	Day 1 - 4
09:00 - 17:00 **with lunch break and assessment**	• Activities of Water or Wastewater Treatment plant process control, automation, mechanical repair, lab analysis, reporting writing, and troubleshooting the plant operation problems. • Water or wastewater treatment process understanding by software simulation, or pictograph. • Water supply or water and wastewater treatment process proposal and design with given scenario could also be considered.

Following additional tasks maybe considered in the Competition

CCTV Inspection

CCTV cameras are commonly used in the water wells, pipes, drains, and sewers. This modern device is widely used in the water industry. In this context, the water technologist should be able to use this device properly. The purpose is to use the CCTV camera in a professional way, to know the related procedure, the inspection processes, and the systematic handling approach. The inspection shall be done according to the health and safety regulations. Inspections can be done at wells, water supply pipes, and wastewater sewers. The outcome is the documentation of the inspection. This report shall be given to the supervisor.

5.4 Test Project coordination and development

The Test Project MUST be submitted using the templates provided by WorldSkills International (www.worldskills.org/expertcentre). Use the Word template for text documents and DWG template for drawings.

5.4.1 Test Project coordination (preparation for Competition)

Coordination of the Test Project/modules will be undertaken by the Skill Competition Manager.

5.4.2 Who develops the Test Project/modules

The Test Project/modules are developed by an Independent Test Project Designer (ITPD) in collaboration with the Skill Competition Manager.

5.4.3 When is the Test Project developed

The Test Project/modules are developed according to the following timeline:

Time	Action
Fifteen (15) months prior to the Competition	The ITPD is identified and a Confidentiality Agreement between WSI and the ITPD is organized.
No later than two (2) months prior to the Competition	The Test Project documents are sent to the WorldSkills International Skills Competitions Administration Manager.

Time	Action
At the Competition on C-3	The Test Project/modules may be presented to Experts and Interpreters, but without pictures, diagram, tables, or questions. Test projects may be translated to native language by AI or other software, and given to interpreter to check the accuracy of the translation.
At the Competition on the beginning of each Module	The Test Project/modules are presented to Competitors.

5.5 Test Project initial review and verification

The purpose of a Test Project is to create a challenge for Competitors which authentically represents working life for an outstanding practitioner in an identified occupation. By doing this, the Test Project will apply the Marking Scheme and fully represent the WSOS. In this way it is unique in its context, purpose, activities, and expectations.

To support Test Project design and development, a rigorous quality assurance and design process is in place (Competition Rules sections 10.6-10.7 refer.) Once approved by WorldSkills, the Independent Test Project Designer (ITPD) is expected to identify one or more independent expert(s), and trusted individuals initially to review the Independent Test Project Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.

A Skill Advisor will ensure and coordinate this arrangement, to guarantee the timeliness and thoroughness of both initial review, and verification, based on the risk analysis that underpins Section 10.7 of the Competition Rules.

5.6 Test Project validation

The Skill Competition Manager coordinates the validation of the Test Project/modules and will ensure that it can be completed within the material, equipment, knowledge, and time constraints of Competitors.

5.7 Test Project circulation

The Test Project/modules are not circulated prior to the Competition. The Test Project/modules are presented to Experts on C-3. Test Project/modules will be presented to Competitors at the beginning of each module.

5.8 Test Project change

Test Project will be developed by an Independent Test Project Designer (ITPD), thus, there is no change required for the Test Project/modules during the Competition. Exceptions are amendments to technical errors in the Test Project documents and according to infrastructure limitations.

5.9 Material or manufacturer specifications

Specific material and/or manufacturer specifications required to allow the Competitor to complete the Test Project will be supplied by the Competition Organizer and are available from www.worldskills.org/infrastructure located in the Expert Centre. 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.

6 Skill management and communication

6.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the WorldSkills skill-specific Discussion Forum. (http://forums.worldskills.org). Skill related decisions and communication are only valid if they take place on the WorldSkills Discussion Forum. The Chief Expert (or an Expert Lead appointed by the Skill Management Team) will be the moderator for this Discussion Forum. Refer to the Competition Rules for the timeline of communication and competition development requirements.

6.2 Competitor information

All information for registered Competitors is available from the Competitor Centre (www.worldskills.org/competitorcentre).

This information includes:

- Competition Rules
- Technical Descriptions
- Mark Summary Form (where applicable)
- Test Projects (where applicable)
- Infrastructure List
- WorldSkills Health, Safety, and Environment Policy and Regulations
- Other Competition-related information

6.3 Test Projects and Marking Schemes

Circulated Test Projects will be available from www.worldskills.org/testprojects and the Competitor Centre (www.worldskills.org/competitorcentre).

6.4 Day-to-day management

The day-to-day management of the skill competition during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team. The Skill Management Team comprises the Skill Competition Manager, Chief Expert, and the Expert Leads. The Skill Management Plan is progressively developed in the six (6) months prior to the Competition and finalized at the Competition. The Skill Management Plan can be viewed in the Expert Centre (www.worldskills.org/expertcentre).

6.5 General best practice procedures

General best practice procedures clearly delineate the difference between what is a best practice procedure and skill-specific rules (section 9). General best practice procedures are those where Experts and Competitors CANNOT be held accountable as a breach to the Competition Rules or skill-specific rules which would have a penalty applied as part of the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System. In some cases, general best practice procedures for Competitors may be reflected in the Marking Scheme.

Topic/task	Best practice procedure
Interpreter communication with Competitor/Expert during competition	• Competitor must raise their hand or communication card to get the attention of an Expert other than the compatriot Expert and show the Expert that they need help from the Interpreter. • The Expert called by the Competitor must, as quickly as possible, get the Interpreter and another neutral Expert to attend to the Competitor. • Communication between an Interpreter and Competitor may only take place in the presence of a neutral Expert. • An app or a software may be used for the communication between interpreter and competitor via online mode for any questions from competitors. Thus, interpreter will not need to go to competitor for translation, instead she/he will stay at designed area doing translation online.
Tools used for translation	• Interpreters maybe allowed to use dictionary, internet, and translation device to check translated documents, including the Test Project. However, during the Competition, if the Interpreter is asked by the compatriot Competitor, the Interpreter cannot use dictionary, Internet, or translation device in front of the Competitor.
Tools/infrastructure	• All equipment must be handled with care and used in a professional manner. Any damage to equipment, tools, work pieces, etc., shall result in mark reductions as stated in the Standard and Assessment Guide or other documents.
Equipment failure	• If equipment or tools which are brought by the Competitor fail, no extra time is allowed. • If equipment or tools supplied by the Competition Organizer fail, extra time is allowed only if the technician of the sponsor or supplying company specifies and proves it is not an error caused by competitor.
Test Project documentation	• All Test Project documents, and other skills related documents must be stored in the Skill competition manager (SCM) room in lockers by SCM.

7 Skill-specific safety requirements

7.1 Personal Protective Equipment

Refer to WorldSkills Safety Policy and Regulations for Host country or region regulations.

Task	Safety glasses with side protection	Cut protection gloves	Latex or nitrile gloves	Safety shoes with protective cap	Tight fitting work clothes (long trousers)	Lab coat	Hearing protection
General Workshop Area				√	√		
During formalization and competition in the workshop (e.g., electrical and mechanical work)	√	√		√	√		
During formalization and competition in the Lab workstation/ area	√		√	√	√	√	
Working with pressure	√	√		√	√		
Working with machines and tool over 85 dB				√	√		√

8 Materials and equipment

8.1 Infrastructure List

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

The Infrastructure List is available at www.worldskills.org/infrastructure.

The Infrastructure List specifies the items and quantities requested by the Skill Management Team for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. 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.

At each Competition, the Skill Management Team must review and update the Infrastructure List in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions 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 for the upcoming WorldSkills 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

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

8.3 Materials, equipment, and tools supplied by Competitors

Competitors are not required to bring materials, equipment, and tools to the Competition. However, Competitors are required to bring their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

8.4 Materials, equipment, and tools supplied by Experts

Experts are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

Experts are responsible that Interpreters bring their own PPE.

When Expert is required to bring something additionally, this will be announced at the WorldSkills Discussion Forum at least one (1) month before the Competition.

8.5 Materials and equipment prohibited in the skill area

Competitors and Experts are prohibited to bring any materials or equipment not listed in section 8.3 and section 8.4.

List of tools not allowed will be announced in the WorldSkills Discussion Forum at least one (1) month before the competition.

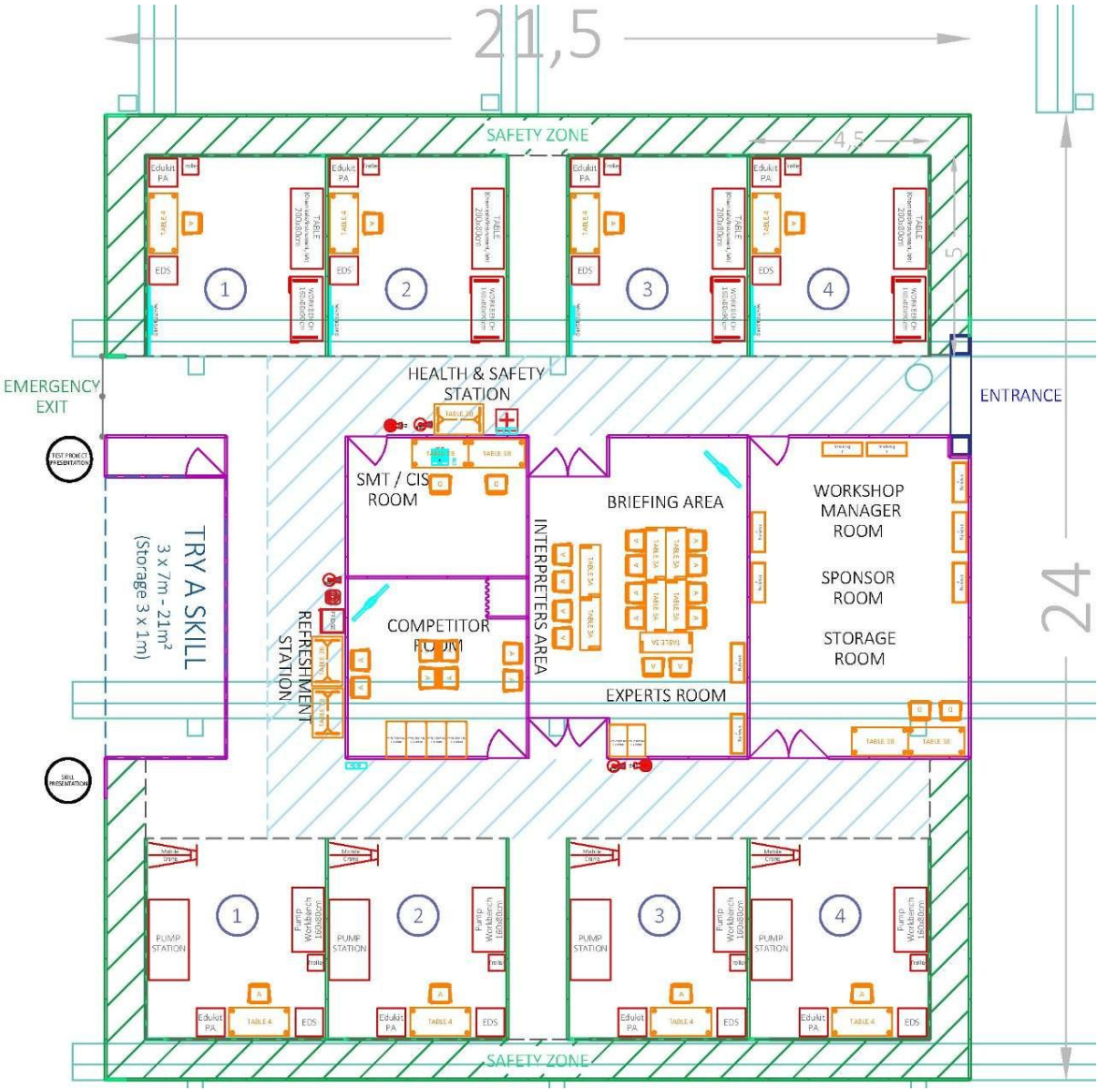
8.6 Proposed workshop and workstation layouts

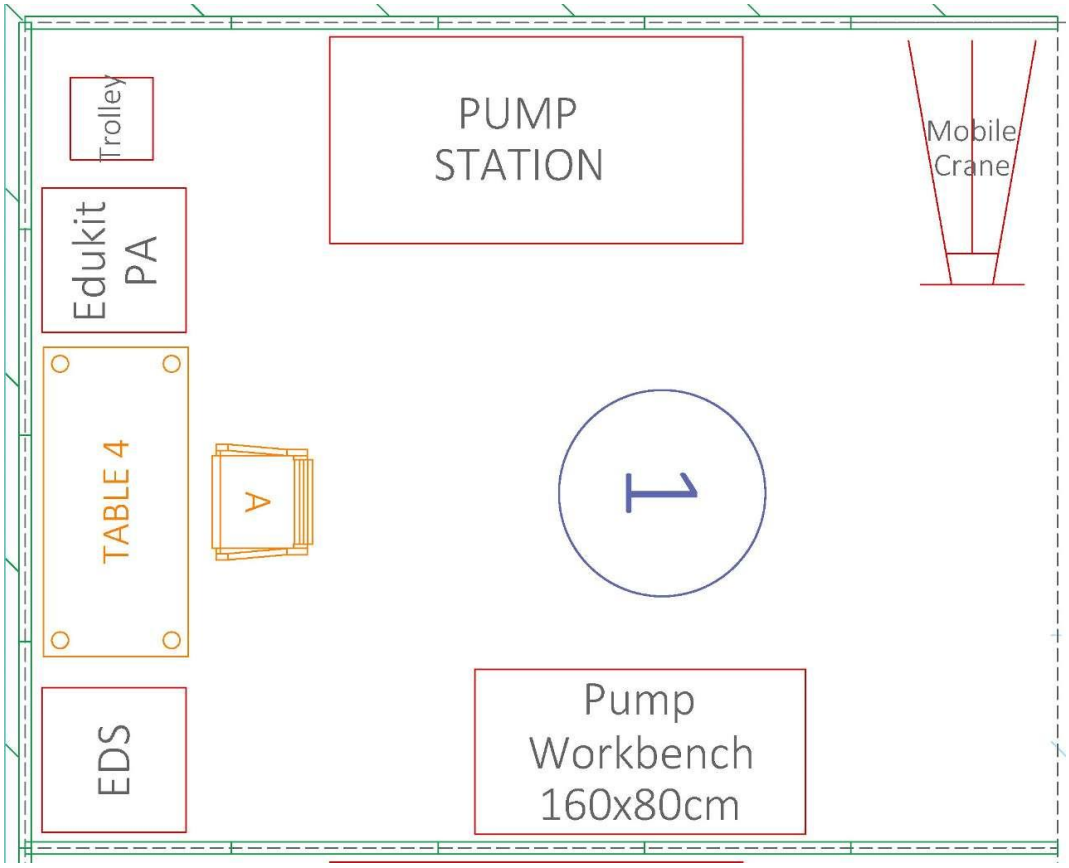
Workshop layouts from previous competitions are available at www.worldskills.org/sitelayout.

Example workshop layout

The Competitor will have his/her own workstation with a space about 4 m x 6 m for lab testing, mechanical repair and other tasks.

The workstation can be used to perform various tasks for the competition, for example, lab testing on water quality, mechanical equipment repair, process control, etc.





9 Skill-specific rules

9.1 General notes

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 Skill-specific rules

Topic/task	Skill-specific rule
Interpreter communication with Expert during competition	• During the competition, the Interpreter is strictly not allowed to communicate with their compatriot Expert. They may only provide interpretation when requested. • Interpreter has to stay at designated area.
Use of technology – USB, memory sticks	• Chief Expert, Experts, Interpreters, and Competitors are not allowed to bring personal memory sticks into the workshop. If these items are brought into the workshop they must be locked in the personal locker and only removed at the end of the Competition on C4. • Skill Competition Manager is exempt from this rule.
Use of technology – personal laptops, tablets, and mobile phones	• Competitors may bring tablets or mobile phones into the workshop, but they must be locked in the personal locker. They may be removed during lunch time and given back at the end of the Competition day. • Skill Competition Manager, Chief Expert, Experts, and Interpreters are allowed to bring and use personal laptops, tablets, and mobile phones in expert room or interpreter room only, but not in the workshop area.
Use of technology – personal photo and video taking devices	• Skill Competition Manager, Chief Expert, Experts, Competitors, and Interpreters are allowed to use personal photo and video taking devices in the workshop at the conclusion of the competition on C4 only.
Calculator, aids, etc.	• Competitors may bring pocket calculators to the Competition but with approval from CE.
Assessment	• Skill Competition Manager, Chief Expert, Competitors, Experts, and Interpreters are not permitted to take paper or digital copies of the Assessment out of the workshop until the competition has finished on C4.

10 Expert knowledge and experience

10.1 Requirements

Experts appointed for this skill competition must have the following knowledge and experience for the appropriate occupation or work role as documented in **section 1.1.2**.

1. Have experience and familiar with the operation and maintenance of water supply, wastewater treatment facilities and the networks.
2. Have knowledge of water supply and wastewater treatment processes, including flocculation, sedimentation, disinfection, ultrafiltration (UF), reverse osmosis (RO), activated sludge processes, and membrane bioreactor.
3. Skilled in water quality assessment, including chemical, physical and biological parameters, as well as sampling methods for both plants and networks.
4. Familiar with plant automation, including SCADA and other monitoring and control tools, as well as knowledge of flow measurement techniques.
5. Understand digitization and IoT applications in water supply, wastewater facilities and the networks.
6. Able to interpret piping and instrumentation diagram (P&ID) for water supply, wastewater facilities and networks.
7. Knowledgeable in the maintenance and repair of essential mechanical equipment used in the water and wastewater operations.
8. Know the international water quality standards, regulatory discharge limits, and compliance requirements, including relevant sampling methods and equipment.
9. Know the health, safety and environment measures in the workplaces and water facilities.
10. Have knowledge of sustainable practice, including resource conservation in water, energy, and materials usage.
11. Effective team player with a strong sense of collaboration and responsibility in group settings.

11 Visitor and media engagement

11.1 Engagement methods

Following is a list of possible ways to maximize visitor and media engagement:

- Test Project description;
- Enhanced understanding of Competitor activity;
- Site layout to enable public and media to get close to Competitors – have access bays;
- Active assessment involving timed and active tasks – use announcer to inform public of what is happening;
- Display screens – some web cams could be installed at the Competition area showing details of the task to the public and on the website;
- Competitor profiles – for each Competitor, a sticker with the national flag, the name of the Competitor and a brief description of their studies can be provided;
- Daily reporting of the Competition status;
- Try-a-Skill – in the workshop to provide an area where young people and public can try individual exercises. This activity could be managed by a couple of students from the Host Country/Region. Those students could explain the way to become a Water Technologist and answer questions;
- Display video, which shows how Water Technologists work, what they do in their daily work, how the machines work (with which they interact, maintain and repair), and what they do and learn during their studies.

12 Sustainability

12.1 Sustainable practices

This skill competition will focus on the sustainable practices below:

- Recycling.
- Use sustainable and green materials.
- Use less resources if possible, including water and electricity, and generate less waste or wastewater.
- Transfer or share files electronically instead of printing out on paper if possible.
- Switch off the light, air con, or other electrical device to save electricity.
- Sustainability award may be given to Competitor with best sustainable practice.

13 References for industry consultation

13.1 General notes

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognized best practice in industry and business. To do this WorldSkills approaches a number of organizations across the world that can offer feedback on the draft Description of the Associated Role and WorldSkills Occupational Standards on a two-yearly cycle.

In parallel to this, WSI consults three international occupational classifications and databases:

- ISCO-08: (http://www.ilo.org/public/english/bureau/stat/isco/isco08/)
- ESCO: (https://ec.europa.eu/esco/portal/home)
- O*NET OnLine (www.onetonline.org/)

13.2 References

This WSOS (Section 2) appears most closely to relate to:

Water Plant Technician: ESCO 3132.6: http://data.europa.eu/esco/occupation/7f800e7d-9d86-406a-9116-b5eca7526869

and Water and Wastewater Treatment Plant and System Operators; https://www.onetonline.org/link/summary/51-8031.00

These links can also be used to explore adjacent occupations.

ILO 3132

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2026.

Organization	Contact name
ADIRO Automatisierungstechnik GmbH	Klaus Kronberger, Managing

14 Appendix

14.1 Appendix information

Not applicable.