Technical Description

Water Technology

Manufacturing and Engineering Technology

worldskills

 TD55 v2.1 WSC2019

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:

Effective 22.08.18

Stefan Praschl
Chair of the Competitions Committee

Michael Fung
Vice Chair of the Competitions Committee

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 waste water, or on both simultaneously or sequentially.

Water Supply Engineering Technicians work in municipal and industrial water supply companies. They carry out their work independently on the basis of technical documents and rules as well as on legal bases. Water Supply Technicians procure information, plan and coordinate their work. They document their services and take measures to ensure quality assurance, safety, health and environmental protection at work.

They may work in large or small facilities for processing drinking water, performing a range of technician duties in larger ones, and management roles in smaller ones.

Wastewater Technicians work in the area of drainage networks as well as in wastewater and sewage sludge treatment in municipal and industrial wastewater treatment plants. They also carry out their work independently on the basis of technical documents and regulations as well as legal requirements. They acquire information, plan and coordinate their work. They document their services and take measures to ensure quality assurance, safety, health and environmental protection at work. They are electro-technically qualified personnel. As with the Water Supply Engineering Technician, in larger facilities they may have wide-ranging technician roles, while in small facilities they may be classed as managers.

For the treatment of waste water, the Water Technician may work in

- Municipal and industrial wastewater discharge facilities, and/or
- Municipal and industrial wastewater treatment facilities.

Whether working with water support or waste water treatment, the role of the Water Technician is to observe, identify, protocol, report, maintain, control and repair equipment and processes throughout the plant and the networks. For this purpose, they must have knowledge and expertise in mechanics, chemistry, biology, electrical, automation and environmental protection. Above all, health and safety matters most.

Irrespective of where they work, and their particular responsibilities, the Water Technician's role is driven by the absolute requirement for quality in many respects, including:

- Continuity, consistency and safety of supply
- Safe removal, treatment and recycling of waste water

Environmental protection.

Since water is the world'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 – Competition Rules
- WSI – WorldSkills Standards Specification framework
- WSI – WorldSkills Assessment Strategy
- WSI Online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations

2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

2.1 GENERAL NOTES ON THE WSSS

The WSSS 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 (www.worldskills.org/WSSS).

The skill competition is intended to reflect international best practice as described by the WSSS, and to the extent that it is able to. The Standards Specification 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 Standards Specification 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 Specification. This is often referred to as the "weighting". 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 Standards Specification. They will reflect the Standards Specification 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 Standards Specification to the extent practically possible. A variation of five percent is allowed, provided that this does not distort the weightings assigned by the Standards Specification.

2.2 WORLDSKILLS STANDARDS SPECIFICATION

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 waste water treatment and operation in the networks and in 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 • principles of team working and their applications • the personal skills, strengths and needs that relate to the roles, responsibilities and duties of others, individually and collectively • the parameters within which activities need to be scheduled	
	The individual shall be able to: • prepare and maintain a safe, tidy and efficient work area • manage and dispose of the refuses 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 • apply or exceed health and safety standards applying to the environment, equipment and materials • restore the work area to an appropriate state and condition • contribute to team performance broadly and specifically • give and take feedback and support	
2	**Communication and interpersonal skills**	**10**
	The individual needs to know and understand: • the range and purposes of documentation in both paper and electronic form • 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, recommendations) • the required standards for communication with clients, team members and others • the purposes and techniques for generating, maintaining and presenting records	

	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 • 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 the client or client group	
3	**Electrical**	**10**
	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 a control cabinet and their functionality • Exchange defective components within a control cabinet • Take electrical measurements and interpret/verify the results • Connect wires/cables according to industrial standards • Install, set up and adjust/calibrate electrical and sensor systems as required • Ensure connection of all wiring according to the circuit diagram • Ensure the functionality of the electrical system (i.e.: rotation direction	

4	**Mechanical**	**10**
	The individual needs to know and understand: • The basics of materials (metals, composites, plastics, etc.) • The basics in processing methods of different materials • The basics of connection technology • The basics of mechanical engineering (mechanics, sealing methods, gear technology, etc.) • The basics of fluidics • Criteria and methods for testing equipment and systems • Analytical techniques for fault finding • Techniques and options for making mechanical repairs • Develop strategies for problem solving • Principles and techniques for generating creative and innovative solution • What water loss and leakage is, its potential causes and potential solutions for prevention	
	The individual shall be able to: • Repair components (up to systems) efficiently • Monitor and control process relevant equipment • Adjust and/or calibrate systems where necessary, according to instruction manuals • Use accessories efficiently • Ensure the correct function of the system • Adjust process relevant parameters • Identify cost drivers and define methods for its 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.	
5	**Environment Protection**	**10**
	The individual needs to know and understand: • The logical sequence of network flow and purification steps • The hazardous aspects/points for the environment (danger/risk analysis) • Different mitigation methods • The basic calculations required within water and wastewater network and treatment processes • 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 • Contingency plans	

	The individual shall be able to: • Operate all steps within a water or wastewater network and treatment plants • Execute proper preventive or correction actions in order to maintain efficiency within all treatment steps • Perform calculations based on given facts • Identify potential problem zones and devise remedies accordingly • Communicate with the defined target groups, in order to give the correct information about the types of refuse that can be disposed in the wastewater collection system • Communicate with the defined target groups, in order to give the correct information about a water distribution system, its possible flaws, water quality and shortage periods • Take measurement and carry out analyses for process and quality control • Monitor and document in compliance with legal requirements • Work in a cost, environmental and hygiene-conscious manner • 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) • Avoid the use of hazardous substances and make proposals for their replacement • Create and evaluate contingency plans	
6	**Chemical/Biological – Quality Assurance**	**25**
	The individual needs to know and understand: • The basics and principles of solvents and solution preparation, mixing and dilution, including basics calculation • The proper use of each specific glassware, analytical equipment or instrument • How to read and execute standard analytical assay protocols • The basics and principles of sample pre-treatment, storage, sample preserving and sample taking • The basics and principles of measuring samples using different techniques (classical and instrumental analysis) • Basic principles of chemical analysis – quality assurance • Basic principles of biological analysis – quality assurance • The basics and principles of the statistical analysis that concern the specific sample (e.g. standard calibration curves, quantification limit, standard deviation) • Basic operation/function 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 the specific assay protocol • Clean and calibrate equipment and instruments before starting the assay protocol • Take samples, including its preservation and pre-treatment • Laboratory equipment according to their function • Follow chemical and biological analysis protocols and quality • Clean and store the equipment and instruments used • Estimate the concentration of an unknown sample, using the proper analytical method, protocol and statistical analysis • Document results/findings • Provide information about the water or wastewater quality, in order to identify any kind of problem within the water or wastewater treatment steps • Acquire information about the water or wastewater quality, in order to identify and execute preventative or corrective actions along the treatment steps • Provide information about the water or wastewater quality in order to fulfil laws and regulation aspects, aiming to keep the population safe and healthy	
7	**Automation and documentation**	**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	
	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 a system and make qualified adjustments • Identify elements within process control, together with their functionality • Monitor, control and regulate systems manually and by using control and communication systems • Document all data in electronic and/or paper form	
8	**Application of health and safety measures**	**10**
	The individual needs to know and understand: • Basics principles and practices of hygiene • Risk assessment for (biological, chemical, electrical, thermal and mechanical-operations) • Health and work-related regulations • The meaning of relevant danger and safety symbols/signage • Health maintaining regulations, personal protection equipment (PPE)	

	The individual shall be able to: • Recognize risks • Create/develop safety instructions • Apply and adhere to work related safety and accident mitigation regulations • Identify health and safety hazards as well as dangerous situations in the workspace environment and generate actions/steps towards their mitigation.	
	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 Specification. The Test Project is the assessment vehicle for the skill competition, and also follows the Standards Specification. 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 Standards Specification and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, in order to demonstrate their quality and conformity with the Standards Specification.

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI 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 standards that represent the skill. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards Specification.

By reflecting the weightings in the Standards Specification, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill 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 Specification, if there is no practicable alternative.

The Marking Scheme and Test Project may be developed by one person, or several, or by all Experts. The detailed and final Marking Scheme and Test Project must be approved by the whole Expert Jury prior to submission for independent quality assurance. The exception to this process is for those skill competitions which use an independent designer for the development of the Marking Scheme and Test Project. Please see the Rules for further details.

Experts and independent designers are required to submit their Marking Schemes and Test Projects for comment and provisional approval well in advance of completion, in order to avoid disappointment or setbacks at a late stage. They are also advised to work with the CIS Team at this intermediate stage, in order to take full advantage of the possibilities of the CIS.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition using the CIS standard spreadsheet or other agreed methods.

4.2 ASSESSMENT CRITERIA

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived in conjunction with the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards Specification; in others they may be totally 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 Specification.

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define 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). It is advisable not to specify either the Assessment Criteria, or the allocation of marks, or the assessment methods, within this Technical Description.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment 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) specified 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, or instructions for how the marks are to be awarded. Aspects are assessed either by measurement or 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 skill in the Standards Specification. 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)

		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, in all circumstances. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (See 4.6.)

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)
- 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, with a fourth to coordinate the marking and acting as a judge to prevent compatriot marking.

4.7 ASSESSMENT AND MARKING USING MEASUREMENT

Three Experts will be used to assess each aspect. 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.

4.8 THE USE OF MEASUREMENT AND JUDGEMENT

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

4.9 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

The skill assessment specification will be completed once the Test Project modules have been drafted. Both measurement and judgement will be used. The choice of either will depend on the agreed aspects to be marked.

4.10 SKILL ASSESSMENT PROCEDURES

There will be daily marking. Each sub criterion will be marked on a daily basis. Subject to their expertise, the rules and quality requirements, there will be a reasonable balance of marking by each Expert.

Each Test Project module will rigorously sample the relevant standards. The assessment criteria will largely or entirely follow the sections of the WorldSkills Standards Specification.

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 WSSS.

The purpose of the Test Project is to provide full, balanced and authentic opportunities for assessment and marking across the Standards Specification, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme and Standards Specification 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 Specification, or affect the balance of marks within the Standards Specification other than in the circumstances indicated by Section 2.

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.

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 Specification. Section 2.1 refers.

5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

The Test Project will demonstrate the daily work in this occupation.

Each Competitor has their own "water office". This space (4 m x 6 m) will include the process control.

The sample workshop layout can be seen in section 8.6.

The "water office" has three activity areas:

Area 1 – Space for process control work and documentation

In this workplace the Competitor will carry out their daily monitoring and control work. Documentation and report writing will take place at this workplace.

During the first "routine day" the Competitor will carry out routine work. They will control the water supply plant or the wastewater treatment plant. At the Competition the wastewater treatment plant will be the main workplace and the water supply will show up as an emergency duty. This could be change over in the next years.

Daily sampling and lab work may be an integral part of their work. During a normal day, the routine maintenance work for the next day may be prepared and a daily work report shall be written and filed at the end of every day.

The visitors will see the PC screen on a big monitor to observe the work. Charts, processes, pictures, videos, and virtual reality space can be seen. The visitors have the chance to see the daily job.

Area 2 – Space for sampling and lab work

Taking samples from water and sludge is within the normal program on water supply and wastewater plants.

During these normal duties the emergency situation may show up. In the morning during the regular monitoring the emergency call may show up.

The documentation work may be more because a monthly report about regular and emergency work has to be finalized and given to the supervisor.

Area 3 – Space for workshop and outdoor work

This space is flexible. The Competitor has to go to the logistic area. They have to pick up the right equipment and tools and has to bring the material with tables (with rolls) to the "water office".

Competitors will work on different tasks. The tasks will be from water supply and/or from wastewater duties. These tasks could easily change during the next competitions. In cooperation with different companies, different work and equipment can be used. With this method, the number of needed equipment will be reduced; the visitors will see different tasks on one day which will show the variety of the occupation.

A potential format in brief:

DAY	OVERVIEW
1	Routine work: Monitoring, inspection work over the plant (i.e.: wastewater treatment plant, water supply plant). Sampling of water and sludge, analysing in lab, Report writing, Preparing regular maintenance work
2 and 3	Routine work: Monitoring, scheduled or emergency repair or maintenance of equipment (e.g. pumps, valves, pipes, sensors, measurement devices) Emergency call during the day 2 and 3 (the call will differ from team to team; depending on the availability of the needed equipment): Emergency repair will continue, and the situation will be managed. The sand filter will be repaired, and the flow and process will be repaired.
4	This day is back to normal. The emergency is finished, the monitoring, sampling and lab work will be carried out to see the plant in a normal routine situation. All aggregates are well functioning and the false are successfully repaired. The documentation work will be more because a monthly report about regular and emergency work has to be finalized and given to the supervisor. The month is over and the major wants to know what happened and wants to know the costs and the measures to avoid problems. This story board will help to explain the occupation to the visitors. It shows routine work indoor (process and lab) and shows the outdoor task on the various "rolling tables". The occupation has variations. Inside work and outside work. Routine and emergency duties. Electrical, metal and chemical skills are need as well as communication and IT skills (see the standards).

ADDITIONAL TASKS FOR CONSIDERATION

Water Leak Detection

Water losses in the water supply network are common in many countries. In this context, the Water Supply and Wastewater Technician (WSWWT) has to work and has to find out where the leaking parts of the water supply pipeline are. The purpose of this work is to know the main leaking part of the pipe.

The Competitor has to use the given instruments in a proper way and has to show the good way to handle this. He surges to the fault by using the noise detection device and to document the values. After knowing the fault, the next process is to document the finding and to enable the construction company to repair the fault. The outcome of this work is to minimize the water supply losses. That will reduce treatment and pumping costs and saves water resources. The Competitor has to work systematically, has to use the equipment in a safe way, has to draw a good sketch and has to document the findings. They have to write a work report with all findings and report to the supervisor.

CCTV Inspection of pipes, wells, and sewers

CCTV cameras are commonly used in the water wells, pipes, drains, and sewers. This modern device is widely used in the water sector. In this context, the water technician should be able to use this device properly. The purpose is to use the CCTV camera in a professional way, to know the related standards, the inspection processes, and the systematic handling approach. The inspection has to be done according to the health and safety regulations. Inspections can be done into wells, water supply pipes, wastewater drains, and wastewater sewers.

The outcome is the documentation of the inspected part. This report has to be given to the supervisor.

5.3 TEST PROJECT DESIGN REQUIREMENTS

The structure below will be followed.

<table>
<tr><th>TIME</th><th>DAY 1</th><th>DAY 2</th><th>DAY 3</th><th>DAY 4</th></tr>
<tr><td>09:00</td><td>Briefing</td><td>2A
Wastewater Treatment Plant Process</td><td>3A
Wastewater Treatment Plant Process</td><td>4A
Wastewater Treatment Plant Process</td></tr>
<tr><td>10:00</td><td>1A
Wastewater Treatment Plant Process</td><td rowspan="2">2 C
Lab Work</td><td rowspan="2">3C
Lab Work</td><td>4B
Sampling and Lab Work</td></tr>
<tr><td>11:00</td><td>1B
Measurements, Monitoring</td><td>4B
Measurements, Monitoring</td></tr>
<tr><td>12:00</td><td colspan="4">Lunch break</td></tr>
<tr><td>13:00</td><td rowspan="2">1 B
Measurements, Monitoring</td><td rowspan="2">2 C
Labwork</td><td rowspan="2">3E
Pump</td><td>Assessment time</td></tr>
<tr><td>14:00</td><td></td></tr>
</table>

15:00		2 B/C EDS Chemical Lab Work	3 D Pneumatic Actor	
16:00	Assessment time	Assessment time	Assessment time	
Daily duration	5 hours	6 hours	6 hours	3 hours
	20 hours total			

5.4 TEST PROJECT 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 Who develops the Test Project or modules

The Skill Competition Manager (SCM) and the Water Technology sponsors, in secret, will develop the Test Project modules.

5.4.2 How and where is the Test Project or modules developed

Test Project modules are developed independently.

5.4.3 When is the Test Project developed

The Test Project modules will be developed by C-6 months in order to check their compatibility with the Infrastructure List and availability. They will be validated thereafter.

5.5 TEST PROJECT VALIDATION

The Test Project modules will be quality assured independently by the industry and also by WorldSkills International.

5.6 TEST PROJECT SELECTION

The Test Project is selected by the Skill Competition Manager and sponsors.

5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

The Test Project is circulated on C-4 before the Competition

5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

The Test Project is coordinated by the Skill Competition Manager.

5.9 TEST PROJECT CHANGE AT THE COMPETITION

All circulated Test Project modules will be subject to 30% change at the Competition if the Skill Management Team (SMT) consider it necessary.

5.10 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.

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 skill specific Discussion Forum (http://forums.worldskills.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 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 during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team led by the Skill Competition Manager The Skill Management Team comprises the Skill Competition Manager, 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 in the Expert Centre (www.worldskills.org/expertcentre).

7 SKILL-SPECIFIC SAFETY REQUIREMENTS

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

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 Experts for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Items supplied by the Competition Organizer are shown in a separate column.

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. Experts 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.

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

The maximum toolbox volume, including all wall thickness, shall not be to exceed 1.0 m³ (1m x 1m x 1m). When more than one toolbox is brought, then the total sum of the volume, including all wall thickness of all boxes, is not allowed to exceed 1.0 m³

8.3 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY COMPETITORS IN THEIR TOOLBOX

- Any commercially available tools may be used. This is subject to approval by the Workshop Manager
- from a safety perspective, but must not take away from commonly used "tools of the trade" as used by
- the Competitors in their every day job. The use of knives is prohibited due to the risk of injury;
- Competitors must supply their own tools;
- Recommended tools to work with the task:
    - Hammer 500 g;
    - Set of socket tool box, 8mm – 34mm;
    - Steel ruler or measuring tape, at least 200 mm long;
    - Open-jawed spanners size 6 mm - 34 mm;
    - Carpet knife;
    - Isolated head screw driver 0,4 x 2,5 mm and 0,4 x 1,9 mm;
    - Side cutter pliers;
    - Stripping pliers;
    - Cable jacket removing tool;
    - Crimping pliers;
    - Set of hex allen keys 1,5 to 10mm;
    - Yard stick;

- Long nosed pliers;
- Cable isolation remover tool;
- Slip joint pliers;
- Tubing cutter;
- Wire end ferrules crimper;
- Watering can;
- Pipe cutter;
- Double open-end wrench width across flats 24 x 27 mm;
- 2 x power plug for electrical with 5 to 6 plugs;
- Min. two Country plug adapters relevant to the competition country;
- Laptop (notebook);
- Mechanical safety gloves (if necessary, different pairs) – Cut protection, Closed fingers, Rubber tip for better grip.

- When some special tools are needed, then this will be announced in the Discussion Forum;
- Competitors must bring at least one printed copy of the Professional Practice document. The latest version will be announced in the forum one month before the competition (the individual Experts must make sure their competitors have the latest version).

8.4 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY EXPERTS

- Stop watch;
- Experts must bring a printed copy of the professional practice document. Last version will be announced in the Discussion Forum one month before the Competition;
- When the Experts have to bring something with them, then this will be announced in the Discussion Forum at least one month before the Competition.

8.5 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

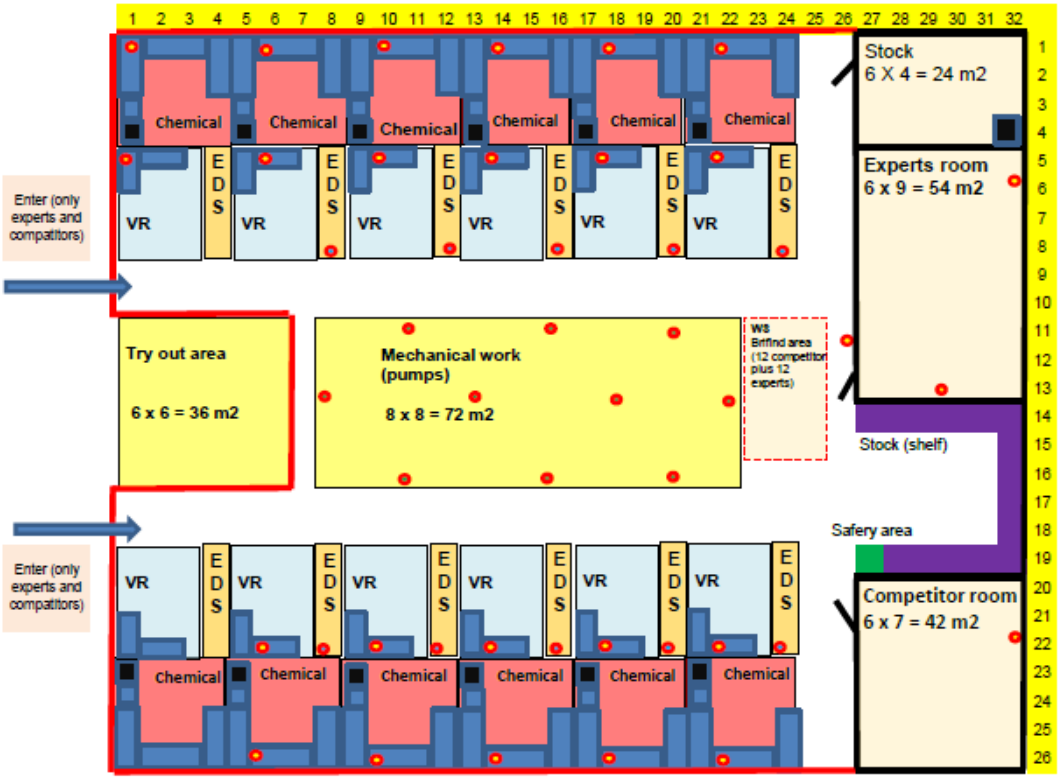
- Competitors may not supply components as spare parts;
- List of tools not allowed will be announced in the Discussion Forum at least six months before the competition.

8.6 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

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

Example workshop layout:

The sketch below is the first draft for the overall workshop. The Competitor's workstations will be seen as their "Water Office" and will include a flexible work space with mobile tables.



9 SKILL-SPECIFIC RULES

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 work flow, and documentation management and distribution.

TOPIC/TASK	SKILL-SPECIFIC RULE
Use of technology – USB, memory sticks	• Competitors are not allowed to bring memory sticks into the workshop • Experts and Interpreters are allowed to bring memory sticks into the workshop
Use of technology – personal laptops, tablets and mobile phones	• Competitors are required to bring personal laptops. Tablets or mobile phones must be locked away upon entering the workshop area. • Experts and Interpreters are allowed to bring personal laptops, tablets or mobile phones into the workshop.
Use of technology – personal photo and video taking devices	• Competitors, Experts, and Interpreters are allowed to use personal photo and video taking devices in the workshop at the conclusion of the competition only.
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 point reductions as stated in the tasks.
Equipment failure	• If equipment or tools which are brought by the Competitor fail, no extra time will be allowed. • If equipment or tools supplied by the Competition Organizer fail, extra time will be allowed only if the Technician of the sponsor or supplying company specifies and proves it is not a "user error".
Templates, aids, etc.	• The Competitors may bring pocket calculators to the Competition.
Assessment	• Competitors, Experts, and Interpreters a not permitted to take paper or digital copies of the Assessment out of the workshop until the competition has finished on C4.
Drawings, recording information	• Competitors are not allowed to bring any prepared drawings or documented information to the Competition. • All Test Project documents must be stored in the Expert room in lockers by the Chief Expert.
Health, Safety, and Environment	• Refer to the WorldSkills Health, Safety, and Environment policy and guidelines document.

10 VISITOR AND MEDIA ENGAGEMENT

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

- Test Project descriptions;
- 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 dispatched on the Competition area and show details of the task to the public and on a website;
- Competitor profiles - For each Competitor: provide a sticker with the national flag, the name of the Competitor and a brief description of their studies;
- Daily reporting of the Competition status;
- Try a Skill - in the Water Technology workshop (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 technician and answer public questions;
- Display a video(s), which show how Water technicians work, what they do in their everyday work, how the machines work (with which they interact, maintain and repair), and what they do and learn in during their studies.

11 SUSTAINABILITY

This skill competition will focus on the sustainable practices below:

- Recycling;
- Use of ‘green’ materials.
- Use of limited amount of water per competitor to wash glassware;
- Use of virtual reality tasks to avoid use of heavy equipment and large amounts of electricity
- The Competitor who uses less water, chemicals and electrical parts will receive an award.

12 REFERENCES FOR INDUSTRY CONSULTATION

WorldSkills is committed to ensuring that the WorldSkills Standards Specifications 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 Standards Specification 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.**oneto**nline.org/)

This WSSS appears to be a more senior version of *Water and Wastewater Treatment Plant and System Operators*: https://www.onetonline.org/link/summary/51-8031.00

and a more junior version of *Water/Wastewater Engineers*: https://www.onetonline.org/link/summary/17-2081.01 .

It appears to be a better fit with *Water Plant Technician*: http://data.europa.eu/esco/occupation/7f800e7d-9d86-406a-9116-b5eca7526869

Adjacent occupations can also be explored through these links.

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Standards Specification in place for WorldSkills Kazan 2019.

ORGANIZATION	CONTACT NAME
BCES, USA	Steven Harrison, Senior Manager, Operator Programmes, Education and Training
Dow Chemical Pacific Singapore Pte Ltd	Lewis Liu Ruixue, Key Account Manager
Festo Didactic SE	Nader Imani, Executive Vice President
Novexx Pte Ltd, Singapore	Lee Tze Kang, Excutive Director
European Water Association	Johannes Lohaus, General Secretary