

WorldSkills Standards Specification

Industrial Control

Manufacturing and Engineering Technology



THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

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.

WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	Work organization and management	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Health and safety regulations and best practice, especially in relation to hazardous working environments and the variety of locations and industrial settings where the work may be conducted • Safety requirements relating to plant and equipment • SIL levels of safety and the application to relevant industries • The importance of site safety inductions • The range of safety equipment used to protect self and others and the application relating to various industries • The types of hazards that may be encountered in industrial settings • The importance of effective communications and interpersonal skills 	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Consistently promote and comply with health and safety regulations and industry best practices in all working environments • Correctly use all safety equipment and personal protection equipment (PPE), lock off systems, and warning indicators • Recognize hazards and potentially hazardous situations and take appropriate actions to minimize risk to self and others • Work effectively as part of a team • Communicate effectively with other professionals including workshop supervisors and other staff where installations are being carried out • Explain complex mechanical and engineering projects to colleagues who may not have specialist knowledge • Provide expert advice and guidance regarding on-going use, care, and maintenance of equipment • Think logically and work systematically 	
2	Circuit design and modification	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Principles of technical specification diagrams • Special technical terms and symbols • Principles and functions of relay/contactors circuits and electro pneumatics 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Read and interpret and make additions to technical diagrams in a simulation software according to a function description • Advise on modifications to circuit design • Interpret drawing standard sections (DIN ISO 1219) that are to be used • Design electrical circuits 	
3	Making of the automation control panel/centre	15
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Terminology and symbols used in technical specifications and diagrams • Principles of technical drawing, circuit diagrams, layouts, function descriptions, and terminal drawings • Uses and layout of operation manuals • Electrical and mechanical tools used in panel building activities, such as drilling and cutting • Lean manufacturing processes (wastes etc.) • Responsibility/liability to the customer (extra holes, dirt, damages) 	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Read, understand, and interpret complex technical drawing, circuit diagrams, layouts, function descriptions, and terminal drawings • Apply information from technical specifications to effective work planning and solutions to engineering and operational problems • Install ducts, terminals, components, and wiring of the control panel according to the drawings and given tolerances • Complete appropriate panel building operations according to specifications • Interpret operations manuals and follow guidelines and instructions 	
4	Field Installation (electrical and automation)	25
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Issues and challenges of the installation of field components • Principles of technical drawings, layouts of installations and control panels, circuit diagrams, and flow charts • Principles and functions of all components used in field installation • Importance of accurate measuring and calculations during field installations 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Measure and calculate the correct positions for the components to be installed • Prepare and install wire trays within given tolerances • Install conduits, cables, devices, instruments, and control centre fittings • Install complex cabling systems that combine power and communications • Plan work effectively to meet time schedule requirements • Use all tools effectively and safely without risk to self or others in the workplace • Test and commission installed equipment • Complete all necessary documentation following installation 	
5	Programming	30
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Principles of technical specifications and diagrams • Processes of controlling motors, valves, and other devices used in industrial control • HMI and PC-based HMI/Visualization to communicate with the PLC code • Setting of input limits • Uses of industry accepted equipment such as PLC, HMI, VFD/VSD, and distributed IO • Distributed IO based and industrial Bus Technologies • Industry 4.0 technology ready • IEC sequence-programming methods (IEC 61131-3) 	

	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Create programmes according to written specifications and diagrams • Configure the HMI-screens according to written specifications and diagrams • Configure the VSD as required in the function description • Test functions thoroughly and safely • Demonstrate functions to users and provide expert advice and guidance • Conform to IEC sequence programming specifications 	
6	Fault-finding	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> • Safety risks during the fault-finding process • Principles of written specifications, technical drawings, and circuit diagrams • Components and symbols of the relay-based circuit diagrams • Principles of the Relay Control Fault Finding using a multi-meter • Principles and functions of the common Industrial relay/contactors control circuits • Principles and functions of PLC diagnostics • Field Bus Diagnostic principles 	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> • Apply all safety precautions • Read, understand, and interpret complex written specifications and diagrams, understanding all technical symbols • Analyse the correct principles of fault finding • Recognize incorrect principles of fault finding • Utilize the correct fault-finding principles • Utilize a range of tools and software to isolate faults 	
	Total	100

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.onetonline.org/)

This WSSS (Section 2) appears to relate most closely to *Industrial Engineering Technicians*:

<https://www.onetonline.org/link/summary/17-3026.00>

and/or to *Industrial Engineering Technician*: <http://data.europa.eu/esco/occupation/bcc21c63-7eee-4520-8fa7-43eefd389668>.

These links also enable adjacent occupations to be reviewed.