WORLDSKILLS STANDARD SPECIFICATION

Skill 18
Electrical Installations

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 not be separate tests of knowledge and understanding.

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. 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**	**5**
	The individual needs to know and understand: • Health and safety legislation, obligations and documentation • The principles of working safely with electricity • The situations when personal protective equipment must be used • The purposes, uses, care, maintenance and storage of all tools and equipment together with their safety implications • The purposes, uses, care and storage of materials • The importance of keeping a tidy work area • Sustainability measures applying to the use of 'green' materials and recycling • The ways in which working practices can minimize wastage and help to manage costs whilst maintaining quality • The principles of work flow and measurement • The significance of planning, accuracy, checking and attention to detail in all working practices • Impact of new technology	

	The individual shall be able to: • Follow health and safety standards, rules and regulations • Diligently follow electrical safety procedures • Identify and use the appropriate personal protective equipment including safety footwear, ear and eye protection • Select, use, clean, maintain and store all tools and equipment safely • Select, use and store all materials safely • Identify and take care of expensive fixtures/fittings • Plan the work area to maximize efficiency and maintain the discipline of regular tidying • Measure accurately • Manage time effectively • Work efficiently and check progress and outcomes regularly • Establish and consistently maintain high quality standards and working processes	
2	**Communication and Interpersonal Skills**	**10**
	The individual needs to know and understand: • The significance of establishing and maintaining customer confidence and trust • The importance of maintaining and keeping knowledge base up-to-date • The roles and requirements of related trades • The value of building and maintaining productive working relationships • Techniques of effective teamwork • The importance of swiftly resolving miss-understandings and conflicting demands	
	The individual shall be able to: • Interpret customer requirements and manage customer expectations positively • Provide advice and guidance on products/solutions e.g. technological advancements • Visualize and translate customer wishes making recommendations which meet/improve their design and budgetary requirements • Question customers closely/deeply to fully understand requirements • Provide clear instructions • Introduce related trades to support customer requirements • Produce written reports for customers and the organization • Produce a cost and time estimate for customers • Recognize and adapt to the changing needs of related trades • Work effectively as a member of a team	
3	**Problem Solving, Innovation and Creativity**	**10**
	The individual needs to know and understand: • The common types of problem which can occur within the work process • Diagnostic approaches to problem solving • Trends and developments in the industry including new technology, standards and working methods e.g. 'smart house' and energy saving measures	

	The individual shall be able to: • Check work regularly to minimize problems at a later stage • Identify problems originating from the work of a related trade e.g. heating pump, ventilation system etc. • Challenge incorrect information to prevent problems • Recognize and understand problems swiftly and follow a self-managed process for resolving • Recognize opportunities to contribute ideas to improve the solution and overall level of customer satisfaction • Demonstrate a willingness to try new methods and embrace change e.g. ready- made components	
4	**Planning and Design**	**5**
	The individual needs to know and understand: • Different types of standards, drawings, installation descriptions and manuals • Range of materials and installation techniques to be used in different environments	

	The individual shall be able to:
	• Read, interpret and revise drawings and documentation including:
	  • Layout and circuit drawings
	  • Follow written instructions
	  • Plan installation work using drawings and documentation provided	

5	**Installation**	**30**
	The individual needs to know and understand: • Ducting and wiring systems for commercial, domestic, residential agricultural and industrial use and when and where to use a specific ducting and/or wiring system • The range of electrical switchboards used for commercial, domestic, residential, agricultural and industrial uses and when and where to use a specific switchboard system • Types of electric lighting and heating systems for commercial, domestic residential and industrial use • Control devices and socket outlets used for commercial, domestic, residential, agricultural and industrial uses • Structured cabling systems including: computer network cabling, fire/burglar alarm (conventional and addressable), evacuation control (audio and optical), control and monitoring, access control ('stand-alone' and 'network supervised'), closed circuit television (cameras, lenses and attachment component, recorders and monitors	

	The individual shall be able to: • Select and install equipment and wire ways as per drawings and documentation provided • Install ducting and cabling systems on different surfaces as per manufacturer's instructions and current industrial standards • Select and install single and double insulated cables inside ducts, conduits and flexible conduits • Install and securely fix double insulated cables onto cable ladder, cable tray and different surfaces as per manufacturer's instructions and current industrial standards • Install metal and plastic ducting (trunking): accurately measure and cut duct at specified lengths/angles; assemble without distortion to joints and to specified tolerances • Assemble different termination adaptors, including glands onto duct and attach ducts, of different types, securely onto a surface • Install metal and plastic conduits/flexible conduits and attach securely onto surface, maintaining even radius bends, without distortion to conduit • Correct termination adaptors used for entry of conduits into boxes, boards and ducts • Install and securely attach different types of cable ladder and cable tray to a surface • Install electrical switchboards onto a surface in a secure way and assemble switchboard apparatus in a switchboard as per layout drawings/instructions to include: main switches, RCDs, MCBs, fuses, controlling equipment such as relays and timers and home and building automation devices • Terminate and install wiring inside a switchboard according to circuit drawings • Connect equipment as per instructions provided to include: structured cabling systems as per manufacturer's instructions and current industrial standards and regulations	
6	**Testing, Reporting and Commissioning**	**25**
	The individual needs to know and understand: • Industrial regulations and standards applicable to different types of installations • Verification standards, methods and reports to be used to record verification results • Types of measuring instruments • Tools and software used for parameterization, programming and commissioning • The correct operation of the electrical installation in accordance with the planned specification and customer requirements	

	The individual shall be able to: • Test installations before energizing to ensure personal and electrical safety to include: insulation resistance and earth continuity tests, correct polarity and complete a visual inspection • Test installations when energized by checking complete function on all equipment installed to ensure correct operation of new installation as per instructions • Set-up equipment to include: selecting and using the appropriate software for programming programmable relays, bus-system; creating necessary settings on devices such as timers and overload relays; programming programmable relays: downloading and importing applications required and programming bus-systems such as for example KNX • Set the installation to fully functioning and ensure customer can operate	
7	**Maintenance, Fault Finding and Repair**	**15**
	The individual needs to know and understand: • Different types of installations for specific environments • Different generations of installations • The purpose of a specific installation • The customers' needs for various functions	
	The individual shall be able to: • Adapt to changing circumstances • Troubleshoot electrical installations and identify faults including: short and open circuits, incorrect polarity, insulation resistance and earth continuity faults, incorrect settings on equipment and incorrect program on programmable devices • Diagnose electrical installations and identify problems including: bad connections, incorrect wiring, high loop impedance and equipment failure • Verify that an existing electrical installation still meets current standards • Use, test and calibrate measuring equipment including: insulation resistance, continuity and installation testers, multi, clamp and network cable testers • Repair and replace faulty components in electrical installations • Rewire and or repair faulty installations	