

# WORLD SKILLS STANDARD SPECIFICATION

Skill 10  
Welding





# 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](http://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	25
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"><li>• The standards and laws relating to the health, safety, security and hygiene in the welding industry</li><li>• The standards and regulations relating to safe working practices, accident procedures, evacuation procedures and escape routes</li><li>• The range, use and maintenance of personal protective equipment used in the industry for any given circumstances</li><li>• The selection and use of safety equipment related to specific or dangerous tasks</li><li>• The safety recommendations and regulations relating to the welding of materials in all conditions including wet/damp areas, confined spaces and situations where oxygen levels are likely to be below those required for safe working.</li><li>• The recommendations, regulations and procedures required to prevent explosion, fire or combustion in all circumstances</li><li>• Terminology and safety data supplied by manufacturers</li><li>• The dangers of slips, trips and falls while engaged in welding operations</li><li>• Primary electrical supply circuit terminology and its operation</li><li>• Secondary electrical / welding circuit terminology and operation</li><li>• The requirements and effects of welding production for the environment and sustainability issues</li><li>• Basic mathematical manipulation and unit conversion</li><li>• Geometrical principles, techniques and calculations</li></ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"><li>• Work safely with regard to themselves and others in all circumstances</li><li>• Select, wear and maintain PPE to high standards as appropriate</li><li>• Select, maintain and wear specialist safety PPE as appropriate to tasks</li><li>• Recognize hazardous situations and take appropriate actions with regard to their own and others safety</li><li>• Follow correct procedural processes when working in dangerous and semi-dangerous environments</li><li>• Demonstrate the adherence to manufacturers safety data sheets</li><li>• Maintain a clean working environment</li><li>• Store used materials in relevant containers for recycling and sustainability</li><li>• Complete work within agreed timescales</li><li>• Calculate material requirements, consumables and costs of welding</li><li>• Calculate areas and volumes using geometric formulae</li><li>• Recognize and inspect the main components of primary and secondary electrical/welding circuits</li><li>• Make essential connections for specific welding procedures being undertaken</li></ul>	



2	Preparation for welding	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The interpretation of welding / engineering drawings and weld symbols</li> <li>• Correct alignment of process with material being used</li> <li>• The classification and specific uses of welding consumables including: <ul style="list-style-type: none"> <li>• Colour coding of gas cylinders</li> <li>• Coding and designation of welding rods</li> <li>• Diameters and specific use of welding wire</li> <li>• Choice and preparation of welding electrodes</li> <li>• Forms of edge preparation process available</li> </ul> </li> <li>• How surface contamination can influence the finished weld characteristics</li> <li>• The correct machine settings to be aligned to: <ul style="list-style-type: none"> <li>• Welding polarity</li> <li>• Welding position</li> <li>• Material</li> <li>• Material thickness</li> <li>• Filler material and feed speed</li> </ul> </li> <li>• Any fine adjustments needed to machine hardware, TIG electrode shape, wire type and diameter etc.</li> <li>• The characteristics and properties of filler materials</li> <li>• The methods of edge preparation to align with joint profile, strength, material and drawing specification</li> <li>• Welding parameters/variables for specific tasks</li> <li>• Effects of changes in welding variables/ parameters of completed weld</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Prepare material edges as per drawing specification</li> <li>• Select welding consumables by use, size, positional characteristic and material being welded</li> <li>• Remove surface contamination prior to welding</li> <li>• Select correct filler material and size to suit materials being welded</li> <li>• Adjust welding equipment with consideration to welding parameters/variables</li> <li>• Set up welding equipment to manufacturers specification including (but not limited to) <ul style="list-style-type: none"> <li>• Welding polarity</li> <li>• Welding amperage</li> <li>• Welding voltage</li> <li>• Wire feed speed</li> <li>• Travel speed</li> <li>• Travel/electrode angles</li> <li>• Mode of metal transfer</li> </ul> </li> <li>• Prepare material edges in line with specification and drawing requirements</li> </ul>	



3	Welding material	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"><li>• The mechanical and engineering properties of carbon steels</li><li>• The mechanical and engineering properties of (5000 and 6000 series) aluminium and its alloys</li><li>• The mechanical and engineering properties of stainless steel (austenitic 300 series)</li><li>• Selection, and storage of welding consumables</li><li>• Correct storage and handling of welding consumables</li><li>• Selection and safe use of electrical power tools</li><li>• The influence of time taken on the outcome cost of services</li><li>• The supply costs of metals and consumables used for specific tasks</li><li>• The control of material and welding operations in environmental protection</li></ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"><li>• Use materials with consideration to their mechanical and engineering properties</li><li>• Store welding consumables correctly with reference to type, use and safety considerations</li><li>• Select and prepare materials with reference to drawing material list and welding symbols</li><li>• Prepare materials according to their properties and surface characteristics</li><li>• Use electrical power tools safely to cut, grind and prepare / finish welds</li><li>• Work efficiently within time limits set</li><li>• Use material efficiently with a view to supply and replacement costs</li><li>• Carry out work effectively and efficiently with regard to environmental protection</li></ul>	



4	Welding Processes	60
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"><li>• The international specifications for the control of weld quality</li><li>• Specific terminology used in the welding industry</li><li>• The precautions necessary for the safe use of power tools and welding equipment</li><li>• Terminology, characteristics and safe use of welding and purging gasses</li><li>• Recognition and selection of welding consumables</li><li>• The selection, use and techniques of the various welding process used</li><li>• The specific methods used in shielding the weld area from contamination</li><li>• The selection of gasses used for shielding and purging</li><li>• Weld positions, weld angles and electrode travel speeds</li><li>• Faults / inclusions that may occur during welding</li><li>• Methods of distortion control in steels, alloys and aluminium</li><li>• Appropriate methods of finishing completed welds</li><li>• Range of destructive and non-destructive weld testing</li><li>• The techniques for efficient stop / starts</li><li>• The selection, adjustment and safe operation of electrical power tools</li><li>• The methods used to control heat input</li><li>• Methods and processes used in transfer of weld metal to the weld area</li><li>• The benefits of alloying to improve the properties of welding material</li><li>• The benefits and limitations of specific welding processes</li><li>• Weld defects and their appropriate rectification</li><li>• The importance of weld metal cleanliness in weld quality</li></ul>	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"><li>• Make welded joints in relation to international specifications</li><li>• Interpret welding terminology to complete task to specification</li><li>• Maintain welding equipment to deliver quality results</li><li>• Select and use appropriate method of shielding the weld area from contamination</li><li>• Select and adjust welding equipment to provide appropriate methods of Weld metal transfer to the weld area</li><li>• Select correct welding consumable to suit process and conditions</li><li>• Perform welding in all positions on pipe and plate for all nominated welding processes as detailed in ISO 2553 and AWS A3.0/A2.4</li><li>• Weld steel plate and sections using the manual metal arc welding process (111)</li><li>• Weld steel plate and sections using the gas metal arc welding process (135)</li><li>• Weld steel plate and sections using the flux cored welding process (136)</li><li>• Weld stainless steel plate and sections using the Gas tungsten arc welding process (141)</li><li>• Weld aluminium plate and sections using the gas tungsten arc welding process (141)</li><li>• Dress welds using wire brushes, scrapers, chisels etc.</li><li>• Perform stop / starts to weld processes</li><li>• Dress completed welds</li><li>• Work accurately to drawing specification</li><li>• Produce welds to meet drawing and legislative specifications</li><li>• Correct weld faults and inclusions to maintain quality</li><li>• Check completed work against drawing requirements to reflect accuracy, square and flatness where necessary</li><li>• Set up and operate appropriate controls to minimize and correct distortion</li><li>• Perform non-destructive weld testing</li><li>• Demonstrate the preparation and safe use of electrical power tools and equipment</li><li>• Carry out appropriate procedures to control heat input</li><li>• Recognize weld defects and take appropriate action to rectify them</li><li>• Take appropriate actions to ensure that weld metal cleanliness is maintained</li></ul>	
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