

Technical Description  
**Architectural  
Stonemasonry**

CONSTRUCTION AND BUILDING TECHNOLOGY





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:

<b>1 INTRODUCTION .....</b>	<b>2</b>
<b>2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS) .....</b>	<b>4</b>
<b>3 THE ASSESSMENT STRATEGY AND SPECIFICATION .....</b>	<b>10</b>
<b>4 THE MARKING SCHEME .....</b>	<b>11</b>
<b>5 THE TEST PROJECT .....</b>	<b>16</b>
<b>6 SKILL MANAGEMENT AND COMMUNICATION .....</b>	<b>20</b>
<b>7 SKILL-SPECIFIC SAFETY REQUIREMENTS .....</b>	<b>21</b>
<b>8 MATERIALS AND EQUIPMENT .....</b>	<b>23</b>
<b>9 SKILL-SPECIFIC RULES .....</b>	<b>26</b>
<b>10 VISITOR AND MEDIA ENGAGEMENT .....</b>	<b>27</b>
<b>11 SUSTAINABILITY .....</b>	<b>28</b>
<b>12 REFERENCES FOR INDUSTRY CONSULTATION .....</b>	<b>29</b>

Effective 12.10.16

Stefan Praschl  
Chair of the Competitions Committee

Michael Fung  
Vice Chair of the Competitions Committee

© WorldSkills International (WSI) reserves all rights in documents developed for or on behalf of WSI, including translation and electronic distribution. This material may be reproduced for non-commercial vocational and educational purposes provided that the WorldSkills logo and copyright notice are left in place.



# 1 INTRODUCTION

## 1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION

1.1.1 The name of the skill competition is

Architectural Stonemasonry

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

An architectural stonemason generally works in the commercial sector, cutting to shape all natural stones (granite, limestone, sandstone, and marble) by hand. In this sector, machines are also used, and may be a component of the stonemason's role. However, operation of these machines is not the task of a stonemason.

There is a direct relationship between the nature and quality of the product required and the payment made by the customer. Therefore, the stonemason has a continuing responsibility to work professionally in order to meet the requirements of the customer and thus maintain and grow the business. As part of this, deep knowledge of geology, materials, processes, and building methods, new and old, are crucial.

The architectural stonemason works on heritage sites and in workshops. The work will range from basic places of worship to massive gothic cathedrals, from simple but significant buildings to the grand architectural and secular commercial and municipal buildings that define a country's heritage. It also includes new building, both classical and commercial.

He or she will produce stonemasonry components, and should be able to undertake letter cutting and carving by hand and machine.

Work organization and self-management, communication and interpersonal skills, problem solving, innovation and creativity, working safely and accurately are the universal attributes of the outstanding architectural stonemason. Whether the architectural stonemason is working alone or in a team the individual takes on a high level of personal responsibility and autonomy. The ability to work with other trades is also increasingly important.

Mistakes are irreversible and very costly. Every part in the process, from working safely through to exceptional precision, accuracy and attention to detail, is important.

Restoring, conserving, renovating and maintaining cultural and architectural heritage is highly valued for structures that are locally, regionally, nationally and internationally significant. For the talented architectural stonemason there are many commercial and international opportunities; however, these carry with them the need to understand and work with diverse cultures and trends. The diversity of skills associated with architectural stonemasonry is therefore like to expand.

## 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](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.



## 2.2 WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	<b>Work organization and management</b>	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The geology, materials, processes, and building methods, new and old, that relate to the role of the stonemason</li> <li>• The principles of working safely with electricity and compressed air equipment</li> <li>• Health, safety, and hygiene legislation, obligations, regulations, and documentation</li> <li>• Specific legislation and regulations governing vibration and noise at work within own country</li> <li>• Emergency procedures and reporting processes for accident, first-aid and fire</li> <li>• The situations when personal protective equipment (PPE) must be used</li> <li>• The purposes, uses, care, maintenance, storage of tools/equipment, and safe handling implications</li> <li>• The purposes, uses, care, storage of materials, and safe handling implications</li> <li>• The importance of keeping a tidy work area</li> <li>• The ways in which working practices can minimize wastage and help to manage costs</li> <li>• The importance of safe disposal of waste for re-cycling</li> <li>• The significance of planning, accuracy, checking, and attention to detail in all working practices</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Follow health, safety, and hygiene standards, rules, and regulations</li> <li>• Maintain a safe working environment</li> <li>• Identify and use the appropriate personal protective equipment including safety footwear, hand, ear, eye, and dust protection</li> <li>• Select, use, clean, maintain and store all hand and powered tools safely</li> <li>• Select, use, and store all materials safely</li> <li>• Examine and sign off material as falling within the acceptable range for use</li> <li>• Plan the work area to maximize efficiency and maintain the discipline of regular tidying</li> <li>• Measure accurately and avoid wastage</li> <li>• Work efficiently and check progress and outcomes regularly</li> <li>• Safely and sustainably dispose of recyclable and dangerous waste</li> </ul>	



2	<b>Communication and interpersonal skills</b>	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The roles and requirements of related trades and the most effective methods of communication</li> <li>• The value of building and maintaining productive working relationships</li> <li>• The importance of swiftly resolving misunderstandings and conflicting demands</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Determine requirements and manage expectations positively</li> <li>• Visualize and translate wishes, making recommendations which meet design and budgetary requirements</li> <li>• Recognize and adapt to the changing needs of architects and related trades</li> <li>• Clearly communicate to colleagues where drawings, variations to the documents and work restrictions are required</li> <li>• Challenge incorrect information to prevent problems</li> </ul>	
3	<b>Problem solving, innovation, and creativity</b>	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The common types of problem which can occur within the work process</li> <li>• Diagnostic approaches to problem solving</li> <li>• Trends and developments in the industry within own country and more widely</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Check work regularly to minimize problems at a later stage</li> <li>• Recognize and understand problems issues swiftly and follow a self-managed process for resolving</li> <li>• Demonstrate a willingness to try alternative methods and positive change</li> </ul>	
4	<b>Interpretation of drawings</b>	5
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The essential information that must be included in construction and detail drawings</li> <li>• The importance of checking for missing information or errors, anticipating problems and resolving in advance of the 'setting out' process and construction</li> <li>• The role of geometry</li> <li>• Mathematical processes and problem solving</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Accurately interpret all plans, elevations, sections, and enlarged details</li> <li>• Identify key dimensions and all angles</li> <li>• Identify curved work</li> <li>• Recognize all features, such as arch work, letters, and symbols</li> <li>• Establish any features that require special equipment or templates and ensure they are available or created</li> <li>• Identify drawing errors or items that require clarification</li> <li>• Determine and check quantities of materials required to produce specified projects</li> </ul>	



<b>5</b>	<b>Information and quantities</b>	<b>5</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The essential information that must be included in specifications</li> <li>• The importance of checking for missing information or errors</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Accurately interpret and produce building information from specifications</li> <li>• Produce basic outline drawings including elevations, plans, and sections to full size</li> </ul>	
<b>6</b>	<b>Produce complex templates</b>	<b>10</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The characteristics of materials used for templates: plastic, zinc, and aluminium sheets</li> <li>• Tracery features including: trefoil, quatrefoil, foils, cusps, dead eyes, pierced eyes</li> <li>• The differences between the orders of architecture: Doric, Ionic, Corinthian, Tuscan and Composite</li> <li>• The members of the entablature: cornice, frieze, architrave</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Select resources, including: plastic, sheet zinc, aluminium, and drawing paper</li> <li>• Produce complex templates and moulds including: tracery, foils, cusps, dead eye, pedestal, cornice, column coping, plinth, capital springer, keystone, or pediment</li> <li>• Apply information/identification marks to templates and moulds</li> </ul>	
<b>7</b>	<b>Produce setting out for templates</b>	<b>5</b>
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• Traditional and modern masonry features</li> <li>• Types of developed true shapes, raking sections, and stretched mouldings</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Set out work full size using standard drawing conventions</li> <li>• Use complex geometry to prepare templates in various materials</li> <li>• Produce templates from zinc sheet</li> <li>• Produce accurate, complex drawings prior to transferring to templates materials</li> <li>• Produce mouldings</li> <li>• Accurately cut templates and reverse templates in plastic, zinc, or aluminium to within 1 mm of specification</li> </ul>	



8	Produce stonemasonry components	50
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• Strategies to assist in the control of vibration</li> <li>• Strategies for reducing exposure to noise</li> <li>• Defects commonly found in natural stones</li> <li>• Specialist surface finishes</li> <li>• The characteristic and usability of the different types of stones, such as granite, sandstone, limestone, marble, etc.</li> </ul>	
	<p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Recognize and check the capacity of the stone for the task in hand</li> <li>• Apply complex templates to mark out the work</li> <li>• Position natural bedding plane in relation to component positions in structures</li> <li>• Use templates to mark out the whole of the work from the datum surface prior to commencing cutting operations to within 1 mm of specification</li> <li>• Apply complex geometric shapes to prepared block of stone</li> <li>• Prepare stone surfaces straight, square and out of twist various types of stones</li> <li>• Prepare stone surfaces to complex shapes using various technical processes</li> <li>• Produce various specified surface finishes to prepared stones</li> <li>• Work the stones square and to give dimensions with 1 mm of specification</li> <li>• Prepare a tooled finish to seen faces only</li> <li>• Produce complex worked stone components using hand and power tools to within 1 mm of specification including: corners, arises and internal mitres; measurements and external mitres; profiles, profile, curved, and flat surfaces</li> </ul>	
9	Produce letter cutting and carving	10
	<p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• Different methods to transfer information onto the stone surface</li> <li>• The characteristics of letters</li> <li>• The characteristics of materials</li> <li>• The different methods of carving including intaglio and bas relief</li> <li>• The different techniques of applying different surface and textured finishes</li> <li>• The need for all work to be presented to meet customer needs and expectations</li> </ul>	



	<p>The individual shall be able to:</p> <ul style="list-style-type: none"><li>• Select resources free from damage, faults or fissures to set out lettering and carving</li><li>• Apply full size drawing to mark out the work</li><li>• Identify the required position of lettering or carved motif on the stone</li><li>• Use carbon paper to transfer information to stone surface using full size drawing details</li><li>• Produce incised and letters in various types of stone</li><li>• Cut incised and raised letters to the specification using hand or pneumatic tools only to reduce the effects of Hand Arm Vibration Syndrome (HAVS) - or pneumatic tools</li><li>• Transfer from drawings and set out lettering in various modern or traditional styles</li><li>• Lightly clean carbon ink marks on the surface by removing with water and fine wet/dry paper</li><li>• Carve motif from given specification onto specified surface to required depth and finish using hand or pneumatic tools</li><li>• Produce straight or flowing lines which provide sharp edges and a crisp appearance</li><li>• Use texture, undercutting, and shadow effectively</li><li>• Organize any waste material in the correct way so that it can be disposed of or recycled efficiently</li><li>• Accurately interpret the clients brief/instructions</li></ul>	
	<b>Total</b>	<b>100</b>



## 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 external designer for the development of the Marking Scheme and Test Project.

In addition, Experts are encouraged 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 the complete and approved 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 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).

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 A 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) has a specified day on which it will be marked.

Each marking form (Sub Criterion) contains Aspects to be assessed and marked by measurement or judgement. Some Sub Criteria have Aspects marked by both measurement and judgement, in which case there is a marking form for each.

### 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, and appear on the appropriate marking form.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it and a reference to the section of the skill as set out in the Standards Specification.

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			2.75	1.00	1.25	0.25	1.00		6.25	6.00	0.25
	2		4.25			2.00		0.50	1.00	7.75	6.00	1.75
	3	11.00	9.75							20.75	22.00	1.25
	4			10.25	11.00					21.25	22.00	0.75
	5					9.50	10.00	1.50		21.00	22.00	1.00
	6					2.00		7.00	14.00	23.00	22.00	1.00
TOTAL MARKS	11.00	14.00	13.00	12.00	14.75	10.25	10.00	15.00	100.00	100.00	6.00	

### 4.5 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
- 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 acting as a judge where required to prevent compatriot assessment.



## 4.6 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.

## 4.7 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.

## 4.8 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

The skill assessment criteria are clear concise aspect specifications which explain exactly how and why a particular mark is awarded.

### Measurement marking

DEGREE OF TOLERANCE	POINTS AWARDED
Within tolerance < 1 mm	Full marks
Within tolerance < 2 mm	Half marks, arises zero marks*
Out of tolerance	Zero marks

\* Arises will be marked as YES (damage < 1 mm: full marks) or NO (out of tolerance: zero marks)

### Judgement marking

The marking will be judgement on the subsections layout and craftsmanship.

## 4.9 SKILL ASSESSMENT PROCEDURES

- The Experts will decide together on the Test Projects, the marking criteria and the dimensional tolerances on Subjective Marking Forms, Objective Marking Forms and Mark Summary Sheets;
- The drawings will indicate the actual positions where the assessment criteria are to be marked;
- The Chief Expert will divide the Experts into groups of three/four to mark;
- Every completed module will be marked as soon as possible;
- The pieces of stone are checked by the Experts before the arrival of the Competitors. The Workshop Manager places approved stones in the working areas;
- The working areas are divided among the Competitors by lottery. Stones will only be replaced when hidden faults occur during the working process;
- The maximum time of module one and two will be made public after the Experts have agreed. The finishing time is clearly written on the Competitor instructions of module one and two. When a Competitor finishes a module they may proceed with the next one. When a module is finished early the remaining time can be used for the next module;
- At least two hours are available to set up the working stations, especially to make the air Connection. The Workshop Manager must be available for support if necessary;
- When the Competition starts the Chief Expert will give the Competitors verbal instructions. If necessary, these will be translated in other languages;
- Prior to module one the Competitors will have an hour at their disposal to study the Test Projects;



- It is possible to give one or two hours' extra time on module three, but only if decided by minimum
- 80% of the Experts. This has to be announced to the Competitor before the start of the third day of the Competition.

### Criterion

1. Work organization, communication, and problem solving\*
2. Production of templates
3. Produce letter cutting and carving
4. General impression, surface finishing
5. Arises\*\*, measurements, internal and external angles, flat surface. Straight profile-surfaces, curved surfaces, fitting of templates to moulded piece.

\* Aspects will be marked as YES (full points) or NO (zero points)

\*\* When a corner is damaged the three adjacent arises will be considered as damaged

\*\* When arises are rubbed they will be marked with 0 points

The use of aspects to assess "Work organization, communication, and problem solving" (Section 1)

Each aspect below is to discuss as a YES or NO decision.

### Module 1 Produce Templates

1. Did the Competitor wear all in the instructions requested health and safety items during the template drawing and cutting?
2. Did the Competitor require extra zinc for templates?
3. In the case of a false start, the competitor will lose this aspect point for replacing extra zinc.
4. Do all templates have the correct identification marks to each template on the correct side in accordance to the drawing?
5. Did the Competitor complete the templates in the time as stated in the project? (not the maximum time)

### Module 2 Produce Letter Cutting/Carving:

1. Did the Competitor wear all in the instructions requested health and safety items during the chiselling?
2. Did the Competitor complete the Letter Cutting/Carving as stated in the project?

### Module 3 Produce the moulded pieces

1. Did the Competitor not cause unnecessary dust by blowing with air hose (with hammer is allowed)
2. Did the Competitor cleaned his workshop and removed the waist at the end of day 2?
3. Day 1: Did the Competitor wear all in the instructions requested health and safety items during the chiselling?
4. Day 2: Did the Competitor wear all in the instructions requested health and safety items during the chiselling?
5. Day 3: Did the Competitor wear all in the instructions requested health and safety items during the chiselling?
6. Day 4: Did the Competitor wear all in the instructions requested health and safety items during the chiselling?
7. The Competitor did never start before the scheduled time? No false start.
8. Did the Competitor not change his templates or produce a new template, after module 1 is finished?



### Generally

1. The Competitor didn't ignore any other ban or break any additional rule which is written in the Technical Description.

Procedures must be made to make clear to the competitors and the experts when points will be scored. These will be given to the competitors before the competition starts.

### Judgement Marking

The use of aspects to assess produce module 2 "Letter Cutting/Carving" (Section 5)

Each aspect below is to discuss as a judgement decision.

### Generally

Did the Competitor:

1. Produce free from pencil and handling marks (cleanliness of the finished product)?
2. Produce the background finishing (chiselling) in accordance with the instructions and drawing?

### **Letter cutting**

Did the Competitor:

1. Produce the lettering in accordance with the drawings?
2. Produce the consistent depth of the letters planes in "V" intersect at 80° to 100° degrees?
3. Produce the exterior letter arises, lines are straight and curves with consistent shapes?
4. Produce the internal surfaces of the letters and interior arises smooth without missing chips or ridges?

### **Ornament**

Did the Competitor:

1. Produce the ornament in accordance with the drawing?
2. Produce the depth of the ornament across the design?
3. Produce the exterior ornament arises lines produce straight and curves produce with consistent shapes?
4. Interpret the internal surfaces of the ornament in professional stile?

The use of aspects to assess module 3 "Surface finishing on moulded piece" (Section 4)

Each aspect below is to discuss as a judgement decision.

Did the Competitor:

1. Produce free from pencil and handling marks, (cleanliness of the finished product)?
2. Produce (chisel) all requested sides in accordance with the instructions and drawing?
3. Produce the flat surfaces in consistently and professional smooth stile, produce without missing chips or ridges?
4. Produce the profiles and curved surfaces in consistently and professional smooth stile, produce without missing chips or ridges?
5. Constantly chisel all the surfaces with professional stile?



## 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 and balanced 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.

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 2.2 refers.

### 5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

The Test Project is a series of standalone modules.

### 5.3 TEST PROJECT DESIGN REQUIREMENTS

The Test Project shall be presented in digital format. It must include detailed drawings of cutting and fitting. The project must include all the difficulties of straight, circular, and diagonal cutting. It must integrate masonry work, such as straight or circular and three dimensional work.

A global Test Project for assembling all pieces to one or more projects is possible, as a column with one or two pieces by same Competitor or a fountain, wall or arch. One template or more can be given at a scale of 1:1 for example large radius.

Depending on the type and characteristics of the natural stone, the Test Projects can be planned on the following objects: pedestal, cornice, column, coping, plinth, capital, springer, keystone, tracery, or pediment (module two), carving or letter cutting (module three).

Note: Sandstone and granite are not allowed because these types of stone contain a high quantity of silica. This would create a health and safety hazard for Competitors, Experts, and members of the public.



Organization example during the Competition:

DAY ONE	DAY TWO	DAY THREE	DAY FOUR
Module one, two and three	Module three	Module three	Module three
Module one Templates	Moulded pieces	Moulded pieces	Moulded pieces
Module two Letter cutting and/or ornament			
Module three Moulded pieces			

Module identification:

MODULE	NAME	HOURS
Module one	Templates	10-20 % of competition time
Module two	Letter cutting and/or ornament	10-20 % of competition time
Module three	Moulded piece	Up to 80 % of competition time

The Test Project must be in accordance with the Technical Description and include:

- Drawing;
- Photograph of completed project;
- Stone type: limestone or marble, colour, density, compression strength;
- Cutting list;
- Quarries or suppliers address.

The Test Projects are to be determined by the size of the provided material. Materials that have to be provided:

- The volume of the stone necessary for the Test Project cannot be more than 0.07 m<sup>3</sup> with a maximum of 0.05m<sup>3</sup> per stone if more than one stone is used;
- The density maximum for stone is up to a maximum of 2750 kg/m<sup>3</sup>; the stone should be a usual stone for stonemason work, preferably with no holes or defects.
- All stones to be supplied +5 mm than the finished size to allow for cutting and squaring to the actual dimension given with the project;
- The project can be in one or more stones (max three stones) with one stone in marble, module three in limestone the selection of the project to be made on the forum by the Experts.
- Module three will be checked with the templates of module one. Competitors are allowed to change the template or produce a new one with approval of the Chief Expert. If a Competitor makes any changes on the templates without approval of the Chief Expert, after finishing module one, that template will not be used to check module three. The aspects that should be measured by that template will be awarded zero.



## 5.4 TEST PROJECT DEVELOPMENT

The Test Project MUST be submitted using the templates provided by WorldSkills International ([www.worldskills.org/expertcentre](http://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 Test Project modules are developed by a non-compatriot external stonemason professional or if not available by all Experts.

### 5.4.2 How and where is the Test Project or modules developed

If the Test Project shall be drawn by an independent external drawer; the drawing will be kept secret till the start of the competition. Only measurement and quarry supplying the stone will to be announced.

In the case of no suitable external designer been found the Test Project or modules are developed independently by the Experts and submitted on the Discussion Forum.

### 5.4.3 When is the Test Project developed

The Test Project is developed according to the following timeline:

TIME	ACTIVITY	ACTIVITY WITH EXTERNAL DRAWER
Eight (8) months prior to the Competition	The proposed Test Project modules are developed and uploaded to the Discussion Forum for consideration by the Experts.	Dimensions of ashlar and delivering quarry shall be announced on the Discussion Forum.
At the Competition C-4	30% change is made to the Test Project modules	WSSS is to be handed out to all Experts
1.5 hours before the start of the competition	Instructions are given in support with compatriot Experts	
1 hour before the start of the competition	The Competitors are seeing the Test Project the first time. The compatriot Expert may NOT give support to his Competitor.	The Competitors and all Experts seeing the Test Project the first time. The compatriot Expert may give support to his Competitor.
In the break time during the competition	Open communication	

## 5.5 TEST PROJECT VALIDATION

It must be demonstrated that the Test Project or modules can be completed within the material, equipment, knowledge of the Competitor, and time constraints. This will be demonstrated by proof of function, proof of construction and completion in the set time as shown in a photograph submitted by the Expert designing the Test Project.



## 5.6 TEST PROJECT SELECTION

When the Test Project is not made by an external drawer, the Test Project is selected as follows by Experts on the Discussion Forum. Eight (8) months prior to the Competition the Chief Expert will circulate all Test Projects on the Discussion Forum and organize an Expert vote to be completed six (6) months before the Competition. The Chief Expert will confirm the Test Project selected with all Experts and it will be uploaded to the website.

## 5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

It is submitted three months before the current Competition.

## 5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

Coordination of the Test Project will be undertaken by the Expert whose Test Project was selected and the Chief Expert.

The Expert whose Test Project is selected will be provided to the WSI Secretariat and the Chief Expert with all documents, drawings, mark sheets, etc.

In addition, the Chief Expert will provide the Workshop Manager with details of the stone type and cutting list.

## 5.9 TEST PROJECT CHANGE AT THE COMPETITION

If no external expert was found the Test Project will be changed by a minimum of 30 % at the first planning meeting attended by all Experts at the competition venue and will be subject to the agreement of these Experts who have provided a proposal for 30% change. Experts who do not bring a proposal will waive their voting rights. Sizes of each stone for module three will not be changed.

Each Expert is required to bring a drawing of their proposal for a 30 % change.

## 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](http://www.worldskills.org/infrastructure) located in the Expert Centre.

A sample piece of stone of approximately 30x30x10cm must be available for testing the machines and tools. If two types of stone are used, a sample piece of each type must be provided.

- Module one: 1 m<sup>2</sup> zinc or aluminium sheet, thickness between 0.2 mm and 0.4 mm
- Module two: letter cutting or ornament will be worked on moulded pieces in limestone
- Module three: One, two or three pieces of stone to be cut with a circular diamond saw

The Competition Organizer is required to supply a sample of the stones to each registered Member. The size of the sample must be 10 x 10 x 5 cm and must be known together with the contact details of the producer/supplier six months before the Competition.

If two types of stone are used, a sample piece of each type must be provided. In addition, a sample 10x10 cm zinc or aluminium for the producing of templates must be available



## 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](http://www.worldskills.org/competitorcentre)).

This information includes:

- Competition Rules
- Technical Descriptions
- Marking Schemes
- Test Projects
- 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](http://www.worldskills.org/testprojects) and the Competitor Centre ([www.worldskills.org/competitorcentre](http://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 Chief Expert. The Skill Management Team comprises the Jury President, 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](http://www.worldskills.org/expertcentre)).



## 7 SKILL-SPECIFIC SAFETY REQUIREMENTS

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

The following skill-specific safety requirements must be met:

### General

- All machinery, equipment, and safety clothing must comply with the safety rules of the Host Country/Region;

### Dust extraction

- An adequate system for dust extraction must remove the stone dust produced during the work process and dust extractors added to the Infrastructure List;
- Dust extraction must be used in the correct manner at all times.

### Use of vibrating equipment

It is acknowledged that by 2010, European Union countries must reduce the use of vibrating equipment under the European Directive of 2002. Presently, there is insufficient data to make an informed, specific decision regarding the reduction until all countries have a strategy in place. The artistic stonemasonry Experts will carry out research and use published data to make any necessary changes for the competition. The UK continues to work within their Health and Safety Regulations and provide any new data via the forum.

Competitors and Experts must familiarize themselves with the WorldSkills Health, Safety, and Environment policy and guidelines prior to the competition, please make sure that all machines and equipment, as well as any personal protective equipment you wish to bring, are safe and in good condition and meet the required standards or with national or international standards.

The European Physical Agents (Vibration) Directive (2002/44/EC) deals with risks from vibration at work and is one of several Directives dealing with Physical Agents such as Noise and Vibration. This will influence the future use of pneumatic hammers used in artistic stonemasonry operations as all members of the European Union will be required to comply with these regulations. This clearly has an impact on the use of equipment at WSC and the reduction in their use for carving or lettering and the time taken to fix the stones is a move forward. Further improvements can be made by the selection of local limestone or marble with a low silica content supplied by the host country. This will reduce the effort in removal of waste and lessen the trigger time in use. The reductions in trigger time will also show a significant improvement in lowering the stonemasonry compressor running time and stonemasonry carbon footprint.



### Competitors

- Competitors must wear safety glasses during all chiselling operations, including sharpening the chisels;
- Competitors must wear gloves at all times;
- Competitors must wear appropriate clothing and safety footwear at all times;
- Competitors must wear hearing protection at all times;
- Competitors must wear dust mask protection at all times unless dust extraction is provided or is worked outside;
- Competitors must keep their workspace clear of obstacles and the floor space clean of material and equipment - any items likely to cause the Competitor to trip, slip or fall;
- Competitors must agree to and sign these regulations before starting the Competition;
- Failure by the Competitor to comply with safety directions or instructions will incur loss of marks for safety.

### Experts

- A sound insulated room with roof, door and windows (for instance a Porta Cabin) will be made available to the Experts due to the noise;
- Every Expert will be provided with a pair of ear defenders;
- Judges will wear the appropriate personal safety equipment when entering the working area when inspecting, checking or otherwise working with a Competitor's project;

### Spectators

- When spectators can come closer to the working table than three meters they must be protected from stone splinters by a fine wire screen or a similar arrangement. It is preferable that measures are taken to assure that neighbouring workshops are not bothered with the noise of the stonemason workshop.



## 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](http://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 COMPETITOR'S TOOLBOX

The toolbox should be as small and light as possible. See section 11.

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

Advice for the toolbox

#### Pneumatic tools

- Six pneumatic chiselling hammers with two hoses of 5 m and fittings;
- One Compressed-air reducing valve (regulator) with manifold;
- Chisels straight and round, booster, punch, point, claw tools (various sizes);

#### Hand tools

- Four Mallets (various sizes);
- Boosters, drafting chisels straight and round, punch, point, claw tool;
- Dummy/lettering/carving hammer;
- Carving chisels (various sizes);
- Lettering chisels (various sizes);
- Four Hammers,
- Squares, straight edges, depth gauges, combination squares; in total 10
- Five steel rules (various sizes).

In total about 50 chisels (hand and pneumatic)



### Setting out equipment

- Three Set squares (various sizes);
- Four Compass (various sizes);
- Assortment of dividers (various sizes);
- Drawing equipment;
- Wire wool/emery paper;
- Two Scissors;
- Tin snips
- Scribe;
- Flat and round files (only for templates);
- Knives
- Pencils;
- Pens;
- Drafting tape.

### Supplementary

- Dusting brush;
- Timber wedges;
- Paper for drawing;
- Carbon paper;
- Two Clamps;
- Sandpaper to finish the top of the letter piece;
- Bucket with sponge and hand brush.

Personal protection: ear protection, safety glasses, dust masks P3

## 8.4 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY EXPERTS

- Measuring equipment for checking tolerances – 1 mm and 2 mm shims
- Lubricant

## 8.5 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

The use of the following machines, fixtures and materials is NOT allowed:

- Grinding and cutting machines;
- Handsaws;
- Rasps and file (only for templates)
- Grinding stones: it is not allowed to rub arises. However, sandpaper may be used to clean the surface of the letter piece

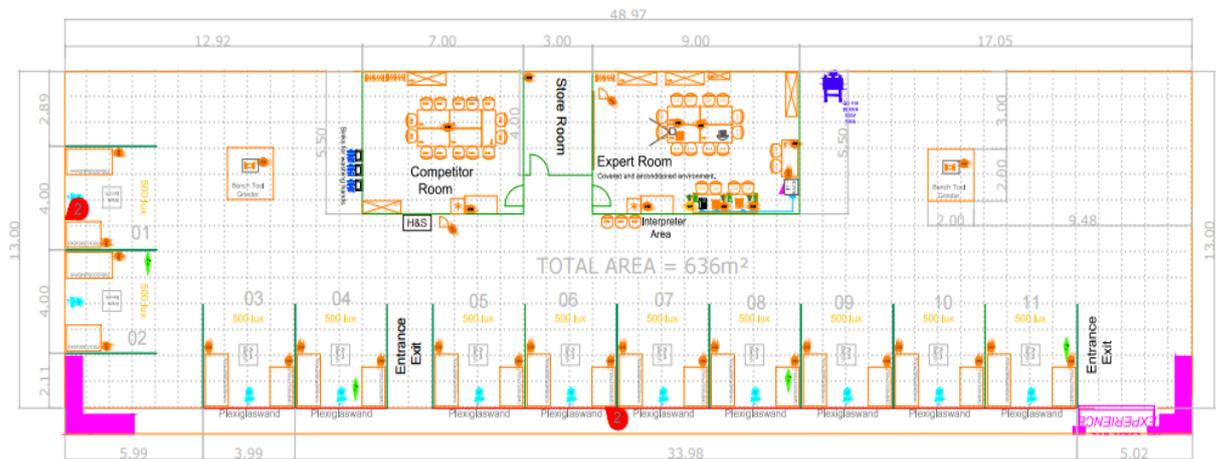
The use of any kind of adhesive for attaching or re-attaching any material is not allowed.



## 8.6 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

Workshop layouts from previous competitions are available at [www.worldskills.org/sitelayout](http://www.worldskills.org/sitelayout).

Example workshop layout:





## 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
Use of technology – personal laptops, tablets and mobile phones	Experts and Interpreters are allowed to bring memory sticks into the workshop and use them with their personal computer however they must be locked away at night and cannot be taken away from the workshop
Use of technology - personal photo and video taking devices	Experts and Interpreters are allowed to use personal laptops, tablets and mobile phones in the Expert room only however they must be locked away at night and cannot be taken away from the workshop
Templates, aids, etc.	Competitors are not allowed to bring personal laptop, tablets or mobile phones into the workshop
Drawings, recording information	Competitors are allowed to use personal photo and video taking devices in the workshop at the conclusion of the competition only
Equipment failure	Experts and Interpreters may use personal photo and video taking devices during the competition provided they are left locked away at the competition site for the duration of the competition
Health, Safety, and Environment	Sharing of any images is not allowed during the competition



## 10 VISITOR AND MEDIA ENGAGEMENT

Stonemasonry is in itself an attractive skill to watch. Because of the noise and the dust it is understandable that it is put away in a tent in a corner of the venue but it deserves a prominent place.

The following list provides examples of how this skill may be more attractive for the media and visitors.

- A sample of drawings showing the Test Project will be displayed:
  - Standard views of the project;
  - Individual components shown in 3D;
  - Finished project in 3D;
  - Experts to be available to explain the project and processes involved to spectators.
- Try a trade:
  - Subject to space and material being made available;
  - Successful 'try a trade' in Calgary saw many school children and adults having a go at stone carving;
  - Involve local stonemasonry schools to help demonstrate and supervise these sessions in future;
  - Stone used to be unsaleable offcuts or rough waste blocks at no cost.
- Display screens:
  - Power Point Presentation showing the work of the stonemason;
  - Profile and work of each Competitor;
  - Film of natural stone industry, also showing the use of machines;
  - Film of a quarry where natural stone is extracted;
- Test Project descriptions;
- Enhanced understanding of Competitor activity;
- See display screens and PPT Presentation above:
  - Competitor profiles;
  - Images of Competitor, examples of their work and employer to be supplied by each Expert;
  - Career opportunities
- Daily reporting of competition status.



# 11 SUSTAINABILITY

This skill will focus on the sustainable practices below:

## Material

- Stone selected for the competition should be from a source either within the host country or as close to the host country as possible to reduce excessive transport costs;
- The stone selected must not be at risk and large reserves should be available so there are sufficient stocks available to ensure the local and regional supplies are not endangered;
- Completed projects to be offered to Local Authorities for use or placement in areas where they will enhance the environment or offer a focal point to a space;
- Stone selected must not pose any health risks to Competitors, Experts, support staff and the public.

## Waste

- Any waste materials from the stone can be reused with careful thought. For example, crushing for aggregate can be passed for use in landscape gardening features or as a base or foundation material;
- To ensure there is minimum waste, project work left after the competition can be offered to host country local authorities, schools etc. for placing in gardens, alternatively projects may be auctioned or sold after the competition to WSC Members or general public and proceeds given to local charities. In Calgary, one project was given to the adopted school in 'One school, one country' scheme. Other projects were given to the local construction college where the material was used for further training;
- It is possible to reduce the workspace of a Competitor from the current 4m x 4m to give a reduction in Competitor workspace of 3.5m x 4m, making an approximate 12% saving in space. This skill had only ten Competitors in Leipzig and eleven in Sao Paulo but hopes to have more in Abu Dhabi. In real terms this would mean an increase in space for the competition but with a reduced working area from that used at WSC2013;
- Completed projects to be offered to local authorities for use or placement in areas where they will enhance the environment or offer a focal point to a space. Everybody could enjoy projects there (hospital, library, park, etc.);
- SMT is already looking at planning for a more experienced team with Experts gaining more experience at WorldSkills regional Competitions. Rotation of jobs at the Competition is most important to reduce the demands and fatigue in Experts;
- Continued to reduce the quantity of tools shipped in tool boxes weight of toolbox is a proposed maximum 100 kg so we save in shipping costs and save our environment. Competition Organizer to supply lubricants for equipment for pneumatic tools as at WSC2013. Waste stone chippings stored for reuse; waste zinc/aluminium stored for recycling after competition;
- Test Projects to be left in São Paulo as a legacy as it was after WSC2009 when the TP was donated to a local school;
- All plastic and paper recycled at WSC2015;

## Transport

Reduce the cost of transport by reducing the size of the toolboxes to 0.32m<sup>3</sup> with a maximum weight of 100 kg. For Asian countries using special tables this is only possible if the Host Country supplies a working table according to the specification provided by the visiting countries, so that these countries do not need to bring their own tables.

Continue to use a material for the Test Project from a local and sustainable source in the country of the competition.



## 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 addition, the career exploration and job analysis database, O\*NET OnLine ([www.onetonline.org/](http://www.onetonline.org/)), is used as a reference to all occupations represented at the WorldSkills Competition.

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 Abu Dhabi 2017.

ORGANIZATION	CONTACT NAME
RJW Gem Campbell Stonemasons	David Edgar, Conservator & Foreman Carver
Sally Strachey Historic Conservation	James Preston, Contracts Manager