# TECHNICAL DESCRIPTION

# INFORMATION NETWORK CABLING


TD02 v5.11— WSC2015

INFORMATION AND COMMUNICATION TECHNOLOGY

WorldSkills International, by a resolution of the Technical 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:


1 INTRODUCTION ..... 2
2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS) ..... 3
3 THE ASSESSMENT STRATEGY AND SPECIFICATION ..... 10
4 THE MARKING SCHEME ..... 11
5 THE TEST PROJECT ..... 15
6 SKILL MANAGEMENT AND COMMUNICATION ..... 18
7 SKILL-SPECIFIC SAFETY REQUIREMENTS ..... 19
8 MATERIALS AND EQUIPMENT ..... 19
9 VISITOR AND MEDIA ENGAGEMENT ..... 22
10 SUSTAINABILITY ..... 23


Effective 12.08.14

Stefan Praschl
Chair Technical Committee

Michael Fung
Vice Chair Technical Committee

# 1 INTRODUCTION

## 1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION

1.1.1 The name of the skill competition is

Information Network Cabling

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

Cable is the medium through which information usually moves from one network device to another. There are several types of cable which are commonly used in network infrastructures. In some cases, a network will utilise only one type of cable, while other networks will use a variety of cable types. The type of cable chosen for a network is related to the network's topology, protocol and size. Understanding the characteristics of different types of cable and how they relate to other aspects of a network is necessary for the development of a successful network.

The Network Cabling Technician constructs the infrastructure of all the telecommunication networks such as those for Wide Area Networks (WAN), Local Area Networks (LAN) and Cable TV (CATV). This work is highly technical and requires detailed specialised knowledge in order to independently design and install networks that meet clients' needs and conforms to recognised industry standards. The technician will create the foundation which is the basis for the network, install cables appropriate for the intended use, maintain and test and commission the network.

The technician / installer may work for either a telecommunications or a communications network company. He or she will install network cabling for businesses both large and small or for domestic users, for services such as cable TV, telephone and broadband installations.

Communications networks are crucial to the efficiency of business and commerce. Network failure can result in wasted time and lost revenue. Robust and reliable communications networks are therefore critical to business success.

## 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 (when available)
- WSI – Online resources as indicated in this document
- Host Country – Health and Safety 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 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** | **Work organization and management** | **10** |
| | The individual needs to know and understand:<br>• Health and safety legislation, obligations, regulations and documentation<br>• Basic first aid<br>• The negative impacts on businesses and organisations of poor or unreliable network installations<br>• The situations when personal protective equipment (PPE) must be used e.g. for ESD (electrostatic discharge)<br>• The correct procedures for working with laser technologies<br>• The purposes, uses, care, maintenance, safe handling and storage of equipment in an ESD friendly environment<br>• The importance of integrity and security when dealing with user equipment and information<br>• The importance of safe disposal of waste for re-cycling<br>• The techniques of planning, scheduling and prioritising<br>• The significance of accuracy, checking and attention to detail in all working practices<br>• The importance of methodical working practices<br>• Research methods and techniques<br>• The value of managing own continuing professional development<br>• The speed of IT systems change<br>• Specialist terminology and symbols used in network cabling<br>• Various types of information network technology and their applications including, Ethernet technology, local area networks (LAN) technology and office/home network technology<br>• Mathematics and physics<br>• The laws of electricity | |

| | | |
|---|---|---|
| | The individual shall be able to:<br>• Follow health and safety standards, rules, and regulations<br>• Maintain a safe working environment including the use of ladders for access to high work<br>• Use personal protective equipment correctly<br>• Identify and use the appropriate personal protective equipment for ESD<br>• Select, use, clean, maintain and store tools and equipment safely and securely<br>• Plan the work area to maximise efficiency and maintain the discipline of regular tidying<br>• Regularly schedule and re-schedule and multi-task according to changing priorities<br>• Work efficiently and check progress and outcomes regularly<br>• Be actively working towards fulfilling industry certification requirements and keep up-to-date with 'license to practice' requirements (determined by their own country) and to complete regular Continued Professional Development (CPD)<br>• Demonstrate thorough and efficient research methods to support knowledge growth<br>• Demonstrate enthusiasm to try new methods, systems and embrace change<br>• Apply sound mathematical skills to the planning, preparation and execution off cabling tasks<br>• Read, understand and apply manufacturers' instructions | |
| **2** | **Communication and interpersonal skills** | **5** |
| | The individual needs to know and understand:<br>• The importance of listening as part of effective communication<br>• The roles and requirements of colleagues and the most effective methods of communication<br>• The importance of building and maintaining productive working relationships with colleagues and managers<br>• Techniques for effective team work<br>• Techniques for resolving misunderstandings and conflicting demands<br>• The process for managing tension and anger to resolve difficult situations | |

| | | |
|---|---|---|
| | The individual shall be able to:<br>• Demonstrate strong listening and questioning skills to deepen understanding of complex situations<br>• Manage consistently effective verbal and written communications with colleagues<br>• Recognize and adapt to the changing needs of colleagues<br>• Pro-actively contribute to the development of a strong and effective team<br>• Share knowledge and expertise with colleagues and develop a supportive learning culture<br>• Manage tensions and anger in others, providing confidence that problems can be resolved<br>• Discuss customer's requirements and provide expert advice and consultancy<br>• Liaise with other professional and suppliers to create a fully tailored package that fulfils the customer's needs<br>• Respect the impact that cabling activity can have on a busy working environment, show consideration and care, causing least disruption at all times<br>• Prepare quotations for planned work and present to customers | |
| **3** | **Planning** | **10** |
| | The individual needs to know and understand:<br>• The process for building cabling including backbone and horizontal<br>• Residential and office cabling systems<br>• Outside plant cabling<br>• Wi-Fi applications<br>• Network applications for CCTV, security etc.<br>• Industry accepted terminology and symbols used in specifications and drawings<br>• Principles of technical drawings and specifications that are recognised by the industry | |
| | The individual shall be able to:<br>• Have strong problem solving skills;<br>• Work independently by planning, ordering and prioritising work in order to maximize efficiency and to adhere to planned time schedules;<br>• Schedule work required to achieve a given outcome;<br>• Prepare, read, interpret and analyse specialist's technical drawings and specifications;<br>• Select the tools and systems that are most appropriate for the planned task;<br>• Assess work sites to effectively identify risks and thereby prevent or minimize hazards;<br>• Assess buildings and plan the location of cables to minimise damages, unsightliness and risks | |

| | | |
|---|---|---|
| **4** | **Cabling** | **25** |
| | The individual needs to know and understand:<br>• The different types of cable, their characteristics, uses and how they relate to other aspects of the network;<br>• Unshielded Twisted Pair (UTP) cable<br>• Shielded Twisted Pair (STP)<br>• Coaxial Cable<br>• Fibre Optic Cable<br>• Categories or quality of cable relating to the speed required and planned use | |
| | The individual shall be able to:<br>• Install and run cables, install rack cabinets, fit network sockets and patch panels.<br>• Interpret and analyse complex plans and specifications<br>• Prioritize work and comply with plans to minimise disruption and to meet agreed time scales<br>• Clean the area after completing drilling and similar activities<br>• Organize and label cabling to make future reconfiguring straightforward<br>• Respect the client's building, keeping it tidy and clean<br>• Terminate and test all installed cables | |
| **5** | **Optic Fibre Structured Cabling System** | **15** |
| | The individual needs to know and understand:<br>• Cables and connecting hardware<br>• Optical fibre cable classification<br>• The uses of various connectors for optical fibre cables<br>• Planning processes for optical fibre structured systems<br>• Processes for installing optical fibre cables<br>• How to build cabling including backbone and horizontal<br>• The cabling appropriate for commercial and domestic use | |

| | | |
|---|---|---|
| | The individual shall be able to:<br>• Plan optical fibre structured cable systems<br>• Select appropriate cable for the proposed use<br>• Prepare optical fibre cables by removing cable jacket and buffer as appropriate<br>• Install and optical fibre cable systems<br>• Splice optical fibre cables<br>• Fusion splicing<br>• Mechanical splicing<br>• Cable preparation<br>• Prepare optical fibre cable<br>• Splicing optical fibre<br>• Install optical closure<br>• Store and protect optical fibre cable during storage<br>• Install optical fibre cable connector to terminate or join cables<br>• Inspect and clean installed cabling and rectify if necessary<br>• Install optical closure and enclosure<br>• Store cable into a tray<br>• Cable entry/out and fixing<br>• Cable buffer management<br>• Test optical fibre cables:<br>  • Optical loss test set (OTLS)<br>  • Optical time domain reflectometre (OTDR)<br>• Select appropriate test equipment | |
| **6** | **Copper Structured Cabling System** | **15** |
| | The individual needs to know and understand:<br>• Copper cabling systems<br>• Types and uses of different types of copper cable<br>• Connecting hardware<br>• How to plan for and install cable | |
| | The individual shall be able to:<br>• Select correct type of cable for the planned project<br>• Install cable setup for horizontal and vertical pathway<br>• Pull horizontal cable in conduit and raceway<br>• Install backbone for horizontal and vertical pathway<br>• Remove jacket of multi-twisted cable, xTP cable and coaxial cable<br>• Use copper insulation displacement (IDC) termination to terminate RJ45 modular jack (U/UTP, SF/UTP, S/FTP), terminate RJ45 modular plug (Cat.5e,Cat.6\<br>• Terminate coaxial cable<br>• Install telecommunication outlet<br>• Install patch panel<br>• Install switching Hub<br>• Test copper cable using LAN tester (ex.DTX)<br>• Field test 100-ohm balanced twisted-pair cable | |

| | | |
|---|---|---|
| **7** | **Wireless Systems** | **10** |
| | The individual needs to know and understand:<br>• IEEE802.11 series | |
| | The individual shall be able to:<br>• Install an access point of Wi-Fi<br>• Set up a Wi-Fi system | |
| **8** | **Troubleshooting and Ongoing Maintenance** | **5** |
| | The individual needs to know and understand:<br>• Where potential system faults may occur<br>• Potential disruption to business activity resulting from system faults | |
| | The individual shall be able to:<br>• Identify, locate and diagnose system faults<br>• Rectify faults<br>• Install updates to ensure systems meet emerging business needs<br>• Provide expert advice and guidance on use of the system, its features and limitations | |
| **9** | **Measurement** | **5** |
| | The individual needs to know and understand:<br>• The principles and purposes of measuring devices<br>• The practical uses of measuring devices | |
| | The individual shall be able to:<br>• Perform measurements in copper cable<br>• Perform measurements in optical fibre | |

# 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 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 judgment. These are referred to as **objective** and **subjective**, respectively. 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 aspect of assessment 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 either objective or subjective Aspects to be marked. Some Sub Criteria have both objective and subjective aspects, 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 objectively or subjectively 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)

| STANDARD SPECIFICATION SECTIONS | CRITERIA | | | | | | | | | TOTAL MARKS PER SECTION |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| TOTAL MARKS PER CRITERION | | | | | | | | | | 100 |

## 4.5 SUBJECTIVE MARKING

Subjective marking uses the 10 point scale below. To apply the scale with rigour and consistency, subjective marking should be conducted using:

- benchmarks (criteria) to guide judgment against each Aspect
- the scale to indicate:
  - 0: non attempt;
  - 1-4: below industry standard;
  - 5-8: at or above industry standard;
  - 9-10: excellence.

## 4.6 OBJECTIVE MARKING

A minimum of three experts will be used to judge each aspect. Unless otherwise stated only the maximum mark or zero will be awarded. Where they are used, partial marks will be clearly defined within the Aspect.

## 4.7 THE USE OF OBJECTIVE AND SUBJECTIVE ASSESSMENT

The final deployment of objective or subjective assessment will be agreed when the Marking Scheme and Test Project are finalized. The table below is advisory only for the development of the Test Project and Marking Scheme.

| SECTION | CRITERION | MARKS | | |
|---|---|---|---|---|
| | | Subjective | Objective | Total |
| A | Knowledge | 0 | 10 | 10 |
| B | Cabling | 0 | 35 | 35 |
| C | Functionality | 0 | 15 | 15 |
| D | Process | 10 | 15 | 25 |
| E | Speed | 0 | 10 | 10 |
| F | Safety | 0 | 5 | 5 |
| Total | | **10** | **90** | **100** |

## 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. For each criterion, it is based on the "skill standards" which is discussed and released in advance on the discussion forum. In addition, if the criterion needs to be modified due to changes in Test Project modules etc. then it can be re-discussed during the Competition.

Each assessment criteria includes the following:

A - Knowledge
Assessing the knowledge of standards, measurement methods and standard cabling.

B - Cabling
Assessing the condition of each cabling, route, design etc. It mainly includes the following things:

- The fixation of cable is good or bad;
- The condition of cable management;
- Whether the cabling is based on the standard or Competition standard or not etc.

C - Functionality
Assessing the quality of the Network Cabling using measuring devices. As for the quality, it includes the following things:

- Wire-map results;
- Certification test results;
- Optical fibre Loss results;
  Making an inspection sheet;

D - Process
Evaluating during the Competition whether the Test Projects have been performed in the correct procedure or not. General evaluating points are as follows:

- Work tasks performed in a professional manner;
- If the cabling process is similar to real cabling field;
- Handling cables and materials;
- If the procedure does not give a bad effect on the Network quality;
- Whether there is no competition rules violation etc.

E – Speed

- Number of successful connections (to required standard);
- Completion of the task in the allocated time.

F - Safety

- All tasks performed in accordance with relevant Health and Safety standards

## 4.9 SKILL ASSESSMENT PROCEDURES

The Experts will be divided into marking groups to assess each section of the marking criteria.

Every completed module will be marked on the same day in which it was completed.

To ensure transparency, each Competitor is provided the same Mark Summary Form as used by the Experts.

The Experts agree that a majority vote is needed to:

- Change the scoring system (within limits specified in the Technical Description);
- Change Competition sequence or content;
- Agree on a solution for disputes concerning points awarded etc.

# 5 THE TEST PROJECT

## 5.1 GENERAL NOTES

Sections three and four 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 0 refers.

## 5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

The format of the Test Project is a series of standalone modules.

## 5.3 TEST PROJECT DESIGN REQUIREMENTS

**Module 1: Optical fibre cabling**

- Plan and design cabling system
- Install FO distribution box, termination box, TO and enclosure/FO closure
- Fibre optic cabling
- Cable management
- Measurement

**Module 2: Structure cabling**

- Plan and design cabling system
- Install FO distribution box, termination box, TO and patch panel.
- Install to 19'inch rack (include patch panel, switching HUB).
- Install to cable rack
- xTP cabling
- Fibre optic cabling
- Cable management
- Measurement

**Module 3: Home & office network cabling**

- Install DD box, TO.
- Install application such as Ethernet, WiFi, CCTV, network camera, etc.
- xTP and Fibre cabling
- Cable management
- Measurement

**Module 4: Speed test**

- Speed and quality test of fibre optic splicing / copper terminations

**Module 5: Troubleshooting for copper and/or fibre cabling**

- Detecting obstacles that and finding out the cause in Optical Fibre and Twist Pair Cable Link.

All Test Project proposals shall comply with this Technical Description and the Test Project checklist. In addition, at the time of the proposal of all the Test Project modules, the proposer must check if their proposals can be enforced and also indicate the details.

## 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 Test Project/modules are developed and validated by all eligible Experts.

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

The Test Project/modules are developed independently jointly with other Experts, the Chief Expert and the Deputy Chief Expert as per the timeline shown below.

This is done by creating four groups each of at least 3 Experts (if possible) to be responsible for the development of each module. Each team will be allocated a day's module to design. Each team will be allocated a team leader.

### 5.4.3 When is the Test Project developed

The Test Project is developed according to the following timeline:

| TIME | ACTIVITY |
|---|---|
| 12 months before the Competition<br>Chief Expert, Deputy Chief Expert and Jury President | Test Project groups (a minimum of 2) will be selected at the previous Competition. The function is to take responsibility of modules and create Test Project scripts and marking schemes required for the Competition.<br><br>Agreement will be made through the use of the forum. The 50% +1 rule will apply.<br><br>In the event of these sub-groups failing to produce the required projects a team consisting of the CE, DCE and team leaders will produce the Test Project. |
| Not less than 12 months before the Competition | Chief Expert, Deputy Chief Expert and Jury President will contact all available Experts for |

| TIME | ACTIVITY |
|---|---|
| | submission of proposals. The Infrastructure List will be developed in consultation with the Competition Organiser. |
| Not less than 6 months before the Competition | The Test Project is finalized by all Experts and sent to the Technical Director. The Test Project will be circulated by the Technical Director on the WSI website. |
| At the Competition | Experts will be required to bring proposed changes to the Test Project to the Competition for selection for the final Test Project.<br>By C-4 all Experts will agree on a 30% change to the Test Project. Only material included in the Infrastructure List may be used for the 30% change. |

## 5.5 TEST PROJECT VALIDATION

The CE, DCE and the Workshop Manager will decide together that it is possible for all modules to be completed. Time, Competitor skill and materials will be taken into consideration.

## 5.6 TEST PROJECT SELECTION

The Test Project is selected as it is stated in section 5.4.2 and 5.4.3.

## 5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

The Test Project will be circulated six months before the current Competition on the WSI website.

## 5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

Coordination of the Test Project will be undertaken by:

- Chief Expert and Deputy Chief Expert

## 5.9 TEST PROJECT CHANGE AT THE COMPETITION

As documented in 5.4.3 a 30% change will be made to the Test Project at the Competition.

## 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
- Marking Schemes
- Test Projects
- Infrastructure List
- Health and Safety documentation
- 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 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).

# 7 SKILL-SPECIFIC SAFETY REQUIREMENTS

Refer to Host Country/Region Health and Safety documentation for Host Country/Region regulations.

Skill-specific safety requirements are:

- All Competitors must use safety glasses when working with fibre or using any hand, power or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes.
- Experts will use the appropriate personal protective equipment (PPE) when inspecting, checking or assessing a Competitor's Test Project.

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

- In an attempt to reduce the Competition carbon footprint toolboxes should not exceed a volume of 0.13 cubic metres, approximately 570mm x 570mm x 400mm in size. However, fusion splicer, measuring equipment, or other specified equipment does not have to be included in this toolbox.
- See point in section 8.4 about fabrication of jigs and special fixtures.
- Competitors MUST NOT bring any equipment or tools that are listed on Infrastructure List, with the exception of the equipment and tools listed on List B.
- Competitors must bring the equipment and tools which they are accustomed to shown in List A.
- The equipment and tools on List B maybe brought by Competitors. If you were to bring your own, you must inform SMT and the Workshop Manager 6 months prior to the competition. In this case, the Workshop Manager shall provide the number of equipment or tools excluding the competitors who are bringing their own.
- The list of equipment to be provided by the Competitors will be confirmed at the proposal of Test Project, 9 months prior to the Competition.

## 8.3 MATERIALS, EQUIPMENT AND TOOLS SUPPLIED BY EXPERTS

Not applicable

## 8.4 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

The Competitors are not allowed to bring their own tables, chairs and special jigs or fixtures.

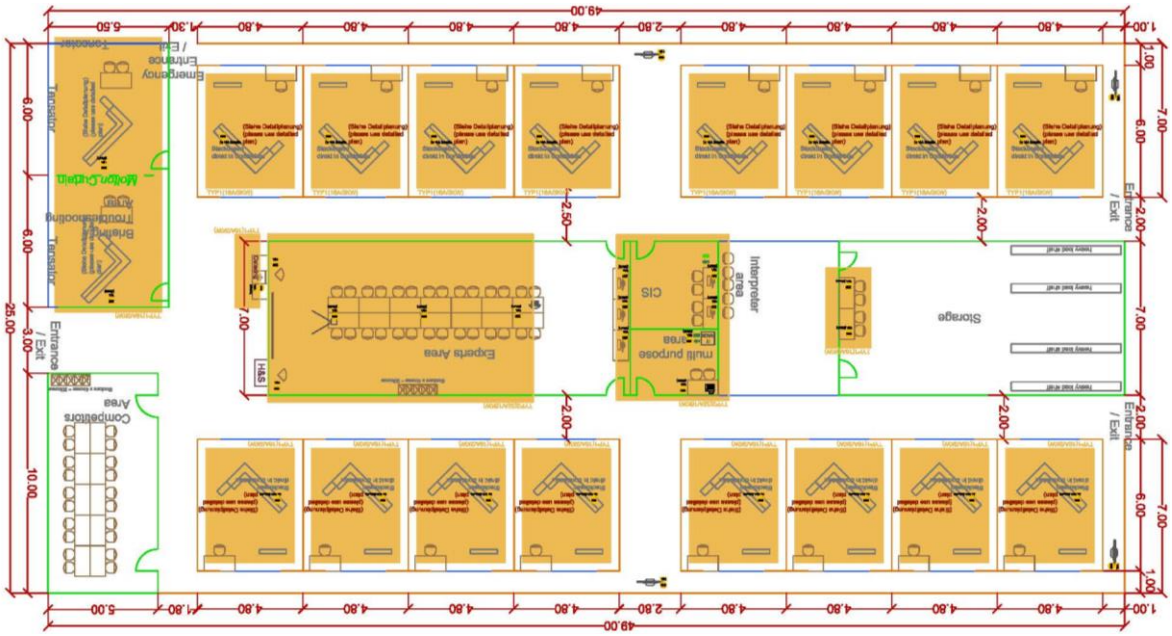
Jigs and special fixtures may be fabricated by the Competitor using the materials supplied in the Infrastructure List during Competition time.

If the Competitor wants to use special jigs or tools, then it must be posted on the Discussion Forum prior to the Competition with a picture and explanation of its use. A majority of Experts must agree.

## 8.5 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

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

Example workshop layout:



# 9 VISITOR AND MEDIA ENGAGEMENT

The following is a list of possible ways to maximize visitor and media engagement for this skill.

- Try a trade
- Display screens
- Test Project descriptions
- Enhanced understanding of Competitor activity
- Competitor profiles
- Career opportunities
- Daily reporting of competition status.

Out of consideration for other Member countries and regions, continuous filming of a Competitor is not allowed.

# 10 SUSTAINABILITY

- Recycling;
- Use of 'green' materials;
- Use of completed Test Projects after Competition;
- Size of the shipping box;
- With a view to minimizing carbon emissions due to the transportation of equipment and materials to the Competition, participants ought to use shipping containers not larger than 0.4 cubic metre.