

TECHNICAL DESCRIPTION

ELECTRICAL INSTALLATIONS



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international

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TD18 v4.0 – WSC2013

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:

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Effective 11.10.11



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1. **INTRODUCTION**

1.1 **Name and description of skill**

1.1.1 The name of the skill is

Electrical Installations

1.1.2 Description of skill

A professional Electrician is to provide a safe and reliable electrical service which ensures all work complete is in accordance with the relevant codes. An electrician's scope of work includes assembling, installing, testing and maintaining electrical or electronic wiring, equipment, appliances, apparatus and fixtures. An electrician must also diagnose and repair malfunctioning systems, apparatus, and components when a fault is present. Today's electrician must also be capable of programming and commissioning home and building automation systems.

1.2 **Scope of application**

1.2.1 Every Expert and Competitor must know this Technical Description.

1.2.2 In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

1.3 **Associated documents**

1.3.1 As this Technical Description contains only skill-specific information it must be used in association with the following:

- WSI - Competition Rules
- WSI - Online resources as indicated in this document
- Host Country - Health and Safety regulations

2. **COMPETENCY AND SCOPE OF WORK**

The Competition is a demonstration and assessment of the competencies associated with this skill. The Test Project consists of practical work only.

2.1 **Competency specification**

General electrical installations and maintenance

An electrician must be able to:

- Demonstrate knowledge of different wiring systems for commercial, domestic and industrial use:
 - Install cables directly to a surface.
 - Attach cables to a surface in a secure way.
 - Maintain even radius bends, without distortion to cable.
 - Correct termination adaptors used for entry of cables into ducts, boards, equipment boxes etc.
 - Install single and double insulated cables inside ducts, conduits and flexible conduits.
 - Install and securely fix double insulated cables onto cable ladder and cable tray.

- Install metal and plastic ducting (trunking).
 - Measure and cut duct at specified lengths and specified angles.
 - Assemble pieces of duct without distortion to joints and to accepted tolerances.
 - Assemble different termination adaptors, such as glands onto duct.
 - Attach ducts of different types, in a secure way onto a surface.
- Install metal and plastic conduits
 - Attach conduits onto a surface in a secure way.
 - Maintain even radius bends, without distortion to conduit.
 - Correct termination adaptors used for entry of conduits into boxes, boards, ducts, etc.
- Install metal and plastic flexible conduits
 - Attach flexible conduits onto a surface in a secure way.
 - Maintain even radius bends, without distortion to flexible conduits.
 - Correct termination adaptors used for entry of flexible conduits into boxes, boards, ducts, etc.
- Install cable-ladders, cable-trays etc.
 - Attach different types of cable ladder and cable tray to a surface in a secure way.
- Demonstrate a competent understanding of different types of electrical switchboards used for commercial, domestic and industrial uses:
 - Install electrical switchboards onto a surface in a secure way.
 - Assemble switchboard apparatus (examples listed below), in a switchboard as per given instructions (layout drawings etc).
 - Main switches
 - RCDs
 - MCBs
 - Controlling equipment such as relays, timers, etc.
 - KNX components
 - Fuses
 - Terminate and install wiring inside a switchboard according to circuit drawings.
- Demonstrate a competent understanding of different types of electric lighting and heating systems for commercial, domestic and industrial use.
- Demonstrate a competent understanding of different control devices and socket outlets used for commercial, domestic and industrial uses.
 - Control Device's E.g., Photo Cell, Motion Detector, Thermostats, Switches etc.
 - Outlet E.g., 1 Phase, 3 Phase, etc
 - Install and connect equipment as per instructions provided.
- Demonstrate a competent understanding of different types of telecommunication systems such as:
 - Structured cabling systems (SCS)
 - Fire alarm systems
 - Conventional fire alarm systems
 - Addressable fire alarm systems
 - Evacuation control systems
 - Audio devices
 - Optical devices
 - Control and monitoring systems
 - Burglar alarm systems
 - Conventional burglar alarm systems
 - Addressable burglar alarm systems
 - Access control systems
 - "Stand alone" access control systems
 - "Network supervised" access control systems

- Closed circuit television systems (CCTV)
 - Cameras, lenses and attachment components
 - Recorders, monitors, etc.
- Install and construct equipment listed above as per instructions provided
- Select and use appropriate tools.
- Read, interpret and revise drawings and documentation such as:
 - Layout drawings.
 - Circuit drawings.
 - Written instructions.
- Plan, install, test and commission electrical installations in a safe and professional manner.
 - Plan installation work using drawings and documentation provided.
 - Install equipment and wire ways as per drawings and documentation provided.
 - Test installations before energizing to ensure personal and electrical safety :
 - Insulation resistance test.
 - Earth continuity test
 - Correct Polarity
 - Visual Inspection
 - Test installations when energised:
 - Check complete function on all equipment installed to ensure correct operation of new installation as per instructions provided.
 - Equipment setup:
 - Use the necessary software for programming programmable relays, bus-system, etc.
 - Make necessary settings on devices such as timers, overload relays etc.
 - Program programmable relays
 - Download and import any application required for the product so the specified task can be achieved.
 - Program bus-systems such as KNX, LON or similar.

Faultfinding

An electrician needs to know and understand:

- How to troubleshoot electrical installations and identify faults such as:
 - Short circuits
 - Open circuits
 - Incorrect polarity
 - Insulation resistance faults
 - Earth continuity faults
 - Incorrect settings on equipment
 - Incorrect program on programmable devices
 - Etc.
- How to diagnose electrical installations and identify problems such as:
 - Bad connections
 - Incorrect wiring
 - High fault loop impedance
 - Equipment failure
 - Etc.
- How to use, test and calibrate measuring equipment such as:
 - Insulation resistance testers
 - Continuity testers
 - Installation testers
 - Multi meters
 - Clamp meters
 - Network cable testers

- How to repair faults in electrical installations.
 - Repair faulty components
 - Replace faulty components
 - Rewire faulty installations

Perform all competencies listed above in a professional manner so personal and electrical safety is achieved.

2.2 Theoretical knowledge

2.2.1 Theoretical knowledge is required but not tested explicitly.

The theoretical knowledge is limited to that necessary to carry out the practical work: the programming of electronic and electromechanical components (not programmable logic controllers) such as timers, programmable relays and KNX components, reading drawings, sketches and schematic diagrams.

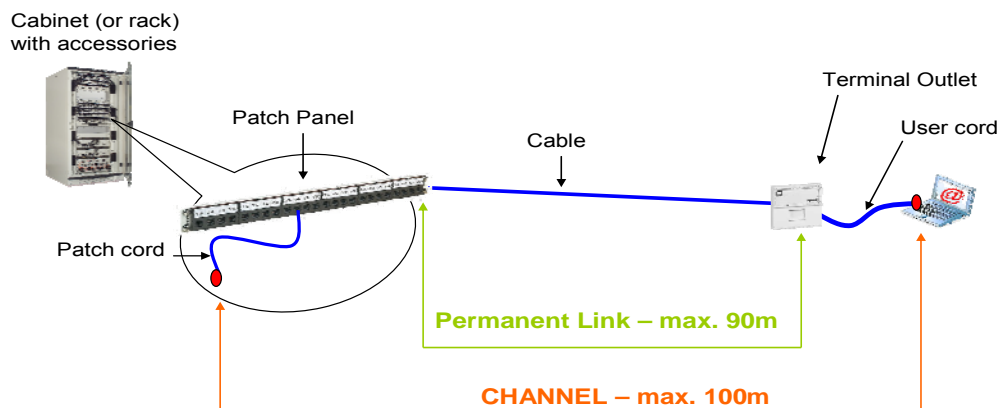
2.2.2 Knowledge of rules and regulations is not examined.

2.3 Practical work

The Competitor must be able to demonstrate a range of skills in the installation of electrical equipment, wiring systems and Structured Cabling Systems (SCS).

The Competitor must be able to carry out all required inspection, testing and commissioning for all relevant modules. When the Test Project is completed, it must be tested by the Competitor and the results submitted in writing.

The following picture illustrates the Permanent link and the Channel.



Refer to: ISO / IEC 11 801

3. **THE TEST PROJECT**

3.1 **Format / structure of the Test Project**

Series of standalone modules

3.2 **Test Project design requirements**

General requirements

- All technical terms and descriptions used in the Test Project must be in accordance with international standards and terms, if applicable.
- Any sub-module as listed below must be integrated into the overall function of the installation or module concerned.
- Cable and conduit measurements are to the centre of the cable/conduit
- Duct and equipment measurements are to the centre or edge of the duct/equipment
- All dimensions must be from specific reference lines (datum/centre lines).
- The Test Project may include the following sub-modules and systems:
 - Lighting installation
 - Plug socket installation
 - Installation of signal/control/power circuits (heat, motors etc. e.g. pump station, boiler control)
 - Extra low voltage installation – limited to a maximum of 50 V (AC or DC)
 - Wiring and connecting complete channels of cabling infrastructure: User cords, RJ 45 terminal outlets, cables, patch panels and patch cords
 - Telephone carrier elements (remote control etc)
 - Current and voltage measuring circuits (current transformers and selector switch systems, potential transformers and selector switch systems)
- At least 3 different wiring systems should be used in each module.
- The design team responsible for the Test Project modules must also design a tool list which is sufficient enough to complete the Test Project. This list is to be used as a guide for the tool boxes.

The Test Project will consist of the following modules:

Module 1 – Domestic and/or commercial installation using current and developing technology

- 10-hour maximum including commissioning and equipment setup.
- The Competition Organiser must supply materials for the competition only.
- Module 1 to begin on day C1
- All measurement marks will be completed at the end of C1
- Module 1 must be completely finished and marked by the end of C3
- Module 1 can be installed on one or two walls and ceiling of the competitors cubicle
- Module 1 will include programming of a small smart relay
- Drawings to be circulated 5 months prior to the Competition

Module 2 – Domestic and/or commercial installation using conventional technology

- 7-hour maximum including commissioning and equipment setup
- Using Competition Supplier supplied material
- Drawings to be circulated 5 months prior to the Competition
- Marking to be completed on day C4
- Module 2 can be installed on one or two walls and ceiling of the competitors cubicle

Module 3 – Programming Exercise

- 2 hours
- Module 3 and marking to be completed by the end of C1
- Approximately 10 programming panels will be constructed and supplied by the Competition Organiser. Each panel is to be exactly the same as the circulated drawings.

- An open protocol, worldwide standardised systems must be used for example KNX. All devices are to be supplied by the Competition Organiser. Equipment to be used for Module 3 is to be circulated at least 5 months prior to the Competition.
- After a Competitor has completed the programming exercise a copy of their programming function must be taken.
- Competitors are to be provided with descriptions, other necessary documentations and associated product files (product data base).
- The Infrastructure List must state the languages that the software, software version and databases will be available in.
- A function list will be created and the programming exercises will be selected from this list.
- Programming exercise is to be completed in front of the general public if possible.
- Once the programming exercise has been completed it will be on display for the rest of the Competition.
- Final function tasks decided upon at the Competition.

Module 4 – Installation Testing

- 1 hour maximum
- Fault finding board to be built by Competition Organiser
- Module 4 and marking to be completed on day C3

General instructions for all modules

The Test Projects must reflect the standards from across the world and not one specific continent. Once all the Test Projects have been completed they must reflect aspects of electrical installations throughout the world.

Test specifications:

- Insulation resistance – The minimum resistance between any current carrying conductors and any other conductors or earth may not be less than 1 M Ω , tested at a voltage of 500 V DC with an insulation resistance tester.
- Earth continuity resistance – The maximum resistance between the main incoming earth terminal and any point on the installation required to be earthed may not be more than 0.5 Ω .
- Polarity of socket outlets as per Host Country standard.

Instructions for module 1 – Domestic and/or commercial installation using current and developing technology

- This module may include lighting circuits, power outlet circuits, fixed appliance circuits, Structured Cabling Systems, environment control or access equipment.
- Installation of consumer units and protection equipment must be included.
- Installation and equipment set up of programmable devices should be included.
- Module specific testing of the installation for module 2 for Structured Cabling System will be to a test performance on the channel (refer IEC 61935-1).
- Inspection, testing and commissioning will be carried out with the test results documented.
- Function testing may be carried out with the installation live at standard mains voltage of the Host Country.
- Manufactured bends are to be used if available in the Host Country.
- No manual bending in this module except offsets if necessary.
- Flush mounting devices may be installed.

Instructions for module 2 – Domestic and/or commercial installation using conventional technology

- Installation may include conventional control of lighting circuits and power outlet circuits.
- Manufactured bends are not to be used even in case they are available in the Host Country. Sufficient practice exercise time shall be given to the Competitors prior to the Competition.
- This module shall include three phase motor control circuit.

Instructions for module 4 – Installation testing

- Installation testing will consist of two sections. One installation will receive a 24 volt power supply and the second installation will receive no power.
- The test circuit designs must include the following circuits:
 - A lighting circuit
 - A socket outlet circuit
 - A power circuit (such as a heater or a cooker)
 - A control circuit (such as a pump control)
 - A total of 10 faults must be installed
- Installation testing faults must include as a minimum:
 - 1 high earth resistance fault
 - 1 low insulation resistance fault
 - 1 incorrect polarity fault
 - 1 incorrect visual fault
- Types of faults that may also be used are:
 - Incorrect timer settings
 - Incorrect overload settings
 - Short circuit faults
 - Open circuit faults
 - High resistance joints
 - Interconnection
- Competitors are required to bring their own test instruments to the Competition in order to be able to carry out the requirements of this module. They must meet the Host Country's/Region's health and safety requirements
- All installation faults must be determined in accordance with "General Instructions for all modules, Test Specifications"
- Figure 1.1 is the standard symbols to be used for Installation Testing. The Competitor is to receive a copy of these symbols before module 1 commences
- At the completion of C3 the Competitors will see the installed faults





	SHORT CIRCUIT	KURZSCHLUSS	COURT CIRCUIT
	OPEN CIRCUIT	UNTERBRECHUNG LEITER	CIRCUIT OUVERT
	LOW RESISTANCE INSULATION FAULT	SCHLECHTER ISOLATIONSWERT	DEFAUT D'ISOLEMENT, RESISTANCE D'ISOLEMENT FAIBLE
SET	INCORRECT SETTING	FALSCHER EINSTELLUNG	MAUVAISE CONFIGURATION
	CROSS OVER	VERTAUSCHUNG	INVERSION

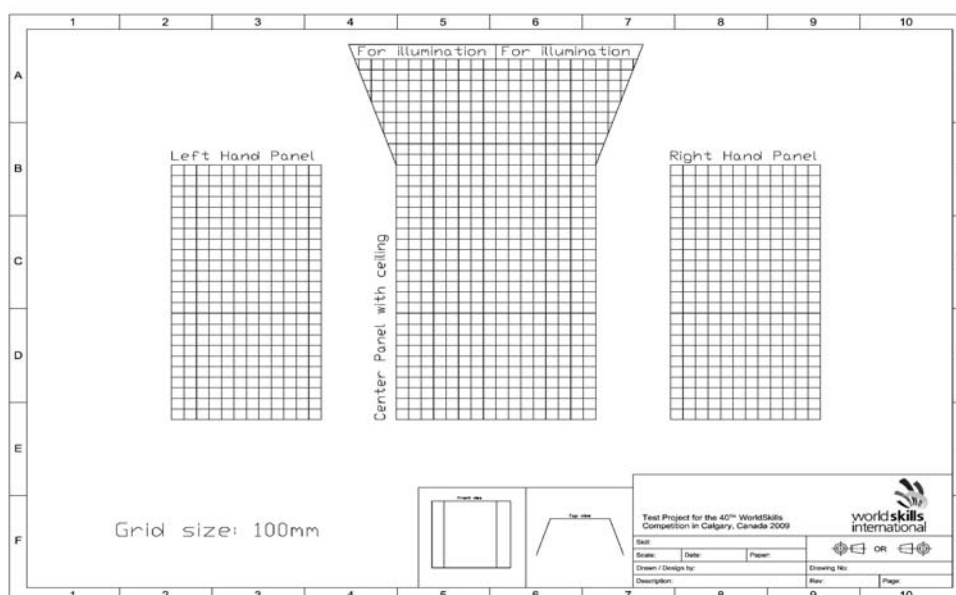
Figure 1.1

Competition Organiser requirements

- Ensure a power supply of 230 V AC or 110 V AC at each workstation.
- Ensure that necessary power supplies are available for testing.

Panel layout

The layout of the work cubicle shown below is just for reference purposes.



3.3 Test Project development

The Test Project MUST be submitted using the templates provided by WorldSkills International (<http://www.worldskills.org/competitionpreparation>). Use the Word template for text documents and DWG template for drawings.

3.3.1 Who develops the Test Project / modules

The Test Project / modules are developed by:

The design team will comprise of:

- Chief Expert
- 4 other Experts who are selected by vote at the previous Competition.

All Experts can submit proposals to the design team.

The design of the project is not to be influenced in anyway way by the sponsors for this Skill.

3.3.2 How and where is the Test Project / modules developed

The Test Projects modules are independently designed by Experts and submitted to the design team.

3.3.3 When is the Test Project developed

The Test Project is developed:

Time	Task
At the previous Competition	Experts selected for the design team. Design team with the Chief Expert will be responsible for developing the modules. Elected design teams for Leipzig 2013 are: Module 1 : FI, NZ, KR, DE, FR Module 2 : UK, BE, IR, ES Module 3 : BR, CH, PT, NO Module 4: DE, JP, ID, KR
3 months after the previous Competition	Experts submit module proposals to design team with drawings and/or written descriptions

Time	Task
6 months after previous Competition	All necessary drawings and instructions for each module are presented to the Workshop Supervisor for the current Competition,
9 months after the previous Competition	Final drawings, instructions and marking schemes are agreed for each module.
9 months prior to the current Competition	Chief Expert is to ensure that: <ul style="list-style-type: none"> • The circuit designs are accurate • All installation requirements can be completed • Each module can be completed within the time constraints • Proper function is achievable • Infrastructure list is accurate • Coordination with Workshop Supervisor is carried out • Competitor instructions are kept to a minimum text, and they do not exceed the space permitted on the instruction sheets for any one module • The Test Project is complete in all aspects • A complete marking scheme has been developed that provides accurate and fair criteria to assess each module • Final changes to the Test Project, if identified and required, are completed
5 months prior to the Competition	Test Project is circulated. Photographs or catalogues of the different devices and methods of installation used in the Test Project are circulated.
At the Competition	30% change to modules 1 and 2 are completed by Experts

3.4 Test Project marking scheme

Each Test Project must be accompanied by a marking scheme proposal based on the assessment criteria defined in Section 5.

3.4.1 The marking scheme proposal is developed by the person(s) developing the Test Project. The detailed and final marking scheme is developed and agreed by all Experts at the Competition.

3.4.2 Marking schemes should be entered into the CIS prior to the Competition.

3.5 Test Project validation

The Chief Expert, Deputy Chief Expert and the Workshop Supervisor will decide together that it is possible for all modules to be completed. Time, Competitor skill and materials will be taken into consideration.

3.6 Test Project selection

The Test Project is selected as follows:

By the design team and the Chief Expert

3.7 Test Project circulation

The Test Project is circulated via WorldSkills International website as follows:

5 months before the current Competition. Refer to table in 3.3.3.

3.8 Test Project coordination (preparation for Competition)

Coordination of the Test Project will be undertaken by:

Chief Expert

3.9 Test Project change at the Competition

At the Competition the Experts make a 30% change to module 1 and module 2 by making any of the following changes:

- Changing measurements
 - Changing function.
 - Changing materials.
 - Changing layout.
-
- Module 3 functions will be decided at the Competition by the experts
 - Module 4 faults will be decided at the Competition by the Experts.
 - When making the 30% change the availability of materials needs to be considered.

3.10 Material or manufacturer specifications

If specific material or manufacturer specifications are required to allow the Competitor to complete the Test Project it will be provided along with the Test Project when it is circulated 5 months prior to the Competition. If necessary the WSS will arrange a demonstration on site during familiarisation.

The materials chosen for modules that are to be built by Competitors, except where the materials are to be supplied by the Competitor, should be of a type available from a number of manufacturers and readily obtainable from suppliers in the Host Country.

4. **SKILL MANAGEMENT AND COMMUNICATION**

4.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration and decision making regarding the skill must take place on the skill-specific Discussion Forum (<http://www.worldskills.org/forums>). All 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 moderator for this forum. Refer to Competition Rules for the timeline of communication and competition development requirements.

4.2 Competitor information

All information for registered Competitors is available from the Competitor Centre (<http://www.worldskills.org/competitorcentre>).

This information includes:

- Competition Rules
- Technical Descriptions
- Test Projects
- Other Competition-related information

4.3 Test Projects

Circulated Test Projects will be available from [worldskills.org](http://www.worldskills.org) (<http://www.worldskills.org/testprojects>) and the Competitor Centre (<http://www.worldskills.org/competitorcentre>).

4.4 Day-to-day management

The day-to-day management 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 finalised at the Competition by agreement of the Experts. The Skill Management Plan can be viewed in the Expert Centre (<http://www.worldskills.org/expertcentre>).

5. ASSESSMENT

This section describes how the Experts will assess the Test Project / modules. It also specifies the assessment specifications and procedures and requirements for marking.

5.1 Assessment criteria

This section defines the assessment criteria and the number of marks (subjective and objective) awarded. The total number of marks for all assessment criteria must be 100.

Section	Criterion	Marks		
		Subjective (if applicable)	Objective	Total
A	Safety (electrical and personal)	0	10	10
B	Commissioning (testing and reporting) and equipment set up.	0	30	30
C	Measurements	0	10	10
D	Installation of equipment and wire-ways	0	15	15
E	Wiring and termination	0	15	15
F	Fault finding	0	10	10
G	Programming	0	10	10
Total =		0	100	100

5.2 Subjective marking

Not applicable

5.3 Skill assessment specification

The Test Project assessment will be based on the following Criteria:

- A. Personal safety during work and electrical safety on the completed installations on all modules.
- B. Testing, reporting and equipment setup from every module will be assessed as described in the instructions for the various modules.
- C. Measurements and level/plumb will be assessed comparing drawings with the actual installations.

Definition

- o Level: Positioned horizontally to the device being checked
- o Plumb: Positioned vertically to the device being checked
- o All dimensions must be from specific reference lines (datum/centre lines).
- o Cable and conduit measurements are to the centre of the cable/conduit
- o Duct and equipment measurements are to the centre or edge of the duct/equipment as shown on drawings

Tolerances	
Level/plumb	bubble on or between lines on level, not outside
Measurement <500mm	+/- 2mm
Measurement >500mm	+/-3mm

- D. Installation of equipment may be checked as:
- o Materials and wire-ways secured.
 - o Secure definition
 - o PVC and Metal Conduit:
 - At least one saddle must be placed between:
 - termination point and bend
 - bend to bend
 - termination point to termination point
 - If the distance between any bend or termination point exceeds 1m then additional saddles must be placed for every meter added.
 - Flexible Conduit: If flexible conduit is to be fixed, at least one saddle must be placed every 300mm
 - o No damage on materials, cables, conduits etc.
 - o Correct materials and wire-ways installed as per drawings.
 - o Materials and wire-ways assembled and installed as per manufacturers specification.
- E. Wiring and terminations may focus on:
- o No copper visible when looking at the connection from a 90 degree position.
 - o No plastic insulation inside the termination.
 - o Terminations done correctly (no loose terminations, good electrical and mechanical connection) If ferrules are required the Competition Organiser must provide all equipment and materials to install.
- F. Faultfinding will be assessed as faults found or not found.
- G. Programming will be assessed as functions completed or not completed

5.4 Skill assessment procedures

The Chief Expert and the Deputy Chief Expert divides the Experts into marking teams. Each team must include at least 1 Expert who is experienced. Cultures and languages are also considered to ensure there is a range in each marking team.

Where possible all Experts will assess a similar percentage of marks.

No live testing or commissioning will take place without the attendance of two Experts.

6. SKILL-SPECIFIC SAFETY REQUIREMENTS

Refer to Host Country Health & Safety documentation for Host Country regulations.

All marking points regarding health and safety marks will be made clear to all Competitors at familiarisation.

If the supervising Experts, who are watching the Competitors, witness any breach of the Health and Safety requirements during the Competition they will:

- On the first occasion: Warn the Competitor and make a note of the breach
- On the second occasion: Warn the Competitor and make a note of the breach
- On the third occasion: A record of the breach will be made and result in a loss of the Health and Safety mark.

The Competitor can receive power from the commissioning Expert's team when:

- All mandatory tests have been completed
- Test Report is submitted and results are correct according to "General instructions for all modules"
- All device covers have been installed
- No exposed or un-terminated conductors or cables are seen

Experts will maintain supervision from outside the Competitors marked workstation during the period that the installation is live to ensure safety. The Expert cannot enter the workstation unless the Competitor requests their assistance or if it is deemed that the Competitors' immediate safety is at risk.

7. MATERIALS & EQUIPMENT

7.1 Infrastructure List

The Infrastructure List details all equipment, materials and facilities provided by the Host Country.

The Infrastructure List is online (<http://www.worldskills.org/infrastructure/>).

The Infrastructure List specifies the items & quantities requested by the Experts for the next Competition. The Competition Organiser will progressively update the Infrastructure List specifying the actual quantity, type, brand/model of the items. Items supplied by the Competition Organiser 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.

7.2 Materials, equipment and tools supplied by Competitors in their toolbox

Competitors must bring their own tools, excluding drop saws. All equipment (including electrical appliances) that has not been explicitly forbidden is allowed.

Handheld jigsaws are allowed.

7.3 Materials, equipment and tools supplied by Experts

Not applicable

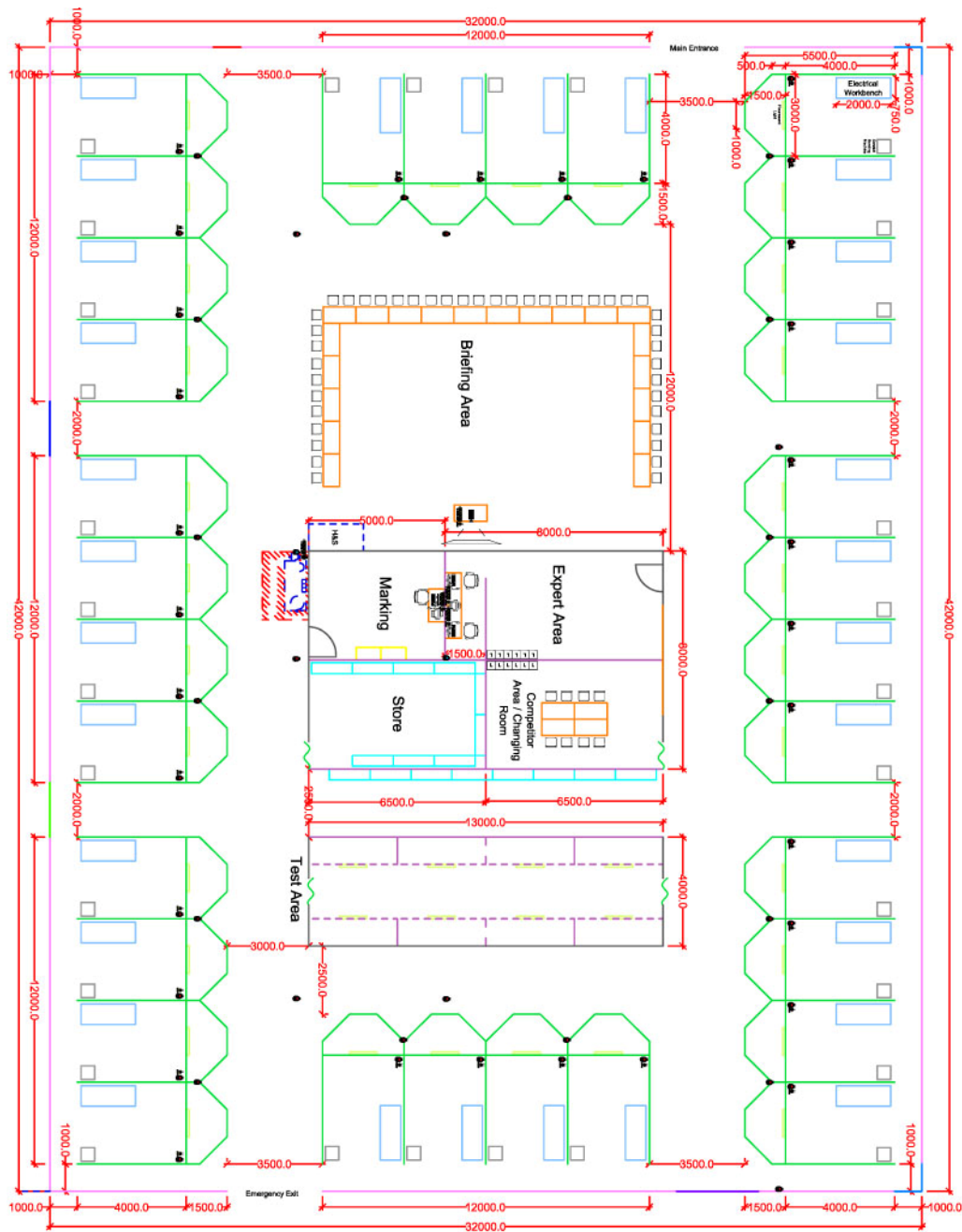
7.4 Materials & equipment prohibited in the skill area

- There are no pre-manufactured materials allowed to be used in Module 3.
- Materials and tools according to the Host Country Health and Safety regulations are not allowed.

7.5 Proposed workshop and workstation layouts

Workshop layouts from London are available at:
http://www.worldskills.org/index.php?option=com_halls&Itemid=540

Workshop layout:



8. **MARKETING THE SKILL TO VISITORS AND MEDIA**

8.1 **Maximising visitor and media engagement**

Following is a list of possible ways to maximise visitor and media engagement

- Try a trade
- An area next to the competition site, Supervised by local apprentices, where young people can try some of the things an electrician work with on a daily basis
- Display screens
- Test Project descriptions
- Drawings and test projects/ parts of test projects may be displayed next to the “try a trade” area.
- Enhanced understanding of Competitor activity
- Competitor profiles
- Competitor profiles may be displayed on screens close to the competition site. Useful information is:
 - Name
 - Age
 - Country of origin
 - Type of education
 - Type of actual career
 - Information about the competitors’ choice of apprenticeship
- Career opportunities
- Information may consist of:
 - Brochures
 - Flyers
 - Informers (young apprentices)
- Daily reporting of competition status
- Daily reporting may be used if all competitors working on the same module on the same day.

8.2 **Sustainability**

- Recycling
- Spare materials, are to be offered to local schools to be used in education for training purposes.
- Use of ‘green’ materials
- During designing of test projects and liaising with the current Workshop Supervisor, the uses of “green” materials are to be considered. Materials that meet the following requirements are to be used as far as possible:
 - Halogen free
 - Recyclable
 - Free from toxic substances
- Use of completed Test Projects after Competition
- Materials that can be reused, are to be offered to local schools to be used in education for training purpose. Materials that cannot be reused are to be sorted as per host country regulations or, if meeting higher requirements, WorldSkills regulations.
- Experts and competitors must take special consideration when designing and packing their tool box for the competition. They must ensure they only pack the minimum amount of tools needed to complete the competition.
- Project design teams must carefully considered sustainability as a key issue.
- All paperwork prepared at the previous competition must be electronically copied by the new Chief and Deputy Chief Expert.