

eGuide

August 2016

Guidance for Events in UK Venues

Electrical Installation And Testing Sub-section

a|e|v
association of event venues

The **acc** Liverpool Group

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Resource Background

eGuide Subsection: Electrical Installation and Testing

This document has been created for those stakeholders only requiring information on the specific eGuide topic(s) included and should not be confused with the full eGuide document that covers approximately fifty topic areas including what is reproduced here. Users are advised to familiarise themselves with the full eGuide as there are likely to be other topics that have general relevance to their role in the event that do not appear here.

What is the eGuide?

The eGuide brings together guidance for achieving common standards of health, safety and operational planning, management and on-site conduct for events at all participating AEO member venues. The scope and development of the eGuide follows extensive consultation with operations professionals within the exhibition and event industry in order to ensure an overall approach that remains broadly acceptable to the community. The status of the eGuide is similar to that of an Approved Code of Practice. It is an industry-specific guide developed by authorised professionals from the UK event venues. It incorporates health, safety and operational practices that represent compliance with Building Regulations and health and safety legislation.

Now recognised as the industry's best practice document, the eGuide is continually reviewed by working industry professionals who represent the best advice currently available, and who themselves have to work within the guidelines in their own professional capacities. Senior representatives from Olympia London, ExCeL London, NEC, Yorkshire Event Centre, Farnborough International Exhibition and Conference Centre, Business Design Centre, Manchester Central, Event City, ACC Liverpool, AECC, HIC, Ricoh Arena, Alexandra Palace, SECC, The International Centre, Telford, The O2, The Crystal and Peterborough Arena currently sit on the **eGuide strategic committee**, meeting twice a year to steer the guidance thematically and address any complex or contentious topics. A number of additional venues also participate in this process and are gradually moving towards formal adoption of the document themselves. Additionally, **the eGuide technical committee** works all year round to maintain the detail of the document, ensure consistency and simplify rules and regulations to the greatest possible extent. The current eGuide technical committee comprises:

Siân Richards, Olympia London

Matt Constance, ExCeL London

Linda Ritchie, NEC

Jonathan Smith, Farnborough International Exhibition and Conference Centre (Chair of the eGuide strategic committee)

Ben Harding, Manchester Central

Instructions from this group are subsequently collated and actioned in the document by Kim Miles, Association of Event Venues.

By coming together, and proactively seeking to identify where working conditions and regulations are common (or, due to unique site circumstance, different), contributing venues are, in essence, providing the answers to questions that organisers and supplier companies may have resulting in more efficient on-site activity, a smoother operation for the event organiser, and, therefore, a more polished product for the client, exhibitor and visitor.

In competent hands these guidelines should be an invaluable tool, simplifying health & safety planning and management and other operational issues on the floor.

Application

For the purposes of this document the word 'event' will generally apply to any event held in the participating eGuide venues. It must be noted that in multipurpose venues where exhibitions, conferences and other like events can be run alongside sporting fixtures or musical entertainment in arenas, other guidance or legislation may be more applicable for specific activities.

How to Use and Engage with the eGuide

The eGuide will save hours of painstaking and detailed work for any AEO venue seeking to maintain regulations that are compliant with UK law. Notwithstanding a few points of detail, which can be separately annotated, any AEO member venue that hosts any degree of exhibition business activity should be able to adopt these guidelines wholesale. The guide equally provides the basis for organisers to plan the operational management of their event and for suppliers and clients/exhibitors to understand what is required of them.

It must be stressed, however, that this is a GUIDELINE document. If meticulously followed, it should ensure that users are compliant with current health and safety law. Nevertheless, the particulars of each exhibition (or similar event) should still be considered on an individual basis and venues, organisers, suppliers and clients/exhibitors must all remember that it is ultimately their responsibility to ensure that they address health & safety, and other operational issues properly, in compliance with the law.

It must also be stressed that all employers have a legal duty to employ staff that are competent to manage health & safety, and other operations that are relevant to their level and range of responsibilities. This guidance alone is not a substitute for proper training and experience.

The committee welcomes any constructive comment on these guidelines. If you feel you can contribute, please email kimberley@aev.org.uk, and your point will be considered at the next committee meeting.

If you require additional health & safety support there are a number of specialist companies providing consultancy, training and floor management capabilities within ESSA and AEO Associate membership. You can gain access to these companies via the 'Approved Supplier' list, within a communal section of the AEO, AEV and ESSA websites.

EIA note on legal compliance

The AEO, AEV and ESSA trade associations are managed by the EIA secretariat. EIA advocates that members of all three associations work within or beyond the requirements of UK law. Where a British standard, HSE guidance, approved code of practice, other central or local government guidance or examples of case law suggest that specific working methods or standards are needed to meet the requirements of UK law, the EIA advocates that members adopt these. In instances where groups of members wish to collaborate on finding alternative, but equally as safe, methods of work that they feel are more suited to the operational constraints of the event industry than those described elsewhere, the EIA will facilitate that collaboration and any benchmarking or HAZOP activity that is required, advise members of their specific duties and liabilities and where requested publish their findings, typically within the eGuide. The EIA cannot and does not however officially advocate any standard or working practice other than those produced by HSE, BSI or other government agencies and offices, whether published within the eGuide or not, and reminds all organisations, members and non-members alike, that it is their individual responsibility to assess the risks of their work and to establish practices that comply with the law and that prevent work related injury and ill-health.

Frequently asked questions – Electrical Installation and Testing

Discussions surrounding electrical testing have been extensive and controversial and there are still some misunderstandings in the industry about what is required, why it is required and what the testing regime covers. The work of the Cross Association Technical Committee on Electrics, comprising experts from organisers (AEO), venues (AEV) and contractors (ESSA) has resulted in the system of work described in this document and the committee has also striven to produce comprehensive answers to the six most commonly asked questions as follows:

Why have new electrics rules been put in place?

Some detail on the UK legal system is needed to fully explain this. Statute law (e.g. the Health and Safety at Work Act and the Electricity at Work Regulations) describes the general safety rules that UK companies are obligated to follow, whereas British Standards are one of a series of quasi-legal information sources that describe in detail the best practice methods of achieving those safety rules. For example, in terms of electrics, whereas statute law states “work activity shall be carried out in such a manner so as not to give rise, so far as is reasonably practicable, to danger”, the latest edition of BS7671 (there have been seventeen at the point of writing) describes in detail the accepted safe methodology for electrical installation and testing in light of the knowledge and technology currently available today. Therefore, wherever a court needs to decide how closely a company came to complying with statute law, they will look to see how closely they followed the British Standard, where one is available – effectively creating an obligation to either follow the standard to the letter, or be extremely confident in an alternative method and be able to pitch it convincingly to a judge or jury. In that context, it was a change to the 17th edition of BS7671 “Requirements for electrical installations” that triggered discussion across the venue and electrical contracting parts of the event community some four years ago, led to the combined AEV/ESSA technical working group, and to the revised methodology now described as a minimum requirement by adopting venues in the eGuide. Regarded as technical experts by the courts, and held accountable for delivering electrically safe events by their organiser customers, electrical contractors potentially faced the highest penalties in the event of something going wrong in an installation and so felt duty bound to work as closely to BS7671 as they felt would be seen as reasonable, legally. There was also a feeling that venues had historically faced disproportionate legal scrutiny due to their notoriety and perceived financial positions – hence the two stakeholder groups were keen to combine knowledge and expertise and collaborate on a solution that would be understood and seen as credible by their organiser customers. Introducing additional measures to meet the higher legal expectations set by BS7671 of course meant higher costs and, contentiously, higher prices that led to some claims of profiteering. In reality, electrical contractors had no legal choice other than to review and scale up their processes and no commercial choice other than to pass on these costs where margins were already too narrow to act as a buffer. The AEV/ESSA facilitated committee did, however, arrive at a methodology that was not as intensive as BS7671, that it felt was more proportionate to the risks at events, in effect compromising from a position that could have cost the industry a great deal more. Comments from certain stakeholder groups within the events community pointing out higher risk areas such as working at height being a higher priority, missed the legal nuance that electrics is an area undertaken and controlled by a single supplier and as such is easier for an organiser to manage, therefore legal expectations for them to do so are higher – working at height, however, is a hazard caused and faced by a multitude of on-site companies and so, albeit with a worse accident track record, is likely to attract greater sympathy and a lower expectation from a court than electrics.

What are the new rules?

In a nutshell, that a greater number and types of testing have to be undertaken and that the individuals doing the testing must have certain qualifications. Each circuit needs a variety of live and dead tests, more detail can be read later in this document. Stand builders can continue to install their own electrics but will need them tested by the main contractor if they are unable to demonstrate that they have the appropriate competency to test them themselves.

What competencies are required to do the testing yourself?

Individuals undertaking the testing must be qualified with either City & Guilds 2360 parts 1 and 2, or City & Guilds 2330 parts 1 and 2 and in either case to have also passed an IET 17th edition course. International qualifications do not match up with City & Guilds and so it will be up to the individual electrical contractor at an event to ascertain the competence of international stand builders on a case by case basis. As the electrical contractor generally accepts overall responsibility for delivering an electrically safe event, they are naturally likely to err on the side of caution.

What about pre-wired components?

Testing is only on circuits, on-site, once everything has been installed and is ready to be connected to the power source.

What will the costs be if you don't test yourself?

This is strictly commercial, has not been discussed in association forums, has no common format or structure at the present time and is likely to vary from event to event, in much the same way electricians and many other exhibition services have varied for many years. Any claims of an official association price for the new electrical testing work is untrue. Most contractors are currently charging (a) for a competency vetting process if stand builders apply to do the testing themselves and (b) for the actual testing if they are undertaking it.

What about electrical appliances and exhibits?

Pat Testing is not covered by these new rules, existing rules in the eGuide for exhibits still apply.

Electrical Installation & Testing

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General Guidance

1 The Electricity at Work Regulations, notably regulations 4 and 16, describe the requirement that "All (electrical) systems shall **at all times** be of such construction as to prevent, so far as is reasonably practicable, **danger**" and that "No person shall be engaged in any (electrical) work activity where technical knowledge or experience is necessary to prevent **danger** or **injury**, unless he possesses such knowledge or experience, or is under such degree of supervision as may be appropriate having regard to the nature of the work". The official HSE guidance to the Electricity at Work Regulations suggests that "BS7671 is a code of practice which is widely recognised and accepted in the UK and compliance with it is likely to achieve compliance with relevant aspects of the Regulations". Absolute compliance with the BS7671 standard is therefore generally considered to be the strongest legal defence for any given party in the event of legal action following an electricity related accident, and some AEV venues may subsequently make this approach to electrical work a

condition of tenancy.

2 However, unless stated otherwise as a "Venue Specific Rule" official eGuide adopting venues have agreed to accept the following, modified guidance as an acceptable minimum standard for electrical installation within their halls (effective from July 1st 2012). This is an independently created methodology, developed from 2008 by a specialist ESSA/AEV facilitated task force consisting of senior members of the event venue, electric and safety communities, and where adopted is believed, by them, to deliver a strong legal defence given the unique operational challenges in the event production environment. Under the auspices of the general eGuide committee, the task force is road-mapped to review and develop this guidance on an ongoing basis against future legislation and emerging technological and methodological advancements and remains proactive in seeking comment and insight from both inside and outside of the event industry.

3 It is stressed, however, that venues, organisers and electrical contractors must all make their own decision as to what constitutes compliance with the law by means of a suitable and sufficient risk assessment (taking into consideration the unique profile of each project and, where appropriate, advice from their health and safety adviser, legal representative and insurer).

Competence Requirements and Definitions

Electrician (testing, labour control, fault finding)

4 Qualified to the standard of City and Guilds 2360 part 1 and part 2 or City and Guilds 2330 part 1 and part 2 – or equivalent – plus in either case an appropriate 17th edition qualification.

Competent Person (installation)

5 Qualified by training and experience having worked in the exhibition electrical industry for at least 5 years, and be able to prove this via provision of a reference from a ESSA/AEV Technical Committee member or AEV/ESSA Board Member, or possession of a professional card such as a JIB card, or others as stipulated by ESSA/AEV Technical Committee.

Mates Wirer, helper

6 Always under supervision, working with a competent person or electrician.

Apprentice

7 Undergoing educational training. Never works unsupervised.

Labourer

8 Can mechanically fix no part of the wiring process. Never works unsupervised.

Note on UK Electrical Supplies

9 For non-standard voltage and frequencies, the client may be allowed to bring suitable voltage transformers and frequency converters if written permission is given by the venues approved person. The venue will not supply electricity to any installation, which does not comply with these regulations or requirements.

Stand Installations

10 It is the responsibility of the persons undertaking the electrical installation to ensure that the specifications for installation laid out in this document have been complied with and that they have either (if suitably qualified) **undertaken appropriate inspection and testing themselves** to verify compliance **or have arranged for the event's official electrical contractor to do so.**

11 Orders for all temporary supplies for use during build-up or breakdown shall be placed with the official event electrical contractor, together with full details of the specific intended use of the supply; this must be approved in writing by the official contractor as appropriate.

Testing

12 The person undertaking the testing and inspection must be an Electrician as defined by this document.

13 Once the installation is complete the Electrician must carry out a visual inspection. Upon satisfactory completion of the inspection, a series of tests must be carried out. The first tests need to be carried out with the supply turned off, and the results recorded on a test form as shown in appendix 1 of this document.

14 Once these "dead tests" have been successfully completed the electricity supply can be connected, energised and live testing undertaken. If the supply requires energising by the venue, the Electrician must sign and submit the test form to the venue. On receipt of a correctly completed and signed form the venue will, energise the system. If a test form or an installation is found by the venue to be unsatisfactory, the Electrician responsible for the installation shall be advised and the supply will not be connected or may be disconnected by the venue. The Electrician, must rectify all faults and advise the venue when the installation is ready for re-inspection by resubmission of a test form. Test forms must be equivalent to the sample in appendix 1.

Re-Testing

15 Where stands are being tested by the event's official electrical contractor and fail the test as a result of the installation not being finished, a charge will be made for re-testing. Also, where stands fail the official contractor's test, for whatever reason more than twice, a charge will be made for re-testing.

Modification or Addition to Stand Installations

16 If, after initial inspection and energising of mains supplies, modifications or additions are made to the stand installations, these must be recorded, tested and inspected by the Electrician undertaking the inspection and notified to the venue.

Appliances

17 It is the owner or user's responsibility to ensure that portable appliances are safe to be plugged into the electrical system. The event organising company must ensure that the product owner is aware that it is their responsibility to make certain their appliance is safe.

Responsibility

18 The venue will not accept responsibility for:

Delays

19 Delay in energising installations found unsatisfactory or where insufficient time has been allowed for testing.

Faults

20 Any faults discovered in installations after testing and energising by the venue.

Floor Ducts and Service Tunnels/Overhead Walkways

Exclusion

21 Ducts set into the floors of the hall and the service tunnels under the floors of the halls, where applicable, do not form part of the hired floor space. Access to and use of the floor ducts is limited to employees of the venue, or contractors employed by the venue, for the purpose of installing main supply cables and piped services.

Limited Use

22 The venue will consider limited use of the floor ducts, where applicable, for purposes other than those specified above, provided that the installation in the ducts is carried out by or under the supervision of the venue mains installer and that such use has been agreed in writing, prior to the commencement of the licence period.

Access

23 No person shall enter the service tunnels, switch rooms or other service areas without permission in writing from the venue mains installer or his nominees.

Main Switchgear and Distribution

Block Mains

24 A single mains cable may be installed to supply a block of up to six adjoining stands. Approval will only be given for this where the electrical installation is on continuous walling, on all stands within the block *and* is the responsibility of a single contractor. The crossing of gangways via fascia or floors with sub-mains shall be prohibited, unless where authorised by the venue.

25 24 hour VENUE mains supplies shall **NOT** be used as block mains, unless authorised by the venue.

26 Specialist exhibitions that necessitate 24 hour block mains will be considered for exemption from this ruling provided that suitable and sufficient risk assessments accompany the request which must be presented to the venue no later than 28 days prior to the exhibition build up.

Minimum Cable Size (Sub-Mains)

27 The minimum acceptable cable size (subject to 20A loading) for the wiring of block sub-main supplies shall be 2.5mm².

Isolation

28 Each mains supply shall have its own means of isolation. Each of the stands on a block fed from a single supply shall have its own means of isolation situated in an accessible position on the stand.

Location of Boards

29 Distribution boards and similar equipment shall be installed adjacent to the fused isolators provided by the venue. The mounting board provided by the contractor for this equipment shall be of sufficient size to allow the fused isolator provided by the venue to be fixed thereon. The distribution board shall be provided with suitable cable entry protection and tested prior to arrival on-site.

30 Switch and fuse gear, motor controls, starters etc. shall be readily accessible, suitably connected and out of reach of the public. The electrical contractor responsible for the stand installation shall supply suitable cabling to connect his installation to the fused isolators on the main supply cables supplied by the venue.

External Supplies

31 Supplies external to halls shall generally be limited to a maximum rating of 100 amps 3 phase Neutral and Earth or 100 amps single phase Neutral and Earth.

32 Where circumstances dictate supplies exceeding 100 amps as absolutely essential, these will only be provided following full consultation with the venue.

33 Earth leakage (RCD) protection of not more than 30 mA rating shall be provided (by the official electrical contractors) for all wiring beyond the termination point of the venue's supply.

Earthing

Regulations and Codes of Practice

34 Metal conduit, metal casing of apparatus, frames of motors etc. shall be efficiently bonded to earth using the earthing system provided within the venue's permanent electrical distribution system. This regulation shall apply to all matters covered by the British Standard 7671 (IEC 364) referred to in clause 1. Where separate special regulations and codes of practice have been prepared and approved by the Authorities (e.g. electrical installations in caravans, electromedical equipment, "all insulated apparatus", and appliances which conform to the standards of double insulation) the current edition of these special regulations shall take precedence.

Lighting Fittings

35 At every lighting point an earth terminal shall be provided and connected to the earth continuity conductor of the final sub-circuit.

Metal Framework

36 Where the electrical bonding to earth of metal framed stands, metal water pipes, sinks and other items is necessary, this shall be to an earth conductor which terminates at the venue's electrical supply. The bonding conductor shall have a minimum cross section area of 6mm². Under no circumstances shall any of these items be used as the sole means of earthing an electrical installation.

37 Where block mains are employed on metal framed stands, the stand framework shall be bonded at the incoming main position and also at the termination point of **every** sub-main. The bonding conductor shall have a minimum cross section area of 6mm².

Insulation Sleeving

38 Every earth continuity conductor shall, wherever exposed, including within all termination enclosures, be totally insulated using green and yellow PVC sleeving.

Use of Residual Current Devices (RCD's)

39 Final circuits rated up to 32A shall be provided with additional protection to reduce/control the risk of electric shock from direct contact by the fitting of an RCD with an operating current not exceeding 30mA and a tripping time not exceeding 40mS at 5I_{AN}. RCD's are considered as supplementary protective devices and should be installed in addition to an approved rated fuse or other excess current devices. RCD's shall be performance tested immediately before or at each show and at least annually.

Electrical Wiring

Material Specification

40 Stand wiring may be thermoplastic, elastomeric or other plastic sheathed cable, not less than 1.5mm² cross sectional area and 300/500 volt grade, complying with the relevant and current British Standard and with a current density not exceeding that recommended in the relevant and current British Standard.

41 Flexible cables used for circuit wiring in approved manufactured systems, must also have a current density not exceeding that recommended in the relevant and current British Standard.

Identification

42 Identification of all wiring shall be in accordance with the colour or numbering systems recommended by BS7671 (IEC364).

Joints

43 Joints shall not be made in cables except where necessary as a connection to equipment/accessories. In such cases insulated screwed connection shall be used, and shall be in totally insulated enclosures.

Metal Sheathed Cable

44 Mineral insulated metal sheathed cable may be used in approved conditions and where it is not liable to mechanical damage.

Current Capacity

45 Current capacities must be in accordance with the "exposed to touch" conditions of BS7671 (IEC364). All joints, connections, terminations and fixings etc. must be made using accessories, which are specifically designed for use with the type of cable installed.

Excess Current Protection

46 All circuits must be separately protected for excess current with fuses or other means of close excess current protection.

Lighting Circuits

Maximum Capacity

47 Lighting circuits, serving more than one fitting, shall not carry more than 1200 VA and all sections of the wiring system shall be capable of carrying its circuit full load current. Where discharge lighting is connected the appropriate reduction shall be made (normally to 800VA). All apparatus over 1000 VA shall be individually fused.

Mains Load

48 Where the lighting load to any stand or feature is in excess of 14000 VA, the circuit shall be arranged to be suitable for connection to a 3 phase supply with neutral and phase conductors being of equal size.

Flexible Cords

49 Flexible cords or cables used in approved manufactured systems for circuit wiring shall have a cross sectional area of not less than 1.5mm² and comply with the relevant and current British Standard.

50 Flexible cords shall be of circular section, fully insulated and sheathed, and the only form of jointing shall be purpose made non-reversible flex connectors, being shrouded and having an earth terminal.

51 For static appliances, flexible cords shall not exceed 2 metres in length and for mobile appliances (e.g. vacuum cleaners) the length shall be kept to a minimum.

Lampholders

52 Lampholders of lighting systems must have screw clamp or screw terminal connections between the conductors and the plungers of the lampholders. Lampholders using spikes for connections shall not be used.

Suspended Lighting Fittings

53 Suspended lighting fittings (other than single lamp pendants) shall be provided with adequate means of suspension independent of the electrical conductors. Heavy lighting fittings shall be provided with a secondary means of suspension.

Special Lighting Systems

Track Lighting Systems

54 These may be used provided the track and all the accessories are of the same make, and also provided the loading on the system is compatible with the rating of the sub-circuit wiring and fuse, and complies with the requirements of "Earthing" and "Protection of Wiring" sections.

Other Lighting Systems

55 Only systems designed and manufactured to suit their intended use shall be permitted and these must comply with **all** other aspects of these regulations. Where a system is wired in flexible cords and cables wholly or in part, an RCD of maximum rating of 30mA tripping current shall be installed at the source of the installation and fitted in an accessible position for switching, testing and resetting purposes. Suitable overcurrent protection must be provided.

Client's Own Equipment

56 Where "client's own" equipment is used this must comply with all regulations and is subject to testing and spot checks.

Separated Extra Low Voltage Lighting Systems Previously Known as Safety Extra Low Voltage Lighting System

Transformers

57 Multiple connection Separated Extra Low Voltage (SELV) Transformers shall be of Class II safety isolating type conforming to the relevant and current British Standard, or providing an equivalent degree of safety, having a fused primary connection. Every secondary connection shall be individually fused to its appropriate rating or shall be fitted with a manual re-set protective device approved by the venue.

58 Transformers shall be clearly labelled indicating the precise details of any integral secondary circuit protective device: that they are manually set and shall include the rated transformer power output in VA.

Positioning

59 Particular care shall be taken when installing SELV transformers, which shall be fixed at high level, allowing adequate ventilation and access for testing/fuse replacement.

Cable Sizing

60 Selection of cabling for SELV circuits shall take into consideration both volt drop and current carrying restraints subject to a maximum volt drop on 12v supplies of 0.6 volts. Cabling from SELV transformers supplying Extra Low Voltage track shall be of sufficient size for the full current rating of the transformer.

SELV Fitting

61 Shall comply fully with IEC598 and the relevant British Standard.

Catenary/Uninsulated Pole Low Voltage Systems

62 The use of uninsulated catenary or uninsulated pole separated extra low voltage systems is prohibited.

Earthing of SELV Equipment

63 Secondary windings of SELV transformers, fittings and lighting track connected to same **shall not** be earthed.

Power Circuits

64 Circuits feeding 13 amp socket outlets shall be radials. Where there is more than one socket per circuit, the maximum rating of the over-current protective device shall be 16A amps. Total load shall not exceed 3000 watts and not more than 3 sockets shall be permitted on that circuit. A 30mA RCD protective device shall be fitted.

Coils/Reels of Flexible Cord/Cable

65 Coils of flexible cord or cable loose or on reels and forming part of the circuit shall not be permitted.

Protection of Wiring

Final Stand Wiring

66 All electrical wiring, where liable to mechanical damage or interference, shall be tough overall sheathed or armoured or enclosed in protective conduit, trunking or cladding. Conductive materials including flooring used to provide mechanical protection shall be efficiently continuously bonded to earth. Where tough overall sheathed cables are used without further protection, e.g. without armour or protective conduit trunking or cladding, such cables shall have stranded conductors and shall have a degree of flexibility. A 30mA RCD must be fitted to final stand wiring circuits up to 32A.

Temporary Supplies

67 The wiring of temporary supplies shall be subject to the requirements above. In circumstances where full mechanical protection is impracticable the supply may be provided if 30 mA RCD protection is installed.

Local Switches and Socket Outlets

Local Switches

68 Local switches shall be fixed out of reach of the public and shall be mounted and protected in a similar way to distribution fuse boards.

Socket Outlets

69 Socket outlets shall be of the switched type to BS 1363 (198A) of metal clad industrial type or suitable equivalent to BS 1363 (1995) for mechanical protection and be provided with suitable cable entry protection.

70 Socket outlet enclosures shall be securely fixed to walls, partitioning or floors in such way that they shall not be subject to mechanical damage and shall be located not less than 2 metres (measured horizontally) from any sink unit. Suitable consideration must be given to the ingress of moisture. Wall sockets shall be a minimum of 300mm above floor or work surface level.

Water Heaters

71 Water heaters shall be connected via fused spur outlets – **NOT SOCKET OUTLETS.**

Floor Sockets

72 Where a floor mounted socket outlet is essential, it shall be adequately protected from the accidental ingress of water, and shall be of surface mounted pattern.

Plugs

73 Not more than one flexible cord shall be connected to one plug.

74 The rating of fuses in fused plugs shall be appropriate for both the equipment and flexible cord connected thereto. Non flexible cords shall not be connected into plugs.

Adaptors

75 Multi-way plug-in type and bayonet adaptors shall not be used.

76 The use of trailing/block type 4 way fused sockets shall be restricted to the following: One 4 way unit per fixed socket outlet, subject to a maximum loading of 500 watts total and its plug shall be fused accordingly.

77 A maximum flexible cord length of 2 metres from plug to trailing block unit.

Electric Motors

Isolators

78 Every motor shall be provided with an effective means of isolation on all poles and such isolators shall be adjacent to the motor which they control.

Starting

79 Motors in excess of 7.5 kw (10 hp) shall be fitted with current limiting devices for starting, e.g. shall not be started "direct-on-line". Where, however, the "direct-on-line" starting of a motor is essential to the satisfactory operation of the machine, details of such requirements shall be submitted in advance to the venue for dispensation.

Overload and No Volt Release

80 Every motor in excess of 0.375 kw (½ hp) shall be fitted with a starter having an overload release in each phase line.

81 Every motor shall be provided with a suitable means to prevent automatic restarting after a stoppage, due to a drop in voltage or a failure of the supply, where unexpected re-starting of the motor might cause danger.

Guarding Equipment

Electrical Equipment and Exhibits

82 Electrical equipment and exhibits shall be guarded as necessary to prevent accidental contact with live metal, moving parts, live terminals etc. and accidental short circuiting.

Conditions of Operation

83 Proper consideration shall be given to the conditions under which the equipment is being demonstrated, which may well differ from the conditions under which it is normally installed and for which the normal safeguards will no longer be appropriate.

Lighting Fittings

84 Lighting fittings mounted below 2 metres from floor level or otherwise accessible to accidental contact shall be firmly and adequately fixed and so sited or guarded as to prevent risk of injury to persons or damage to materials.

Heat Generation

85 Incandescent lamps and other apparatus or appliances with high temperature surfaces shall, in addition to being suitably guarded, be arranged well away from combustible exhibits and in such a manner as would prevent contact therewith. Stands containing a concentration of electrical apparatus, lighting fittings or lamps liable to generate abnormal heat shall have well ventilated ceilings, which shall be made of non-combustible materials.

Transformers and Frequency Converters

Step-up Transformers

86 Step-up transformers shall not be installed without the written permission of the venue. Where such permission is requested, drawings and full details shall be submitted at the time of application. Where, however, step-up transformers are used as an integral part of any electronic or similar apparatus, appliance or equipment, and providing the use of such step-up transformers conforms to the customary practice within a particular industry, no such permission will be required.

Step-Down Transformers

87 Step-down transformers shall have separately wound primary and secondary windings. The iron core and frame shall be connected to earth. In addition to the normal fuse protection on the phase line(s) of the primary circuit, the secondary protection in the phase line(s) and with three phase transformers, the neutral connected to earth.

Auto-Transformers

88 Auto-transformers shall not be used, except as an integral part of motor starters, unless the written permission of the venue has been obtained.

Location

89 Transformers shall be placed in positions out of reach of the public and must be adequately ventilated.

Oil-Filled Transformers

90 Oil-filled transformers containing more than 20 litres of oil shall be mounted in a suitable catch-pit or tray capable of containing the entire quantity of oil plus a margin of 10%.

Frequency Converters

91 The venue shall be notified in advance of the intention to provide apparatus to convert the frequency of the electrical supply to any machine or exhibit.

Space for Working

92 Electrical apparatus (other than exhibits and portable equipment) shall be fixed in position with adequate space for operation and maintenance.

Chokes and Capacitors

Location

93 Choke and capacitor equipment for fluorescent lighting shall be fixed in accessible and well-ventilated positions away from combustible material and shall be spaced at least 10mm therefrom by an air gap or by non-combustible material.

Connecting Wiring

94 Where choke and capacitor equipment for fluorescent lighting is not contained within the lighting fitting, any connecting wiring exceeding 1.0 metre in length shall be of PVC sheathed, PVC insulated flexible construction, placed well away from readily flammable articles and shall not be installed under flooring or in spaces enclosed by stand construction.

Lighting of Cages

95 Any artificial lighting of cages or enclosures for livestock shall be arranged outside the cages or enclosures and any heating shall be to the satisfaction of the relevant Authorities.

Lighting of Signs

Fixing

96 Electrically operated or illuminated signs shall not be fixed on wood or cloth unless effectively protected by non-combustible material.

Construction and Wiring

97 Internally illuminated signs shall be constructed of approved materials and wired in approved type cables (not flexible cords), which are related to the expected internal ambient temperature and adequately ventilated.

Location

98 Illuminated signs which in any way resemble exit notices and similar mandatory signs shall not be positioned in such a way as to cause confusion to the public.

Lighting of Showcases

Externally

99 Unless the exhibits are of a non-combustible nature, showcases shall be illuminated from the outside only. A valid PAT test is required and the label clearly visible.

Internally

100 Internally illuminated showcases shall be constructed of approved materials and wired in approved type cables (not flexible cords) and adequately ventilated. The minimum c.s.a of the cable shall be 1.5mm². The units shall be fused at the correct current rating to protect cable and equipment.

Battery Powered Lamps and Lighting

101 Individual lamps, powered by a dc battery supply are acceptable where the battery forms part of a self-contained lamp unit. At no time must dc supplies be connected by means of an external cable. Remote and lead-acid batteries must not be used to power lighting at any time. Wireless controlled lamps (usually LED colour changing) are acceptable where the antenna is a composite part of the lamp unit.

Electrical Discharge Lamp Installations

102 Discharge tube signs or lamp installations used as illuminated units on stands, or as part of an exhibit, whether of high or low voltage operations, shall be regarded as high voltage for the purpose of these regulations, and conform to the following conditions:

Location

103 The sign or lamp exhibit shall be installed out of reach of or shall be adequately protected from the public.

Installation

104 The fascia or stand fitting material behind luminous signs of this nature shall be of non-combustible material and protected as required by BS7671 (IEC364).

High Voltage Gear

105 High voltage gear shall be mounted on non-combustible material and protected as required by BS7671 (IEC364).

Fireman's Switch

106 A separate electric circuit must be used to supply such signs or lamp exhibits, and shall be controlled by an approved pattern "Fireman's emergency switch" located in an accessible and visible position and labelled "Fireman's Switch" in a visible position in accordance with the Authority's requirements.

Approval

107 The venue shall be advised by persons responsible for installing this type of apparatus of their proposals prior to installation on-site. No installation of this type will be permitted unless approved by the venue in writing.

Electrical Cookers, Kettles, Irons, Radiators etc.

General

108 The use of radiators or heaters with exposed elements is not permitted. Any apparatus, which has a hot surface, and all electrical appliances such as electric kettles, radiators, irons etc. shall be guarded where necessary and stood or mounted on non-combustible material. All appliances under this heading which are liable to exceed a surface temperature of 70°C shall be supplied from a socket outlet having a pilot lamp indicating whether the appliance is switched on or not. Kettles, irons, radiators and similar appliances shall not be connected to the lighting circuit; they shall be

separately connected to the electrical supply. Electric cookers shall be wired on an independently fused final sub-circuit complete with 30mA RCD protection. All equipment shall be PAT tested and labelled.

Electric Kettles

109 Electric kettles shall be fitted with an automatic safety device whereby in the event of boiling dry the kettle will be automatically disconnected.

Adjacent Construction

110 Walls adjacent to all electrical cookers, irons, kettles, hotplates etc. shall be protected with non-combustible material. Shelves are not allowed immediately above any of the appliances, and adequate ventilation shall be provided.

Batteries

111 Charged batteries may only be exhibited as part of electric lighting, ignition or starting for motor vehicles, boat engines, small demonstration house lighting plants or other small working devices. No stand lighting shall be connected thereto. The use of approved purpose made self-contained secondary lighting fittings both of a maintained and non-maintained pattern will be permitted provided that they are connected to a 24 hour supply (see also "Battery Powered Lamps and Lighting").

Terminals

112 All terminals of charged batteries, whether in use or not, shall be fitted with a cover of non-conducting non-combustible material.

Switches and Fuses

113 A double pole metal clad switch with suitable fuses shall be fitted and shall control all connections serving such appliances.

Charging

114 The battery charging unit shall be fitted with an approved type of automatic current regulator which cuts off the mains supply to the rectifier when the battery is fully charged.

Times for Charging

115 The battery shall not be charged on the stand except at times when the public is not in the hall.

Charger Isolation

116 The circuit to the charger unit shall be directly connected to the venue's supply with its own isolator, separate from all other circuits, to permit the isolation of these other circuits without affecting the charging circuit.

Enclosure

117 The vehicles or equipment and its charger must stand in a free and enclosed space, the battery box cover shall be removed and the gas vents of the cells shall be cleared and inspected daily.

No Smoking Signs

118 "No Smoking" signs shall be displayed in the vicinity of the charging operation.

Batteries Not in Use

119 Charged batteries not in use on exhibited vehicles or other exhibits shall be disconnected at both terminals.

Harmonic Distortion

120 The venue's mains normally provide an acceptably "clean" supply. However no protection is automatically incorporated to counteract interference produced by other exhibitors' equipment

connected to the same source of supply. All sensitive/vulnerable equipment should therefore be protected by filters etc.

Electrical equipment which produces harmonic distortion can cause problems for the local area supply board, the venue, and other clients in the hall. This equipment may only be used if adequate precautions and harmonic filters are used.

121 The customer's equipment shall not under any circumstances emit into the supply any currents in excess of the following:

122 Third harmonics in excess of 48A RMS and /or in excess of 15% of load current; Fifth harmonics in excess of 28A RMS and no harmonic current emissions in excess of the recommendations given in the Electricity Association's Engineering Recommendations G5/4.

123 The VENUE reserves the right to:
Refuse to connect any suspect equipment and disconnect any known problem equipment.

124 Connect only via a physically separate supply (e.g. a generator).

125 Impose additional charges to cover the costs of remedial works, depending on the exact nature of the harmonics being produced by the load.

126 Recover any costs to repair damage to the venue's supply equipment or to others' equipment.

Electro Magnetic Compatibility

127 Any electrical equipment radiating a magnetic field could cause problems for the venue and other clients in the hall. This equipment may only be used if adequate precautions and suitable screening is provided.

128 Any extra costs involved to overcome the magnetic problems will be the responsibility of the installer.

129 Liability for any costs/damage to venue's supply equipment or others equipment lies with the installer.

130 The venue reserves the right to refuse to connect up any suspect equipment and disconnect any known problem equipment.

Mains Supply

Right of Supply

131 All current for consumption on the premises, howsoever generated, shall be supplied by the venue.

Standard Supplies

132 These comply with the EU Harmonized Voltage Band of + 10% and – 6%
Single phase 230v 50hz (216v to 253v)
Three phase 415v 50hz (376v to 440v)

133 All electrical appliances used by exhibitors must be compatible with standard UK voltage provided by the venue, so as to ensure safety in use.

"Clean" Supplies

134 The venue's mains normally provide an acceptably "clean" supply. However no protection is automatically incorporated to counteract interference produced by other exhibitors' equipment

connected to the same source of supply. All sensitive/vulnerable equipment should therefore be protected by filters etc.

Separate Lighting and Machinery Mains

135 Where requested separate mains can be supplied by the venue for machinery and for lighting and small power.

24 Hour Supplies

136 24 hour supplies are available for any standard supplies during the open period and by arrangement for breakdown of an exhibition. 24 hour supplies cannot be guaranteed during build-up.

Non-Standard Supplies

137 Alternating current supplies which are non-standard in voltage, current or frequency and direct current supplies may be arranged on application to the venue.

Load Limitation

138 The venue, at its own discretion, will limit the power rating of a supply or supplies where, in the venue's opinion, the load or combination of loads requested may have an adverse effect on the supplies to other exhibitors. Where it is proposed by the organiser to group exhibitors demonstrating heavy current consuming machines in such a way as to cause an abnormal demand (e.g. in excess of 100 watts per square metre) in a particular section of the exhibition, the organiser should discuss this arrangement with the venue prior to the final allocation of stand space to exhibitors and should conform to any rearrangement required by the venue.

Power Factor

139 The venue aims to achieve a minimum .9pf on-site but is required by the Electricity Supply Authority to maintain a power factor of not less than 0.92 lagging. Where electrical machines or equipment at an exhibition are such that in the opinion of the venue the power factor is likely to fall below 0.92, power factor correction apparatus shall be supplied and installed by the person responsible for the electrical installation.

Correction Apparatus

140 Correction apparatus shall be connected on the "load" side of the main switches controlling the supply to the stand or individual piece of equipment. The scale of provision shall be that agreed by the venue.

Notification

141 The venue will notify organisers, within a reasonable time after it becomes apparent, of the likelihood of correction apparatus being required at the exhibition.

Main Supply Cables

Supply and Installation

142 All main supply cables from the venue's electrical distribution system to the point of supply, which may be an exhibit, stand or group of stands, shall be supplied and installed by the venue.

Termination

143 Each cable will be terminated with a fused isolator or circuit breaker supplied by the venue.

Separate Lighting and Machinery Mains

144 Separate mains will be supplied for machinery from those used for the provision of lighting and small power. A machine is defined as a single item of plant or equipment, which could not be connected using a 13-amp socket or spur unit.

Connection of Machinery to Lighting Mains

145 Connection of machinery to lighting mains will be permitted.

Connection of Lighting or Small Power to Machinery Mains

146 Connection of lighting or small power to machinery mains is prohibited. If any such connections are made, then the party responsible for placing the order for electrical supplies to that stand will be required to order and have installed an appropriate lighting main. Where this is not practical the stand will be subject to a surcharge equivalent to the late order cost of the lighting main which would otherwise have been installed.

Proliferation of Mains Cables

147 Where installation of a number of small supplies would, in the opinion of the venue, lead to an unacceptable proliferation of mains cables, the venue may, at its discretion, either itself install a large main cable and provide the mains ordered by sub distribution within the block, or instruct the nominated electrical contractor that only a single main will be installed to the group of stands.

Access for Installation

148 The main supply cables to stands or exhibits will be installed before or immediately after the starting date of the licence period, provided that the supply has been ordered from the venue by the agreed date. Before occupying the stand site, exhibitors and their contractors must check with the venue that the supply cables have been installed and, if not, shall only occupy areas of the stand site permitted by the venue until such time as the supply cables are installed.

Appendix I: Forms

Although test forms will vary, the following represents the minimum information required:



Exhibition Stand Electrical Installation Inspection & Testing Form Template

Exhibition Name.....

Hall Ref.	Main Located on Stand No.	Main Supply/Main No.	Main Size Amps	Mains Cable Visual Check	Mains Voltage	Mains Polarity Correct	PSCC	Ze (Venue Supply)
			A	Yes / NO	230v / 400v	Yes / NO	kA	Ω

	Stand No:	Stand No:	Stand No:	Stand No:	Stand No:	Stand No:	Stand No:
Circuit Details	Circuit Description/Designation						
	Points Served						
	Conductor Size						
	C.P.C. Size						
	Cable Type *						
	Protective Device *						
	Rating and Type						
Dead Test	Visual Inspection						
	Earth Bond Connected						
	Continuity (R1 + R2)						
	Insulation Resistance Line / Neutral to C.P.C. - MΩ						
	Polarity (Yes/No)						
Live Test	Earth Loop Impedance (Zs) Test						
	RCD Test – X1						
	RCD Test – X5						
	RCD Function Button Test (Yes/No)						

Comments or Observations

Installer Name (Print)..... Signed.....

For and on behalf of COMPANY NAME (Block Capitals)..... Date.....

I request that the electrical supply ordered be finally connected and energised and I certify that the installation has been inspected and tested and is complete, ready for energisation

Tester Name (Print)..... Signed.....

For and on behalf of COMPANY NAME (Block Capitals)..... Date.....

Test Instrument..... Test Serial.....

Illegible test forms will be not be accepted

<p>Codes for Cable Type</p> <p>A: PVC/PVC B: PVC cable in metal conduit C: PVC cable in non-metallic conduit D: PVC cable in metallic trunking E: PVC cable in non-metallic trunking F: SWA cable G: H07 cable Any other please state</p>	<p>Codes for Protective Device</p> <p>M: MCB BS(EN)60898 H: HRC BS88 fuse R: RCBO BS(EN)61009</p>	<p>Energised By.....</p> <p>Energised Date.....</p> <div style="text-align: center; border: 1px solid gray; padding: 5px; width: fit-content; margin: 0 auto;">Date / Time Stamp</div>
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*Insert codes where appropriate

The tester must ensure that test readings are inserted where appropriate and use Yes or No to confirm actions.

Appendix II: Inspection and Testing Regimes for Electrical Installations at UK Events and Exhibitions

149 The following copy relates directly to the electrical installation test form featured in 'Appendix I' and to BS7671 2008 (seventeenth edition). This appendix seeks to provide additional information on the testing regime points.

Overview: Why is Inspection and Testing Required?

150 Inspection and testing of electrical installations is required to confirm that the installation is safe, that it is fit for the assigned purpose and, if a fault later occurs, that it 'fails safely' to protect those within its proximity. Due to the nature and type of installation to which these regulations apply, the venue's requirement to inspect and test differs from that defined within other existing standards and regulations. The system or regime of inspection and testing described below has been deemed appropriate, by the ESSA/AEV Technical Committee, to the nature/type of installation commonly found at UK events and exhibitions, reflecting the 'non-complex' nature of these installations and focussing on safety.

a) Live/Dead Test: Visual Inspection

151 The HSE has recognised that 95% of all faults are identified during a visual inspection and this is the first essential part of the testing process. The visual inspection should be undertaken by the installation team, their supervisor and/or manager. This initial verification confirms that the equipment and materials are of the correct type and comply with the relevant standard, that all parts of the installation have been fixed adequately and that no part of the installation is visibly damaged or otherwise defective.

152 The visual inspection may ultimately constitute a single tick in the appropriate box, but all of the following elements should be considered and checked:

- *Connection of conductors*
- Are terminations electrically and mechanically sound? Is insulation and sheathing removed only to a minimum, to allow satisfactory termination?
- *Identification of conductors*
- Are conductors correctly identified in accordance with these regulations?
- *Routing of cables*
- Are cables installed with appropriate consideration of external influences, such as mechanical damage, corrosion, heat etc.?
- *Conductor selection*
- Have conductors for current carrying capacity and voltage drop been selected with appropriate consideration for the design?
- *Connection of single pole devices*
- Are single pole protective and switching devices connected in the phase conductor only?
- *Accessories and equipment*
- Are all accessories and items of equipment correctly connected?
- *Thermal effects*
- Where required, are fire barriers present and is there provision for protection against thermal effects?
- *Protection against shock*
- What methods have been used to provide protection against basic protection and fault protection?
- *Mutual detrimental influence*
- Are wiring systems installed such that they can have no harmful effect on nonelectrical systems? Are systems of different currents or voltages segregated where necessary?
- *Isolation and switching*
- Are the appropriate devices for isolation and switching present, correctly located and installed?

- *Undervoltage*
- Where undervoltage may give rise for concern, are there protective devices present?
- *Protective devices*
- Are protective and monitoring devices correctly chosen and present, to ensure protection against indirect contact and/or overcurrent?
- *Labelling*
- Are all protective devices, switches (where necessary) and terminals correctly labelled?
- *External influences*
- Have all items of equipment and all protective measures been selected in accordance with the appropriate external influences?
- *Access*
- Are all means of access to switchgear and equipment adequate?
- *Erection methods*
- Have all wiring systems, accessories and equipment been selected and installed in accordance with the requirements of these regulations, and are fixings for equipment adequate for the specific environment?
- Following the visual inspection across all the aforementioned areas, and the subsequent determination that there are no defects that may lead to a dangerous situation when testing, it is time to proceed with actual testing.

b) Dead Test: Polarity

153 This test ensures that all wires are correctly connected and terminated, that they are continuous, and that they will provide adequate protection for the current supplied.

c) Dead Test: Insulation Resistance ('line to CPC' and 'neutral to CPC')

154 These tests are undertaken in order to ensure that the insulation of conductors, accessories and equipment is in a healthy condition, and will prevent dangerous leakage currents between conductors, and between conductors and earth. It will also detect the existence of any short circuit(s).

d) Live Test: Earth Loop Impedance

155 This test confirms the capability of the earth, to ensure that it is able to take the fault current, rather than discharge it to surrounding materials (and possibly a person).

e) Live Test: RCD 5X Test (Functional Testing)

156 This verifies the ability of the RCD to 'break' under load. Furthermore, the test ensures that any 'break' will occur in sufficient time, and at the required amperage to ensure safety.

f) Live Test: Continuity

157 This test ensures that all wires are correctly connected and terminated, that they are continuous, and that they will provide adequate protection for the current supplied.

Venue Specific Rules

The O2 – General

158 All work including mains supply, distribution, testing and installation of electrical fittings, must be undertaken exclusively by venue's approved contractor.

The full eGuide can be downloaded at www.aev.org.uk/eGuide