

## **BS7909 Guidance Note.**

### **The Use of Temporary Electrical Systems (TES) in Broadcast / TV and Events.**

In 2008, the British Standard BS 7909, relating to Temporary Electrical Systems (TES) in the Entertainment and Broadcast Industry was instigated. It outlines the defined responsibilities and installation requirements for a TES. The standard is required to be implemented alongside the requirements of BS7671 (Commonly known as the 17<sup>th</sup> Edition wiring regs) which relates to the wiring regulations for permanent electrical installations. Since 2008 there have been a number of reviews and updates of the standards, ensuring they are fit for purpose in the industry.

#### **What does this mean for production?**

Within the requirements of BS7909 there are clear responsibilities and requirements for both production and the person responsible for the TES.

The use of electricity has differing requirements depending on the type of system being used. For example, a self-shooting PD who is filming an interview or piece to camera in a hotel room using below 6KVA will vary significantly from the requirements necessary for a large TES over 6KVA supplying an Outside Broadcast.

Below are a number of subsections providing information and guidance relating to BS7909, which has been broken down into differing power uses;

#### **Using up to 2kW of power from one electrical supply; typically a 13A socket outlet in the UK.**

- The user must be competent in the safe set up and operation of the equipment to be used.
- Use a maximum supply of power not exceeding 2kW in total.
- Must know how to correctly test the supply from socket outlets using a polarity and earth loop impedance tester such as a Martindale EZ150 or similar.
- Must use a suitable 30mA Residual Current Device (RCD) when plugging in electrical equipment.
- All portable electrical appliances must have evidence of an up-to-date Portable Appliance test (PAT) and have a thorough visual inspection before use.
- Where possible, use Class II double insulated equipment to reduce the risk of electrical shock.
- Ensure someone competent is always present when system is energised.

#### **Using over 2kW but below 6kW of power eg, small film shoot, conference, small event in UK.**

Only competent and experienced personnel must be used for example, a lighting camera operator. It is up to the Producer to ensure they are competent – check qualifications, CV etc.

If in any doubt, consider engaging an experienced lighting electrician, even on small setups, to rig equipment, cables and assist with transport and handling.

- No individual light exceeds 2kW.
- Should have access to and know how to use, polarity and earth loop impedance tester such as a Martindale EZ150 or similar to correctly test socket outlets.
- Should have access to and know how to use, a suitable 30mA RCD when plugging in electrical equipment.

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- All portable electrical appliances must have evidence of an up-to-date PA test and have a visual test before use.
- Where possible, use Class II insulated equipment to reduce the risk of electrical shock.
- Ensure someone competent is always present when system is energised.

#### **Using over 6kW of power supplied by ANY source, including generators.**

- Must use a pre-vetted contractor for dry or wet hire if in UK.
- If working abroad, please contact 1<sup>st</sup> Option Safety.
- If no suitable pre-vetted contractors available, you should discuss with 1<sup>st</sup> Option.
- Ensure that the producer / Production Manager nominates a competent individual to act as the 'Senior Person Responsible' (SPR) – normally a gaffer/chargehand or could be the Radio OB Sound Supervisor or the OB Engineering Manager (EM).
- If gaffer/chargehand is supplied by pre-vetted contractor, then they must determine their competence.
- If gaffer/chargehand is supplied by production, it is up to the producer to determine their competence. The 'Gaffer Competence' form can be used for this purpose – contact 1<sup>st</sup> Option to obtain a gaffers competence form.
- SPR – Must ensure that all crew engaged in electrical work are competent for the task assigned.
- SPR – Must ensure that all equipment is 'fit for purpose'.
- SPR – Must provide a location specific risk assessment and where necessary, a method statement.
- SPR - Production of suitable sign-off certificates for temporary installation (NB, may need retesting and certifying if significant alterations, change of environment, damage or additional items added but at SPR's discretion – see section 'Certification and Sign Off' below).

#### **Further guidance when using more than 6kW:**

Facilities eg, Radio or TV OB truck, make-up vehicle, catering, toilet block, portakabins etc: All such facilities with installed electrical systems must have a valid periodic testing and inspection certificate issued by a competent electrician every two years and retained for inspection. There must also be evidence of a regular routine electrical check undertaken by a competent person every 12 months.

The person responsible for the facilities eg: Radio OB Sound Supervisor, TV OB Engineering Manager (EM), make-up artist, chef, driver etc, must have a basic knowledge and understanding of their electrical system.

#### **Design and Instruction:**

The SPR and/or Producer must take into account the source of supply, design and selection of cables and equipment for event/production requirements with adequate over current and residual current protection, facilities and crewing.

Occasionally, a specialist company may be required to produce a suitable design.

Ensure all final circuits are suitably protected including the use of a 30mA Residual Current Device (RCD)

The installation of fixing wiring and electrical equipment to scenery must be carried out by a competent electrician and will require testing.

**Work on site:**

The SPR is responsible to ensure all equipment in place is suitable prior to system being energised eg, cables tidy, RCD's present and functional, adequate earthing in place, warning signs, means of isolation identified, equipment protected for interference etc. A system design should be available and the correct loading should be implemented across the system.

**Inspection and Testing:**

- Ensure RCD's checked and tested
- Ensure all portable equipment on site has evidence of an up-to-date PA test and have a through visual test before use.

Operational procedures:

- Ensure someone competent always present when system is energised
- Ensure access to / communication remains in place and available between the senior person responsible and the deputy person responsible if the SPR has left the site
- Regular visual checks
- RCD bypass only if suitable risk assessment produced by competent person

**Certification and Sign Off:**

As part of the requirements under BS7909:2011, all temporary electrical systems above 6KVA must be certified by a competent person, confirming that the temporary system is safely set up for use. As a minimum, there should be a Completion Certificate for temporary systems connected to each source of supply. This will need to be completed and handed over to the event manager/producer/ Production Manager by the person deemed responsible and placed into the production safety file.

The design should specify the circuits that should be tested or the person responsible should specify these circuits based on the design and circumstances at the event and the environmental conditions present.

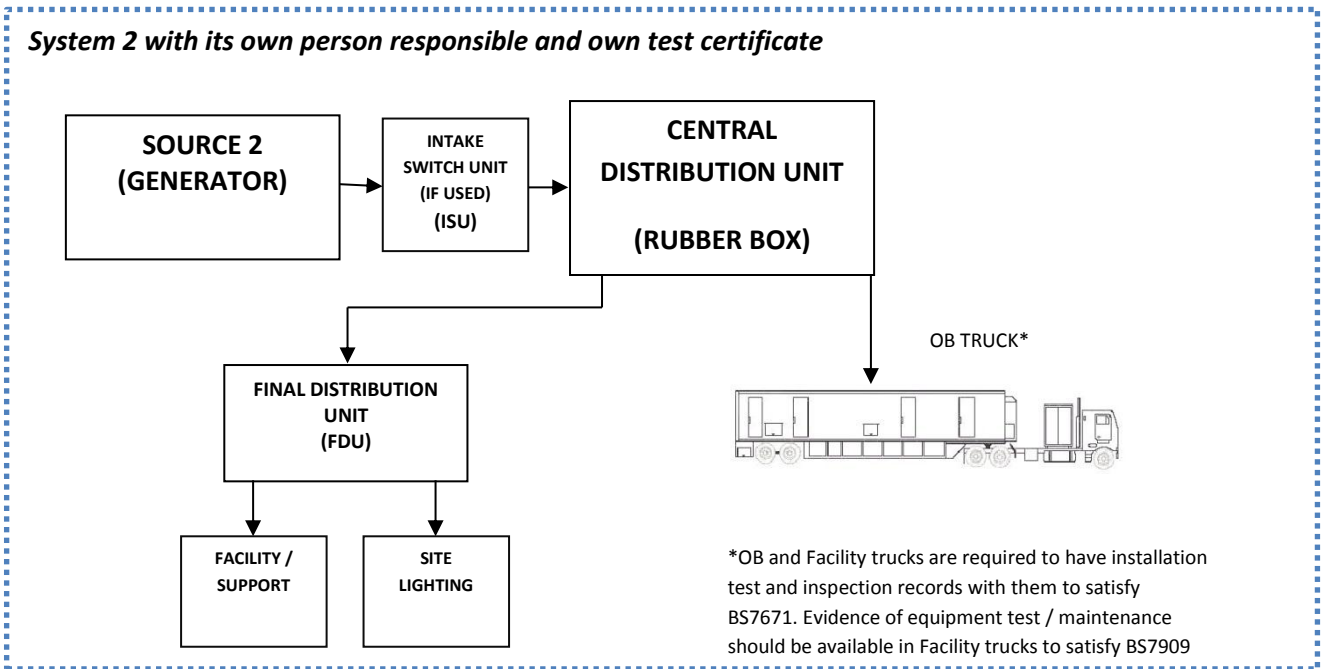
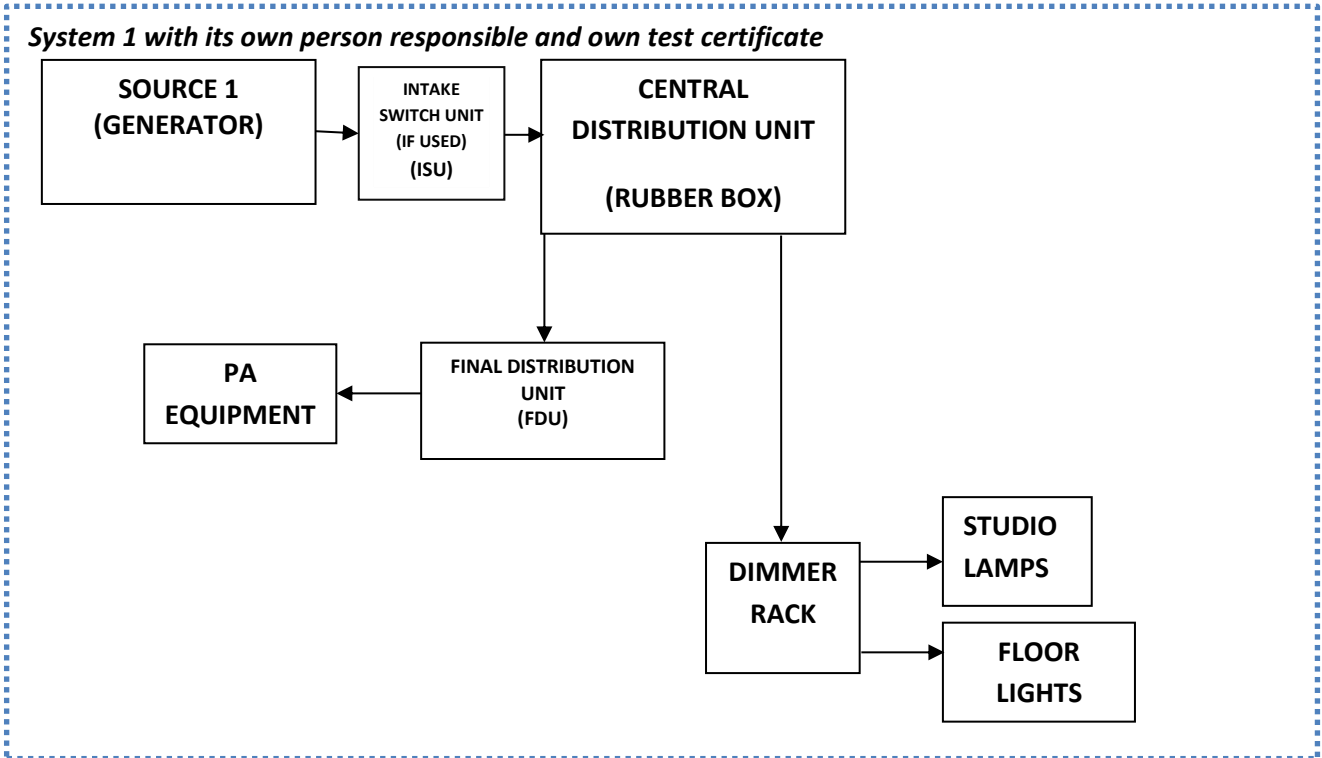
These tests should include the output of the first ISU (Intake Switch Unit – see Fig 1) and as a minimum a selection of final circuits, but not necessarily the whole system.

The results should be recorded on the Completion Certificate and the Schedule of Test Results.

Examples of these forms can be found in Appendix 1 and 2 of this document.

Where multiple distribution is used, the Senior Person Responsible may designate a Person Responsible for each Temporary Electrical System (TES). Where an event is extensive or complex enough to require more than one Completion Certificate, a Confirmation of Electrical Completion should be provided by the senior person responsible to indicate that the temporary electrical system has been set-up, inspected, tested and is safe and suitable for use at the event: an example is provided in appendix 3.

Fig 1 - Location using multiple supply sources (this is an example only):

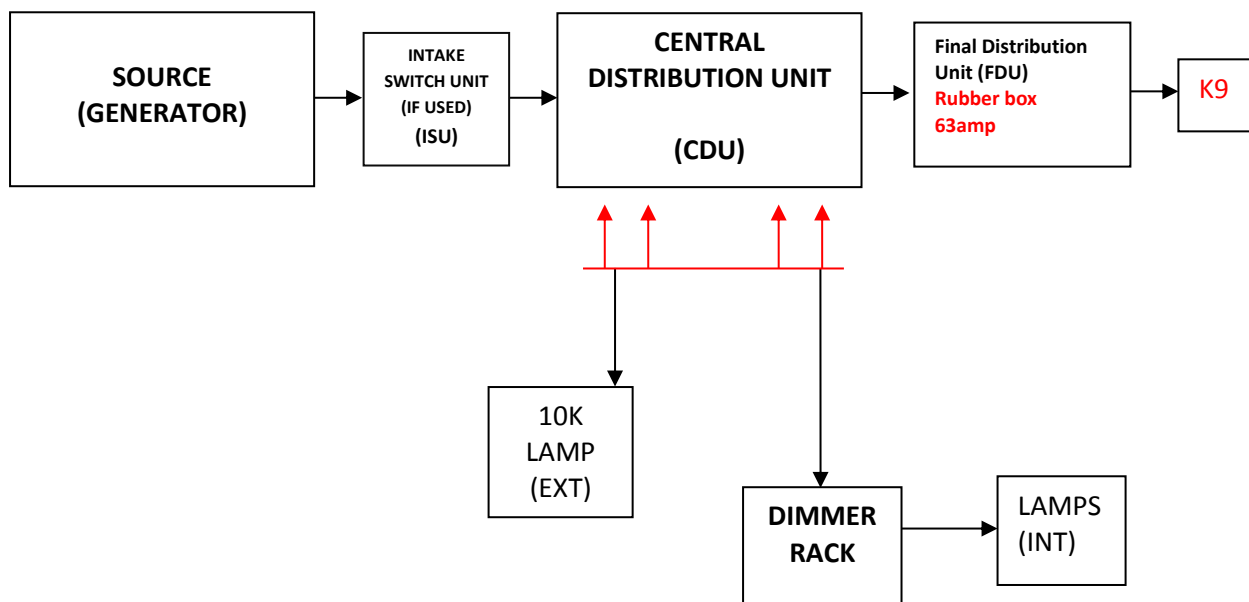


## When am I required to obtain an additional Completion Certificate?

Under the requirement for BS7909, the TES is required to be re tested and re certified if:

- The system has significant alterations. **See fig 1.1**
- There is potential damage to part of the distribution system. **See fig 1.2**
- If there are environmental changes for example, if the electrical distribution is moved to another location and set up again from scratch using different hardware / equipment. See **note 2** below.
- Or, if the competent person responsible deems it necessary to retest and certify

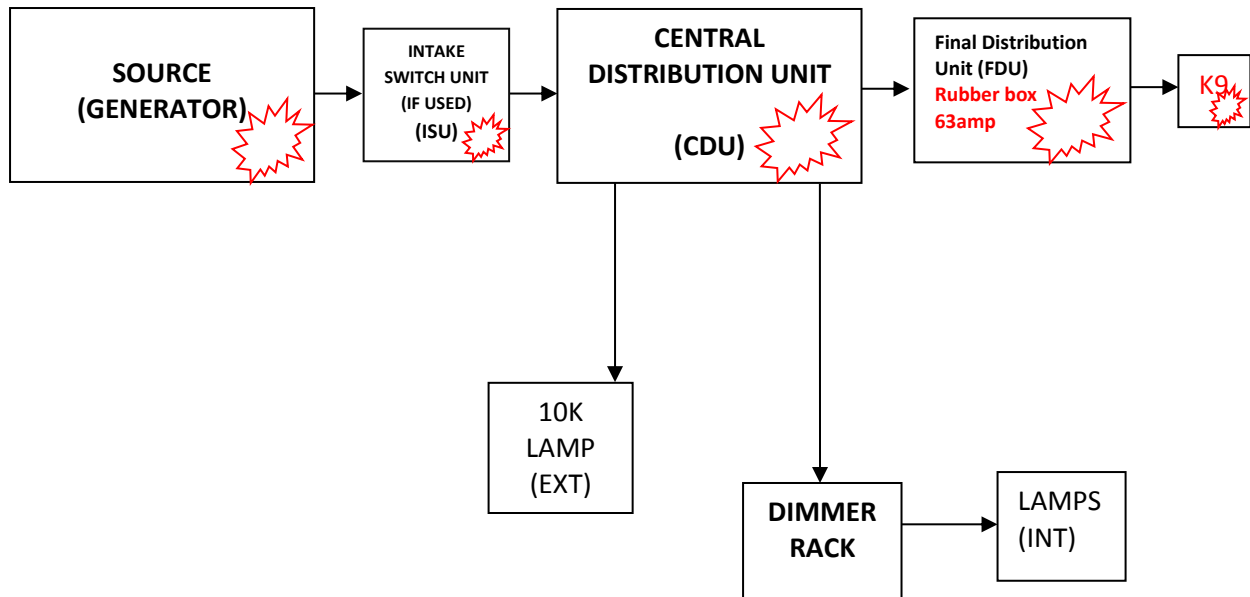
**Fig 1.1 - Significant alterations to a system**



A significant alteration / change includes any part of the system that is changed from the red arrows back, including the source (Generator) the HEAVY mains cable linking the generator to the ISU, the CDU, or the FDU.

Moving the location of the dimmers or lamps for example does not normally constitute as a significant change. This is however, at the discretion of the competent person in charge

**Fig 1.2 - A damaged system**



Where the system has damage to it, for example caused by fire, heat, water or weight (heavy mains damaged by vehicle due to insufficient cable management or a stand / rig falling onto the mains distribution box) etc, then the equipment must be replaced and retested.

If a lamp, dimmer rack or other items plugged into the system fail (hand tools; cameras etc), then a retest and additional Completion Certificate is not required unless the competent person in charge decides it is necessary.

**Note 2 – Change of Environment**

If the electrical system is set up on location A (for example, a swimming pool) to begin with but then moves to location B (for example, in a park) for the rest of the day, then the system will need to be retested.

Another change of environment includes where the system has been set up in dry conditions and then is subject to a deluge of rain, submerging parts of the system into water. The gaffer on site will be able to make this judgment as the person responsible for the electrical distribution.

The certificate outlines the details of the event/ production; details of the system; who the responsible person on site is; various system test readings necessary and earthing arrangements. A template certificate is attached in Appendix 1.

### Appendix 1 – Completion Certificate Template

<p><b>Completion certificate</b>  <i>(For use with BS 7909, Code of practice for temporary electrical systems for entertainment and related purposes)</i>  <i>This Certificate, showing the results of inspections and tests carried out on the temporary distribution described, should be handed to the event manager / Production Manager. A copy should be available for the owner of the electrical supply which feeds the temporary system. One certificate should be prepared for each electrically separate temporary distribution.</i>                      This document is not valid without a completed Schedule of Test Results</p>		
Ref. No.:		
<b>PART 1: DESCRIPTION OF THE ACTIVITY BEING COVERED AND SUPPLY CHARACTERISTICS</b>		
1. Event:	2. Location or venue:	
3. Does this certificate cover a subsection of a larger system? Y/N If yes, give details:	4. Supply: Single phase <input type="checkbox"/> Three-phase <input type="checkbox"/> Max demand: _____ A or kVA (delete as appropriate) Distribution schematic attached? Y/N	
5. Date of inspection and test:		
<b>PART 2: SYSTEM DETAILS OF SUPPLY USED (ONE CERTIFICATE FOR A SYSTEM FED FROM EACH SEPARATE SUPPLY)</b>		
<b>6. Source of supply used</b>	Generator at:	Installed supply at:
7. Supply earthing arrangements	TN-S <input type="checkbox"/> TT <input type="checkbox"/> TN-C-S <input type="checkbox"/> IT (see BS 7909:2011, <b>C.4.5</b> ) <input type="checkbox"/>	
<b>8. Protective devices at source of supply</b>	CB/RCBO/fuse rating: _____ A	RCD/RCBO I <sub>n</sub> : _____ mA
	Type:	Time delay setting: _____ ms
<b>9. Additional earthing arrangements</b>	Are earth electrodes deployed? Y/N	Give details:
<b>10. Interconnection of earthing systems</b>	Have deliberate connections between the temporary distribution and any other system been made? Y/N	Give details:
<b>11. Protective devices in the ISU if present</b>	CB/RCBO/fuse rating: _____ A	RCD/RCBO I <sub>n</sub> : _____ mA
	Type:	Time delay setting: _____ ms
<b>12. Final circuit's details and tests should be shown on a Schedule of Test Results, where appropriate.</b>		
<b>13. Specify any deviations from BS 7909 or the design, or other significant information:</b>		
<b>PART 3: ESSENTIAL INSPECTION AND TESTS</b>		
14. Visual inspection satisfactory <input type="checkbox"/>	15. Polarity throughout satisfactory <input type="checkbox"/>	
16. Earth fault loop Z throughout satisfactory <input type="checkbox"/>	17. RCD 'T' buttons satisfactory <input type="checkbox"/>	
18. Evidence of formal inspection and test provided and satisfactory for electrical equipment <input type="checkbox"/>	19. Earth loop impedance of the supply, measured at the source of supply or ISU if present: _____ Ω	
20. Planned duration of this system:	21. Date to re-inspect & re-test this system:	
<b>PART 4: DECLARATION</b>		
I certify that the temporary electrical distribution system described above has been set-up in accordance with the recommendations of BS 7909:2011 and inspection and testing has been completed. To the best of my knowledge and belief, the system is safe and suitable for the intended purpose.		
Name:	For and on behalf of:	
Signature:	Responsibility on event:	
	Date:	





