

# Electrical Installation Checklist



## Project Details

Reference Number:		Company Name:	
Site Name:		Site City:	
Project Manager Name:		Contact Email:	

Please complete the form and return to the Project Manager detailed above, before the medical equipment is installed.

## Electrical Contractor Details

Company Name:		Contact Name:	
Contact Telephone:		Contact Email:	

## Checklist

Electrical installation meets BS 7671 including section 710 medical locations (717 mobile locations)?	Yes/No
The assessed medical location group number, as identified following BS 7671 and HTM 06-01:2017, is?	0/1/2
The electrical and panel design fulfils the function as indicated on the supplied technical drawings?	Yes/No
The RCD protection for the equipment mains supply is confirmed as being correct (type A, F or B) and a test certificate is supplied? <b>Note:</b> Generally, 3-phase X-ray generators always need a type B RCD.	Yes/No
The panel indicator colours meet BS EN 60601-1 if the panel is mounted in a medical location (the colour red should not be used unless to indicate immediate action must be taken to prevent danger)?	Yes/No
All provided (non-medical equipment mounted) motion STOP and emergency power off (EPO) buttons are labelled according to the <a href="#">AXREM</a> guidelines and meet HTM 06-01:2017?	Yes/No
Power control panels are designed and built to BS EN 61439 and has such declaration indicated?	Yes/No
Emergency switching devices use switch disconnectors, as indicated in BS EN 60364-5-53 or contactors of type IEC 60947-4-1 (rated as disconnectors)? <b>Note:</b> Contactors of IEC 61095 are not permitted.	Yes/No
Any connections from the power control panel for mains operated warning lights (e.g. radiation indicators) are RCD protected and not derived from any supplies feeding the medical equipment?	Yes/No/NA
Are the radiation warning lights suitable for the intended frequency of operation (on/off/on rate)?	Yes/No/NA
In the event of a mains power loss the supply to the medical equipment will be restored automatically, in line with the function shown on the supplied diagrams?	Yes/No/NA
Where specified on the provided diagrams, suitable isolated emergency power off contacts (circuits) are supplied (to allow shut down of internal UPS)?	Yes/No
The line impedance meets the requirements set out in the specifications for the equipment?	Yes/No
The supplies to the medical equipment meet the specified voltage, frequency, total harmonic distortion, and required overvoltage protection category?	Yes/No

## Declaration

The person named below confirms the checklist completed above is accurate. If any item fails to meet the requirements, the medical equipment supplier/installer will not be held liable in the case harm occurs to a patient or anyone else.

Full Name:		Company:	
Signed:		Date:	Click or tap to enter a date.

# Appendix – Informative Information

## General

Medical equipment relies on a safe and effective power supply to ensure the safe operation of the equipment and to maintain patient safety. Medical imaging products must meet strict regulatory requirements for both safety and performance. It is therefore critical the electrical supply and installation meet similar exacting standards to contribute to the safe and reliable operation of the medical equipment.

### BS 7671 & HTM 06-01

Standards for the electrical installation are set out within BS 7671. It is important that all appropriate regulations are followed, including those for special locations. Section 710 has additional requirements for medical locations and other locations, such as 717 – mobile or transportable locations, may also be required.

One requirement of section 710 is to perform an assessment to determine the appropriate medical location group rating. This is also a requirement given in the Department of Health (DoH) Health Technical memorandum HTM 06-01. In particular the clinical users must indicate what effect any loss of power would have on patient safety. This will determine the power supply continuity requirements and the medical location group rating. Please note there may be a difference between the supply continuity requirements of the diagnostic imaging equipment than that of the associated group rating. The guidance within HTM 06-01 includes other areas and topics that are not covered by BS 7671. Meeting HTM 06-01 may be a contractual requirement.

### Control Panels (Contact controls)

Most requirements for permanently installed medical imaging equipment will require the installation of a control panel to provide isolation and switching of the mains power supply. The panel may also incorporate automatic transfer switching equipment (ATSE) and bypass switches when a local UPS is specified. It is important that the supplies to and from any control panels meet BS 7671 and the control panel meet the standard for such panel design, BS EN 61439. Switching and isolation is also covered in BS 7671, but as other functions may be incorporated the use of BS EN 61439 is often also required. When it is specified to have emergency power off buttons (EPO) it is essential that the switching device is rated for this function. The safety integration level of components will also need consideration, especially when ATSE, UPS, and other critical functions are included. The marking of all control functions is essential, including all emergency mushroom buttons, to avoid error and loss of critical equipment. The clear labelling of buttons providing emergency motion stop and those providing emergency power off is vital, as pressing the wrong one could lead to loss of patient data or delays in treatment! The colour of other buttons and indicators on the panel should be considered carefully, especially if the panel may be located or visible in a medical location of group 1 or 2. Medical products meeting have to carefully select control and indicator colours to avoid errors and mis-operation. BS EN 60601-1 sets down requirements for such colours and in particular a red indicator can only be used when immediate action must be taken to remove the condition resulting in the red indicator. Therefore, using red for any panel indicator is generally not acceptable. From BS EN 60601-1:

Colour	Meaning
Red	Warning – immediate response by the OPERATOR is required
Yellow	Caution – prompt response by the OPERATOR is required
Green	Ready for use
Any other colour	Meaning other than that of red, yellow or green

**Note:** Dot-matrix and other alphanumeric displays are not considered to be indicator lights.

The colour blue is often used in various standards to indicate a change of state or change of operating mode.

### Line Impedance

Typically to meet BS 7671 the line impedance is required to be low enough to operate the circuit protective device. However, for many items of imaging equipment the line impedance is required to be much lower in order that the equipment maximum output power can be achieved. This mostly applies to X-ray equipment, such as used for radiography, fluoroscopy, interventional radiology and CT examinations. However, even MR systems require specified line impedance levels. Failure to meet these requirements can lead to unacceptable diagnostic images or equipment errors. Please note medical equipment manufacturers specified line impedance values are quoted at the connection to the equipment. Therefore, please consider the resistance of the final circuit connection cable in any calculations.

### Mains Supply Quality

The quality of the mains supply can affect the performance and safety of the medical equipment. Requirement for harmonic distortion is often specified as these can seriously affect the operation of equipment. For example, MR units may show image artefacts if too high. Damage from voltage transients could damage equipment and therefore prevent patient treatment or examinations.