SAFE SYSTEMS OF WORK

Objective and Purpose
To, provide a general overview of a Safe System of Work application when undertaking activities surrounding the Electrical authorisation. It should be noted that additional cross-reference should be made to further provided publications dependent on the specific activity where defined risk assessments have been made. This document considers the application of the Electricity at Work Regulations (EaWR) in order to provide for safety whilst an Engineer Surveyor conducts; Inspection, 'Dead' and 'Live', testing activities.
Notwithstanding the condition of an installation being subjected to an inspection and test that is duly assessed and subsequently reported upon, for the purpose of this document the following Regulations shall be administered;

- Regulation 3 – Persons on whom duties are imposed
- Regulation 4 – Systems, work activities and protective equipment
- Regulation 12 – Means for cutting off the supply and for isolation
- Regulation 13 – Precautions for work on equipment made dead
- Regulation 14 – Work on or near live conductors
- Regulation 15 – Working space, access and lighting
- Regulation 16 – Persons to be competent to prevent danger and injury

In order to cover the Regulations specified, this document makes specific reference through the following subject matter;

Risk Assessments
Engineer Surveyors shall be entirely familiar with relevant parts of the Allianz Engineering Technical Health and Safety Manual and apply the content at all times.

The published assessments are intended to provide an informative indication of the risks typically anticipated on sites when inspecting and testing electrical fixed wiring installations. The Engineer Surveyor, in consultation with the site operator, may identify other risks which may be specific to the site. In such cases the risk assessment for the inspection shall be extended to incorporate the additional information.

The nominated person(s) representing the client should have; written risk assessments, safe operating procedures and/or operate Permit to Work systems, developed either for the Company or the specific site being visited. The Engineer Surveyor shall include these procedures into the method of operation. If there is any concern that safety will or may be compromised by following these procedures then the attending Engineer Surveyor shall discuss the issue with the client responsible person at the earliest opportunity and agree a way forward. Such issues shall be referred to the Engineer Surveyor's line Manager to assist in the decision making process, along with the creation of a suitable record, maintained as a 'Contemporaneous Note'. The results may result in the application of Limitations to the intended inspection or necessitate the issuing of a PNA notification.

General Safety

Safe operating procedures

Before carrying out any activity on, or near an electrical installation or electrical equipment, an assessment of all risks must be made. This assessment shall specify how the work activity shall be carried out and where control measures should be applied, to ensure continued safety. This specific to site activity assessment need not be formally recorded but should be captured as a 'Contemporaneous Note' allowing for future reference.
Risks and subsequent control measures not registered within existing Allianz Engineering publications should be duly reported to Engineering Standards where further analysis will be conducted that may result in the reviewing and revision of supplementary procedural guidance.

In general terms, all work carried out, including testing, on electrical installations or equipment shall ideally be conducted with the electrical supply isolated unless the following extract from EaWR, Regulation 14 can be safely applied;

(a) It is unreasonable in all the circumstances for it to be dead; and
(b) It is reasonable in all the circumstances for him to be at work on or near it while it is live; and,
(c) Suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.

SAFE SYSTEMS OF WORK

Personnel

The responsibilities placed upon persons for the safety of those engaged in any work activity involving electricity, and those who are, or may be affected by the activity are defined within EaWR, Regulation 3.
All Engineer Surveyor's authorised in the Electrical discipline have demonstrated competence, as defined through EaWR, Regulation 16. This should also apply to the Client and their employees, whereupon the witnessing of unsafe practices should be duly reported in an appropriate manner to the Client and Allianz Engineering, considering circumstances surrounding the identified issue. Additional capture as a contemporaneous note would be beneficial if future reference can be anticipated.

Often the Engineer Surveyor will be the most experienced and knowledgeable person at the site in regard to electrical systems, where a proactive role should be administered in assisting the client in the discharge of their duties. This will normally take the form of asking the clients nominated person if there are rules of working, if there are any peculiar circumstances existing at the site which may be affected by the work, and generally conducting a familiarisation exercise prior to inspection and/or test.
Before and during that all activities, the Engineer Surveyor shall ensure that all-relevant requirements, rules and instructions are complied with.

The Engineer Surveyor shall closely liaise with all persons that may be directly or indirectly affected by the intended inspection and test ensuring that all potential dangers and necessary control measures are identified. This shall also involve seeking approval to disrupt electrical supplies, where appropriate.

Allianz Engineering employees shall wear suitable protective clothing as provided, where the Engineer Surveyor shall determine the most appropriate considering; client requirements, exposure to the environment of the location and the weather conditions. Equipment providing protection for; head, feet, ears and hands are also available where these items shall be worn if the site circumstances demand or merit. Special consideration shall be given to any jewellery worn by the Engineer Surveyor and this shall be removed if it presents a danger, remembering that metals used for these items are typically highly conductive to electricity.

Allianz Engineering complies with the standards for Engineer Surveyor competency set by UKAS through their relevant RG document series. The following criteria are used in assessing the competence of electrical Engineer Surveyors:

- Knowledge of electricity
- Experience of electrical work
- Understanding of the installation to be worked on and practical experience of that work
- Understanding the hazards which can arise during the work and the precautions to be observed
- Ability to recognise at all times whether it is safe to continue working

Subject to the conditions of authorisation, the complexity of the work activity will be within the capability of all Engineer Surveyors. When accompanied by others the authorised Engineer Surveyor shall assess them, before the activity starts, to ensure that the person is competent to undertake the work activity he or she is being asked to complete. This may also involve the provision of location demarcation to fellow Engineer Surveyor's.

The Client

The client or operator should place each electrical installation under the control of a nominated person. This will normally be the manager or supervisor of the site. Where two or more installations come together, it is essential that there are formal arrangements between the nominated persons in control of each of those installations. This situation will not normally occur, but if it does the Engineer Surveyor shall ensure that each nominated person is fully aware of the work being undertaken. During the course of the inspection and testing the Engineer Surveyor will have responsibilities as the person in charge of the installation, or part thereof. This shall be agreed with the clients nominated person as the work proceeds and having regard to the complexity of the work.

Access to all places where electrical hazards are present should be correctly managed and controlled. The method of access shall be the responsibility of the nominated person in control of the installation. The Engineer Surveyor shall ensure that this access is adequately controlled whilst the inspection and test is conducted.

In the event that additional Contractors are involved at the location being subjected to an inspection and test, the Engineer Surveyor should ensure agreement is reached with all parties, co-ordinated through the client's nominated person, with regard to access and isolation of supplies prior to commencement of work.
If difficulties are experienced the Engineer Surveyor shall assess the situation as to whether it is safe to continue. Further consultation may be necessary with the Engineer Surveyor's Line Manager or Engineering Standards.

Communication

This section concerns itself with communication protocols when conducting an inspection and test of an electrical fixed wiring installation, therefore excluding the preparation and initial liaison elements conducted with the client's nominated person.
Consideration should be given to both persons 'affected' or 'involved' with the inspection and test and must therefore be made fully aware of activities that will typically disrupt from a 'usual' day.

Interruption to 'affected' persons from their 'norm' can usually be greeted as an inconvenience and must therefore be treated with caution and respect. Once the necessity for an activity has been conveyed no further objection is normally identifiable, but the Engineer Surveyor must never assume full acknowledgement and should always ensure that safety is never compromised.
Issues presented by 'affected' site staff must lead to further consultation with the client's nominated person in an effort to seek a resolution.

Utilisation of 'involved' persons is where others are engaged to assist in the inspection and test, that may be electrically competent or not.
Where the person is employed to assist, the Engineer Surveyor must ensure that that person is fully understanding of their role and will only operate under instruction.
The Engineer Surveyor should ensure that two-way communication is maintained at all times and that all parties are fully aware of;

- Each other's location
- Plant and Equipment status (on/off or isolated for example)
- Activities being performed

- When an activity has been completed

Usual communication techniques when issuing instruction involves a certain amount of etiquette where an instruction is given and preferably repeated by the recipient in acknowledgment and understanding. This may not be forthcoming where the Engineer must assess each situation for its merits and detriments.

All communication must be clear and unambiguous, leaving no possibility of misunderstanding. Effective communication is achieved through both the transmitting and receiving of information pertinent to the activities being undertaken.
On completion of activities all 'affected' and 'involved' persons should be further advised that may require further consultation with 'involved' persons to achieve confirmation that safety is maintained

It is should be noted that the majority of an inspection and test takes place in relatively small areas under close control of the Engineer surveyor who remains responsible for the work activity.

Work location

The work location shall be defined and agreed with the client's nominated person prior to commencement.

Suitable precautions shall be taken to prevent injury to persons from other sources of danger such as mechanical, pressure systems, toxic hazards or falls.

Objects which impede access and/or materials with flammable properties shall not be placed adjacent to, in or on;

- Access ways
- Escape routes
- Control gear
- Areas where personnel have to operate equipment.

Flammable materials shall also be kept out of electric arc sources.

Failure to achieve the above may require further consultation with the client's nominated person and may result in the application of Limitations to the inspection and test

Tools, equipment and devices

An electrical fixed wiring inspection and test requires the use of many items of tools, equipment and devices, where PPE shall be included within the definition.
All items shall be maintained in a condition suitable for the intended use, and be properly used, where "maintained in a condition suitable for use" means; periodic visual inspections, to verify the electrical integrity and mechanical properties of the items. The periodic inspection shall be undertaken by the 'holding' Engineer Surveyor and should be carried out prior to each use

Only test equipment issued by Allianz Engineering may be used for inspection and test activities and shall comply with the requirements specified within ES-E-06 series

Allianz Engineering provides certain items of tools, equipment and devices not defined as 'test equipment'. Where supplied items fail to allow completion of a specified activity or task, it is permissible for an authorised Electrical Engineer Surveyor to obtain items from an alternative reliable source providing the item is fit for purpose.

All tools, equipment and devices shall be used in accordance with the instructions and/or guidance provided by the manufacturer or supplier.

The Engineer Surveyor shall properly store all tools, equipment and devices, in his charge, used during operation of, or work on, with, or near an electrical installation.

Drawings and records

The Engineer Surveyor shall ensure sufficient knowledge of the system to be inspected and tested utilising the use of diagrams and circuit details acquired from the client's nominated person.
In the event that records are not forthcoming it is permitted for the Engineer Surveyor to conduct a familiarisation of the installation that may be with or without the direction of a recognised knowledgeable third party.
The Engineer Surveyor shall take note of distribution boards, points of isolation and other work being undertaken on or near or reliant on the power from the system, where alteration to the working of the system during testing may cause danger or inconvenience. This will include loss of light if luminaries loose power. This potential disruption will form part of the test methodology agreements made with the client's nominated person.

Signs

During any activity, adequate warning signs shall be appropriately displayed to draw attention to any relevant hazard. The signs shall be those provided by Allianz Engineering. These signs shall only be removed when the hazard has been confirmed as no longer present

Immediate Danger

Where during the course of inspection or test an immediate danger is found, an exposed live part accessible in Normal use for example, immediate action will be necessary before continuing. It is not sufficient to record the fault for inclusion in written reports. The client's nominated person, with responsibility for the safety of the installation, shall be made aware that the danger exists and agreement shall be made with this person as to the appropriate action to be taken to remove the danger. Typically this might involve isolating the affected part of the installation until remedied. In this event it is essential to record the findings and action taken within the final report and as a contemporaneous note.

The inspection and testing of the system may then continue.

An appropriately worded emergency report shall be generated and issued on the day that the immediate danger was identified

Isolation

Isolation is defined as; the procedure to ensure that a source of electrical energy is disconnected and remains disconnected for reasons of safety. The process of isolation can be broken down into a number of steps as necessary for the particular circumstances. As a minimum, the following safe working procedure shall be adopted by the Engineer Surveyor to ensure conductors are 'dead' for work.

- Remove the electrical load if practicable to do so and always if the protective device is not rated for load breaking.

- Open the means of disconnection and secure in the open position with a lock or other suitable means.
- If means of disconnection is unsuitable for 'locking' in the off position, then other means shall be used to ensure the supply is not restored until it is safe to do so. This may involve the removal of fuses or links, and their retention by the person doing the work activity.
- Notices shall be fixed at the point of isolation declaring that work is being undertaken on the system and that power shall not be restored.
- Prove the correct operation of an authorised voltage test instrument, against a known source.
- With the same voltage test instrument, test the circuit(s) to be worked on to verify that no dangerous voltage is present.
- Prove the voltage test instrument again against the known source to confirm function

Working Procedures
Inspections shall be carried out by Engineer Surveyor with experience of similar installations.

Inspections shall be carried out with suitable equipment in such a way as to prevent danger whilst taking into account, if necessary, the constraints imposed by the presence of bare live parts.

Before starting any work it shall be planned and thought through having regard to the particular installation.

In most circumstances the Engineer Surveyor will be the only person working on the electrical installation. In cases where more than one person is involved in the testing work activity then one will be deemed to be the person in charge of the inspection and test activity, typically identified as the person to whom the inspection/test has been allocated. That Engineer Surveyor shall ensure that specific and detailed instructions are given to other personnel carrying out the work before starting and on completion of the work.

All these procedures are based on the use of protective measures against electric shock and/or the effects of short-circuits and arcing.

Earthing and short-circuiting
On occasion there is a possibility of voltage being present because of the influence of adjacent circuits, in which case all parts which to be worked on shall be earthed and short-circuited. In the case of High Voltage this will be the responsibility of the person issuing the permit to work, which will be the client or his operator. When necessary on lower voltage systems the client's nominated person will normally undertake the procedure.

Earthing and short-circuiting equipment or devices shall be first connected to the earthing point and then to the components to be earthed. The earthing and short circuiting equipment or devices shall be visible, whenever possible, from the work location. Otherwise, the earth connections shall be applied as close to the work location as is reasonably practical.

Where during the course of the work activity conductors are to be broken or joined and there is danger from potential differences on the installation, suitable measures such as bonding and/or earthing shall be taken at the work location before the conductors are broken or joined.

In all cases it shall be ensured by the Engineer Surveyor that the earthing and short-circuiting equipment or devices and cables and connectors for bonding used for this purpose are suitable and adequately matched to the fault rating of the electrical installation where they are installed. Precautions shall be taken by the client or his representative to ensure that the earths remain secure during the time the work is in progress. If during measurement or testing the earth connections are removed special precautions to prevent danger shall be taken.

When remote controlled earthing switches are used to earth and short circuiting an electrical installation (normally on high voltage) the position of the earthing switch shall be reliably signalled by the remote control system.

Protection against adjacent live parts
If there are parts of an electrical installation in the vicinity of the work location that cannot be made dead, then special additional precautions are necessary and shall be applied before work starts. The special precautions might include the use of temporary screens, barriers, or insulating covers. Each of these devices shall be suitable for the electrical and mechanical stresses to which they may be subjected.

If the above measures cannot be carried out then protection shall be provided by maintaining a safe distance not less than 700mm for voltages less than 1000volts ac.

The Engineer Surveyor shall make a judgement of safe working for the specific area in which there is a likelihood of working near live conductors, taking into account the particular circumstances of the intended testing methodology. Working on or near live conductors shall not be a normal working arrangement and shall only be undertaken having full regard for EaWR, Regulation 14 and associated guidance.
For example if the conductors are positioned at the top of an enclosure and the Engineer Surveyor is working below them the probability of accidental contact is reduced because the risk of slipping onto them is small. If however they were at the base of the enclosure the probability of accidental contact would be higher.

When working near live conductors the Engineer Surveyor shall ensure that the location is constructed in such a way that both hands are engaged in the inspection/test activity and not required to prevent slips, trips or falls.

Certain tests will have to be carried out with the supply voltage present, measuring voltage, prospective fault current, and earth fault loop impedance for example, and particular care should be taken under these circumstances. The Engineer Surveyor shall take appropriate precautions to prevent accidents. Such as;

- Ensuring that test instruments and test leads are suitable, fit for purpose and properly used
- That the equipment to be worked upon is safe for the intended tests providing protection no less than IP2X/IPXXB
- The working environment does not present additional dangers

End of document