

BHS HSI 41

**Electrical
Safety Rules
Issue 11.1**

Safety Saves
Quality Pays

Remember:

Everyone at **Bridges** is empowered to **STOP** work if they feel the task they are being asked to perform is unsafe.

If you are unhappy with the way you are being asked to work or feel unduly pressured, **STOP** and speak with your Supervisor, Manager, or a member of the HSE Team.

ELECTRICAL SAFETY RULES

SAFE WORKING PROCEDURES

The Bridges Electrical Safety Rules are in place to ensure that the actions of our employees, staff or any person working directly for or on behalf of the company do not create a hazard or dangerous occurrence that may put themselves or any other person in a situation that could cause injury.

These rules are mandatory and it is the responsibility of all to ensure that they are complied with and to give a route to allow persons to advise of any occurrence or situation that they consider being dangerous or having the risk of causing a situation that could cause injury.

Supporting mandatory documents to be referred to, in conjunction with these rules: -

Health and Safety at Work Act 1974
Electricity at Work Regulations 1989
IET Wiring Regulations BS7671:2018 (Amendment 1 - 2020)

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Revision status

Revision	Description	Approval Date	Status
Revision 01	First Issue	02/01/07	Withdrawn
Revision 02	Live testing document incorporated	20/01/07	Withdrawn
Revision 03	Minor changes, Isolation procedure added	8/02/07	Withdrawn
Revision 04	Minor changes	15/02/07	Withdrawn
Revision 05	Annual update	21/01/08	Withdrawn
Revision 06	Mechanical section modified	28/08/08	Withdrawn
Revision 07	2010 review	01/09/10	Withdrawn
Revision 08	2011 review	27/10/11	Withdrawn
Revision 09	June 2013 – Review following incident – No Change	28/06/13	Withdrawn
Revision 10	Full Review, BS7671 update, Addition of Arc Clothing, Inclusion of APLVT & removal of Mechanical Safety Rules (now a separate document)	07/12/16	Withdrawn
Revision 10.1	Minor additions and clarification – No change to procedures	12/04/17	Withdrawn
Revision 10.2	Minor Clarifications added – No change to procedures	01/08/17	Withdrawn
Revision 11	Full Review, BS7671:2018 update Additions, layout, and clarification throughout, Separation of dual SAP/AE role, Changes to procedures in flowcharts, Inclusion of Safety documents and Safety locks and procedures, Additions to Commissioning and Breakdown procedures. Addition of Arc Flash guidance.	01/11/20	Withdrawn
Revision 11.1	Addition of ‘energisation’ to roles APLV and above (Pg. 11) Inspection & Testing procedures and RAMS (Pg. 18) Addition of Peer-to-Peer (P2P) energisation procedure (Pg. 21) Addition of Energisation Flowcharts (Pg. 22) Modification of ‘Final’ and ‘Distribution’ circuit definition (Pg. 31) Pre-Energisation Checklist (Appendix 11, Pg. 53)	01/07/21	Issued

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Electricity at Work Regulations 1989

Electricity at Work Regulations 1989 – Absolute Requirements:		Bridges Method of Compliance
Regulation	<i>The following regulations relate to working on or near electrical systems</i>	
13	<p>Precautions for work on equipment made dead</p> <p><i>“Adequate precautions shall be taken to prevent electrical equipment, which has been made dead in order to prevent danger while work is carried out on or near that equipment, from becoming electrically charged during that work if danger may thereby arise.”</i></p>	<p>Electrical Safety Rules BHS HSI 41</p> <p>Isolation, Lock-off</p>
14	<p>Work on or near live conductors</p> <p><i>“No person shall be engaged in any work activity on or so near any live conductor (other than one suitably covered with insulating material so as to prevent danger) that danger may arise unless –</i></p> <p><i>(a) it is unreasonable in all the circumstances for it to be dead; and</i></p> <p><i>(b) it is reasonable in all the circumstances for that person to be at work on or near it while it is live; and</i></p> <p><i>(c) suitable precautions (including where necessary the provision of suitable protective equipment) are taken to prevent injury.”</i></p>	<p>Electrical Safety Rules BHS HSI 41</p> <p>No Live Working Permitted</p> <p>Training, Competency Assessment, Grading</p> <p>Signage, Barriers</p> <p>ARC Protection PPE</p>
15	<p>Working space, access, and lighting</p> <p><i>For the purposes of enabling injury to be prevented, adequate working space, adequate means of access, and adequate lighting shall be provided at all electrical equipment on which or near which work is being done in circumstances which may give rise to danger.</i></p>	<p>Electrical Safety Rules BHS HSI 41</p> <p>Design, Risk Assessment</p>
16	<p>Persons to be competent to prevent danger and injury</p> <p><i>No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent danger or, where appropriate, injury, unless they possess such knowledge or experience, or are under such degree of supervision as may be appropriate having regard to the nature of the work.</i></p>	<p>Electrical Safety Rules BHS HSI 41</p> <p>Training, Experience, Competency Assessment, Authorisation</p>

- The purpose of the Regulations is to require precautions to be taken against the risk of death or personal injury from electricity in work activities.
- The Regulations are made under the ‘Health and Safety at Work Act 1974’ (HSW Act). The HSW Act imposes duties principally on employers, the self-employed and on employees, including certain classes of trainees.
- Compliance with ‘BS7671:2018 IET Wiring Regulations’ is likely to achieve compliance with relevant aspects of the ‘Electricity at Work Regulations 1989’.

ELECTRICITY AT WORK REGULATIONS 1989

Purpose of the Regulations

- Prevent danger (Risk of Injury)
- Prevent Injury (Where Danger Exists)
- Not to Give Rise to Danger

Definitions

Absolute - Regardless of any cost or other consideration.

Reasonably Practicable - Access, on the one hand, the magnitude of the risks of the particular work activity or environment and, on the other hand, the costs in terms of physical difficulty, time, trouble, and expense which would be involved in taking steps to eliminate or minimise those risks.

Regulation 3 - Persons to whom duties are imposed by these Regulations

Status - Absolute

Duty of every employer, self-employed person or employee to ensure that compliance to the Regulations is absolute, except where the duty is subject to the qualifying term, "Reasonably Practicable". The extent to which these duties are imposed on an individual is determined by the degree of "control" the individual may have. These duties are enforceable by law and failure to comply could provide for an offence that could be seen as a criminal act.

Regulation 1 - Citation & Commencement

- Effective from April 1990
- Revoked, replaced & extended Electricity at Work Regs.
- Over & above Health & Safety at Work Act 1974
- Duty of Employer & Employees to comply (by law)
- Failure to comply can be seen as criminal act

Regulation 2 - Interpretation (of key words)

Circuit Conductor: Conductor in System; Conductor: Prevent Danger; Electrical Equipment: Injury; System: Live; Charged: Dead

Regulation 4 (4) - Protective Equipment

Status - Absolute

Any equipment provided under these Regulations for the purpose of protecting persons at work on or near electrical equipment shall be suitable for the use for which it is provided, be maintained in a condition suitable for that use, and properly used.

Regulation 4 (3) - Work Activity

Status - Reasonably Practicable

Every work activity, including operation, use and maintenance of a system and work near a system, shall be carried out in such a manner as not to give rise, so far as is reasonably practicable, to danger.

Regulation 4 (2) - Maintenance (Inspection & testing of systems)

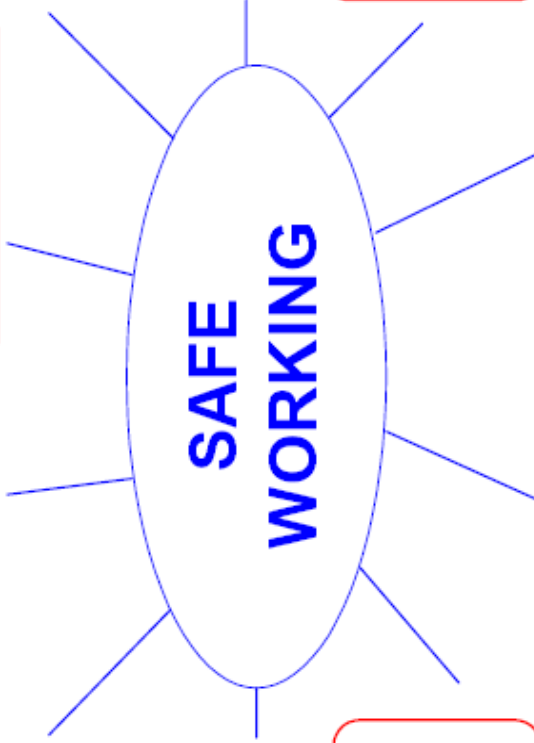
Status - Reasonably Practicable

As may be necessary to prevent danger, all systems shall be maintained so as to prevent, so far as is reasonably practicable, such danger.

Regulation 4 (1) - Construction of Systems

Status - Reasonably Practicable

All systems shall at all times be of such construction as to prevent, so far as is reasonably practicable, danger.



Regulation 16 - Persons to be Competent

Status - Absolute

No person shall be engaged in any work activity where technical knowledge or experience is necessary to prevent danger or, where appropriate, 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.

Regulation 15 - Working Space, Access & Lighting

Status - Absolute

For the purpose of enabling injury to be prevented, adequate working space, adequate means of access, and adequate lighting shall be provided at all electrical equipment on which or near which work is being done in circumstances which may give rise to danger.

Regulation 14 - Work on or near Live Conductors

Status - Absolute

No person shall be engaged in any work on or so near any live conductor (other than one suitably covered with insulating material so as to prevent danger) that danger may arise unless:

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

Regulation 13 - Precautions for work on Equipment made Dead

Status - Absolute

Adequate precautions shall be taken to prevent electrical equipment, which has been made dead in order to prevent danger while work is carried out on or near that equipment, from becoming electrically charged during that work if danger may thereby arise.

Regulation 5 - Strength & Capability of Electrical Equipment

Status - Absolute

No electrical equipment shall be put into use where its strength and capability may be exceeded in such a way as may give rise to danger.

Regulation 6 - Adverse or Hazardous Environments

Status - Reasonably Practicable

Electrical equipment which may reasonably be foreseeable be exposed to:

- mechanical damage,
- the effects of the weather, natural hazards, temperature / pressure,
- the effects of wet, dirty, dusty or corrosive conditions
- any flammable or explosive substance, protected as to prevent, so far as is reasonably practicable, danger arising from such exposure.

Regulation 7 - Insulation, Protection & Placing of Conductors.

Status - Reasonably Practicable

All conductors in a system which may give rise to danger shall either:

- be suitably covered with insulating material and as necessary protected so as to prevent, so far as is reasonably practicable, danger or
- have such precautions taken in respect of them (including, where appropriate, their being suitably placed) as will prevent, so far as is reasonably practicable, danger.

Regulation 8 - Earthing or other suitable Precautions

Status - Absolute

Precaution shall be taken, either by earthing or by other suitable means, to prevent danger arising when any conductor (other than a circuit conductor) which may reasonably be foreseeable become charged as a result of either the use of a system, or a fault in a system, becomes so charged, and, for the purposes of ensuring compliance with this regulation, a conductor shall be regarded as earthed when it is connected to the general mass of earth by conductors of sufficient strength and current-carrying capability to discharge electrical energy to earth.

Regulation 9 - Integrity of Referenced Conductors

Status - Absolute

If a circuit conductor is connected to earth or to any other reference point, nothing which might reasonably be expected to give rise to danger by breaking the electrical continuity or introducing high impedance shall be placed in that conductor unless suitable precautions are taken to prevent that danger.

Regulation 10 - Connections

Status - Absolute

Where necessary to prevent danger, every joint and connection in a system shall be mechanically and electrically suitable for use.

Regulation 11 - Means of Protection from Excess of Current

Status - Absolute

Efficient means, suitably located, shall be provided for protecting from excess of current every part of a system as may be necessary to prevent danger.

Regulation 12 - Means of Cutting off the Supply and for Isolation

Status - Absolute

Subject to paragraph (3), where necessary to prevent danger, suitable means (including where appropriate, methods of centring circuits) shall be available for:

- cutting off the supply of electrical energy to any electrical equipment.
- the isolation of any electrical equipment.

(2) In paragraph (1) "isolation" means the disconnection and separation of the electrical equipment from every source of electrical energy in such a way that this disconnection and separation is secure.

(3) Paragraph (1) shall not apply to electrical equipment which is itself a source of electrical energy but, in such a case as is necessary, precautions shall be taken to prevent, so far as is reasonably practicable, danger.

1. Glossary of Terms

Term	Description
Authorising Engineer AE	Electrical power engineer who has relevant managerial, operational, and technical experience of low-voltage systems
SAP LV or SAP	Senior Authorised Person Low Voltage – “Skilled Person”
APLV/T	Authorised Person Low Voltage / Technical – “Skilled Person”
APLV	Authorised Person Low Voltage – “Skilled Person”
APLV/R	Authorised Person Low Voltage / Restricted – “Skilled Person”
CPLV or CP	Competent Person Electrical bias – “Instructed Person”
Trainee or Apprentice	Person employed under a recognised training scheme – “Ordinary Person”
RA	Risk Assessment
MS	Method Statement
RAMS	Risk Assessment & Method Statement
PTW	Permit to Work
HV	High Voltage (see definitions)
LV	Low Voltage (see definitions)
System	An electrical system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy and includes such source and equipment.
Live	Equipment with voltage present, due to being connected to a source of energy
Potentially Live	Equipment that has the potential to be Live and may have voltage present
Charged	Equipment that has voltage present, due to having induced, or residual stored energy within it, even though it may be electrically disconnected from the rest of the system
Dead	At or about zero volts, neither live nor charged
Prove Dead	Demonstrate with the use of a GS38 approved Voltage Indicator and Proving Unit that the electrical equipment being tested is ‘Dead’
Isolated	Disconnected and separated from all sources of electrical energy by a safe distance, in such a way that it’s disconnection and separation is secure
Earthed	Connected to the general mass of earth in such a manner as will always ensure, an immediate discharge of electrical energy without danger. When applied to electrical equipment, all phase conductors are connected together and efficiently connected to earth.
Safety Locks	Uniquely keyed locks used for the purpose of locking any item in an isolated state
Safety Documents	A Permit to Work, Sanction for Test, or Limitation of Access
Final Circuit	A circuit connected directly to current using equipment, or to a socket outlet or other outlet points, for the connection of such equipment
Distribution Circuit	A circuit supplying a distribution board, or switchgear and may also connect the origin of the installation to a separate installation, sometimes called a sub-main
Circuit Protective Conductor (CPC)	A protective conductor connecting exposed-conductive-parts of equipment to the main earthing terminal
Caution Notice	Caution Notice (CN) - a notice conveying a warning against interference
Danger Notice	Danger Notice (DN) - a notice conveying a warning of live equipment
Electrical Permit to Work (PTW)	A formal written safety control system that is implemented to help prevent accident or injury to personnel. It is used to confirm a system is safe to work on
Sanction for Live Testing (LV)	A formal document issued to allow an authorised person to test low voltage equipment whilst it is live
Limitation of Access (LV)	A Limitation of Access is a document to control and record access to restricted areas such as potentially dangerous electrical switch rooms and restricted electrical equipment areas, primarily during construction
Switching Schedule	A document prepared by the Authorised Person and approved by the Senior Authorised Person/Authorising Engineer which defines the work to be done, the sequence of operations, the earthing required and any alternative supply arrangements which must be considered.
Isolation & Earthing Diagram	A pictorial document prepared by the Authorised Person and approved by the Senior Authorised Person/Authorising Engineer which shows graphically the required isolation & earthing arrangements.

2. Issue of Safety Rules

A copy of these procedures shall be issued to all employees who may be concerned with Electrical work at the company and/or customer sites. The employee shall sign that they have read and understood this document and their responsibilities to those working for/with them. A copy of this document will be kept in the vehicle/site Health and Safety file and in the technical library (intranet) at the place of employment and Bridges Online.

Accompanying these procedures will be a Health & Safety Handbook.

The Bridges Electrical Systems, Safe Working Procedures set the **minimum** safety requirements that shall be applied by all personnel working on sites where the company has responsibility for the electrical system, installation, and equipment. The implementation of these Safe Working Procedures is **mandatory** and should be followed by all employees and sub-contractors **at all times**.

Personnel may carry out work on premises where a third party has the legal responsibility for the electrical system, installation, and equipment under the third party's own safety rules. Providing these safety rules and associated procedures meet or exceed the minimum standards laid down in these procedures, this is acceptable. All affected personnel shall be fully trained and assessed on the third party's rules.

3. Scope

These safety procedures apply to all sites and all work activities dealing with electrical systems and equipment and all Bridges employees and to sub-contractors carrying out work for the Company.

These procedures also apply to all equipment and systems and all voltages including low voltage (LV) and extra-low-voltage (ELV). Bridges do not carry out work on High Voltage (HV) systems. Where this is required, the work will be sub-contracted to suitably experienced and qualified approved sub-contractors.

3.1 Duties

It is the duty of all concerned to:

- Act in a responsible manner and take reasonable care of themselves, their colleagues and anyone else who may be affected by the activities of the Company
- Avoid careless behaviour, in particular horseplay that may affect themselves or others.
- Carry out their work in accordance with the Company policy, safe working practices and other instructions at all times.
- To be conversant with all regulations governing the work they may be requested to undertake. These procedures do not overrule any statutory regulations that may be in force at that time, they are to be read in conjunction with these.
- Undertake only such duties as have been specified to them in the instruction to work or as detailed in the Method Statements issued to them, as and when required and they shall modify this Method Statement to suit the work as found at the job. Any person carrying out such work must be Competent to carry out that work and where necessary, suitably authorised as detailed below. Any changes in the Method must be briefed to the whole team involved.
- Use tools, materials, and equipment safely, inspecting it before use to ensure it is safe to use.
- Immediately report any risk, hazard or shortcoming that may affect health and safety and not to undertake any work until matters have been resolved to their satisfaction.

There is a legal obligation on all persons to take reasonable care of their own health and safety and the health and safety of other persons, who may be affected by their own acts or omissions. Failure to do so may result in action against the person carrying out the work by the Health and Safety Executive.

4. Associated Documents

This document should be read where necessary, in conjunction with the following legislation and documents:

United Kingdom statutory legislation and associated amendments apply:

- The Health and Safety at Work Act 1974 (HSWA)
- The Electricity at Work Regulations 1989 (EAWR)
- The Electrical Safety, Quality and Continuity Regulations 2002 (ESQCR)
- The Management of Health and Safety at Work Regulations 1999
- The Construction (Design and Management) Regulations 2015 (CDM)
- The Provision and Use of Work Equipment Regulations 1998 (PUWER)
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)

HSE Documentation and Non-Statutory Guidance notes:

- HSE Guidance Note GS38 (Fourth Edition)
- IET Guidance Note 3 – Inspection & Testing (18th Edition)
- IET Wiring Regulations BS7671:2018 (Amendment 1 - 2020)

The Bridges Health and Safety document register, details all documents issued by the company relating to Health and Safety. Listed below are those that apply to this document:

Bridges Health and Safety Policy	BHS POL 02
Risk Assessments	BHS HSI-01 (Essential Safety Standard No.1)
Permit to Work issue and control	BHS HSI-12
Lone working	BHS HSI- 36

5. Test Equipment Maintenance & Calibration

Prior to and after use, all items of test equipment shall be inspected by the person in charge of carrying out the task and any defective item of equipment shall be withdrawn either for re-test or for disposal. Inspections of equipment to be recorded on Pre-Start-Check form.

Test instruments, probes and leads shall be manufactured, tested, calibrated, checked, and used in accordance with relevant European or British Standards and codes of practice. In case of doubt, guidance must always be sought from the Authorising Engineer, or Senior Authorised Person.

Voltage indicators and phase indicators used on low-voltage equipment shall be of a pattern suitable for use at the nominal system highest voltage. They must be proved serviceable, on purpose-made live-source test equipment, immediately before and after application to any conductor

Multi-meters and non-contact Volt-sticks **must not** be used to prove equipment dead. For the presence of low-voltage detection, a purpose-made instrument shall be used. The Voltage Indicator shall be fitted with an approved safety device (500mA fuse) and be equipped with suitably insulated and shrouded terminals and probes, in accordance with HSE Guidance Note GS38 'Electrical Test Equipment for use by Electricians'.

Under no conditions should volt-meters or multi-meters be used to detect for presence of voltage, except at Extra-Low-Voltage (below 50VACrms and 120VDC), or unless for fault-finding by relevant engineers, having suitably risk assessed and ensured compliance with Bridges Electrical Safety Rules and **Regulation 14** of the '**Electricity at Work Regulations (1989)**' (reference on Page 4 of these rules).

GS38 approved electrical test and measurement equipment is to have a functional test prior to use, by use of a company issued NICEIC Cal Card, or a proprietary resistor box (having clearly defined characteristics) for 'dead tests'. For 'live compliance tests', an Earth Fault Loop Impedance test (Zs) and/or the cycle of RCD tests at a suitably designated socket outlet should be carried out (relevant authorised persons should refer to IET Guidance Note 3).

Checks on the condition of all Multi-Function testers must be made at a minimum of 3 months and a maximum of 6 monthly intervals and records completed and stored, to monitor the accuracy and consistency of results and the state of the physical parts. Where possible, proven calibrated equipment may also be used as a reference, to check the accuracy and consistency of results.

Test equipment is to be sent for calibration compliance, at a minimum of 12-monthly intervals, or as recommended by the equipment manufacturer, at a UKAS accredited laboratory.

6. Definition of roles

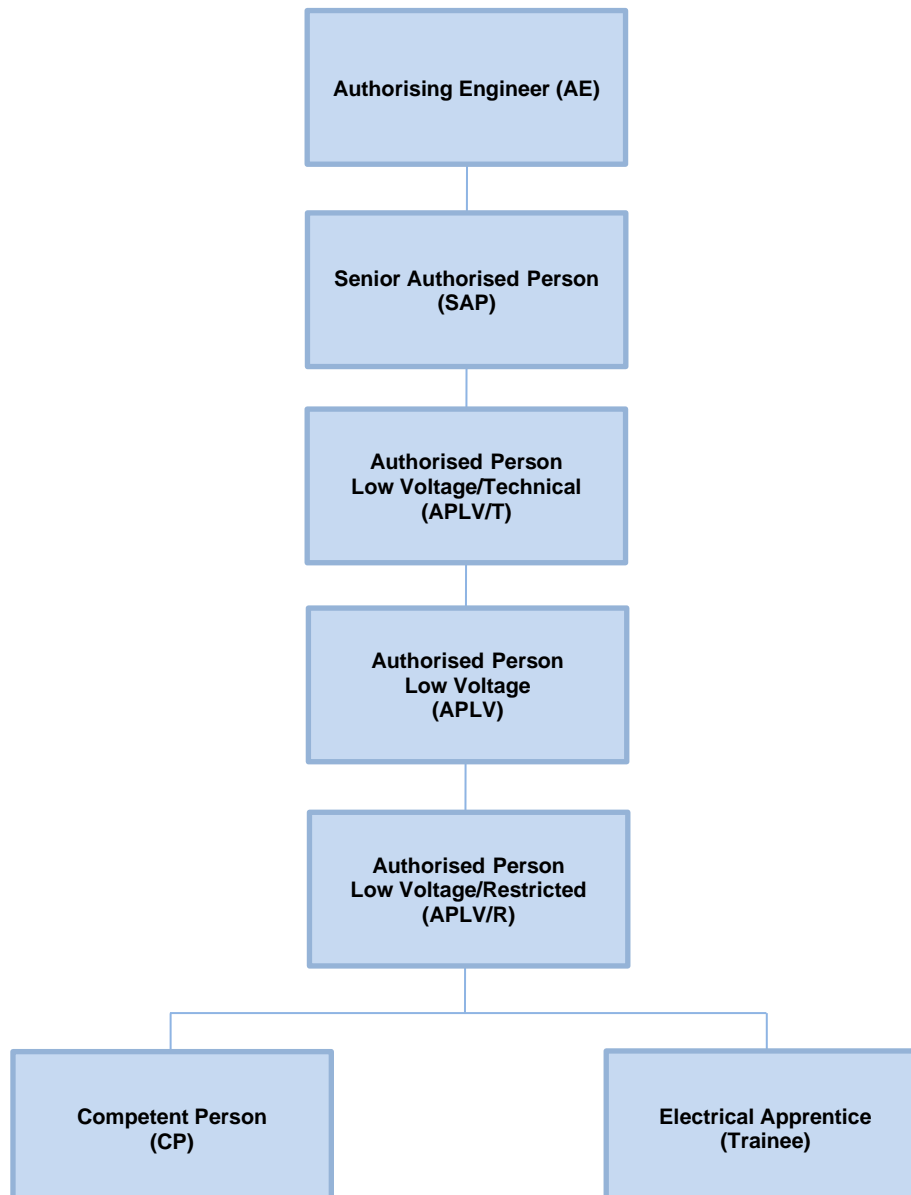
6.1 Authorised Persons

IET Wiring Regulations BS7671:2018 – Definition of ‘Persons’

BS7671:2018 defines three levels of ‘Persons’, in connection with electrical installations. These definitions correspond to Bridges Electrical Safety Rules in the following way:

BS7671 Definition of Persons		Bridges Electrical Safety Rules - Authorised Persons
‘Skilled Person’	=	AE – Authorising Engineer SAP – Senior Authorised Person APLV/T – Authorised Person Low Voltage / Technical APLV – Authorised Person Low Voltage APLV/R – Authorised Person Low Voltage / Restricted
‘Instructed Person’	=	CP - Competent Person
‘Ordinary Person’	=	Electrical Trainee or any other person (Trainee moves to CP when in third year of training)

For the role of Authorising Engineer, performance is subject to audit by the HSE Compliance Director.



For clarity Bridges definitions of Authorised Persons will be used in this document.

Authorising Engineer

An electrical professional having relevant managerial, technical, and operational experience of low-voltage systems and installations. The Authorising Engineer is to be independent of local management responsibilities.

Within the Authorising Engineer's designated area of appointment, the duties and responsibilities shall include:

- Providing professional technical guidance on all electrical matters.
- Maintaining a current set of Safety Rules and associated procedures.
- Interpreting, administering, and monitoring the Safety Rules and procedures and advising the HSE Compliance Director and Senior Management of any significant shortfalls or defects
- Ensuring the rules remain up to date and that any amendments to the Safety Rules and procedures are brought to the attention of, and are understood by the HSE Compliance Director, Senior Authorised Persons and Authorised Persons.
- Reporting to the HSE Compliance Director any deficiency in the number of suitably trained and experienced Senior Authorised Persons and Authorised Persons, that significantly impairs the ability to provide a safe and efficient system.
- Providing guidance to management on competency assessment methods and relevant training requirements, including the development and delivery of educational content.
- Interviewing, assessing and making recommendations on the appointment of Senior Authorised Persons (SAP/LV), Authorised Persons (APLV/T, APLV, APLV/R) and Competent persons (CP), along with issuance, suspension, reduction, or withdrawal of authorisation certificates.
- Maintaining a register of all Senior Authorised Persons, Authorised Persons and Competent Persons training, ensuring the relevance and adherence to their appointment is maintained.
- Notifying the HSE Compliance Director and Senior Authorised Persons of any Operational Restrictions that are received and ensuring that they all receive copies.
- Investigating all dangerous occurrences and incidents, involving electrical systems and installations and reporting to the HSE Compliance Director.
- Undertaking or arranging for regular inspections on low voltage installations to ensure compliance with statutory legislation and company safety rules, as part of the audit process.
- Conduct audits set out in the Institute of Engineering and Technology's (IET) *Code of Practice for Electrical Safety Management* annually, or on significant change of the safety management system.

Authorising Engineers are not to undertake the practical duties of a Senior Authorised Person, or Authorised Person on a routine basis. In exceptional circumstances Authorising Engineers may act in either of these capacities, provided they are aware of the installation and have received the same training as the Senior Authorised Person, or Authorised Person.

Senior Authorised Person Low Voltage (SAP/LV)

A relevantly qualified electrical professional who has relevant managerial, technical, and operational experience of low-voltage systems and installations only.

- Providing professional technical guidance on all electrical matters.
- Assessing and appointing Authorised Persons (LV) in association with the Authorising Engineer.
- Provide guidance to management on the assessment and appointment of competent persons.
- Ensuring that all Senior Authorised and Authorised Persons are made aware of any Operational Restrictions that are received and that they receive copies.
- Ensuring that test equipment and electrical certification is maintained efficiently.
- Be involved as and when required, as the main point of contact for annual NICEIC assessments.
- Ensure that all persons working under their control, have relevant experience, qualifications, and authorisations for the tasks that they must perform.

Unless otherwise specified on the 'Certificate of Authorisation', they can: -

- Carry out interviews, competency assessments and appoint all persons detailed below
- Carry out Safe Isolation procedures for low voltage electrical supply and distribution systems
- Issue and cancel all Permits to Work
- Issue Isolation and Earthing Diagrams/ Switching Schedules / Limitation of Access documents
- Issue and receive Sanction to Test documents
- **Isolate a 'Potentially Live' or 'Live' System and Prove Dead**
- **Energise and re-energise electrical circuits/installations in accordance with Section 9 of these rules.**
- **Carry out Live Compliance Testing and Live Commissioning and Fault-finding functions**
- Approve Safe Isolation of 'Potentially Live' or 'Live' Systems, by suitably authorised and competent persons

Authorised Person Low Voltage / Technical (APLV/T)

A person who fulfils the requirements of a Competent Person and has relevant experience and qualifications in an electrical discipline and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Unless otherwise specified on the Certificate of Appointment they can: -

- Carry out Safe Isolation procedures for low voltage electrical supply and distribution systems
- Issue and cancel Permits to Work issued only by them
- Issue Isolation and Earthing Diagrams / Switching Schedules / Limitation of Access documents
- Issue and receive Sanction to Test documents
- **Isolate a 'Potentially Live' or 'Live' System and Prove Dead**
- Racking In and out of 'Withdrawable Circuit Breakers' (***Only Trained/Competent personnel***)
- **Energise and re-energise electrical circuits/installations in accordance with Section 9 of these rules.**
- **Carry out Live Compliance Testing and Live Commissioning and Fault-finding functions**
- Oversee training of Apprentices/Trainee's.
- Supervise the work of Competent Persons, Trainees, and other persons

Authorised Person Low Voltage (APLV)

A person who fulfils the requirements of a Competent Person and has relevant experience and qualifications in an electrical discipline and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Unless otherwise specified on the Certificate of Appointment they can:-

- Carry out Safe Isolation procedures for low voltage electrical supply and distribution systems
- Issue and cancel Permits to Work issued only by them
- Issue Isolation and Earthing Diagrams / Switching Schedules / Limitation of Access
- **Isolate a 'Potentially Live' or 'Live' System and Prove Dead**
- **Carry out Dead Testing and 'Live' functional commissioning tests**
- **Re-energise electrical circuits / installations in accordance with Section 9 of these rules.**
- Oversee training of Apprentices/Trainee's
- Supervise the work of Competent Persons, Trainees, and other persons

Authorised Person Low Voltage Restricted (APLV/R)

A person who fulfils the requirements of a Competent Person and has relevant experience and qualifications in an electrical discipline and who has had adequate training to work without danger and accepts responsibility for the safety of others working under his direction.

Unless otherwise specified on the Certificate of Appointment they can: -

- **Prove Dead, on a Proven Isolated and Dead system** (if the system is found to be live, testing must cease and an APLV or above must investigate and isolate)
- Apply safety locks to points of isolation on **'final circuits' and 'distribution circuits'**
- Oversee training of Apprentices/Trainee's
- Supervise the work of Competent Persons, Trainees, and other persons

Competent Person (CP)

A person with sufficient technical knowledge, training and/or experience to prevent danger or, where appropriate, injury, during their work. This person will have successfully completed the relevant sections of the Bridges competency questionnaire. They must be adequately advised or supervised by a skilled person (SAP, APLV/T, APLV or APLV/R) to enable that person to perceive risks and to avoid hazards that electricity can create.

Electrical Trainee / Apprentice (Trainee)

A person employed or sub-contracted by the company to undertake training as part of recognised technical progression. Trainees shall always work under the guidance and instruction of an SAP, APLV/T, APLV or APLV/R. They will always work on equipment that is not energised and that has been proved dead by an SAP, APLV/T, APLV or APLV/R. Under no circumstances shall these people be involved in any live testing in their early years of training. When they are in the final year, they will be permitted to carry out live compliance / diagnostic testing of equipment whilst under close personal supervision of an SAP or APLV/T who holds a recognised 'Electrical Inspection and Testing' qualification.

Accompanying Safety Person

When electrical work is being undertaken that requires the presence of an Accompanying Safety Person, the following must apply:

- The competent person must have a valid Emergency First Aid qualification, having received suitable training, and have adequate knowledge, experience, and the ability to recognise hazards.
- They are required to keep watch, prevent interruption, summon help, and apply first-aid if required.
- The person is to have sufficient familiarity with electrical systems being worked on and have received instructions prior to work commencing, on how to safely disconnect the equipment from all supplies of electricity, and how to safely switch off or disconnect any test equipment.

They will be required to undertake the following duties:

- Maintain a watching brief for those undertaking electrical work for hazards, distractions, and other sources of interruption; and
- In the event of an incident summon help, make the work area safe as appropriate, disconnecting equipment being worked on from all supplies of electricity, and switch off any test equipment or disconnect it from the supply, and apply first-aid if it is safe to do so.

Person in Charge

A person who has accepted a 'Permit to Work', or 'Sanction to Test' on or near Electrical Equipment, or 'Live Electrical Equipment', who is responsible for ensuring a suitable risk assessment and method statement is in place for the work planned, and the controls detailed within are implemented.

Appointment

Appointment of persons is carried out by the Authorising Engineer, or their delegated representative/s.

Prior to appointment a competency assessment is carried out, this includes:

- Written assessment of the understanding of 'Bridges Electrical Safety Rules'
- Written assessment of Electrical and Health & Safety knowledge
- Practical assessment of:
 - ✓ *Isolation and Lock-off*
 - ✓ *Proving Dead*
 - ✓ *Signage*
 - ✓ *Dead testing*
 - ✓ *Live Testing (where qualified)*
 - ✓ *Types of Earthing*
 - ✓ *Fault Finding*
 - ✓ *Variable Speed Drives*
 - ✓ *Instrumentation*

A certificate appointing an SAP, APLV/T, APLV, APLV/R, CP or Trainee stating details to which it applies and operations and/or work that the person is authorised to carry out, shall be issued after successful completion of a competency assessment. The certificate of appointment will be countersigned by the holder confirming their acceptance and understanding of the extent of their authority.

Withdrawal of authorisations shall be carried out by the Authorising Engineer, should there be any incidents due to working outside of the level of authorisation, or if any H&S investigation is in place due to negligence, or accidental acts.

6.2 Voltage Levels

For clarity, the voltage ranges are taken from BS7671:2018 – (18th Edition IET Wiring Regulations)

Nominal Voltage (rms values for AC)

- **Extra-Low Voltage** - Not exceeding 50V AC, or 120V ripple-free DC, whether between conductors or to Earth.
- **Low Voltage** – Exceeding extra low voltage but not exceeding 1000V AC or 1500V DC between conductors, or 600V AC or 900V DC between conductors to Earth
- **High Voltage** – Normally exceeding low voltage

Reduced Low Voltage System:

A system in which the nominal line-to-line voltage does not exceed 110 volts and the nominal line-to-earth voltage does not exceed 63.5 volts (*Three-phase 63.5V to earthed neutral, Single-phase 55V to earthed midpoint*).

7. Work on Isolated Low Voltage Equipment

7.1 Authorisation of Work

Management is to ensure that any person carrying out work on LV equipment is competent and authorised to carry out such work. Where an activity is deemed to require a Permit to Work it is the responsibility of the SAP, APLV/T or APLV to ensure the person is competent to receive a PTW and carry out the specified work.

The permit to work shall indicate all the isolation points and where warning signs are placed, it shall also clearly define the work area and any Limitation of Access (LOA) to the person carrying out the work.

Where the PTW requires a permit from third parties e.g., the Regional Electric Company or Client, the responsibility for safety and the avoidance of danger rests with both the other party and the Bridges Authorised Person in charge of the works. The permit to work shall reference to the third party's documents and shall not be issued until the third-party document is in place and isolation padlocks are fitted. In these circumstances the SAP, APLV/T, APLV, APLV/R shall fit their locks along with the third parties lock-off.

7.2 Permit to Work

A Permit to Work (PTW) is not necessarily required for work on LV equipment unless the SAP, APLV/T or APLV considers the complexity of the system to justify its issue, or the system is isolated by a third party. The standard PTW (BHS F086) is shown in Appendix 6.

7.3 Proving Dead on Proven Isolated and Dead Systems (Minimum Competency APLV/R)

Where a system is isolated by a third party and a permit to work received, the person in charge of the work must also apply their locks to the isolation point. They must also prove the system is dead using the procedure as detailed in Appendix 2, where the minimum competency requirement for this activity is APLV/R (**if a system is found to be live, testing must cease and an APLV or above must investigate and isolate**). *Detail of these incidents must be recorded and logged for lessons to be learned!*

7.4 Switching and Isolating on 'Potentially Live' and 'Live' Systems (Minimum Competency APLV)

The switching operations necessary to make dead and isolate any designated LV equipment prior to the issuing of any written authorisation document, shall be carried out by, or under the supervision of an SAP, APLV/T or APLV only.

Before carrying out any isolation procedures the SAP, APLV/T or APLV must notify all parties concerned and ensure that the interruption to the supply does not cause any dangerous occurrences or environmental impact.

As part of the isolation, and before work is started, the conductors of any such equipment must be proved dead by using a GS38 approved voltage indicator. The voltage indicator is to be verified on a known live source, or company issued test equipment, both **before and after** application to the conductor. It is essential to ensure the voltage indicator is suitably rated for the voltages being tested.

If the removal of fuse carriers and their fuse links is the sole means of isolation, then care must be taken to ensure that these fuses cannot be replaced by others not involved in the work. Clear signage indicating that the fuses have been removed and that there are people working on the circuit must be in place.

If the switching of moulded-case or miniature circuit breakers is the sole means of isolation, then such circuit breakers should be locked off.

'Working Locks' shall be used to lock off all devices being used as a point of isolation; these locks shall have singular keys differing from others being used in the area. The keys shall be kept in the possession of the person applying the lock and should a key cabinet be in place, procedures should follow **Section 11** of these rules (**Locks and Keys**).

Removal of these locks by any person other than the person who originally applied that device, and without the written permission of that person, or the SAP/AE, is a serious breach of both Health and Safety Legislation and these Electrical Safety Rules. To do so without authority will lead to disciplinary action.

7.5 Isolation of Electrical Apparatus (Low Voltage Systems)

The person in charge of the work, and any persons for whom they are responsible, must be fully conversant with the nature and extent of the work to be done, the area in which it is safe to work, their own responsibilities for safety, and the safety precautions in force

Isolation and Earthing

With the exception of the rule for live testing of low voltage circuits in Section 8.0, no person shall undertake any work on any part of low voltage equipment which is, or can be connected to a point of supply unless that equipment is: -

1. Dead.
2. Isolated from all possible sources of supply of electricity and locked off to prevent reconnection.
3. Protected by having `Caution Notices` applied at all points of isolation
4. Where necessary, protected by having `Danger Notices` applied to all live equipment which is shrouded and in the vicinity of the equipment being worked on and which may be confused with dead equipment by persons carrying out the work.
5. Proved to be Dead using an appropriately rated `GS38 Approved Voltage Indicator` and its associated company issued `Proving Unit`.
6. Where necessary, released for work by the issue of a **‘Permit to Work’** or **‘Sanction to Test’**.

When isolating circuits, a visible break, is to be made in every supply circuit. A conductor is to be proved dead by using an approved voltage indicator. The voltage indicator is to be proved serviceable on a known live source, or preferably on a test apparatus, both before and after use on the conductor.

Multi-meters are not to be used to detect the presence of voltage, they are only to be used after the Isolation and Proving Dead Procedure is completed, or to measure any Extra-Low-Voltage <50AC and 120VDC, or stored charge, if its presence is indicated by the Voltage Indicator. More information on this can be found in the notes of the following flowcharts.

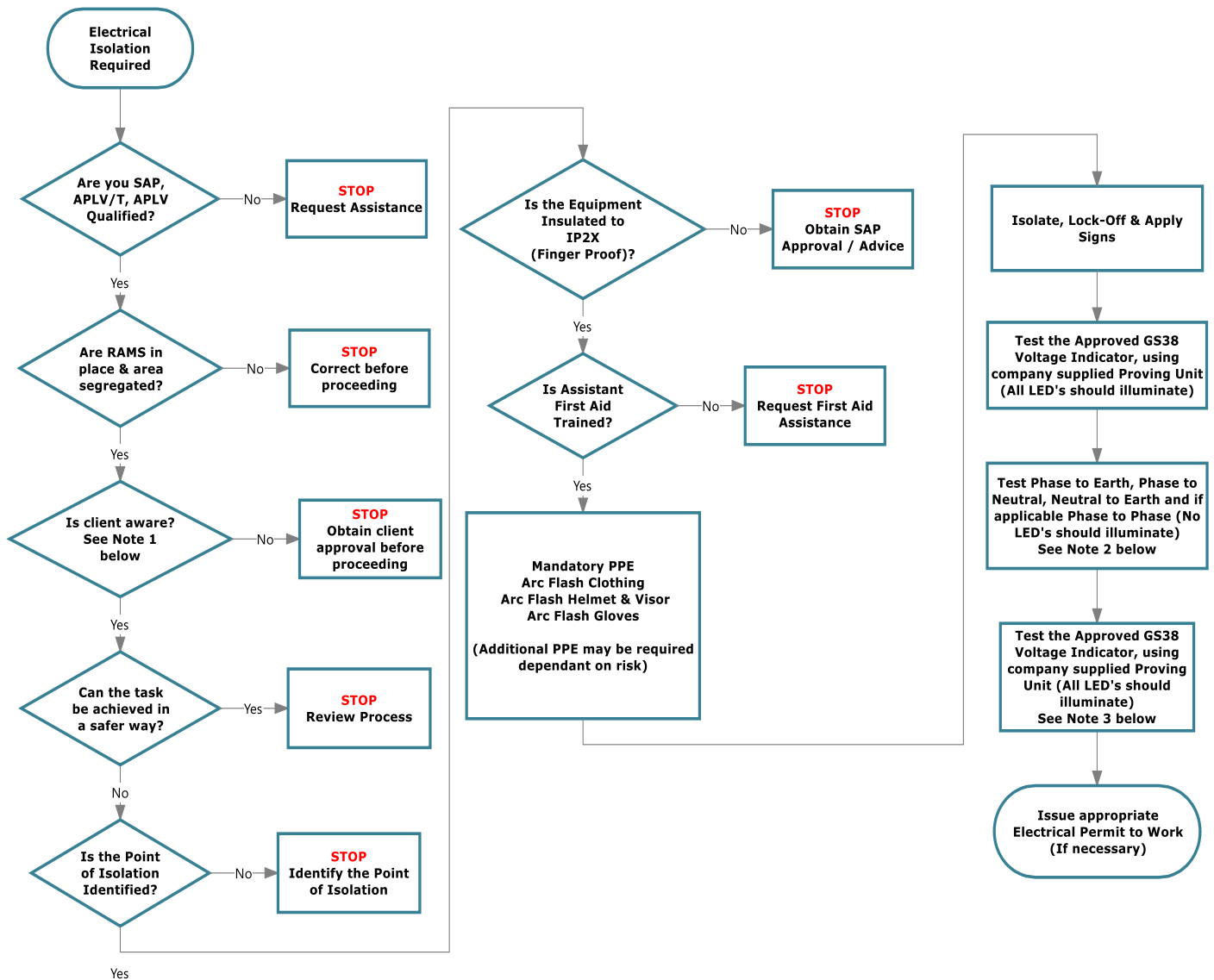
Positive identification of equipment

Where the point of isolation of equipment cannot be positively identified or there is any doubt as to the point of isolation, the following must be followed:

Manually run the equipment (to prove operation), isolate the equipment and lock-off, attempt to manually operate the equipment again. If the equipment fails to run, this will help to prove the point of isolation is correct, however if there is any doubt, STOP.

7.5.1 Isolation & Proving Dead Procedure – ‘Potentially Live’ and ‘Live’ Systems

Minimum Competency – APLV



Following the completion of work, any permits should be cancelled, and the equipment left in a safe condition.

Note 1:

Before any isolation is carried out, it is vital to ensure that the client is aware and has confirmed that it is safe to carry out the isolation taking into consideration which equipment/process may be affected by the isolation, if any. If the isolation is to be continued for a prolonged period (after leaving site), signage must be applied at all points of work detailing the nature and duration of the isolation and who is the responsible person to contact and contact details.

Note 2:

For company issued Voltage Indication pack ‘VIPD138’, the VI13800 Voltage Indicator ‘Polarity LED’s’, show presence and polarity of voltages greater than 12VAC and 12VDC, up to 50VAC and 50VDC. If voltage is present at these values, caution must be taken to identify and ensure that the source of this Extra-Low-Voltage is known, and all hazards are eliminated in the correct manner before work can continue. If in doubt **STOP** and **ASK**.

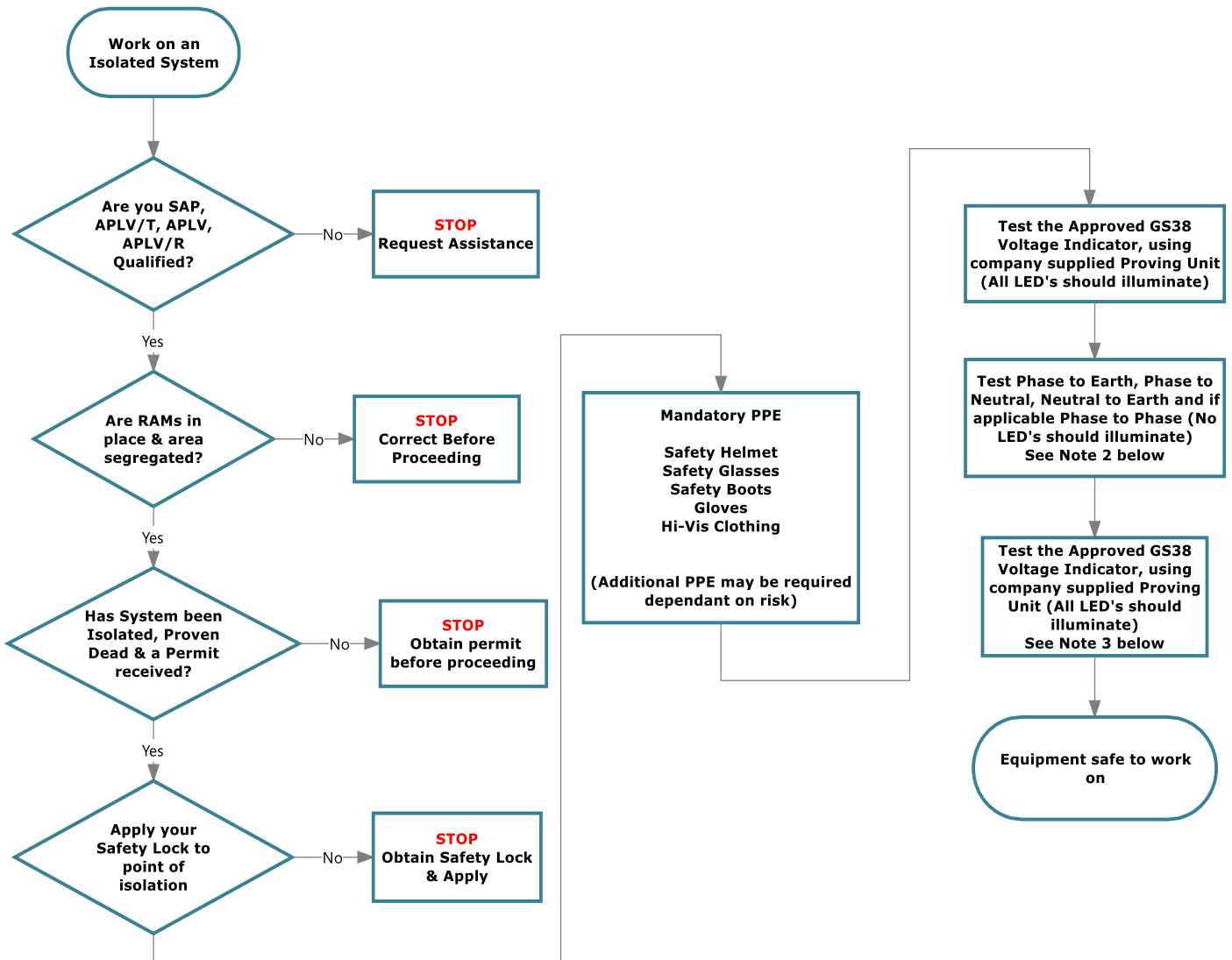
The presence of ‘Hazardous Live’ voltage is indicated by the ‘Threshold LED’s’, from 50VAC/DC up to 400VAC/DC. *If testing at higher voltages, model VIPD150 will be issued, although this **only indicates voltage above 50VAC/DC!***

Note 3:

If no LED’s illuminate, the source of supply **cannot** be identified as being de-energised. **STOP** work, make the system safe and identify another Voltage Indicator/Proving unit, repeating the Safe Isolation Procedure.

7.5.2 Proving Dead Procedure – Proven Isolated and Dead Systems

Minimum Competency – APLV/R (Restricted)



Following the completion of work, any permits should be cancelled, and the equipment left in a safe condition.

Note 1:

Before any isolation is carried out, it is vital to ensure that the client is aware and has confirmed that it is safe to carry out the isolation taking into consideration which equipment/process may be affected by the isolation, if any. If the isolation is to be continued for a prolonged period (after leaving site), signage must be applied at all points of work detailing the nature and duration of the isolation and who is the responsible person to contact and contact details.

Note 2:

For company issued Voltage Indication pack '**VIPD138**', the VI13800 Voltage Indicator '**Polarity LED's**', show presence and polarity of voltages greater than 12VAC and 12VDC, up to 50VAC and 50VDC. If voltage is present at these values, caution must be taken to identify and ensure that the source of this Extra-Low-Voltage is known, and all hazards are eliminated in the correct manner before work can continue. If in doubt **STOP** and **ASK**.

The presence of 'Hazardous Live' voltage is indicated by the '**Threshold LED's**', from 50VAC/DC up to 400VAC/DC. *If testing at higher voltages, model **VIPD150** will be issued, although this **only indicates voltage above 50VAC/DC!***

Note 3:

If no LED's illuminate, the source of supply **cannot** be identified as being de-energised. **STOP** work, make the system safe and identify another Voltage Indicator/Proving unit, repeating the Safe Isolation Procedure.

8.0 Electrical Inspection and Testing procedures (RAMS BHS-F-152)

Values of External Earth Fault Loop Impedance (**Z_e**) should have been obtained as early as possible (Preferably at survey stage). Z_e/Z_{db} must be known, prior to dead testing being carried out.

Dead Testing (APLV/R minimum competence)

- All test equipment should be '**zeroed**'. MFT's must be proved on a checkbox (or a plan for this be in place).
- All 'main protective bonding' and 'supplementary bonding' **shall be complete, prior to dead testing.**
- All inspections on the relevant NICEIC form, **shall be complete prior to dead testing.**
- Proving dead procedures in line with **Bridges Electrical Safety Rules** shall be carried out prior to testing.
- The protective device and its 'Maximum Zs' value **shall be identified and recorded, prior to dead testing.**
- **For 'Hazardous Areas'**, test equipment must be in the '**safe zone**', testing out to field equipment (**S.T.A.R.**).
- Dead tests shall be carried out following the sequence of tests stated in BS7671:2018 and IET GN3:

1. Continuity of protective conductors (R₁ + R₂).

Phase conductors must be **connected** in their final position. **R₁ + R₂** must not be calculated, unless for verification.

Correct polarity should be checked at the source location of each circuit, up to the furthest point of each circuit. Any 'shorting links' used to complete the 'cpc and line conductor loop', **must** be removed once tests are complete.

Before proceeding, **calculation of Zs values** should be made and confirmed against the relevant 'Max Zs values' that the required 'disconnection time' permitted in BS7671:2018, or from manufacturers data can be achieved.

2. 'Continuity of main protective bonding'

(R2 wandering lead measurement to be taken) and continuity of all newly installed '**supplementary bonding conductors**' must be confirmed.

3. Continuity of ring final circuit conductors

End-to-End (r1, rn, r2) and figure of 8 values should be measured (Where applicable, see IET Guidance Note 3).

4. 500V DC insulation resistance test

Test between 'all live conductors to protective earth', and 'between all live conductors'. *All cables/cores must be **connected** in their final position.*

*For VSD's, motors or sensitive electronic equipment, which is connected directly to the circuit under test with no isolation points or protective devices in-line, **the cores may require disconnecting.** If this is confirmed and the test is to be completed with one or more cores disconnected, a note should be made on the relevant certificate.*

*Where possible after a detailed inspection of the circuit/drawings, **a lower test voltage may be used** and be recorded on the relevant certificate (100V DC / 250V DC). Caution must be taken with this approach and if possible, confirmation from the manufacturer must be sought.*

5. Polarity

This should have been confirmed through testing at Step 1 but must be visually checked/confirmed.

Phase sequence should also be checked prior to energisation, using the **R₁ + R₂** method.

6. DB Schedule/Circuit charts

Circuit charts must be in place and the equipment or circuit/s must be complete and clearly identified. Temporary written versions are permitted but **must be checked** to confirm accuracy. Final laminated versions shall be installed once available.

Initial Energisation process (APLV/T minimum competence)

- The Bridges 'Energisation flowchart' (**BHS-HSI-138 rev 2.2**) pages 1 – 3 must be adhered to.
- All doors/covers/IP2X barriers must be fitted in place and boundaries (blast zones) must be clear.
- For non-IP2X panels, site specific RAMS must be followed for any dead/live working procedures.
- The Peer-to-Peer authorisation process (**ITC-P2P rev 2**) must be initiated at least 24 hours in advance.
- The 'Pre-Energisation checklist' (**ITC-F-ECS-028**) must be complete/submitted (*FastFields or a hard copy*).
- NICEIC certificates must be complete (Live test values to be added once complete and acceptable).
- Client must be aware of energisation.
- Electrical Permit to Work (**BHS-F-086**) **must be cancelled**, as no longer considered safe to work on.
- Correct PPE shall be worn - **ARC Flash body wear, ARC Helmet and Visor, ARC Gloves, Safety Boots**

Live Compliance Testing (APLV/T minimum competence)

APLV/T's will carry out Live compliance tests following the sequence of tests stated in BS7671:2018 and IET GN3:

1. Presence of voltage tests (Polarity)

Tests with the 'Martindale VIPD138' **shall be carried out** to confirm the supply is present. The '10-point test' (All phases to phase x 3, All phases to earth x 3, All phases to neutral x 3, Neutral to Earth) **shall be carried out** for 3-phase systems. The '3-point test' (phase to earth, phase to neutral, neutral to earth) **shall be carried out** for single phase systems.

2. Earth-fault loop impedance (Ze/Zdb/Zs)

The presence of upstream integrated 'Earth Leakage Circuit Breakers'(ELCB's), or Residual Current Circuit Breakers (RCCB's) **must be identified**. If confirmed as present, a '3-wire low current/no trip' test shall be carried out. If not present, a 'two-wire high current' test shall be applied. Extreme care must be taken when planning this test. ***There may be a high risk to plant process failure, due to tripping devices being activated under test conditions. If in any doubt, STOP work and seek assistance from line manager, SAP, QS or the AE.***

Where measured values are available for the 'Ze' (Main Earthing conductor disconnected) and the $R_1 + R_2$ of the circuit, it is then acceptable to calculate the 'Zs' for the circuit by using the formula: $Z_s = Z_e + (R_1 + R_2)$.

Where a 'Ze' is not possible, the value of 'Zdb' measured at a Distribution Board, or an MCC may be substituted for 'Ze' in the above formula, giving: $Z_s = Z_{db} + (R_1 + R_2)$.

3. Prospective Fault Current (Pfc)

Two-wire high-current tests are preferred (*The same precautions as in 8.2 above apply*). For three-phase systems the PSCC Phase-to-Phase tests should be avoided, due to the potential of incorrect equipment being used. The PEFC value measured **shall be doubled** with this value being recorded as the 'Pfc' on the certificate.

4. Additional Protection

Operational/Functional testing of ACB's/RCCB's/MCCB's (RCD tests/settings etc). *Great care must be taken and the same precautions as in 8.2 above apply.*

5. Phase rotation/sequence tests

Bridges approved test equipment (Martindale PSI4000 non-contact preferred). 'Socket & See SOK82' or similar may be used, but ***care should be taken with this 3-lead contact test.***

6. Functional testing

Switchgear/controls/interlocks/emergency switching should be checked/confirmed.

If readings are not acceptable and 'disconnection times' cannot be achieved, the circuit **must be isolated** and investigation carried out to ensure correct results can be obtained. All 'P2P nominated persons' shall have access to manufacturers Zs values and acceptable reference documents, including BS7671:2018 and the 'On-Site guide'. They shall also be familiar with the correction factors to be applied to these values, where relevant.

NICEIC certificates shall be returned to the QS/office/uploaded to the site folder, within 1 week of completion.

9.0 Switching and Energising Circuits

Low Voltage new installations, additional circuits, minor works and alterations.

Installations that require the submission of either an 'Electrical Installation Certificate (EIC)' or a 'Minor Electrical Installation Works Certificate (MEIWC)'.

Fixed Electrical Testing (FET) teams carrying out EICR's and remedials may require other controls (as detailed in FET RAMS).

A. Type 1 (T1) - 'Final Circuits' of any current rating and 'Distribution Circuits' rated at 100A and below.

A Bridges APLV/T with Inspection & Testing qualifications (C&G 2394/2395/2391 or EAL 4337/4338) and listed as a 'Peer-to-Peer nominated person' (NP), may authorise and/or energise these circuits.

Prior to energisation, all results and calculations shall be confirmed by themselves as acceptable. The 'Energisation Checklist' (ITC-F-ECS-028) shall be completed using 'FastFields' digital platform on the tablet, or on the paper-based version and then be submitted electronically at the point of works (FastFields submission or email). The NICEIC certificate/s must also be attached.

For multiple energisations, all circuits must be referenced on the relevant RAMS/PTW's. Energisation can then proceed, following Bridges safe working procedures.

For a Bridges APLVT without Inspection & Testing qualifications, or who does but is not listed as a 'Peer-to-Peer nominated person' (NP), the Peer-to-Peer authorisation process **must** be used to verify safety and compliance prior to energisation.

The process must be planned and agreed with that 'nominated person' and their availability confirmed, along with submission of any relevant drawings/information **no less than 24 hours** in advance of the required energisation. If energisation is required during emergency conditions or out of hours, *contact should be made with the SAP/QS/AE.*

The 'Energisation checklist' (ITC-F-ECS-028) shall be completed in full by the person requesting the energisation, along with the uploaded NICEIC certificate and relevant photographs at the point of works. This should then be submitted to the 'nominated person' for authorisation **a minimum of 1-hour** prior to the energisation.

For multiple energisations, all circuits must be referenced on the relevant RAMS/PTW's. Energisation can then proceed, following Bridges safe working procedures.

All results must be confirmed in writing as acceptable by the 'nominated person', prior to energisation/s taking place. Authorisation shall be refused if any non-conformances are present, or 'disconnection times' cannot be achieved.

B. Type 2 (T2) - 'Distribution Circuits' rated above 100A.

For all APLVT's, authorisation to energise these circuits must be gained from either a Senior Authorised Person (SAP), a Qualifying Supervisor (QS), or the Authorising Engineer (AE).

The process must be planned and agreed with that person and their availability confirmed, **no less than 24 hours** in advance of the required energisation.

The 'Energisation checklist' (ITC-F-ECS-028) shall be completed in full by the person requesting the energisation, along with the uploaded NICEIC certificate/s and relevant photographs at the point of works. The checklist should then be submitted to the 'nominated person' electronically for authorisation, **a minimum of 1-hour** prior to the energisation.

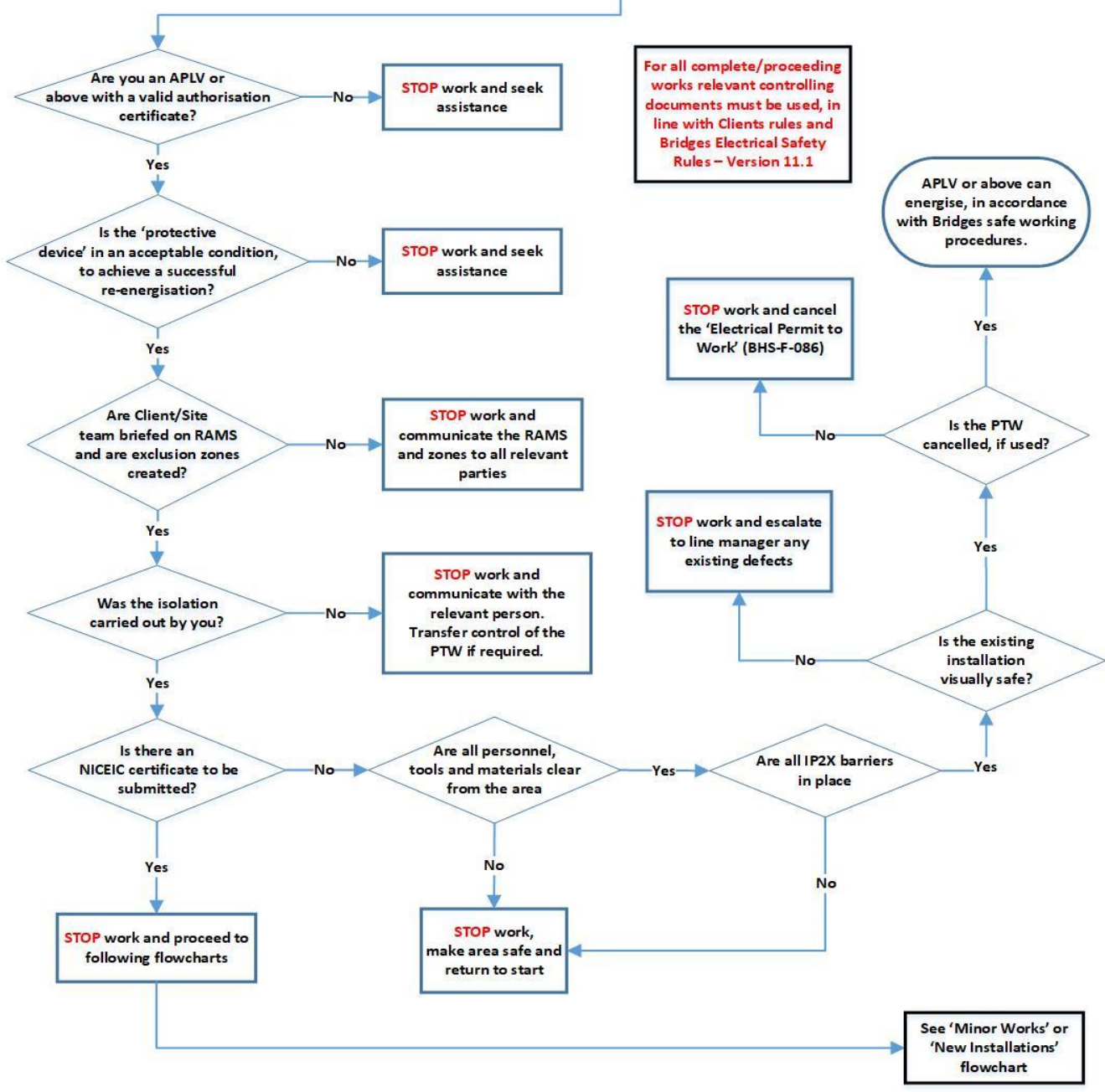
All results must be confirmed in writing as acceptable by the SAP/QS/AE, prior to energisation/s taking place. Authorisation shall be refused if any non-conformances are present, or 'disconnection times' cannot be achieved.

Authorisation by the client may also be required, where they have control of the works and are permitting isolations and energisations.

Re-energisation Flowchart

Type 1 (T1) – ‘Distribution Circuits’ rated 100A and below, and all ‘Final Circuits’ at any current rating
 Type 2 (T2) – ‘Distribution Circuits’ above 100A

Re-energisation is required for existing circuits, after no installation work has been carried out by Bridges



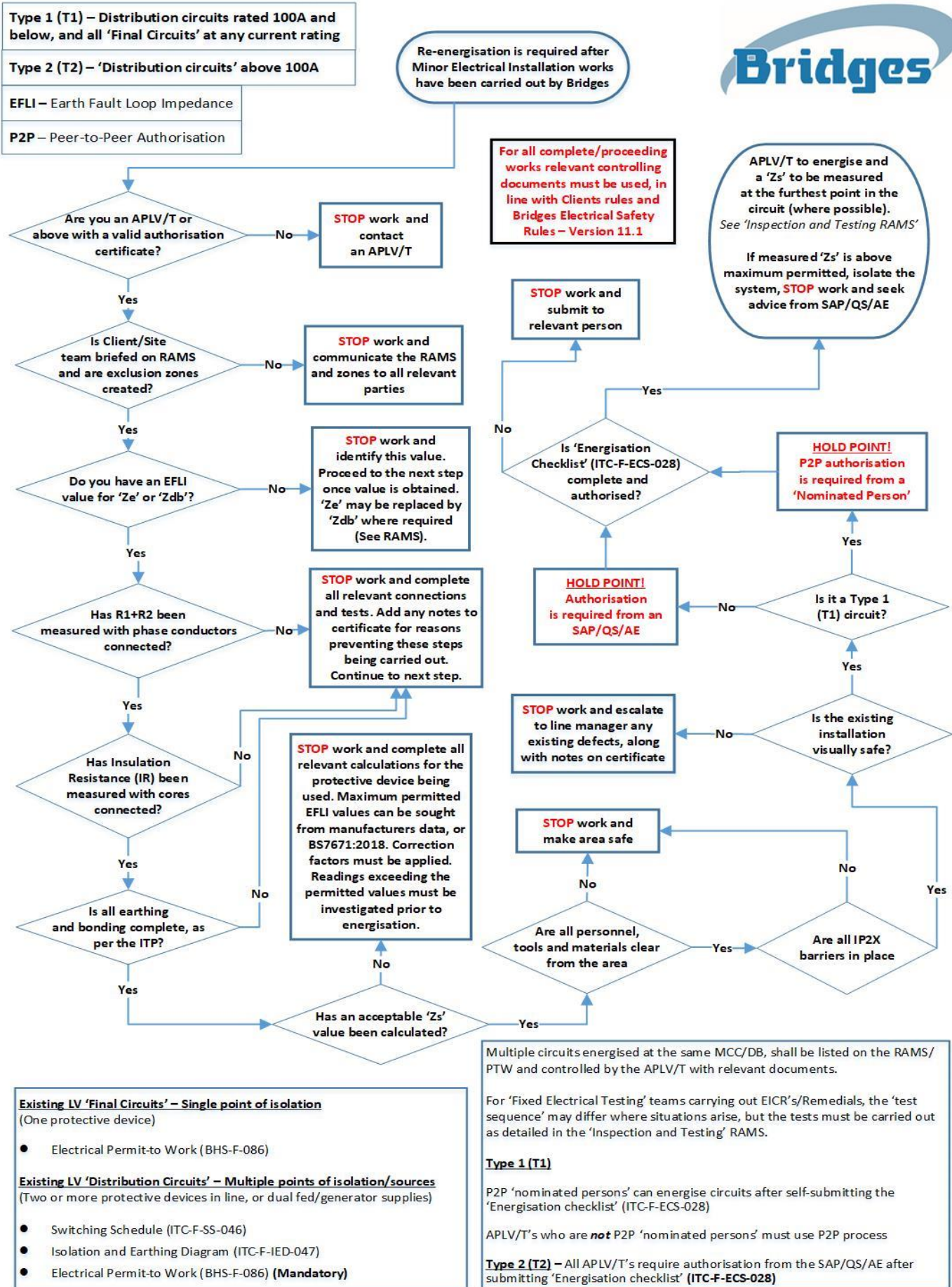
For all complete/proceeding works relevant controlling documents must be used, in line with Clients rules and Bridges Electrical Safety Rules – Version 11.1

- **EIC – (Electrical Installation Certificate)**
(New LV installations, circuits and replacement/new DB's/MCC's)
- **MEIWC – (Minor Electrical Installation Works Certificate)**
(Remedial LV works, not extending to the provision of a new circuit)

- APLV and above can isolate any existing circuit.
- Multiple circuits isolated/energised at the same MCC/DB, shall be listed on the RAMS/PTW and controlled by the APLV or above.
- If no EIC or MEIWC is required, no authorisation to re-energise is required, other than from the client (if present).
- APLV and above can re-energise.

- Existing LV ‘Final Circuits’ – Single point of isolation**
 (One protective device)
- Electrical Permit-to Work (BHS-F-086)
- Existing LV ‘Distribution Circuits’ – Multiple points of isolation/sources**
 (Two or more protective devices in line, or dual fed/generator supplies)
- Switching Schedule (ITC-F-SS-046)
 - Isolation and Earthing Diagram (ITC-F-IED-047)
 - Electrical Permit-to Work (BHS-F-086) **(Mandatory)**

Minor Works – Re-energisation Flowchart



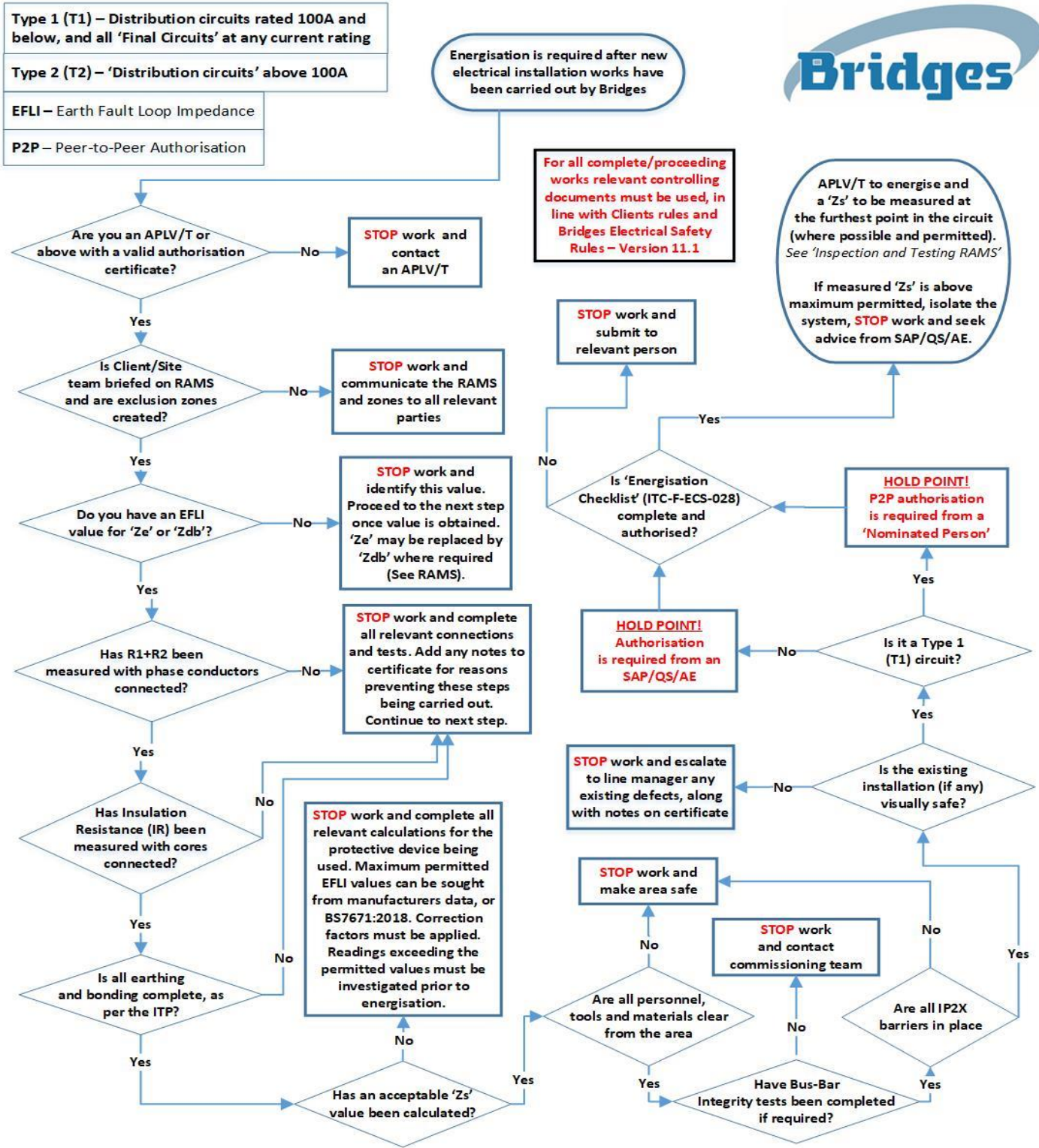
Existing LV 'Final Circuits' – Single point of isolation
(One protective device)

- Electrical Permit-to Work (BHS-F-086)

Existing LV 'Distribution Circuits' – Multiple points of isolation/sources
(Two or more protective devices in line, or dual fed/generator supplies)

- Switching Schedule (ITC-F-SS-046)
- Isolation and Earthing Diagram (ITC-F-IED-047)
- Electrical Permit-to Work (BHS-F-086) (Mandatory)

New Installations – Initial Energisation Flowchart



- New LV 'Final Circuits – Single point of isolation**
(One protective device)
- Electrical Permit-to Work (BHS-F-086)
- New LV 'Distribution Circuits' – Multiple points of isolation/sources**
(Two or more protective devices in line, or dual fed/generator supplies)
- Switching Schedule (ITC-F-SS-046)
 - Isolation and Earthing Diagram (ITC-F-IED-047)
 - Electrical Permit-to Work (BHS-F-086) **(Mandatory)**

Multiple circuits energised at the same MCC/DB, shall be listed on the RAMS/PTW and controlled by the APLV/T with relevant documents.

Type 1 (T1)

P2P 'nominated persons' can energise circuits after self-submitting the 'Energisation checklist' (ITC-F-ECS-028)

APLV/T's who are **not** P2P 'nominated persons' must use P2P process

Type 2 (T2) – All APLV/T's require authorisation from the SAP/QS/AE after submitting 'Energisation checklist' (ITC-F-ECS-028)

Installation teams should be briefed when circuits/systems are to be energised, especially new build, or when the complete system has been fully isolated for the entire installation time.

When an installation transitions from an isolated system to an energised system, once energised, a permit system must be in place to control the work. This should include the relevant documents from **Section 12**.

Complicated multi-source supplied systems should have a switching plan or commissioning plan in place to control switching activities. The switching plan can be incorporated in the Method Statement or be a stand-alone document.

9.2 Fault protection Setting Prior to energisation

All circuits will be correctly protected from faults and this protection will be verified prior to energisation. The correct protection of any circuit being energised is the responsibility of the person energising the circuit.

Large current circuit protection is often achieved by ACB's (Air Circuit Breaker's) and MCCB's (Moulded Case Circuit Breaker's). They can cover large time/current ranges and will normally need to be configured to achieve discrimination between upstream and downstream devices.

They may also have Ground Fault Protection or Restricted Earth Fault Protection built in, amongst many other protection settings. Ground Fault or Restricted Earth fault protection may also be in a separate device, which will also need configuring to achieve the correct circuit protection.

- **The responsibility for ensuring the correct protection settings are in place, is down to the person energising the circuit(s)/system.**
- **The person energising the circuit(s)/system does not need to be the person responsible for calculating the settings, or even setting up protective devices, but is the person to ensure it has been completed correctly.**
- **Verify settings on Panel Schematic Drawings / Protective Device Commissioning Report are correct and that they match the ACB (verification by phone or email to Cable Designer).**
 - For panels from other manufacturers, verification of correct settings should be provided/checked. Who the detail comes from will vary with contractors engaged (generally the cable designer should advise). Design can support with this if required.
- **Ensure the ITP is fully signed off, including customer acceptance**
- **Energisation only permitted if settings have been verified and ITP signed off**
- **Commissioning Engineer to verify settings and record in commissioning documents**

Switching and racking in and out of ACB's shall only be undertaken by authorised staff and sub-contractors, and all relevant ARC rated PPE, including gauntlets, visors and overalls must be worn **(APLVT minimum competency and only if specified on their individual authorisation certificate)**

Until further notice, if there is an operational need to rack in or out GE/GE Alstom M-Pact or M-Pact Pro ACB's, written permission must be obtained from Bridges Electrical SAP/AE before proceeding.

10.0 Work on or near Live Electrical Equipment

Except for testing conductors in accordance with the requirements set out below, work on live conductors above 50VAC and 120VDC, is not permitted.

10.1 Authorisation of Live Testing (Minimum Competency APLV/T)

Management must ensure that any person carrying out testing on live Electrical Equipment is competent and authorised to carry out such work.

There must be a presumption that work will be carried out with the Electrical Equipment isolated, wherever possible.

An SAP or an APLV/T can carry out live compliance, or diagnostic testing as required by the job and carry out any on-site Risk Assessment to allow the work to proceed safely. However, the SAP or APLV/T **will not** carry out live testing or inspection procedures unless they are satisfied that:

- The requirements of **Regulation 14** of the '**Electricity at Work Regulations 1989**' are satisfied.
- It is unreasonable in all circumstances for the circuit to be dead.
- Equipment is insulated to IP2X or additional shrouding or precautions are put in place as per **8.2** below.
- Adequate precautions are taken to prevent injury, including an accompanying person with a first aid qualification

Authorisation will be confirmed by the issue of a `Sanction to Test (LV)` Certificate where appropriate (Appendix 7)

In all cases Regulation 13 & 14 of the Electricity at Work Regulations 1989 must be complied with and the appropriate Category of 'Arc Protection PPE' must be worn.

10.2 Testing of Live Electrical Equipment

Whenever possible and if available the separate test supply, incorporated into some motor control gear equipment, to enable the control and auxiliary circuit supplies while ensuring power supplies remain isolated, is to be used to check the operation of the control gear for test purposes only.

For fault finding, phasing out or commissioning of low voltage equipment, **no work** is to be carried out on or near live conductors unless:

- The conductors are insulated or screened to an index of protection of at least IP2X (finger proof).
- The tests are carried out using a GS38 Approved Voltage Indicator, or test and measuring equipment. Where test leads are used, they must be correctly fused and inspected for damage/deterioration.
- The work is carried out by an authorised and Competent Person, with a valid authorisation certificate.

Where the conductors are not insulated or screened to an index of protection of IP2X, the SAP or APLV/T in charge of the work shall ensure that temporary shrouds/covers are used so that conductors in the area where testing is being undertaken, cannot be touched or short-circuited when they are live. To enable shrouds to be fitted, the equipment must first be isolated and proven dead using Bridges standard procedures. When suitable shrouds to prevent contact have been fitted, the equipment may be energised. Recommendations should be made to the AE/SAP to upgrade and improve the level of protection of that equipment, where possible.

Current shall be measured by using an approved clip-on ammeter placed around a fully insulated conductor. Some clip-on ammeters are fitted with voltage and insulation ranges; these facilities should not be used unless used with GS38 compliant, fused test leads and test at the highest range made first.

Particular attention is drawn to Appendix 1 and Appendix 2; these documents detail the equipment required to carry out Live Testing and the procedure for Proving Dead.

10.3 Testing in workshops etc.

Where live electrical equipment inspection or testing procedures are carried out in a workshop on new equipment, portable or fixed barriers must be used to exclude those not involved in the test, together with the display of safety signs, stating that **'Live Testing is in progress'**. In such circumstances the mains supply, if used for testing purposes, must be protected by a 30mA residual current device (where possible). PTW's must be in place where VSD's are under test and bypassing of RCD's is being undertaken.

Persons undertaking 'live electrical equipment testing' within a workshop environment, must hold a minimum status of **APLV** and must be deemed competent, or be supervised when carrying out workshop testing. Where assessed as competent and authorised, the requirement for a recognised Electrical Inspection and Testing qualification may be relaxed (workshop new equipment testing only).

Protective covers providing 'basic protection' against live parts of equipment, must be replaced as soon as the necessary tests are completed. Equipment under test must not be left unattended whilst the test supply is energised under any circumstances.

10.4 Live Testing within Control Panels.

Before carrying out any 'live test' procedure, the equipment must be reviewed for compliance to IP2X protection requirements (Finger proof). If the equipment does not comply or compromises safety in any way, then work is not to proceed, and further action is to be discussed and approved by the Commissioning/Breakdown Manager and/or SAP/AE.

10.5 Commissioning / Re-commissioning

No LV equipment is to be commissioned / re-commissioned and made live after the completion of work (sections/phases of work), until the following apply:

- The equipment is visually checked to ensure that all removable covers/guarding have been replaced.
- All persons, PPE, materials, and tools employed in the work area, are withdrawn, and accounted for.
- All earthing devices (where applicable) are in place, apart from the busbar integrity tests.
- Barriers and safety signs are in place warning that the installation is live but not handed over.
- The correct testing procedures have been carried out, i.e. NICEIC/Pressure/Atex
- It is released for service by the cancellation of any work authorisation document where applicable.
- Client is aware, process and safety implications have been assessed and appropriate certification and/or documentation has been handed over.
- The Commissioning Engineer will hold an initial and regular progress meeting with Key People, (i.e. PM/Client/Site supervisors/Operators)
- The correct authorisation document for any commissioning work is in place, where applicable, (i.e. PRA)
- Teams working on/in/around systems/circuits being commissioned, to be briefed of works and permits required. This is especially relevant on new installations when changing from a dead system to initial energisation.
- HV protection in an LV system will be commissioned with a HV competent person
- Commissioning will be carried out in the order listed below
 1. Pre-commission – inspection
 2. Dry commission – individual plant item function
 3. Wet commission – whole/part plant with product
 4. Optimisation
 5. Trail/Training/Handover
- Deviation from the Safety Rules is not permitted, but under extreme circumstances adjustments may be made upon agreement by the Commissioning Manager, SAP, Authorising Engineer, and the Client. It will be risk assessed and documented and logged in the site-records.

10.6 Maintenance and Breakdowns

The work of the Maintenance and Breakdown engineers has increased inherent risks involved. For the Breakdown engineers, some live testing and work around moving machinery may be required. These are only examples of some works that may be encountered.

Mandatory Arc Flash PPE must be worn during **all** live testing or fault-finding activities. Additional Arc Flash PPE (Helmet and visor) **must** be used where risk assessments have identified its requirement.

If a situation arises where work/testing in enclosures is limited, due to the equipment not being protected to greater than IP2X (12.5mm), on a vertical surface, or IP4X (1mm) on a horizontal surface and also working space is limited, then adequate plans and precautions must be in place, to ensure no direct contact with live parts is possible, whilst the work is carried out. A detailed risk assessment must be made and a Safe System of Work in place, identifying the hazards and control measures that will be in place, to mitigate the risks to all personnel. Further action is to be discussed and approved by the Commissioning/Breakdown Manager and/or SAP/AE

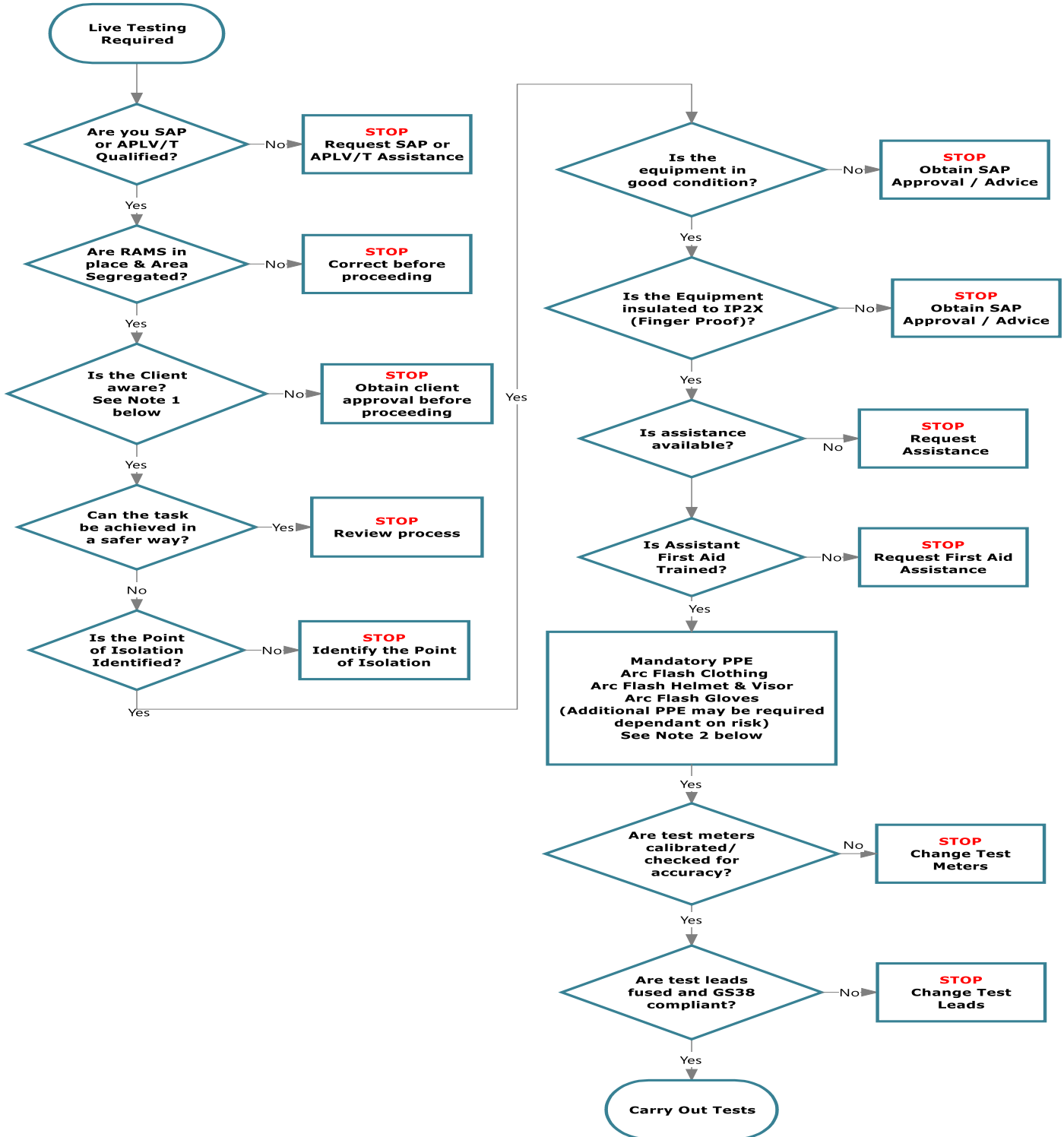
As an example, temporary shrouding may be designed and manufactured, to keep the worker safe from the hazardous parts not being worked on. Isolation of the panel should then be carried out using the approved procedures and the temporary shrouding should be installed in the safest manner and a plan to re-energise safely, in place. There are many varying factors, such as environment, proximity to the origin of supply, working height/access that must be considered to ensure Arc Flash levels and the relevant PPE have been determined.

Persons undertaking Maintenance and Breakdowns must hold a minimum status of APLV/T to carry out 'live testing' in a breakdown situation.

The requirements of Regulations 13 and 14 of the 'Electricity at Work Regulations 1989' must always be satisfied, or the work cannot proceed.

10.7 'Live Testing' Procedure (Compliance or Diagnostic)

Minimum Competency – APLV/T (Technical)



Note 1:

Before any 'Live Testing' is carried out, it is vital to ensure that the client is aware and that it is safe to carry out the work. Following the completion of work, any documents should be cancelled, and all equipment left in a safe condition.

Note 2:

Mandatory Bridges Arc Flash PPE must be worn during **all** live testing or fault-finding activities, at any voltage/current levels. A Risk Assessment may identify the need for additional arc flash protection. If this is the case, seek advice from the SAP/AE to request provision of such equipment.

11. Safety Terminology

System

An electrical system in which all the electrical equipment is, or may be, electrically connected to a common source of electrical energy and includes such source and equipment.

Electrical Equipment

Anything used, intended to be used or installed for use to generate, provide, transmit, transform, rectify, convert, conduct, distribute, control, store, measure or use electricity.

Conductor

A conductor of Electrical energy

Electrical Installation

An assembly of components, conductors and associated electrical equipment to fulfil a specific purpose which forms part of a system.

Installation

Abbreviation for an Electrical or Mechanical installation

Hazardous Area

Any location in which there is danger or a risk to health. The danger or risk may be due to any hazard including the presence of combustible material, explosive material, poisonous substances, substances hazardous to health, electromechanical radiation, or may be due to the location of the work such as the danger posed by a confined space.

Potentially Live

Equipment that has the potential to be **Live** and may have voltage present

Live

Equipment that has voltage present, due to being connected to a source of energy.

Dead

At or about zero volts, neither **live** nor **charged**

Note: - For equipment containing capacitors, the capacitors must be discharged before the equipment can be considered to be dead.

Prove Dead

Demonstrate with the use of a GS38 approved Voltage Indicator and Proving Unit that the electrical equipment being tested is 'Dead'.

Isolated

Disconnected and separated from all sources of electrical energy by a safe distance, in such a way that its disconnection and separation is secure

Isolate

Disconnect and separate Electrical / Mechanical equipment from the normal source(s) of energy in such a way that the disconnection and separation is secure.

Earthed

Connected to the general mass of earth in such a manner as will always ensure an immediate discharge of electrical energy without danger. When applied to electrical equipment, all phase conductors are connected together and efficiently connected to earth.

Safety Locks

Unique locks, available for the use of an Authorised Person or Approved Person, for the purpose of locking any item of Electrical Equipment in isolated or earthed positions, including securing shutters, whilst work is being carried out. The keys for such locks are to be retained in either a Key Safe on large installations or in the case of a single piece of equipment with single isolation where the APLV or APLV/R are undertaking work they may retain the key whilst undertaking the work.

Circuit Protective Conductor

A protective conductor connecting exposed-conductive-parts of equipment to the main earthing terminal.

Protective Conductor

A protective conductor used for some measure of protection against electric shock.

Protective Equipment

Equipment used to protect persons from injury in the working environment. Protective equipment includes items such as special tools, protective clothing, insulating screening, safety harnesses and temporary signs.

Electrical Injury

Injury is death or personal injury from electric shock, electric burn, electrical explosion or arcing or from fire or explosion initiated by electrical energy.

Danger

Danger is the risk of injury arising from electric shock, electric burn, electrical explosion or arcing or from fire or explosion initiated by electrical energy.

Dangerous Occurrence

An incident which involves a source of electrical energy and gives rise to danger to any person.

Dangerous Condition / Dangerous Practice

A condition or practice that is likely to lead to a Dangerous Occurrence

11.1 Test and Measurement Equipment

Multi-function tester

A piece of test equipment that can perform several different functions, for electrical measurement. RCD tests, Earth Fault Loop Impedance & Prospective Fault Current tests, Continuity and Resistance tests and Insulation Resistance tests.

Multi-meter

An instrument that combines more than one function for measuring or testing electrical characteristics (for example, single instrument that measures Resistance, Voltage and Current).

Multi-Range Instrument

An instrument with only one function for measuring or testing, but at different ranges.

Proving Unit

A portable device used to confirm the correct function of a GS38 approved Voltage Indicator. It should be used as a source of energy to test the Voltage Indicator before and after testing the electrical conductors.

Test Equipment

Equipment to undertake tests that are suitable for the use for which it is designed, provided that is maintained in a condition suitable for that use and is properly used.

Test Supply

In reference to test equipment, it is a portable piece of test equipment for proving the function of a Voltage Indicator, phasing test equipment, or current test equipment.

In reference to circuits, it is used to provide a temporary supply to a circuit for functional / fault-finding tests.

Voltage Indicator

A piece of equipment used to test for presence of electrical energy and demonstrate that equipment or circuits are dead.

11.2 Circuit descriptions

Final Circuit

A circuit connected directly to current-using equipment, or to a socket-outlet or socket outlets or other outlet points for the connection of such equipment.

Distribution Circuit

A circuit supplying a distribution board or switchgear.

A distribution circuit may also connect the origin of an installation to an outlying building or separate installation when it is sometimes called a sub-main.

12. Documentation

The recognised documentation associated with work on electrical systems, installations and equipment comprises. For further information refer to Appendices.

Work Authorisation Documentation

- Site Authorisation Document / Clients Permit to Work
- Risk Assessment
- Method Statement / Safe System of Work

Planning and Control Procedures

- Switching Schedule (ITC-F-SS-046)
- Isolation and Earthing Diagram (ITC-F-IED-047)
- Pre-Energisation Checklist (ITC-F-ECS-028)

Safety Documentation

- Permit to Work (BHS-F-086)
- Sanction to Test (BHS-F-091)
- Limitation of Access (BHS-F-090)

Electrical Records

- Site Logbook

12.1 Work Authorisation Documentation

Site Authorisation Document / Clients Permit to Work

A site authorisation document is issued either by the Controller of Premises or their delegated representative to contractors and other visiting workers. It provides both an authority to enter the site to carry out work and is the medium for exchanging information to protect the health and safety of both the contractor and any others who may be affected by the contract works.

Risk Assessment

A documented risk assessment is used to identify the hazards and risks pertaining to the task to be carried out and for providing guidance in developing and implementing the appropriate control measures to manage those risks. The procedure is to be in accordance with Bridges health and safety procedures. This document can be modified by the person in charge of the work as situations change and the immediate line manager must be kept informed.

Risk assessments are to identify:

- Site/location where the task is being undertaken
- Relevant dates
- Person carrying out the risk assessment
- Identification of the significant hazards
- Persons at risk and the level of risk of being exposed to the hazard
- Control measures
- Details of permits or safe systems of work that may be required
- Person responsible for implementing and monitoring the control measures.

Method Statement / Safe System of Work (SSOW)

A documented safe system of work, based upon the risk assessment, enables the person in charge of the work to plan and carry out the task in a systematic way. The procedure is to be in accordance with Bridges health and safety procedures. This document shall be prepared by the managers / persons in charge of the work and in all cases, all parties involved in the work must agree to the work structure. This document can be modified by the person in charge of the work as situations change and the immediate line manager must be kept informed.

The Safe System of Work will include:

- Brief description of work
- Details of the risk assessment associated with the task
- Significant risk activity and associated hazards
- Details of emergency procedures
- Tools/equipment/location that apply to the task
- Materials that apply to the task
- Details of any standards/guidance being referred to.
- Details of permits or other authorisation documents
- Specialist skills and/or safety equipment required
- Personal protective equipment required
- Details of any personnel
- Site contact details
- Sequence of main job tasks identifying safety controls
- Name of person devising safe system
- Details of persons receiving copies of safe system of work

12.2 Planning and Control documents

Switching Schedule (ITC-F-SS-046) - refer to Appendix 9.

A switching schedule is a planning document for the implementation of a specific switching exercise. It is produced either by a Senior Authorised Person (**SAP**), Authorised Person Low Voltage/Technical (**APLV/T**), or Authorised Person Low Voltage (**APLV**):

- In preparation for issuing a Permit to Work or Sanction for Test
- In preparation for cancelling a Permit to Work or Sanction for Test
- Prior to application of an earth on to a system (if applicable)
- Complex switching

The schedule provides clear and concise information on switching operations and must include the following:

- Site name
- Details of the person in charge of the switching operations
- Purpose, location, and nature of switching operations
- Relevant dates and times
- Application/removal of earth connections, locks, signs, etc.
- Time sequence
- Requirements for accompaniment during direct contact live testing (if applicable)

The schedule is to be of the **form shown in Appendix 9**. An Approved standard word structure shall be followed. An Authorising Engineer, SAP, APLV/T, or APLV must check the schedule and countersign before any switching operation takes place. It is preferable for the person countersigning to have knowledge of the site. In the case of a switching schedule for LV work activities with a single point of electrical isolation, countersignature may be dispensed with.

Isolation and Earthing Diagram (ITC-F-IED-047) - refer to Appendix 10.

An Isolation and Earthing Diagram shows the configuration of the system at the point of work. It must clearly illustrate:

- All points of isolation and earthing (if applicable)
- Caution and danger signs displayed
- Safety locks fitted
- Location of work/fault
- The key cabinet used for retention of the safety locks
- Any CP keys issued from a key cabinet

A diagram is to be issued with each copy of a Permit to Work or Sanction for Test and is to be produced on the **form shown in Appendix 10**. An Authorising Engineer, SAP, APLV/T, or APLV (preferably for the site) must check the diagram before any switching operation takes place and countersign the diagram. For LV work activities with a single point of electrical isolation, countersignature may be dispensed with.

12.3 Safety Documentation

Permit to Work – BHS-F-086 (Appendix 6)

An electrical Permit to Work is issued to a Competent Person by an SAP, APLV/T or APLV in the case of low voltage equipment. The permit confirms that it is safe to carry out electrical work on an item, or items of electrical equipment that have been isolated from a system and confirmed as dead. The permit is to have an issue number and a RAMS reference number, be produced in triplicate form and is to be completed on the **mandatory form BHS F086**.

Sanction to Test – BHS-F-091 (Appendix 7)

A Sanction to Test is issued by an SAP or APLV/T to a suitably competent person to confirm that all precautions and safety measures are in place and it is safe to carry out live tests on an item of Low Voltage electrical equipment. The Sanction to Test is to have an issue number and a RAMS reference number, be produced in triplicate form and is to be completed on the **mandatory Bridges form**.

Limitation of access – BHS-F-090 (Appendix 8)

A safety document issued by the **SAP, APLV/T or APLV** and issued to a person to carry out work in areas such as switch rooms, near or adjacent to enclosed live electrical equipment but not on live electrical equipment, for example painting internal walls, building repairs etc.

A Limitation of Access shall be established as described below, with electrical safety barriers being erected to control access. Such areas shall be as defined in these rules, with access only being granted to others by the Authorised Person following a toolbox talk and issue of a suitable permit (such as a Permit to Work). A **‘No admittance to unauthorised personnel’** sign shall be placed on the barrier.

In general, electrical equipment that shall be subject to these requirements includes the following:

- switchboards, motor control centres, control panels or distribution boards that have been connected to a live supply and are either live, or have the potential to become live and electrical work is ongoing in the installation, testing or commissioning stages of the project
- existing switchboards, motor control centres, control panels or distribution boards on which work is being carried out to make electrical modifications
- field-mounted pieces of electrical equipment such as pumps, actuators, or instruments for which the electrical protection rating is less than IP2X and on which work is being carried out.
- any electrical equipment that is adjacent to or on a public right of way.

It is **mandatory** to set up a Limitation of Access with controlled access using barriers, for all live electrical testing work carried out on construction sites. The Limitation of Access is to have an issue number and a RAMS reference number, be produced in triplicate form and is to be completed on the **mandatory form shown in Appendix 8**.

12.4 Electrical Records

Site Logbook

When acting as Principal Contractor, the site logbook should contain a record of each switching operation or other activity carried out on or around a Low Voltage system and should include the following information:

- Site name
- Key issues/returns
- Relevant dates and times
- A summary of the switching operations and/or work carried out
- The name of the person carrying out the activity
- Issue and Cancellation of safety documents
- Any other relevant information

12.5 Retention of Safety Documentation

The following completed safety documentation is to be retained by the issuer:

- Switching schedule
- Isolation and Earthing Diagram
- Permit to Work
- Sanction for Test
- Limitation of Access

This documentation is to be retained in an orderly manner by the issuer to demonstrate competency and allow for audit by the Authorising Engineer.

13. Locks and Keys

Safety Locks

A safety lock is used to lock an item of electrical equipment in the isolated or earthed (if applicable) position and to secure switchgear shutters, whilst work is carried out, or doors to areas where switchgear cannot be locked off. It takes the form of one padlock having one unique key. Multiple safety lock keys should be kept in a locked cabinet and signed out when required for use and signed back in once work is complete.

All personnel having authorisation of APLV and above shall be issued with approved locking off kits upon authorisation assessment. The Authorised Person/s (**SAP, APLV/T, or APLV**) shall ensure that a key control system is set up on site with suitable locks, multi hasps and other proprietary locking devices and warning signs/labels in place.

Key Cabinet

A Key cabinet is a lockable cabinet or box, in which the keys that afford access to the low voltage electrical equipment for a particular installation are kept. The key to the cabinet is to be held by the appropriate Senior Authorised Person, or Authorised Person (**SAP, APLV/T, or APLV**) for that installation. A copy of the '*Safety Documentation*' and '*Planning and Control documents*' used, are to be retained in the Key Cabinet. The Key Cabinet is to be clearly labelled with an approved sign.

Key Control System

Bridges will follow customer key control systems and procedures, when acting as contractor on client's sites. The keys to all significant low voltage switch-rooms and enclosures as well as working locks, under Bridges control, are to be controlled in an approved manner. Records should be kept of who, why and when keys are removed from cabinets and this information should be stored safely with all other safety documentation.

Service and enclosure Keys

Bridges will follow customer key control systems and procedures. Access to low voltage switch-rooms and enclosures will be gained/supervised by **SAP, APLV/T, or APLV**.

Key Switch Keys (selector, etc.)

Bridges will follow customer key control systems and procedures. Key switches will not be operated without full comprehension of the system operation and with relevant customer permission/permits in place as required.

Appendix 1 - Live Testing

Required test equipment for 'Live Compliance/Diagnostic Testing' on Site

The following is a list of equipment required for Live Testing on site:

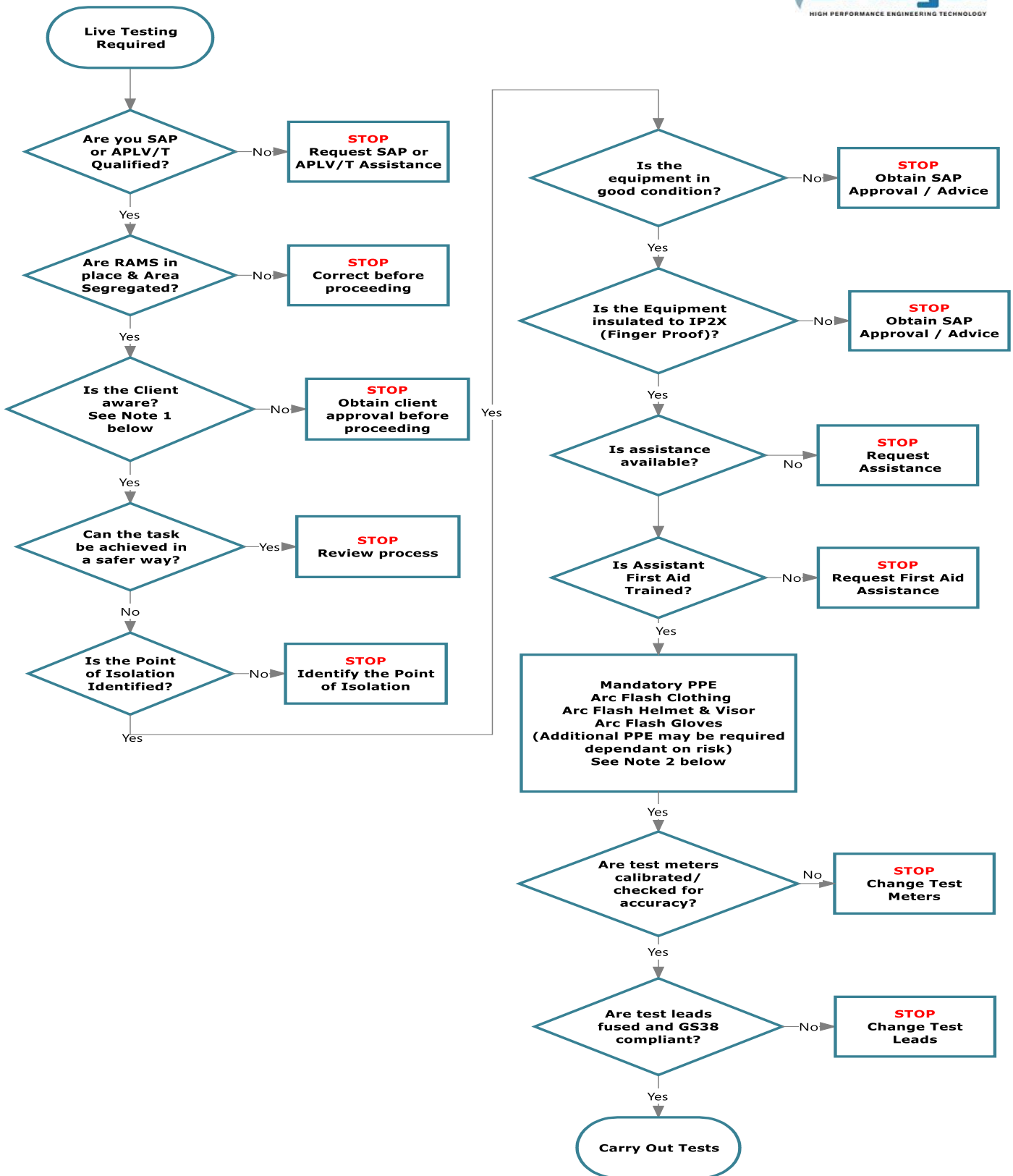
- a) Test equipment such as the Martindale VIPD138 Voltage Indicator & Proving Unit and Multi-function testers, all of which must be fitted with test leads complying with GS38. *(Multi-meters (GS38 compliant), for Diagnostic testing **only** with a valid Risk Assessment, Method Statement, and a Sanction to Test in place).*

Optional equipment if necessary, for 'Live Testing' due to site conditions

- a) Safety matting which must comply with ASTM D178 Type-1 Class 2 Safety Standard, or BS 921

Mandatory PPE requirements and minimum authorised competency for 'Live Testing' on site

PPE Requirements & Competency	
Activities	
ANY work within LIVE enclosures which are <u>not</u> protected to IP2X	Work is NOT Permitted
LIVE Compliance Testing in designated Hazardous Areas	Work is NOT Permitted
LIVE Compliance Testing in enclosures which contain LIVE parts which are insulated to IP2X.	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
LIVE Diagnostic Testing in enclosures which contain LIVE parts which are insulated to IP2X.	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
Proving DEAD on potentially LIVE Systems	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
Compliance dead testing in enclosures which contain LIVE parts which are insulated to IP2X.	Bridges Standard PPE
Glanding & Connecting in enclosures which contain LIVE parts which are insulated to IP2X.	
Proving DEAD on Isolated Systems	
Non-intrusive testing for re-setting purposes only in enclosures which contain LIVE parts which are insulated to IP2X	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
Installing Earth Rods	
Installing containment or cabling on site or glanding/terminating in enclosures which are Isolated & contain no LIVE parts	Bridges Standard PPE
Minimum Competency Requirement - Colour Code	
Competent Person (CP) or Electrical Trainee	CP or Trainee
Authorised Person / Restricted (APLV/R)	APLV Restricted
Authorised Person (APLV)	APLV
Authorised Person Technical (APLV/T) or Senior Authorised Person (SAP)	APLV / T or SAP



Note 1:

Before any 'Live Testing' is carried out, it is vital to ensure that the client is aware and that it is safe to carry out the work. Following the completion of work, any documents should be cancelled, and all equipment left in a safe condition.

Note 2:

Mandatory Bridges Arc Flash PPE must be worn during **all** live testing or fault-finding activities, at any voltage/current levels. A Risk Assessment may identify the need for additional arc flash protection. If this is the case, seek advice from the SAP/AE to request provision of such equipment.

Appendix 2 - Proving Dead

Test equipment required:

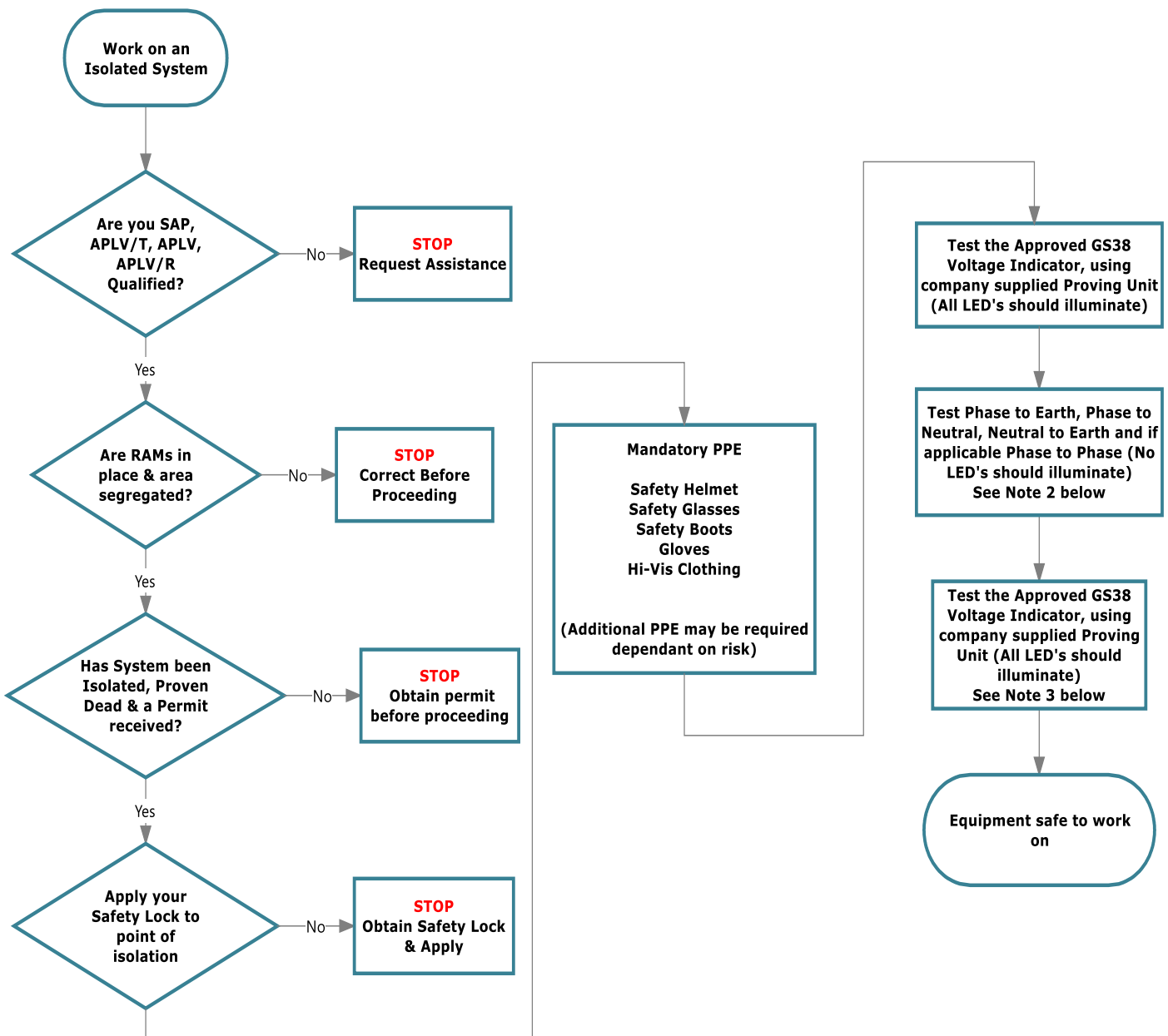
GS38 compliant Martindale Voltage Indicator & Proving Unit (Currently VIPD138)

Mandatory PPE requirements and minimum authorised competency for Proving Dead on site

PPE Requirements & Competency	
Activities	
ANY work within LIVE enclosures which are <u>not</u> protected to IP2X	Work is NOT Permitted
LIVE Compliance Testing in designated Hazardous Areas	Work is NOT Permitted
LIVE Compliance Testing in enclosures which contain LIVE parts which are insulated to IP2X.	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
LIVE Diagnostic Testing in enclosures which contain LIVE parts which are insulated to IP2X.	
Proving DEAD on potentially LIVE Systems	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
Compliance dead testing in enclosures which contain LIVE parts which are insulated to IP2X.	Bridges Standard PPE
Glanding & Connecting in enclosures which contain LIVE parts which are insulated to IP2X.	
Proving DEAD on Isolated Systems	
Non-intrusive testing for re-setting purposes only in enclosures which contain LIVE parts which are insulated to IP2X	
Installing Earth Rods	ARC Flash Overalls ARC Helmet & Visor Arc Gloves Safety Boots
Installing containment or cabling on site or glanding/terminating in enclosures which are Isolated & contain no LIVE parts	Bridges Standard PPE
Minimum Competency Requirement - Colour Code	
Competent Person (CP) or Electrical Trainee	CP or Trainee
Authorised Person / Restricted (APLV/R)	APLV Restricted
Authorised Person (APLV)	APLV
Authorised Person Technical (APLV/T) or Senior Authorised Person (SAP)	APLV / T or SAP

Optional equipment if necessary:

Safety matting which must comply with ASTM D178 Type-1 Class 2 Safety Standard, or BS 921



Following the completion of work, any permits should be cancelled, and the equipment left in a safe condition.

Note 1:

Before any isolation is carried out, it is vital to ensure that the client is aware and has confirmed that it is safe to carry out the isolation taking into consideration which equipment/process may be affected by the isolation, if any. If the isolation is to be continued for a prolonged period (after leaving site), signage must be applied at all points of work detailing the nature and duration of the isolation and who is the responsible person to contact and contact details.

Note 2:

For company issued Voltage Indication pack 'VIPD138', the VI13800 Voltage Indicator 'Polarity LED's', show presence and polarity of voltages greater than 12VAC and 12VDC, up to 50VAC and 50VDC. If voltage is present at these values, caution must be taken to identify and ensure that the source of this Extra-Low-Voltage is known, and all hazards are eliminated in the correct manner before work can continue. If in doubt **STOP** and **ASK**.

The presence of 'Hazardous Live' voltage is indicated by the 'Threshold LED's', from 50VAC/DC up to 400VAC/DC. *If testing at higher voltages, model VIPD150 will be issued, although this only indicates voltage above 50VAC/DC.*

Note 3:

If no LED's illuminate, the source of supply **cannot** be identified as being de-energised. **STOP** work, make the system safe and identify another Voltage Indicator/Proving unit, repeating the Safe Isolation Procedure.

Appendix 3 - Standard Isolation and Lockout Procedures

For work on LV electrical equipment or circuits, it is important to ensure that the correct point of isolation is identified, an appropriate means of isolation is used and that the supply cannot be inadvertently re-instated, while the work is in progress. **Warning signs/notices should be applied at all points of isolation and in addition, must be installed on adjacent/nearby electrical equipment that is still live (See Appendix 5).** They should be placed on the live panels directly adjacent to the panel that is isolated and to be worked on. There should also be a discussion between the person placing the signs and the person carrying out the work, to make sure they are clear on what is live and what is dead. All conductors must be proven dead in accordance with procedures stated in the Bridges Electrical Safety Rules App 2.

Prior to any isolation procedure being carried out full details from the customer / end user should be obtained to ensure that the work in question will not have detrimental effect to any process or operational functions on the site.

It is essential that the correct point of isolation for a piece of plant is identified and proven. This can be achieved by running the plant in `Hand` (Manual), isolating it and attempting to run it in `Hand` (Manual) again. If the correct item of plant has been isolated, it should not start. Identification notices (example Pump No 1) should not be used as the sole means of plant identification as these can be incorrect.

The person carrying out the work is to maintain control of any isolation locks that may be fitted, this can mean that we have total control of the work, or where isolation is carried out by others that our locks are fixed alongside those issuing the isolation certificate or Permit to Work.

The means of isolation can be an adjacent isolation device (plug and socket, switch disconnecter, circuit breaker, fuse device etc.). This device should be under the direct control of the competent person carrying out the work. Where multiple work functions are being carried out then it may be necessary for more than one person to secure the isolation device. These devices can be used without further precautions provided there is no foreseeable risk that the supply can be reinstated.

Where there is no such means of local isolation or there is a risk of reinstatement of the supply then the circuit or equipment to be worked on must be securely isolated by one of the following methods. In all cases the Padlocks used should have a unique key and any keys should be retained by the person carrying out the work.

Isolation using a main switch or distribution board (DB) switch-disconnector

Isolation of equipment or circuits using the DB switch-disconnector or main switch is the preferred method. The point of isolation should be locked off by the person carrying out or in charge of the work. In the case of multiple isolations on a DB, a multi-lock hasp can be used to prevent access to a main isolator until such time that all persons working on a system have completed their work and removed their padlocks from the hasp.

If locking-off facilities are not provided on the relevant switch, then a locked DB door or locked switch-room door is acceptable provided the key is unique. In this case, clear signage must be in place to detail that equipment within the area is under a permit to work and that access is prohibited until such time as this is completed. Again, multi-lock hasps can be used to control multiple isolations, although a key box (**See Section 11**) or similar system may be needed to retain and control access to the main door key.

Where it is intended that more than one person will be working on circuits supplied from a DB, (i.e. multiple isolations) and a multi-lock hasp cannot be used to secure the main point of isolation, individual isolation of each circuit by one or more of the methods shown below is recommended, to prevent inadvertent reinstatement of the supply. The principle is that each person carrying out such work should have control of their own point(s) of isolation and not rely on others to prevent inadvertent energisation.

Isolation of individual circuits

Where it is not practical to isolate a distribution board, individual circuits supplied from it can be isolated by one of the methods described below. However, bear in mind the overriding advice to avoid energising any outgoing electrical distribution services, preferably until the distribution switchgear and all connected circuits are complete and have been inspected and the relevant tests carried out.

If any items required to carry out the procedures recommended below are not manufactured for the DB in question or cannot be obtained through retail/trade outlets, it is acceptable to disconnect the circuit from the DB as long as the disconnected tails are made safe by being coiled or insulated. Suitable labelling of the disconnected conductors is important to prevent the supply being re-instated, particularly if other electricians are present.

Remember that work carried out inside a live DB is regarded as live working when there is access to exposed live conductors. In this case the appropriate precautions should be taken with respect to **Regulation 14** of the '**Electricity at Work Regulations 1989**'.

The following gives guidance as to how to safely isolate, but in all cases, it does mean that access to the equipment may be made whilst other equipment is live. The person will need to assess the equipment as to whether it is safe in the first instance to enter.

Isolation of individual circuits protected by circuit breakers

Where circuit breakers are used, the relevant device should be locked-off using an appropriate locking-off clip with a padlock which can only be opened by a unique key.

Some DBs are manufactured with 'Slider Switches' to disconnect the circuit from the live side of the circuit breaker. These devices should not be relied upon as the only means of isolation for circuits, as the wrong 'Slider Switch' could easily be operated on completion of the work.

Isolation of individual circuits protected by fuses

Where fuses are used, the removal of the fuse is acceptable as a means of disconnection. Where removal of the fuse exposes live terminals that can be touched, the incoming supply to the fuse must be isolated. To prevent the fuse being replaced by others, the fuse should be retained by the person carrying out the work, and a lockable fuse insert with a padlock should be fitted. Caution notices should also be used to deter inadvertent replacement of a spare fuse. In addition, it is recommended that the enclosure is locked to prevent access as stated above under '**Isolation using a main switch or distribution board (DB) switch-disconnector**'.

If the isolation is to be continued for a prolonged period (after leaving site) signage must be applied at all points of work detailing the nature and duration of the isolation and who is the responsible person to contact and contact details.

Note:

In TT systems, the incoming neutral conductor cannot reliably be regarded as being at earth potential. Therefore, for TT supplies, a multi-pole switching device which disconnects the phase and neutral conductors must be used as the means of isolation.

Where appropriate a Permit to Work should be issued. In all cases where the isolation is carried out at HV (by others), then the HV PTW must be referenced to the LV PTW, in this case a PTW must always be in place.

Caution notices are an important part of Safe Isolation and these should be present at all points of isolation, clearly stating the work being carried out, the point(s) of isolation and who is working on what circuit and where.

Typical wording of such notice is shown below.

CAUTION! THIS DISTRIBUTION BOARD HAS A NUMBER OF CIRCUITS THAT ARE SEPARATELY ISOLATED. CARE SHOULD BE TAKEN WHEN REINSTATING THE SUPPLY TO AN INDIVIDUAL CIRCUIT, THAT IT HAS BEEN CORRECTLY IDENTIFIED.

New Installations

Many incidents occur on new installations when work is required on a DB after the system has been energised. **It is therefore very important that every device is clearly and correctly marked BEFORE energisation takes place.** In this case ALL unused protective devices MUST be correctly isolated and locked off prior to this. It is recommended that where possible, spare ways must have blanking modules installed, as opposed to blanking plates. Access must be restricted to the person in charge of the work who holds an APLV authorisation.

The use of insulation tape as a means of isolation will result in disciplinary action being taken against the person(s) involved.

Neutral conductors.

Neutral conductors should never be treated as 'dead'. The practice of sharing neutrals is not uncommon (although prohibited by BS7671). In this instance the neutral can become 'live' when the conductor is disconnected if a load (e.g. contactor coil) is connected to the circuit.

Unused or unidentified cables.

These cables must be treated as **'live'** until it is proven **'dead'**.

Complex Systems

Where complex systems exist and partial isolation is required to maintain operational plant i.e. sections in Motor Control Centres, the work must be planned and approved.

A switching schedule (Appendix 9) and Isolation and Earthing Diagram (Appendix 10) must be produced as part of the planning process. These documents must be reviewed and approved by an SAP/AE before work proceeds and the documents must be included in the safe system of work.

Mechanical Isolation

The above will prove that the equipment is suitably electrically isolated provided that the equipment cannot be energised from any other source (these sources must also be isolated). In circumstances where total isolation is not possible via electrical isolation the equipment must be rendered physically safe, by either removal of drive belts couplings or other agreed methods. Before work can commence, all other sources of stored energy must also be isolated and where necessary released (e.g. system pressure etc.).

If any item of plant does not function **do not** assume that it is satisfactorily isolated for any procedures to be carried out on it.

Interface

In the event of multiple trades or companies needing to carry out work on isolated plant or electrical circuits etc. each manager/supervisor is to be informed of the intended work. These persons must then ensure that the safety procedures are adhered to; it will be necessary to ensure each attaches their own personal padlocks.

Appendix 4 – Authorised Person Low Voltage (Example)

AUTHORISATION CERTIFICATE

To:

I hereby certify that for the purposes of the Bridges Safe Working Procedures, you are appointed as an **Authorised Person Low Voltage (APLV)** for the duties shown below, for a period of 3 years from date of issue.

Date of Issue Date of Expiry

Name - **Carl Tongue** Signed

Authorising Engineer (AE)

All results in the below table must indicate a **pass**. The authorisation is **not active** until each section is complete.

Bridges Competency Assessment	Result	Assessor	Date
Skills – Practical Assessment	Pass	C Tongue – Authorising Engineer	1/11/2020
Experience – CV Work History Check	Pass	C Tongue – Authorising Engineer	1/11/2020
Training – Qualification Check	Pass	C Tongue – Authorising Engineer	1/11/2020
Knowledge – Competency Test Score	Pass	C Tongue – Authorising Engineer	1/11/2020
Emergency First Aid – Qualification Check	Pass	C Tongue – Authorising Engineer	1/11/2020

Authorised Person (APLV)

Unless otherwise specified on the Certificate of Appointment you can: -

- Carry out Safe Isolation procedures for low voltage electrical supply and distribution systems
- Issue and cancel Permits to Work issued only by them
- Issue Isolation and Earthing Diagram / Switching Schedule / Limitation of Access
- **Isolate a ‘Potentially Live’ or ‘Live’ System and Prove Dead**
- **Prove Dead, on a Proven Isolated and Dead system**
- **Carry out Dead Testing and ‘Live’ functional commissioning tests**
- Re-energise electrical circuits / installations in accordance with Version 11.1 of BHS-HSI-41
- Oversee training of Apprentices/Trainee’s
- Supervise the work of Competent Persons (CP), Trainees and other persons

WARNING:

Should you decide to operate outside of the above mandatory authorisation limits, you understand that you will not only be endangering yourself and others, but that you will be liable to disciplinary action which could result in the reduction, suspension, or termination of this authorisation and/or dismissal from the company.

Upon the expiry date of this certificate, unless competence has been assessed and another certificate issued, the authorisation will be withdrawn and Competent Person (CP) status will be assigned, if relevant.

You are **NOT** permitted to operate, adjust, or interfere with any High Voltage (HV) apparatus or equipment.

The holder of this authorisation must always have this certificate available, for audit and inspection purposes

Accepted by Signature:

Date:

Everyone at Bridges is empowered to STOP work if they feel the task, they are being asked to perform is unsafe

Appendix 5 - Typical Warning signs

The Health and Safety (Safety Signs and Signals) Regulations 1996 (Third Edition, 2015), bring into force the EC Safety Signs Directive (92/58/EEC) on the provision and use of safety signs at work.

They require managers to provide specific safety signs whenever there is a risk that has not been avoided or controlled by other means, e.g. by safe systems of work. Where a safety sign would not help to reduce that risk, or where the risk is not significant, there is no need to provide a sign.

The Regulations require safety signs to comply with British Standard 5378 Parts 1 & 3 "Safety Signs and Colours". There are four basic types in the BS.

- a) A blue circle symbol indicates MANDATORY ACTION - 'you must do'
- b) A red circular outline with red bar indicates PROHIBITION - 'do not do'
- c) A yellow triangle indicates CAUTION - 'warning of danger'
- d) A green square indicates INFORMATION - 'safe conditions'.

Graphic symbols may be placed in the shapes to give them additional meaning where appropriate e.g. a flame symbol for fire hazards, skull and crossbones for toxic chemical hazard, a 'flash' symbol to warn of electrical hazards etc. Supplementary text may also be added to a sign to reinforce the meaning e.g. 'No Smoking', 'Danger-Slippery Surface', 'Wear Safety Helmet' etc.

Caution Notices

Lock off Information



Lock out Tag



No Unauthorised Access



Multi Hasp



Permanent Signs:



Temporary signs:



A warning/prohibition sign **attached to all points of Isolation** and control.



A warning/prohibition sign, placed on the adjacent panel, in the vicinity of work, or tests, drawing attention to the **danger** of approach to, or interference with, potentially **live** equipment. These signs are also placed at the boundary of the area enclosing the place of work or test.

For both above temporary signs, supplementary information including the name and telephone number of the person placing the sign, should be added on the back.

The above notices must comply with the Health and Safety (Safety Signs and Signals) Regulations 1996 and generally conform to BS 5378: Part 1: 1980 The Notices must be clearly visible in the locations where they are used



Issue No: _____

ELECTRICAL PERMIT TO WORK (LV)

(Complete precisely and legibly in ink and BLOCK CAPITALS)

Part 1. (Issue) – To be completed by the Company or Contractors Authorised Person

Issued to:

Employed by:

I hereby declare that it is safe to work on the LV electrical equipment listed below, which is dead, isolated from all live conductors and is connected to earth if required. I have shown the recipient the safety arrangements in place at the points of isolation, the notices I have posted and I have explained all relevant safety precautions and procedures.

Location

Equipment:

All other electrical equipment is dangerous to work on

The system is isolated with safety locks, point of isolation notices, posted at:

The equipment is / is not* earthed at: (*delete as appropriate)

Caution Notices posted at: (on isolated equipment)

Danger Notices posted at: (on adjacent live equipment)

The following work is to be carried out:

RAMS REFERENCE: _____

Company or Contractors Authorised Person

Signed: Print Name:

Time: Date: Contact Tel No:

Part 2. (Receipt) – To be completed by the Recipient

I hereby declare that I accept responsibility for carrying out the work detailed in Part 1, I have been shown and understand the safety arrangements in place. And I am personally responsible for supervising the works or undertaking the works.

Signed: Print Name:

Time: Date: Contact Tel No:

Part 3. (Clearance) – To be completed by the Recipient

I hereby declare that the works detailed in Part 1 are now suspended/completed* (* delete as appropriate) and that all persons, tools and instruments have been withdrawn from the place of work I have advised all persons associated with the works that it is no longer safe to work on the equipment.

Signed: Print Name:

Time: Date:

Part 4. (Cancellation) – To be completed by the Company or Contractors Authorised Person

This permit is hereby cancelled. I hereby declare that have checked that the equipment is in a safe condition.

Signed: Print Name:

Time: Date:

Permit to Work

An **SAP**, **APLV/T** or **APLV** may issue and cancel Electrical Permits to Work.

(a) Issue procedure (Part 1):

A Permit to Work shall be issued to a Competent Person at the place where the work is to be carried out when the following conditions have been met:

- The person authorised to issue the permit is satisfied that the person in charge has the correct level of technical knowledge and expertise to carry out the work without danger
- Both parties are satisfied that all necessary actions have been taken to make the circuit(s) or equipment safe
- The permit has been read aloud by the person issuing the permit to avoid any misunderstanding.

(b) Receipt procedure (Part 2):

After both parties have signed the permit:

- The original shall be retained by the person in charge
- One copy shall be retained by the person issuing the permit, along with their key. In general, it would be expected that the Competent Person would also install their padlock and retain their key

The recipient of the permit shall supervise all members of the working party to ensure that only the work that is detailed on the permit is undertaken and that it is carried out in accordance with the agreed safe system of work.

(c) Clearance procedure (Part 3):

When the work has been completed to the satisfaction of all parties and any working earths have been removed (if applicable), the person in charge shall clear and return the Permit to Work to the authorised person who issued it. The issuer should ascertain that all work is completed and that it is safe to remove any locks.

(d) Cancellation procedure (Part 4):

The Authorised Person (issuer) receiving the original of the cleared permit shall annotate it accordingly as cancelled and retain it in the site records together with a copy of any isolation and earthing diagrams if applicable.

If the Competent Person (receiver) is unable to complete the work for which the 'Permit to Work' was issued and it has to be suspended until a later date, the 'Permit to Work' shall be cleared and cancelled in the manner described above.

A new 'Permit to Work' shall be issued when the work is to be re-started.

Whenever the permit holder leaves the site, the 'Permit to Work' and associated keys shall be deposited in an agreed secure location.

Where the permit holder is not available to clear the 'Permit to Work', the Authorised Person who issued it, being satisfied that no danger will arise, may after receiving the agreement of the appropriate SAP/AE collect the permit and keys from the secure location and clear and cancel the document. This procedure shall only be used in cases of emergency and the circumstances shall be recorded on the permit and in the site log book. The permit holder shall be informed of the action taken as soon as possible.

Where the person who issued the 'Permit to Work' is unavailable in person to cancel it, then in consultation with that person, an SAP can authorise an APLV/T to cancel the permit. The nature of the exceptional circumstance shall be recorded in the site logbook.

Appendix 7 - Sanction for Live Testing (LV) (BHS-F-091)



Issue No: _____

SANCTION FOR LIVE TESTING (LV)
(Complete precisely and legibly in ink and BLOCK CAPITALS)

Part 1. (Issue) – To be completed by the Company or Contractors' Authorised Person

Issued to:

Employed by:

I hereby authorise the above-named person (who I have ensured holds a valid Authorisation Certificate) to work on the Low Voltage equipment specified below whilst it is live. But only if accompanied by a second person who understands their role.

It is reasonable in all circumstances for the recipient to be on or near equipment whilst it is live, and suitable precautions have been specified to prevent danger.

Only equipment covered by this Sanction for Testing may be worked upon

Name of second person:

Location of equipment:

Details of equipment to be worked on:

Mandatory Precautions specified, during live testing: (i) Live Testing shall take place within a prescribed area. (Barriers erected and access restricted to Electrical Equipment and Installations under test)
(ii) 'Live Testing in Progress' signage **must** be erected around the prescribed area.
(iii) A second person with the ability to restrict access into the prescribed area, able to recognise and avoid **danger**, aware of how to isolate the equipment and trained to render prompt assistance in an emergency, **shall** be within sight and sound of the person carrying out the testing.

Additional Precautions specified, during live testing:

The following work (testing) is to be carried out:

RAMS REFERENCE:

Company or Contractors Authorised Person

Signed: Print Name:

Issue Date: Time: Contact Tel No:

Expiry Date: Time: **(Must be on the same day)**

Part 2. (Receipt) – To be completed by the Recipient

I hereby declare that the equipment is under my temporary control and I have responsibility for carrying out the work detailed in Part 1, I am responsible for taking the required safety precautions to avoid danger during the testing.

Signed: Print Name:

Time: Date: Contact Tel No:

Part 3. (Clearance) – To be completed by the Recipient

I hereby declare that the works detailed in Part 1 are now suspended/completed* (* delete as appropriate) and that all persons, tools, materials, and instruments have been withdrawn from the place of work. I have advised all persons associated with the works that it is no longer safe to work on the equipment.

Signed: Print Name:

Time: Date:

Part 4. (Cancellation) – To be completed by the Company or Contractors Authorised Person

This permit is hereby cancelled. I hereby declare that have I checked that the equipment is in a safe condition.

Signed: Print Name:

Time: Date:

Sanction to Test:

An **SAP, or APLV/T** may issue and cancel 'Sanction to Test' documents, with authorisation from the Authorising Engineer, Commissioning Manager, or Breakdown Manager. If working under the clients 'Permit to Work', precautions must be taken to ensure a formal document is in place for 'Live Working' procedures.

(a) Issue procedure (Part 1):

A 'Sanction to Test' shall be issued to the person in charge at the place where the test is to be carried out, when the following conditions have been met:

- **'Regulation 14' of the 'Electricity at Work Regulations 1989'** has been satisfied
- The person authorised to issue the permit is satisfied that the person in charge of the work has the correct level of competence, technical knowledge, training, and expertise to carry out the tests without danger, in accordance with **Regulation 16 of the 'Electricity at Work Regulations 1989'**
- Both parties are satisfied that all necessary actions have been taken to make the circuit(s) or equipment safe to work on.
- The 'Sanction to Test' has been read aloud by the person issuing to avoid any misunderstanding.

(b) Receipt procedure (Part 2):

After both parties have signed the 'Sanction to Test':

- The original shall be retained by the Competent Person
- One copy shall be retained by the Authorised Person issuing the 'Sanction to Test'
- One copy shall be posted on or near the equipment

(c) Clearance procedure (Part 3):

When the tests are completed to the satisfaction of the Competent Person in charge of the work, the equipment should be restored to the same operational state as it was at the time of issue (Isolated or Energised). When this has been completed and the system is in a safe and/or functional condition, the person in charge shall clear the 'Sanction to Test' and return it to the Authorised Person, who issued the permit.

(d) Cancellation procedure (Part 4):

When the Authorised Person is confident that the equipment has been restored to the same operational state as it was at the time of issue (Isolated or Energised) and the system is in a safe and/or functional condition, the Authorised Person shall cancel the 'Sanction to Test'.

Appendix 8 - Limitation of Access (LV) (BHS-F-090)



Issue No: _____

LIMITATION OF ACCESS (LV)

(Complete precisely and legibly in ink and BLOCK CAPITALS)

Part 1. (Issue) – To be completed by the Company or Contractors’ Authorised Person

Issued to:

Employed by: and being a Competent Person, is hereby given permission to carry out the following work:

Location:

The following work is to be carried out:

RAMS REFERENCE: _____

No other work shall be carried out

Hazards and control measures in place:

HAZARD	CONTROL MEASURES

Company or Contractors Authorised Person

Signed: Print Name: Issue

Date: Time: Contact Tel No:

Expiry Date: (No longer than 7 days from issue)

Part 2. (Receipt) – To be completed by the Recipient

I hereby declare that I accept responsibility for carrying out the work detailed in Part 1, and accept I am personally responsible for supervising the works or undertaking the works, and to take the necessary safety precautions to avoid danger.

Signed: Print Name:

Time: Date: Contact Tel No:

Part 3. (Clearance) – To be completed by the Recipient

I hereby declare that the works detailed in Part 1 are now suspended/completed* (* delete as appropriate) and that all persons, tools and materials have been withdrawn from the place of work. I have advised all persons associated with the works that it is no longer safe to work in the area.

Signed: Print Name:

Time: Date:

Part 4. (Cancellation) – To be completed by the Company or Companies Authorised Person

This permit is hereby cancelled. I hereby declare that I have checked that the area has been left in a safe condition.

Signed: Print Name:

Time: Date:

Limitation of Access

a) Issue procedure (Part 1):

The person authorised to issue the Limitation of Access is satisfied that the person in charge of the work has the correct level of technical knowledge and expertise to carry out the works without danger. The Limitation of Access has been read aloud by the person in charge of the work, to the person authorised to issue the Limitation of Access to avoid any misunderstanding.

A limitation of Access must always have the valid until date completed and must not be left open ended. It is recommended that a Limitation of Access should not be left 'open' for longer than 6 months.

The authorised person issuing needs to consider the work activity when considering an appropriate valid to duration (6 months may be appropriate for a construction site manager for general access but may not be appropriate for a joiner fitting a door).

b) Receipt procedure (Part 2):

The person supervising the works signs for receipt. The person supervising must always be present. If the person supervising needs to leave the work site for any reason the work must stop, and the work party must exit the controlled area until the person supervising returns.

c) Clearance procedure (Part 3):

When the works are completed to the satisfaction of both the person authorised to issue the Limitation of Access and the Person in Charge of the work and all people and materials have been removed, the person in charge of the work clears the Limitation of Access and returns it to the person authorised to issue it.

d) Cancellation procedure (Part 4):

The person who issued the limitation of access, inspects the area to ensure it is left in a safe condition and cancels the limitation of access.

Sheet of Serial No.

Switching Schedule

Purpose of proposed WORK/TEST (Delete as appropriate)	Equipment which the proposed sequence of operations will make safe to work on

ITEM No	LOCATION	EQUIPMENT	OPERATION AND REASON	ITEMS REQUIRED	TIME & DATE

Date countersigned switching schedule is required to Commence

.....

Authorised Person

Name

Signature Date

Countersigning Senior Authorised Person

I hereby declare that I have checked the above Switching Schedule, and I am satisfied that, to the best of my knowledge, it will enable the proposed work or test to be carried out safely. I have knowledge of and have access to the current diagram of the system and equipment.

Name

Signature Date

Appendix 10 - Isolation and Earthing Diagram – (ITC-F-IED-047)

Serial No.

**Complex LV - Isolation and Earthing
diagram (complete precisely and legibly in
BLOCK CAPITALS)**

Site	Project No
Switching Schedule, No.....	Date.....
Permit-to-work/Sanction-for-test No	Date.....

Purpose of proposed WORK/TEST

Equipment which the proposed sequence of operations will make safe to work ON / TEST

Sketch of isolation and earthing arrangements

LV CP - Name and Signature


Authorised Person

Signed..... Name..... Date.....

Countersigning Senior Authorised Person

Signed..... Name..... Date.....

Appendix 11 – Pre-Energisation Checklist – (ITC-F-ECS-028)

Client		Check sheet ref :	
Site		Area of work :	
Project Number			
Pre-Energisation Check Sheet			
Check Sheet ITC-F-ECS-028			
			
You are NOT permitted to energise ANY circuit until this document is completed and reviewed by the Nominated Person (identified below)			
Number	Operational Check	Comment	INITIALS
1	Is the energisation planned and the Authorised Person contacted and available ?	<u>Y/N :</u>	
2	Define the type of circuit being energised ?	<u>Distribution circuit above 100A (T2 circuit)</u>	
		Name of the nominated person:	
		<u>Distribution circuit Equal to or below 100A (T1 circuit)</u>	
		Name of the nominated person (P2P)	
3	Has the client, other trades and the site team been informed of the need to energise ?	<u>Y/N :</u>	
4	Have the Testing RAMS (BHS-F-152) been briefed and signed, with exclusion zones communicated to all persons affected ?	<u>Y/N :</u>	
5	Has the cable for the circuit(s) to be energised been connected at both ends ?	<u>Y/N :</u>	
6	Is the Multi Function Tester / Approved Specialist Device calibrated ?	<u>Y/N :</u>	
		<u>Type / Model :</u>	
		<u>Serial Number :</u>	
7	Have R1+R2 been measured with Phase Conductors connected ?	<u>Y/N/Other :</u>	
		<u>Detail disconnected items:</u>	
8	Have Insulation Resistance Tests been carried out whilst the cores are connected ?	<u>Y/N/Other :</u>	
		<u>Detail disconnected items:</u>	
9	Is the Polarity / Phase Rotation correct ?	<u>Y/N :</u>	
		<u>Confirmed how ?</u>	
10	All circuits fed from the equipment being energised that are not complete or tested have been disconnected or isolated & locked off ?	<u>Y/N :</u>	
11	Has all the 'Main Protective' & 'Supplementary Bonding' been completed and confirmed as satisfactory ?	<u>Y/N :</u>	
12	DB Schedule / Circuit Charts in place and/or equipment or circuit is complete and clearly identified ?	<u>Y/N :</u>	
13	Has there been a review of open permits to ensure NO conflicts exist ?	<u>Y/N :</u>	
14	Have all personnel, tools and materials been removed from the work area with suitable signs and barriers in place for protection ?	<u>Y/N :</u>	
15	Are all IP2X Barriers in place ?	<u>Y/N/NA :</u>	
		<u>Details if N or NA answer:</u>	
16	Are all the results satisfactory to achieve the permitted disconnection time for the circuit ?	<u>Y/N :</u>	
17	Name of the APLV/T present to carry out Live Testing ?	<u>Name:</u>	
18	Has the NICEIC Document been completed ?	<u>Y/N :</u>	
19	Has the NICEIC Document been scanned or photographed and sent to the AP ?	<u>Y/N :</u>	
Additional Comments:			
The information given above is a true, full and accurate record of the checks carried out on site.			
Bridges Engineers Name		Client Authorised Person (if applicable)	
Bridges Engineers Signature		Client AP Signature (if applicable)	
Date		Date	

Appendix 12 - Training, Assessment, Appointment & Authorisation

All Senior Authorised Persons (SAP), Authorised Persons (APLV/T, APLV & APLV/R) and Competent Persons (CP) shall receive such training, assessment, appointment and authorisation as are necessary for them to undertake the responsibilities and duties placed upon them by these Rules.

The Authorising Engineer shall establish the procedures necessary to meet this statutory obligation and ensures that they are promulgated. The Authorising Engineer and any delegated representative/s shall not permit any person to carry out work on a site unless that person has been appropriately authorised as competent to carry out the task.

Training

External training of personnel is to be arranged by local management through the HSE department.

Formal training is to be to a recognised national standard where possible.

All training courses shall include a documented final assessment of the individual's ability.

Appointment of persons is carried out by the Authorising Engineer, or their delegated representative/s

Assessment, Appointment and Authorisation

Prior to appointment, a competency assessment is carried out, this includes:

- Written assessment of the understanding of 'Bridges Electrical Safety Rules'
- Written assessment of Electrical and Health & Safety knowledge
- Practical assessment of:

<ul style="list-style-type: none"> ✓ <i>Isolation and Lock-off</i> ✓ <i>Proving Dead</i> ✓ <i>Signage</i> ✓ <i>Dead testing</i> ✓ <i>Live Testing (where qualified)</i> 	<ul style="list-style-type: none"> ✓ <i>Types of Earthing</i> ✓ <i>Fault Finding</i> ✓ <i>Variable Speed Drives</i> ✓ <i>Instrumentation</i> ✓ <i>Commissioning (where required)</i>
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A certificate appointing an SAP, APLV/T, APLV, APLV/R, CP or Trainee stating details to which it applies and operations and/or work that the person is authorised to carry out. The certificate of appointment will be countersigned by the holder confirming their acceptance and understanding of the extent of their authority

The Authorising Engineer and/or their delegated representative, are to carry out an assessment of the candidate prior to appointment of any authorisation. Recommendation from that persons' senior line manager should have been received, prior to the assessment. The candidate is to receive regular refresher training and be formally re-assessed at intervals not exceeding 3 years. Informal annual assessments should also be carried out and recorded, to ensure continuing competence.

If authorised to carry out switching (minimum competence APLV), switching history should be recorded in that person's logbook, to assist with the informal annual competency assessment process. Any evidence (copies of Safety Documents, or such), which can show a level of progression, or maintaining a level of competence in the workplace should be kept and logged where possible.

Reduction, suspension, or termination of authorisations may be carried out by the Authorising Engineer, should there be any 'erroneous incidents' due to working outside of that persons level of authorisation, or should any incident investigation be in process, or have been closed, where the Authorised Person was involved due to negligent, or accidental acts.

Appendix 13 – Experience and qualifications

Senior Authorised Person (SAP/LV)

Knowledge, Qualifications and Experience:

Senior Authorised Person Low Voltage (SAP/LV) should:

- be an experienced electrical professional with an approved form of technical training (such as NVQ or City & Guilds) and achieved an acceptable standard.
- have an approved form of training in Electrical Inspection and Testing (2391, 2394/5)
- have detailed technical knowledge and experience of low voltage electrical equipment systems.
- have, where necessary, attended an approved 'Authorised Person' low-voltage training course within the previous three years and achieved an acceptable standard.
- have received appropriate training on BS 7671 'Requirements for Electrical Installations'
- have received appropriate training on the Electrical Safety Rules.
- be competent to discharge the duties/responsibilities of a Senior Authorised Person (LV)
- have received instruction in the treatment of persons suffering from electric shock, including resuscitation techniques (minimum 1-day emergency first aid)

Although not prohibited, it is considered unlikely that a person younger than 25 years of age will have the necessary knowledge and experience to fulfil the role of a Senior Authorised Person.

Authorised Person - Technical (APLV/T)

Knowledge, Qualifications and Experience:

Authorised Person Low Voltage / **Technical** (APLV/T) should:

- have undergone an approved form of technical training (such as NVQ3 or City and Guilds/EAL) and achieved an acceptable standard or demonstrated sufficient experience of LV systems to an equivalent level
- have or be working towards an approved form of training in Electrical Inspection and Testing (2391, 2394/5) or have sufficient industry knowledge and experience to be deemed competent
- have received appropriate training on BS 7671 'Requirements for Electrical Installations'
- have received appropriate training on the Electrical Safety Rules
- be familiar with the type(s) of equipment and installations that they are required to carry out work on, including where appropriate hazardous area equipment.
- be capable of issuing a low voltage Permit to Work and Limitation of Access (LV).
- have received instruction in the treatment of persons suffering from electric shock, including resuscitation techniques (minimum 1-day emergency first aid).

Authorised Person (APLV)

Knowledge, Qualifications and Experience:

Authorised Person Low Voltage (APLV) should:

- have undergone an approved form of technical training (such as NVQ or City and Guilds/EAL) and achieved an acceptable standard or demonstrated sufficient experience of LV systems to an equivalent level.
- have received appropriate training on BS 7671 'Requirements for Electrical Installations'
- have received appropriate training on the Electrical Safety Rules.
- be familiar with the type(s) of equipment and installations that they are required to carry out work on, including where appropriate hazardous area equipment.
- be capable of issuing a low voltage Permit to Work and Limitation of Access (LV).
- have received instruction in the treatment of persons suffering from electric shock, including resuscitation techniques (minimum 1-day emergency first aid).

Authorised Person - Restricted (APLV/R)

Knowledge, Qualifications and Experience:

Authorised Person Low Voltage / **Restricted** (APLV/R) are to:

- have undergone an approved form of technical training (such as NVQ or City and Guilds/EAL)
- have received appropriate training on BS 7671 'Requirements for Electrical Installations'
- have received appropriate training on the Electrical Safety Rules
- be familiar with the type(s) of equipment and installations that they are required to carry out work on, including where appropriate hazardous area equipment

Competent Person (CP)

Knowledge, Qualifications and Experience:

Competent Person (CP) is to:

- be either experienced in an electrical or mechanical discipline and having received formal training (such as 'cross skilling'),
- have received appropriate training on the Electrical Safety Rules
- be familiar with the type(s) of equipment and installations that they are required to carry out work on, including where appropriate hazardous area equipment.

Assessment and appointment of Competent Persons:

Personnel for appointment to Competent Persons are to be assessed by an Authorising Engineer, or their delegated representative on recommendation from their line manager. The candidate is to be subject to continuous assessment by their line manager, who is to take the appropriate action as and when required, to assist in further assessments for authorisation and/or progression purposes.

Subcontractors:

The above-mentioned assessment, appointment and authorisation processes apply to both Bridges employees and sub-contractors equally.

Appendix 14 – Guidance notes on Arc Flash Protection

An Arc Flash is usually caused by inadvertent contact between an energised conductor such as a bus bar or wire, with another conductor or an earthed surface. When this occurs, the resulting short circuit current can melt conductors and produce strong magnetic fields that blow the conducting objects apart. The resultant fault current ionises the air and creates a conducting plasma fireball with arc temperatures that can reach upwards of 35,000 degrees Fahrenheit. Severe injury and even death can not only occur to persons working on the electrical equipment, but also to people located nearby.

Arc flash injury can include external burns to the skin, internal burns from inhaling hot gases and vaporised metal, hearing damage, eye damage and blindness from the ultraviolet light of the flash, as well as many other devastating injuries. Depending on the severity of the arc flash, an explosive force known as an arc blast may occur, which can result in a pressure of hundreds and even thousands of pounds of force, launching debris as shrapnel at hundreds of miles per hour.

The severity of the thermal effect of an arc flash is defined as ‘incident energy’ and is measured in terms of calories per centimetre² (cal/cm²), that a victim could receive to the skin surface.

An arc flash can range from nothing more than minor uneventful sparks to a massive and deadly explosion.

Protection from arc flash

As a frame of reference for incident energy, an exposure of **1.2 cal/cm²** can produce the onset of second degree burns to the skin. This value is used by many standards as the benchmark that defines adequate protection against the thermal effect of arc flash. Limiting the ‘incident energy’ exposure at the skin surface to no more than **1.2 cal/cm²** means you can still receive some burn injury, however the primary objective of arc flash protection is to minimise the injury and probability of death.

In general, if the prospective ‘incident energy’ exposure at a given location is below **1.2 cal/cm²**, no additional thermal protection is required for the worker. However, if the ‘incident energy’ exceeds this value, protection against the thermal effects may become necessary, but it must be emphasised that PPE does not prevent the accident happening in the first place.

Personal Protective Equipment (PPE) used for arc flash protection includes garments made from Flame Retardant (FR) fabric. This fabric is designed to provide a thermal barrier and limit the ‘incident energy’ exposure at the skin surface to no more than **1.2 cal/cm²**. Although FR fabric will burn when exposed to a flame, it is designed to stop burning when the flame is removed. It must also not break or burn open and expose the skin directly to the flame.

FR clothing is rated based on its ‘**Arc Thermal Performance Value**’ (ATPV) in cal/cm². To properly protect a worker, the ATPV rating of the FR clothing must exceed the prospective ‘incident energy’ available at a given location.

Depending on the prospective short circuit current available at a switchgear, a defined hazard is present to maintenance and operating personnel, due to the possibility of a high-intensity electric arc. Maximum temperature of an arc can exceed 10,000 kelvin and the radiant heat, expanding hot air, and explosive vaporisation of metal and insulation material can cause severe injury and death to unprotected workers.

To prevent injury by high temperature arc flash discharge, it is necessary to carry out an arc flash study on the installed equipment and select the appropriate PPE to meet the arc flash study requirements. It is recommended the highest level of PPE should be used.

Category 0 – Arc rated Garments and PPE Required:

Safety Glasses, Hard Hat, Lightweight Safety gloves, Safety shoes and one layer of untreated cotton (covering whole of body).

Calories per cm²: 0 to 1.2

Minimum ATPV: 1.2

Category 1 – Arc rated Garments and PPE Required:

Safety Glasses, Hard Hat, Arc-Flash protective gloves, Safety shoes, Arc rated shirt and pants (or Arc rated coveralls).

Calories per cm²: 1.21 to 4

Minimum ATPV: 4

Category 2 – Arc rated Garments and PPE Required:

Safety Glasses or Goggles, Arc-Flash protective gloves, Hard Hat and Arc rated face-shield with chin-guard (or Arc flash hood), Hearing protection, Cotton underwear, Arc rated shirt and pants (or Arc rated coveralls), Safety shoes.

Calories per cm²: 4.1 to 8

Minimum ATPV: 8

Category 3 – Arc rated Garments and PPE Required:

Safety Glasses or Goggles, Arc-Flash protective rubber gloves, Leather gloves on top, Hard Hat, Hearing protection, Arc flash hood, Arc rated shirt and pants, Arc rated coveralls (in addition to Arc rated shirt and pants), Cotton underwear, Safety shoes

Calories per cm²: 8.1 to 25

Minimum ATPV: 25

Category 4 – Arc rated Garments and PPE Required:

Safety Glasses or Goggles, Arc-Flash protective rubber gloves, Leather gloves on top, Hard Hat, Hearing protection, Cotton underwear, Arc rated shirt and pants, Arc rated coveralls (in addition to Arc rated shirt and pants), Full flash suit with hood.

Calories per cm²: 25.1 to 40

Minimum ATPV: 40

Further guidance can be found in the following documents:

- HSE Guidance note HSG85 – Electricity at Work Regulations 1989
- IET Health and Safety Bulletin 51C – Arc flash protection

An Arc Flash hazard analysis should determine:

- The maximum duration of a potential arc (dependent on the 3-phase fault detection and clearance time of the system)
- The incident energy level from a potential arc flash (proportional to the prospective short circuit current from the system being worked on or near)
- Whether the work will take place with any enclosure closed or open
- The flash protection boundary within which PPE will be required

Appendix 15 - Working with Electricity, Risk Assessment

Limitations:	Categories of Persons at Risk	
Voltages up to and including 415v, 3-phase (LV Only)	Occupations involved in the Activity	Electrical Staff
	Other Persons at Work	Any persons in the immediate vicinity of the work
	Public or Other Parties	Any persons in the immediate vicinity of the work

Score	LIKELIHOOD (Chances of occurrence)		Score	SEVERITY (Outcome)
1	Remote Possibility		1	Negligible Injury
2	Unlikely		2	Minor Injury
3	Possible		3	Major Injury or Disability
4	Very Likely		4	Death
5	Certainty		5	Multiple Deaths

Risk = Likelihood x Severity

LOW Risk Tolerable with correct control measures (1 – 5)	MEDIUM Risk Tolerable with correct control measures (6 – 10)	HIGH Risk DO NOT proceed until appropriate control measures are in place (12 – 15)	VERY HIGH Risk DO NOT proceed until appropriate control measures are in place (16 – 25)
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Ref	Activity	Hazard/Risk Identified	Uncontrolled Risk			Minimum Competency	Control Measures	Residual Risk		
			Likelihood	Severity	Risk			Likelihood	Severity	Risk
1	ANY work within any LIVE enclosures or system which is <u>not</u> protected to IP2X	Electric Shock / Burns	4	4	16	N/A	Work is NOT Permitted	0	4	0
2	LIVE Compliance Testing in designated Hazardous Areas	Explosion / Burns	4	5	20	N/A	Work is NOT Permitted	0	5	0
3	Racking IN and OUT Air-Circuit breakers and withdrawable devices by only (Trained/Competent persons)	Explosion / Burns	4	4	16	APLV-T	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Arc Flash Overalls - Arc Flash Trousers & Polo Shirt - Arc Flash Safety Helmet & Visor – Arc Flash Gloves ** (Remote Racking as a 1st option)	1	3	3
4	LIVE Compliance Testing in enclosures which contain LIVE parts which <u>are</u> insulated to IP2X.	Electric Shock / Burns	3	4	12	APLV-T	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Arc Flash Overalls - Arc Flash Trousers & Polo Shirt - Arc Flash Safety Helmet & Visor – Arc Flash Gloves **	1	3	3
5	LIVE Diagnostic Testing in enclosures which contain LIVE parts which are insulated to IP2X.	Electric Shock / Burns	3	4	12	APLV-T	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Arc Flash Overalls - Arc Flash Trousers & Polo Shirt - Arc Flash Safety Helmet & Visor – Arc Flash Gloves **	1	3	3
6	Isolating and Proving DEAD procedures on 'LIVE' Systems	Electric Shock / Burns	3	4	12	APLV	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Arc Flash Overalls - Arc Flash Trousers & Polo Shirt - Arc Flash Safety Helmet & Visor – Arc Flash Gloves **	1	3	3

7	Dead Testing in enclosures which contain LIVE parts which are insulated to IP2X.	Electric Shock / Burns	2	4	8	APLV-R	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE - Bridges Standard	1	4	4
8	Glanding in enclosures which contain LIVE parts which are insulated to IP2X.	Electric Shock / Burns	2	4	8	APLV-R	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Bridges Standard	1	4	4
9	Proving DEAD on Isolated Systems	Electric Shock / Burns	2	4	8	APLV-R	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Bridges Standard	1	4	4
10	Non-intrusive testing for re-setting purposes only, in enclosures which contain LIVE parts which are insulated to IP2X	Electric Shock / Burns	2	4	8	APLV-R	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Bridges Standard	1	4	4
11	Installing Earth Rods	Electric Shock / Burns	3	4	12	APLV	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Arc Flash Overalls - Arc Flash Trousers & Polo Shirt - Arc Flash Safety Helmet & Visor – Arc Flash Gloves	2	3	6
12	Installing containment or cabling on site, glanding / terminating or Dead testing in enclosures which are Isolated & contain <u>no</u> LIVE parts	Electric Shock / Burns	1	4	4	CP or Trainee	Work in compliance with Bridges Safety Rules & The Electricity at Work Regulations. PPE – Bridges Standard	1	4	4

**** - Unless risk assessed out by an APLV/T based on potential fault current, location and environment and all relevant factors.**

Assessment completed by:	S Spencer, M Bridges, K Molloy, C Tongue, J Clarke	1 st November, 2020
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