1 SCOPE

This section of the Power Systems Live Working Manual sets out further justification for ***HV Rubber Glove Working*** and defines the principles, authorisation requirements and precautions to be taken both before and during work. This is in order to achieve **Safety from the System** and compliance with ScottishPower Electrical & Mechanical Safety Rules 4th edition Specialised Procedure SP4

2 ISSUE RECORD

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3 ISSUE AUTHORITY

Author	Owner	Issue Authority
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4 CONTENTS

5 DEFINITIONS

5.1 Terms printed in bold type are as defined in the ScottishPower Safety Rules Electrical and Mechanical 4th Edition.

5.2 For the purposes of this section of the PSLWM, the following additional definitions apply:-

HV Rubber Glove Working

The carrying out of work including the application and removal of **Approved** protective equipment, on **Live High Voltage** overhead lines from an **Approved** Insulated Aerial Device (IAD) while wearing **Approved** protective rubber gloves and sleeves.

Immediate Working Area

The area within which contact could be made during the course of ***HV Rubber Glove Working*** between any part of a linesman's body other than his gloved hands or sleeved arms, and any overhead line **Apparatus** other than the phase being worked on.

Second Point of Contact

The point by which current would enter or leave the body should inadvertent contact be made simultaneously between two points at different potential by unprotected parts of the body. This includes all conductors, equipment, staywires, earth conductors, and any other **Apparatus,** including those within falling distance that are at different potential from the **Apparatus** being worked on.

Limit of Approach

Distances to ***Second Points of Contact*** which shall at all times be maintained:

- In accordance with Specialised Procedure 4 a distance of not less than 300mm shall be maintained between unprotected parts of the body or insulated spares boom and buckets, to energised conductors or Second Points of Contact which have not been shrouded.
- A distance of not less than 150mm shall be maintained between unprotected parts of the body or insulated boom and buckets, to energised conductors or Second Points of Contact which have been shrouded.
- A distance of not less than 1 metre shall be maintained between uninsulated parts of the aerial device to all **Apparatus.**

On Site Job Planning Sheet

The document completed and signed by the team members each time before ***HV Rubber Glove Working*** commences. The document shall record their agreement on:

- Details of the work to be carried out.
- Abnormal hazards identified.
- Precautions to be taken.
- ***HV Rubber Glove Working*** techniques to be employed.
- The name of the ***Person in Charge*.**

Person in Charge

The member of the ***HV Rubber Glove Working*** team responsible for carrying out the **Personal Supervision** of the other team members during the course of ***HV Rubber Glove Working***. He shall act as Dedicated Observer positioned at ground level and not carry out any work himself, while fulfilling this role.

6 JUSTIFICATION

6.1 In addition to the justification for ***HV Live Working,*** stated in the foreword of the PSLWM, the following paragraphs set out further justification for the use of ***HV Rubber Glove Working***.

6.2 An intensive investigation into ***HV Rubber Glove Working***, showed that there were fewer accidents working with the system energised or 'live', rather than in apparently 'not live' or 'dead' situations.

6.3 Safety is ensured through strict adherence to Safety Rules and procedures contained in support documentation, together with detailed attention to Training, Tools and Equipment, and Work Systems & procedures.

6.4 Continuity of a supply of electricity to hospitals, surgeries, home based patients, and the old and infirm, particularly in rural areas, is of ever increasing importance in maintaining the health and welfare of this section of the community.

6.5 Working with 'hands on' energised conductors or equipment, using rubber gloves from an insulated platform, is now the most commonly recognised method of live line working in world utilities.

6.6 The use of aerial devices give a comfortable and stress free working platform and reduces sickness/accident related absence due to climbing wood poles.

7 PRINCIPLES

7.1 ***HV Rubber Glove Working*** shall be carried out utilising the principles of "INSULATE, ISOLATE and PROTECT".

- Apparatus in the ***Immediate Working Area*** is "INSULATED" by using insulated shrouding material. The purpose of shrouding is to insulate personnel from any possible ***Second Point(s) of Contact*** (e.g.: crossarm, pole, structure, other plant etc.) and eliminate inadvertent phase to phase, or phase to earth contact of energised conductors or apparatus.

- The Linesman is "ISOLATED" from earth by using an **Approved** Insulated Pole Platform or Insulated Aerial Device (IAD). The purpose of an IAD is to provide an access platform with the required stability, mechanical and dielectric strength to carry out ***HV Rubber Glove Working*** and it may be equipped with a material handling jib and winch for the raising and lowering of plant and equipment.

- The Linesman is "PROTECTED" by rubber gloves and sleeves. Gloves and sleeves are made from rubber (natural or synthetic) and are used to insulate the hands and arms from energised lines or equipment. They are manufactured in various classes for work at voltages up to 33kV and shall conform to BS EN 60903 and BS EN 60984 respectively.

7.2 Team members shall confine their work to one phase at a time and shall not make simultaneous contact with any other part of the **Apparatus**.

7.3 It is emphasised that when “Hot Stick” Techniques are being utilised as part of a job task then these techniques are governed by the “Hot Stick” section of the PSLWM and should therefore be kept separate and distinct from ***HV Rubber Glove Working*** Techniques.

7.4 **Apparatus** may be erected or recovered within the upper portion of the pole using ***HV Rubber Glove Working*** Techniques through the application of shrouding and the use of the material handling device of the IAD.

8 TRAINING AND AUTHORISATION

8.1 To comply with Specialised Procedure SP 4, ***HV Rubber Glove Working*** shall only be carried out by a team (comprising a minimum of 2 members - the maximum number will depend on the nature of the work being undertaken). Every team member shall have been trained in both ***HV Rubber Glove Working*** techniques and all the Standard Job Tasks listed in Appendix 1.

8.2 All persons carrying out ***HV Rubber Glove Working*** shall be **Authorised** in accordance with PSMSP 5.1 to WL-1.531. Note that this authorisation level relates to issue 1 of this document.

9 JOB PLANNING

9.1 Before ***HV Rubber Glove Working*** commences the members of the team shall agree whether or not it is safe for work to be carried out using ***HV Rubber Glove Working*** Techniques, taking into account all relevant factors including weather, ground conditions, type of line construction, condition of the line, etc.

9.2 The On Site Job Plan is the means by which all jobs involving ***HV Rubber Glove Working*** shall be assessed, planned and defined. The On Site Job Plan is one of the essential safety elements of ***HV Rubber Glove Working*** and shall be conducted before every job, even for jobs that seem similar. Experience has shown that no two jobs are the same; site conditions, pole top construction, etc, may have slight differences and will affect the way that the work can be carried out. Planning is the responsibility of each member of the team and shall not be conducted by only one team member.

9.3 The On Site Job Plan comprises a group discussion at the workplace to:

- Identify the work to be done.
- Identify any hazards, which may be encountered.
- Agree how the work is to be accomplished. A team decision is taken regarding the sequence of work.
- Allocate individual responsibilities between team members.
- Agree which one of them will act as the ***Person in Charge***.

9.4 Before work commences, the team shall complete an ***On Site Job Planning Sheet***, which shall list:

- All points of agreement arising from the On Site Job Plan.
- All identified hazards and the methods to control or remove them.
- The sequence of work written down as a step-by-step job plan.

9.5 When compiled the ***On Site Job Planning Sheet*** defines the sequence in which the job shall be carried out without deviation.

9.6 An ***On Site Job*** Planning ***Sheet*** shall be completed for every job.

9.7 The reference number on the ***On Site Job Planning Sheet*** shall be cross-referenced to the associated Switching schedule via the **Control Person**.

9.8 If after work has commenced any change in the sequence of the work becomes necessary, the team shall be withdrawn and a further On Site Job Plan shall be held to agree and record changes to the sequence of work or safety precautions.

9.9 The step-by-step job plan may include one or more of the Standard Tasks (which constitute the majority of ***HV Rubber Glove Working*** Jobs carried out. Alternatively the job plan may be a combination of the Standard Tasks and/***or HV Rubber Glove Working*** Techniques to enable non-standard tasks or fault repairs to be completed.

9.10 Where a combination of Standard Tasks and/or ***HV Rubber Glove Working*** Techniques is to be undertaken, the pre-job risk assessment shall take account of possible hazards arising from:

- Interference between the selected Standard Job Tasks and/or ***HV Rubber Glove Working*** Techniques or
- The order in which the tasks/techniques are to be carried out.

9.11 In planning non-standard job tasks, the principles of ***HV Rubber Glove Working*** shall be adhered to at all times and the constituent parts of the job plan shall be consistent with training and the ***HV Rubber Glove Working*** Manual. Technical queries on specific issues should be raised with the Outage Free Co-ordinator, or Support & Development Advisor.

9.12 The effect of altering weights and tensions on the line being worked on shall be considered during the job planning stage, particularly when handling conductors using the elevating jib, as this will have a bearing on the vehicle stability.

10 ASSESSMENT

10.1 All work on or near **Live** exposed **HV** conductors that **Danger** may arise requires assessment before the commencement of work to ensure that **Danger** will be avoided during the course of work. This assessment will be carried out by the **Authorised Persons** who are to undertake the work.

10.2 In all cases, however, as part of this assessment, **Apparatus** shall be subjected to a routine inspection prior to the start of any work to ensure that **Danger** will not arise due to the condition of the **Apparatus**.

10.3 Should this inspection reveal any significant deficiency in the **Apparatus** which could give rise to **Danger**, no attempt shall be made to work on the **Apparatus** whilst it is **Live**, unless the **Danger** arising from the deficiency can be prevented by **Approved** means.

10.4 In addition to the application of shrouding, where earthed metalwork is in the ***Immediate Working Area***, the earth connection to such metalwork shall be removed, where reasonably practicable. Earth connections shall not be removed where system operational integrity could be compromised e.g. Transformer neutral earth.

11 PRECAUTIONS – GENERAL

11.1 The requirements of the ScottishPower Safety Rules (Electrical and Mechanical) 4th edition shall be complied with at all times.

11.2 In addition to fully complying with the requirements of SP 4.3 (i) and (ii), where reasonably practicable, the **Control Person** shall be given advance notice of the intention to carry out ***HV Rubber Glove Working*** of not less than 24 hours.

11.3 Before any ***HV Rubber Glove Working*** commences, the auto-reclose feature applied to that circuit at the point of work shall, where it is practicable to do so and with the consent of the **Control Person,** be rendered inoperative. The method of achieving this shall ensure one shot to lockout operation in the event of a fault at the point of work.

11.4 Where it is not practicable to render auto-reclose features inoperative, the **Control Person** shall be notified.

11.5 The ***Person in Charge*** shall remain on the ground at all times in the best visual position to observe and direct the work. During the course of the work, the ***Person in Charge*** will monitor the team and their position in relation to **Apparatus** around them, to ensure that no inadvertent contact is made with **Live** conductors or ***Second Points of Contact***. He will also ensure that the work is performed in accordance with the ***On Site Job Planning Sheet.*** If the ***Person in Charge*** leaves the work-site for any reason or has to perform any other function, all ***HV Rubber Glove Working*** shall stop, and the team withdrawn from the ***Immediate Working Area,*** until he resumes his role.

11.6 Personnel shall wear the appropriate personal protective equipment.

11.7 Before any ***HV Rubber Glove Working*** commences utilising an IAD, the Job Task Preparatory Actions listed in the ***HV Rubber Glove Working*** Manual shall be completed. These actions shall be noted on the ***On Site Job Planning Sheet.***

11.8 Only **Approved** tools and equipment as listed in the PSLWM shall be used for ***HV Rubber Glove Working***. The use of hydraulic powered and "Hot Stick" tools when working from an IAD bucket shall be restricted to those specifically **Approved** for this purpose.

11.9 An **Approved** safety harness shall be worn by every team member whilst they are in the IAD buckets. The safety harness shall be securely attached to the bucket anchorage point immediately on entry.

11.10 A bucket evacuation rig shall be stored at the point of work within reach of the bucket occupants. All personnel authorised for ***HV Rubber Glove Working*** shall be trained in bucket rescue techniques.

11.11 All personal metallic objects such as wristwatches, jewellery, medallions, rings, pens, pencils shall be removed prior to the commencement of work.

11.12 When work using ***HV Rubber Glove Working*** techniques cannot be completed, for example, if the hydraulic power fails, the ***HV Rubber Glove Working*** team shall be withdrawn. The work shall be made safe with the conductors secured, and the **Control Person** informed.

11.13 Shrouding shall not, under normal circumstances, be left on energised conductors or equipment beyond the working day. Should this be unavoidable, due to, for example, unfavourable weather, the shrouding shall be inspected and replaced where necessary, prior to the main work recommencing

11.14 ***HV Rubber Glove Working*** shall not be started or continued when:

- Weather conditions are unfavourable and are deemed to represent a hazard to a safe system of work. Such unfavourable weather may include lightning, excessive precipitation - rain, mist, fog, snow, or when wind is sufficiently strong (wind speeds in excess of 30 m.p.h.) to affect the stability of the IAD or the line being worked on.

- The level of natural light has fallen and is deemed to pose a hazard to a safe system of work. Artificial lighting shall not be used.

12 PRECAUTIONS – WORK ON CONDUCTORS

12.1 **Live** conductors shall not be moved without being secured by **Approved** means.

12.2 Work shall not be performed on steel conductors, pre-1998 aluminium alloys, or covered conductors under tension.

12.3 Where work is to be performed on cadmium copper, 16 sq. copper or other non standard conductor, a detailed visual inspection of the conductor shall take place before commencing work and consideration given to increased risk of failure while the work is being performed.

12.4 Conductors shall not be displaced until adequate precautions are taken to prevent the risk of infringing minimum clearances. Minimum clearances are:

- **Safety Distances** as stated in the Safety Rules
- Limits of Approach
- Minimum heights of conductors and clearances to **Apparatus** as specified in the Electricity Supply Regulations.

12.5 When moving conductors consideration shall be given to span, sag, weight and tension in the conductors. Consideration shall be given to any uplift or other conductor movement during work and the effect it will have.

12.6 Conductors shall not be supported by the IAD buckets.

12.7 Conductors shall not be raised more than twice the original sag in the shorter span.

12.8 An **Approved** insulated link stick shall be installed between an **Approved** hoist (pull-lift) and any other surface with a different potential.

12.9 No other work shall be carried out on an overhead line where ***HV Rubber Glove Working*** is in progress, or vice versa.

12.10 Making and/or breaking of all current carrying conductors or connections shall only be carried out using **Approved** "Hot Sticks" or an **Approved** "Make and Break" switch, to minimise the effects of arcing or flashing during initial contact. The **Approved** "Make and Break" switch shall be used in all situations where there is a risk of ferroresonance occurring.

13 PRECAUTIONS - APPLICATION OF SHROUDING

13.1 Shrouding shall only be applied whilst working from an **Approved** Insulated Pole Platform or IAD and whilst wearing Rubber Gloves, Glove Protectors and Sleeves.

13.2 Before Shrouding is applied, the work area shall be checked for any sharp edges, which may damage the shrouding. When safe to do so these shall be removed prior to the application of the shrouding.

13.3 Shrouding shall be applied in such a manner that all ***Second Points of Contact*** in the ***Immediate Working Area*** are covered.

13.4 Whilst working on, or moving, an energised conductor, it shall be ensured that there is no inadvertent contact between other phases, crossarms, poles or structures.

13.5 It shall be ensured that the conductor is fully enclosed within the line hose and that the line hoses are fully interlocked. When insulator hoods are being used they shall also be interlocked with the line hoses.

13.6 Deliberate physical contact with shrouding on energised lines and **Apparatus** shall not be made by any part of the body other than that protected by **Approved** rubber gloves and sleeves.

13.7 Shrouding shall, where reasonably practicable, be removed in the reverse order of application.

14 APPENDICES

Appendix 1 – Standard Job Tasks
Appendix 2 – On Site Job Planning Sheet

APPENDIX 1

STANDARD JOB TASKS

1. PIN INSULATOR CHANGE
2. CROSSARM CHANGE – INTERMEDIATE POLE
3. INTERMEDIATE POLE CHANGE – THREE PHASE
4. INTERMEDIATE POLE CHANGE – SINGLE PHASE
5. CONNECTION OF MIDSPAN INTERMEDIATE POLE
6. STRAIN INSULATOR CHANGE
7. FITTING / REMOVING INSULATOR INSERT
8. CONDUCTOR REPAIR
9. CONNECTION / DISCONNECTION OF POLE MOUNTED APPARATUS
10. MAINTENANCE / LUBRICATION OF AIR BREAK SWITCH DISCONNECTOR
11. TREE CUTTING / LIMBING
12. RENEWING / INSTALLING STAY
13. ERECTION OF STEELWORK ON AN EXISTING POLE
14. INSTALLING BIRD FLIGHT DIVERTORS
15. TWO MAN TEAM JUMPER CUT / REMAKE
16. LOAD BREAK / LOAD MAKE

Standard Job Tasks are developed at the Overhead Line Training Facility approved by the Outage Free User Group and detailed in the ***HV Rubber Glove Working*** Manual.

APPENDIX 2 - ON SITE JOB PLANNING SHEET Ref No……

Job Location .....Date .....

Line .....Pole .....

Job Description..... .....

....

HV Rubber Glove Working techniques available Y/N ☐

Associated non HV Rubber Glove Working Y/N ☐

If yes, have appropriate actions been taken

HAZARD CHECKLIST

NETWORK CONDITIONS

		Y/N		Y/N		Y/N
Poles:	Decayed	☐	Leaning	☐	Temp Support Needed	☐
Steelwork:	Rusted	☐	Non Standard	☐	Loose	☐
Conductors:	Damaged	☐	Out of Regulation	☐	Insecure Binds/Terminations	☐
Ferroresonance:	Cable connected transformers with surge arresters present					☐

SITE CONDITIONS

	Y/N		Y/N		Y/N
Poor Access	☐	Unstable/Uneven Ground	☐	Livestock Present	☐
Other People Present	☐	Other Apparatus Nearby	☐	Other Obstacles Nearby	☐
Weather Unfavourable or Visibility Inadequate			☐	Traffic Present	☐

If yes to any of these hazards control measures taken to eliminate or reduce them shall be stated overleaf

PRE-JOB ACTIONS

Tick ☐ *when completed*

Notify Control Person before work starts	☐	Set auto-reclosers to one trip to lockout	☐
Test operation of holding valves	☐	Test operation of lower and upper boom controls	☐
Inspect all RG Equipment	☐	Inspect IAD and wipe clean	☐
Position vehicle and earth it	☐	Test steelwork for leakage	☐
Check boom/jib can lift total weight	☐		

WITH REFERENCE TO CHECKLIST OVERLEAF HAZARDS IDENTIFIED

HAZARDS	CONTROL MEASURES

JOB PLAN
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
If it is necessary to deviate from the plan, stop work and rewrite the plan to incorporate any changes

We, the undersigned, agree it is safe to carry out the work described above.

		Name (Print)	Signature
Person in charge is:		.....	.....
Other Team Member(s)	(1)	.....	.....
	(2)	.....	.....
	(3)	.....	.....