









PPE for Electrical Work

Document no	D2013/80874																						
Work description	<p>Scope</p> <p>This SWI applies to all employees and contractors of Sydney Trains, Transport for NSW and Authorised Engineering Organisations:</p> <ol style="list-style-type: none"> 1. Entering any electricity substations. 2. Hold electrical certifications in accordance with PR D 78701 Personal Certifications – Electrical authorising them to: <ul style="list-style-type: none"> – Undertake operational work on the high-voltage, 1500V DC or LV network – Apply working earths or safety earths – Work on live low-voltage electrical installations – Work on low-voltage, 1500V DC or high voltage cables, or – Testing high-voltage equipment/cables and aerial conductors. <p>This SWI does not apply to persons performing non-electrical work outside a substation.</p>																						
References	<p>Electrical Safety Definitions page available on the RailSafe site</p> <p>RL D 79801 One Method of Safe Working</p> <p>SMS-06-GD-3323 Personal Protective Equipment</p> <p>Compliance:</p> <table> <tr> <td>AS 2225:1994</td> <td>Insulating gloves for electrical purposes</td> </tr> <tr> <td>AS/NZS 1336:2014</td> <td>Eye and face protection - Guidelines</td> </tr> <tr> <td>AS/NZS 1337.1:2010</td> <td>Personal eye protection – Eye and face protectors for occupational applications</td> </tr> <tr> <td>AS/NZS 1801:1997</td> <td>Occupational protective helmets</td> </tr> <tr> <td>AS/NZS 2210.1:2010</td> <td>Safety, protective and occupational footwear – Part 1 Guide to selection, care and use</td> </tr> <tr> <td>AS/NZS 2210.3:2009</td> <td>Occupational protective footwear – Part 3: Specification for safety footwear (ISO 20345:2004, MOD)</td> </tr> <tr> <td>AS/NZS 4602.1:2011</td> <td>High-visibility safety garments – Part 1: Garments for high-risk applications</td> </tr> <tr> <td>ASTM F1891-12</td> <td>Standard Specification for Arc and Flame Resistant Rainwear</td> </tr> <tr> <td>ENA NENS 09 – 2014</td> <td>National Guideline for the Selection, Use and Maintenance of Personal Protective Equipment for Electrical Arc Hazards</td> </tr> <tr> <td>IEC 61482-1-1:2009-05</td> <td>Live working – Protective clothing against the thermal hazards of an electric arc – Part 1-1: Test methods – Method 1: Determination of the arc rating (ATPV or EBT50) of flame resistant materials for clothing</td> </tr> <tr> <td>ISO 14116:2015</td> <td>Protective clothing – Protection against flame – Limited flame spread materials, material assemblies and clothing</td> </tr> </table> <p>NFPA 70E National Fire Protection Standards</p>	AS 2225:1994	Insulating gloves for electrical purposes	AS/NZS 1336:2014	Eye and face protection - Guidelines	AS/NZS 1337.1:2010	Personal eye protection – Eye and face protectors for occupational applications	AS/NZS 1801:1997	Occupational protective helmets	AS/NZS 2210.1:2010	Safety, protective and occupational footwear – Part 1 Guide to selection, care and use	AS/NZS 2210.3:2009	Occupational protective footwear – Part 3: Specification for safety footwear (ISO 20345:2004, MOD)	AS/NZS 4602.1:2011	High-visibility safety garments – Part 1: Garments for high-risk applications	ASTM F1891-12	Standard Specification for Arc and Flame Resistant Rainwear	ENA NENS 09 – 2014	National Guideline for the Selection, Use and Maintenance of Personal Protective Equipment for Electrical Arc Hazards	IEC 61482-1-1:2009-05	Live working – Protective clothing against the thermal hazards of an electric arc – Part 1-1: Test methods – Method 1: Determination of the arc rating (ATPV or EBT50) of flame resistant materials for clothing	ISO 14116:2015	Protective clothing – Protection against flame – Limited flame spread materials, material assemblies and clothing
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Minimum PPE for Electrical Work	The minimum PPE to be worn for electrical work consists of arc-rated base garments (next page) and safety footwear with toe protection and ankle support compliant to AS/NZS 2210.3 and maintained to AS/NZS 2210.1.																						
NOTE	Only wear clothing that is in good condition without holes or tears that may allow an arc to enter the gap																						
Assess the risk	<p>Prior to work proceeding under this SWI the Line Manager shall review and consider the requirements have been risk assessed. The risk assessment may lead to additional PPE requirements.</p> <p>Note there may be further analysis of equipment in future that will require a risk assessment to consider information in the development of a risk assessment.</p>																						
Work in the rail corridor	The base garments should be suitable for work in the rail corridor in accordance with SMS-06-GD-3323 Personal Protective Equipment and RL D 79801 section 3.2.																						

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<p>Base Garments</p>  <p>Arc Flash Shirt</p>  <p>Arc Flash Trousers</p>	<p>Base garments consist of either a long-sleeved shirt with placket and gusset; and long trousers, or one-piece coveralls (overalls). They must:</p> <ol style="list-style-type: none"> Be labelled stating the fabric or garment is arc-rated not less than 6 cal/cm² Be labelled stating the fabric or garment has been tested (in accordance with either IEC61482-1-1, ASTM F1959) or complies with ISO 14116 Be worn so that the body is covered from neck to wrist to ankle. Shirt, coat or jacket, and/or overalls must be fastened at both the wrist and neck area Have non-metallic fasteners or have fasteners protected by a layer of the same material as that of the garment on both the top and undersides Have colours and reflective hi-visibility tapes in accordance with SMS-06-GD-3323 Personal Protective Equipment, and Not be modified or altered subsequent to their original manufacture. In instances where altering is required e.g. shortening of pants contact railelectricalsafety@transport.nsw.gov.au
<p>NOTE</p>	<p>Short sleeves or short trousers/pants are not permitted.</p>
<p>Outer garments</p>	<p>Outer garments (thermal or otherwise) must, as a minimum, be either made of wool, or be Flame Resistant to ISO 14116.</p>
<p>Undergarments</p>	<p>Undergarments should contain no more 10% flammable synthetic materials.</p>
<p>Safety boots</p>	<p>Safety boots must have ankle support. NOTE: Elastic sides are not permitted.</p>
<p>Cold weather and/or rain</p>  <p>Arc Flash wet weather coat</p>  <p>Arc Flash wet weather trousers</p>	<p>Thermal underwear may be worn under the base garments. Thermal underwear should have not less than 90% natural fibres.</p> <p>A 100% woollen cap or beanie can be worn.</p> <p>Thermal outer garments (pullovers, jumpers) and/or rainwear may be worn over the base garments. Thermal outer garments shall have an outer layer that is flame retardant in accordance with ISO 14116 and have no flammable melting layers or components (e.g. no synthetic fabrics or plastic components). 100% woollen knitwear is recommended. These outer garments must not be relied on for protection against arcs, base garments must still be worn</p> <p>Rainwear must be arc and flame resistant in accordance with ASTM F 1891 or ISO 14116, and be labelled stating compliance with that standard, and have no flammable melting layers, fasteners or components.</p> <p>Orange arc-rated wet weather coats and trousers may be worn. The orange jacket must be suitable for electrical work, i.e. flame resistant in accordance with ASTM F 1891 or ISO 14116, labelled stating compliance with that standard, and have no flammable melting layers, fasteners or components.</p>

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<p>Additional PPE</p>  <p>Balaclava</p>  <p>Face shield with arc-rated hood and chin flap</p>	<p>Where indicated by the risk assessment, Additional PPE that may be worn over or in combination with the base garments. These items include:</p> <ul style="list-style-type: none"> Flame-resistant balaclava, constructed from two layers of Nomex rated to not less than 10 cal/cm² and complying with NFPA 70E Hazard/Risk Category 2; Face shield (with chin flap covering the chin, or a balaclava), Insulated gloves compliant to AS 2225 to be worn on both hands when undertaking live LV work, or when the hazard assessment shows a need. Riggers gloves should be worn at all times as outer gloves to ensure the insulation is not compromised; and where cutting and tearing hazards exist. Arc rated gloves must be worn while performing HV, 1500VDC operational work. Hearing protection (earplugs), <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Insulated glove and outer riggers gloves</p> </div> <div style="text-align: center;">  <p>Arc –rated gloves</p> </div> </div>
<p>Hazardous equipment</p>	<p>All personnel undertaking tasks in the following locations shall wear arc-rated electrical PPE providing protection not less than 6 cal/cm² – including face shield, neck guard (or, balaclava) and gloves:</p> <ul style="list-style-type: none"> When within 1m of rear of indoor HV switchgear that vents to the rear, including (but not limited to): <ul style="list-style-type: none"> live 33kV AREVA/Schneider WSA switchgear live 33kV Nuova Magrini Galileo switchgear live 33kV Alstom NormafLOUR DNF7 live 33kV Merlin Gerin FLUARC FG4 live 11kV Merlin Gerin type DIS 10T2 live 11kV South Wales D4X4 Operating or working within 1m of: <ul style="list-style-type: none"> live Nebb, Andelec and Holec Switchgear When proving dead Rectifier 1500V diode units, or Testing or working on live low voltage distribution boards.
<p>Maintenance & Replacement</p>	<p>PPE should be kept clean by washing or cleaning according to the manufacturer's instructions.</p> <p>Garments should be disposed of and replaced when they have deteriorated, damaged or have a limited life as indicated by the label or swing tags.</p> <p>The nominal life of the base garments is 50 machine washes, after which they should be disposed of and replaced.</p>
<p>Storage</p>	<p>Avoid storing PPE in proximity to chemicals known to fade or damage fabrics, such as bleach or chlorine. For longer life of reflective materials, store at room temperature.</p>
<p>Inspection</p>	<p>Inspect before use for excessive dirt, rips, fractures, tears, missing fasteners, or fading.</p>
<p>Additional controls</p>	<p>As per risk assessment</p>