

COMMISSIONING TESTS FOR NEW HV CABLES (UP TO 33 KV)

JOB SAFETY ANALYSIS



Title: Carry Out Field Testing	
Purpose and Scope: To identify the hazards and control measures associated with testing and commissioning new HV cables	
Staffing Resources: EFM or Cable Joiner experienced in the use of test equipment. Competent assistant. Both staff are required to be trained in switchboard rescue and resuscitation and manual handling techniques. Both staff are to have appropriate Switching & Access authorisations for the roles they are required to perform and have the ability to assess and maintain relevant exclusion zones from exposed live electrical apparatus.	
Documentation/References: Test equipment manufacturers manual. P53 HVIA procedures. AS1026, AS1429, AS1660, SWP Carry Out Field Testing SP0506	
Key Tools and Equipment: Test equipment within calibration date, tested and tagged. PPE – Long cotton pants/shirt, safety shoes, safety helmet. Additional PPE as determined by daily risk assessment – safety glasses, hearing protection, class 00 gloves, high visibility vest, leather gloves.	
Development Team: Dean Maltby, Col Steel, Robert Bates	Date Completed: 12 June 2003
Reviewed By: Carmelo Pasquale	Date Completed: 10 September 2009, 6 November 2012
Related SWP No.: SP0407	SWP Owner Approval: Group Manager Energy Network Services
Key Stakeholders: GMSD's, GMENS and GMTAPS	

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Task No.	Task Step	Hazard	Most Likely Breakdown Event (Loss Of Control)	Most Likely Outcome (Incident Outcome)	Risk Score	
					Existing Controls	Additional/ Alternate Controls
5.1	On Site Risk Assessment	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.2	Preliminary Steps and Safety Management	As identified in "Carry Out Field Testing JSA SP0506R01" in particular pedestrian and traffic control (which is also applicable for all items up to 5.13)	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.3	General	As identified in "Carry Out Field Testing JSA SP0506R01",	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.4	Check and Record Cable Identification	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.5	Verify Sheath Integrity	As identified in "Carry Out Field Testing JSA SP0506R01" ABB Safelink Malfunction	As identified in "Carry Out Field Testing JSA SP0506R01" Switch may move from Earth On to On in 1 movement.	As identified in "Carry Out Field Testing JSA SP0506R01" Feeder Trip if cable still earthed at other end or if test may cause injury to persons.	L M	 L
5.6	Core Insulation Test	As identified in "Carry Out Field Testing JSA SP0506R01", in particular stored charge in the cable under test, manual handling hazards, and electrical hazard associated with high voltage testing and correct earthing of cable and test equipment.	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.7	Verify Phasing and Cable Continuity and Prepare Cable For Testing	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.8	Carry Out High Voltage Withstand Test and Record Leakage Currents	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.9	Post High Voltage Withstand Test Core Insulation Test	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.10	Insulation condition diagnostic assessment	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	

Check this is the latest Process Zone version before use.

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					Existing Controls	Additional/Alternate Controls
5.11	Final checks	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.12	Finalise Results	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	As identified in "Carry Out Field Testing JSA SP0506R01"	L	
5.13	Energise HV Cable	Possible failure of cable or cable terminations Defective switching device Ferroresonance	Cable fails Termination fails Switching device fails	Flash burns Flying bits of failed switching device Loss of supply	L	

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Existing Control Measures

Task No.	Elimination	Substitution	Engineering	Administration	Personal Protective Equipment	Risk Ranking			
						C = Consequences	E = Exposure	P = Probability	Risk Score
5.1 to 5.12	Refer to "Carry Out Field Testing JSA SP0506R01" for details on control measures and risk ranking. The tasks carried out in testing HV cables are a subset of tasks identified in this JSA								
5.5									
5.13				Ensure insulation resistance test was carried out and within tolerances Inspect cable terminations to ensure they are not damaged Ensure terminations are not porcelain or oil filled Inspect switching device (e.g. ABS/ HV links) is operational Ferroresonance awareness included in HV Operator Training	All appropriate PPE worn.	2	4	4	L

Additional/Alternative Control Measures

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Task No.	Elimination	Substitution	Engineering	Administration	Personal Protective Equipment	Risk Ranking			
						C = Consequences	E = Exposure	P = Probability	Risk Score
5.5				<p>Caution: Where the cables to be tested are not disconnected from the ABB Safelink RMU the following actions must be taken to minimise the risk of injury or damage:</p> <ol style="list-style-type: none"> 1. The Earth Switch on any energised ABB Safelink RMU must not be switched from the EARTH to OFF position when the connected HV Electrical Apparatus are under access (i.e. the Busbar of the RMU must be de-energised using double isolation before the Earth Switch can be operated). 2. After operating the Earth Switch the switching operator must visually confirm that the correct switch state is displayed by the indicator. If the indicator is incorrect or in an indeterminate state personnel must stay well clear of the RMU and associated cable(s) and contact the Switching Co-ordinator for further instructions. 		2	4	4	L

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1: DETERMINE CONSEQUENCE: - The most likely outcome of a potential incident resulting from exposure to the identified hazard.

Level	Descriptor	Definition
5	Disaster	Fatality; toxic release off-site with detrimental effect; financial loss (>\$1,000,000).
4	Very Serious	Extensive injuries (e.g. permanent disability, amputation) requiring medical treatment, hospitalisation and long term rehabilitation; off-site release with no detrimental effects loss of production capability; financial loss (\$500,000 to \$1,000,000).
3	Serious	Disabling injuries requiring medical treatment and rehabilitation (e.g. broken limbs, hospitalisation); on-site release contained with outside assistance; financial loss (\$50,000 to \$500,000).
2	Substantial	Medical treatment required (e.g. stitches, removal of foreign body); on-site release immediately contained; financial loss (\$5,000 to \$50,000).
1	Minor	First aid treatment; negligible environmental damage; financial loss (<\$5,000).

2: DETERMINE EXPOSURE: - How often a person interacts with a hazard.

Level	Descriptor	Definition
1	Continuous	Many times a day.
2	Frequent	Daily.
3	Occasional	Weekly.
4	Infrequent	Between weekly and monthly.
5	Rare	Between monthly and yearly.
6	Very Rare	Less than once a year.

3: DETERMINE PROBABILITY

The likelihood of the breakdown event and nominated consequences occurring once the person is exposed to the hazard.

Level	Descriptor	Definition
1	Almost Certain	Breakdown event will almost certainly occur from exposure to hazard.
2	Quite Possible	Not unusual for breakdown event occurring, even 50/50 chance.
3	Unusual but Possible	Unusual for breakdown event to occur but possible.
4	Remotely Possible	Remote possibility of breakdown event occurring but history of occurrence exists within industry.
5	Conceivable but Unlikely	No known history of breakdown event occurring after years of exposure but is conceivably possible.
6	Practically Impossible	Practically impossible for breakdown event to occur. Has never occurred before and is not likely to occur.

4: RISK ASSESSMENT MATRIX

Consequences (How Bad?)	Probability x Exposure				
	1 to 2	3 to 5	6 to 10	11 to 23	24 to 36
	Likelihood (How often?)				
	Almost certain will occur	Quite possible could occur	Possible	Unlikely but possible	Extremely unlikely
5. Disaster	Extreme	Extreme	Extreme	High	Moderate
4. Very Serious	Extreme	Extreme	High	Moderate	Low
3. Serious	Extreme	High	High	Moderate	Low
2. Substantial	High	Moderate	Moderate	Low	Low
1. Minor	High	Moderate	Low	Low	Low

5: RISK TREATMENT STRATEGY

Risk Score	Required Actions
Low	Implement control measures and verify compliance by routine monitoring.
Moderate	Action required within agreed timeframe to minimise risk to "As Low As Reasonably Practicable" (ALARP). Further action may be required and management responsibility specified to take this action. The ALARP principle implies that controls have been determined such that the level of risk-reducing action is in proportion to the benefit obtained.
High	Action as soon as possible to minimise risk to acceptable level. Requires attention by senior management and measures should be put in place to reduce the probability, exposure and/or consequence of the outcome occurring to ALARP.
Extreme	Same treatment as for high risks however immediate action required to minimise risk to acceptable level.

(Adapted from AS/NZS 4360:1999 Risk Management and NSCA Risk Score Calculator, 2001)