

JOB SAFETY ANALYSIS TRANSFORMER PRIMARY INJECTION TESTING



Title: Transformer Primary Injection Testing	
Purpose and Scope: Provide guidelines for carrying out primary injection testing of a power transformer.	
Staffing Resources: Testing Officer in Charge and Competent Assistant.	
Documentation/References: AS 1675 – 1986 – Current Transformers – Measurement and Protection. AS 60044.1 – 2003 – Instrument Transformers – Part 1 Current Transformers AS 2374.1 – 1997 – Power Transformers - General Secondary Systems Isolation sheets and work schedules, Access and Test Permits, Switching sheets	
Key Tools and Equipment: PPE – Long sleeve shirt and long trousers, safety footwear and protective eyewear, safety helmet Approved and calibrated test equipment: Multimeter, tong Step Ladder, extension leads, barriers, HV testing signage. Generator, high current leads, isolation switch, capacitors	
Development Team: Robert Bates	Date Completed: 14 January 2005
Reviewed By: Matthew Ogg	Date Completed: January 2005
Related SWP No.: SP0511	SWP Owner Approval: Neil Dwyer
Key Stakeholders: Neil Dwyer, John Cass	

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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	Preliminary Steps	As described in JSA SP0506R01 Carry Out Field Testing, in particular tasks "Travel to worksite", Entry to worksite", Toolbox meeting"	As described in JSA SP0506R01	As described in JSA SP0506R01	Low	Low
5.2, 5.3	Isolate Protection, Isolate/Short CT secondaries not required for test	As described in JSA SP0506R01 Carry Out Field Testing, in particular tasks "Unload vehicle and set up test equipment", "Carry out test"	As described in JSA SP0506R01	As described in JSA SP0506R01	Low	N/A
5.4, 5.5	Connect primary injection source and apply short circuit, carry out primary injection	As described in JSA SP0506R01 Carry Out Field Testing, in particular tasks "Unload vehicle and set up test equipment", "Carry out test",	As described in JSA SP0506R01	As described in JSA SP0506R01	Moderate	Low
5.6	Return plant to normal	As described in JSA SP0506R01 Carry Out Field Testing, in particular tasks "Strip down test equipment, return plant to service, load vehicle"	As described in JSA SP0506R01	As described in JSA SP0506R01	Low	Low

Existing Control Measures

Task No.	Elimination	Substitution	Engineering	Administration	Personal Protective Equipment	Risk Ranking			
						C = Consequences E = Exposure P = Probability			
						C	E	P	Risk Score
5.1	Control measures are in place as described in the JSA "Carry Out Field Testing" SP0506R01 and it's related SWP SP0506 as well as the SWP "Transformer Primary Injection Testing" SP0511				PPE – Long sleeve shirt and long trousers, safety footwear and protective eyewear.	1	4	5	Low
5.2, 5.3	Control measures are in place as described in the JSA "Carry Out Field Testing" SP0506R01 and it's related SWP SP0506 as well as the SWP "Transformer Primary Injection Testing" SP0511				PPE – Long sleeve shirt and long trousers, safety footwear and protective eyewear.	1	4	5	Low

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Task No.	Elimination	Substitution	Engineering	Administration	Personal Protective Equipment	Risk Ranking			
						C = Consequences E = Exposure P = Probability			
						C	E	P	Risk Score
5.4, 5.5	Control measures are in place as described in the JSA "Carry Out Field Testing" SP0506R01 and it's related SWP SP0506 as well as the SWP "Transformer Primary Injection Testing" SP0511				PPE – Long sleeve shirt and long trousers, safety footwear and protective eyewear.	3	4	5	Moderate

Additional/Alternative Control Measures

Task No.	Elimination	Substitution	Engineering	Administration	Personal Protective Equipment	Risk Ranking			
						C = Consequences E = Exposure P = Probability			
						C	E	P	Risk Score

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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)