ATTACHMENT 3

Factory Acceptance Testing Report on Square-D PZ4 Rx Trip Switchgear, FAT-Report-06910327-1, dated August 2009

FACTORY ACCEPTANCE TESTING REPORT ON SQUARE-D PZ4 RX TRIP SWITCHGEAR

FAT-REPORT-06910327-1 Revision 0 August 2009

APPROVAL FOR FACTORY ACCEPTANCE TESTING REPORT ON SQUARE-D PZ4 RX TRIP SWITCHGEAR

This test report has been prepared in accordance with the NLI Quality Assurance Program.

Prepared by:	_date_8/3/09
Verified by:	date 8/4/09
Approved by:	date 8/7/09

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REVISION HISTORY

Revision	Description	<u>Date</u>
0	Original Issue	8/7/09

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1.0 SUMMARY OF RESULTS

This report addresses the factory acceptance testing performed by NLI on the Rx Trip Switchgear to be installed at the Exelon – Three Mile Island Nuclear Plant. Testing and acceptance criteria were in accordance with TMI approved NLI Verification Plan VP-PZ4, Rev. 6 and TMI purchase order 00428587, dated 11/29/07 [7.2].

The purpose of the testing was to verify proper operation of the switchgear. The switchgear met all acceptance criteria as outlined in the TMI approved test plan and functioned properly during the testing except as noted in the discrepancy reports contained in Appendix B and discussed in section 4.1 of this report.

There were four discrepancy reports recorded during the testing. A brief description of the four discrepancy reports is as follows:

- 1) The instrument sections of the switchgear did not have the same amount of indicating lights as listed on the test plan.
- 2) The test plan incorrectly listed the wrong light should extinguish during specific steps of the testing.
- 3) The test plan stated to remove fuses from the switchgear during testing, however the fuses were not removed.
- 4) The test plan stated to remove the 90VAC applied to the UV circuit (MN coil and 27 relay) to trip the breakers. The 90VAC was not removed during testing.

These discrepancies are discussed in detail in Section 4.1 of this report and documented in discrepancy reports DR-210005-04 through -07 contained in Appendix C.

All fuses are considered Class 1E. The fuses installed in the switchgear were dedicated by NLI prior to installation. The installed fuses passed all testing as outlined in the NLI test plans prepared in accordance with the NLI QA program. The fuse test data is contained in Appendix B. All fuse testing was performed at the NLI facility in Fort Worth, TX.

The switchgear factory acceptance test data is contained in Appendix A. All switchgear testing was performed at the Square-D facility in West Chester, OH.

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2.0 EQUIPMENT IDENTIFICATION

2.1 RX Control Rod Drive Breaker Cabinet and Breakers

The supplied unit is as a Square-D PZ-4 series low-voltage switchgear. The unit consists of two (2) 20" wide vertical sections with two (2) circuit breakers (the breakers are Square-D Masterpact NT, 800A frame, p/n: NT08NA) installed in each vertical section, associated instrumentation devices and doors are as identified in NLI design drawing 06910327-LD-1, (latest revision) and below.

The switchgear and circuit breaker ratings are as follows:

- Nominal operating voltage: 480Vac.
- Rated current: 800A
- Interrupt Rating: 42,000A @ 508Vac
- Nominal control voltage: 125VDC
- UV voltage range: 42 84Vac
- Shunt trip voltage range: 70 140Vdc
- Trip Unit: None
- Nominal Control voltage (charging and closing): 120VAC

2.2 Function

The safety function of the switchgear is to provide power to safety related loads and interrupt power on a trip signal.

3.0 EVALUATION OF RESULTS

3.1 Discrepancy Reports

There were four discrepancy reports documented during the factory acceptance testing. A detailed discussion of the discrepancy reports are as follows:

<u>DR-06910327-04</u> – The breaker instrument sections of the switchgear did not have the same amount of indicating lights as listed on the test plan. The VP incorrectly states that the breaker instrument sections have 6 white lights. The instrument sections for each breaker have 5 white lights. The sixth white light is a global 'trip confirm status' light for Train A or Train B for the switchgear and is located on the instrument door for each vertical section, not each breaker.

The switchgear configuration is correct with 5 indicating lights per breaker instrument section and is acceptable.

<u>DR-06910327-05</u> – The test plan incorrectly listed the wrong light should extinguish during specific steps of the testing. The VP incorrectly states which light will extinguish. The proper operation is for the 'Shunt Trip Signal Present' light to extinguish. The VP test data sheets list the correct light. The switchgear operated properly and the correct expected light sequence was achieved and is acceptable.

<u>DR-06910327-06</u> – The test plan stated to remove fuses from the switchgear during testing, however the fuses were not removed. The VP incorrectly states to remove the fuses. The fuses must remain so that the UV coil has power applied to allow the circuit breakers to close for this testing. The test procedure was modified as documented in DR-06910327-07.

The use of the fuses for testing is acceptable and the gear operated as expected according to the procedure as documented in DR-06910327-07.

<u>DR-06910327-07</u> – The test plan stated to remove the 90VAC applied to the UV circuit (MN coil and 27 relay) to trip the breakers. The 90VAC was not removed during testing. The VP states to remove the power applied to the UV circuit of the breaker (both the MN coil in the breaker and the external undervoltage relay). The purpose of this particular test is to perform breaker main pole opening timing after loss of AC power using the external (27) relay actuating the shunt trip coil of the breaker. In order to perform this test correctly, the AC power must remain applied to the breaker installed MN (UV) coil to ensure that the 27 relay/shunt trip combination trips the breaker and does not race the breaker installed MN UV coil to trip the breaker.

It was determined that the power would be applied to the MN coil installed in the breaker and the breaker test switch would be moved to the 'Shunt Trip' position. The movement of the test switch to the shunt trip position allows the AC voltage to remain applied to the MN coil in the breaker, but removes the AC voltage sensed by the external 27 UV relay. The 27 relay then actuates and closes a contact in series with the shunt trip coil thus tripping the breaker and

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producing the correct circuit progression to measure a valid opening time of the breaker due to loss of voltage on the 27 relay and shunt tripping.

TMI engineering representatives on-site during the FAT testing concurred with the test setup. The change in procedure is acceptable and produced acceptable test results.

3.2 **Modifications**

There were no modifications made to the production units as a result of FAT testing.

3.3 **FAT Open Items**

There were no open items at the completion of the FAT testing.

3.4 **Results and Conclusions**

Based on successful completion of the FAT per the TMI approved NLI Verification Plan, VP-PZ4, Rev. 6, and acceptable resolutions to the discrepancy reports discussed in section 4.1, the switchgear is acceptable for use at the Three Mile Island Nuclear Plant.

4.0 **QUALITY ASSURANCE**

Project activities were performed in accordance with the NLI Quality Assurance Program which meets the requirements of 10CFR50 Appendix B, 10CFR21 and ASME NQA-1 [7.1].

5.0 MEASUREMENT & TEST EQUIPMENT

Measurement & Test Equipment which were used is controlled by the NLI M&TE program (procedure NLI-QUAL-05, latest revision). The test data sheets identify the M&TE that was used. All M&TE used during testing is traceable to NIST standards.

6.0 **DOCUMENTATION**

This FAT report is prepared to summarize the testing and present the results of the testing. Test data sheets and any other relevant data is included in this report.

7.0 REFERENCES

- 7.1 NLI Quality Assurance Manual, Rev. 8, 12/14/07 including applicable Supplements.
- 7.2 TMI purchase order 00428587.
- 7.3 TMI Technical Specification SP-1101-11-250, Rev. 0.

Appendix A

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Switchgear Factory Acceptance Test Data

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Acceptance			
		Criteria	Ref	Method	
Dimensions & Configuration CC#1	100%	Note: All dimensions are nominal unless noted Sections will line-up and bolt together with other sections of switchgear based on measured dimensions. Height = 93.20" (floor to top of wireway trough) Width = 20.0" (per section) Depth = 63.23" (back to front of wireway trough) Switchgear has 2 vertical sections, 4 cubicles high. Each vertical section has 2 cubicles for breakers and 2 cubicles for instrumentation. Instrument sections have the following: a) Breaker test switch with a key lock b) UV relay c) 6 white indicating lights d) Auxiliary relays Layout of components/conduit entrance location and size are in accordance with NLI design drawings.	1,3	Measure dimensions to all mating mount holes on the switchgear sections including ground bus. Measure and record the switchgear dimensions. (see latest revision of switchgear layout drawing for measurement location). Visual Inspection. Visual Inspection Visual Inspection that devices are as follows: a) Electroswitch Series 20K. b) ABB cat# 411R0175 c) Square-D type ZB5AVBG1 d) Square-D type XUD080V63, Square-D type XO1200V02 and XO80V02. Visual Inspection	
		Channel A breaker door is painted Red	l	Visual Inspection	

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Dimensions & Configuration		Channel B breaker door is painted Green		Visual Inspection
CC#1 (con't.)		Channel C breaker door is painted Yellow		Visual Inspection
		Channel D breaker door is painted Blue		Visual Inspection
		Control wiring is Rockbestos, SIS, 90°C wire.		Visual Inspection
		Each vertical section has a 15kVA CPT.		Visual Inspection that CPT is Square-D Cat#15S40F.
	ļ	Verify insulated ring tongue lugs are used on control wiring to terminal blocks.		Visual Inspection
		Ground bus is tin or silver plated.	į	Visual Inspection
		Circuit breakers have operation counter installed.		Visual Inspection
		Circuit breakers have contact indicators.		Visual Inspection
		A means of locking the circuit breakers in place while in the CONNECTED or DISCONNECTED positions is installed on the switchgear.		Visual Inspection
		All indicating lights are LED type.		Visual Inspection

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Dimensions & Configuration CC#1 (con't.)		Safety-related wiring has a minimum of 6"separation from the other safety-related channels.		Visual Inspection
		Safety-related wiring is fed in thermosleve and is color coded to distinguish it from Non-safety related wiring.		Visual Inspection
Wiring Check CC#2	100%	Switchgear sections are wired per the latest approved design drawings.	1	NLI QC to perform point-to-point wiring check on switchgear using the latest revisions of the design drawings.
·		Yellow line drawings for inclusion in test data package.		
Circuit breaker Fit-up CC#3	100%	Breaker fits into breaker compartment without any binding.	1,3	Insert each circuit breaker into their respective breaker compartment.
i		Compartment door closes without excessive gap.		Close compartment door and check door fit.
		Door mounted components do not interfere with removal of the breaker from the switchgear cell.		Remove breakers from switchgear. Verify that door mounted components do not interfere with removal of the breaker.
Proper Operation of Close Circuit	100%		1,3	Place all breaker test switches in 'NORMAL'.
CC#4a		The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C.		Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Close circuit CC#4a (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Power' light extinguishes for Channel A & C. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D.		Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 (channel A & C) in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Power' light extinguishes for Channel B & D.		Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2 (channel B & D).
				Reset the 27A, B, C & D relays. Apply a jumper across points TB5-6 & TB5-7.
				Apply 90VAC across points TB5-1 & TB5-2.
	·	Breakers A, B, C, & D charge.		Apply 90VAC control power to points TB40-1 & TB40-4 in section 1 for Channel A & C and TB41-1 and TB41-4 for Channel B & D.
!	!	Channel A breaker closes when jumper is applied.		Apply a jumper across points TBA3-3 & TBA3-4.

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Sample Size	Acceptance 1		
	Criteria	Ref	Method
	Channel C breaker closes when jumper is applied.		Apply a jumper across points TBC3-3 & TBC3-4.
	Channel B breaker closes when jumper is applied.		Apply a jumper across points TBB3-3 & TBB3-4.
	Channel D breaker closes when jumper is applied.		Apply a jumper across points TBD3-3 & TBD3-4.
100%	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV	1,3	Place all breaker test switches in 'NORMAL' Apply a jumper across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Apply a jumper across points TB5-6 & TB5-7. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).
	Size	Criteria Channel C breaker closes when jumper is applied. Channel B breaker closes when jumper is applied. Channel D breaker closes when jumper is applied. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A	Criteria Ref Channel C breaker closes when jumper is applied. Channel B breaker closes when jumper is applied. Channel D breaker closes when jumper is applied. 100% 1,3 The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and

Verification Plan # VP-PZ4, REV. 6.

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Accept		
	1 A 1 A 1 A 1	Criteria	Ref	- March Carlo Carlo Control Carlo Ca
Proper Operation of Under-		'UV Trip Power' and 'UV Device Energized' lights are		Apply 90VAC to TBA1-1 & TBA1-2 and
voltage circuit CC#4b		illuminated for channel A and C. 'Shunt Trip Power'		TBC1-1 & TBC1-2 in section 1.
(con't)		light extinguishes for Channel A & C.		
(con t)		The 'Shunt Trip Power', 'Shunt Trip Signal Present' and		Apply 90VDC to TBB-1 & TBB-2 and TBD-1
		'DC Power Available' lights illuminate for channel B		& TBD-2 in section 2 (channel B & D).
		and D. Verify that the 'UV Device Energized' and 'UV		(chalmer B & B).
		Trip Power' lights are not illuminated for channel B and	İ	
		D.		
				1 001/10 500
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Power'	Ì	Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2.
		light extinguishes for Channel B & D.		1BD1-1 & 1BD1-2 in section 2.
		ingh extinguishes for Chaimer B & B.		
				Reset the 27A, B, C & D relays.
		:		Close all breakers.
		'Shunt Trip Power' light for Channel A is not		Place the breaker test switch for Channel A in
•		illuminated. 'UV Device Energized' and 'UV Trip		the 'UV Trip' position.
		Power' lights are illuminated for Channel A.		
		Channel A breaker trips and the 'UV Device Energized',		Remove the 90VAC power applied to points
		'UV Trip Power' and 'Shunt Trip Signal Present' lights		TBA1-1 & TBA1-2 and verify Channel A
		are not illuminated for Channel A.		breaker trips.
	i	Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal		Return the breaker test switch for Channel A to
		Present' lights are illuminated for Channel A.	-	the 'Normal' position.

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Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Acceptance			
		Criteria	Ref	Method	
Proper Operation of Undervoltage circuit CC#4b (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A. 'Shunt Trip Power' light for Channel B is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel B.		Apply 90VAC power to points TBA1-1 & TBA1-2. Place the breaker test switch for Channel B in the 'UV Trip' position.	
·		Channel B breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel B.		Remove the 90VAC power applied to points TBB1-1 & TBB1-2 and verify Channel B breaker trips.	
		Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel B.		Return the breaker test switch for Channel B to the 'Normal' position.	
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B.		Apply 90VAC power to points TBB1-1 & TBB1-2.	
		'Shunt Trip Power' light for Channel C is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel C.		Place the breaker test switch for Channel C in the 'UV Trip' position.	
		Channel C breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel C.		Remove the 90VAC power applied to points TBC1-1 & TBC1-2 and verify Channel C breaker trips.	
		Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel C.		Return the breaker test switch for Channel C to the 'Normal' position.	

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance			
Proper Operation of Undervoltage circuit CC#4b (con't)	CALCON STATE OF THE PROPERTY OF	Criteria The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel C. 'Shunt Trip Power' light for Channel D is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel D. Channel D breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel D. Verify that the 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel D.	Ref	Apply 90VAC power to points TBC1-1 & TBC1-2. Place the breaker test switch for Channel D in the 'UV Trip' position. Remove the 90VAC power applied to points TBD1-1 & TBD1-2 and verify Channel D breaker trips. Return the breaker test switch for Channel D to the 'Normal' position. Reset the target on the 27A, B, C & D relays.	
	·			Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove jumpers across points TB5-6 & TB5-7.	

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Critical Characteristic	Sample Size	Accept	ance	
		Criteria	Ref	Method
Proper Operation of Undervoltage circuit CC#4b (con't)				
Proper Operation of Shunt Trip circuit CC#4c	100%	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C.	1,3	Place all breaker test switches in 'NORMAL' Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Apply a jumper across points TB5-6 & TB5-7. Apply 90VAC across points TB5-1 & TB5-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2. Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Shunt Trip circuit CC#4c (con't)		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Power' light extinguishes for Channel A & C. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. Verify that the 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D.		Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).
		The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Power' light extinguishes for Channel B & D.		Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Reset the 27A, B, C & D relays. Close all breakers.
		'UV Trip Power' light for Channel A is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel A. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27A relay drops out.		Place the breaker test switch for Channel A in the 'Shunt Trip' position.
	•	'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel A. 'Shunt Trip Signal Present' light is not illuminated for Channel A.		Return the breaker test switch for Channel A to the 'Normal' position and reset the target on the 27A relay.

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Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample/ Size	Acceptance			
		Criteria	Ref	Method	
Proper Operation of Shunt Trip circuit CC#4c (con't)		Breaker for Channel A closes. 'UV Trip Power' light for Channel B is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel B. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27B relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel B. 'Shunt Trip Signal Present' light is not illuminated for Channel B closes. 'UV Trip Power' light for Channel C is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel C. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27C		Close the breaker for Channel A. Place the breaker test switch for Channel B in the 'Shunt Trip' position. Return the breaker test switch for Channel B to the 'Normal' position and reset the target on the 27B relay. Close the breaker for Channel B. Place the breaker test switch for Channel C in the 'Shunt Trip' position.	
		relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel C. 'Shunt Trip Signal Present' light is not illuminated for Channel C.		Return the breaker test switch for Channel C to the 'Normal' position and reset the target on the 27C relay.	

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Accept		
		Criteria	Ref	Method
Proper Operation of Shunt Trip circuit CC#4c (con't)		Breaker for Channel C closes. 'UV Trip Power' light for Channel D is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel D. Breaker trips when test		Close the breaker for Channel C. Place the breaker test switch for Channel D in the 'Shunt Trip' position.
		switch is moved to 'Shunt Trip' position and the 27D relay drops out. 'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel D. 'Shunt Trip Signal Present' light is not illuminated for Channel D.		Return the breaker test switch for Channel D to the 'Normal' position and reset the target on the 27D relay.
		Breaker for Channel D closes.		Close the breaker for Channel D. Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
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Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Acceptan	ice :	
		Criteria R	Ref	Method
Proper Operation of UV trip timing CC#4d	100%	.1	,	Place all breaker test switches to the UV TRIP position.
· ·				Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
				Place a jumper across points TB5-6 & TB5-7.
				Apply 90VAC across points TB5-1 & TB5-2.
			İ	Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2.
				Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).
				Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1.
				Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).
				Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2.

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Accept	ance	
December 1997		Criteria /	Ref	
Proper Operation of UV trip timing CC#4d (con't)		The opening time for the breakers main poles is < 50ms after removal of the 90VAC. Verify that the 'UV Trip Power' and 'UV Device Energized' lights are not illuminated.		Ensure the 27A, B, C & D relays are reset. Close all breakers. Remove the 90VAC control power applied to points TBA1-1 & TBA1-2 (channel A) and TBC1-1 & TBC1-2 (channel C) in section 1 and TBB1-1 & TBB1-2 (channel B) and TBD1-1 & TBD1-2 (channel D) in section 2. Measure the time required for the breakers main poles to open after removal of the 90VAC. Note: This test can be performed on one breaker at a time. Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove the jumper across points TB5-6 & TB5-7.

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Accepta	ance	
		Criteria	Ref	Method
Proper Operation of 27 relay and shunt trip timing CC#4e	100%		1,3	Place all breaker test switches in the NORMAL position.
				Remove fuse F3 & F7 in section 1 and F13 & F17 in section 2.
				Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
				Place a jumper across points TB5-6 & TB5-7.
·				Apply 90VAC across points TB5-1 & TB5-2.
				Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2.
				Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).
	-			Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1.
				Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Accepta	nce
Proper Operation of 27 relay and shunt trip timing CC#4e (con't)		The opening time for the breakers main poles is < 64ms after removal of the 90VAC. Verify that the 'Shunt Trip Signal Present' lights are illuminated.	Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Apply 90VAC across secondary disconnect points D1 and D2 on all breakers. Ensure the 27A, B, C & D relays are reset. Close all breakers. Remove the 90VAC control power applied to points TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1 and TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Measure the time required for the breakers main poles to open after removal of the 90VAC. Note: This test can be performed on one breaker at a time.
			Remove all control power. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove a jumper across points TB5-6 & TB5-7.

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Accepta	ance	
		Criteria	Ref	Method
Proper Operation of 27 relay and shunt trip timing CC#4e (con't)				Replace fuse F3 & F7 in section 1 and F13 & F17 in section 2.
Proper Operation of Shunt Trip signal from TMR control system	100%		1,3	Place all breaker test switches in the NORMAL position.
CC#4f	· ·			Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
				Place a jumper across points TB5-6 & TB5-7.
				Apply 90VAC across points TB5-1 & TB5-2.
		·		Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2.
				Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).
				Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1.
				Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Accept	ance	
		Criteria	Ref	Method
Proper Operation of Shunt Trip signal from TMR control system CC#4f				Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Ensure the 27A, B, C & D relays are reset.
(con't)				Close all breakers.
		Verify that Channel A breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-A relay is picked-up and that the KB-B, KB-C and KB-D relays are not picked-up.		Place a jumper across points TBA2-1 & TBA2-2 in section 1 for Channel A.
				Remove the jumper across points TBA2-1 & TBA2-2.
		Verify that Channel C breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-C relay is picked-up and that the KB-A, KB-B and KB-D relays are not picked-up.		Place a jumper across points TBC2-1 & TBC2-2 in section 1 for Channel C.
				Remove the jumper across points TBC2-1 and TBC2-2.
		Verify that Channel B breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-B relay is picked-up and that the KB-A, KB-C and KB-D relays are not picked-up.		Place a jumper across points TBB2-1 & TBB2-2 in section 2 for Channel B.

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample - Size	Acceptance -		
		Criteria	Ref	Method
Proper Operation of Shunt Trip signal from TMR control system CC#4f (con't)	·	Verify that Channel D breaker trips and the 'Shunt Trip Signal Present' light is illuminated. Verify that the KB-	·	Remove the jumper across points TBB2-1 and TB2-2. Place a jumper across points TBD2-1 & TBD2-2 in section 2 for Channel D.
		D relay is picked-up and that the KB-A, KB-B and KB-C relays are not picked-up.		Remove the jumper across points TBD2-1 and TBD2-2. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 &
·				TBB3-4 and TBD3-3 & TBD3-4. Remove jumper across points TB5-6 & TB5-7. Remove all control power.

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Trip Free Operation CC#5	100%		1,3	Apply 125VDC and 120VAC control power to the switchgear and charge all breakers.
Perform this CC on all breakers.				Depress the push to trip button and hold-in on Channel A breaker.
		Breaker A (B, C, D) should not close.		Depress the push to close button on Channel A breaker.
				Repeat for all breakers.
Anti-pump Operation CC#6	100%		1,3	Apply 125VDC and 120VAC control power to the switchgear and charge the breakers.
Perform this CC on all breakers.		Breaker closes when close signal is applied.		Apply and maintain a close signal on the Channel A breaker.
		Breaker trips when trip signal is applied and does not reclose.		Apply a momentary trip signal to the Channel A breaker while maintaining the close signal.
	ļ	Breaker closes when close signal is reapplied.		Release the close signal and then re-apply the close signal.
				Repeat for all breakers.

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Breaker Interlocks CC#7	100%		1,3	Rack the breaker for Channel A to the TEST position.
Perform this CC on all breakers.				Close the breaker.
DA CARCAGO	·	Breaker racking tool cannot be inserted into the breaker unless TRIP button is pushed.		Attempt to rack the breaker to the CONNECT position.
	:			Repeat for all breakers.
Breaker UV Trip Voltage CC#8	100%	Verify breaker tripped in the voltage range of 42 to 84Vac.	1,3	Apply 125VDC and 120VAC control power to the switchgear.
Perform this CC on all breakers.				Charge and close breaker for Channel A.
Dicarcis.	=			Reduce the AC control voltage until the breaker trips.
				Record the voltage at which the breaker trips.
				Repeat for all breakers.
Remote Close Test CC#9	100%		1,3	Place all breaker test switches in the NORMAL position.
		·		Apply 90VAC across points TB5-1 & TB5-2.

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Acceptance Acceptance		
		Criteria	Ref	Method'
Remote Close Test CC#9 (con't)				Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2.
				Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C).
		·		Apply 90VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1.
				Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).
				Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2.
				Ensure the 27A, B, C & D relays are reset.
		Breakers should not close.		Attempt to close all breakers.
				Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
		Breakers should not close.		Attempt to close all breakers electrically.
				Place a jumper across points TB5-6 & TB5-7.

Critical Characteristic	Sample Size	Acceptance			
		Criteria	Ref	Method	
Remote Close Test CC#9 (con't)		All breakers should close.		Close all breakers electrically. Remove jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Remove jumper across points TB5-6 & TB5-7.	
				Remove all control power.	
Proper Operation of Trip Confirm Circuit CC#10	100%		1,3	Place all breaker test switches in the NORMAL position. Apply 90VAC across points TB5-1 & TB5-2 and TB1-1 & TB1-2. Apply 90VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2.	
				Apply 90VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). Apply 90VAC to TBA1-1& TBA1-2 and TBC1-1 & TBC1-2 in section 1. Apply 90VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).	

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)				Apply 90VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. Ensure the 27A, B, C & D relays are reset. Place jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4.
				Place a jumper across points TB5-6 & TB5-7.
	!	Verify that the 'Train A Trip Confirm Status' light is not illuminated.		Place a jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5.
		Verify that the 'Train A Trip Confirm Status' light is not illuminated.		Close breaker A. Open breaker A.
		Verify that the 'Train A Trip Confirm Status' light is not illuminated.		Close breaker C.
		Verify that the 'Train A Trip Confirm Status' light is illuminated.		Close breakers A & C.
		mannatur.		Open breakers A & C.
,		Verify that the 'Train A Trip Confirm Status' light is not illuminated.	· i	Close breaker B. Open breaker B.

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Critical Characteristic	Sample - Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip		Verify that the 'Train A Trip Confirm Status' light is not		Close breaker D.
Confirm Circuit CC#10 (con't)		illuminated. Verify that the 'Train A Trip Confirm Status' light is illuminated.		Close breakers B & D.
Con ty				Open breakers B & D.
				Remove jumpers across points TB1-3 & TB1-4 and TB1-3 & TB1-5.
·				Place a jumper across points TB5-3 & TB5-4 and TB5-3 & TB5-5.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker A.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Open breaker A.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker C.
		Verify that the 'Train B Trip Confirm Status' light is illuminated.		Close breakers A & C.
				Open breakers A & C.
		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker B.

Verification Plan # VP-PZ4, REV. 6

Critical Characteristic	Sample Size	Acceptance		
Proper Operation of Trip		Criteria	Ref	Method Open breaker B.
Confirm Circuit CC#10 (con't)		Verify that the 'Train B Trip Confirm Status' light is not illuminated.		Close breaker D.
		Verify that the 'Train B Trip Confirm Status' light is illuminated.		Close breakers B & D.
		mulmuted.		Place a jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5.
	-	Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close all breakers.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers A & B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers A & B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers A & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers A & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers C & B.

Verification Plan

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Accept	Acceptance	
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers C & B.
(con't)		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Open breakers C & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Close breakers C & D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-4 and TB5-3 & TB5-4. Open breaker B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4. Close breaker B.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-4 and TB5-3 & TB5-4. Open breaker D.
	·	Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4. Close breaker D.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-5 and TB5-3 & TB5-5. Open breaker A.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. Close breaker A.
				·

Verification Plan

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-5 and TB5-3 & TB5-5. Open breaker C.
(con't)		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. Close breaker C.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are not illuminated.		Remove jumper from TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Replace jumper from TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Open breaker A.
				Close breaker A.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Open breaker B.
		15 Trip Commin Status Tights are munimated.		Close breaker B.
,		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Open breaker C.
				Close breaker C.
		Verify that the 'Train A Trip Confirm Status' and 'Train B Trip Confirm Status' lights are illuminated.		Open breaker D.

Verification Plan

Verification Plan # VP-PZ4, REV. 6

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers

Manufacturer / Model: Square-D / PZ-4

Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size	Acceptance		
		Criteria	Ref	Method
Proper Operation of Trip Confirm Circuit CC#10 (con't)				Open all breakers. Remove all control power. Remove all jumpers.
CPT Operation CC#11	100%	CPT secondary voltage = 120VAC ± 5%	1,3	Apply 480VAC to the primary side (H1 & H2) of the CPT's in both section 1 & 2. Measure CPT secondary voltage at points TBA3-1 & TBA3-2, TBC3-1 & TBC3-2 and TB10-1 & TB10-2 in section 1 and TBB3-1 & TBB3-2, TBD3-1 & TBD3-2 and TB11-1 & TB11-2 in section 2.
Hi-Pot Testing (Switchgear Assembly) CC#12	100%	The Hi-Pot testing was performed on the switchgear per the applicable Square-D document. NLI to review Form 87-0816R, step 19 for conformance.	2	Perform or verify that AC High Pot. testing was performed in accordance with Square-D procedure Form 87-0816R for "Low Voltage Switchgear."
Megger Test (Switchgear Control Wiring) CC#12a	100%	AC/DC Control circuit @ 1250Vdc: R > 12.5 MΩ	N/A	Control circuit to ground. Apply 1250VDC and megger as follows: Control circuit (DC) of switchgear. Control circuit (AC) of switchgear.

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Verification Plan # <u>VP-PZ4, REV. 6</u>
Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers
Manufacturer / Model: Square-D / PZ-4
Safety Function: To provide power to Class 1E loads

Critical Characteristic	Sample Size		<u></u>	
		Criteria	Ref	Method
AC Hi-pot Testing (Circuit breakers) CC#13 Perform this CC on all breakers. Breakers should be removed from cell.	100%	Note: This is a pass/fail test. No insulation breakdown after 1 minute	N/A	With the breakers in the closed position, apply a voltage of 2200Vac using an AC high-pot between each phase and ground for a period of 1 minute. With the breaker in the closed position, apply 2200VAC using an AC high-pot between phases With the breaker in the open position, apply 2200VAC and hi-pot between phase line-to-load.

References:

- 1. NLI 069-10327 set of design drawings for PZ4 switchgear.
- 2. Square-D "Low Voltage Switchgear Test Inspection Report" Form 87-0816R.
- 3. AmerGen technical specification SP-1101-11-250.

VP Approval

7/7/09_Reviewed:

7/7/69 Approved

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NUCLEAR LOGISTICS INC TEST DA	ATA SHEET PRE-SEIS	SMIC 🗆 POST-SEISMIC 🗓 VERIFIC	:ATION OTHER
rest data for: VP- <u>PZ4</u>	Rev:6	Job #: 069-10327 P.E: CT	Cat ID#:
Item Description: Switchgear,	, 480VAC, 3Ф, 3W, 800A with NT с	circuit breakers Manufacturer: Square-D	Model/Part No.: Pz-4
CC# 1 Dimensions	s & Configuration	CC#	
CC#		CC#	
Critical characteristic (CC#)	CC#1	CC#1	CC#1
Test Temperature	NA	N A	NA
Test surface: V=Vertical, H=Horizontal	H	N/A	N/A
QC Setup check (if applicable)	NIA	ИД	N A
8/N: <u>25570-401-00</u> 01	Sections will line-up and bolt together with other sections of switchgear based on measured dimensions. Yes No	Instrument sections have the following: a) 1 - Electroswitch Series 20K b) 1 - ABB relay cat#411R0715 c) 6 -Square-D light ZB5AVBG1 d) Square-D XUD080V63, XO1200V02, XO80V02	Channel C breaker door is painted Yellow ✓ Yes □ No Channel D breaker door is painted Blue ✓ Yes □ No
	Height = 93 " Width = 20 " Depth = 63 " Switchgear has 2 vertical	☐ Yes ☐ No ¥ SEE. De. 06910727-04 Layout of components/conduit entrance location and size are in accordance with NLI design drawings.	wire. Ves No Each vertical section has a 15kVA CPT.
	sections, 4 cubicles high. Yes No Each vertical section has 2	☐ Yes ☐ No Channel A breaker door is painted Red ☐ Yes ☐ No	Verify insulated ring tongue lugs are used on control wiring to terminal blocks.
	cubicles for breakers and 2 cubicles for instrumentation. Yes No	Channel B breaker door is painted Green ☐ Yes ☐ No	Yes □ No Ground bus is tin or silver plated.

PASS CT

7/22/09

PASS CT

Ground bus is tin or silver plated.

✓ Yes

✓ No

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

7/22/09

PASS CT

Form No. T-1004, Rev. 6

N L I TEST DATA SHEET

Check off appropriate test

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TEST DATA FOR: VP-PZ4	Rev:6	Job #: 069-10327 P.E: CT	Cat ID#:Q
Item Description: Switchgear, 4	480VAC, 3Ф, 3W, 800A with NT	circuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC#1 Dimensions &	& Configuration	CC#	· · · · · · · · · · · · · · · · · · ·
CC# 2 Wiring Check	k		
Critical characteristic (CC#)	CC# 1	CC#1	CC#2
Test Temperature	Na	NIA	nla
Test surface: V=Vertical, H=Horizontal	N/A	N/A	H
QC Setup check (if applicable)	Na	Ma	4/2
S/N: <u>25576-001-0000 I</u>	Circuit breakers have operation counter installed. Yes No	Safety-related wiring has a minimum of 6"separation from the other safety-related channels. WYes No	Switchgear sections are wired per the latest approved design drawings. Yes No
	Circuit breakers have contact indicators. Yes	Safety-related wiring is fed in thermosleve and is color coded to distinguish it from Non-safety related wiring. Wes	Yellow line drawings for inclusion in test data package. ✓ Yes □ No
	breakers in place while in the CONNECTED or DISCONNECTED positions is installed on the switchgear. Yes No	·	TDM 7/30/09
·	All indicating lights are LED type. ☑ Yes □ No		•
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT 7/22/09

N	L	I

Check	off	appropriate	tests:
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NUCLEAR LOGISTICS INC	TEST DATA SHEET	□PRE-SEIS	SMIC POS	T-SEISMIC \Box	VERIFICA	TION 🗆 OTHER	·
TEST DATA FOR:	VP- <u>PZ4</u>	_Rev:6	_Job #: <u>069-10</u>	1327	P.E: <u>C7</u>	Cat ID#: NA	***************************************
tem Description:	Switchgear, 480VAC, 3Ф, 3W,	800A with NT	circuit breakers	_Manufacturer:_	Square-D	Model/Part No.:	PZ-4
CC# <u>3</u>	Circuit Breaker Fit-up		CC#				
CC# <u>4a</u>	Proper Operation of Close Circ	cuit	CC#				

CC# 4a Proper Oper	ation of Close Circuit		
Critical characteristic (CC#)	CC#_3	CC# <u>4a</u>	CC#4a
Test Temperature	NA	NA	NA
Test surface: V=Vertical, H=Horizontal	H	Н	Н
QC Setup check (if applicable)	(d) M	NA	N/M
S/N: <u>255 70 - 00(-000</u> 0)	Breaker fits into breaker compartment without any binding. Yes	Voltage applied = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A & C). The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C. Yes □ No	Voltage applied =
	the breaker from the switchgear cell. Yes	Voltage applied = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 (channel A & C) in section 1. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel A and C. 'Shunt Trip Signal Present' light extinguishes for A & C. Yes # □ No	Voltage applied = 70 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2 (channel B & D). The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. 'Shunt Trip Signal Present' light extinguishes for B & D. Yes □ No

子 5年 DR-06910327-05 CT 기2리09 # SEE DR-06910327-05 ET 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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Form No. T-1004, Rev. 6

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□PRE-SEISMIC □	POST-SEISMIC	VERIFICATION	OTHER

TEST DATA FOR: VP-PZ4	Rev:6	Job #: 069-10327 P.E: C1	Cat ID#: NA
Item Description: Switchgear,	480VAC, 3Ф, 3W, 800A with NT	circuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC#4a Proper Oper	ation of Close Circuit	CC#	
CC#		CC#	<u> </u>
Critical characteristic (CC#)	CC# <u>4a</u>	CC#4a	CC#4a
Test Temperature	N/A	N/A	
Test surface: V=Vertical, H=Horizontal	Н	H	Н
QC Setup check (if applicable)	NIA	N/A	·
S/N: <u>25570</u> -001 - 00001	Jumpers across points TB5-6 & TB5-7? NYes □ No Voltage applied = 90 VAC across points TB5-1 & TB5-2. □Yes □ No Voltage applied = 90 VAC across points TB40-1 & TB40-4 and TB41-1 & TB41-4. □Yes □ No A, B, C & D breakers charge? □Yes □ No	Jumper across points TBC3-3 & TBC3-4. Channel C breaker closes when jumper is applied? ☑ Yes □ No Jumper across points TBB3-3 & TBB3-4. Channel B breaker closes when jumper is applied? ☑ Yes □ No Jumper across points TBD3-3 & TBD3-4. Channel D breaker closes when jumper is applied? ☑ Yes □ No	
	Jumper across points TBA3-3 & TBA3-4. Channel A breaker closes when jumper is applied? Yes No	PASS CT 7/22/09	

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NUCLEAR LOGISTICS INC						

CC#3

Circuit Breaker Fit-up

NUCLEAR LOGISTICS INC	TEST DATA SHEET	□PRE-SE	EISMIC D PO	ST-SEISMIC	VERIFIC	CATION OTHER	
TEST DATA FOR:	VP- <u>PZ4</u>	_Rev:6	_Job#:_ <u>069-</u>	10327	P.E: CT	_Cat ID#:N/a	
Item Description:	Switchgear, 480VAC, 3Ф, 3W,	800A with NT	circuit breakers	_Manufacturer:_	Square-D	Model/Part No.: <u>P2-</u> 4	
CC# 3	Circuit Breaker Fit-up		CC#	4b	Proper Operat	ion of UV Circuit	

Proper Operation of Close Circuit CC#_4a

CC#_

	Critical characteristic (CC#)	CC#4b	CC# <u>4b</u>	CC#4b
	Test Temperature	N) _A	NL	N)~
	Test surface: V=Vertical, H=Horizontal	н	H	Н
	QC Setup check (if applicable)	NIA	2/4	N/O
44 of 190	S/N: 25570-001-0001	All breaker test switches in 'NORMAL' ✓ Yes □ No	Voltage applied = <u>Qo</u> VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2.	Voltage applied = <u>90</u> VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2.
		Jumper across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-4 and TBD3-3 & TBD3-4. √Yes □ No	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel A and C. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel A and C.	The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D.
		Jumper across points TB5-6 & TB5-7. ☑ Yes □ No	Voltage applied = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1- 2.	Voltage applied = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2.
		Voltage applied = 90 VAC to points TB40-1 & TB40-4, TB40-2 & TB40-5, TB41-1 & TB41-4 and TB41-2 & TB41-5.	The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for A & C. 'Shunt Trip Signal Present' extinguishes for A & C. Yes # No	The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for B & D. 'Shunt Trip Signal Present' extinguishes for B & D. B & D. No See De-CA10327-05

SEE DR-01/10327-05

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□PRE-SEISMIC	POST-SEISMIC	☑ VERIFICATION ☐	OTHER

NUCLEAR LOGISTICS INC			
TEST DATA FOR: VP-PZ4	Rev:6	Job #: 069-10327 P.E: CT	Cat ID#: NA
Item Description: Switchgear, 4	180VAC, 3Ф, 3W, 800A with NT cir	cuit breakers Manufacturer: Square-D	Model/Part No.: न्य-५
CC# 4b Proper Opera	ation of UV Circuit (CC#	
CC#		CC#	
Critical characteristic (CC#)	CC#4b	CC# <u>4b</u>	CC#4b
Test Temperature	NIA	Nla	NIA
Test surface: V=Vertical, H=Horizontal	Н	Н	H
QC Setup check (if applicable)	NA	NA	NIA
S/N: 25570 - 00 (-0000)	Breaker test switch for Channel A in the 'UV Trip' position. 'Shunt Trip Power' light for Channel A is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel A. Yes No 90VAC power applied to points TBA1-1 & TBA1-2 is removed. Channel A breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel A. Yes No	Breaker test switch for Channel A in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel A. Yes	Breaker test switch for Channel B in the 'UV Trip' position. 'Shunt Trip Power' light for Channel B is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel B. BYES DNO 90VAC power applied to points TBB1-1 & TBB1-2 is removed. Channel B breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel B. BYES DNO

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□PRE-SEISMIC □ POST-SEISMIC □ VERIFICATION □ OTHER	
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NUCLEAR LOGISTICS INC			
TEST DATA FOR: VP-PZ4	Rev:6	Job #: 069-10327 P.E: CT	Cat ID#: NA
Item Description: Switchgear,	480VAC, 3Ф, 3W, 800A with NT cir	cuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC#4b Proper Opera	ation of UV Circuit	CC#	
CC#		CC#	
Critical characteristic (CC#)	CC#4b	CC#4b_	CC#4b
Test Temperature	NA	NA	NA
Test surface: V=Vertical, H=Horizontal	Н	Н	Н
QC Setup check (if applicable)	NIA	N _A	NA
S/N: 25570-001-00001	Breaker test switch for Channel B in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel B. Yes DNO 90VAC power applied to points TBB1-1 & TBB1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B. Yes DNO Breaker test switch for Channel C	90VAC power applied to points TBC1-1 & TBC1-2 is removed. Channel C breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel C. WYes No Breaker test switch for Channel C in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel C. WYes No	Breaker test switch for Channel D in the 'UV Trip' position. 'Shunt Trip Power' light for Channel D is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel D. Yes No 90VAC power applied to points TBD1-1 & TBD1-2 is removed. Channel D breaker trips and the 'UV Device Energized', 'UV Trip Power' and 'Shunt Trip Signal Present' lights are not illuminated for Channel D. Yes No
	in the 'UV Trip' position. 'Shunt Trip Power' light for Channel C is not illuminated. 'UV Device Energized' and 'UV Trip Power' lights are illuminated for Channel C.	90VAC power applied to points TBC1-1 & TBC1-2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel C. □Yes □ No	Breaker test switch for Channel D in the 'Normal' position. The 'Shunt Trip Power' & 'Shunt Trip Signal Present' lights are illuminated for Channel D. BY S No

PASS CT 7/2/09

PASS CT 7/22/09

PASS 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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□PRE-SEISMIC □	POST-SEISMIC A	VERIFICATION	OTHER

NUCLEAR LOGISTICS INC	SI DA	IA SHEET	LJPRE-SEIS	MIC LI POS	1-SEISMIC LA VERIFI	CAHON LI C	OTHER
TEST DATA FOR: VP-I	PZ4		_Rev:6	Job #: 069-1	0327 P.E: <u>C</u> 7	Cat ID#:	J _A
Item Description: Swi	tchgear, 48	80VAC, 3Ф, 3W,	800A with NT c	ircuit breakers	_Manufacturer:Square-D	Mo	odel/Part No.: P2-4
CC#4b Prop	per Operat	tion of UV Circui	it	CC#			
CC# 4c Prop	per Operat	tion of Shunt Trip	Circuit	_ CC#			
Critical characteristic (C	:C#)	CC#4	4b		CC#4c		CC#4c
Test Temperature		NA		7	k	N (k
Test surface: V=Vertical, H=Horizont	tal	Н			Н		Н
QC Setup check (if appli	icable)	Alm		1		N]4
S/N: <u>US70-001-00001</u>	4		□No	All breaker test Ves Jumpers across	t switches in 'NORMAL' No points TBA3-3 & TBA3-	TBA-2 and TE Trip Power', 'and 'DC Powe	ad = <u>90</u> VDC to TBA-1 & BC-1 & TBC-2. The 'Shunt Shunt Trip Signal Present' or Available' lights illuminate
		Jumpers across po & TBA3-4, TBC: TBB3-3 & TBB3 TBD3-4 and TB5 are removed.	3-3 & TBC3-4, 6-4, TBD3-3 & 6-6 & TB5-7	4 and TBD3-3 Ves Jumper across	□ No points TB5-6 & TB5-7.	Energized' and not illuminated IV Yes	and C. The 'UV Device d 'UV Trip Power' lights are for channel A and C. No
		Ū∕Yes □] No	points TB5-1 & Voltage applied TB40-1 & TB4	☐ No d = 90 VAC across to TB5-2. d = 50 VAC to points 10-4 and TB40-2 & TB40- B41-4 and TB41-2 &	TBA1-2 and T Trip Power' ar lights are illum The 'Shunt Tri extinguishes for Yes SEE DL-069	□ No

PASS CT 7/22/09

PASS CT 7/22/09

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□PRE-SEISMIC □ POST-SEISMIC □ VERIFICATION □ OTHER
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UCLEAR LOGISTICS INC							
TEST DATA FOR:	VP- <u>PZ</u> 4	_Rev:6_	Job#: 06	7-10327	P.E:	Cat ID#: NIA	
Item Description:	Switchgear, 480VAC, 3Ф, 3W,	800A with N	IT circuit breake	ers Manufacturer:	Square-D	Model/Part No.: PZ-4	
CC# <u>4c</u>	Proper Operation of Shunt Trip	Circuit	cc	:#			
CC#			cc	:#			

Critical characteristic (CC#)	CC# <u>4c</u>	CC# <u>4c</u>	CC# <u>4c</u>
Test Temperature	NA	· NIX	NA
Test surface: V=Vertical, H=Horizontal	H	Н	Н
QC Setup check (if applicable)	MIA	NA	NIA
S/N: <u>25570-001-000</u> 0 (Voltage applied = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2. The 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights illuminate for channel B and D. The 'UV Device Energized' and 'UV Trip Power' lights are not illuminated for channel B and D.	Breaker test switch for Channel A in the 'Shunt Trip' position. Yes	'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel A. 'Shunt Trip Signal Present' light is not illuminated for Channel A. Yes
	Voltage applied = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. The 'UV Trip Power' and 'UV Device Energized' lights are illuminated for channel B and D. The 'Shunt Trip Signal Present' light extinguishes for B & D.	Breaker test switch for Channel A in the 'Normal' position and reset the target on the 27A relay. Yes No Pass 7/22/09	'Shunt Trip' position. Yes

SEE DR-06910327-05 c7 1/2/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

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□PRE-SEISMIC	☐ POST-SEISMIC	✓ VERIFICATION ☐ OTHER

NUCLEAR LOGISTICS INC		•	•			
TEST DATA FOR: VP-PZ4	Rev:6	Job #: 069- 10	0327 P	P.E: <u>CT</u>	Cat ID#: NA	
Item Description: Switchgear, 480	OVAC, 3Φ, 3W, 800A with NT c	circuit breakers	Manufacturer: S	Square-D	Model/Part No.: P2-4	
CC# 4c Proper Operation	on of Shunt Trip Circuit	CC#			·	
CC#		CC#				
Tail 11 (oal)		 				

			·	
	Critical characteristic (CC#)	CC# <u>4c</u>	CC# <u>4e</u>	CC# <u>4c</u>
	Test Temperature	NIA	Na	NIA
	Test surface: V=Vertical, H=Horizontal	H	H	H
	QC Setup check (if applicable)	h)V	NIA	NJA
10 of 100	S/N: 25570 - 001 - 00001	'UV Trip Power' light for Channel B is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel B. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27B relay drops out. TYES No	'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel B. 'Shunt Trip Signal Present' light is not illuminated for Channel B. Ves No Close the breaker for Channel B. Breaker B closes? Yes No	'UV Trip Power' light for Channel C is not illuminated. 'UV Device Energized', 'Shunt Trip Power', 'Shunt Trip Signal Present' and 'DC Power Available' lights are illuminated for Channel C. Breaker trips when test switch is moved to 'Shunt Trip' position and the 27C relay drops out. 'Yes
		Breaker test switch for Channel B in the 'Normal' position and reset the target on the 27B relay. Yes No PASS T 1/22/09	Breaker test switch for Channel C in the 'Shunt Trip' position. BYes No PASS 7/22/09 CT	'UV Device Energized', 'UV Trip Power', 'Shunt Trip Power' and 'DC Power Available' lights are illuminated for Channel C. 'Shunt Trip Signal Present' light is not illuminated for Channel C. Yes No YASS 7/22/09 CT

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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□PRE-SEISMIC [☐ POST-SEISMIC	☑ VERIFICATION	OTHER

NUCLEAR LOGISTICS INC

TEST DATA FOR: VP-PZ4

Rev: 6 Job #: 069~(0327 P.E: CT Cat ID#: N/A

Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: PZ-4

CC# 4c Proper Operation of Shunt Trip Circuit CC#

CC# 4d Proper Operation of UV Timing CC#

Critical characteristic (CC#)	CC#4c	CC#4c	CC#4d
Test Temperature	NA	مال <i>ه</i>	N/a
Test surface: V=Vertical, H=Horizontal	. Н	Н	Н
QC Setup check (if applicat	le) NA	N/A	NA
S/N: <u>74510-001-000</u> 01	Close the breaker for Channel C. Breaker C closes? Yes	Breaker test switch for Channel D in the 'Normal' position and reset the target on the 27D relay. Yes	All breaker test switches to the UV TRIP position. Yes □ No Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Yes □ No Jumper across points TB5-6 & TB5-7. Yes □ No Applied voltage = 90 VAC across points TB5-1 & TB5-2.
	when test switch is moved to 'Shunt Trip' position and the 27D relay drops out. Yes No	PASS CT 7/22/09	Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 in section 1, TB41-1 & TB41-4 and TB41-2 & TB41-5 in section 2.
	PASS CT 7/2/09		PASS 7/22/09 CT

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CCLEAR LOGISTICS INC							
TEST DATA FOR:	VP- <u>PZ4</u>	Rev: 6	Job #: <u>069-(</u>	327	P.E: CT	_Cat ID#: NA	
Item Description:	Switchgear, 480VAC, 3Φ, 3W,	800A with NT c	ircuit breakers	_Manufacturer:_	Square-D	Model/Part No.: Pz	-4
CC# <u>4d</u>	Proper Operation of UV Timin	g	CC#				
CC#48	Proper Operation of 27 relay of	ad ohunt trin tim	ina CC#				

CC#4e Proper Oper	ation of 27 relay and shunt trip tim	ing CC#	
Critical characteristic (CC#)	CC#4d	CC#4d	CC#4e
Test Temperature	NIA	NA	N/A
Test surface: V=Vertical, H=Horizontal	H	Н	H
QC Setup check (if applicable)	NA	NIA	NIA
S/N: 25570-001-00001	Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2 in section 1 (channel A	27A, B, C & D relays are reset? □ Yes □ No	All breaker test switches in the NORMAL position. Vyes No
	& C). Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 in section 1. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2 in section 2 (channel B & D).	All breakers closed? Yes □ No 90VAC control power removed from points TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2 and TBD1-1 & TBD1-2 and TBD1-1 & TBD1-2. UV Trip Power & UV Device Energized lights are not illuminated. Yes □ No	Fuse F3 & F7 and F13 & F17 removed? Yes No & See DR-06910327-06 Jumpers across points TBA3-3 & TBA3-4, TBC3-3 & TBC3-4, TBB3-3 & TBB3-4 and TBD3-3 & TBD3-4. Yes No Jumper across points TB5-6 & TB5-7. Yes No
	Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBD1-2 in section 2. PASS CT 7/22/29	Time required for the breakers main poles to open after removal of the 90VAC. (A, B, C) Time = 7.0, 7.0, 7.1 ms (Breaker A) Time = 14.6, 14.2, 14.6 ms (Breaker B) Time = 12.9, 11.6, 12.3 ms (Breaker C) Time = 7.0, 6.2, 7.5 ms (Breaker D) PASS 7 (22 (08) CT	Applied voltage = 90 VAC across points TB5-1 & TB5-2. CT Pass 7/22/07

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NUCLEAR LOGISTICS INC

TEST DATA SHEET

□PRE-SEISMIC □	POST-SEISMIC D VERIFICATION	v □ other

TEST DATA FOR: VP-PZ4	Rev: 6	Job #: 069 - 10327	P.E. CT	Cat ID#:	
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Item Description: Switchgear, 480VAC, 3Φ, 3W, 800A with NT circuit breakers Manufacturer: Square-D Model/Part No.: P2-4 CC#__ Proper Operation of 27 relay and shunt trip timing CC#<u>4e</u>___

CC# CC#

Critical characteristic (CC#)	CC#4e	CC# <u>4e</u>	CC# <u>4e</u>
Test Temperature	NA	NIA	NA
Test surface: V=Vertical, H=Horizontal	H	Н	Н
QC Setup check (if applicable)	NA	NIA	NA
S/N: 25570 - 001-00001	Applied voltage = 90 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-5 and TB41-1 & TB41-4 and TB41-2 & TB41-5. Applied voltage = 90 VDC to TBA-1 & TBA-2 and TBC-1 & TBC-2. Applied voltage = 90 VAC to TBA1-1 & TBA1-2 and TBC1-1 & TBC1-2. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-1. Applied voltage = 90 VDC to TBB-1 & TBB-2 and TBD-1 & TBD-2. Applied voltage = 90 VAC to TBB1-1 & TBB1-2 and TBD1-1 & TBB1-2.	Applied voltage = 90 VAC across secondary disconnect points D1 and D2 on all breakers. The 27A, B, C & D relays are reset? Yes	Time required for the breakers main poles to open after removal of the 90VAC. (A B C) Time = 15.7, 16.0, 16.0 ms (Breaker A) Time = 16.0, 16.6, 16.7 ms (Breaker B) Time = 16.3, 15.1, 16.2 ms (Breaker C) Time = 14.8, 14.1, 15.5 ms (Breaker D) Fuse F3 & F7 and F13 & F17 replaced? Yes No 4 See 52-06910327-06 C7 1/22/09

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□PRE-SEISMIC □ POST-SE	SMIC NEVERIFICATION OTHER

NUCLEAR LOGISTICS INC				
TEST DATA FOR	VP- <u>PZ4</u> Rev: <u>6</u> Job #	#: <u>069-(0327</u>	P.E: CT	_Cat ID#:_NA
Item Description:_	Switchgear, 480VAC, 3Ф, 3W, 800A with NT circuit	breakers Manufacturer:	Square-D	Model/Part No.: PZ-4
CC# <u>4f</u>	Proper Operation of Shunt Trip Signal from TMR	CC#		
CC#		CC#		

	Critical characteristic (CC#)	CC# <u>4f</u>	CC#4f	CC#4f
ŀ	Test Temperature	N).	N/ _A	N) _A
-		NIA		
-	Test surface:	H	Н	H
Ł	V=Vertical, H=Horizontal		·	
	QC Setup check (if applicable)	NA	4/4	N/A
		All breaker test switches in the	Applied voltage = 90 VDC to TBA-1 &	Jumper across points TBA2-1 & TBA2-2.
2	S/N: 25570 - 001-00001	NORMAL position.	TBA-2 and TBC-1 & TBC-2.	☑ Yes □ No
ţ.		D∕Yes □ No		
53 of 190			Applied voltage = 90 VAC to TBA1-1	Channel A breaker trips and the 'Shunt Trip
	•	Jumpers across points TBA3-3	& TBA1-2 and TBC1-1 & TBC1-2.	Signal Present' light is illuminated. The
J		& TBA3-4, TBC3-3 & TBC3-4,		KB-A relay is picked-up and the KB-B,
ı		TBB3-3 & TBB3-4 and TBD3-3	Applied voltage = <u>Go</u> VDC to TBB-1 &	KB-C and KB-D relays are not picked-up.
-	,	&,TBD3-4.	TBB-2 and TBD-1 & TBD-2.	☑ Yes □ No
١		Yes □ No		
- 1		105	Applied voltage =7oVAC to TBB1-1	Jumper across points TBC2-1 & TBC2-2.
1		Jumper across points TB5-6 &	& TBB1-2 and TBD1-1 & TBD1-2.	✓ Yes □ No
ł		TB5-7.		M 1 es 🗆 140
1		☑Yes □ No	The 27A, B, C & D relays are reset?	Channel C breaker trips and the 'Shunt Trip
1			☑ Yes □ No	Signal Present' light is illuminated. The
ı		Applied voltage = 90 VAC		KB-C relay is picked-up and the KB-A,
1		across points TB5-1 & TB5-2.	All breakers closed?	KB-B and KB-D relays are not picked-up.
		across points 1135-1 & 1135 2.	▼Yes □ No	✓Yes □No
1		Applied voltage =VAC to	21.0	103
Ī		points TB40-1 & TB40-4 and		
1	!	TB40-2 & TB40-5 and TB41-1		,
1		& TB41-4 and TB41-2 & TB41-		·
L		5.	0 0 0 0 0 0 0 0	0455 7/22 log CT
		PASS CT 7/22/09	PASS 7/22/09 CT	PASS 7/22/09 CT

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PASS CT 7/22/09 PASS 7/22/09 CT
NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TOCLEAR LOGISTICS INC							
TEST DATA FOR:	VP- <u>PZ4</u> Re	v: <u> 6 </u> Job#	#: 069-16	327	P.E: CT	Cat ID#: 시A	_
Item Description:	Switchgear, 480VAC, 3Ф, 3W, 800	A with NT circuit	breakers	_Manufacturer:_	Square-D	Model/Part No.: 72-4	
CC# <u>4f</u>	Proper Operation of Shunt Trip Sign	nal from TMR	CC#				_
CC#_5	Trip Free Operation		CC#	,			

Critical characteristic (CC#)	CC# <u>4f</u>	CC# <u>4f</u>	CC#5
Test Temperature			
Test surface: V=Vertical, H=Horizontal	H	Н	Н
QC Setup check (if applicable)			
S/N: <u>15570-061-0000</u> 1	Jumper across points TBB2-1 & TBB2-2. ✓ Yes □ No Channel B breaker trips and the 'Shunt Trip Signal Present' light is illuminated. The KB-B relay is picked-up and the KB-A, KB-C and KB-D relays are not picked-up. ✓ Yes □ No Jumper across points TBD2-1 & TBD2-2. ✓ Yes □ No	Channel D breaker trips and the 'Shunt Trip Signal Present' light is illuminated. The KB-D relay is picked-up and the KB-A, KB-B and KB-C relays are not picked-up. ✓ Yes □ No	Applied voltage = 125 VDC and 120 VAC control power to the switchgear. All breakers charged? Yes

PASS CT 7/22/09

PASS CT 7/22/09

PASS CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DA	ATA SHEET PRE-SEIS	SMIC D POST-SEISMIC D VERIF	
TEST DATA FOR: VP- <u>PZ4</u>	Rev:6	Job #: 069- 10327 P.E: PE	Cat ID#: NA
tem Description: Switchgear,	480VAC, 3Φ, 3W, 800A with NT c	ircuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC# 6 Anti-Pump (Operation		
CC# 7 Breaker Inte	rlocks		
Critical characteristic (CC#)	CC# <u>6</u>	CC#6	CC#7
Test Temperature	NA	N/A	N _A
Test surface: V=Vertical, H=Horizontal	Н	H	Н
QC Setup check (if applicable)	NA	β(_A	NIA
S/N: <u>25570-001-0000</u> 1	Applied voltage = 125 VDC and 120 VAC control power to the switchgear.	Released the close signal and then reapply the close signal and the breaker closed when close signal was reapplied.	Breaker for Channel A racked to the TEST position and closed.
	All breakers charged? Yes	Breaker B operates the same? ☐ True ☐ False Breaker C operates the same? ☐ True ☐ False Breaker D operates the same? ☐ True ☐ False	Attempted to rack the breaker to the CONNECT position. Breaker racking tool cannot be inserted into the breaker unless TRIP button is pushed. True
	PASS CT 7/22/09	PASS CT 7/22/09	PASS CT TZZ/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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UCLEAR LOGISTICS INC							
TEST DATA FOR:	VP- <u>PZ4</u>	_Rev:6	_Job #: <u>_069-</u> _I	0327	_P.E:	Cat ID#: NA	
Item Description:	Switchgear, 480VAC, 3Ф, 3W,	800A with NT	circuit breakers	_Manufacturer:_	Square-D	Model/Part No.: P2-4	
CC# <u>8</u>	Breaker UV Trip Voltage		CC#				
CC# <u>9</u>	Remote close test		CC#				
Critical characteris	tic (CC#) CC#	8		CC#9		CC#9	

	Critical characteristic (CC#)	CC#8	CC# <u>9</u>	CC# <u>9</u>
	Tot Town and the	111		
	Test Temperature	NIA	NA	N) _A
	Test surface:	Н	H	, H
	V=Vertical, H=Horizontal			
	QC Setup check (if applicable)	2/10	NA	PIA
		Applied voltage = 125 VDC	All breaker test switches in the NORMAL	Applied voltage = 90 VAC to TBB1-1 &
56 of 190	S/N: 25570-061-00001	and 220 VAC control power to	position.	TBB1-2 and TBD1-1 & TBD1-2.
)f]		the switchgear.	✓Yes □ No	
06				The 27A, B, C & D relays are reset?
İ		Breaker A charged and closed?	Applied voltage = <u>90</u> VAC across	of Yes □ No
	•	Y Yes □ No	points TB5-1 & TB5-2.	
		D 1 4. · · · · · · · · · · · · · · · · · ·	9- 440	Attempt to close all breakers. No breakers
		Breaker A trips at 49.4 VAC	Applied voltage = 95 VAC to points TB40-1 & TB40-4 and TB40-2 & TB40-	closed? ☑ True ☐ False
		Breaker B trips at SO.6 VAC	5, TB41-1 & TB41-4 and TB41-2 & TB40-	☐ False
	•	Breaker B trips atVAC	TB41-5.	Jumpers across points TBA3-3 & TBA3-4,
		Breaker C trips at 49.5 VAC	11541-5.	TBC3-3 & TBC3-4, TBB3-3 & TBB3-4
		Broader & trips at	Applied voltage = 90 VDC to TBA-1 &	and TBD3-3 & TBD3-4.
	•	Breaker D trips at 49.3 VAC	TBA-2 and TBC-1 & TBC-2.	□Yes □ No
			4	
			Applied voltage = 90 VAC to TBA1-1	Attempt to close all breakers electrically.
ı			& TBA1-2 and TBC1-1 & TBC1-2.	No breakers closed?
			6	☐ True ☐ False
			Applied voltage = 90 VDC to TBB-1 &	
	•		TBB-2 and TBD-1 & TBD-2.	
				<u> </u>

PASS CT 7/22/09 PASS CT 7/22/09 NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA FOR: V	P- <u>PZ4</u>	· 	_Rev:6	Job #: 069-10327	P.E: <u>CT</u>	Cat ID#:!	N/A
Item Description:S	Switchgear, 4	180VAC, 3Ф, 3W,	800A with NT c	ircuit breakers Manufacturer:	Square-D	Mo	del/Part No.: P2-4
CC# <u>9</u> <u>F</u>	Remote close	test		CC#			
CC# <u>10</u> <u>F</u>	'roper Opera	tion of Trip Confir	m Circuit	CC#			
Critical characteristic	; (CC#)	CC#)	CC#10_			CC#10
Test Temperature		AL		Alh			AlA
Test surface: V=Vertical, H=Horiz	vontal	H	Į.	Н			Н
QC Setup check (if a	pplicable)	Ala		AL			NIA
S/N: 16570-001-00	<u> </u>	Jumper across po TB5-7. VYes	oints TB5-6 &	All breaker test switches in the position. Yes No	e NORMAL	TBB1-2 and T	e = <u>90 VAC to TBB1-1 & BD1-1 & TBD1-2.</u> & D relays are reset?
		Close all breakers All breakers close True	•	Applied voltage = <u>90</u> VAC points TB5-1 & TB5-2 and TB TB1-2.	31-1 &	Jumpers across TBC3-3 & TBC	□ No s points TBA3-3 & TBA3-4, C3-4, TBB3-3 & TBB3-4
				Applied voltage = <u>90</u> VAC TB40-1 & TB40-4 and TB40- 5, TB41-1 & TB41-4 and TB4	2 & TB40-	and TBD3-3 & ☑ Yes	: TBD3-4. □ No
				TB41-5. Applied voltage = 90 VDC	to TRA-1 &	Jumper across	points TB5-6 & TB5-7. □ No
				TBA-2 and TBC-1 & TBC-2.		TB1-3 & TB1-	points TB1-3 & TB1-4 and 5.
	ļ			Applied voltage = <u>90</u> VAC 1& TBA1-2 and TBC1-1 & TI		L'Yes	□No

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TBB-2 and TBD-1 & TBD-2.

Applied voltage = <u>\fo</u> VDC to TBB-1 &

PASS CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA FOR: VP-PZ4	Rev:6	Job #: 069-10327 P.E: CT	Cat ID#: NA
Item Description: Switchgear, 4	4 <u>80VAC, 3Ф, 3W, 800A with NT с</u>	ircuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC# 10 Proper Oper	ation of Trip Confirm Circuit		
CC#		CC#	
Critical characteristic (CC#)	CC#10	CC#10_	CC#10
Test Temperature	N/A	NA	NA
Test surface: V=Vertical, H=Horizontal	H .	Н	Н
QC Setup check (if applicable)	11/2	hlY	NA
S/N: <u>25570-001-000</u> 01	Breaker A closed? Yes □ No 'Train A Trip Confirm Status'	'Train A Trip Confirm Status' light is illuminated. ☐ True ☐ False	Breaker B & D closed? DYes No 'Train A Trip Confirm Status' light is
	light is not illuminated. True	Breaker B closed? Ves □ No	illuminated.
	I Irue I Faise	□ Yes □ No	True 🗆 False
	Breaker A open? ☐ Yes ☐ No	'Train A Trip Confirm Status' light is not illuminated.	Jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5.
	Breaker C closed?	☐ True ☐ False	□Yes □ No
	☐Yes ☐ No	Breaker B open? Yes □ No	Jumper across points TB5-3 & TB5-4 and TB5-3 & TB5-5.
	'Train A Trip Confirm Status' light is not illuminated.	Breaker D closed?	☑ Yes □ No
	☐ True ☐ False	☑Yes □ No	Breaker A closed? □ Yes □ No
·	Breaker A & C closed?	'Train A Trip Confirm Status' light is not illuminated.	'Train B Trip Confirm Status' light is not
		☐ True ☐ False	illuminated.
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NOTE: Initial and date af	• •	ndicate Pass or Reference DR#.	Page 19 of 26 Form No. T-1004, Rev. 6

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NUCLEAR LOGISTICS INC	DATA SHEET LIPRE-SEISI	MIC L POST-SEISMIC LE VERIFIC	CATION LI OTHER
TEST DATA FOR: VP-PZ	4Rev:6	Job #: <u>069-10327</u> P.E: <u>CT</u>	Cat ID#: NA
Item Description: Switch	gear, 480VAC, 3Ф, 3W, 800A with NT c	ircuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC#10 Proper	Operation of Trip Confirm Circuit		· · · · · · · · · · · · · · · · · · ·
CC#		CC#	
Critical characteristic (CC#)	CC#10	CC# <u>10</u>	CC#10
Test Temperature	N/A_	NL	NIA
Test surface: V=Vertical, H=Horizontal	H	Н	Н
QC Setup check (if applicable)	NA	NA	NIA
3 S/N: <u>25570-001-000</u> 1		'Train B Trip Confirm Status' light is not illuminated. ☑ True ☐ False	All breakers closed? ☐ Yes ☐ No
	Breaker C closed? ☑Yes □ No	Breaker B open? Breaker D Closed?	'Train A & B Trip Confirm Status' lights are illuminated. ☐ True ☐ False
	'Train B Trip Confirm Status' light is not illuminated.	'Train B Trip Confirm Status' light is not	Breakers A & B open?
	☐ True ☐ False	illuminated. □/True □ False	☐Yes ☐ No
	Breaker A & C closed? ☑ Yes □ No	Breaker B & D closed?	'Train A & B Trip Confirm Status' lights are not illuminated.
	'Train B Trip Confirm Status' light is	☑Yes □ No	☐ True ☐ False
	illuminated.	'Train B Trip Confirm Status' light is illuminated.	Breakers A & B closed? ☐ Yes ☐ No
	☐ True ☐ False	☐ True ☐ False	Lifes Lino
	Breaker B closed?	Jumper across points TB1-3 & TB1-4 and TB1-3 & TB1-5.	'Train A & B Trip Confirm Status' lights are illuminated. □ True □ False

| Yes | Jumper across points 1B1-3 & TB
| TB1-3 & TB1-5. | Yes | No
| No
| Pass cr 7(22/09 | Vass cr 7/22/09 |
| NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TUCLEAR LOGISTICS INC			•
TEST DATA FOR: VP- <u>PZ4</u>	Rev:6	Job#: 069-10327 P.E: CT	Cat ID#: NA
Item Description: Switchgear, 4	180VAC, 3Ф, 3W, 800A with NT c	ircuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC# 10 Proper Opera	tion of Trip Confirm Circuit		
CC#		CC#	·
Critical characteristic (CC#)	CC#10	CC#10_	CC#10
Test Temperature	NIA	NIA	NA
Test surface: V=Vertical, H=Horizontal	H	H	H
QC Setup check (if applicable)	7/4	NA	ALA
S/N: 255 70 - 001-00001	Breakers A & D open? Yes	Breakers C & B open? Yes	Breakers C & D open? Yes □ No 'Train A & B Trip Confirm Status' lights are not illuminated. True □ False Breakers C & D closed? Yes □ No 'Train A & B Trip Confirm Status' lights are illuminated. True □ False

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DA		SMIC D POST-SEISMIC D VERIFI	CATION OTHER
TEST DATA FOR: VP- <u>PZ4</u>	Rev:6	Job#: 069-10327 P.E: CT	Cat ID#: 1/A
tem Description: Switchgear,	480VAC, 3Ф, 3W, 800A with NT c	ircuit breakers Manufacturer: Square-D	Model/Part No.: <u></u> P2-4_
CC#10 Proper Opera	ation of Trip Confirm Circuit	CC#	
CC#		CC#	
Critical characteristic (CC#)	CC#10	CC#10_	CC# <u>10</u>
Test Temperature	7/4	1/4	7/2
Test surface: V=Vertical, H=Horizontal	Н	H	Н
QC Setup check (if applicable)	4/4	NIA	NIA
S/N: 25570-001-00001	Jumper removed from TB1-3 & TB1-4 and TB5-3 & TB5-4. ✓ Yes □ No	Jumper removed from TB1-3 & TB1-4 and TB5-3 & TB5-4. ✓ Yes □ No	Jumper removed from TB1-3 & TB1-5 and TB5-3 & TB5-5. √Yes □ No
	Breaker B Open? ✓ Yes □ No	Breaker D open? ☑ Yes □ No	Breaker A open? ☑ Yes □ No
	'Train A & B Trip Confirm Status' lights are not illuminated.	'Train A & B Trip Confirm Status' lights are not illuminated. ✓ True □ False	'Train A & B Trip Confirm Status' lights are not illuminated. ☑ True □ False
	☐ True ☐ False Jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4.	Jumper across TB1-3 & TB1-4 and TB5-3 & TB5-4.	Jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5. ☑ Yes □ No
		Breaker D closed? ☑ Yes □ No	Breaker A closed? ☑ Yes ☐ No
	'Train A & B Trip Confirm Status' lights are illuminated.	'Train A & B Trip Confirm Status' lights are illuminated.	'Train A & B Trip Confirm Status' lights are illuminated. True False

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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TEST DATA SHEET

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NUCLEAR LOGISTICS INC			
TEST DATA FOR: VP-PZ4	Rev:6	Job#: 069-10327 P.E: CT	Cat ID#:^ A
Item Description: Switchgear,	480VAC, 3Φ, 3W, 800A with NT c	ircuit breakers Manufacturer: Square-D	Model/Part No.: PZ-4
CC#10 Proper Opera	ation of Trip Confirm Circuit	CC#	·
CC#		CC#	
Critical characteristic (CC#)	CC#10	CC#10_	CC#10
Test Temperature	NA	P/V	NA
Test surface: V=Vertical, H=Horizontal	H	Н	Н
QC Setup check (if applicable)	NA	NA	NA
S/N: <u>25570-001-00001</u>	Jumper removed from TB1-3 & TB1-5 and TB5-3 & TB5-5. ✓ Yes □ No	Jumper removed from TB1-3 & TB1-4, TB5-3 & TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5.	'Train A & B Trip Confirm Status' lights are illuminated. □ True □ False
·	Breaker C open? ☑ Yes □ No	'Train A & B Trip Confirm Status' lights are not illuminated.	Breaker A closed? Yes □ No
	'Train A & B Trip Confirm Status' lights are not illuminated.	☐ True ☐ False Jumper across TB1-3 & TB1-4, TB5-3 &	Breaker B open? ☑ Yes □ No
·	□ True □ False	TB5-4, TB1-3 & TB1-5 and TB5-3 & TB5-5.	'Train A & B Trip Confirm Status' lights are illuminated.
	Jumper across TB1-3 & TB1-5 and TB5-3 & TB5-5.	☐ Yes □ No	☐ True ☐ False
	l Yes □ No	'Train A & B Trip Confirm Status' lights are illuminated.	Breaker B closed? BY Yes D No
	Breaker C closed? ☑ Yes □ No	√True □ False	
	·	Breaker A open?	
	'Train A & B Trip Confirm Status' lights are illuminated.	☑Yes □ No	
	☑ True ☐ False		PASS CT 7/22/09

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NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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UCLEAR LOGISTICS INC			Cat ID#: 1/4
TEST DATA FOR: VP- <u>PZ4</u>	Rev:6	Job #: b 69-(0327 P.E: CT	Cat ID#: " \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
Item Description: Switchgear,	180VAC, 3Ф, 3W, 800A with NT	circuit breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC# 10 Proper Opera	tion of Trip Confirm Circuit	CC# 12 Hi-Pot Test	ting (Switchgear Assembly)
CC# 11 CPT Operation	on .	CC#	
Critical characteristic (CC#)	CC#10	CC#11_	CC#12
Test Temperature	N/A	N _A	N)A
Test surface: V=Vertical, H=Horizontal	Н	Н	Н
QC Setup check (if applicable)	NA	N/A	Ø A
S/N: 25570-001-00001	Breaker C open? Yes	Applied voltage to primary of CPT =	Verify that AC High Pot. testing was performed in accordance with Square-D procedure Form 87-0816R for "Low Voltage Switchgear." Yes No
	PASS CT 7/22/09	points TB11-1 & TB11-2.	PASS CT 7/22/09

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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Check off appropriate tests:
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UCLEAR LOGISTICS INC	TA SHEET LIPRE-SEISMIC	L POST-SEISMIC LA VERIFICA	ATION LI OTHER
TEST DATA FOR: VP- <u>PZ4</u>	Rev:6Job #	#: <u>069-10327</u> P.E: <u>CT</u>	Cat ID#: NA
Item Description: Switchgear, 4	80VAC, 3Φ, 3W, 800A with NT circuit	breakers Manufacturer: Square-D	Model/Part No.: P2-4
CC# 12a Megger Testin	ng (Switchgear control wiring) CC#		
CC# 13 AC Hi-Pot Te	esting (Circuit Breakers) CC#		·
Critical characteristic (CC#)	CC# <u>12a</u>	CC# <u>13</u>	CC#
Test Temperature	NA	NA	NIA
Test surface: V=Vertical, H=Horizontal	Н	Н	H
QC Setup check (if applicable)	NIA	A	NA
S/N: <u>25570-001-00001</u>	Voltage Applied = 1250 VDC Control circuit (DC) of switchgear. R \geq 1840 M Ω Control circuit (AC) of switchgear. R \geq 1840 M Ω	Voltage Applied = 27.00 VAC Breaker Closed Phase to Ground Pass/Fail: PASS Phase to Phase Pass/Fail: PASS Breaker Open ΦA Line to ΦA Load Pass/Fail: PASS ΦB Line to ΦB Load Pass/Fail: PASS ΦC Line to ΦC Load Pass/Fail: PASS	

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TEST DATA FO	R: VP- <u>PZ4</u>	Rev: 6	_Job #:_	069-1035	.7 P.F	E: CT Cat ID#: NK	4	
Item Description:	, 480VAC, 3Ф, 3W, 800	A with NT circ	uit break	ersM	anufacturer: Sq	uare-D Model/Part No.	: PZ-4	·
Check appro □All Items	ID passed below.	Qty passed:	φ		ify below: 🛱 Yes	□No □N/A		- -
		25570-001-	00001				·	
S/Ns or ID# VP- 724	ь	DR# 06910327-0- 06910327-0- 06910327-0- 06910327-0-	5	MAcceptal MAcceptal MAcceptal	ble	otable Initials/Date by PE: otable Initials/Date by PE: otable Initials/Date by PE: otable Initials/Date by PE: otable Initials/Date by PE:	CT 7/2	109 2109 2109 2109
Record All M&T								
NLI MTE#	Description		Cal. D	ue Date	NLI MTE#	Description		Cal. Due Date
HIPO-NUK	AC HI-POT		251	0				
1176	STOPWATCH		12/1/9					
MEG- NUK	MEGGEL		5/7/10				· · · · · · · · · · · · · · · · · · ·	,
256 526	DMM		2/27/0					
Windate M&TE log on computer CT 7/32/69								
NOTES:					Verified by:	M	D	ate: 7/22/09 ate: 1/28/09
	•				Approved by:	- and	Da	ate: 649

NOTE: Initial and date after performance of each CC#. Indicate Pass or Reference DR#.

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CERTIFICATE OF FACTORY TESTS Low Voltage Switchgear

Purchased By:	N.L.I. / TMI	_ P.O. Number:	N.L.I.# 0025570	
Job Name:	Three Mile Island Reactor Trip Switchgear	Factory Order Number:	24769954-003	
Job Location:	Three Mile Island Nuclear C	Generating Station	n, Pennsylvania	
Unit Description:	2 Section – 4 Non-Auto Sw	itches – 600V Swi	tchgear	
Designation:	Reactor Trip Switchgear			
Descrip	tion of Tests	Tested and Accept	ted By	Date
Inspection of Swi Factory/Production	tchgear on tests as required by applicat	Gary Ragle		07/23/09
A. Dielectric Test		Gary Ragle		07/23/09
B. Mechanical Op	peration	Gary Ragle)	07/23/09
C. Electrical Oper Tests	ration/ Control Wiring	Gary Ragle	<u> </u>	07/23/09
D. Ground Fault I	Protection	N/A		
	he above tests have been perfo umber, and that this equipment			
Gary Ragle			y 23, 2009	
Signature		Date		
Sr. Mechanical I	Engineer	· .		
		Respectfully sub	mitted,	
		SQUARE D COM		MERICA

WEST CHESTER, OH



Power Zone 4 Test Inspection Report

Factory Order:	24769954	Line Item:	003	Date:	07/23/2009
Total Sections	2	Total Cells/Prepared/Unprepared	4		

	<u>Instructions</u>
G	eneral Instructions:
•	For detailed instructions, see procedure for inspection of switchgear (DCP 4.9-300 and 4.9-300-B).
•	DCP are located in the local Document Control directory
•	Mark every item on this form.
•	Use job drawings and documents, as well as design engineering documents, bills and specifications as inspection guides.
	Place a red check mark on each symbol or description on the drawing or document as each item is inspected.
•	If additional inspection procedures are required, attach a copy to this inspection report.

	Prerequisites	Approved (Y,N or N/A)
1.	In-Process Inspection:	
	Assembly in-process inspection sheets have been completed.	N/A
	Assembly point-to-point wiring check sheets have been completed.	Y

	Enclosure	
2.	General:	
	Number and location of shipping splits agree with record drawings.	Y
	Provision for rolling, jacking, lifting enclosure provided per Bulletin 80298-002 series and agree with	Y
	record drawings.	
	Enclosure type, overall dimensions, layout agrees with record drawings.	Y
	Conduit entrance location/size agrees with record drawings.	Y
	Seismic requirements comply with site specific requirements.	Qualified
	Record drawing general notes have been verified as complete.	Υ
3.	Paint:	
	General appearance (complete coverage, no scratches, no dents, orange peal in visible areas).	Y
	Paint color agrees with record drawings.	Υ
4.	Traveling Lifter:	
	Device and crank function properly.	N/A
	Traveling lifter rails included.	N/A
5.	Cell/Rear Doors:	
	Fit and open/close smoothly. Check doors for squareness.	Y
	Door latches work properly. Latches with locks are located on correct compartment(s).	Y
	Rear doors fit and operate smoothly. Latches with locks are located on correct section(s). Padlock	N/A
	provisions are located on the correct section.	
6.	Labels:	
	Switchgear rating nameplate data (enclosure type, electrical rating information) agrees with drawing.	Y
	Special markings (customer nameplates, mimic bus, etc.) attached and located per order records.	Y
	UL Standard or Service Entrance label attached and information is verified when inspection is	N/A
ļ	complete. All features are in accordance with latest UL procedures and standards.	
	General DANGER label and other DANGER, CAUTION, and WARNING labels	Y
	attached per 80298-032-R1.	
	UL labels are affixed only to applicable switchgear sections.	N/A
1	Instruction labels are affixed per 80298-009-R1.	Y
	Handling labels affixed per 80298-009-R1.	Y
	Multiple Source Disconnect label affixed per 80298-009-R1.	N/A
	Hazard labels attached to all removable panels that permit access to energized parts per 80298-009-R1.	Y
	All labels installed straight.	Y

	·	Approved (Y,N or N/A)
7.	Barriers:	
	UL Service Entrance barriers installed per record drawings.	N/A
	Rodent barriers installed per record drawings.	N/A
	Other internal barriers installed per record drawings.	N/A
	IWR Barriers, if necessary, are installed and painted black per 80287-DS-001	N/A
8.	Circuit Breaker Cells:	
	Quantity and location of circuit breaker cells agrees with record drawings.	Y
	6 disconnect rule: Certain customer jobs will utilize the six disconnect rule described in NEC. Record	N/A
	drawings shall show blank cells for any breaker cells over 6.	
9.	Prepared Space:	
	Quantity and location of prepared circuit breaker cells agrees with record drawings.	N/A
L	Plate is installed in the breaker escutcheon cut-out of the breaker cell door with Hazard label.	N/A
10.	Gasketing:	
	Quantity and location correct per enclosure type and standard records.	N/A
	Securely glued or otherwise attached.	N/A
11.	Blank/Instrument Cells:	ARREST SERVICE
	Quantity and location agrees with record drawings.	Y
12.	Circuit Monitors, Metering, Other Components:	是的推翻的
	Circuit monitors located per record drawings.	N/A
	Other devices (transformers, pilot lights, etc) location agrees with record drawings.	Υ
1	All other metering located per record drawings.	Y
	Devices are mounted such that proper electrical spacing are maintained per Table 1 or 2 below.	Y

Inspected By: Gary Ragle – Sr. Mechanical Engineer

Date: 07/10/2009

Table 1. US Minimum Acceptable Spacing

Voltage	Live Parts of Opposite Polarity	Live Parts of Opposite Polarity	Live Parts to Ground
	Through-Air (in.)	Over Surface (in.)	(in.)
≤ 125	1/2	3/4	1/2
126 - 250	3/4	1 1/4	1/2
251 - 600	1	2	1*

^{*}A through-air spacing of not less than ½ inch is acceptable:

- 1. at a circuit breaker or a switch (excluding a snap switch).
- 2. uninsulated live parts of a meter-mounting base and grounded dead metal.
- 3. between grounded dead metal and the neutral of a 277/480 volt, 3-phase, 4-wire switchboard.

Table 2.

Canadian Minimum Acceptable Spacing

		Canadami i i i i i i i i i i i i i i i i i i			
Voltage	Live Parts of C	Opposite Polarity	Live Parts and gro	ounded dead metal	
	Through-Air (in.)	Over Surface (in.)	Through-Air (in.)	Over Surface (in.)	
0-120	1/2	3/4	1/2	3/4	
121 - 240	3/4	1 1/4	3/4	1	
241 - 480	7/8	1 3/4	7/8	1-3/8	
481 - 600	1	2	1	1-1/2	

Where a neutral is involved, the spacing between the neutral and other current-carrying parts may be based on the lower voltage that normally occurs between them.

The spacing from neutral to grounded metal parts is to be the same as those between the other conductors and grounded metal parts.

	Mechanical	Approved (Y,N or N/A)
13.	Hardware:	
	The following hardware is included and located:	
	Bus splices Qty: Location:	N/A
	Bolts Qty: Location:	N/A
	Frame connection bolts	Y
14.	Unit Substation Transformer Connections:	
	Connection location and phasing agree with record drawings and Unit Sub Group Coordination Sheet.	N/A
	Connections are labeled.	N/A
	Frame bolt holes are sized and located according to record drawings.	N/A
	Adapter bus and/or flexible braided connectors included (80283-DS-001).	N/A
15	Bus:	
	Phase sequence, material, plating type, ampacity, configuration, location, and bracing agree with record drawings, Data Sheet and notes or as marked.	Y
	Bus spacing and clearances (Table 1 or 2) shall agree with the standards.	Y
i	Lug sizing and position agree with record drawings.	Υ
	Bus configuration agrees with record drawings.	Y
	Provision for bus extension and future connections (80282-DS-001) agree with record drawings.	N/A
	Insulated bus complies with 80282-DS-005.	N/A
	Busduct connection location and phasing agree with record drawings.	See pg. 8
	Bus supports are correct for AIC rating and/or per Eng Bulletin SD250.001A.01 (14 March 02)	Y
	Neutral bus connected to ground bus only in Service Entrance section only.	N/A
}	Electrical joints have been torqued (60-70 ft-lbs.) and marked. Conical washers on both sides of joint.	Y
	Contact area per engineering records or based on 200A per square inch if a special bussing joint.	
	If bus passes through a metal partition, all phase and neutral bus of the same circuit are routed through same opening (UL891 13.9.6).	N/A
	Ground bus is present and location agrees with record drawings.	Y
	If UL Service Entrance is required neutral disconnect link, main bonding jumper, grounding electrode are installed per record drawings.	N/A
	Cable bending space per UL 1558.	Y
	Bus plating is clean and is not flaking, loose, rough, or wrinkled (80065-DS-004, 005 or 008).	Y
16.	Circuit Breakers:	
	Rack-out/in freely.	Y
	Frame size, quantity, trip unit, and accessories agree with record drawings.	Y
}	Breaker Cell Shutter Assemblies operate correctly.	Y
	General appearance is undamaged and clean.	Y
17.	Key Interlocks:	
	Sequence tested correctly.	N/A
	Keys located for shipping: Section Cell	N/A
18.	Sensors	
	Current transformers and voltage transformers are located and oriented correctly.	N/A
	Current transformers and voltage transformers have correct ratios.	N/A
	Ground fault current transformers have correct ratios and are located and oriented correctly.	N/A

a		_	
Inspected By:	Gary Ragle – Sr. Mechanical Engineer	Date:	07/10/2009

	Electrical	Approved (Y,N or N/A)
19.	High Potential (Dielectric) Test: Before performing this test, disconnect all coils, transformers, pilot	
	devices, PLC's, fuses, meters, circuit monitors, and trip units.	
	Power circuit bus insulation tested at 2500 Vac for 1 minute. Test each phase to phase, phase to neutral,	Y
	and phase to ground. (ANSI C37.20,C37.51)	
	Neutral to ground circuit bus insulation tested at 1800 Vac for 1 minute. (ANSI C37.20,C37.51.7.4)	N/A
	Control wiring continuity test correctness verified by either:	Y
	Actual electrical operation of component	
	2. Individual circuit continuity checks (ANSI C37.51.7.4)	
	Polarity test: ensure meters, instrument transformers and relays are connected with the correct polarity.	Y
20.	Fuses inspected for location, rating, continuity, and labeled per UL1558.	Y
21.	Device function numbers agree with record drawings and actual device function.	Y
22.	Metering:	
	Door mounted electrical components over 42V to ground to be properly guarded.	N/A
	Ammeters and ammeter selector switches function properly and labeled.	N/A
	Voltmeter and voltmeter switches function properly and labeled.	N/A
	Circuit monitors and other meters function properly and labeled.	N/A
23.	Control Circuitry:	
	Control circuit wiring and shielded wiring are bundled separately and routed separately.	N/A
	Wire is not routed over hinged mounting areas or venting/arcing areas of the circuit breakers.	Y
	Wire strip length is correct (no exposed conductors at lug).	Y
	Crimp lugs are sized correctly for wire gauge.	Y
	Wire size agrees with standards.	Y
	Spacing agrees with UL 1558.	Y
	All control transformers have correct voltage, current, VA rating, and ratio.	Y
	Sufficient slack is present for all wiring routed on doors to permit easy door operation.	Y
	Breaker communications verified operational. Shield is grounded at one end only. If equipment is	N/A
	Transparent Ready, determine TRE level from order documentation (TRE-1,2,3). Retrieve TRE plant	
	procedure document from intranet and complete appropriate TRE checklist. Attach completed	
	checklist to test record.	
	Control circuit or Automatic Transfer Scheme operation functioning properly (C37.20.1, C37.51.7.4).	N/A
1	All systems requiring wire labels are covered in data sheet 80301-DS-001. Certain customers require	Y
	wire labels and this will be stated on the record drawings.	
24.	Ground Fault:	
	Ground fault wiring agrees with record drawings.	N/A
	Tests shall be conducted for switchgear incorporating MDGF ground fault protection equipment to	N/A
	determine the system functions. (UL1558, ANSI C37.20.1, UL file E201954) Signed and dated record	
	of the test <u>must</u> be made on the label inside the section door.	
25.	Strip heater circuitry functioning properly (Data Sheet 51210).	N/A
26.	Power Circuit Phasing:	
	Verify electrical continuity and phasing of power circuits to insure that there is no phase reversal,	Y
	unless specified. Power wiring continuity must exist as specified on engineering records.	TO THE RESERVE TO THE
27.	Circuit Breakers:	
	Circuit breaker electrical options (charging motor, aux contacts, ring tongue lugs, etc) work properly.	Y
	Circuit breaker secondary contacts position and wiring agrees with record drawings.	Y
	Mechanical operation of the breaker and accessories (shunt trip, aux contacts, alarm contacts, indicator	Y
	lights, charging/discharging) are correct.	ļ <u>- :</u>
	Ir trip setting set to 1, all others set to minimum or to values specified by coordination study/customer	N/A
	specification.	
	Circuit breakers are tagged per compartment location when required by customer specifications or	N/A
	shipped separately.	<u> </u>

		Approved (Y,N or N/A)
28.	Circuit Breaker Interlock Verification (Complete for all breakers installed in the switchgear):	AAFKI TOM
	Place the breaker in the "Open-Discharged" position. Verify the breaker cannot be charged.	Y
	Place the breaker on extended cradle rails. Push the breaker into the "Disconnected Position".	Y
	Charge the breaker. Push the "Close" button. Verify the breaker closes.	Y
!	Press the "Push To Open" button. Verify the breaker opens.	Y
	Insert the crank. Rack-in the breaker to the "Test" position.	Y
	In "Test Position, withdraw the crank. Verify the "Push To Open" button returns to the normal position.	Y
ļ	Charge, then Close and Open the breaker and charge again.	Y
	Re-insert the crank, push in the "Release" button and rack-in the breaker to the "Connected" position.	Y
	During the travel to the Connected position, verify the breaker cannot be closed.	Y
	Crank to "Connected" position. Withdraw the crank. Verify the "Push To Open" button returns to the normal position. Close the breaker by pressing the "Push To Close" button.	Y
	Verify the crank cannot be inserted without depressing the "Push To Open" button breaker must open. Insert the crank; press the "Release" button. Charge breaker then crank the breaker to the "Test" Position.	Y
	During the travel to the "Test" position, verify the breaker cannot be closed.	Y
	In the "Test" position, withdraw the crank. Verify the "Push To Open" button returns to the normal position. Charge, Close and then Open the breaker and charge again.	Y
	Insert the crank, press the "Release" button and crank out the breaker to the "Disconnected" position.	Y
	In the "Disconnected "position, remove the crank and verify that: a) The "Push To Open" Button returns to normal position.	Y
	b) The latch on the right of the cradle trim cover moves allowing the extraction of the right rail.	1
	Press the "Push To Close" button. Verify the breaker closes. Charge it again.	Y
	Extract the breaker from the cradle. Verify the breaker opens and discharges.	Y
		Y

	Inspected By:	Gary Ragle - Sr. Mechanical Engineer	Date:	07/23/2009	
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		Approved (Y,N or N/A)
	Before Shipping	TATELY STATE
31.	All doors are closed with latches engaged, and lay flat.	Y
32.	Manuals and latest record drawings are in Customer Documentation Package and located in switchgear. Location: Section Cell	N/A
33.	For orders with MDGF, Instruction Bulletin 80043-703-01 is included in the Customer Documentation Package.	N/A
34.	Record on page 8 all UL label serial numbers applied to this equipment.	N/A
35.	All spare parts and all parts that ship with but are not installed in the gear are present and ready to be sent to shipping.	Y
36.	Structure	
	All fasteners used to assemble the structure are secure.	Y
	All cover panels fit and are properly installed. Special covers to meet the requirements of access plates described in ANSI C37.20.1.6.5.	Y
	Cleanliness, clear of debris: All sections should be free of dirt, moisture, lubricants, packaging etc. before packout. Loose metal parts such as hardware and tools should never be left in a section.	Y
37.	Record on page 7 the Catalog Number and Serial Numbers of all circuit breakers and cradles to be installed in this equipment.	Y
38.	Mechanical	der eine eine eine
	Verify the main bonding jumper (neutral to ground) is disconnected if the equipment is labeled as "Suitable for Use as Service Equipment".	N/A
39.	Electrical	
	All shorting terminal blocks have shorting pins installed.	N/A
40.	Attach copies the record drawings used to inspect this order. Attach copy of any ship short items approved by the customer.	N/A
41.	Each section shall have handling labels, per label placement drawing 80298-009-R1, affixed that gives the customer information on proper movement of the structure.	Y

Inspected By: Gary Ragle – Sr. Mechanical Engineer Date: 07/23/2009

	Packaging Packaging	BEFERVIORS
42.	Correct size and placement of skids, wrapped	RECUES:
	When complete and covers are installed, the section must be properly packaged for shipment. Care must be used to insure multiple sections in a truck will not damage each other.	Y
43.	Circuit Breakers	
	All 6-pole breakers are securely mounted in their shipping crates. All 3 pole breakers are fully racked-in the cells. All breaker-charging springs are discharged, and breaker is open.	N/A

Inspected By:	Gary Ragle - Sr. Mechanical Engineer	Date:	07/23/2009
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Circuit Breaker Model and Serial Numbers

	Circuit Breaker Model and Serial Numbers					
Cell	Model Number	Serial Number	Catalog Number			
<u>1B</u>	NT08NA	064091496104	TA2AARNNX9AFFFXCJAN			
<u>1D</u>	NT08NA	064091496101	TA2AARNNX9AFFFXCJAN			
<u>2B</u>	NT08NA	064091496102	TA2AARNNX9AFFFXCJAN			
<u>2D</u>	NT08NA	064091496103	TA2AARNNX9AFFFXCJAN			

Circuit Breaker Cradle Model and Serial Numbers

Cell	Model Number	Serial Number	Catalog Number
<u>1B</u>	NT08	064091084204	CTAAVV3BXAXXXXEFXXCNW
<u>1D</u>	NT08	064091084201	CTAAVV3BXAXXXXEFXXCNW
<u>2B</u>	NT08	064091084202	CTAAVV3BXAXXXXEFXXCNW
<u>2D</u>	NT08	064091084203	CTAAVV3BXAXXXXEFXXCNW
-			
		·	

UL Labels Applied to this Factory Order Line Item

Section	UL Label Number	Section	UL Label Number	Section	UL Label Number	Section	UL Label Number
	·					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

Ship Less Items Noted Below

	Description	NCR Number 0	
1.	Bus duct final design to be completed at a later date pending site measurements.		
2.			
3.	•		
4.	·		
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

Note 0 - A NCI	R may be substituted	with written approval	I from the Field Office.	Attach Field	Office approval to	this Report.

		•	
Recorded By:	Gary Ragle - Sr. Mechanical Engineer	Date:	

Verify the shutters operate without sticking or binding			
Masterpact Breaker Outside	66		
Record Breaker S/N: C6409/496/04	84609	·	
Verify the arc chutes mounting nut retainers are not missing and are properly installed.	6/16 M		
Verify the top of breaker is clean.	6/H090M		
Verify there are no cracks or chips in the breaker polyester case: Top, Sides, Back, Front, and Bottom.	QC.		
Verify the back insulator fins are not cracked.			
Verify the secondary block connects in test position	24-69		
Verify the secondary block housing "Locks-out" properly in	199		
the disconnected position.	6/1/00		
Verify the secondary block housing springs are silver in color.	CATOM IDM		
The state of the s	7QC		
Verify the secondary block housing springs are properly installed.	4/100 PM		
Verify the discharge interlock is properly installed – the			
return spring is installed.	6/1/00 DM		
Verify the rejection hardware is configured per the design			
drawings and properly tightened.	N/A		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks.	7°C	•	
Verify there are no cracks or chips.	LINDON		
Record grease color Red . Grease must be	(QC)		
red (Mobilith) or white (Kluber) Isoflex.	Willes		
Verify the electrical terminations are not loose.	6/1/09		
Verify all visible springs in the mechanism are connected	(30)		
and not loose.	6/1/00		
Verify all accessible fasteners are hand tight.	c/ittem		
	Sat	Unsat	Rework Satisfactory
Remove trip unit for mechanism assembly inspection.	(QC)		
Verify there are no cracked washers. Apply NLI seal on trip unit after inspection.	8 800	*	
Verify the cover is replaced and the mounting screws are snug.	GICLE TOM	-	
Verify the breaker cover mounting holes are not stripped.	cheton		
Verify the Open/Close pushbutton covers are in place after inspection complete.	CIXTORM		

·	
Verify all cover plates are installed -Verify torque/tightness of fasteners.	The stand
Verify the counter operates properly.	Cotton
Document counter reading W182	846.09
Verify breaker is discharged, open	K-4-08
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision).	CC
Verify the breaker data sheets filled out and signed.	est of
Verify the Data plate is installed. Record the Date of Manufacture	
No grease on primary and secondary disconnects.	CATA
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	GC TOM 6/2/67
Comments:	
MTE Used:	· · · · · · · · · · · · · · · · · · ·
Inspections Derformed by	Date: 8:4-09

Verify the shutters operate without sticking or binding			
Masterpact Breaker Outside			
Record Breaker S/N: 06409/496/02	8 1 29		
Verify the arc chutes mounting nut retainers are not missing	(00)		
and are properly installed.	4		
Verify the top of breaker is clean.	CHARDY		
Verify there are no cracks or chips in the breaker polyester	(00)		
case: Top, Sides, Back, Front, and Bottom.	CYNGO		
Verify the back insulator fins are not cracked.	LINOTIDM	-	
Verify the secondary block connects in test position	cliles		
Verify the secondary block housing "Locks-out" properly in	/oc		
the disconnected position.	Children		
Verify the secondary block housing springs are silver in	/ac		
color.	6MODEM		
Verify the secondary block housing springs are properly	(0)		
installed.	6/1/69		
Verify the discharge interlock is properly installed - the	TDM		
return spring is installed.	6/1/09		
Verify the rejection hardware is configured per the design			
drawings and properly tightened.	NA		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks.	/QC >		
Verify there are no cracks or chips.	2 KARN		
Record grease color Red . Grease must be	1/00		
red (Mobilith) or white (Kluber) Isoflex.	6 X ABOV		
Verify the electrical terminations are not loose.	LLAS		
Verify all visible springs in the mechanism are connected			
and not loose.	clipa		
Verify all accessible fasteners are hand tight.	6/MOBM)	-	
			Demonts
	Sat	Unsat	Rework Satisfactory
Remove trip unit for mechanism assembly inspection.	(°C)		
Verify there are no cracked washers.	6/2/09		
Apply NLI seal on trip unit after inspection.	6/2000M	· .	
Verify the cover is replaced and the mounting screws are	(40)		
snug.	CARN.		·
Verify the breaker cover mounting holes are not stripped.	6/8/88W)		
Verify the Open/Close pushbutton covers are in place after	(QC)	VA	
inspection complete.	6/2/09		ĺ

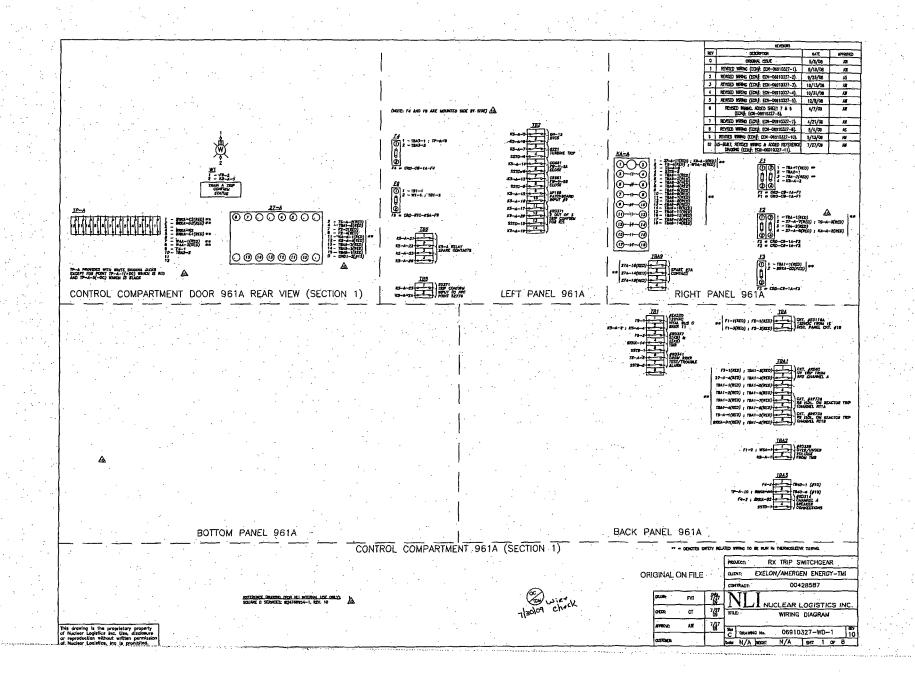
·	
Verify all cover plates are installed -Verify torque/tightness	(90)
of fasteners.	6/2/8
Verify the counter operates properly.	distant
Document counter reading 10112	\$29-04
Verify breaker is discharged, open	KHI3057
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision).	OC MAN
Verify the breaker data sheets filled out and signed.	rest con
Verify the Data plate is installed.	(ac)
Record the Date of Manufacture	Mars /
No grease on primary and secondary disconnects.	(WEA)
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	4/2/05
Comments:	
MTE Used:	
Inspections Performed by:	(QC) (RL) Date: 8-4-19

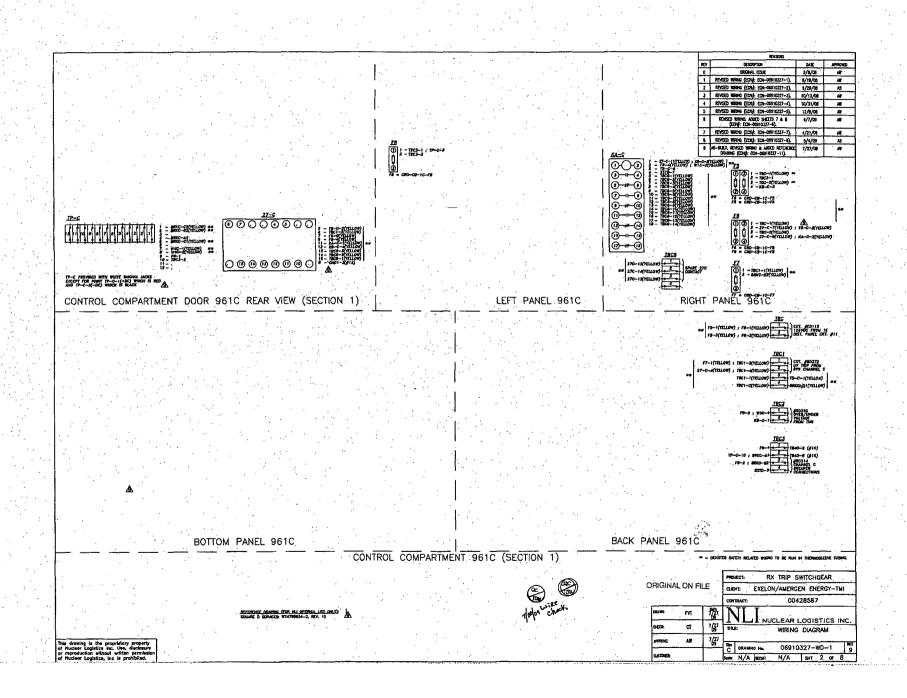
Verify the shutters operate without sticking or binding	T		
Masterpact Breaker Outside	QC		
Record Breaker S/N: 064091496/03	154 159	<u> </u>	
Verify the arc chutes mounting nut retainers are not missing	7ac		
and are properly installed.	4/000 PM		1
Verify the top of breaker is clean.	Most		
Verify there are no cracks or chips in the breaker polyester	70c		
case: Top, Sides, Back, Front, and Bottom.	children		
Verify the back insulator fins are not cracked.	c/sta DM		
Verify the secondary block connects in test position	E.4-09		
Verify the secondary block housing "Locks-out" properly in	1227		
the disconnected position.	C/IL TOM		
Verify the secondary block housing springs are silver in	Elita Pu		
color.	A THE CO		
Verify the secondary block housing springs are properly	70C		
installed.	6/HOPM		
Verify the discharge interlock is properly installed – the	(QC)		
return spring is installed.	C/NOT DIM		
Verify the rejection hardware is configured per the design			
drawings and properly tightened.	NA		<u> </u>
Masterpact Breaker Inside			·
With front cover removed, inspect breaker case for cracks.	(QC)		
Verify there are no cracks or chips.	6/1/0)	
Record grease color Red . Grease must be	/ QC		
red (Mobilith) or white (Kluber) Isoflex.	6/11/04		
Verify the electrical terminations are not loose.	Wilosom		
Verify all visible springs in the mechanism are connected	100	} ·	
and not loose.	C/I/EFR	<i>'</i>	
Verify all accessible fasteners are hand tight.	6/Hogy		
	Sat	Unsat	Rework Satisfactory
Remove trip unit for mechanism assembly inspection.	/QC X		
Verify there are no cracked washers.	c/stown		
Apply NLI seal on trip unit after inspection.	(Iclosum)		
Verify the cover is replaced and the mounting screws are snug.	(QC)		
Verify the breaker cover mounting holes are not stripped.	(245		1
Verify the Open/Close pushbutton covers are in place after inspection complete.	1300	,	

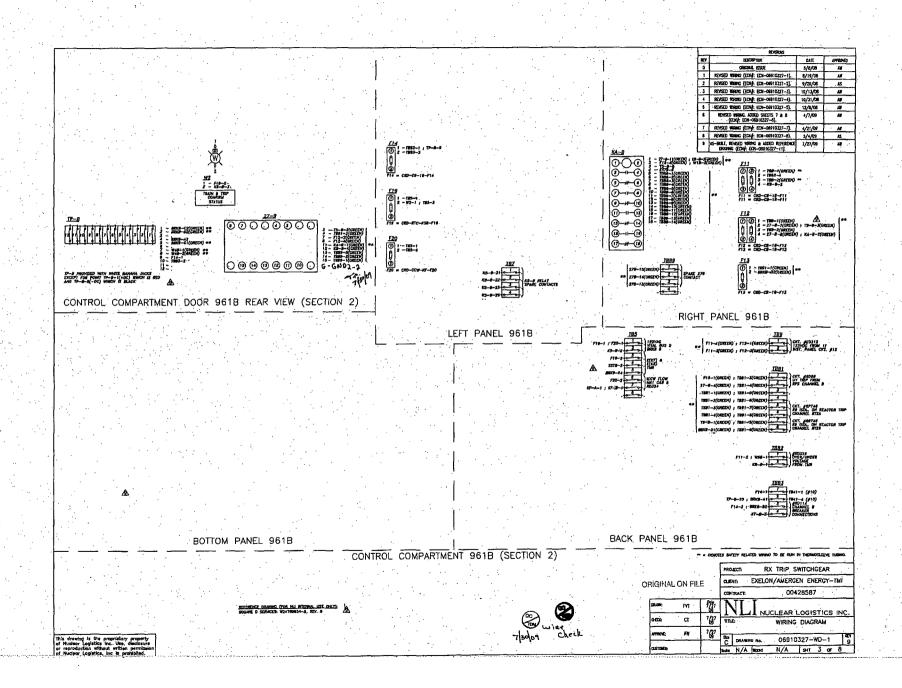
·	
Verify all cover plates are installed -Verify torque/tightness of fasteners.	C C C C C C C C C C C C C C C C C C C
Verify the counter operates properly.	6 to the second
Document counter reading	R-AT-OF
Verify breaker is discharged, open	8 4.09
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision).	
Verify the breaker data sheets filled out and signed.	8.4.69
Verify the Data plate is installed. Record the Date of Manufacture	
No grease on primary and secondary disconnects.	ALA)
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	6/2/09
Comments: MTE Used:	
Inspections Performed by	QC Date: 8-4-04

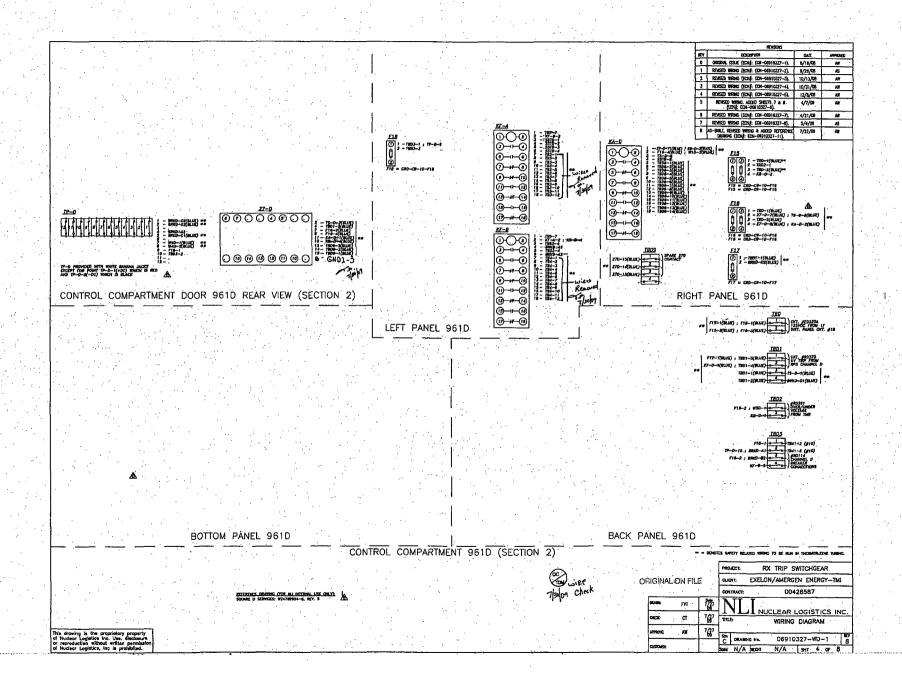
Masterpact Breaker Outside			
Record Breaker S/N: 0640914961021 7.7. 6-2-04	C-2-06	•	
Verify the arc chutes mounting nut retainers are not missing	(00)		
and are properly installed.	c/z/og DM		
Verify the top of breaker is clean.	6/2/G		
Verify there are no cracks or chips in the breaker polyester	700		
case: Top, Sides, Back, Front, and Bottom.	Uzla		
Verify the back insulator fins are not cracked.	L/2 FOR TOM		
Verify the secondary block connects in test position	J. J. J. J. J. J. J. J. J. J. J. J. J. J	·	
Verify the secondary block housing "Locks-out" properly in	(QC)		
the disconnected position.	6/2/00 TON	/	
Verify the secondary block housing springs are silver in	QC		
color.	6/2/09		
Verify the secondary block housing springs are properly			
installed.	Chipe		
Verify the discharge interlock is properly installed – the	Class		
return spring is installed.	G/E/OF TOM	'	
Verify the rejection hardware is configured per the design			
drawings and properly tightened.	N/A		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks.	1 /QC 1		
Verify there are no cracks or chips.	6/4/04		
Record grease color Red . Grease must be		1	
red (Mobilith) or white (Kluber) Isoflex.	6/2/09	,	ļ
Verify the electrical terminations are not loose.	LILLOGE)	
Verify all visible springs in the mechanism are connected	1700		
and not loose.	Jeton		
Verify all accessible fasteners are hand tight.	13/19		
	6/2/0/		
	Sat	Unsat	Rework Satisfactory
Remove trip unit for mechanism assembly inspection.	QC		
Verify there are no cracked washers.	CKIE		
Apply NLI seal on trip unit after inspection.	(Alabana)		
Verify the cover is replaced and the mounting screws are	100		
snug.	CHAS		<u> </u>
Verify the breaker cover mounting holes are not stripped.	() Jose		
Verify the Open/Close pushbutton covers are in place after	100		
inspection complete.	6 kelon	I	l .

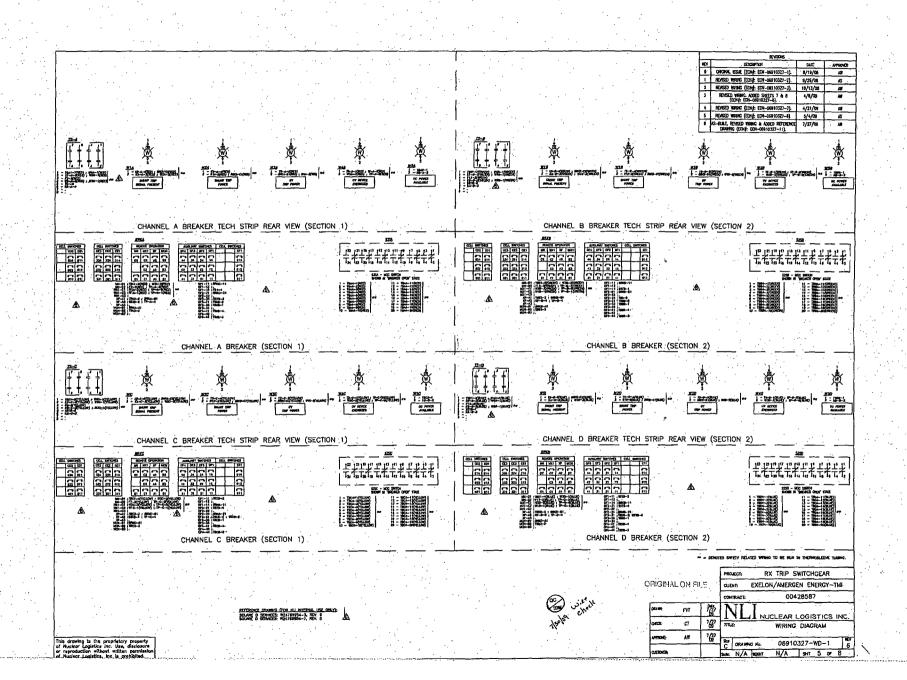
Verify all cover plates are installed -Verify torque/tightness	(QC)	
of fasteners.	(AZTON)	
Verify the counter operates properly.	Jelos	
Document counter reading	2509	
Verify breaker is discharged, open	REON	
Record the As-built drawing markup of NLI layout drawing		
and bill of materials (latest revision).	(QC)	
	(Vota (Bt)	į
Verify the breaker data sheets filled out and signed.	安长 的	
Verify the Data plate is installed.		
Record the Date of Manufacture	MAN I	
No grease on primary and secondary disconnects.	WELL !	
With the breaker cover off, inspect the trip unit performer		
plug. A green plug is satisfactory. A blue plug is	QC	
unsatisfactory. If a blue plug is present, replace it with a	1 Day	
green plug. After replacement, primary injection testing		
must be performed to verify proper operation.	C/2/04	
Comments:		
MTE Used:		
	(oc)	_
Inspections Performed by:	Date: 8-4-09	

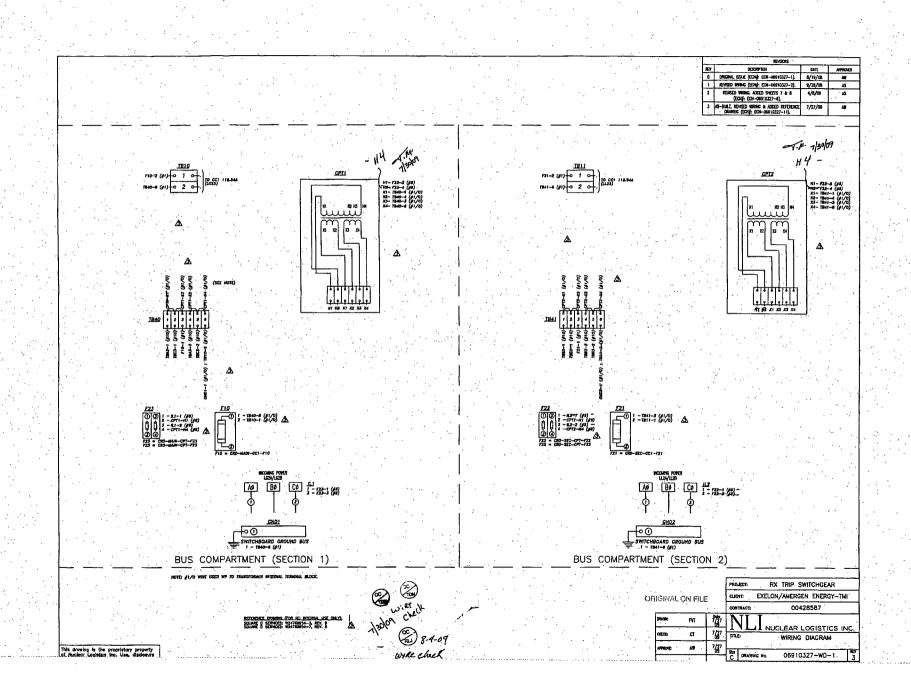


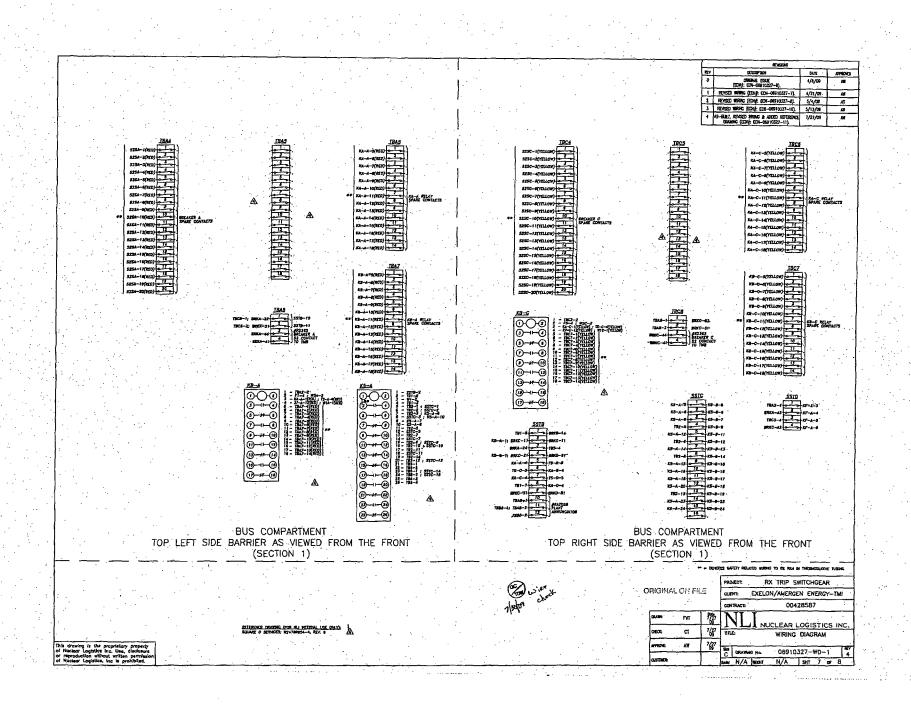


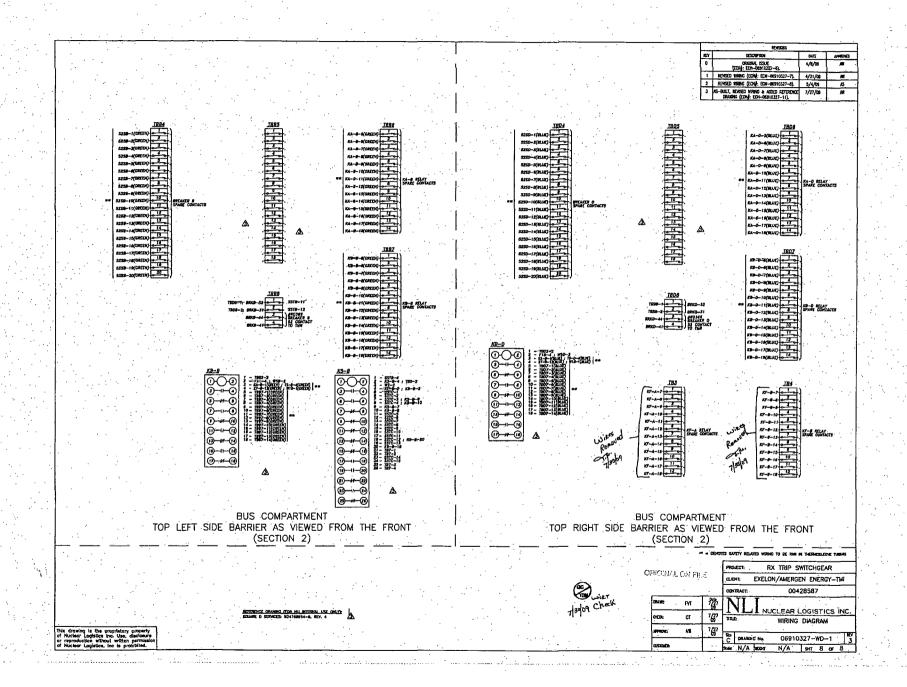












STANDARD VERIFICATION PLAN FOR SQUARE-D MASTERPACT LGSB11 BREAKER (LOW VOLTAGE CIRCUIT BREAKER) FUNCTIONAL TESTING

TMI SPACE BREAKER ONLY

BREAKEZ 5/10: 064076362301

ALL ELECTRICAL TESTING WAS
PERFORMED IN CRADE S/N. 25180820-002H

Document Number: SVP-102 Revision 2

SVP for S	quare-D	Mast	erpac	t LGS	B11 I	Breaker
Nuclear L	ogistics,	Inc.	_			

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APPROVAL

STANDARD VERIFICATION PLAN FOR SQUARE-D MASTERPACT LGSB11 BREAKER (LOW VOLTAGE CIRCUIT BREAKER) FUNCTIONAL TESTING

This procedure is prepared in accordance with the NLI Quality Assurance Program and its implementing procedures.

Prepared by:		Date: 8/25/08
Verified by:	alel	Date: 8/26/09,
Approved by:	W. W.L	Date: 8/26/0-8

SVP for Square-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2
Nuclear Logistics, Inc.	Page ii

REVISION HISTORY

Revision No.	Item Description	Date
0	Original Issue	2/22/07
1	Added clarifications to sections 3.0, 5.8.3, 6.0 & 10.0. Removed Attachment I.	7/2/08
2	Renumbered sections 4 – 10, revised sections 2.1, 3.1.c, 4.0, 6.9.1.b, 8.1, added sections 6.9, 12.0, added attachment I & II	8/26/08

Rev. 2

1.0 SCOPE

The purpose of this standard verification plan is to verify the critical characteristic and function of the Square-D Masterpact LGSB11 600A circuit breaker with cradle as a complete assembly. Some of the critical characteristics may not be applicable depending on the options and functions available on the assembly that is being verified. The following step numbers in this document identify the standard critical characteristics. The results shall be documented within each section of this SVP and on the NLI QC Inspection Checklist for Masterpact NT Breakers, MANCON-LGSB11-1 (latest revision).

This test plan is generally used for testing of the circuit breaker and cradle together (LGSB11 part number). If circuit breaker or cradle only testing is required, NLI engineering will specify what sections are to be performed for the specific part required to be tested.

2.0 PRODUCTION CONTROLS

The following production controls and procedures are to be in effect throughout the life of this project. All of the following activities will be performed.

2.1 Methodology

☐ Sat ☐ Unsat

NA

a. SDS has been audited by NLI and is currently on the NLI Approved Vendor List. The NLI audit addressed the following:

- All bolts, lugs, wire, nuts, etc. used for production have been dedicated for safetyrelated use.
- All steel used in production of the cradles has been verified to be the correct material.

□ Sat □ Unsat



NLI QC will implement the following production controls during construction. A separate QC inspection checklist will be used and maintained by QA. The sample size is 100%, unless a smaller sample size is documented. The QC checklist will verify the following items:

- 1. Dedicated parts supplied or verified by NLI are used during assembly as follows:
 - a. Bolts, nuts, washer, and other fasteners.
 - b. Lugs and wire.
 - c. Steel.
 - d. Mobil 28 grease.
 - e. Primary and secondary fingers.
- 2. Welding as follows:
 - a. Welding is performed per NLI-approved welding procedures.
 - b. Welders performing welding activities have been CWI certified.
 - c. Welds are inspected by a CWI.
- 3. Fastener tightness is verified on 100% of the accessible fasteners and terminations, including intermediate assemblies.
- 4. 100% of the wire and wire connections have been inspected. There shall be no kinks, cuts, nicks or splits in the wire.
- 5. Lubrication inspection
 - a. Breakers are supplied without primary and secondary disconnect lubrication. Plant to lubricate per plant established procedures.
- 6. Inspect and verify that there are no loose or damaged parts.

•		
, 	NIZ	
Cradle S/N (on nameplate):	w)	

3.0 BREAKER IDENTIFICATION

NOTE: Ensure that the correct engineering drawings are used for the specific client breakers during testing per this SVP.

3.1 <u>M</u>	etnodology
a.	Record the Square D nameplate data of the cradle. The nameplate shall contain the following information:
	1. Manufacturer:
	2. Type (Breaker & Cradle):
	3. Cradle Serial Number:
	4. Style:
	5. Rated Max Voltage/Freq:
	6. Rated Continuous Current:
•	7. Rated Short Circuit/Interrupt Current:
	8. Control Voltage Range: Charge: Close: Trip:
	9. Weight:
	10. Conversion Date:
Sat Unsat ICM b.	Perform a detail inspection of the breaker & cradle for any chips, cracks, gouges or any other damage.
γ3., c.	Record the circuit breaker specific data.
	1. Circuit breaker p/n: NTO SNA
	2. Circuit breaker s/n: 064 096362301
	3. Cradle date of manufacture:
	4. Circuit breaker date code: 093/5
٠ .	5. Micrologic trip unit s/n: 1082424 (bummy Trip unit) (NO Trip unit supplied)
	·

4.0	PROPE	R BREAKER CONFIGURATION	
	4.1	Methodology	
		This section is to be performed with the circuit breaker out of the cell.	
		a. <u>Terminals tightened</u> . Verify all terminals are tight during wire check.	ŀ
□ Sat □ Unsat	MA Toch	b. <u>Terminal identification</u> . Verify the terminal points are labeled per the wiring/schematic drawing. Use the final revision of the NLI approved schematics and record discrepancies, if any. If there are any discrepancies found, do not proceed any further with the testing until the discrepancies have been resolved.	
☑Sat □Unsat ☑SM Tech	8.6.0	Proper wiring. Verify wiring against the final revision of the NLI approved schematic or wiring diagram. Attach a copy of the yellow-lined wiring/schematic drawing.	
8.5 .	A	NLI drawing # with revision: 054/0753-50-1 ZEV.3	
☑ Sat ☐ Unsat	JCM QC	d. Correct programmer. Verify that the programmer, sensor plugs and rating plugs are per the design documents:	
	8.5.9	Record the part numbers and/or rating:	
•		Programmer: MA	
		Rating Plug:	
		Sensor Plug: 800A	
		 Trip unit date code. Verify the trip unit date code is P05491 or later. The format of the date code is Pxxyyz, with: xx = last two digits of the year. yy = week. z = day of the week. 	
	A	Trip Unit Date Code:	-
⊠Sat □ Unsat	JCM 1884 2-5-9	with the breaker cover off, inspect the trip unit performer plug. The performer plug should be green. A blue performer plug is not acceptable. If a blue plug is present, replace with a green performer plug. Note: The correct green performer plug must be present during primary injection testing.	
•	3	f. Trip unit is programmed for breaker type. Program the breaker type into the trip unit.	
□ Sat □ Unsat	NA Total	g. Trip unit battery is fully charged. Verify the battery is fully charged.	Re
	•		

			-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2	7
	IVac	lear Logisti	cs, Inc.	Page 4	
□ Sa	t 🗆 Uns	at NA 1	Verify the rejection hardware pin configuration aga approved NLI layout drawings (if applicable).	ainst the final revision of the	
			NLI drawing # with revision:		
			Breaker pin configuration:		
			Cradle pin configuration:		Rev. 2
	5.0	CIRCUI	T BREAKER PROPER FIT-UP & INSTALLTIO	N	
		5.1 M	thodology		
□ Sat	☐ Unsat	Tech a.	Install the cradle into a typical AK-2A-25 type cell. disconnects, secondary disconnects and interlocks m in the cell. Verify the Truck Operated Cell Switch (with the TOC switch inside the cell.	atch up with the mating connectors	
□ Sat	□ Unsat	Tech b.	Ensure there is a positive ground connection between Measure the continuity from the switchgear frame to continuity reading throughout this section.	n the switchgear and the cradle. the cradle frame. Maintain this	
☑ Sat	☐ Unsat	JCM C.	Install the breaker into the 'DISCONNECT' position occurs.	n. Verify no binding of the interloc	ks
	□ Unsat	8019	Ensure that the racking crank cannot be inserted unled depressed.	ess the "PUSH TO OPEN" button is	S
☑ Sat	□ Unsat	7.1CM 1700.5 8.5.9	Rack the breaker to the 'TEST' position. To rack the 'TEST' position, a racking crank is required to be in OPEN' button. To begin turning the racking crank the pushed. Turn the racking crank clockwise until the position. When the "TEST" position is reached, the out. The status of the position indicator should show position.	serted while pressing the 'PUSH To he 'STOP RELEASE' button must he breaker reaches the 'TEST' 'STOP RELEASE' button will pop	
□ Sat	☐ Unsat	ALCh f.	Monitor a set of closed and open TOC switch contact change state when the breaker is racked to the 'TES'	ets. Verify that the contacts do not I' position.	
☑ Sat	□ Unsat	JCM g. 8.5.9	Verify the primary disconnects, secondary disconnectable without any interference or binding.	cts and interlocks match up with the	e
□ Sat	□ Unsat	h.	Verify the continuity from the switchgear frame to the	he cradle frame is present.	•
☑ Sat	□ Unsat	ICM i. Tech 8:5:9	Push the 'STOP RELEASE' button again to continu "CONNECT" position is reached. Again, the 'STO! The status of the position indicator should show that position.	P RELEASE' button will pop out.	

□ Sat	☐ Unsat	AJA j.	Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'TEST' to the 'CONNECT' position.
		k.	Manually close the breaker.
		I.	Manually charge the breaker.
☐ Sat	☐ Unsat	JA m.	Verify that the cradle racking tool cannot be installed on the cradle racking mechanism and that the cradle cannot be removed from the cell.
☑ Sat	□ Unsat	JCM n.	Verify the primary disconnects, secondary disconnects and interlocks match up with the cradle without any interference or binding.
☐ Sat	☐ Unsat	NA O.	Verify the continuity from the switchgear frame to the cradle frame is present.
		yech p.	Trip the breaker.
		q.	Rack the breaker to the 'TEST' position.
□ Sat	□ Unsat	yech r.	Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'CONNECT' to the 'TEST' position.
		s.	Rack the breaker to the 'DISCONNECT' position and remove the breaker from the

t. Remove the cradle from the cell.

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6.0 PRODUCTION TESTS

Sections 5.1, 5.2, 5.3 & 5.4 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell.

6.1 MAIN CONTACT RESISTANCE (DUCTOR TEST)

- a. This test checks the resistance of the primary current path, hinge points, wipe, connections, and quality of conductivity of the current path. Perform this test on each phase of the circuit breaker.
- b. Apply 85Vdc minimum to UV trip device (if applicable). Note: UV trip device must be energized to close the breaker.

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, c.	Connect test cables to Phase A, line & load bus or stabs.
Sat Unsat JCM	Measure the contact resistance and record in $\mu\Omega$ using the appropriate M&TE. Repeat for each phase. Contact resistance for each phase is $< 100\mu\Omega$.
8.5.9	Phase A: $_{\mu\Omega}$ (Criteria is < 100μΩ)
	Phase B: 30 $\mu\Omega$ (Criteria is $< 100\mu\Omega$)
	Phase C: $\mu\Omega$ (Criteria is $< 100\mu\Omega$)
	Compare the contact resistance between each phase. Contact resistance of each phadoes not vary more than ±20% from the average of all three phases.
	Average all phases: 30 $\mu\Omega$
	See discrepancy report number: N/A if all pass)

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			•
	6.2	INSULAT	ION INTEGRITY (DC MEGGER TEST)
		6.2A Co	ntrol Wiring
⊠ Sat	☐ Unsat	F5.9	Control wiring except charging motor. Isolate the charging motor from the control circuit. With the breaker in the open position, apply 1000Vdc and megger each secondary disconnect to ground for 1 minute except the charging motor disconnects. Record the lowest insulation resistance. Repeat this test with the breaker in the closed position.
,			Applied Voltage: 1000 Vdc (Criteria is 1000VDC nominal)
			WITH BREAKER OPEN
			Lowest insulation res.: Σ_0 , Σ_0 M Ω (Criteria is ≥ 100 M Ω)
			WITH BREAKER CLOSED
			Lowest insulation res.: $\geq 20,000$ M Ω (Criteria is ≥ 100 M Ω)
		A	Record the number of tested secondary disconnects: 26
⊠ Sat	☐ Unsat	JCM b. Tech b. 85.9	Charging motor. Megger the charging motor secondary disconnects (SDA-1 & SDA-2) to ground at 500Vdc for one minute. Record the lowest insulation resistance.
			Perform with the breaker open discharged:
			Applied Voltage: Vdc (Criteria is 500VDC nominal)
			Lowest insulation res.: $>20,000$ $+4$ $M\Omega$ (Criteria is $\geq 2M\Omega$)
			Perform with the breaker closed and charged:
,			Applied Voltage: Vdc (Criteria is 500VDC nominal)
	: :		Lowest insulation res.: $20,000$ $M\Omega(Criteria is \geq 2M\Omega)$

	for Squar lear Logis		rpact LGSB11 Breaker	SVP-102, Rev. 2 Page 8
	·	6.2.2	Phase-to-Phase, Phase-to-Ground, & Line	e-to-Load
⊠ Sat	□ Unsat	JCM a. Tech 8.5.9	With the breaker in the closed position, apprephases (Note: UV trip device must be energing the breaker).	
			APPLIED VOLTAGE: 1000 VOC	(Criteria is 1000VDC)
			PHASE-TO-PHASE WITH BREAKER CL	OSED
			Ø A To Ø B: >10,000 MJZ Ø B To Ø C: >10,000 MJZ Ø C To Ø A: >10,000 MJZ	_M Ω (Criteria is > 100M Ω) _M Ω (Criteria is > 100M Ω) _M Ω (Criteria is > 100M Ω)
		Δ	- . .	(N/A if all pass)
☑ Sat	□ Unsat	JCM b.	With the breaker in the closed position, app phases to ground (Note: UV trip device mu minimum to close the breaker).	
			APPLIED VOLTAGE: 1000 VDC	_(Criteria is 1000VDC)
			PHASES-TO-GROUND WITH BREAKE	R CLOSED
	·	A	Ø A To GROUND: >10,000 M.L. Ø B To GROUND: >10,000 M.L. Ø C To GROUND: >10,000 M.L. See discrepancy report number:	_MΩ (Criteria is > 100MΩ) _MΩ (Criteria is > 100MΩ)
☑ Sat	☐ Unsat	JCM Tech	With the breaker in the open position, apply phase line-to-load.	y 1000VDC and megger between
		8:5:9 AI	PPLIED VOLTAGE:(Criter	ria is 1000VDC)
			PHASE LINE-TO-LOAD WITH BREAK	ER OPEN
	•		Ø A LINE To LOAD: >10,000 M ~ 2. Ø B LINE To LOAD: >10,000 M ~ 2. Ø C LINE To LOAD: >10,000 M ~ 2.	$M\Omega$ (Criteria is > 100 $M\Omega$)
			See discrepancy report number: MA	(N/A if all pass)

6.3 INSULATION INTEGRITY (AC HI-POT TEST)

CAUTION: STAND AT LEAST 6 FEET FROM THE BREAKER DURING THIS TESTING. REMOVE THE TRIP UNIT RATING PLUG PRIOR TO PERFORMING THIS TEST.

Note: This is a "pass/fail" test. Perform this test at 2200Vac for 1 minute. Acceptance criteria is no insulation breakdown after 1 minute.

6.3.1 Poles-to-Ground, Phase-to-Phase, & Line-to-Load

		A	Мe	thodology		·	
☑ Sat	☐ Unsat	JCM A Took on	a. 4.5°	All unenergized po	les shou id be ground	ed for the AC hi-pot tests.	
☑ Sat	☐ Unsat	487.3	b .	Line to load w/ bre	oot between phase lin	breaker in the open position, e-to-load. Acceptance Criter	
				Applied Voltage:	2200	Vac (Criteria is 2,200V	AC nom.)
		A		Ø A Line to Load: Ø B Line to Load: Ø C Line to Load;	Pass/Fail Pass		
☑ Sat	□ Unsat	JOM Toch 8-5-9	c.		e-to-ground. Accepta	se the breaker and repeat the ance Criteria is no insulation	testing
				Applied Voltage:	2200	Vac (Criteria is 2,200V	AC nom.)
		A		ØA to Ground: ØB to Ground: ØC to Ground:	Pass/Fail PASS Pass/Fail PASS		
☑ Sat	□ Unsat	JCM Tech 8:5.9	d.		nd hi-pot between ph	the breaker in the closed pos ases. Acceptance Criteria is	
		-		Applied Voltage:	2200	Vac (Criteria is 2,200V.	AC nom.)
. •				ØA to ØB: ØB to ØC: ØC to ØA:	Pass/Fail PASS Pass/Fail PASS Pass/Fail PASS		
	•						÷₹.

	•	6.4	IN	ERATION AT NOMINAL/DEGRADED/OVERVOLTAGE CONDITIONS & FERLOCK OPERATION ON 1-1-4 **CHARLES HAS AC CHARLES CHARLES MOTOZ.
		A	a.	With the breaker installed in a cradle.
☑ Sat	□ Unsat	JCM Tech	· b .	Apply 125vdc to the UV trip device circuit (if applicable).
		8.6.9		VOLTAGE APPLIED: 125 VOC
			c.	120/AC CT 8/6/09 (SEE ADG P.20) Apply 125 Vde to the charging motor circuit.
				VOLTAGE APPLIED: 120 VAC
			d.	Apply 70VDC to the trip circuit.
		A		VOTLAGE APPLIED: 70 VOC
☑ Sat	□ Unsat	JCM	∕e.	Rack the breaker to the "TEST" position.
		8.6.9	f.	Verify that breaker charges as the breaker is racked to the 'TEST' position.
☑ Sat	☐ Unsat	JCM Tech	g.	Verify status indicators indicate that breaker is open and closing spring is charged.
		869	h.	Close the breaker.
Sat	□ Unsat	ACI	W.	Verify that the closing springs recharge.
☑ Sat	□ Unsat	S ICM	<u>)</u>	Verify status indicators indicate that breaker is closed and closing spring is charged.
☑ Sat	☐ Unsat	Lich	Ŋĸ.	Trip the breaker.
		8.6.7	1.	Verify status indicators indicate that breaker is open and closing spring is charged.
			m.	Close the breaker.
		A	n.	Attempt to rack the breaker to the 'CONNECT' or 'DISCONNECT' positions.
☑ Sat	☐ Unsat	7.1CM Tech 8.6.9	V.	Verify that the breaker cannot be racked to the 'CONNECT' or 'DISCONNEC positions.
		A	p.	Trip the breaker.
☑ Sat	☐ Unsat	JCM Tech	∑q.	Verify status indicators indicate that breaker is open and the closing spring is charged.
	2	3-6-9	r.	Rack the breaker beyond the 'TEST' position but before the 'CONNECT' position.
		A	s.	Attempt to close the breaker.
☑ Sat	☐ Unsat	ICN Lich	T.	Verify that the breaker cannot be closed.
		8.6.9		d.
	Crad	le S/N (on n	ameplate):

		_		O Masterpact LGSB11 Breaker	SVP-102, Rev. 2
	Nuc	lear Logi	stic	s, Inc.	Page 11
☑ Sat	☐ Unsat	JCM Toch	th.	Verify status indicators indicate that breaker is open and closing spri	ing is charged.
		8.6.9	v. :	Rack the breaker to the 'CONNECT' position.	
,			w.	Close the breaker.	
☐ Sat	☐ Unsat	JCM Jean	*	Verify that the closing springs recharge	•
☑ Sat	☐ Unsat	JCM Tech	<u>Z</u> .	Verify status indicators indicate that breaker is closed and closing sp	pring is charged.
į.	*		z . '	Trip the breaker.	
図Sat	☐ Unsat	Tech		Verify status indicators indicate that breaker is open and closing spr. عاد المجالة العلم المجالة العلم المجالة العلم المجالة	ing is charged.
		8.6.9		Lower the control voltage to 90Vdc to the charging motor circuit.	
				VOLTAGE APPLIED: 88 VAC	
		ı		Lower the UV voltage to 85Vdc.	
, .		Δ		VOLTAGE APPLIED: 85 VAC	
☑ Sat	☐ Unsat	Tech		Charge, close and trip the breaker 5 times. 137 VAC CT 86 (09 (See Note P20)	
		8.6.9		Raise the control voltage to 140Vde to the charging motor circuit. VOLTAGE APPLIED:	•
				Raise the UV voltage to 140Vdc.	
		A		VOLTAGE APPLIED: 146 VOC	· ·
⊠Sat	☐ Unsat	: LICM		Charge, close and trip the breaker 5 times.	
		Tech		Close the breaker.	
⊡ Sat	☐ Unsat	: ASM	ii.	With the breaker closed, attempt to rack the breaker out to the 'TES	T' position.
☑ Sat	☐ Unsat	S G Y	jj.	Verify that the breaker cannot be racked to the 'TEST' position.	
		8-6-9	.» kk.	Trip the breaker.	
☑ Sat	□ Unsat	Fig. 9	. 0	Rack the breaker to the 'TEST' position. Monitor a set of closed contacts. Verify that the contacts change state when the breake 'CONNECT' to the 'TEST' position.	
		:	mm	Rack the breaker back to the 'CONNECT' position.	

	P for Squ clear Log		-D Masterpact LGSB11 Breacs, Inc.	aker		SVP-	-102, Rev. 2 Page 12	
	6.5	AN	VTI-PUMPING FUNCTION					
	PERFORM THIS TEST 3 TIMES. Record the results in the table below.							
	Sections 6.5, 6.6, 6.7, 6.8 & 6.9 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell. Note: Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).							
	a. Apply and maintain a close signal at 125Vdc nominal. Apply a momentary trip signal at 125Vdc nominal while maintaining the close signal. Verify the breaker opens and does not re-close.							
		Ъ.	Release the close signal and the	hen re-apply	the close signal. V	erify the brea	ker closes.	
	A	C,	Trip the breaker.					
Sat Unsa	t Joh	1	1 ST Test	2 nd Test		3 rd Test		
•	8.6.9		☑ Sat ☐ Unsat	☑ Sat [☐ Unsat	⊠ Sat □	Unsat	
_	66	M	ANUAL OPERATION					
Sat Unsa	t JCM Tech	a.	Remove 125VDC control vol	tage.				
	8-6.9	b.	Ensure that there is 85Vdc mi	inimum powe	er to the UV trip de	vice (if appli	cable).	
		c.	Ensure that the breaker is ope	n and the clo	sing springs are dis	scharged.		
	A	đ.	With the breaker in the 'Co manually charged using the cl				breaker can be	
Sat Unsa	t JCM	è.	Verify the status indicators in	dicate that th	e closing spring is	charged upor	a completion.	
	8-6.9	f.	Close the breaker.					
	00	g.	Trip the breaker.					
	6.7		MING TESTS					
•		6.7	•		۔ دانسس در			
		a.	Ensure that there is 85Vdc mi	inimum pow	er to the UV trip de	evice (if appli	cable).	
		b.	With the breaker in the closed	d position, ap	ply 70Vdc to the sl	hunt trip coil	•	

APPLIED VOLTAGE:____

SVP for Square-D Masterpact LGSB11 Breaker SVP-102, Rev. 2 Page 13 Nuclear Logistics, Inc. ☑ Sat ☐ Unsat Using the appropriate M&TE timing equipment, record the opening time of the main and auxiliary contacts and verify that the breaker is open. (Criteria is ≤ 50mS) φα main pole opening time: 30.5 ms **6B MAIN POLE OPENING TIME:** 30.4 (Criteria is ≤ 50mS) OC MAIN POLE OPENING TIME: 30-5 MS (Criteria is ≤ 50mS) AUXILIARY CONTACT OPENING TIME: 35.9 m5 (Criteria is ≤ 62mS) UV Trip (if applicable) PERFORM STEPS 6.7.2.d – 6.7.2.o 3 TIMES. Record the results in the table below. Apply a voltage of 105Vdc to the UV coil and close the circuit breaker. Reduce the voltage until the breaker trips. Sat Unsat Verify breaker tripped in the voltage range of 43.75 to 87.5Vdc. 48.8 voc (Criteria is 43.75 to 87.5VDC) 8.6.9 TRIP VOLTAGE: d. Re-apply a voltage of 105Vdc to the UV trip. Charge and close the breaker. Remove power from the UV trip. ☑ Sat ☐ Unsat Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

	1 ST Test	2 nd Test	3 rd Test	Acceptance Criteria
φA	15.7 ms	17.0 ms	16.2 MS	≤ 50mS
φВ	15.7 ms	17.0 ms	16.1 ms	≤ 50mS
φC	17.0 MS	18.3 ms	17.4 ms	≤ 50mS
Auxiliary Contact	24.3 ms	23.1 ms	22.5 ms	≤ 62mS

After the breaker trips, attempt to close the breaker.

Verify that breaker cannot be closed.

Apply a voltage of 135Vdc to the UV trip.

Charge and close the breaker.

Remove power from the UV trip.

Cradle S/N (on nameplate)

☑ Sat ☐ Unsat

		O Masterpact LGSE	311 Breaker		SVP-102, Rev. 2		
	Nuclear Logistics	s, Inc.			Page 14		
Sat !	Unsat JCM n. Tech 9	is open.	time of the main ar	nd auxiliary contacts	and verify that the breaker		
		1 ST Test	2 nd Test	3 rd Test	Acceptance Criteria		
	фА	14.0 MS	16.1 05	16.7 ms	≤ 50mS		
	φB	14.9 ms	16.9,m5	17.5 MS	≤ 50mS		
	фС	137 ms	17.4 MS	18.1 MS	≤ 50mS		
	Auxiliary Contact	25.1 ms	23.5 MS	26.4 ms	≤ 62mS		
	6.7.3 Operation of Test Pushbuttons & Test Plug 6.7.3.1 Shunt Trip Test PushButton						
		0.7.5.1 Shullt	Trip rest rushbutt	OIE			
		1. Apply 90V	dc at the secondary of	disconnect terminals	for the shunt trip circuit.		
	 Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker. 						
		3. Charge and	I close the breaker.				
	□ Sat □ Unsat	Verify the "TEST SH	nameplate on top of UNT".	f the shunt trip test p	oushbutton is designated as		
	□ Sat □ Unsat	fech 5. Verify the	TEST SHUNT pushi	button is installed wi	th 'ORANGE' plastic disk.		
		6. Push the Sl	hunt Trip Test Buttor	n.			
	□ Sat □ Unsat	7. Verify that	the breaker trips.				

breaker is open.

\$A MAIN POLE OPENING TIME:

φB MAIN POLE OPENING TIME:_

¢C MAIN POLE OPENING TIME:

AUXILIARY CONTACT OPENING TIME:

8. Record the opening time of the main and auxiliary contacts and verify that the

_ (Criteria is ≤ 50mS)

(Criteria is ≤ 50mS)

(Criteria is ≤ 50mS)

(Criteria is ≤ 62mS)

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6.7.3.2 UV Trip Pushbutton

- a. Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker.
- b. Charge and close the breaker.

□ Sat	□ Unsat	Tech	с.	Verify the nameplate on top of the UV test trip pushbutton is designated as "TEST UV".
□ Sat	□ Unsat		d.	Verify the TEST UV pushbutton is installed with 'BLUE' plastic disk.
,		Tech	e.	Push the "UV TRIP" button on the front of the breaker.

f. Verify that breaker trips. □ Sat □ Unsat

> g. Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

\$A MAIN POLE OPENING TIME: _ (Criteria is ≤ 50mS) **\$\phi B MAIN POLE OPENING TIME:** (Criteria is ≤ 50mS) **C MAIN POLE OPENING TIME:** _____ (Criteria is ≤ 50mS)

AUXILIARY CONTACT OPENING TIME: ____(Criteria is ≤ 62mS)

6.8 AUXILIARY SWITCH / MOC SWITCH TESTS

☑ Sat □ Unsat

☐ Sat ☐ Unsat



Methodology

With the breaker in the OPEN position, verify all auxiliary contacts and MOC (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance.

Acceptance Criteria is >40MΩ for open contacts and 100 for the NLI approved schematics and record contact resistance. Record the readings in the table below.

NLI Drawing # with revision: 054/0753-50-1

Contact ID:	Resistance:	Contact ID:	Resistance:
0F1-11 TO 0F1-17	2/M) 0.2.2		
OF1-11 70 OF1-14	as xome		
0F2-21 70 OF2-22			
0F2-21 -0 OF2-24	W >40ms		
983-31 70 OF3-32	WC 0.22		
OF3-31 TO OF3-34 0	is your		
0F4-41 to 0F4-42	(NO) 0.7.2		
0F4-41 TO 0F4-44	60 >40Mr		

SVP for Square-D Masterpact LGSB11 Breaker	
Nuclear Logistics, Inc.	

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Sat Unsat ICM RLJ.

46.9 9.6-09

With the breaker in the CLOSED position, verify all auxiliary contacts and MOC contacts that are accessible by secondary disconnect pins are in the correct state (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each auxiliary contact and record contact resistance. Acceptance Criteria is >40M Ω for open contacts and <1 Ω for closed contacts, except for the contact in series with the trip coil. It is not practical to measure the contact resistance of this switch while closed. When the breaker is closed, measuring the resistance across secondary disconnect pins will result in the shunt trip coil resistance and not the closed contact resistance. Proper closing of this switch is verified by tripping the breaker at degraded voltage conditions. The resistance across the secondary disconnect pins, while the breaker is closed, shall be recorded for informational purposes only.

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Contact ID:	Resistance:	Contact ID:	Resistance:	
OF1-11 TO OF1-12 (NC)	>40M2			
OF1-11 TO OF1-14 (NO)				
OFZ-21 TO OFZ-22 (NC)				
OF2-21 TO OF2-24 (NO)	0.2-2			
083.31 TO 0F3-32/WC				
083-31 to 083-34 (wa)				
0F4-41 TO 0F4-42 (NO	HOMS			
OF4-41 TO OF4-44 (2)	0.2-2			

6.9 TRIP UNIT / OVERCURRENT TRIP SWITCH TESTS

6.9.1	Methodology
0.2.1	MICHIDADIOEA

□ Sat □ Unsat

AVA QC a

Overcurrent trip switch configuration/contact resistance. With the breaker closed, measure the resistance of the overcurrent trip switch contacts. Only measure those switches that are being used; i.e. only measure those switches accessible via a secondary disconnect. Verify the contacts are in the proper state using the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance. Acceptance Criteria is >40M Ω for open contacts and <1 Ω for closed contacts.

NLI Drawing # with revision:

Contact ID (SDEn):	Resistance:

	7		
Cradle S/N (on nameplate):	<u> </u>	4	

SVP for Squar Nuclear Logis		act LGSB11 Breaker		SVP-102, Rev. 2 Page 17
□ Sat □ Unsat _	Tekh tr fi	evercurrent trip switch con ipped from step 6.9.1.a, ve om step 6.9.1.a. Identify of cceptance Criteria is >40N	erify the overcurrent trip each contact and record	switches changed states
	Contact	D (SDEn):	Resistance:	·
•	<u> </u>			
1				
at □ Unsat <u>JA</u> Tech	QC 6	ong-time pickup point. Pe 9.1.d. Apply [(long time purrent through all three phone) werload (OL) signal LED of	pickup setting) x (sensor ases. Verify the breaker	plug rating) x 1] amps of does not trip and that the
	ľ	ong time pickup setting:_	Applie	d Current:
	Г	oes breaker trip?		
	. I	Does the OL signal LED lig	ght come on?	
	ti	apply [(long time pickup so arough all three phases. Volote: This is not a trip test;	erify the overload signal	ing) x 1.25] amps of current LED light comes on fy that the breaker trips.
	I	ong time pickup setting:_	Applie	ed Current:
•	I	oes the OL signal LED lig	ght come on?	<u> </u>
at 🗆 Unsat	QC ii	rimary injection tests. Per njection test table. Perform the current through one ph chneider Electric trip curvest. The curves are in Atta	n the testing at the client ase will power the trip uses to determine the acce	settings (if applicable). init. Use the following ptable trip time for each
		osi. Tito out tos ale ili Atti	icimilati.	·
·	•	Short time tests: Curve depending upon the i ² t	setting	14/2008 13TC0005, dated 4/2008 0.05 seconds, (based upon
		Curve No. 0613TC000		18"
			·	

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PRIMARY INJECTION TEST TABLE

Actual trip times:

Trip Function	Pickup Setting	Time Delay Setting	i²t on/off	Sensor plug rating	Applied current	Trip time range acceptance criteria	Ø A	ØB	ØС
Long time at 200% ¹	Ir =	tr =	N/A						
Long time at 500% ^{L5}	Ir =	tr =	. N/A			la			
Short time at 200% or 170% ^{2, 4}	Ir = Isd=	tsd =				74			
Instantaneous at 200% ³	Ii =	N/A	N/A		·	≤ 0.05 seconds			

Record the client-required trip setting drawing number and revision level (if not applicable, write N/A):

Notes:

1. Applied current for long time testing is (long time pickup) x (sensor plug rating) x (2 or 5).

2. Applied current for short time testing is (long time pickup) x (short time pickup) x (sensor plug rating) x (2 or 1.7).

Applied current for instantaneous testing is (instantaneous pickup) x (sensor plug rating) x 2.
 Perform short time primary injection testing at 200% for NT type breakers and at 170% for NW type breakers.

5. When testing long time at 500%, put the short time pickup setting at the maximum value to avoid interference.

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7.0 DESIGN TESTS

All design tests in accordance with IEEE C37.50/20 for the Masterpact LGSB11 circuit breaker have been performed and documented. Copies of the test report(s) shall be provided (if required).

8.0 DEDICATION OF DOOR

	Test Ec	quipment	ID:SDS Tech ID:
□ Sat	□ Unsat	8.1	Methodology a. Verify that the dimensions on the door matches the NLI approved door drawings by measuring the overall width, length, depth, material thickness and location of the hinges and location of the hole cut-outs and size of the hole cut-outs. Visually inspect that the door is the correct color per the client required specification. Rev. 2
□ Sat	□ Unsat	JA Tech	NLI DRAWING NUMBER: b. Verify that each door has the appropriate labeling per the door drawings.

9.0 QUALITY ASSURANCE

All activities will be performed in accordance with the requirements of the NLI Quality Assurance Program and its implementing procedures. This QA program meets the requirements of 10CFR50 Appendix B, 10CFR21 and ASME NQA-1.

10.0 MEASUREMENT & TEST EQUIPMENT

All measurement and test equipment used for the testing shall be documented in the test data sheets including the calibration due dates. All M&TE shall be traceable to a NIST or equivalent industry standard, where applicable.

11.0 REFERENCES

- 11.1 Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003.
- 11.2 IEEE C37.13-90, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures."
- 11.3 C37.16-88, "ANSI Standard for Low Voltage Power Circuit Breakers & AC Power Circuit Protectors Preferred Ratings, Related Requirements & Application Recommendations."
- 11.4 C37.20.1-87, "ANSI Standard for Metal Enclosed Low Voltage Power Circuit Breaker Switchgear."
- 11.5 IEEE C37.50-89, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures Test Procedures"
- 11.6 IEEE C37-59-91, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment."
- 11.7 NLI QA Manual, Rev.6 dated 12/8/04.
- 11.8 NLI design drawings for LGSB11 Masterpact circuit breaker and doors.
- 11.9 NETA ATS-1999, "Acceptance Testing Specifications for Electrical Power Distribution Equipment & Systems".
- 11.10 EPRI TR-017218-R1, "Guideline for Sampling in Commercial-Grade Item Acceptance Process."
- 11.11 MANCON-LGSB11-1, latest revision, "NLI QC Checklist for Masterpact NT Breakers."
- 11.12 IM-LGSB11-1, (latest revision), "NLI Instruction Manual for Square-D Masterpact NT Breakers, P/N: LGSB11."

12.0 ATTACHMENTS

Attachment I - trip curves:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

Attachment II – Exert from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003, page 7.

Rev. 2

Prepared by: QC Ris 8.6-09	JCM Date: 8.5.9
Verified by:	CN 8/2/09 Date: 8/6/09
<i>S</i> 0.	P alalas
Approved by:	Date: 8/7/07
Client Approval:	Date:

NOTE: THE TESTING OF THE CHARGE CIRCUIT WAS PERFORMED WITH AC VOLTAGE APPLIED.

THE BREAKERS ARE SUPPLIED WITH AC CHARGING MOTOR. THE ACCEPTABLE RANGE IS 90-137VAC.

THE TESTING PERFORMED IS ACCEPTABLE.

CT RIGIDS

	lasterpact LGSB11	Breaker	SVP-102, Rev
Iuclear Logistics, In	ic.		Page
	•		
	TEST	DATA APPROVAL / M	ITE LOG
Breaker S/N: <i>664</i>	096362301	Cradle S/N:	N/H
			•
MTE Log	* m	to a de Tito de la companya della companya della companya de la companya della co	California Dana Data
Item Descript		est Equipment ID#	Calibration Due Date
neggee		- NUK	06-23-10
DUCTOR 41-POT		- 140 - NUK	02-09-10
EST SET		- NUK - 007	07-01-10
MULTIMETER		-256	05.07.10
STOP WATCH			12-01-09
TIMER		-019	06:16:10
		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	
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·		<u> </u>	
			•
Discrepancy Log Discrepancy #:	SVP Section:		
<b>Discrepancy #:</b>	SVP Section:	Check one:	PE initials and date:
		☐ Acceptable ☐ Unacceptable	
		☐ Acceptable	
	•	☐ Unacceptable	
		☐ Acceptable	
		☐ Unacceptable	
		. Onacceptable	
		☐ Unacceptable	
	· · · · · · · · · · · · · · · · · · ·	☐ Acceptable	
	•	☐ Unacceptable	
1			

150M Date: 8/6/09
Date: 8/6/09

Prepared by:

Verified by:

Approved by:

SVP for Square-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2
Nuclear Logistics, Inc.	Page I.1

## ATTACHMENT I TO SVP-102

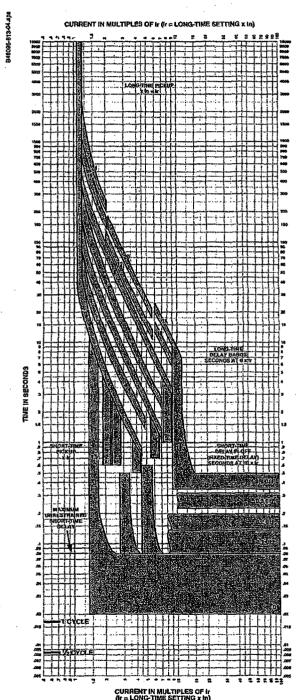
## TRIP CURVES:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008 Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

## Masterpact® NT and NW Universal Power Circuit Breakers Trip Curves

## Micrologic 5.0/6.0 A/P/H Trip Unit

Figure 166: Micrologic 5.0/6.0 A/P/H Trip Units: Long-Time Pickup and Delay, Short-Time Pickup, and I2t OFF Delay



### Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-4

Long-Time Pickup and Delay Short-Time Pickup and I2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

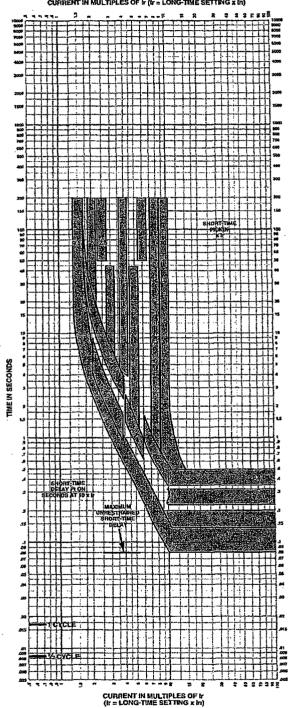
Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

#### NOTE:

- 1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the longtime delay pickup value exists for a time and then Is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
- 2. The end of the curve is determined by the interrupting rating of the circuit breaker.
- 3. With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
- 4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
- 5. For a withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
- 6. Overload indicator illuminates at 100%.

## Masterpact[®] NT and NW Universal Power Circuit Breakers Trip Curves

Figure 167: Micrologic 5.0/6.0 A/P/H Trip Units: Short-Time Pickup and I²t ON Delay



Micrologic 5.0/6.0 A/P/H Trip Units Characteristic Trip Curve No. 613-5 Short-Time Pickup and I²t ON Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

### NOTE:

- 1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
- 2. The end of the curve is determined by the interrupting rating of the circuit breaker.
- With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
- For withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
- See trip curve 613-4 for long-time pickup and delay trip curve.

Curve No. 0813TC0005 Drawing No. 848095-613-05

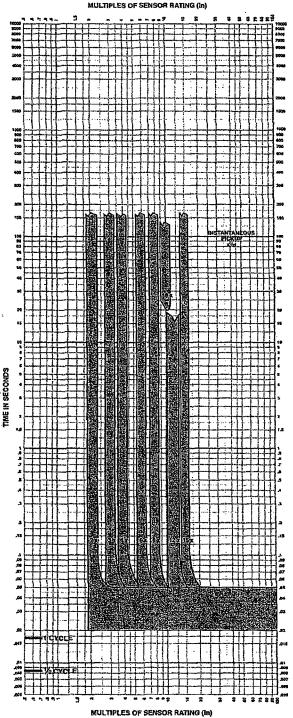
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Schneider Bectric 04/2008

## Masterpact® NT and NW Universal Power Circuit Breakers Trip Curves

Figure 168: Micrologic 5.0/6.0 Trip Units: Instantaneous Pickup, 2x to 15x and OFF



## MICROLOGIC* 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup 2x-15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

#### Notes:

- The end of the curve is determined by the interrupting rating of the circuit breaker.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
- 3. The Instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
- For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
- See 613-4 and 613-5 for long-time pickup, long-time delay, short-time pickup, and shorttime delay trip curves.

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## ATTACHMENT II TO SVP-102

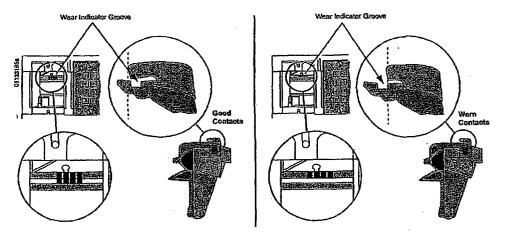
Excerpt from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 4/2008: Page 7 – contact wear

# Masterpact[®] NT and NW Universal Power Circuit Breakers Masterpact Circuit Breakers

Reduced Maintenance: Under normal operating conditions, the circuit breaker does not require maintenance. However, if maintenance or inspection is necessary, the arc chambers are easily removed so you may visually inspect the contacts and wear indicator groove (see the figure below for how wear is indicated). The operation counter can also indicate when inspections and possible maintenance should be done. The life of the circuit breaker may be extended by replacing the arc chamber and spring-charging motor and/or replacing the main contact assembly of ANSI Certified circuit breakers.



Figure 4: Contact Wear Indicators



### **Operating Conditions**

Masterpact circuit breakers are suited for use:

- At ambient temperatures between -22°F (-30°C) and 140°F (60°C).
- At altitudes +13,000 ft. (3900 m).

Masterpact circuit breakers have been tested for operation in industrial atmospheres. It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust. Operation at temperatures above 104°F (40°C) may require derating or overbussing the circuit breaker. See the appropriate instruction bulletin and page 15 of this catalog for additional information.

Masterpact circuit breakers meet IEC 68-2-6 Standards for vibration.

- 2 to 13.2 Hz and amplitude 0.039 in. (1 mm)
- 13.2 to 100 Hz constant acceleration 0.024 oz. (0.7 g.)

The materials used in Masterpact NT and NW circuit breakers will not support the growth of fungus and mold.

Masterpact circuit breakers have been tested to the following:

- IEC68-2-30 Damp heat (temperature +55°C and relative humidity of 95%)
- IEC 68-2-52 level 2 salt mist

### Storage Temperature

Circuit breakers with trip units without LCD displays may be stored in the original packaging at temperatures between -58°F (-50°C) and 185°F (85°C). For circuit breakers with trip units with LCD displays, this range is -40°F (-40°C) to 185°F (85°C).

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INSPECTION CHECKLIST Masterpact NT Breakers Type: LGSB11

> MANCON-LGSB11-1, Rev. 0 Page 1 of 1

## Cradle S/N:

	Š	Sat	Unsat	Rework Satisfactory
Material Control	1	A		
NLI supplied dedicated material used during manufacture				
(fasteners, wire, lugs, grease, etc.)		<b>\</b>		
Circuit breaker p/n and s/n, See SVP Data Sheets				
Perform weld inspections per AWS.				
N/A for Non-Safety Cradles.				
Material testing (steel cradle) demonstrates material is per				
SDS specifications. N/A for Non-Safety Cradles.				
SDS purchased parts are per SDS design drawings (relays,				
sockets, switches, etc.) N/A for Non-Safety Cradles.				
Assembly Cradle Cell Interface				
N/A for Non-Safety Cradles. All wire installed is the correct				
size.				
Record wire size.				
Wire must be at least flush with end of lug barrel.		•		
No broken or nicked wire strands from being stripped.				
Wiring does not interfere with any moving parts.	П			
As-built wiring check against NLI schematic to verify				
correct wiring. NLI QC independent yellow-line.				
Verify the MOC actuator Snap Ring is properly installed.				
Verify the MOC E-Clips are properly installed (qty 2)				
Inspect the secondary disconnects and verify there are no cracks.			·	
Verify there is no binding of secondary disconnect pins.				
Verify Mobil-28 and Mobilith greases are used where they are needed only. Record locations on attached lubrication checklist.				
Verify the mechanism is free of foreign objects.				
Verify the cradle area is free of foreign objects.	-	1		
Verify torque/tightness and mark heads with Sharpie or	T	<del>                                     </del>		
equivalent for all accessible structural fasteners.	1	<u></u>		<u> </u>
	L			
	Sa	at	Unsat	Rework Satisfactory

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Verify no loose or missing hardware in the cradle linkage.	2	Α		
Verify no loose or missing hardware in the cradle frame.	-	-		
· ·				
Verify primary finger assembly mounting is correct and				
tight.	_			
Verify primary finger assemblies are not damaged.				
Verify torque/tightness and mark heads with Sharpie or				
equivalent for all accessible electrical connections.				<u> </u>
Verify back primary disconnect stab mounting fastener	Ì			
torque 133 – 150 in/lbs.				
Check the accessible fasteners qty= of 12 fasteners.				,
If torques are unacceptable for any fasteners, check 100%.			1 1	
See Figure 2.				
If the primary disconnects are removed to check 100% of the			1 1	
fastener torques, verify 100% of the primary disconnect			· .	
mounting bolt torques.  Verify there is clearance between fasteners/linkage and			<del> </del>	
adjacent objects.				•
Verify there is no binding of TOC assembly linkage.	$\vdash$			
Verify the TOC operator Pin is loaded and cannot slip off				4
roll pin.		<del> </del>		
Verify the back panel nut retainers are removed in 4				
locations. See Figure 3. Remove if present.			<b> </b>	
Verify the bottom insulators are replaced after the nut		]		
retainer is removed. Verify that the fasteners are tightened properly.	-	ļ		
Cradle Inside		-		
		1		
Verify the rejection hardware configured per the design		1	•	
drawings and tightened properly.	<del> </del>	—		
Verify the extension rail release latch is securely mounted				
(pin not loose). Replace rail if the pin is loose.	-	-	<del></del>	
Verify the extension rail mounting is tightened properly.				
Verify the primary disconnect back panel mounting bolt				
torque 89 - 107 in/lbs in 4 locations. See Figure 1.	_	<u> </u>	<u> </u>	
Verify discharge interlock mounting is correct and tightened	١.			
properly.	_	<b>-</b>		
	S	at	Unsat	Rework Satisfactory
Verify the breaker guide rails' mounting is correct and properly tightened.	*	A N		
Verify the NT cradle to frame mounting is correct and properly tightened.		1	÷	

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Verify the shutters operate without sticking or binding	NIA		
Masterpact Breaker Outside			
Record Breaker S/N: 064096362301	8508		
Verify the arc chutes mounting nut retainers are not missing	△		
and are properly installed.  Verify the top of breaker is clean.	185		
	855		
Verify there are no cracks or chips in the breaker polyester	TAN I		
case: Top, Sides, Back, Front, and Bottom.	8.59		
Verify the back insulator fins are not cracked.	855		
Verify the secondary block connects in test position	8/509		
Verify the secondary block housing "Locks-out" properly in	山		
the disconnected position.	852		
Verify the secondary block housing springs are silver in			
color.	8/502		
Verify the secondary block housing springs are properly			
installed.	859		
Verify the discharge interlock is properly installed – the			•
return spring is installed.	8.57	<u> </u>	
Verify the rejection hardware is configured per the design			1 .
drawings and properly tightened.	8/509		
Masterpact Breaker Inside			
With front cover removed, inspect breaker case for cracks.	一个		
Verify there are no cracks or chips.	85E		
Record grease color RED Grease must be	瓜		
red (Mobilith) or white (Kluber) Isoflex.	855		<u> </u>
Verify the electrical terminations are not loose.	8/509		
Verify all visible springs in the mechanism are connected	瓜		
and not loose.	8750 P	·	
Verify all accessible fasteners are hand tight.	8.5191	<u> </u>	
	Sat	Unsat	Rework
			Satisfactory
Remove trip unit for mechanism assembly inspection.	位		
Verify there are no cracked washers.	8.50		
Apply NLI seal on trip unit after inspection.	8:50		
Verify the cover is replaced and the mounting screws are	8-51/2		
snug.	8-8-2		
Verify the breaker cover mounting holes are not stripped.	8:519		
Verify the Open/Close pushbutton covers are in place after	"瓜		
inspection complete.	85		

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Verify all cover plates are installed -Verify torque/tightness	Finia
of fasteners.	8.00-1
Verify the counter operates properly.	854
Document counter reading	849
Verify breaker is discharged, open	860
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision).	A SE 9
Verify the breaker data sheets filled out and signed.	8.6.94
Verify the Data plate is installed.	
Record the Date of Manufacture	N/A
No grease on primary and secondary disconnects.	wla
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	JCM 85-9
Comments:  MTE Used:	1
Inspections Performed by:	Date: _ 8.5.9_

# Lubrication Points for LGSB11

Initial Points to be		
Lubricated During Assembl	ly:	• .
		Verified
Cradle Linkage/Cell Inter	face	
Cell Interlock		Mobil 28
TOC Operator		🗍 🐧 Mobil 28
MOC Switch Lever Pivot p	oint	Mobil 28
MOC Actuator Lever		Mobil 28
MOC Operator		Mobil 28
MOC Cam Roller		Mobil 28
MOC Arm (1)		Mobil 28
•		
Breaker Interface		' /
Breaker to carriage primary	clusters (6)	Møbil 28
Roller Guides (2)		Mobilith
Top Guide Right side (1)		Mobilith
Bottom ground tabs (2)		Mobilith
Extension Rail Slides (2)	•	Mobilith
		7
Verified By:	Date:	

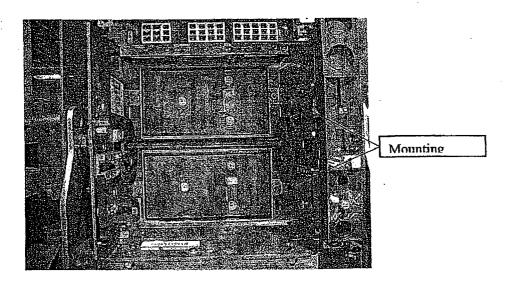


Figure 1: Location of Primary Disconnect Back Panel Mounting Bolts (qty=4)

Torque Value: 89 – 107 in-lbs

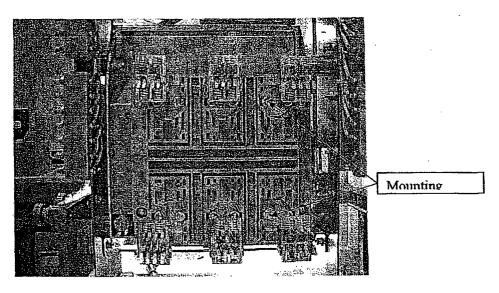


Figure 2: Location of Primary Disconnect Stabs to Back Panel Mounting Bolts (qty=12)

Torque Value: 133 - 150 in-lbs

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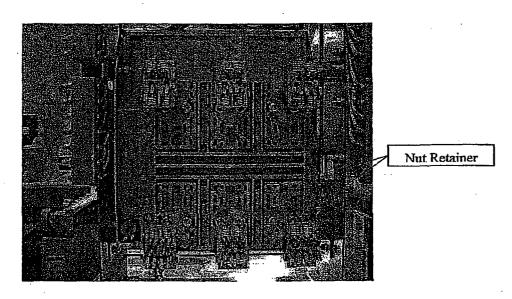
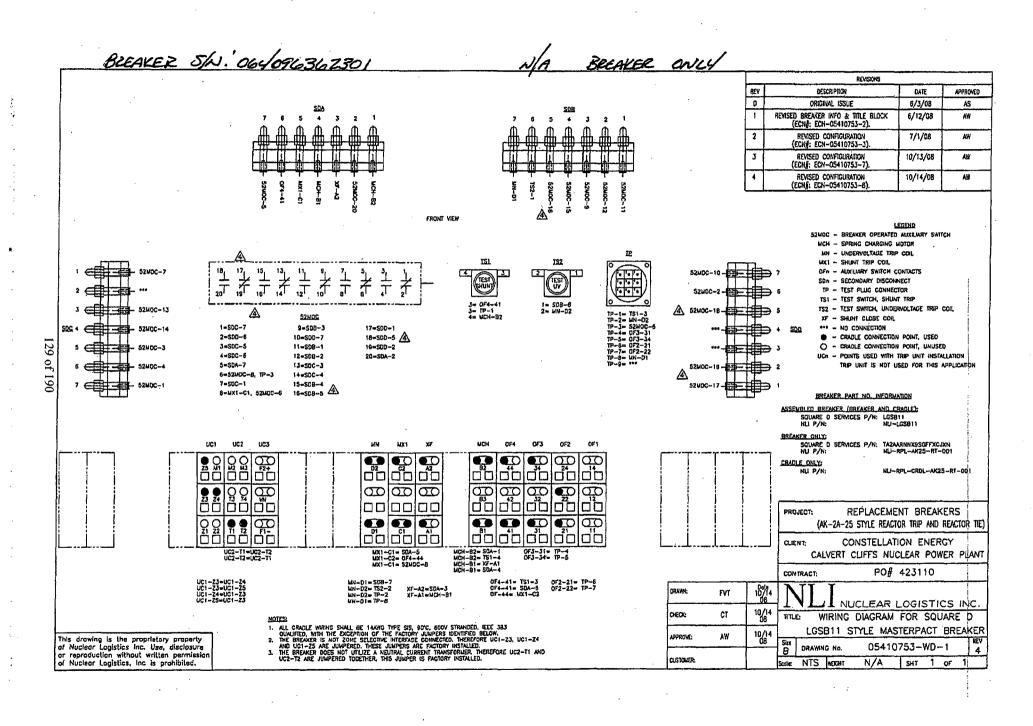
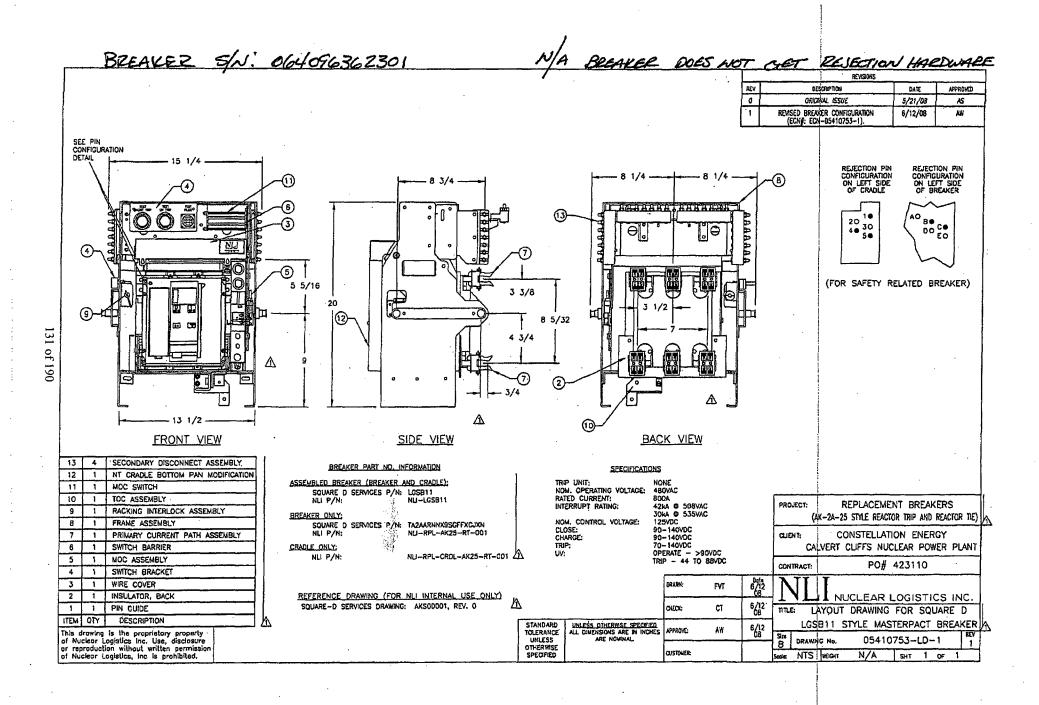


Figure 3: Location of Back Panel Nut Retainer on Primary Disconnect Mounting Back Panel (Remove nut retainer, if present, from all 4 locations)



BREAKER SW: 064096362301 REVISIONS DESCRIPTION DATE APPROVED REV 6/3/08 ORIGINAL ISSUE AS REVISED BREAKER INFO & TITLE BLOCK 6/12/08 AW TEST UV TRICCER (+) TP-2 UV (+) SCB-6 TEST TEST CHARGE (+) CLOSE (+) SDA-1 SDA-3 TEST TRIP TRIP (+) (ECN): ECN-05410753-2). TIMING CONTACT TIMING CONTACT TRIGGER (+) AVI REVISED CONTACTS 10/14/08 (ECN): ECH-05410753-8) AW ADDED INFORMATION 4/2/09 (ECN#: ECN-05410753-9). **TS**1 TS2 BS 우 우 LECENO 52MOC - BREAKER OPERATED AUXILIARY SV MCH - SPRING CHARGING MOTOR MN - UNDERVOLTAGE TRIP COL MXS - SHUNT TRIP COIL OFO - AIDOLIARY SWITCH CONTACTS SON - SEPONDARY DISCONNECT (NOT USED MCH 2 OF2 OF1 TP - TEST PLUG CONNECTOR OF4 MN 131 - TEST SMICH, SHUNT TRIP, HOMENTARY PUSHBUITTON, COMMINT SHOWN IN NORMAL STATE 132 - TEST SMICH, UNDERNOLITAGE TRIP, MOMENTARY PUSHBUITON, CONTACT SHOWN IN HORMAL STATE TCB-9) XF - SHUNT CLOSE COIL < -- SECONDARY DISCONNECT FROM CRADLE TO CELL < - SECONDARY DISCONNECT FROM BREAKER TO CRADLE 22 0 0 - TEST PLUG DISCONNECT O - CONNECTION POINT 130 of 190 CONTROL VOLTAGE INFORMATION CHARGE - 125 YOC CLOSE - 125 VOC TP-7 SDA-5 SDA-4 508-7 SHUNT TRIP - 125 VOC YEST CLOSE (-) TIMING CONTACT TIMING CONTACT UV (-) INDERVOLTAGE TRIP - 125 VDC CHARGE (-) TP-8 TEST TRIGGER (-) CRADLE TO CELL BREAKER PART NO. INFORMATION CELL SIDE DISCONNECT-ASSEMBLED BREAKER (BREAKER AND CRADLE): SQUARE D SERVICES P/N: LGSB1! NU P/N: NU-LOSB1! S0D-5 SDC-7 SDA-7 S0B-3 SDC-3 500-1 SD8-4 SDC-1 SD8~1 CRADLE WIRING BREAKER CNLY BREAKER TO CRADLE DISCONNECT SQUARE D SERVICES P/N: TAZAARNINXSSGFFXCJXN NU-RPL-AK25-RT-00! 13 Ò 17 11 ¢ 15 þ 18 ¢ CRADIE ONLY: 7 Q NU P/N: NU-RPL-CROL-AK25-RT-001 ۵ 20 0 14 19 12 15 Ó BREAKER WIRING-REPLACEMENT BREAKERS PROJECT: (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE) SDC-4 SD0-2 S00-6 S00-7 SDC-6 508-2 SDB-5 SDA-Z CONSTELLATION ENERGY CLIENT: TP-3 CALVERT CLIFFS NUCLEAR POWER PLANT CRADLE WIRING-TEST TRIGGER -- MOC CONTACTS (52MOC) -----(-)_ PO# 423110 CONTRACT: CELL SIDE DISCONNECT-DRAWN: FVT CRADLE/BREAKER WIRING NUCLEAR LOGISTICS INC. (TYPICAL) 4/2 CHECKS CT TITLE: SCHEMATIC DIAGRAM FOR SQUARE D 1. THE STATUS OF THIS ORAWING IS WITH THE BREAKER INSTALLED IN THE CONNECTED POSITION AND THE BREAKER CHARLED AND OPEN. PERFERENCE NUL ANOUTD PRAWING 05410783—LEDT AND SPECIFICATIONS. LGSB11 STYLE MASTERPACT BREAKER 4/2 09 A₩ APPROVE This drawing is the proprietary property of Nucleor Logistics Inc. Use, disclosure or reproduction without written permission of Nucleor Logistics, Inc is prohibited. REV Size B 05410753-SD-1 DRAWING No. CUSTOMER: N/A SLUICE NTS WEIGHT SHT 1 OF



STANDARD VERIFICATION PLAN FOR SQUARE-D MASTERPACT LGSB11 BREAKER (LOW VOLTAGE CIRCUIT BREAKER) FUNCTIONAL TESTING

TMI SPACE BREAKER ONLY BREAKEZ SW: 064096362302

ALL ELECTRICAL TESTING WAS
PERFORMED IN CRADLE 5/2: 25180820-002H

Document Number: SVP-102 Revision 2

SVP for	Square-D	Masterpact LGSB11	Breaker
Nuclear	Logistics,	Inc.	

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## APPROVAL

### STANDARD VERIFICATION PLAN FOR SQUARE-D MASTERPACT LGSB11 BREAKER (LOW VOLTAGE CIRCUIT BREAKER) FUNCTIONAL TESTING

This procedure is prepared in accordance with the NLI Quality Assurance Program and its implementing procedures.

	01	
Prepared by:		Date: 8/25/03
Verified by:	alel	Date: 8/76/09,
Approved by:	M. M.	Date: 8/26/0-8

SVP for Square-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2
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## **REVISION HISTORY**

Revision No.	Item Description	<u>Date</u>
0	Original Issue	2/22/07
1	Added clarifications to sections 3.0, 5.8.3, 6.0 & 10.0.  Removed Attachment I.	7/2/08
2	Renumbered sections 4 – 10, revised sections 2.1, 3.1.c, 4.0, 6.9.1.b, 8.1, added sections 6.9, 12.0, added attachment I & II	8/26/08

Rev. 2

### 1.0 SCOPE

The purpose of this standard verification plan is to verify the critical characteristic and function of the Square-D Masterpact LGSB11 600A circuit breaker with cradle as a complete assembly. Some of the critical characteristics may not be applicable depending on the options and functions available on the assembly that is being verified. The following step numbers in this document identify the standard critical characteristics. The results shall be documented within each section of this SVP and on the NLI QC Inspection Checklist for Masterpact NT Breakers, MANCON-LGSB11-1 (latest revision).

This test plan is generally used for testing of the circuit breaker and cradle together (LGSB11 part number). If circuit breaker or cradle only testing is required, NLI engineering will specify what sections are to be performed for the specific part required to be tested.

### 2.0 PRODUCTION CONTROLS

The following production controls and procedures are to be in effect throughout the life of this project. All of the following activities will be performed,

2.1 <u>Methodology</u>

☐ Sat ☐ Unsat



a. SDS has been audited by NLI and is currently on the NLI Approved Vendor List. The NLI audit addressed the following:

- 1. All bolts, lugs, wire, nuts, etc. used for production have been dedicated for safety-related use.
- All steel used in production of the cradles has been verified to be the correct material.

☐ Sat ☐ Unsat



NLI QC will implement the following production controls during construction. A separate QC inspection checklist will be used and maintained by QA. The sample size is 100%, unless a smaller sample size is documented. The QC checklist will verify the following items:

- 1. Dedicated parts supplied or verified by NLI are used during assembly as follows:
  - a. Bolts, nuts, washer, and other fasteners.
  - b. Lugs and wire.
  - c. Steel.
  - d! Mobil 28 grease.
  - e. Primary and secondary fingers.
- 2. Welding as follows:
  - a. Welding is performed per NLI-approved welding procedures.
  - b. Welders performing welding activities have been CWI certified.
  - c. Welds are inspected by a CWI.
- Fastener tightness is verified on 100% of the accessible fasteners and terminations, including intermediate assemblies.
- 4. 100% of the wire and wire connections have been inspected. There shall be no kinks, cuts, nicks or splits in the wire.
- 5. Lubrication inspection
  - a. Breakers are supplied without primary and secondary disconnect lubrication. Plant to lubricate per plant established procedures.
- 6. Inspect and verify that there are no loose or damaged parts.

•	Νı	
Cradle S/N (on nameplate):_	NA	

## 3.0 BREAKER IDENTIFICATION

3.1 <u>M</u>	ethodology
a.	Record the Square D nameplate data of the cradle. The nameplate shall contain the following information:
	1. Manufacturer:
·	2. Type (Breaker & Cradle):
	3. Cradle Serial Number:
	4. Style:
	5. Rated Max Voltage/Freq:
	6. Rated Continuous Current;
	7. Rated Short Circuit/Interrupt Current:
·	8. Control Voltage Range: Charge: Close: Trip:
•	9. Weight:
	10. Conversion Date:
A	
Unsat / ICM h	Perform a detail inspection of the breaker & cradle for any chips, cracks, gouges or a other damage.
8.5 · 1 c.	Record the circuit breaker specific data.
	1. Circuit breaker p/n: NTO 8NA
	2. Circuit breaker s/n: 064096362302
	3. Cradle date of manufacture:
	4. Circuit breaker date code: 693/5
	5. Micrologic trip unit s/n: 7082461 (Dummy TRIP UNIT)

4.0	PROPE	R BREAKER CONFIGURATION	
	4.1	Methodology	
		This section is to be performed with the circuit breaker out of the cell.	
		a. <u>Terminals tightened.</u> Verify all terminals are tight during wire check.	
□ Sat □ Unsat	JA Toch	b. Terminal identification. Verify the terminal points are labeled per the wiring/schematic drawing. Use the final revision of the NLI approved schematics and record discrepancies, if any. If there are any discrepancies found, do not proceed any further with the testing until the discrepancies have been resolved.	
ZSat □Unsat / UC	M 8.3	Proper wiring. Verify wiring against the final revision of the NLI approved schematic or wiring diagram. Attach a copy of the yellow-lined wiring/schematic drawing.	
9	A	NLI drawing # with revision: 054/0753-5D-1 ZEV. 3	ĺ
Sat Unsat	OC JON	d. Correct programmer. Verify that the programmer, sensor plugs and rating plugs are per the design documents:	
	0.59	Record the part numbers and/or rating:	
	0	Programmer:	
	·	Rating Plug: MA	
		Sensor Plug: 800A	
		<ul> <li>Trip unit date code. Verify the trip unit date code is P05491 or later. The format of the date code is Pxxyyz, with:</li> <li>xx = last two digits of the year.</li> </ul>	
		• yy = week.	
•		• $z = day$ of the week.	
,	A	Trip Unit Date Code: P09271	
☑ Sat ☐ Unsat	R.S.9	With the breaker cover off, inspect the trip unit performer plug. The performer plug should be green. A blue performer plug is not acceptable. If a blue plug is present, replace with a green performer plug. Note: The correct green performer plug must be present during primary injection testing.	
	. 1	f. <u>Trip unit is programmed for breaker type.</u> Program the breaker type into the trip unit.	
□ Sat □ Unsat	WA Tech	g. Trip unit battery is fully charged. Verify the battery is fully charged.	Rev.

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	Nucl	ear Logistic	CS, INC.	Page 4	
□ Sat	□ Unsat	Tech h	<ul> <li>Verify the rejection hardware pin configuration against the final rev approved NLI layout drawings (if applicable).</li> </ul>	ision of the	٠
			NLI drawing # with revision:		
			Breaker pin configuration:	·	
			Cradle pin configuration:	Rev.	2
	5.0	CIRCUI	T BREAKER PROPER FIT-UP & INSTALLTION		
		5.1 Me	ethodology		
□ Sat	☐ Unsat	NA a.	Install the cradle into a typical AK-2A-25 type cell. Visually inspect disconnects, secondary disconnects and interlocks match up with the in the cell. Verify the Truck Operated Cell Switch (TOC) flap on the with the TOC switch inside the cell.	nating connectors	
□ Sat	□ Unsat	Tech b.	Ensure there is a positive ground connection between the switchgear at Measure the continuity from the switchgear frame to the cradle frame continuity reading throughout this section.	and the cradle Maintain this	
Z Sat	□ Unsat	JCM a.	Install the breaker into the 'DISCONNECT' position. Verify no bind occurs.	ing of the interlocks	
	□ Unsat	JCM A	Ensure that the racking crank cannot be inserted unless the "PUSH To depressed.	OPEN" button is	
Z Sat □	□ Unsat	Tech 85.9	Rack the breaker to the 'TEST' position. To rack the breaker into the 'TEST' position, a racking crank is required to be inserted while press OPEN' button. To begin turning the racking crank the 'STOP RELEAD be pushed. Turn the racking crank clockwise until the breaker reache position. When the "TEST" position is reached, the 'STOP RELEAD out. The status of the position indicator should show that the breaker position.	sing the 'PUSH TO ASE' button must s the 'TEST' E' button will pop	
□ Sat I	□ Unsat	AA f.	Monitor a set of closed and open TOC switch contacts. Verify that the change state when the breaker is racked to the 'TEST' position.	e contacts do not	
ZSat 1	□ Unsat	FICH 8.	Verify the primary disconnects, secondary disconnects and interlocks cradle without any interference or binding.	match up with the	
□ Sat I	□ Unsat	MA h.	Verify the continuity from the switchgear frame to the cradle frame is	present.	
Sat I	□ Unsat	10M i. 875.9	Push the 'STOP RELEASE' button again to continue to turn the rack "CONNECT" position is reached. Again, the 'STOP RELEASE' but The status of the position indicator should show that the breaker is in position.	ton will pop out.	

□ Sat	□ Unsat	N/A Vech	_ j.	Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'TEST' to the 'CONNECT' position.
			k.	Manually close the breaker.
			1.	Manually charge the breaker.
☐ Sat	☐ Unsat	JA	m.	Verify that the cradle racking tool cannot be installed on the cradle racking mechanism and that the cradle cannot be removed from the cell.
☑ Sat	□ Unsat	JCM Tech 8.5.4	n.	Verify the primary disconnects, secondary disconnects and interlocks match up with the cradle without any interference or binding.
☐ Sat	☐ Unsat	N/A	О.	Verify the continuity from the switchgear frame to the cradle frame is present.
			p.	Trip the breaker.
			q.	Rack the breaker to the 'TEST' position.
□ Sat	□ Unsat	N/A Yech	r.	Monitor a set of closed and open TOC switch contacts. Verify that the contacts change state when the breaker is racked from the 'CONNECT' to the 'TEST' position.
			S.	Rack the breaker to the 'DISCONNECT' position and remove the breaker from the cradle.
			t.	Remove the cradle from the cell.

### 6.0 PRODUCTION TESTS

Sections 5.1, 5.2, 5.3 & 5.4 are to be performed with the circuit breaker racked into the cradle to the 'CONNECT' position but not racked into a cell.

### 6.1 MAIN CONTACT RESISTANCE (DUCTOR TEST)

See discrepancy report number:

- a. This test checks the resistance of the primary current path, hinge points, wipe, connections, and quality of conductivity of the current path. Perform this test on each phase of the circuit breaker.
- b. Apply 85Vdc minimum to UV trip device (if applicable). Note: UV trip device must be energized to close the breaker.

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	6.2	INSULATION INTEGRITY (DC MEGGER TEST)		
		6.2/1 Co	ntrol Wiring	
✓ Sat □ Unsat		Tech 8.5.9	Control wiring except charging motor. Isolate the charging motor from the control circuit. With the breaker in the open position, apply 1000Vdc and megger each secondary disconnect to ground for 1 minute except the charging motor disconnects. Record the lowest insulation resistance. Repeat this test with the breaker in the closed position.	
			Applied Voltage: 1800 Vdc (Criteria is 1000VDC nominal)	
			WITH BREAKER OPEN	
			Lowest insulation res.: $\geq 20,000$ M $\Omega$ (Criteria is $\geq 100$ M $\Omega$ )	
			WITH BREAKER CLOSED	
			Lowest insulation res.: $\geq 20,000$ M $\Omega$ (Criteria is $\geq 100$ M $\Omega$ )	
		A	Record the number of tested secondary disconnects: 26	
⊠ Sat	□ Unsat	JCM b. Tech 8-5-9	<u>Charging motor.</u> Megger the charging motor secondary disconnects (SDA-1 & SDA-2) to ground at 500Vdc for one minute. Record the lowest insulation resistance.	
			Perform with the breaker open discharged:	
			Applied Voltage: Vdc (Criteria is 500VDC nominal)	
			Lowest insulation res.: $20,000$ $M\Omega(Criteria is \geq 2M\Omega)$	
			Perform with the breaker closed and charged:	
			Applied Voltage: Soo Vdc (Criteria is 500VDC nominal)	
			Lowest insulation res.: $>20,000$ $M\Omega(Criteria is \geq 2M\Omega)$	
			-	

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2 tables 20 Blotto, 120.		
A ^{6.2.2}	Phase-to-Phase, Phase-to-Ground, & Lin	ne-to-Load
Sat Unsat JCM Fech 8.5.9	<ul> <li>With the breaker in the closed position, app phases (Note: UV trip device must be ener the breaker).</li> </ul>	
	APPLIED VOLTAGE: 1000 VOC	(Criteria is 1000VDC)
	PHASE-TO-PHASE WITH BREAKER C	LOSED
	ØAToØB: <u>&gt;20,000</u> ØBToØC: <u>&gt;20,000</u>	_M $\Omega$ (Criteria is > 100M $\Omega$ ) _M $\Omega$ (Criteria is > 100M $\Omega$ )
•	ØCTo ØA: >20,000	$\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$ $\underline{\hspace{0.1cm}}$
A	See discrepancy report number: MA	(N/A if all pass)
Sat Unsat ICM	b. With the breaker in the closed position, appropriate phases to ground (Note: UV trip device minimum to close the breaker).	
	APPLIED VOLTAGE: 1000 VOC	(Criteria is 1000VDC)
	PHASES-TO-GROUND WITH BREAKE	ER CLOSED
	Ø A To GROUND: >20,000 Ø B To GROUND: >20,000 Ø C To GROUND: >20,000	$M\Omega$ (Criteria is > 100M $\Omega$ )
$\triangle$	See discrepancy report number:	(N/A if all pass)
Sat Unsat JCM Tech	With the breaker in the open position, appl phase line-to-load.	y 1000VDC and megger between
<i>₹.</i> 5.7	APPLIED VOLTAGE: 1000 VDC (Crite	ria is 1000VDC)
	PHASE LINE-TO-LOAD WITH BREAK	ER OPEN
	Ø A LINE To LOAD: >20,000	$\underline{M}\Omega$ (Criteria is > 100M $\Omega$ )
	ØBLINE To LOAD: >20,000	$M\Omega$ (Criteria is $> 100M\Omega$ )
•	ØCLINE To LOAD: >20,000	$M\Omega$ (Criteria is $> 100M\Omega$ )
	See discrepancy report number:	(N/A if all pass)

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## 6.3 INSULATION INTEGRITY (AC HI-POT TEST)

CAUTION: STAND AT LEAST 6 FEET FROM THE BREAKER DURING THIS TESTING. REMOVE THE TRIP UNIT RATING PLUG PRIOR TO PERFORMING THIS TEST.

Note: This is a "pass/fail" test. Perform this test at 2200Vac for 1 minute. Acceptance criteria is no insulation breakdown after 1 minute.

## 6.3.1 Poles-to-Ground, Phase-to-Phase, & Line-to-Load

		A	Met	hodology
Sat	☐ Unsat	JCM Tech	a.	All unenergized poles should be grounded for the AC hi-pot tests.
☑ Sat	□ Unsat	JCM Tech 869	ù	Line to load w/ breaker open. With the breaker in the open position, apply 2,200VAC and hi-pot between phase line-to-load. Acceptance Criteria is no insulation breakdown after 1 min.
				Applied Voltage: Z200 Vac (Criteria is 2,200VAC nom.)
		Δ		<ul> <li>Ø A Line to Load: Pass/Fail PASS</li> <li>Ø B Line to Load: Pass/Fail PASS</li> <li>Ø C Line to Load: Pass/Fail PASS</li> </ul>
☑ Sat	□ Unsat	JCM Tech 8-6-9		Phase to ground w/ breaker closed. Close the breaker and repeat the testing between each phase-to-ground. Acceptance Criteria is no insulation breakdown after 1 min.
	•			Applied Voltage: ZZOO Vac (Criteria is 2,200VAC nom.)
		A		<ul> <li>ØA to Ground: Pass/Fail PASS</li> <li>ØB to Ground: Pass/Fail PASS</li> <li>ØC to Ground: Pass/Fail PASS</li> </ul>
Sat	□ Unsat į	JCM Tech 8.6.9	đ.	Phase to phase w/ breaker closed. With the breaker in the closed position, apply 2,200VAC and hi-pot between phases. Acceptance Criteria is no insulation breakdown after 1 min.
				Applied Voltage: Z200 Vac (Criteria is 2,200VAC nom.)
				ØA to ØB:         Pass/Fail         7455           ØB to ØC:         Pass/Fail         7455           ØC to ØA:         Pass/Fail         >455

		6.4 O	PERATION AT NOMINAL/DEGRADED/OVERVOLTAGE CONDITIONS &
			TERLOCK OPERATION
		, +	(BEEAKER HAS AC CHARGENG MOTOR,
		A a.	With the breaker installed in a cradle.
☑ Sat	☐ Unsat	JCM b.	Apply 125vdc to the UV trip device circuit (if applicable).
		8.69	VOLTAGE APPLIED: 125 VDC
			120VAC CT 8/6/09 (SEE NOTE A 20)
		C.	Apply <del>125Vde</del> to the charging motor circuit.
			VOLTAGE APPLIED: /20 VAC
		d.	Apply 70VDC to the trip circuit.
	•	A	VOTLAGE APPLIED: 70 voc
Sat	□ Unsat	JCM	Rack the breaker to the "TEST" position.
	٠	8.6.9 f.	Verify that breaker charges as the breaker is racked to the 'TEST' position.
☑ Sat	☐ Unsat	J.ICMB:	Verify status indicators indicate that breaker is open and closing spring is charged.
_		8/69 h.	Close the breaker.
Sat	☐ Unsat	JCM i.	Verify that the closing springs recharge.
☑ Sat	□ Unsat	7.CM	Verify status indicators indicate that breaker is closed and closing spring is charged.
☑ Sat	☐ Unsat	ZIGM k.	Trip the breaker.
		8.6.9 _{1.}	Verify status indicators indicate that breaker is open and closing spring is charged.
		m	Close the breaker.
		A n.	Attempt to rack the breaker to the 'CONNECT' or 'DISCONNECT' positions.
☑ Sat	☐ Unsat	JCM o. Tech 8-6-9	Verify that the breaker cannot be racked to the 'CONNECT' or 'DISCONNECT' positions.
		A p.	Trip the breaker.
☑ Sat	☐ Unsat	JCM q.	Verify status indicators indicate that breaker is open and the closing spring is charged.
		8-6.9 r.	Rack the breaker beyond the 'TEST' position but before the 'CONNECT' position.
		A s.	Attempt to close the breaker.
<b>⊘</b> Sat	☐ Unsat	JCM t.	Verify that the breaker cannot be closed.
		8-6-9	N)
	Cradi	le S/N (on i	namenlate):

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	A		•
☑ Sat	i ccn	Verify status indicators indicate that breaker is open and closing sp	ring is charged.
	8.6.9 _{v.}	Rack the breaker to the 'CONNECT' position.	
	A w.	Close the breaker.	
☑ Sat	□ Unsat JCM x	Verify that the closing springs recharge	
Sat	☐ Unsat JCM y.	Verify status indicators indicate that breaker is closed and closing	spring is charged.
_	8.6.9 z.	Trip the breaker.	·
☐ Sat	☐ Unsat JCM aa.	Verify status indicators indicate that breaker is open and closing sp 90VAC CT 8669 (SEE NOTE P.20)	oring is charged.
	8.6.9 bb.	Lower the control voltage to 90 Vdc to the charging motor circuit.	
	•	VOLTAGE APPLIED: 88 VAC	
	cc.	Lower the UV voltage to 85Vdc.	
	Δ	VOLTAGE APPLIED: 85 VAC	
☐ Sat	☐ Unsat ICMdd.	Charge, close and trip the breaker 5 times.  137VAC CT 8/6/09 (SEE HOTE P.20)	
	86.9 ee.	Raise the control voltage to 140Vdc to the charging motor circuit.	
		VOLTAGE APPLIED: 137 VAC	
	ff.	Raise the UV voltage to 140Vdc.	
/	$\triangle$	VOLTAGE APPLIED: 140 VDC	
Sat	☐ Unsat <u>ICM</u> gg.	Charge, close and trip the breaker 5 times.	
•	8-6-9 hh.	Close the breaker.	
Sat Sat	☐ UnsatJCM Ni	With the breaker closed, attempt to rack the breaker out to the 'TF	ST' position.
☑ Sat	□ Unsat <u>JCM</u> jj.	Verify that the breaker cannot be racked to the 'TEST' position.	
		Trip the breaker.	
[∃\Sat	Unsat ICM II. 8.6.9	Rack the breaker to the 'TEST' position. Monitor a set of close contacts. Verify that the contacts change state when the brea 'CONNECT' to the 'TEST' position.	
	, mn	n. Rack the breaker back to the 'CONNECT' position.	

#### 6.7 TIMING TESTS

### 6.7.1 Shunt Trip

- a. Ensure that there is 85Vdc minimum power to the UV trip device (if applicable).
- b. With the breaker in the closed position, apply 70Vdc to the shunt trip coil.

	•		•
		•	

APPLIED VOLTAGE:

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Sat □ Unsat



Using the appropriate M&TE timing equipment, record the opening time of the main and auxiliary contacts and verify that the breaker is open.

8.6.9

 $\phi$ A MAIN POLE OPENING TIME: 26.9 m5 (Criteria is  $\leq$  50mS)  $\phi$ B MAIN POLE OPENING TIME: 28.1 m5 (Criteria is  $\leq$  50mS)  $\phi$ C MAIN POLE OPENING TIME: 28.1 m5 (Criteria is  $\leq$  50mS) AUXILIARY CONTACT OPENING TIME: 32.9 m5 (Criteria is  $\leq$  62mS)

## 6.7.2 UV Trip (if applicable)

PERFORM STEPS 6.7.2.d - 6.7.2.o 3 TIMES. Record the results in the table below.

a. Apply a voltage of 105Vdc to the UV coil and close the circuit breaker.

Sat Unsat JCM

b. Reduce the voltage until the breaker trips.

Verify breaker tripped in the voltage range of 43.75 to 87.5Vdc.

TRIP VOLTAGE: 48.7 voc (Criteria is 43.75 to 87.5VDC)

- d. Re-apply a voltage of 105Vdc to the UV trip.
- e. Charge and close the breaker.

Sat Unsat



Remove power from the UV trip.

Record the opening time of the main and auxiliary contacts and verify that the breaker is open.

	1 ST Test	2 nd Test	3 rd Test	Acceptance Criteria
φA	19.0 MS	16.1 m5	19.0 ms	≤ 50mS
φB	19.0 ms	16.1 ms	19.0 MS	≤ 50mS
φC	19.0 MS	16.7 MS	19.0 MS	≤ 50mS
Auxiliary Contact	25.6 ms	25.2 ms	29.9 ms	≤ 62mS

h. After the breaker trips, attempt to close the breaker.

Sat Unsat



Verify that breaker cannot be closed.

8.6.9

Apply a voltage of 135Vdc to the UV trip.

- k. Charge and close the breaker.
- 1. Remove power from the UV trip.

	1 ·	Masterpact LGSB	11 Breaker		SVP-102, Rev. 2
	Nuclear Logistics	, IIIC.			Page 14
⊠ Sat	Unsat JCMin.	Record the opening is open.	time of the main and	d auxiliary contacts	and verify that the breaker
		1 ST Test	2 nd Test	3 rd Test	Acceptance Criteria
	фА	17.2 MS	23.7 ms	17.905	≤ 50mS
	φВ	17.7 ms	23.7 ms	17.9 ms	≤ 50mS
	φC	17.8 ms	23.8 ms	18.0 ms	≤ 50mS
	Auxiliary Contact		28.7 m5	26.3 ms	≤ 62mS
Ø Sat	Unsat JCM 8.  Tech 8-6-9  6.7.3	Operation of T  6.7.3.1 Shunt 7  1. Apply 90V6  2. Apply 85V	est Pushbuttons & Trip Test PushButto	rest Plug on isconnect terminals UV trip device a	for the shunt trip circuit.  t the secondary disconnect order to close the
	□ Sat □ Vinast	1	close the breaker.		
	□ Sat □ Unsat	TEST SHU	nameplate on top of JNT".	the shunt trip test	pushbutton is designated as
	□ Sat □ Unsat _	5. Verify the	TEST SHUNT pushb	utton is installed wi	th 'ORANGE' plastic disk.
		6. Push the Sh	unt Trip Test Button.		
	□ Sat □ Unsat	7. Verify that	the breaker trips.		
	□ Sat □ Unsat	8. Record the breaker is o		main and auxiliary	contacts and verify that the
		<b>6A MAIN POLE O</b>	PENING TIME:		_ (Criteria is ≤ 50mS)
		♦B MAIN POLE O			_ (Criteria is ≤ 50mS)
		<b>¢C MAIN POLE O</b>			_ (Criteria is ≤ 50mS)

Cradle S/N (on nameplate): N/A

AUXILIARY CONTACT OPENING TIME:_

_(Criteria is ≤ 62mS)

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## 6.7.3.2 UV Trip Pushbutton

- a. Apply 85Vdc minimum to the UV trip device at the secondary disconnect terminals. The UV trip device must be energized in order to close the breaker.
- b. Charge and close the breaker.

☐ Sat ☐ Unsat	A c.	Verify the nameplate on top of the UV "TEST UV".	test trip pushbutton is designated as
□ Sat □ Unsat		Verify the TEST UV pushbutton is install	led with 'BLUE' plastic disk.
	Tech e.	Push the "UV TRIP" button on the front of	of the breaker.
☐ Sat ☐ Unsat	Tech f.	Verify that breaker trips.	f 
□ Sat □ Unsat	g.	Record the opening time of the main and breaker is open.	l auxiliary contacts and verify that the
	φΑ ΜΑ	AIN POLE OPENING TIME:	(Criteria is ≤ 50mS)
	фВ МА	AIN POLE OPENING TIME:	(Criteria is ≤ 50mS)
	фC MA	IN POLE OPENING TIME:	(Criteria is $\leq 50 \text{mS}$ )
			•

## 6.8 AUXILIARY SWITCH / MOC SWITCH TESTS

AUXILIARY CONTACT OPENING TIME:

Sat Unsat JCM Find a. Tech QC G-6-0

Methodology

With the breaker in the OPEN position, verify all auxiliary contacts and MOC contacts that are accessible by secondary disconnect pins are in the correct state (closed or open). Use the final revision of the NLI approved schematics and record discrepancies, if any. Identify each contact and record contact resistance. Acceptance Criteria is >40M $\Omega$  for open contacts and <1 $\Omega$  for closed contacts. Record the readings in the table below.

(Criteria is  $\leq 62$ mS)

NLI Drawing # with revision: 054/0753-5D-1 2EV. 3

Contact ID:	Resistance:	Contact ID:	Resistance:
OF1-11 TO OF1-12/W	0.22		
OF1-11 TO OF1-14 &	SHOME		
0F2-21 TO 0F2-22 (NO			
0F2-21 -0 0F2-24 616	HOMA		
683-31 70 083-32 CNG	0.2~2		
OF3-31 TO OF3-34 (20)	Home		
0F4-41 to 0F4-42 (NE			
0F4-41 TO 0F4-44 WO	>40MJZ		

	di	
Cradle S/N (on namenlate):	MA	

	e-D Masterpact LGSB11 Br	eaker		SVP-102, Rev. 2
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M = M + C	With the breaker in the contacts that are access (closed or open). Use discrepancies, if any.  Acceptance Criteria is except for the contact contact resistance of the measuring the resistant trip coil resistance and switch is verified by the resistance across the sube recorded for informatical contact resistance.	in series with the his switch while a ice across second i not the closed c ripping the break econdary discont	e trip coil. It is not pra closed. When the brea ary disconnect pins we ontact resistance. Pro er at degraded voltage nect pins, while the br	actical to measure the aker is closed, ill result in the shunt oper closing of this conditions. The
· ·	Contact ID:	Resistance:	Contact ID:	Resistance:
	OF1-11 TO OF1-12 (NC)	>40m2	Contact ID.	Resistance.
•	OF1-11 TO OF1-14 (NO)	0.212		
	0F2-21 TO 0F2-22 GVC	>40MZ		
•	062-21 to 062-24 (NO)	0.2.2		
	0F3-31 TO DE3-32 (NC)	>40Mr		
•	083-31 to 083-34 (WB)	0.2-2		
	084-41 TO 084-42 (NO	>40M2		
	OF4-41 TO OF4-44 (2)	0.22		
	TRIP UNIT / OVERCURRE	ENT TRIP SWIT	TCH TESTS	
,				
l Sat □ Unsat <u>Alf</u> Teh	measure those swi accessible via a se state using the fina discrepancies, if an	te resistance of the tenes that are be condary disconneal revision of the cond.  I dentify each	ne overcurrent trip swing used; i.e. only me ect. Verify the contact NLI approved schematic contact and record co	itch contacts. Only asure those switches ets are in the proper atics and record
Sat Unsat AJA Tech	closed, measure the measure those swing accessible via a sestate using the final discrepancies, if an	the resistance of the teches that are being condary disconnical revision of the ray. Identify each is $>40M\Omega$ for	ne overcurrent trip swing used; i.e. only me ect. Verify the contact NLI approved schematic contact and record co	atch contacts. Only asure those switches are in the proper atics and record ontact resistance.

SVP for Square-D Ma Nuclear Logistics, Inc	sterpact LGSB11 Breaker	SVP-102, Rev. 2 Page 17
□ Sat □ Unsat → A	from step 6.9.1.a. Identify each	ration/contact resistance. While the breaker is the overcurrent trip switches changed states a contact and record contact resistance. for open contacts and $<1\Omega$ for closed contacts.
Con	ntact ID (SDEn):	Resistance:
		·
,		
t □ Unsat <u> </u>	6.9.1.d. Apply [(long time pick	rm before primary injection tests per step cup setting) x (sensor plug rating) x 1] amps of s. Verify the breaker does not trip and that the he trip unit does not come on.
·	Long time pickup setting:	Applied Current:
	Does breaker trip?	
	Does the OL signal LED light	come on?
	through all three phases. Verif	ng) x (sensor plug rating) x 1.25] amps of currently the overload signal LED light comes on. s not required to verify that the breaker trips.
	Long time pickup setting:	Applied Current:
	Does the OL signal LED light	come on?
t □ Unsat <u>J/A</u> QC	injection test table. Perform the The current through one phase	m primary injection testing per the primary te testing at the client settings (if applicable). will power the trip unit. Use the following to determine the acceptable trip time for each ment I.
	<ul> <li>Short time tests: Curve No depending upon the i²t sett</li> </ul>	ceptance criteria is ≤ 0.05 seconds, (based upon

SVP for Square-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2	
Nuclear Logistics, Inc.	Page 18	

## PRIMARY INJECTION TEST TABLE

## Actual trip times:

Trip Function	Pickup Setting	Time Delay Setting	i²t on/off	Sensor plug rating	Applied current	Trip time range acceptance criteria	ØA	ØB	ØC
Long time at 200% ¹	lr =	tr =	N/A						
Long time at 500% ^{1.5}	Ir =	tr =	N/A			1			
Short time at 200% or 170% ^{2, 4}	Ir = Isd=	tsd =			7	H			* .
Instantaneous at 200% ³	Ii =	N/A	N/A			≤ 0.05 seconds			

Record the client-required trip setting drawing number and revision level (if not applicable, write N/A): _Notes:

- 1. Applied current for long time testing is (long time pickup) x (sensor plug rating) x (2 or 5).
- 2. Applied current for short time testing is (long time pickup) x (short time pickup) x (sensor plug rating) x (2 or 1.7).
- 3. Applied current for instantaneous testing is (instantaneous pickup) x (sensor plug rating) x 2.
- 4. Perform short time primary injection testing at 200% for NT type breakers and at 170% for NW type breakers.
- 5. When testing long time at 500%, put the short time pickup setting at the maximum value to avoid interference.

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## 7.0 DESIGN TESTS

All design tests in accordance with IEEE C37.50/20 for the Masterpact LGSB11 circuit breaker have been performed and documented. Copies of the test report(s) shall be provided (if required).

## 8.0 DEDICATION OF DOOR

	Test Eq	puipment I	D:SDS Tech ID:
□ Sat	□ Unsat	8.1 A a	Verify that the dimensions on the door matches the NLI approved door drawings by measuring the overall width, length, depth, material thickness and location of the hinges and location of the hole cut-outs and size of the hole cut-outs. Visually inspect that the door is the correct color per the client required specification.  Rev. 2
□ Sat	□ Unsat	JA b	NLI DRAWING NUMBER:  Verify that each door has the appropriate labeling per the door drawings.

## 9.0 QUALITY ASSURANCE

All activities will be performed in accordance with the requirements of the NLI Quality Assurance Program and its implementing procedures. This QA program meets the requirements of 10CFR50 Appendix B, 10CFR21 and ASME NQA-1.

## 10.0 MEASUREMENT & TEST EQUIPMENT

All measurement and test equipment used for the testing shall be documented in the test data sheets including the calibration due dates. All M&TE shall be traceable to a NIST or equivalent industry standard, where applicable.

	115		GYD 100 D 0
SVP for Square-D Masterpact LGSB	II Breaker	;	SVP-102, Rev. 2
Nuclear Logistics, Inc.			Page 20

#### 11.0 REFERENCES

- 11.1 Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 10/2003.
- 11.2 IEEE C37.13-90, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures."
- 11.3 C37.16-88, "ANSI Standard for Low Voltage Power Circuit Breakers & AC Power Circuit Protectors Preferred Ratings, Related Requirements & Application Recommendations."
- 11.4 C37.20.1-87, "ANSI Standard for Metal Enclosed Low Voltage Power Circuit Breaker Switchgear."
- 11.5 IEEE C37.50-89, "ANSI Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures Test Procedures"
- 11.6 IEEE C37-59-91, "IEEE Standard Requirements for Conversion of Power Switchgear Equipment."
- 11.7 NLI QA Manual, Rev.6 dated 12/8/04.
- 11.8 NLI design drawings for LGSB11 Masterpact circuit breaker and doors.
- 11.9 NETA ATS-1999, "Acceptance Testing Specifications for Electrical Power Distribution Equipment & Systems".
- 11.10 EPRI TR-017218-R1, "Guideline for Sampling in Commercial-Grade Item Acceptance Process."
- 11.11 MANCON-LGSB11-1, latest revision, "NLI QC Checklist for Masterpact NT Breakers."
- 11.12 IM-LGSB11-1, (latest revision), "NLI Instruction Manual for Square-D Masterpact NT Breakers, P/N: LGSB11."

### 12.0 ATTACHMENTS

Attachment I - trip curves:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

Attachment II – Exert from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class <u>0613</u>, dated 10/2003, page 7.

Rev. 2

. *	(0c)	. A	
Prepared by:	8-6.09	JCM Date: 8.5-9	
		Qy 8/7/09 Date: 2/6/09	
Verified by:		Date: 46/09	
Approved by:	Sh	Date: 8/7/09	<del></del>
		1	
Client Approval:		Date:	

NOTE: THE TESTING OF THE CHARGE CIRCUIT WAS PERFORMED WITH AC VOLTAGE APPLIED.

THE BREAKERS ARE SUPPLIED WITH AC CHARGING MOTOR. THE ACCEPTABLE PANK IS 90-139 VAC.

THE TESTING PERFORMED IS ACCEPTABLE.

CT 8/6/09

SVP for Square-D Ma	sterpact LGSB11 Bro	eaker	SVP-102, Rev. 2
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	TEST DA	TA APPROVAL / M	ITE LOG
Breaker S/N: 06407	16362302	Cradle S/N:	NIA
MTE Log			•
Item Description	on Test	Equipment ID#	Calibration Due Date
MEHGEL	MEG-	NUK	06-23-10
DUCTOIZ	DUC-		02-09-10
HI-POT	41PO-	NUK	02-05-10
TEST SET	HCTS-C	207	07-01-10
MULTIMETER	MTE-2		05.07-10
STOP WATCH	MIE-1		12-01-09
TIMER	TIME -C	019	06:16:10
			· ·
			·
Discrepancy Log			
Discrepancy #:	SVP Section:	Check one:	PE initials and date:
		☐ Acceptable	٠
	#*************************************	☐ Unacceptable	
·	•	☐ Acceptable	
<u>-</u>	<del></del>	☐ Unacceptable	
		☐ Acceptable	
		☐ Unacceptable	
		☐ Acceptable ☐ Unacceptable	
	·	☐ Acceptable	
		☐ Unacceptable	
	W	- Directopiante	
Final Cycle Counter Re	eading (if applicable):_	00056	·
Client Breaker ID (if a		y/A	·
Prepared by:	( 8-4·0	q /ICN	Date: 08-05-09
Verified by:	0	CN 8/2	1/09 Date: 8/c/09
	-		

Approved by:

SVP for Square-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2
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## ATTACHMENT I TO SVP-102

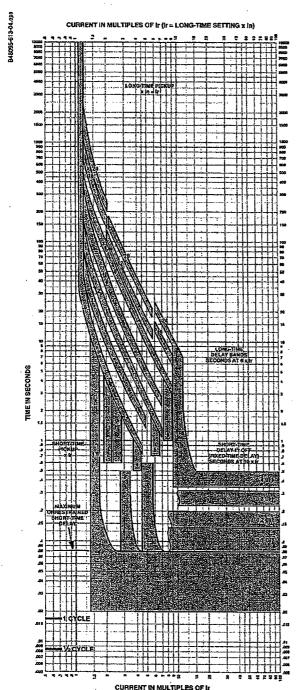
## TRIP CURVES:

- Schneider Electric Curve No. 0613TC0004, dated 4/2008
- Schneider Electric Curve No. 0613TC0005, dated 4/2008
- Schneider Electric Curve No. 0613TC0007, dated 4/2008

## Masterpact[®] NT and NW Universal Power Circuit Breakers Trip Curves

## Micrologic 5.0/6.0 A/P/H Trip Unit

Figure 166: Micrologic 5.0/6.0 A/P/H Trip Units: Long-Time Pickup and Delay, Short-Time Pickup, and I2t OFF Delay



#### Micrologic 5.0/6.0 A/P/H Trip Units

Characteristic Trip Curve No. 613-4

Long-Time Pickup and Delay Short-Time Pickup and I²t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

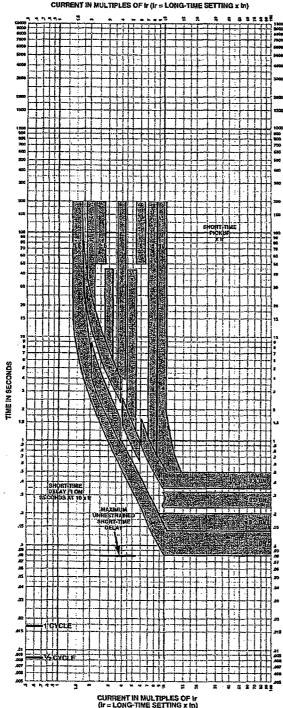
#### NOTE:

- 1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the longtime delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermal-imaging.
- 2. The end of the curve is determined by the interrupting rating of the circuit breaker.
- With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
- For a withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for instantaneous override values.
- 6. Overload indicator illuminates at 100%.

Curve No. 0613TC0004

# Masterpact[®] NT and NW Universal Power Circuit Breakers Trip Curves

Figure 167: Micrologic 5.0/6.0 A/P/H Trip Units: Short-Time Pickup and I²t ON Delay



Micrologic 5.0/6.0 A/P/H Trip Units Characteristic Trip Curve No. 613-5 Short-Time Pickup and I²t ON Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to +60°C (-22°F to +140°F) ambient temperature.

#### NOTE:

- 1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately twenty minutes is required between overloads to completely reset thermalimaging.
- The end of the curve is determined by the interrupting rating of the circuit breaker.
- With zone-selective interlocking ON, short-time delay utilized, and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of current.
- For withstand circuit breaker, instantaneous can be turned OFF. See trip curve 613-7 for instantaneous trip curve. See trip curve 613-10 for Instantaneous override values.
- 6. See trip curve 613-4 for long-time pickup and delay trip curve

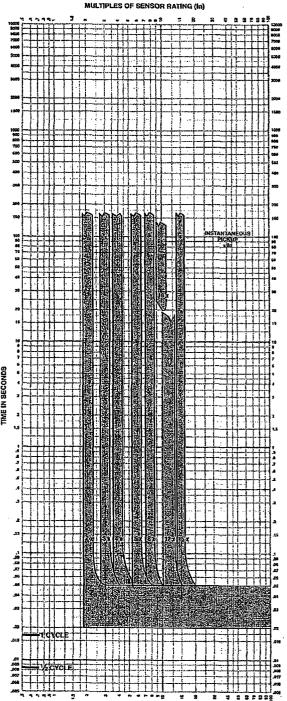
Curve No. 0913TC0005 Drawing No. 848095-613-0

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Schneider

04/2008

Figure 168: Micrologic 5.0/6.0 Trip Units: Instantaneous Pickup, 2x to 15x and OFF



MULTIPLES OF SENSOR RATING (In)

#### MICROLOGIC* 5.0/6.0 A/P/H TRIP UNIT CHARACTERISTIC TRIP CURVE NO. 613-7

Instantaneous Pickup 2x-15x and OFF

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30° to +60°C ambient temperature.

#### Notes:

- The end of the curve is determined by the interrupting rating of the circuit breaker.
- Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
- 3. The instantaneous region of the trip curve shows maximum total clearing times. Actual clearing times in this region can vary depending on the circuit breaker mechanism design and other factors. The actual clearing time can be considerably faster than indicated. Contact your local Sales Office for additional information.
- For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
- See 613-4 and 613-6 for long-time pickup, long-time delay, short-time pickup, and shorttime delay trip curves.

SVP for Square-D Masterpact LGSB11 Breaker	SVP-102, Rev. 2
Nuclear Logistics, Inc.	Page II.1

#### ATTACHMENT II TO SVP-102

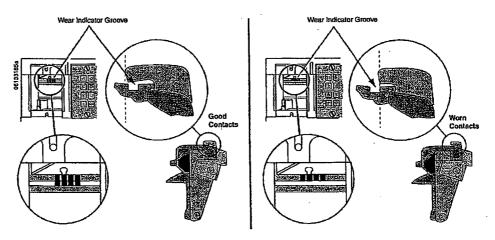
Excerpt from Schneider Electric Masterpact NT/NW Universal Power Circuit Breakers Catalog Class 0613, dated 4/2008: Page 7 – contact wear

## Masterpact[®] NT and NW Universal Power Circuit Breakers Masterpact Circuit Breakers

Reduced Maintenance: Under normal operating conditions, the circuit breaker does not require maintenance. However, if maintenance or inspection is necessary, the arc chambers are easily removed so you may visually inspect the contacts and wear indicator groove (see the figure below for how wear is indicated). The operation counter can also indicate when inspections and possible maintenance should be done. The life of the circuit breaker may be extended by replacing the arc chamber and spring-charging motor and/or replacing the main contact assembly of ANSI Certified circuit breakers.



Figure 4: Contact Wear Indicators



## **Operating Conditions**

Masterpact circuit breakers are suited for use:

- At ambient temperatures between -22°F (-30°C) and 140°F (60°C).
- At altitudes +13,000 ft. (3900 m).

Masterpact circuit breakers have been tested for operation in industrial atmospheres. It is recommended that the equipment be cooled or heated to the proper operating temperature and kept free of excessive vibration and dust. Operation at temperatures above 104°F (40°C) may require derating or overbussing the circuit breaker. See the appropriate instruction bulletin and page 15 of this catalog for additional information.

Masterpact circuit breakers meet IEC 68-2-6 Standards for vibration.

- 2 to 13.2 Hz and amplitude 0.039 in. (1 mm)
- 13.2 to 100 Hz constant acceleration 0.024 oz. (0.7 g.)

The materials used in Masterpact NT and NW circuit breakers will not support the growth of fungus and mold.

Masterpact circuit breakers have been tested to the following:

- IEC68-2-30 Damp heat (temperature +55°C and relative humidity of 95%)
- IEC 68-2-52 level 2 salt mist

## **Storage Temperature**

Circuit breakers with trip units without LCD displays may be stored in the original packaging at temperatures between -58°F (-50°C) and 185°F (85°C). For circuit breakers with trip units with LCD displays, this range is -40°F (-40°C) to 185°F (85°C).

Schneider

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INSPECTION CHECKLIST Masterpact NT Breakers Type: LGSB11

> MANCON-LGSB11-1, Rev. 0 Page 1 of 1

## Cradle S/N:

	Sat		Unsat	Rework Satisfactory
Material Control	4	A		
NLI supplied dedicated material used during manufacture	·····y		-	
(fasteners, wire, lugs, grease, etc.)				
Circuit breaker p/n and s/n, See SVP Data Sheets		.	•	
Perform weld inspections per AWS.				
N/A for Non-Safety Cradles.				
Material testing (steel cradle) demonstrates material is per		·		
SDS specifications. N/A for Non-Safety Cradles.				
SDS purchased parts are per SDS design drawings (relays,				
sockets, switches, etc.) N/A for Non-Safety Cradles.				<u> </u>
Assembly Cradle Cell Interface				
N/A for Non-Safety Cradles. All wire installed is the correct				
size.		1		
Record wire size.				
Wire must be at least flush with end of lug barrel.				
No broken or nicked wire strands from being stripped.	$\prod$			
Wiring does not interfere with any moving parts.				
As-built wiring check against NLI schematic to verify	П		,	
correct wiring. NLI QC independent yellow-line.				
Verify the MOC actuator Snap Ring is properly installed.				
Verify the MOC E-Clips are properly installed (qty 2)				
Inspect the secondary disconnects and verify there are no				
cracks.	Ì			
Verify there is no binding of secondary disconnect pins.				
Verify Mobil-28 and Mobilith greases are used where they	$\vdash$			
are needed only. Record locations on attached lubrication			ł	
checklist.		1		
Verify the mechanism is free of foreign objects.	T	<b> </b>		
Verify the cradle area is free of foreign objects.	$\dagger$	<del>                                     </del>		
Verify torque/tightness and mark heads with Sharpie or	+	1		
equivalent for all accessible structural fasteners.				
	Sat		Unsat	Rework Satisfactory

MANCON-LGSB11-1, Rev. 0 Page 2 of 9

Verify no loose or missing hardware in the cradle linkage.	نہ	A		
Verify no loose or missing hardware in the cradle frame.		1.,		
				·
Vorification of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent of the consequent				
Verify primary finger assembly mounting is correct and tight.				·
Verify primary finger assemblies are not damaged.				
Verify torque/tightness and mark heads with Sharpie or				
equivalent for all accessible electrical connections.				
Verify back primary disconnect stab mounting fastener torque 133 – 150 in/lbs.				,
Check the accessible fasteners qty=of 12 fasteners.				
			i	
If torques are unacceptable for any fasteners, check 100%. See Figure 2.				
If the primary disconnects are removed to check 100% of the				
fastener torques, verify 100% of the primary disconnect			1	
mounting bolt torques.				
Verify there is clearance between fasteners/linkage and				
adjacent objects.				
Verify there is no binding of TOC assembly linkage.				
Verify the TOC operator Pin is loaded and cannot slip off				
roll pin.				
Verify the back panel nut retainers are removed in 4				
locations. See Figure 3. Remove if present.				
Verify the bottom insulators are replaced after the nut	. "			
retainer is removed. Verify that the fasteners are tightened				
properly.	·			
Cradle Inside		<u> </u>		
Verify the rejection hardware configured per the design	1			
drawings and tightened properly.		-		
Verify the extension rail release latch is securely mounted				
(pin not loose). Replace rail if the pin is loose.		<del> </del>		
Verify the extension rail mounting is tightened properly.	L			<u> </u>
Verify the primary disconnect back panel mounting bolt				
torque 89 - 107 in/lbs in 4 locations. See Figure 1.		<u> </u>		
Verify discharge interlock mounting is correct and tightened	١.			
properly.	<u> </u>	<u> </u>	<u> </u>	
				Rework
	Sa	ıt	Unsat	Satisfactory
	ldash			
Verify the breaker guide rails' mounting is correct and	1	AIL		
properly tightened.	<u> </u>			
Verify the NT cradle to frame mounting is correct and		<b>√</b>		
properly tightened.	ı	▼	1	

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Verify the shutters operate without sticking or binding	NIA		· · · · · · · · · · · · · · · · · · ·
Masterpact Breaker Outside	15,1		
Record Breaker S/N:064096362302	859		
Verify the arc chutes mounting nut retainers are not missing	72		
and are properly installed.	859		
Verify the top of breaker is clean.	85 PM	<b>X</b>	
Verify there are no cracks or chips in the breaker polyester	山	·	
case: Top, Sides, Back, Front, and Bottom.	8		,
Verify the back insulator fins are not cracked.	Fich		
	8:59		
Verify the secondary block connects in test position	8 30	·	
Verify the secondary block housing "Locks-out" properly in	1/10		
the disconnected position.	8155		
Verify the secondary block housing springs are silver in	心人		
color.	859		
Verify the secondary block housing springs are properly	15	***************************************	
installed.	859	<b>.</b>	
Verify the discharge interlock is properly installed - the	1 1		
return spring is installed.	8.512M	7	}
Verify the rejection hardware is configured per the design	「」		
drawings and properly tightened.	850	<b>.</b>	
Masterpact Breaker Inside	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		
With front cover removed, inspect breaker case for cracks.			
Verify there are no cracks or chips.	8591	7	
Record grease color RED . Grease must be	ZIX		
red (Mobilith) or white (Kluber) Isoflex.	8 5		
Verify the electrical terminations are not loose.	8/509		
Verify all visible springs in the mechanism are connected	位		
and not loose.	8 55	a.	
Verify all accessible fasteners are hand tight.	1		
	8.5.2		<u> </u>
•	Sat	Unsat	Rework
·		0 11044	Satisfactory
Remove trip unit for mechanism assembly inspection.	12		
Verify there are no cracked washers.	8	·	
Apply NLI seal on trip unit after inspection.	Jai	<u> </u>	
Verify the cover is replaced and the mounting screws are	100		
snug.	5 digi	<u> </u>	
Verify the breaker cover mounting holes are not stripped.	Link		<del> </del>
	850	<u> </u>	
Verify the Open/Close pushbutton covers are in place after			
inspection complete.	859	<b>&gt;</b>	

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·	λ.			
Verify all cover plates are installed -Verify torque/tightness	瓜			
of fasteners.	8:50		<u> </u>	
Verify the counter operates properly.	8850			
Document counter reading	和			
Verify breaker is discharged, open	864			
Record the As-built drawing markup of NLI layout drawing and bill of materials (latest revision).	A 30% 816.9			
Verify the breaker data sheets filled out and signed.	STENS.			_
Verify the Data plate is installed.				
Record the Date of Manufacture	NA			
No grease on primary and secondary disconnects.	NA			_
With the breaker cover off, inspect the trip unit performer plug. A green plug is satisfactory. A blue plug is unsatisfactory. If a blue plug is present, replace it with a green plug. After replacement, primary injection testing must be performed to verify proper operation.	859	7		
Comments: 354 MTE Used: 25 MTE - 256 5.7.10				
Inspections Performed by:	E	ate: 8.5	-9	

# Lubrication Points for LGSB11

Initial Points to be		
Lubricated During Assembly	<b>/:</b>	
	·	Verified
Cradle Linkage/Cell Interf	ace	/
Cell Interlock		Mobil 28
TOC Operator		Mobil 28
MOC Switch Lever Pivot po	oint	Mobil 28
MOC Actuator Lever		Mobil 28
MOC Operator		Mobil 28
MOC Cam Roller		Mobil 28
MOC Arm (1)		Mobil 28
•		
Breaker Interface		' /
Breaker to carriage primary	clusters (6)	
Roller Guides (2)		Mobilith
Top Guide Right side (1)		Mobilith
Bottom ground tabs (2)		Mobilith
Extension Rail Slides (2)	•	Mobilith
Verified By:	Date:	

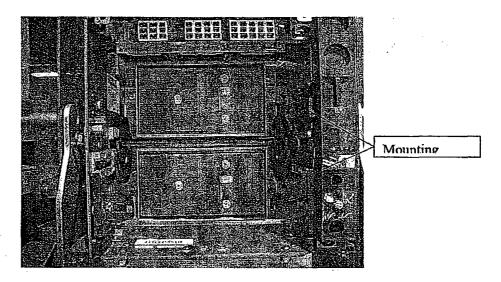


Figure 1: Location of Primary Disconnect Back Panel Mounting Bolts (qty=4)

Torque Value: 89 – 107 in-lbs

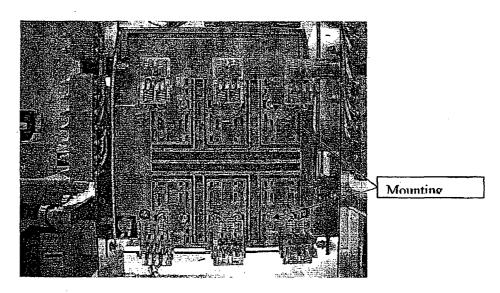


Figure 2: Location of Primary Disconnect Stabs to Back Panel Mounting Bolts (qty=12)

Torque Value: 133 – 150 in-lbs

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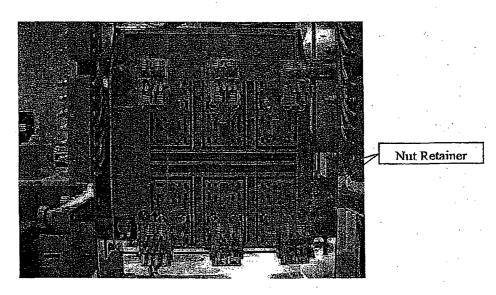


Figure 3: Location of Back Panel Nut Retainer on Primary Disconnect Mounting Back Panel (Remove nut retainer, if present, from all 4 locations)

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NA BELAKEZ ONLY BREAKER S/N. 064096362301 REVISIONS DESCRIPTION APPROVED REV DATE 0 ORIGINAL ISSUE 6/3/08 AS REVISED EREAKER INFO & TITLE BLOCK 6/12/08 A₩ (ECN): ECN-05410753-2). REVISED CONFIGURATION (ECN#: ECN-05410753-3). 2 7/1/08 ΑW AW 3 REVISED CONFIGURATION 10/13/08 (ECN#: ECN-05410753-7). REVISED CONFIGURATION 10/14/08 ΑW (ECN#: ECN-05410753-8). FRONT VIEW SZMCC - RREAKER OPERATED AUXILIARY SWITCH MCH - SPRING CHARGING MOTOR MN - UNDERVOLTAGE TRIP COIL MX1 - SHUNT TRIP COIL OFA - AUXILIARY SWITCH CONTACTS Z EST TEST SOn - SECONDARY DISCONNECT TP - TEST PLUG CONNECTOR TS1 - TEST SWITCH, SHUNT TRIP 3= 0F4-41 3= TP-1 4= NCH-82 1= 508-6 2= KN-02 TS2 - TEST SWITCH, UNDERVOLTAGE TRIP COIL -E3- 5ZMOC-13 TP-1= TS1-3 TP-2= MN-D2 TP-3= 52MOC-TP-4= 0F3-31 TP-5= 0F3-34 TP-6= 0F2-21 TP-7= 0F2-22 TP-8= MN-D1 TP-9= *** 52M0C-18 A XF - SHUNT CLOSE COL 1=SDC-7 9 = SDB-3 17=500~1 *** - NO CONNECTION 52M0C=14 18=SDD-5 🛕 2-300-6 - CRADLE CONNECTION POINT, USED 10=500-7 O - CRADLE CONNECTION POINT, UNUSED 3#S0C#S 52400-3 11#SDB-1 19=SDD-2 4-50C-8 12=508-2 20=50A-2 UCn - POINTS USED WITH TRIP UNIT INSTALLATION TRIP UNIT IS NOT USED FOR THIS APPLICATION 5=SDA-7 13=SDC-3 52M0C=4 5=52MOC-B, TP-3 14=50C-4 ◬ 7-SDC-1 15=S08-4 52MQC-1 52MOC=12 15=508-5 8-MX1-C1, 52MOC-6 BREAKER PART NO. INFORMATION ASSEMBLED BREAKER (BREAKER AND CRADLE): SQUARE D SERVICES P/N: LGSB11 NU P/N: NLI-LGSB11 BREAKER ONLY: UÇ1 UC2 HC3 MX1 SQUARE D SERVICES P/N: TAZAARNNX95GFFXCJXN
NU P/N: NU-RPL-AX25-RT-001 0.00 **₽** CRADLE ONLY: 0.0 NU P/N; NU-RPL-CROL-AK25-RT-001 <u>___</u> ф П  $\sigma$  $\frac{\alpha}{2}$ و مام ما PROJECT: REPLACEMENT BREAKERS di di (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE) امتمامت اممامم CLIENT: CONSTELLATION ENERGY MCH-82= SDA-1 MCH-82= TS1-4 MCH-81= XF-A1 MCH-81= SDA-4 UC2-T1=UC2-T2 UC2-T2=UC2-T1 MX1-C1= SOA-5 MX1-C2= OF4-44 MX1-C1= 52MOC-8 OF3-31= TP-4 OF3-34= TP-5 CALVERT CLIFFS NUCLEAR POWER PLANT PO# 423110 CONTRACT: UG1-Z3=UC1-Z4 UC1-Z3=UC1-Z5 UG1-Z4=UG1-Z3 UC1-Z5=UC1-Z3 OF2-21 = TP-6 OF2-22 = TP-7 DRAWN FVT NUCLEAR LOGISTICS INC. 10/14 08 CHECK: CT WIRING DIAGRAM FOR SQUARE D 1. ALL GRADLE WIRING SHALL BE 14AWG TYPE SIS, SDC, GOOV STRANDED, IEEE 383
QUALIFER, MITH THE EXCEPTION OF THE FACTORY JUNEARS IDENTIFED BELOW.
2. THE SHEARCH IS NOT SCHOOL SELECTIVE WITERFACE CONNECTED. THEREFORE UC1-Z3, UC1-Z4
AND UC1-Z3 ARE JUMPERED, THESE JUMPERS ARE FACTORY INSTALLED.
3. THE SHEARCH DOES NOT UTUIZE A RUTURAL CURRENT TRANSFORMER, THEREFORE UC2-T1 AND
UC2-T2 ARE JUMPERED TOGETHER. THIS JUMPER IS FACTORY INSTALLED. LGSB11 STYLE MASTERPACT BREAKER This drawing is the proprietory property APPROVE: ΑW of Nuclear Logistics Inc. Use, disclosure DRAWING No. 05410753-WD-1 or reproduction without written permission CUSTOMER: of Nucleor Logistics. Inc is prohibited. Scale NTS WEIGHT N/A SHT 1 OF

BREAKER S/N: 064096362308 REVISIONS OATE APPROVED REV DESCRIPTION ORIGINAL ISSUE 6/3/08 D REVISED BREAKER INFO & TITLE BLOCK 6/12/08 AW. TEST TIMING CONTACT UV (+) TEST UV SOB-6 TRIGGER (+) CHARGE (+) CLOSE (+) SDA-1 SDA-3 TEST TRIP TRIP (+) TIMING CONTACT (ECN#: ECN-05410753-2). TRIGGER (+) AW REVISED CONTACTS 10/14/08 (ECN#: ECN-05410753-8) A₩ ADDED INFORMATION 4/2/09 (ECN#: ECN-05410753-9). <u>152</u> A2 6 0 83 Q Q 82 LEGEND 52MDC - BREAKER OPERATED AUXILIARY SWITCH MCH - SPRING CHARGING MOTOR MN - UNDERVOLTAGE TRIP COIL MIX! - SHUNT TRIP COIL OFn - AUXILIARY SWITCH CONTACTS SON - SECONDARY DISCONNECT (NOT USED ON BREAKER QF1 TP - TEST PLUG CONNECTOR MCH OF4 MN OE3 OF2 MX1. 151 - TEST SWITCH, SHURT TRIP, MOMENTARY PUSHBUTTON, CONTACT SHOWN IN NORMAL STATE TS2 - TEST SMITCH, UNDERVOLTAGE TRIP, MOMENTARY PUSHBUTTON, CONTACT SHOWN IN NORMAL STATE XF - SHUNT CLOSE COIL CO - SECONDARY DISCONNECT FROM CRADLE TO CELL <--- - SECONDARY DISCONNECT FROM BREAKER TO CRADLE ← - TEST PLUG DISCONNECT O - CONNECTION POINT CONTROL VOLTAGE INFORMATION CHARGE - 125 .VDC CLOSE - 125 VDC TP-5 TEST TP-7 SDA-5 SDA-4 S08-7 TEST SHUNT TRIP - 125 VOC CLOSE (-) UV (-) TIMING CONTACT TIMING CONTACT UNDERVOLTAGE TRIP - 125 VOC CHARGE (-) TP-8 TEST TRIGGER (-) CRADLE TO CELL DISCONNECT CELL SIDE DISCOMNECT-AREAKER PART NO. INFORMATION ASSEMBLED BREAKER (BREAKER AND CRADLE): SDB-4 SDD~5 SUA-7 SDB~3 SDD-1 500-5 SOC-508-SQUARE O SERVICES P/N: LGS811 NU P/N: NU-LGS811 CRADLE WIRING BREAKER CHLY BREAKER TO CRADLE DISCONNECT SQUARE D SERVICES P/M; TAZAARNINGSGFFXCIXN NU-RPL-AX25-RT-DO1 13 ¢ 15 Ò CRADLE ONLY: NLI P/N: NU-RPL-CROL-AK25-RT-001 Δ 20 Q 19 16 10 BREAKER WIRING-REPLACEMENT BREAKERS PROJECT: (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE) SDC-6 SD8-5 SDA~2 5DD-6 SD0-7 SOC-4 SDD~2 CONSTELLATION ENERGY CLIENT: CALVERT CLIFFS NUCLEAR POWER PLANT CRADLE WIRING TEST TRIGGER MOC CONTACTS (52MOC) -PO# 423110 CONTRACT: CELL SIDE DISCONNECT CRAIN: FVT CRADLE/BREAKER WIRING NUCLEAR LOGISTICS INC. NOTES: (TYPICAL) CT CHECK 1. THE STATUS OF THIS DRAWING IS WITH THE BREAKER INSTALLED IN THE CONNECTED POSITION AND THE BREAKER CHARGED AND GREN. 2. REFERENCE NIL LANDUIT DRAWING 05410733-LO-1 FOR SPECIFICATIONS. TITLE: SCHEMATIC DIAGRAM FOR SQUARE D LGSB11 STYLE MASTERPACT BREAKER This drawing is the proprietary property of Nuclear Logistics Inc. Use, disclesure APPROVE: ΑW DRAWNG No. 05410753~SD-1 or reproduction without written permission of Nuclear Logistics, Inc is prohibited. CUSTOWER: Scote: NTS WEIGHT N/A SHT 1 OF



BREAKER 5/W: 06409636230x 8/6/09 REVISIONS DATE APPROVED REV DESCRIPTION 5/21/08 AS 0 ORIGINAL ISSUE REVISED BREAKER CONFIGURATION 5/12/08 AW (ECN#: ECN-05410753-1). SEE PIN CONFIGURATION 15 1/4 REJECTION PIN REJECTION PIN ON LEFT SIDE ON LEFT SIDE OF BREAKER 8 3/4 OF CRADLE AO BO 20 00 C . ⊖ 30 4. EO 5. (FOR SAFETY RELATED BREAKER) 5 5/16 20 8 5/32 4 3/4 Δ - 13 1/2 FRONT VIEW SIDE VIEW BACK VIEW 13 SECONDARY DISCONNECT ASSEMBLY BREAKER PART NO. INFORMATION SPECIFICATIONS 12 NT CRADLE BOTTOM PAN MODIFICATION ASSEMBLED BREAKER (BREAKER AND CRADLE): TRIP UNIT: NONE 11 MOC SWITCH SQUARE D SERVICES P/N: LGSB11 NL! P/N: NU-LGSB11 NOM, OPERATING VOLTAGE: 480VAC TOC ASSEMBLY RATED CURRENT: 800A REPLACEMENT BREAKERS PROJECT: INTERRUPT RATING: 42kA 9 508VAC RACKING INTERLOCK ASSEMBLY 9 BREAKER ONLY: 30KA 9 535VAC (AK-2A-25 STYLE REACTOR TRIP AND REACTOR TIE) NOM. CONTROL VOLTAGE: 125VDC FRAME ASSEMBLY 8 SQUARE D SERVICES P/N: TAZAARNNX9SCFFXCJXN CLOSE: 90-140VDC NU-RPL-AK25-RT-001 PRIMARY CURRENT PATH ASSEMBLY CONSTELLATION ENERGY 1 CLIENT: CHARGE: 90-140VDC 70-140VDC OPERATE - >90VDC TRIP - 44 TO 88VDC SWITCH BARRIER CRADLE CNLY: TRIP: CALVERT CLIFFS NUCLEAR POWER PLANT UV: NU P/N: NU-RPL-CROL-AK25-RT-001 5 1 MOC ASSEMBLY PO# 423110 CONTRACT: 4 1 SWITCH BRACKET 3 WIRE COVER DRAWN: FVT 2 INSULATOR, BACK REFERENCE DRAWING (FOR NU INTERNAL USE ONLY) NUCLEAR LOGISTICS INC. PIN GUIDE SQUARE-D SERVICES DRAWING: AKSOOOO1, REV. O 6/12 CHECK CT LAYOUT DRAWING FOR SQUARE D ITEM OTY DESCRIPTION UNLESS OTHERWISE SPECIFIED ALL OWENSIONS ARE IN INCHES ARE NOWINAL LGSB11 STYLE MASTERPACT BREAKER IA STANDARD This drawing is the proprietary property of Nuclear Lagistics Inc. Use, disclosure TOLERANCE APPROVE: A₩ UNLESS DRAWING No. 05410753-LD-1 or reproduction without written permission OTHERWISE CUSTOMER: of Nuclear Logistics, Inc is prohibited. Scote: NTS WEIGHT N/A SHT 1 OF

## Appendix B

**Fuse Factory Acceptance Test Data** 

Test Temperature: 20.0c
Fuse Amperage: 5 Amp
Test surface: #

VP- ATOR FUSES-1 Rev. O Fuse P/N: ATOR 5 Date code: 12/07 Tor # 069-10327

Length	ז		meter	Marking	gs	Fuse resistance	Hold-in ca		Interrupt capability	
.50							Current =	5 A	i .	
	1"									
	1"			ATORS			Time = 1	p.C.	Current: 10 A	-
	1		- 11	600 VAC		R= 2	☐ Yes	<b>M</b> No	Trip time: #6. 465	ec .
	1	4.4	08"	300 VOC		60.02ms2			current: 101	_
szo				•		R= 9 Go. ofmSZ		No	Triptime: 47.	23 5
		0.4	0/	<del> </del>		GO. ON MSC	Fuse melt:		A pass	┨
50	311	<b>.</b>	~Q#			R= 56.9 m52	□ Yes	No No	PARS 12/23,	68
		2.4	<u>Q.a</u>	<del> </del>			Fuse melt;			1
531	"	6.W	08"			1	☐ Yes	ØNo ·		
			a		<del></del>	_	Fuse melt:	· · · · · · · · ·		1
509	N	o. 4	08"				☐ Yes	MNo		
							Fuse melt:			
514	*	o.#	07"	<u> </u>			<u> </u>	XVINo		1
<i>.</i>						Ř=		∏ NI~		
. 5//		0.4	108"			444,6m52		□ 140		×
	<i>,</i> "		. 7//			R =		≸ No		
<u>، ۲۵٬</u>	1	0.1	101			36.0m52		<b>X</b>		ł
ء ار		M	*			R=	□ Yes	□ No		
~						6 1 4 m 7 c	Fuse melt:		>CC. ₩4	*
			•	·		R=	☐ Yes	No.	77	
_							Fuse melt:	116	KIL 12/23/6	8
							□ Yes	∐No		
						_	Fuse melt:	<u> </u>		1
_L							□ Yes	□ No		k
4.							Fuse melt:			
						54.8m52		□No		
						R≠				
					<u>.</u>	63.9m52	☐ Yes	□ No		
					**	R =		CINIC		1
- -						59.1m.52		Li NO		
						R =		ΠNo		
-					*	63.7m57	Fuse melt:			1
					Ì	R=	□ Yes	□No		
十							Fuse melt:			1
						R=	□ Yes	□No		
$\top$						[	Fuse melt:			1.
							□ Yes	□No		}
1							Fuse melt:			1
M			<u>.                                    </u>	A		R 63.1m5				
	.531 .509 .511 .500 .501	.531" .509" .511" .509" .509"	159" 0.4 1509" 0.4 1511" 0.4 1509" 0.1 101	.511" 0.408"	1521" 0.408" 1509" 0.408" 1511" 0.408" 1509" 0.401" 11 A A A	1521" 0.408" 1509" 0.408" 1511" 0.408" 1509" 0.407" 1	R= 58.2m52 R= 58.2m52 R= 55.6m52 R= 64.1m52 R= 56.0m52 R= 67.4m52 R= 57.9m52 R= 54.8m52 R= 54.8m52 R= 54.8m52 R= 55.3m52 R= 63.7m52 R= 63.7m52 R= 63.7m52 R= 66.1m52 R= 66.1m52	R=	R = 58.2 m S   1 Ves   1 No   1 Ves	R =   Fuse melt:   Yes   No

174 of 190

Page of 3

Test Temperature	: <u>20.0°C</u>
Fuse Amperage:	5 Amp
Test surface:	#

VP- <u>ATDRFUSES-1</u> Rev. <u>O</u>
Fuse P/N: <u>ATOR5</u>
Date code: 12/07
Tok# 069-10327

<del></del>	<del>}</del>						708# 059-10327			
Serial Number			C# 1		CC # 2 arkings	CC# 3 Fuse resistance	CC Hold-in o		CC#	
	Len	gth	Diamete	r			Current =	NIA	ļ	
2757/ 201-		•			•		1	•		
27526-001-	<del> </del>			ATORS	<del>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</del>	<u> </u>	Time = Fuse melt;	H/H	Current:	AI/A
00621		1/4	N/A	600 VAC	<del></del>	R= 65.8 mΩ	☐ Yes Fuse melt:	□No	Trip time:	
00022						R= 64.6 m.Q	□ Yes	□№		
00023						R = 65.7 m Q	Fuse melt:	□No		
						R=	Fuse melt:	□No		
00024 00025						587 ms2	Fuse melt:	□ No		
20025		-				65.6 mQ	Fuse melt:	D 140		<del></del>
00026						63.4 ms2	☐ Yes Fuse melt:	□No		
00027			<u> </u>	-		R= 59.4 m 52	☐ Yes	□ No		
00028						R= 57.2 mS2	☐ Yes	□No		
00029					. ,	R= 48.0 m Q	Fuse melt:	[] No		
0003D	. ,				ļ	R= 53.8 mSZ	Fuse melt:	□No		
	cc	\$1 P	<del>4</del> 22	A	pass- 12/23/08	R= 59.92mS	Fuse melt:	□ N ₀		
	G	1/1	9/09		i	R KTL	Fuse melt:	□ No		
						* See VR.4 R = 6910327-	Fuse melt:	ΠNο		
					<del></del>	R=	Fuse melt:	□No		
		<u>·-</u>				R ==	Fuse melt:	□No		
				_		R=	Fuse melt:			
		-	ļ		- <del></del>	R=	Fuse melt			
					<del></del>	R =	☐ Yes Fuse melt:	□No		<del></del>
		-			<del></del>		☐ Yes Fuse melt	□ No		
: !					<del></del>	R =	Yes  Fuse melt	□N ₀		
			a	<u></u>		R=	☐ Yes	□No		

ee DR# 06910327-02

Tempera Amperag surface:	ture: 20.0°C ge: 5Amp			Fuse P/N:	DRFUSES-1 Rev #1015 12/07
2752	6-001-000	05000 - 11/10 - 00030		JoB#	069 - 10327
Number	of fuses in lot		<u> </u>	30	
Normal	sample size based on	1 lot size		<u> </u>	
Average	fuse resistance from	lot of same fuses		59.92 m52	<u> </u>
Accepta	ble fuse resistance ra	inge	53.	93 m 52 = R =	
Summary	of Results				
Item pas	ssed all CC#s	□Yes Ø	No If no, fill in D	R# below and attach DI	₹.
<u>S/N:</u> 2 <u>1526</u> -0	01-00007.	<u>C#</u> <u>DR#</u> <u>3 06910327-</u> 02	-	Not Acceptable	PE Initials CT
0000	19, <del></del>		□ Acceptable	□ Not Acceptable	PE Initials
-00019	1,-00029,	<del></del>	☐ Acceptable	□ Not Acceptable	PE Initials
	-00030	<u> </u>	☐ Acceptable	□ Not Acceptable	PE Initials
			□ Acceptable	□ Not Acceptable	PE Initials
Notes:	(PE to page	or juil ecti) x	BENAINING GERLA	t Numbers are a	1000 FM USE CT 1/19/19
MTE#		Instrument Used			ation Due Date
MTE#	Caliper	Instrument Used	Pemaining Serva		
MTE#  \$6  20	Caliper  Mirco-Ohm	Instrument Used			
MTE#	Caliper  Mirco-Ohm	Instrument Used			- Aufot
MTE#  \$6  20	Caliper  Mirco-Ohm	Instrument Used meter ker test Set			
MTE#  \$61 201 \$60	Caliper  Mirco-Ohm  Urcuit broa	Instrument Used meter ker test Set			
MTE#  \$61 201 \$60	Caliper  Mirco-Ohm  Urcuit broa	Instrument Used meter ker test Set			
MTE#  S61 201 S60 714	Caliper  Mirco-Ohm  Urcuit broa	Instrument Used  meter  ker test set			
MTE# S61 201 S60 714	Caliper  Mirco-Ohm 1  Circuit Isroa  Thermaclack  e MTE on computer:	Instrument Used  meter  ker test Set  12/23/08		Calibr  1/23/6  9/23/6  7/3/09  3/11/09	ation Due Date
MTE#  S61 201 S60 714  D Updat	Caliper  Mirco-Ohm  Circuit larea  Thermoclock  e MTE on computer:	Instrument Used  meter  ker test Set  12/23/08		Calibr  1/23/6 9/23/6 9/31/09 3/11/09	ation Due Date
MTE# S61 201 S60 714	Caliper  Mirco-Ohm  Circuit Area  Thermoclock  e MTE on computer:	Instrument Used  meter  ker test Set  12/23/08		Calibr   1/23/6   9/23/6   4/3/69   3/11/09   Date: 12	ation Due Date

Test Temperature: 23.5 °C
Fuse Amperage: 10A
Test surface: V

Fuse P/N: ATORIO
Date code: 10/08

Serial Number		CC	# 1	.		2#2		C# 3	CC#			C# 5
Seriai Number			# 1 nsions_			kings		sistance	Hold-in ca			_# 5 capability
								•	Current =	10A		:
27526K2-01	Length	1	Diame	ter								٠.
<u>- XXX x </u>	<del>                                     </del>				·		<del> </del>	· · · · · · · · · · · · · · · · · · ·	Time =   Fuse melt:		Current:	20 A
- 0001	1.52	-4	24	11	2.	35	R=	9 m.s	1) Yes	No.		45.855
- 000j	1.2 %	3	V. 7	2		27	_	, TW1	Fuse melt:	· · · · · · · · · · · · · · · · · · ·		
-0002	1.52	"	0.40	90	Pa		R =	.8 ms	☐ Yes	e No	l N	A
		`				-dd.	1	. 0 ((1)	Fuse melt:		1	
-0003	1.51	5"	0.4	05	Pa	. <del>5</del> 5	R =	<u>500</u>	O Yes	S No		
		1		J		- <del> </del>	R=		Fuse melt:			
-0004	1.520	<b>5</b> "	8.40	36	Pa	55	K = 1-	1.9 ms	□ Yes	S No		
		- {	,				1		Fuse melt:	1		
-0005		N	A		Pa	55	R =	3.4ms	□ Yes	D No	1	
		1	1				R =		Fuse melt:			
-0006					Pa	<u> </u>	19	5.6 ma		ДΝο		
					•		R=	-	Fuse melt;			
-0007					Pa	<u>.55</u>	18	.3mn	□ Yes	D No		1
		-					" -		Fuse melt:			
-0008					Pa	55	1	3.000	□ Yes	□ No		<u> </u>
_		Ì					R=		Fuse melt:			1
-0009	<del>                                     </del>				Pa	<u>5</u> S	1	<u>ሊ</u> ም ^{ይ.} ጀ	☐ Yes	□ No		ļ
				ł	_	_	R =	, . <del></del>	Fuse melt:	 		
-0010	+			-	74	,55	14	ma	☐ Yes Fuse melt:	□ No	<u> </u>	
11/A				• -	· i/	/ <b>A</b>	R≖	1/6	Puse meit. □ Yes	ί Ο Νο		
N/A	+	_		-:-	. 14	<u>/</u> \	<u>'</u>	VA_	Fuse melt:		ļ	ļ
							R =	1	□ Yes	i D No		
	┼┼-			-		-		<del> </del>	Fuse melt:		<del> </del>	
. ]								]	D Yes	□No		
	<del> </del>	$\dashv$				<del>                                     </del>	<del> </del>	<del> </del>	Fuse melt:	<u> </u>		ļ
1				, {		1	1	1	☐ Yes	□ No		l
	<del>  </del> -		$\neg +$			<del> </del>	<del></del>	<del> </del>	Fuse melt;	<u> </u>	<del> </del>	
		1		1					☐ Yes	Q No		
	<del>                                     </del>		$\neg +$		~ <del></del>	<u> </u>	<del> </del>	<del> </del>	Fuse melt:	-	<del> </del>	<del> </del>
									□Yes	□ No		
	<del>                                     </del>	ᅱ	$\neg +$		<del></del>	<del>                                     </del>	<del>  · · · · · · · · · · · · · · · · · · ·</del>	<del> </del>	Fuse melt:	-	<del> </del>	ļ
									□ Yes	D No		f ·
	-	+	$\dashv$	_		<del> </del>		1	Fuse melt:	-	<del> </del>	<u>                                     </u>
				j					□ Yes	D No		
1			一十	$\neg$	<del></del>		<del> </del>	<del>                                     </del>	Fuse melt:	1		<u> </u>
			}	ļ		1		1	□ Yes	D No		
	1/	-		,	<del></del>	,	<u> </u>	1,	Fuse melt:	<del></del>	<del>                                     </del>	<del>                                     </del>
Ψ	₩	1	Ψ		1	V	,	W ·	□ Yes	□No ·	1	1/

ATORFUSES-1

emperature: 2			VP- <u>-<del>K</del>-</u>					
Amperage: 16	O A			ATORIO				
urface:			Date cod	le: 10/08				
			•					
Number of fuses	in lot		<u> </u>	***************************************				
Normal sample si	ze based on lot size		10					
Average fuse resi	stance from lot of same fuses	ı	18.6m.A					
Acceptable fuse r	esistance range		16.7 - 20.5 m.a.					
ummary of Resul	ts							
Item passed all C	C#s ♥Yes	□ No If no, fill in DR#	below and attach l	OR.				
Discrepancy repo	orts:		•					
S/N:	CC# DR#	•	<del>.</del>					
	· · · · · · · · · · · · · · · · · · ·	_	□ Not Acceptable	PE Initials				
		□ Acceptable	☐ Not Acceptable					
		Acceptable	□ Not Acceptable					
			□ Not Acceptable	PE Initials				
			□ Not Acceptable	PE Initials				
Notes:	ie	wand per cutte	5					
27 CC#1 D	526K2-01-6001 me	94						
CC#1 D	MS ACCEPTABLE. CT 2/19/0	9						
27 CC-#1 D	MS ACCEPTABLE. CT 2/19/0	9		bration Due Date				
CC-#1 D	Instrument Use	Pq ed	Cali	bration Due Date				
CC=#  D  MTE#	Instrument Use	Pq ed	Cali					
CC=#  D  MTE#  264  201	Instrument Use  Wicro Ohm	9	Cali 5.	16.09				
CC=#  D  MTE#  264  201  198	Instrument Use  Will Dial Cal  Micro Ohan  CBT3	d lipers meter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201	Instrument Use  Wicro Ohm	d lipers meter	Cali 5. 9.	16.09				
CC=#  D  MTE#  264  201  198	Instrument Use  Will Dial Cal  Micro Ohan  CBT3	d lipers meter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201  198	Instrument Use  Will Dial Cal  Micro Ohan  CBT3	d lipers meter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201  198	Instrument Use  Will Dial Cal  Micro Ohan  CBT3	d lipers meter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201  198	Instrument Use  Will Dial Cal  Micro Ohan  CBT3	d lipers meter	Cali 5. 9.	16.09 23.09 27.09				
CC#  D  MTE#  264  201  198  226	Instrument Use  Wirochan  CBT3  The rmor	d lipers meter neter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201  198	Instrument Use  William Cal  Micro ohn  CBT3  The rmor	d lipers meter neter	Cali 5. 9.	16.09 23.09 27.09				
CC#  D  MTE#  264  201  198  226	Instrument Use  Wirochan  CBT3  The rmor	d lipers meter neter	Cali 5. 9.	16.09 23.09 27.09				
CC#  D  MTE#  264  201  198  226	Instrument Use  William Cal  Micro ohn  CBT3  The rmor	d lipers meter neter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201  198  226  Update MTE or	Instrument Use  William Cal  Micro ohn  CBT3  The rmor	d lipers meter neter	Cali 5. 9. 10.	16.69 23.09 27.69 .15.09				
CC#  D  MTE#  264  201  198  226	Instrument Use  William Cal  Micro ohn  CBT3  The rmor	d lipers meter neter	Cali 5. 9.	16.09 23.09 27.09				
CC=#  D  MTE#  264  201  193  215  Prepared by:	Instrument Use  ("Dial Cal  micro ohm  CBT3  The rmor  Initials and date	d lipers meter neter	Cali 5. 9. 10. 8	16.69 23.09 27.69 .15.09				
CC=#  D  MTE#  264  201  198  226  Update MTE or	Instrument Use  ("Dial Cal  micro ohm  CBT3  The rmor  Initials and date	d lipers meter neter	Cali 5. 9. 10.	16.69 23.09 27.69 .15.09				
CC=#  D  MTE#  264  201  193  215  Prepared by:	Instrument Use  ("Dial Cal  micro ohm  CBT3  The rmor  Initials and date	d lipers meter neter	Cali 5. 9. 10. 8	16.69 23.09 27.69 .15.09				

**FUSE TEST DATA SHEET** Test Temperature: 26.00 VP- ATORFUSES-1 Rev. D Fuse Amperage: 15 Amp Fuse P/N: ATUR15 Test surface: Date code: 05/08 Job# 069-10827 CC#3 CC# 4 Serial Number CC# 1 CC # 2 CC# 5 Hold-in capability Dimensions Markings Fuse resistance Interrupt capability Current = 15A Length Diameter 27526-603-Time = 1hr Current: 304 ATDRIS Fuse melt: 600 VAC R = Trip time: 53.64 Sec. ☐ Yes K No <u>1.500</u>" <u>0.40</u>8 00001 11.28m52 300 UDC Fuse melt: R =<u>.5</u>00" □ Yes **M**No 00002 0.408 11.62 ms2 NIA Fuse melt: R= L.490" ☐ Yes **₩** No 00003 11.08m52 Fuse melt: ☐ Yes No No 00004 10.95m52 Fuse melt: Ř= Yes W/A 00005 11.33mS2 NIA Fuse melt: R =☐ Yes □No 60066 11.26m52 Fuse melt: ☐ Yes □No 11,25m52 <u> 70000</u> Fuse melt: R = □ Yes □ No <u>0000</u>8 11, 19 m S Fuse melt: R≂ □ Yes U No 00009 10,36mS Fuse melt: □ Yes □ No 00010 11.19m5 pass press Fuse melt: 11.15mS 12/23/08 12/23/08 ☐ Yes □No KTI 12/23/08 Fuse meit: KTL R= □ Yes D No PASS 1123/0 Fuse melt: CC+1 PASS R= ☐ Yes O No 1119109 Fuse melt: R= 1 Yes □ No Fuse melt: R =□ Yes □ No Fuse melt: R= □ Yes □ No Fuse melt: R = ☐ Yes D No

12/23/08

□ No

□ No

□ No

Fuse melt:

Fuse melt:

Fuse melt:

☐ Yes

☐ Yes

□ Yes

**R** =

R =

R⇒

							Job 4	069-1032	
Number	r of fuses in lot					10			
	sample size based				#				
	e fuse resistance fi		same fuses			11.15m	52		
Accepta	able fuse resistanc	e range			10.04	4 CZ C	2 s. 12.	27 m.g_	
ummary	y of Results				····		<del></del>		
Item pa	ssed all CC#s		<b>⊠</b> Yes	□No	If no, fill in D	R# below	and attach DR	L.	
Discrep <u>S/N:</u>	ancy reports:	<u>CC#</u>	DR#	п	Acceptable	⊓Мо	t Acceptable	PE Initials	
······································		<del></del>			Acceptable		t Acceptable	PE Initials	
					Acceptable		t Acceptable	PE Initials	
					Acceptable		t Acceptable	PE Initials	
					Acceptable	□No	t Acceptable	PE Initials	
Notes:									
	( PE TO POP	se or f	ail ce#1)						
138	D ×12 121		Instrument Use	·			Calibra	ation Due Date	
138	Dust 121.	22/08	Instrument Use		·			ation Due Date	
138 561	Caliper Micro-Obd	22/08 n meder	Instrument Use				1/23/0	9	
138 561 201	Caliper Micro-Obd	22/08 n meder	Instrument Use				1/23/0	9	
MTE#  138  561  201  560	Caliper Micro-Obd	22/08 meder kerte	Instrument Use				1/23/0	9	
138 561 201 560	Caliper Micro-Charle Circuit Bree	22/08 meder kerte	Instrument Use				1/23/0 9/23/09 1/3109	9	
138 561 201 560	Caliper Micro-Charle Circuit Bree	meder	Instrument Use				1/23/0 9/23/09 1/3109	9	
138 56/ 20/ 560 7114	Califer Micro-Charle Circuit Bree Thermocks	meder	Instrument Use				1/23/09 9/23/09 7/3/09 3]11/09	9	
138 561 201 560	Califer  Micro - Ohn  Circuit Bree  Thermocks  te MTE on comput	meder	Instrument Use				1/23/09 9/23/09 7/3/09 3]11/09	/23/08	

FUSE TEST DATA SHEET VP- AJTFUSES-1 Rev. O Test Temperature: Fuse Amperage: 500 Fuse P/N: AJT50 Test surface: Date code: 07/08 TOB # 069-1032 Serial Number CC# 4 CC# 1 CC # 2 CC# 3 Dimensions Markings Fuse resistance Hold-in capability Interrupt capability Current = 50A Length Diameter 27526-004 Time = | hr AUTSO 600 VAC Current: 100 # Fuse melt: Trip time: 142.82 Sec 2.396 1.062" Yes Yes O No -0000 l 200 002 2.2/m52 Fuse melt: 2.400" 1.062" MONO ! D Yes *0000*2 2.32m5 Fuse melt: 1.062" D Yes No -00003 2.33m50 Fuse melt: 1.062" □ Yes **M**No 2.343 OUSS -00004 2.41msc Fuse melt: 12/30/0 □ Yes **M**No 00005 2.30m57 Fuse melt: R= ₩No ☐ Yes -00006 2.35mSZ Fuse melt: ☐ Yes **M**No 0000 232m52 Fuse melt: **M**No □ Yes <u>-00008</u> 2.31m50 Fuse melt: M No [] Yes 00009 &,35*m*≤2 Fuse meit: ☐ Yes No X -00010 2.34 m52 Fuse melt: Rada 1) Yes DNG KTL 2/30/08 pass Fuse melt: 12/30/08 □ Yes () No CC# 1 Pass Fuse melt: CT 1/19/09 12/30/08/Yes [] No Fuse melt: R≂ DN ☐ Yes Fuse melt: □ Yes / R= □ No Fuse melt: R = Yes □ No Fuse melt: R = □ Yes ON Fuse melt: **R** = □ Yes / □ No Fuse melt: R = Yes O No

> * SE DR# 06910327-03 KTL 12/30/08

□ No

Fuse melt:

R =

Temperature: 23.9°C.  Amperage: 50A			VP- AJJ Fuse P/N:	FUSES-1 Rev.
surface: #		_	Date code: _	9-10327
27526-004-00061	<u> 1hru -</u> 6001	O	•	
Number of fuses in lot			10	
Normal sample size based on lot size		· · · · · · · · · · · · · · · · · · ·	- 1	
Average fuse resistance from lot of same fus	es		2.33m5Z	
Acceptable fuse resistance range		2.10m	52 = R6 2.5	6m52
Summary of Results				
Item passed all CC#s	9 1.9.09 × No	If no, fill in D	R# below and attach DR.	
Discrepancy reports:  S/N:  27526 -004-0001 4 069		Acceptable Acceptable Acceptable Acceptable	Not Acceptable □ Not Acceptable □ Not Acceptable □ Not Acceptable □ Not Acceptable	PE Initials CT PE Initials PE Initials PE Initials PE Initials
Notes:  PE to pass or fails		·	- Tot recopmon	
MTE# Instru	ment Used	<del></del>	Calibrat	ion Due Date
561 ( - 0)			1/23 /09	
561 Caliper 201 Micro Ohm meter			9/23/	9
228 Fluke 52			7/27/6	,
you a d			8/13/67	
1/96 Big Ked		·	/6/14/0	7
			,	
MUpdate MTE on computer:	12/30/08			
Maintals and da	te		•	
Prepared by:	te		Date: />	130/08
	e e e e e e e e e e e e e e e e e e e		Date: />	/30/08 9-09

Test Temperature: 20.50
Fuse Amperage: 125A
Test surface: H

VP- ATTRIBUSES - 1
Fuse P/N: AJ 1 1 25
Date code: 06/08
108 # 069 - 10327

Scrial Number	CC Dime	# 1 nsions	CC # Marki			CC# 3 e resistance	CC Hold-in o		CC# 5 Interrupt capability	
	Length	Diameter					Current =	1254	•	
27526-005-			ATT 125				Time = I	hr	Current: 250#	_
00001	57674	1.633"	600 VAC		R=	12 m <i>S</i> L	□ Yes	No K	Trip time: <u>539.7</u>	ı,
	S. 763"	6214		· · · · · · · · · · · · · · · · · · ·	R≖		Fuse melt:	<b>jø</b> No		
		i			R=	.74msz	Fuse melt:	·- <u>'</u>	KTL 12/2	5
00003	5.765"	1.635"				.78msl	D Yes  Fuse melt:	No (X	/KTL\ 12/2	
0004	5.766"	1.63/"			R =	79 m.sz	□ Yes	□ No	.~	
<b>'</b>	5.764 ¹¹ ;				R=	79 m 57	Fuse melt:	□ No		
	,, 184 j	1	KTL	pass 12/23/08	F	0.764m <i>S</i> Z	Fuse melt:	□No		
· · · · · · · · · · · · · · · · · · ·	1 /2	123/08		12/23/08	j	A	Fuse melt			-
	`\	<u> </u>			R =	KIL	☐ Yes Fuse melt:	□ No		_
	CC#1	Pass		,	R=	Parss 12/23/0	Yes Tien.	□ No	`	
:	CT 1/1				R=		Fuse melt:	□No		
					R=		Fuse melt:	A		
					R=		Fuse melt	□N ₀		
					R=		Fuse melt	: □ No		
					R=		Fuse melt			
					R=		Fuse melt	□ No		
					R=		Fuse melt	: □ No		
					R=		Fuse melt	A		
,				<del>!</del>	R=		Fuse melt			
					R=	<del> </del>	Fuse melt	:		
	1			······································	R=		Fuse melt	. AL		
<u> </u>				· · · · · · · · · · · · · · · · · · ·	R =		Fuse melt			1

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Page of 2

**FUSE TEST DATA SHEET** Test Temperature: 26.50 VP- AJT FUS 65-1 Rev. O Fuse P/N: 437/25
Date code: 06/08 Fuse Amperage: 125 Test surface: Job # 069-10327 27526-005-00001 Hora-00005 Number of fuses in lot Normal sample size based on lot size Average fuse resistance from lot of same fuses 0.764m52 Acceptable fuse resistance range 0,688 msz & 2 & 0,840ms> Summary of Results Item passed all CC#s YYes □ No If no, fill in DR# below and attach DR. Discrepancy reports: DR# <u>S/N:</u> CC# PE Initials ☐ Acceptable ☐ Not Acceptable PE Initials ☐ Acceptable ☐ Not Acceptable PE Initials ☐ Acceptable ☐ Not Acceptable ☐ Acceptable ☐ Not Acceptable PE Initials PE Initials ☐ Acceptable □ Not Acceptable Notes: ( PE 10 pass or juil ce# 1) MTE# Instrument Used Calibration Due Date 561 Caliper 1/23/09 201 Micro ohm meter 362 228 Update MTE on computer: Initials and date Prepared by:

Approved by:

Date:

Date:

Square-D PZ4 Rx Trip Switchgear	FAT-REPORT-06910327-1, Rev. 0
Exelon Nuclear – Three Mile Island	Page C.1

Appendix C

**Discrepancy Reports** 

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Material Hold	•
ong, Alan	7/22/2009
pproved By	Date
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centable with rework note	ed
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Date: 7/22/09	-
Date: 8/4/9	
Date: 8/10/09	<u>-</u>

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Item: Swite		DR#:	06910327-05
Item. Own	chgear		
Manufacturer: SQL	JARE D		
Model/P/N: PZ4			
Serial Number: 2557	70-001-00001		
Qty: 1		,J	
Issue:		•	
	hunt Trip Power' light extinguishe Frip Power' light does not extingui		
	•		
		,	
Affected Hardware/Docu	ment/M&TE: VP-PZ4, Rev. 6,	CC#4a, 4b, 4c	
Initial Evaluation / Taggi	ng Conditional Release	☐ Material Hold	•
Tribble, Chris	7/22/2009	Wong, Alan	7/22/2009
Prepared By	Date	Approved By	Date
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Signal Present' light to e	xtinguish. The VP test data shee le correct expected light sequenc	ts list the correct light. Th	e switchgear
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Disposition ✓ Accepta  Code 1 30  See Table 3.2	xtinguish. The VP test data shee le correct expected light sequence table/Use as is	ts list the correct light. The was achieved and is accommod and is accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod accommod	e switchgear ceptable.
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Signal Present' light to e operated properly and the operated properly and the operated properly and the operated properly and the operated properly and the operated by a compared by a	xtinguish. The VP test data shee le correct expected light sequence table/Use as is	Acceptable with rework:  Reject / Do not use  Date: 7/22/o	ne switchgear ceptable.

A. IDENTIFICATION	NLI Job Number: 0691	0327 DR#:	06910327-0
Item: Swi	tchgear		
Manufacturer: SQ	UARE D		
Model/P/N: PZ	ļ		
Serial Number: 255	70-001-00001		
Qty: 1			•
Issue:			
The VP states to remove removed from the gear of		from the switchgear. The fu	ises were not
	•		
		:.	
Affected Hardware/Door	ument/M&TE VP-PZ4, I	Ray 6 CC#Aa	
nitial Evaluation / Tagg	_		7/00/0000
Tribble, Chris	7/22/2009 Date	Wong, Alan	7/22/2009
Prepared By	Date	Approved By	Date
3. RESOLUTION (Atta	ch additional pages, if req	uired.)	
Evaluation:			
The VP incorrectly state power applied to allow the modified as documented	ne circuit breakers to close	ne fuses must remain so that e for this testing. The test pro	the UV coil has ocedure was
The use of the fuses for procedure as document	testing is acceptable and ed in DR-06910327-07	the gear operated as expect	ed according to the
Disposition 💆 Accep	table/Use as is	☐ Acceptable with rew	ork noted
Accepta	able with limitations noted	d Reject / Do not use	
Code 1 30		Code 2	
See Table 3.2			
Prepared By:	5-0-	Date: 7	1/22/09
Reviewed By:	and	Date:	3/4/4
Approved By:		Suly Date:	8/7/09
		1	NILL OTTAL OCT
age l of l		•	NLI-QUAL-06, I Attachme
	•		Page 18 of

A. IDENTIFICATION	NLI Job Number: 06310327	DR#:	06910327-07
Item: Sv	vitchgear		
Manufacturer: SC	QUARE D		
Model/P/N: PZ	24		
Serial Number: 25	570-001-00001		
Qty: 1			
Issue:			
	ve the 90VAC applied to the UV c relay undervoltage relay. The 90V		
Affected Hardware/Do	cument/M&TE: VP-PZ4, Rev. 6	CC#4e	
			<del></del>
Initial Evaluation / Tag Tribble, Chris	ging	☐ Material Hold	7/00/0000
Prepared By	7/22/2009 Date	Wong, Alan Approved By	7/22/2009 Date
	_		Date
B. RESOLUTION (Att	ach additional pages, if required.)		<del> </del>
breaker and the extern breaker main pole ope shunt trip coil of the breapplied to the breaker the breaker and does not be applied to the shunt trip position removes the AC voltage.	ve the power applied to the UV citizal undervoltage relay). The purport ning timing after loss of AC power eaker. In order to perform this test installed MN (UV) coil to ensure the trace the breaker installed MN the power would be applied to the uld be moved to the 'Shunt Trip' part allows the AC voltage to remain ge sensed by the external 27 UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV results in the UV result	ose of this particular test is to using the external (27) relay to correctly, the AC power must the 27 relay/shunt trip con UV coil to trip the breaker.  MN coil installed in the break osition. The movement of the applied to the MN coil in the elay. (see continuation sheet)	perform actuating the st remain abination trips ker and the e test switch breaker, but
Disposition Acce	ptable/Use as is	Acceptable with rework no	ted
Accep	table with limitations noted	Reject / Do not use	
Code 1 30	Co	de 2	
See Table 3.2	<u> </u>		
Prepared By:	400	Date: 7/22/09	
Reviewed By:	Linkly	Date: 849	
Approved By:	1	Control of the	
		Date: 8/7/05	<u>_</u>

## **DISCREPANCY REPORT**

Continuation of: Part B. Resolution		DR#: <u>06910327-07</u>					
The 27 relay then actuates and closes a contact in series with the shunt trip coil thus tripping the breaker and producing the correct circuit progression to measure a valid opening time of the breaker due to loss of voltage on the 27 relay and shunt tripping.							
TMI engineering representatives on-site during the FAT testing concurred with the test setup. The change in procedure is acceptable and produced acceptable test results.							
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NLI QUAL 06, R13 Attachment I Page 20 of 30