

PEARL Inspect & Test Standards			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2121-I</b>	3	6-2009

This standard is designed to verify that a medium voltage electrically operated enclosed fusible air disconnect switch is in a safe and reliable operating condition based upon the design of the original manufacturer at the time of manufacturing. PEARL testing does not verify the claims of the original equipment manufacturer as to the validity of its design criteria. In the event that the device is not in this condition then this standard cannot be used and the PEARL Reconditioning Standard needs to be followed.

**NOTE:** If fuses are installed, they are to be properly designed and rated with respect to voltage and interrupting rating for the device and specific application for which they are intended, and must be approved by the customer for said purpose. The final determination is ultimately the responsibility of the end user.

PEARL does not warrant, guarantee or make any representation regarding the correctness of specifications, use for any particular purpose, quality or extent of testing, accuracy, or reliability as to any equipment, products or documentation referenced herein.

## REFERENCES

The following references are use in this standard. Each of these references can be found in their respective listed locations.

### Table References: Section 6000

- Table 1: US Standard bus connection bolt torque values.
- Table 2: Insulation resistance and test values for electrical apparatus.
- Table 11: Insulation resistance and test temperature conversion to 20°C values.

The Following PEARL Standards are referenced in this standard and should be followed if applicable.

### PEARL Standard References

- Section 1400: *Low Voltage Transformers*
- Section 1700: *Protection Relays*

<b>PEARL Inspect &amp; Test Standards</b>			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2121-I</b>	3	6-2009

## **I TEST EQUIPMENT**

The following test equipment is required to perform the testing requirements of this standard:

1. Insulation Resistance Test Set (Megohmmeter) 2500 Vdc minimum
2. DC Overpotential Test Set (Hipot)

One of the following pieces of test equipment is required to perform the contact resistance testing requirements of this standard:

1. Digital Low Resistance Ohmmeter (DLRO - 10 amp unit is sufficient.)
2. DC Current Source and a Millivoltmeter

PEARL Inspect & Test Standards			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2121-I</b>	3	6-2009

## II EVALUATION

The following procedures shall be used to determine the condition of a medium voltage electrically operated enclosed fusible air disconnect switch under this standard.

### 1 INSPECTION

#### 1.1 Frame/Enclosure

- 1.1.1 Ensure that the nameplate data is legible.
- 1.1.2 Ensure that the third party listing service label is legible.
- 1.1.3 Inspect for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.1.4 Inspect for rust and corrosion.
- 1.1.5 Inspect all insulators for defects, cracks, chips and signs of tracking.
- 1.1.6 Inspect insulation structure for signs of overheating and deterioration.
- 1.1.7 Inspect viewing window for cracks and clarity.
- 1.1.8 Inspect glass weather stripping.
- 1.1.9 Record results on an approved PEARL Evaluation Form.

#### 1.2 Interlocks

- 1.2.1 Inspect for proper door interlock operation.
- 1.2.2 Inspect for proper Kirk lock assembly as necessary.
- 1.2.3 Record results on an approved PEARL Evaluation Form.

#### 1.3 Interphase Barriers

- 1.3.1 Inspect for dust, dirt and foreign materials.
- 1.3.2 Inspect for chips, cracks and deterioration.
- 1.3.3 Inspect for overheating and tracking.
- 1.3.4 Record results on an approved PEARL Evaluation Form.

#### 1.4 Arc Extinguishers

- 1.4.1 Inspect for loose and missing parts.
- 1.4.2 Inspect for dust, dirt, foreign material, cracks, chips and signs of overheating.
- 1.4.3 Inspect for excessive deterioration and carbon buildup.
- 1.4.4 Inspect arc runners for excessive deterioration.
- 1.4.5 Record results on an approved PEARL Evaluation Form.

#### 1.5 Arcing Contacts or Blades

- 1.5.1 Inspect for excessive deterioration.
- 1.5.2 Inspect for cracks, chips and pitting.
- 1.5.3 Inspect for signs of overheating.
- 1.5.4 Record results on an approved PEARL Evaluation Form.

#### 1.6 Main Contacts or Blades

- 1.6.1 Inspect for excessive deterioration.
- 1.6.2 Inspect for cracks, chips and pitting.
- 1.6.3 Inspect for signs of overheating.
- 1.6.4 Record results on an approved PEARL Evaluation Form.

PEARL Inspect & Test Standards			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2121-I</b>	3	6-2009

- 1.7 Fuse Assembly**
  - 1.7.1 Ensure the nameplate data is legible.
  - 1.7.2 Check fuse for proper rating per switch.
  - 1.7.3 Inspect for missing screws, defective parts, bolts, nuts, fasteners, retainers and keepers.
  - 1.7.4 Inspect for rust and corrosion.
  - 1.7.5 Inspect line and load clips for signs of overheating and missing and defective parts.
  - 1.7.6 Inspect the fuse clips for proper tension.
  - 1.7.7 Inspect all insulators for defects, cracks, chips and signs of tracking.
  - 1.7.8 Record results on an approved PEARL Evaluation Form.
- 1.8 Operating Mechanism**
  - 1.8.1 Inspect for signs of rust and corrosion.
  - 1.8.2 Inspect for excessive and inappropriate lubrication.
  - 1.8.3 Inspect closing spring.
  - 1.8.4 Inspect opening spring.
  - 1.8.5 Inspect operating chain and belt.
  - 1.8.6 Inspect close/open motor.
  - 1.8.7 Inspect for missing screws, bolts, nuts, fasteners, retainers and keepers.
  - 1.8.8 Manually operate disconnect switch a minimum of five (5) times while checking for proper operation of the quick-make and quick-break feature.
  - 1.8.9 Record results on an approved PEARL Evaluation Form.
- 1.9 Limit Switches**
  - 1.9.1 Inspect all limit switches for proper operation.
  - 1.9.2 Check all terminal connections.
  - 1.9.3 Inspect for chips, cracks and defective limit switch cases.
  - 1.9.4 Record results on an approved PEARL Evaluation Form.
- 1.10 Control Circuits**
  - 1.10.1 Inspect all connections for proper torque.
  - 1.10.2 Inspect all control wiring for signs of:
    - 1.10.2.1 Deterioration
    - 1.10.2.2 Overheating
  - 1.10.3 Check all switches and control knobs for:
    - 1.10.3.1 Damage
    - 1.10.3.2 Proper ratings
  - 1.10.4 Heater Circuit
    - 1.10.4.1 Inspect wiring
    - 1.10.4.2 Inspect heater(s) condition
    - 1.10.4.3 Temperature control device
  - 1.10.5 Verify accuracy and legibility of all applicable wiring schematics and drawings.
  - 1.10.6 Record results on an approved PEARL Evaluation Form.

<b>PEARL Inspect &amp; Test Standards</b>			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2121-I</b>	3	6-2009

**1.11 Control Power or Instrumentation Transformers**

**1.11.1** Control power or instrumentation transformers will be evaluated in accordance with applicable PEARL Standards found in Section 1400.

**1.12 Current Transformers**

**1.12.1** Current transformers will be evaluated in accordance with applicable PEARL Standards found in Sections 1400.

**1.13 Protective Relays**

**1.13.1** Protective relays will be evaluated in accordance with applicable PEARL Standards found in Section 1700.

PEARL Inspect & Test Standards			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	2121-I	3	6-2009

## 2 TESTING

### 2.1. Insulation Resistance

**2.1.1** Perform an insulation resistance test at test values specified in Table 2 of Section 6000 as follows:

**2.1.1.1** Disconnect switch in the open position (unless a visual open air gap exists)

**2.1.1.1.1** Line to load

**2.1.1.2** Disconnect switch in the closed position

**2.1.1.2.1** Phase to phase

**2.1.1.2.2** Phase to ground

**2.1.2** Correct for temperature, if necessary (Table 11).

**2.1.3** Record results on an approved PEARL Evaluation Form.

**2.1.4** Compare test results to manufacturer's recommendations or Table 2 of Section 6000

### 2.2 Contact Resistance

**2.2.1** Perform a contact resistance, millivolt drop test and/or watt-loss test from line to load on each phase of a closed switch as follows:

**2.2.1.1** Switch

**2.2.1.1.1** Line terminal of switch to load terminal of switch

**2.2.1.2** Fuses, if fuses are included.

**2.2.1.2.1** Load terminal of switch to load terminal of fuse

**2.2.1.3** Overall (if fuses are included)

**2.2.1.3.1** Line terminal of switch to load terminal of Fuse)

**2.2.2** Record results on an approved PEARL Evaluation Form.

**2.2.3** A PEARL recognized method is comparing the test results of each pole. Results should be within 50% for any of the poles. Any industrial standard used shall provide at least the same integrity as the PEARL recognized standard of comparing the test results of each pole and ensuring that they are within 50% of each other.

**NOTE:** If the original equipment manufacturer has designed the parts to be field installed, then the devices may be replaced as necessary. Otherwise, if changes are made to the accessories then the PEARL Reconditioning Standards need to be followed.

### 2.3 Checks and Adjustments

**2.3.1** Make all checks and adjustments per manufacturer's recommendations. In the absence of a manufacturer's recommendations, any check or adjustment made will be based upon procedures that will ensure the original manufacturer's design.

**2.3.2** All checks and adjustments must be within the guidelines recommended in order for the product to become a PEARL labeled product.

**2.3.3** Record results on an approved PEARL Evaluation Form.

<b>PEARL Inspect &amp; Test Standards</b>			
<b>MEDIUM VOLTAGE AIR DISCONNECT SWITCHES ENCLOSED ELECTRICALLY OPERATED FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2121-I</b>	3	6-2009

**2.4 Torque**

**2.4.1** Check all screw and bolt connections for the proper torque per manufacturer's recommendations or Table 1 of Section 6000.

**2.4.2** Record results on an approved PEARL Evaluation Form.

**2.5 Final Operation**

**2.5.1** Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.

**2.5.2** Operate the device a minimum of ten (10) times while checking for proper operation of the quick-make and quick-break feature.

**2.5.3** All devices must operate properly in order for the product to become a PEARL labeled product.

**2.5.4** Record results on appropriate PEARL Evaluation Form.

**3 EVALUATION REVIEW**

In order for the device to be eligible for the Inspect & Test Quality Seal, the device needs to have passed all of the preceding Inspection (1) and Testing (2) points. Any failures in the process will require that the device be "Reconditioned" at which time the PEARL Reconditioning Standard needs to be followed.

**III PEARL CERTIFICATION**

This product has now been inspected and tested and has passed all tests under the PEARL Inspect & Test Standard. The green PEARL Inspect & Test Quality Seal may now be placed on the device.