

<i>PEARL Inspect &amp; Test Standards</i>			
<i><b>LOW VOLTAGE SAFETY SWITCHES SINGLE THROW- FUSIBLE</b></i>	<i><b>PROPOSED STANDARD</b></i>		
	<i>Standard</i>	<i>Number</i>	<i>Date</i>
	<i>1154-I</i>	<i>3</i>	<i>6-2009</i>

This standard is designed to verify that a low voltage fusible single throw safety switch is in a safe and reliable operating condition. In the event that the switch is not in this condition then this standard will establish the reconditioning requirements. The term "reconditioning" is defined as "the process of returning electrical equipment to safe and reliable operating condition based upon the design of the original manufacturer at the time of manufacturing."

**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.

## **I TEST EQUIPMENT**

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

1. Insulation Resistance Test Set (Megohmmeter) 1000 Vdc minimum

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

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## **II EVALUATION**

The following procedures shall be used to determine the requirements to recondition a low voltage fusible single throw safety switch under this standard.

### **1 INSPECTION**

#### **1.1 Enclosure**

- 1.1.1 Ensure that the nameplate/label data is legible.
- 1.1.2 Ensure that the third party listing service label is legible.
- 1.1.3 Inspect the overall enclosure for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.1.4 Inspect for rust and corrosion.
- 1.1.5 Ensure hinges are secure.
- 1.1.6 Inspect cover gasket or seal
- 1.1.7 Record results on an approved PEARL Evaluation Form.

#### **1.2 Insulation System**

- 1.2.1 Inspect for dust, dirt and foreign materials.
- 1.2.2 Inspect for chips, cracks and deterioration.
- 1.2.3 Inspect for overheating.
- 1.2.4 Inspect for missing or defective insulation components.
- 1.2.5 Inspect for missing or defective interphase barriers.
- 1.2.6 Record results on an approved PEARL Evaluation Form.

#### **1.3 Current Carrying Components**

- 1.3.1 Inspect line and load lug connections for missing and defective parts.
- 1.3.2 Inspect line and load lug connections for signs of overheating.
- 1.3.3 Inspect hinge/pivot joints for signs of overheating.
- 1.3.4 Inspect hinge/pivot joints for missing and defective parts.
- 1.3.5 Inspect any other current carrying components for signs of overheating.
- 1.3.6 Inspect any other current carrying components for missing and defective parts.
- 1.3.7 Record results on an approved PEARL Evaluation Form.

#### **1.4 Stationary Contacts or Blade Clips**

- 1.4.1 Inspect for excessive deterioration of contact surface area.
- 1.4.2 Inspect for cracks, chips and pitting.
- 1.4.3 Inspect for signs of overheating.
- 1.4.4 Record results on an approved PEARL Evaluation Form.

#### **1.5 Moving Contacts or Blades**

- 1.5.1 Inspect arc contact tip for excessive deterioration of contact surface area.
- 1.5.2 Inspect arc contact tip for cracks, chips and pitting.
- 1.5.3 Inspect the main contact surface area for cracks, chips and pitting.
- 1.5.4 Inspect for signs of overheating.
- 1.5.5 Check for proper alignment/seating in the closed position.
- 1.5.6 Record results on an approved PEARL Evaluation Form.

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- 1.6 Fuse Assembly**
  - 1.6.1 Inspect fuse clips for signs of overheating.
  - 1.6.2 Inspect fuse clips for missing and defective parts.
  - 1.6.3 Inspect the fuse clips for proper connection and tension.
  - 1.6.4 Record results on an approved PEARL Evaluation Form.
- 1.7 Arc Extinguishers**
  - 1.7.1 Inspect for loose and missing parts.
  - 1.7.2 Inspect for dust, dirt, foreign material, cracks, chips and signs of overheating.
  - 1.7.3 Inspect for excessive deterioration and carbon buildup on the metal separator.
  - 1.7.4 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 for missing screws, bolts, nuts, springs, fasteners, retainers and keepers.
  - 1.8.4 Manually operate safety switch a minimum of three (3) times while checking for proper operation of the quick-make and quick-break feature.
  - 1.8.5 Record results on an approved PEARL Evaluation Form.
- 1.9 Interlocks**
  - 1.9.1 Inspect all interlocks for proper operation.
  - 1.9.2 Record results on an approved PEARL Evaluation Form.

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## **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** Switch in the open position

**2.1.1.1.1** Line to load

**2.1.1.2** Switch in the closed position

**2.1.1.2.1** Phase to phase

**2.1.1.2.2** Phase to enclosure

**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 or watt-loss test from line to load on each phase of a closed switch with the test points at the line and load lug landings.

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

**2.2.3** Compare test results to manufacturer's recommendations.

**2.2.4** A PEARL recognized method for evaluation of the current carrying path is comparing the test results of each pole. Results should be within 50% for any of the poles. Any other industrial standard used for evaluation of the current carrying path 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.

### **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.

### **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.

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**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** Manually 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.

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