

| <i>PEARL Reconditioning Standards</i>                                       |                                 |                 |                       |
|---|---------------------------------|-----------------|-----------------------|
| <b><i>LOW VOLTAGE<br/>SAFETY SWITCHES<br/>DOUBLE THROW- NON-FUSIBLE</i></b> | <b><i>PROPOSED STANDARD</i></b> |                 |                       |
|   | <i>Standard</i>                 | <i>Number</i>   | <i>Date</i>           |
|   | <b><i>1180</i></b>              | <b><i>5</i></b> | <b><i>11-2008</i></b> |

This standard is designed to verify that a low voltage non-fusible double 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."

## **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 reconditioning 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 reconditioning standard:

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

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## **II RECONDITION EVALUATION**

The following procedures shall be used to determine the requirements to recondition a low voltage non-fusible double 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 top, center, and bottom lug connections for missing and defective parts.
- 1.3.2 Inspect top, center, and bottom 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.

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- 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.
- 1.6 Arc Extinguishers**
  - 1.6.1 Inspect for loose and missing parts.
  - 1.6.2 Inspect for dust, dirt, foreign material, cracks, chips and signs of overheating.
  - 1.6.3 Inspect for excessive deterioration and carbon buildup on the metal separator.
  - 1.6.4 Record results on an approved PEARL Evaluation Form.
- 1.7 Operating Mechanism**
  - 1.7.1 Inspect for signs of rust and corrosion.
  - 1.7.2 Inspect for excessive and inappropriate lubrication.
  - 1.7.3 Inspect for missing screws, bolts, nuts, springs, fasteners, retainers and keepers.
  - 1.7.4 Manually operate safety switch a minimum of three (3) times while checking for proper operation of the quick-make and quick-break feature.
  - 1.7.5 Record results on an approved PEARL Evaluation Form.
- 1.8 Interlocks**
  - 1.8.1 Inspect all interlocks for proper operation.
  - 1.8.2 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 center position

**2.1.1.1.1** Top side to center

**2.1.1.1.2** Bottom Side to center

**2.1.1.2** Switch in the closed position-top side

**2.1.1.2.1** Phase to phase

**2.1.1.2.2** Phase to enclosure

**2.1.1.3** Switch in the closed position-bottom side

**2.1.1.3.1** Phase to phase

**2.1.1.3.2** 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 top side lugs to center lugs on each phase of a closed switch.

**2.2.2** Perform a contact resistance, millivolt drop test or watt-loss test from bottom side lugs to center lugs on each phase of a closed switch

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

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

**2.2.5** 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.

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### III RECONDITION PROCEDURES

The following procedures are required to recondition this product. PEARL recognizes that, based upon the recondition evaluation that was conducted and/or the actual product design, some of these procedures may not be applicable. However the testing requirement must be completed before the product can be labeled as a PEARL reconditioned product.

#### 1 RECONDITIONING

##### 1.1 Enclosure

- 1.1.1 Disassemble to clean.
- 1.1.2 Clean all parts of contamination and corrosion.
- 1.1.3 Cover any unused openings.
- 1.1.4 Ensure that the enclosure is plumb and square
- 1.1.5 Prepare the enclosure to paint, as necessary.
- 1.1.6 Paint enclosure, as necessary.
- 1.1.7 Replace door gasket or seal, as necessary.
- 1.1.8 Ensure door properly closes.
- 1.1.9 Ensure door interlock properly works.
- 1.1.10 Ensure that the nameplate/label data is complete, correct and legible.
- 1.1.11 Record results on an approved PEARL Reconditioning Test Form.

##### 1.2 Missing or Defective Components, Parts and Hardware

- 1.2.1 Replace or repair any missing or defective components, parts and hardware found during the inspection phase of this standard.
- 1.2.2 Record results on an approved PEARL Reconditioning Test Form.

##### 1.3 Operating Mechanism

- 1.3.1 Disassemble operating mechanism, as necessary.
- 1.3.2 Clean operating mechanism.
- 1.3.3 Replace any defective parts.
- 1.3.4 Replate operating mechanism parts, as necessary.
- 1.3.5 Apply proper lubrication.
- 1.3.6 Assemble operating mechanism.
- 1.3.7 Manually operate switch a minimum of five (5) times while checking for proper operation of the quick-make and quick-break feature.
- 1.3.8 Record results on an approved PEARL Reconditioning Test Form.

##### 1.4 Insulation System

- 1.4.1 Replace any defective insulation components.
- 1.4.2 Clean all insulation components.
- 1.4.3 Record results on an approved PEARL Reconditioning Test Form.

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- 1.5 Arc Extinguishers**
  - 1.5.1 Remove arc extinguishers.
  - 1.5.2 Replace any defective arc extinguishers.
  - 1.5.3 Clean arc extinguishers.
  - 1.5.4 Replace arc extinguishers.
  - 1.5.5 Record results on an approved PEARL Reconditioning Test Form.
- 1.6 Contacts or Blades**
  - 1.6.1 Remove and replace any defective contacts or blades.
  - 1.6.2 Remove and replate, as necessary.
  - 1.6.3 Clean and dress.
  - 1.6.4 Make all adjustments per manufacturer's instructions. In the absence of a manufacturer's instructions, these adjustments will be based upon procedures that will ensure the original manufacturer's design.
  - 1.6.5 Check for proper torque on connections.
  - 1.6.6 Record results on an approved PEARL Reconditioning Test Form.
- 1.7 Current Carrying Components**
  - 1.7.1 Line and load connections.
    - 1.7.1.1 Clean and degrease.
    - 1.7.1.2 Replate, as necessary.
  - 1.7.2 Hinge/pivot joints.
    - 1.7.2.1 Clean and degrease.
    - 1.7.2.2 Replate, as necessary.
  - 1.7.3 Other current carrying components.
    - 1.7.3.1 Clean and degrease.
    - 1.7.3.2 Replate, as necessary.
  - 1.7.4 Record results on an approved PEARL Reconditioning Test Form.
- 1.8 Checks and Adjustments**
  - 1.8.1 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.
  - 1.8.2 All checks and adjustments must be within the guidelines recommended in order for the product to become a PEARL labeled product.
  - 1.8.3 Record results on an approved PEARL Reconditioning Test Form.
- 1.9 Torque**
  - 1.9.1 Check all screw and bolt connections for the proper torque per manufacturer's recommendations or industrial standards (Table 1).
  - 1.9.2 Record results on an approved PEARL Reconditioning Test Form.
- 1.10 Final Operation**
  - 1.10.1 Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.

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**1.10.2** Manually operate the switch a minimum of ten (10) times while checking for proper operation of the quick-make and quick-break feature.

**1.10.3** Record results on an approved PEARL Reconditioning Test Form.

## **2 TESTING**

### **2.1 Insulation Resistance**

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

**2.1.1.1** Switch in the center position

**2.1.1.1.1** Top side to center

**2.1.1.1.2** Top side to enclosure

**2.1.1.1.3** Bottom side to center

**2.1.1.1.4** Bottom side to enclosure

**2.1.1.1.5** Center to enclosure

**2.1.1.1.6** Phase to phase on top side

**2.1.1.1.7** Phase to phase on center side

**2.1.1.1.8** Phase to phase on bottom side

**2.1.1.2** Switch in the closed position – top side

**2.1.1.2.1** Phase to phase

**2.1.1.2.2** Phase to enclosure

**2.1.1.3** Switch in the closed position – bottom side

**2.1.1.3.1** Phase to phase

**2.1.1.3.2** Phase to enclosure

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

**2.1.3** Record results on an approved PEARL Reconditioning Test Form.

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

**2.1.5** The test results must be within the guidelines recommended in order for the product to become a PEARL labeled product.

### **2.2 Contact Resistance**

**2.2.1** Perform a contact resistance, millivolt drop test or watt-loss test from top side lugs to center lugs on each phase of a closed switch.

**2.2.2** Perform a contact resistance, millivolt drop test or watt-loss test from bottom side lugs to center lugs on each phase of a closed switch

**2.2.3** Record results on an approved PEARL Reconditioning Test Form.

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

**2.2.5** 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.

**2.2.6** The test results must be within the guidelines recommended in order for the product to become a PEARL labeled product.

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#### **IV PEARL CERTIFICATION**

This product has now been reconditioned under the PEARL Reconditioning Standard. The blue PEARL Reconditioning Quality Seal may now be placed on the device.