

PEARL Reconditioning Standards			
<b>LOW VOLTAGE DISCONNECT SWITCHES MANUALLY OPERATED AIR FUSIBLE</b>	Revision		
	Standard	Number	Date
	1114	5	11-2008

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.

## 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 fusible disconnect switch under this standard.

### 1. INSPECTION

#### 1.1 Frame/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 frame/enclosure for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.1.4 Inspect for rust and corrosion.
- 1.1.5 Inspect insulation structure for signs of overheating and deterioration.
- 1.1.6 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 Operating Mechanism

- 1.3.1 Inspect for signs of rust and corrosion.
- 1.3.2 Inspect for excessive and inappropriate lubrication.
- 1.3.3 Inspect for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.3.4 Manually operate circuit breaker three (3) times while checking for proper operation of the quick-make and quick-break feature.
- 1.3.5 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 on the metal separator.
- 1.4.4 Record results on an approved PEARL Evaluation Form.

#### 1.5 Stationary Contacts or Blade Clips

- 1.5.1 Inspect for excessive deterioration of contact surface area.
- 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.

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**1.6 Moving Contacts or Blades**

- 1.6.1** Inspect arc contact tip for excessive deterioration of contact surface area.
- 1.6.2** Inspect arc contact tip for cracks, chips and pitting.
- 1.6.3** Inspect the main contact surface area for cracks, chips and pitting.
- 1.6.4** Inspect for signs of overheating.
- 1.6.5** Check for proper alignment/seating in the closed position.
- 1.6.6** Record results on an approved PEARL Evaluation Form.

**1.7 Fuse Assembly**

- 1.7.1** Inspect fuse clips for signs of overheating.
- 1.7.2** Inspect fuse clips for missing and defective parts.
- 1.7.3** Inspect the fuse clips for proper connection and tension.
- 1.7.4** Record results on an approved PEARL Evaluation Form.

**1.8 Current Carrying Components**

- 1.8.1** Inspect line and load connections for signs of overheating.
- 1.8.2** Inspect line and load connections for missing and defective parts.
- 1.8.3** Inspect hinge/pivot joints for signs of overheating.
- 1.8.4** Inspect hinge/pivot joints for missing and defective parts.
- 1.8.5** Inspect any other current carrying components for signs of overheating.
- 1.8.6** Inspect any other current carrying components for missing and defective parts.
- 1.8.7** 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 frame/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 lug landing and the load side of the switch prior to the fuse clip.

**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.

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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 requirements must be completed before the product can be labeled as a PEARL reconditioned product.

#### 1 RECONDITIONING

##### 1.1 Frame/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 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 circuit breaker 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.

##### 1.5 Arc Extinguishers

- 1.5.1 Remove arc extinguishers.
- 1.5.2 Clean arc extinguishers.
- 1.5.3 Replace any defective arc extinguishers.
- 1.5.4 Assemble arc extinguishers.
- 1.5.5 Record results on an approved PEARL Reconditioning Test Form.

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- 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 Fuse Assembly**
  - 1.8.1 Remove defective line side fuse clips.
  - 1.8.2 Remove defective load side fuse clips.
  - 1.8.3 Clean, replate or replace any defective fuse clips.
  - 1.8.4 Reinstall fuse clips.
  - 1.8.5 Check for proper tension of fuse clips.
  - 1.8.6 Record results on an approved PEARL Reconditioning Test Form.
- 1.9 Checks and Adjustments**
  - 1.9.1 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.
  - 1.9.2 All checks and adjustments must be within the guidelines recommended in order for the product to become a PEARL labeled product.
  - 1.9.3 Record results on an approved PEARL Reconditioning Test Form.
- 1.10 Torque**
  - 1.10.1 Check all screw and bolt connections for the proper torque per manufacturer's recommendations or Table 1 of Section 6000.
  - 1.10.2 Record results on an approved PEARL Reconditioning Test Form.
- 1.11 Final Operation**
  - 1.11.1 Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.

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- 1.11.2 Manually operate the switch a minimum of ten (10) times while checking for proper operation of the quick-make and quick-break feature.
- 1.11.3 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 open position
    - 2.1.1.1.1 Line to load
    - 2.1.1.1.2 Line to frame/enclosure
    - 2.1.1.1.3 Load to frame/enclosure
    - 2.1.1.1.4 Phase to phase on line side
    - 2.1.1.1.5 Phase to phase on load side
  - 2.1.1.2 Switch in the closed position
    - 2.1.1.2.1 Phase to phase
    - 2.1.1.2.2 Phase to frame/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 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 Reconditioning Test 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.
- 2.2.5 The test results must be within the guidelines recommended in order for the product to become a PEARL labeled product.

## **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.