

PEARL Inspect & Test Standards			
<b>LOW VOLTAGE DISCONNECT SWITCHES BUS DUCT PLUG-IN FUSIBLE</b>	Revision		
	Standard	Number	Date
	<b>2035-I</b>	3	6-2009

This standard is designed to verify that a low voltage bus duct plug-in fusible 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 1200: *Low Voltage Circuit Breakers*
- Standard 1214 – Low Voltage Molded Case Switches  
(Non-Automatic Circuit Interrupters)

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## **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 condition of a low voltage bus duct plug-in 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 the fuse clips for proper connection and tension.
- 1.1.6 Inspect for signs of overheating at the fuse connections.
- 1.1.7 Inspect insulation structure for signs of overheating and deterioration.
- 1.1.8 Record results on an approved PEARL Evaluation Form.

#### 1.2 Operating Mechanism

- 1.2.1 Inspect for signs of rust and corrosion.
- 1.2.2 Inspect for excessive and inappropriate lubrication.
- 1.2.3 Inspect for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.2.4 Manually operate bus duct switch three (3) times while checking for proper operation of the quick-make and quick-break feature.
- 1.2.5 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.
- 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 on the metal separator.
- 1.4.4 Inspect arc runners for excessive deterioration.
- 1.4.5 Record results on an approved PEARL Evaluation Form.

#### 1.5 Arcing Contacts

- 1.5.1 Inspect for excessive deterioration.
- 1.5.2 Inspect for cracks, chips and pitting.
- 1.5.3 Check for proper alignment/seating in the closed position.
- 1.5.4 Record results on an approved PEARL Evaluation Form.

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- 1.6 Main Contacts**
  - 1.6.1** Inspect for excessive deterioration.
  - 1.6.2** Inspect for cracks, chips and pitting.
  - 1.6.3** Check for proper alignment/seating in the closed position.
  - 1.6.4** Record results on an approved PEARL Evaluation Form.
- 1.7 Molded Case Switch (if applicable)**
  - 1.7.1** Molded case switches will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1200.
  - 1.7.2** 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** Bus duct switch in the open position

**2.1.1.1.1** Line to load

**2.1.1.2** Bus duct 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 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 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.

### 2.3 Molded Case Switch (if applicable)

**2.3.1** Molded case switches will be tested in accordance with PEARL Reconditioning Standards found in Section 1200.

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

### 2.4 Checks and Adjustments

**2.4.1** 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.

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

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

### 2.5 Torque

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

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

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## 2.6 Final Operation

- 2.6.1 Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.
- 2.6.2 Manually operate the device a minimum of ten (10) times while checking for proper operation of the quick-make and quick-break feature.
- 2.6.3 All devices must operate properly in order for the product to become a PEARL labeled product.
- 2.6.4 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.