

<i>PEARL Inspect &amp; Test Standards</i>			
<i>INSTANTANEOUS VOLTAGE RELAYS SOLID STATE</i>	<i>PROPOSED STANDARD</i>		
	<i>Standard</i>	<i>Number</i>	<i>Date</i>
	<i>1735-I</i>	<i>3</i>	<i>6-2009</i>

This standard is designed to verify that an instantaneous voltage solid state relay 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.

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 2 Insulation resistance and test values for electrical apparatus.
- Table 11 Insulation resistance and test temperature conversion to 20°C values.

### National Electrical Code – NEC 2002 Edition

- Article 310 Conductors for General Wiring
- Table 310.17 Allowable Ampacities of Single-Insulated Conductors Rates 0 Through 2000 Volts in Free Air, Based on Ambient Air Temperatures of 30°C (86°F).

## I TEST EQUIPMENT

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

1. Insulation Resistance Test Set (Megohmmeter) 500 Vdc minimum
2. Multimeter
3. AC Current Supply with means of timing

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## II EVALUATION

The following procedures shall be used to determine the condition of an instantaneous voltage solid state relay under this standard.

### 1 INSPECTION

#### 1.1 General

- 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 case for cracks
- 1.1.4 Record results on an approved PEARL Evaluation Form.

#### 1.2 Circuit Boards and Solid State Components

- 1.2.1 Inspect for signs of overheating.
- 1.2.2 Inspect for signs of contamination.
- 1.2.3 Inspect terminals for signs of corrosion.
- 1.2.4 Record results on an approved PEARL Evaluation Form.

#### 1.3 Wiring

- 1.3.1 Inspect signs of overheating.
- 1.3.2 Inspect for signs of contamination.
- 1.3.3 Record results on an approved PEARL Evaluation Form.

#### 1.4 Relay Terminals

- 1.4.1 Inspect for missing screws
- 1.4.2 Check for stripped screws
- 1.4.3 Inspect for signs of overheating.
- 1.4.4 Inspect for signs of contamination.
- 1.4.5 Inspect for signs of corrosion.
- 1.4.6 Record results on an approved PEARL Evaluation Form.

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## 2 TESTING

### 2.1 Contact Transfer

- 2.1.1 Set relay to minimum voltage setting
- 2.1.2 Using a multimeter verify each contact state (NO or NC)
- 2.1.3 Apply rated current to operating coil
- 2.1.4 Using a multimeter verify the transfer of each contact
- 2.1.5 Remove rated current
- 2.1.6 Record results on an approved PEARL Evaluation Form.

### 2.2 Pickup Voltage – Minimum Setting

- 2.2.1 Increase voltage until relay pickup is achieved.
- 2.2.2 Record as Pickup Voltage – Minimum Setting.
- 2.2.3 Remove voltage
- 2.2.4 Compare test value for Pickup Voltage – Minimum Setting with manufacturers tolerance for relay pickup or +/- 10 % of scale setting.
- 2.2.5 Record results on an approved PEARL Evaluation Form.

### 2.3 Pickup Voltage – Maximum Setting

- 2.3.1 Increase voltage until relay pickup is achieved.
- 2.3.2 Record as Pickup Voltage – Maximum Setting.
- 2.3.3 Remove voltage
- 2.3.4 Compare test value for Pickup Voltage – Maximum Setting with manufacturers tolerance for relay pickup or +/- 10 % of scale setting.
- 2.3.5 Record results on an approved PEARL Evaluation Form.

### 2.4 Instantaneous Operation Verification

- 2.4.1 Set. relay to minimum setting
- 2.4.2 Set test voltage to 2 times setting
- 2.4.3 Connect timing circuit to relay
- 2.4.4 Apply test voltage to relay
- 2.4.5 Remove voltage if test set failed to deenergized
- 2.4.6 Compare time of operation with manufacturer specification for relay pickup time or 100 milliseconds or less.
- 2.4.7 Record results on an approved PEARL Evaluation Form.

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**2.5 Insulation Resistance**

- 2.5.1 Consult manufacturer's instructions for any precautions before performing this test.
- 2.5.2 Perform an insulation resistance test at test voltage specified by manufacturer or using a 500-volt dc megohmmeter.
  - 2.5.2.1 Relay De-energized
    - 2.5.2.1.1 Test across each contact
    - 2.5.2.1.2 Test between contacts on the line side
    - 2.5.2.1.3 Test between contacts on the load side
  - 2.5.2.2 Relay Energized
    - 2.5.2.2.1 Test between contacts
- 2.5.3 Record results on an approved PEARL Evaluation Form.
- 2.5.4 Compare test results to manufacturer's recommendations or a minimum of 1 megohm.

**2.6 Checks and Adjustments**

- 2.6.1 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.
- 2.6.2 All checks and adjustments must be within the guidelines recommended in order for the product to become a PEARL labeled product.
- 2.6.3 Record results on an approved PEARL Evaluation Form.

**2.7 Torque**

- 2.7.1 Check all screw and bolt connections for the proper torque per manufacturer's recommendations or Table 1 of Section 6000.
- 2.7.2 Record results on an approved PEARL Evaluation Form.

**2.8 Final Operation**

- 2.8.1 Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.
- 2.8.2 Manually operate the device a minimum of ten (10) times while checking for proper operation of the quick-make and quick-break feature.
- 2.8.3 All devices must operate properly in order for the product to become a PEARL labeled product.
- 2.8.4 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.

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### **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.