This standard is designed to verify that a time delay overcurrent relay {electromagnetic induction disk type} 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 6	Transformer Insulation Resistance Test Value
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 (Megohmeter) 500 Vdc minimum
2. Multimeter
3. AC Current Supply with means of timing
4. DC Current Supply

II EVALUATION

The following procedures shall be used to determine the condition of a time delay overcurrent relay {electromagnetic induction disk type} under this standard.

1 INSPECTION

1.1 Case

1.1.1 Inspect for dents.
1.1.2 Inspect for stripped relay terminal screws.
1.1.3 Inspect all current transformer shorting switches
1.1.4 Record results on an approved PEARL Evaluation Form.

1.2 Cover

1.2.1 Inspect foe cracked or broken cover glass.
1.2.2 Inspect cover gasket or pad
1.2.3 Inspect cover glass holders or tabs
1.2.4 Record results on an approved PEARL Evaluation Form.

1.3 Induction Coil

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

1.4 Instantaneous Coil

1.4.1 Inspect for signs of overheating.
1.4.2 Inspect for signs of contamination.
1.4.3 Inspect terminals for signs of corrosion.
1.4.4 Record results on an approved PEARL Evaluation Form.

1.5 Target & Seal-In Coil

1.5.1 Inspect for signs of overheating.
1.5.2 Inspect for signs of contamination.
1.5.3 Inspect terminals for signs of corrosion.
1.5.4 Record results on an approved PEARL Evaluation Form.

1.6 Wiring

1.6.1 Inspect signs of overheating.
1.6.2 Inspect for signs of contamination.
1.6.3 Record results on an approved PEARL Evaluation Form.

1.7 Relay Terminals

1.7.1 Inspect for missing screws
1.7.2 Check for stripped screws
1.7.3 Inspect for signs of overheating.
1.7.4 Inspect for signs of contamination.
1.7.5 Inspect for signs of corrosion.
1.7.6 Record results on an approved PEARL Evaluation Form.

1.8 Contacts

1.8.1 Inspect signs of overheating.

1.8.2 Inspect for signs of contamination.

1.8.3 Record results on an approved PEARL Evaluation Form.

1.9 Disk

1.9.1 Inspect signs of overheating.

1.9.2 Inspect for signs of contamination.

1.9.3 Ensure disk is not bent

1.9.4 Check for proper end play

1.9.5 Record results on an approved PEARL Evaluation Form.

1.10 Spiral Spring

1.10.1 Inspect signs of overheating.

1.10.2 Inspect for signs of contamination.

1.10.3 Ensure spring is not bent

1.10.4 Record results on an approved PEARL Evaluation Form.

1.11 Tap Block

1.11.1 Inspect signs of overheating.

1.11.2 Inspect for signs of contamination.

1.11.3 Ensure there are no stripped screw holes

1.11.4 Record results on an approved PEARL Evaluation Form.

2 TESTING

2.1 Zero Check of the Time Dial

2.1.1 Adjust time dial until the induction unit contacts first touch

2.1.2 Record time dial reading on an approved PEARL Evaluation Form.

2.2 Induction Unit Minimum Pickup

2.2.1 Set relay to minimum tap setting

2.2.2 Set time dial to maximum setting.

2.2.3 Connect ac current source to the induction coil

2.2.4 Increase ac current until the disk begins to move

2.2.5 Record induction unit pickup on an approved PEARL Evaluation Form.

2.3 Induction Unit Creep Test

2.3.1 Set relay to minimum tap setting

2.3.2 Set time dial to maximum setting.

2.3.3 Connect ac current source to the induction coil

2.3.4 Set ac current to 105% of tap or manufacturers maximum pickup tolerance. Disk should continue to rotate until disk contacts close

2.3.5 Record results on an approved PEARL Evaluation Form.

2.4 Induction Unit Timing Test

2.4.1 Set relay to minimum tap setting

2.4.2 Set time dial to maximum setting.

2.4.3 Connect ac current source to the induction coil

2.4.4 Perform three timing tests at different percentages of tap to verify the timing characteristic of the induction unit.

2.4.5 Record induction unit timing results on an approved PEARL Evaluation Form.

2.5 Target and Seal-In Unit Functional Tests

2.5.1 Set relay to minimum tap setting

2.5.2 Set time dial to one.

2.5.3 Connect ac current source to the induction coil

2.5.4 Connect dc current source to the induction coil

2.5.5 Apply ac current of 150% of tap to induction unit coil.

2.5.6 Ensure induction unit contacts are close

2.5.7 Increase dc current to target and seal-in unit until pickup is achieved.

2.5.8 Record target and seal-in unit pickup results on an approved PEARL Evaluation Form.

2.5.9 Set dc current to tap value setting

2.5.10 Remove ac current to induction unit coil.

2.5.11 Record target and seal-in unit seal-in results on an approved PEARL Evaluation Form.

2.5.12 Decrease dc current until the target and seal-in unit dropout is achieved.

2.5.13 Record target and seal-in unit dropout results on an approved PEARL Evaluation Form.

2.6 Instantaneous Unit Pickup Current – Minimum Scale Setting

2.6.1 Connect ac current source to the instantaneous coil

2.6.2 Increase ac current until instantaneous unit pickup is achieved.

2.6.3 Record as Pickup Current – minimum scale setting.

2.6.4 Remove current

2.6.5 Compare test value for Pickup Current – minimum scale setting with manufacturers tolerance for relay pickup or + /- 10 % of scale setting.

2.6.6 Record instantaneous results on an approved PEARL Evaluation Form.

2.7 Instantaneous Unit Pickup Current – Maximum Scale Setting

2.7.1 Connect ac current source to the instantaneous coil

2.7.2 Increase ac current until instantaneous unit pickup is achieved.

2.7.3 Record as Pickup Current – maximum scale setting.

2.7.4 Remove current

2.7.5 Compare test value for Pickup Current – maximum scale setting with manufacturers tolerance for relay pickup or + /- 10 % of scale setting.

2.7.6 Record instantaneous results on an approved PEARL Evaluation Form.

2.8 Instantaneous Operation Verification

2.8.1 Set. instantaneous to minimum scale setting

2.8.2 Set ac current to 2 times scale setting

2.8.3 Connect timing circuit to relay

2.8.4 Apply ac current to relay

2.8.5 Remove ac current if test set fails to reenergized

2.8.6 Compare time of operation with manufacturer specification for instantaneous pickup time or 100 milliseconds or less.

2.8.7 Record results on an approved PEARL Evaluation Form.

2.9 Insulation Resistance

2.9.1 Perform an insulation resistance test at test voltage specified by manufacturer or using a 500-volt dc megohmeter.

2.9.2 Record results on an approved PEARL Evaluation Form.

2.9.3 Compare test results to manufacturer's recommendations or a minimum of 1 megohm.

2.10 Checks and Adjustments

2.10.1 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.

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

2.10.3 Record results on an approved PEARL Evaluation Form.

2.11 Torque

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

2.11.2 Record results on an approved PEARL Evaluation Form.

2.12 Final Operation

2.12.1 Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.

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

2.12.3 All devices must operate properly in order for the product to become a PEARL labeled product.

2.12.4 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.