

PEARL Reconditioning Standards			
LOW VOLTAGE MOLDED CASE MOTOR CIRCUIT PROTECTORS	Revision		
	Section	Number	Date
	1215	3	2-11-03

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."

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
2. High Current Test Set

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

One of the following pieces of test equipment may be required to perform the testing requirements of this reconditioning standard, depending on the accessories:

1. AC Voltage Supply
2. DC Voltage Supply

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II RECONDITION EVALUATION

These steps are used to determine what will be required to recondition this product under this standard.

1 INSPECTION

1.1 Case

- 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 case for cracks, chips and unused holes.
- 1.1.4 Inspect the case for signs of overheating.
- 1.1.5 Inspect all control wire for signs of deterioration, overheating and damage.
- 1.1.6 Inspect for missing parts.
- 1.1.7 Record results on appropriate PEARL Inspection and Test Form.

1.2 Lugs

- 1.2.1 Inspect for tightness.
- 1.2.2 Inspect for signs of overheating.
- 1.2.3 Inspect plating.
- 1.2.4 Inspect for signs of cross threads and stripped threads.
- 1.2.5 Record results on appropriate PEARL Inspection and Test 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 motor circuit protector a minimum of three (3) times while checking for proper operation of the quick-make and quick-break feature.
- 1.3.5 Record results on appropriate PEARL Inspection and Test Form.

1.4 Interphase Separators

- 1.4.1 Inspect for dust, dirt and foreign materials.
- 1.4.2 Inspect for chips, cracks and deterioration.
- 1.4.3 Inspect for overheating.
- 1.4.4 Record results on appropriate PEARL Inspection and Test Form.

1.5 Arc Extinguishers/Chutes

- 1.5.1 Inspect for loose and missing parts.
- 1.5.2 Inspect for dust, dirt, foreign material, cracks, chips and signs of overheating.
- 1.5.3 Inspect for excessive deterioration and carbon buildup on the metal separator.
- 1.5.4 Inspect arc runners for excessive deterioration.
- 1.5.5 Record results on appropriate PEARL Inspection and Test Form.

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- 1.6 Arcing 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 appropriate PEARL Inspection and Test Form.
- 1.7 Main Contacts**
 - 1.7.1 Inspect for excessive deterioration.
 - 1.7.2 Inspect for cracks, chips and pitting.
 - 1.7.3 Check for proper alignment/seating in the closed position.
 - 1.7.4 Record results on appropriate PEARL Inspection and Test Form.
- 1.8 Current Carrying Components**
 - 1.8.1 Inspect hinge/pivot joints for signs of overheating.
 - 1.8.2 Inspect hinge/pivot joints for missing and defective parts.
 - 1.8.3 Inspect any other current carrying components for signs of overheating.
 - 1.8.4 Inspect any other current carrying components for missing and defective parts.
- 1.9 Instantaneous Units**
 - 1.9.1 Inspect for signs of overheating.
 - 1.9.2 Inspect for corrosion and rust.
 - 1.9.3 Inspect unit for missing and defective screws, bolts, nuts, fasteners and keepers.
 - 1.9.4 Check for loose connections.
 - 1.9.5 Check for proper sizing.
- 1.10 Shunt/Electric Trip Devices**
 - 1.10.1 Inspect shunt/electric trip unit for missing and defective screws, bolts, nuts, fasteners and keepers.
 - 1.10.2 Inspect shunt/electric trip unit for signs of overheating and deteriorated insulation.
 - 1.10.3 Inspect for pinched and damaged wire insulation.
 - 1.10.4 Check shunt/electric trip unit for loose and defective terminal connectors.
 - 1.10.5 Record results on appropriate PEARL Inspection and Test Form.
- 1.11 Undervoltage Trip Devices**
 - 1.11.1 Inspect undervoltage trip unit for missing and defective screws, bolts, nuts, fasteners and keepers.
 - 1.11.2 Inspect undervoltage trip unit for signs of overheating and deteriorated insulation.
 - 1.11.3 Inspect for pinched and damaged wire insulation.
 - 1.11.4 Check undervoltage trip unit for loose and defective terminal connectors.
 - 1.11.5 Record results on appropriate PEARL Inspection and Test 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 Motor circuit protector in the open position

2.1.1.1.1 Line to load

2.1.1.2 Motor circuit protector in the closed position

2.1.1.2.1 Phase to phase

2.1.1.2.2 Phase to ground

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

2.1.3 Record results on appropriate PEARL Inspection and Test 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 motor circuit protector.

2.2.2 Record results on appropriate PEARL Inspection and Test 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 Instantaneous Trip Test

2.3.1 Perform an instantaneous trip test to the motor circuit protector. Note this test is done with fuses removed and the blown fuse feature defeated.

2.3.2 Use specific length and size of wire that meet or exceeds manufacturer's guidelines or NEC standards.

2.3.3 Record results on appropriate PEARL Inspection and Test Form.

2.3.4 Compare results to manufacturer's recommendations or Table 4 of Section 6000.

2.4 Shunt Trip Test

2.4.1 Close motor circuit protector.

2.4.2 Connect appropriate voltage source to shunt trip input leads.

2.4.3 Increase voltage until shunt trip unit operates. Verify that the device operates properly at its minimum rated voltage.

2.4.4 Record results on appropriate PEARL Inspection and Test Form.

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2.5 Undervoltage Unit

- 2.5.1** Connect voltage source to undervoltage input leads.
- 2.5.2** Apply rated voltage to the undervoltage unit.
- 2.5.3** Close motor circuit protector.
- 2.5.4** Decrease voltage until undervoltage unit operates and trips the motor circuit protector.
- 2.5.5** Verify that the device operates properly within its rated voltage range.
- 2.5.6** Record results on appropriate PEARL Inspection and Test Form.

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III RECONDITION PROCEDURES

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

1 RECONDITIONING

1.1 Case and Interphase Barriers

- 1.1.1 Clean case.
- 1.1.2 Clean interphase barriers.

1.2 Operating Mechanism

- 1.2.1 Disassemble the operating mechanism, as necessary.
- 1.2.2 Clean mechanism.
- 1.2.3 Replace any defective parts.
- 1.2.4 Replate operating mechanism parts, as necessary.
- 1.2.5 Assemble operating mechanism.
- 1.2.6 Apply proper lubrication.
- 1.2.7 Manually operate motor circuit protector a minimum of three (3) times while checking for proper operation of the quick-make and quick-break feature.

1.3 Arc Extinguishers/Chutes

- 1.3.1 Remove arc extinguishers.
- 1.3.2 Clean arc extinguishers.
- 1.3.3 Replace any defective arc extinguishers.
- 1.3.4 Assemble arc extinguishers.

1.4 Arcing Contacts

- 1.4.1 Remove and replace any defective arcing contacts.
- 1.4.2 Stationary arcing contacts.
 - 1.4.2.1 Clean and dress.
 - 1.4.2.2 Remove and replate, as necessary.
 - 1.4.2.3 Replace contacts.
- 1.4.3 Movable arcing contacts.
 - 1.4.3.1 Clean and dress.
 - 1.4.3.2 Remove and replate, as necessary.
 - 1.4.3.3 Replace contacts.
- 1.4.4 Check for proper wipe and alignment.
- 1.4.5 Check for proper torque on connections.

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- 1.5 Main Contacts**
 - 1.5.1 Remove and replace any defective main contacts.
 - 1.5.2 Stationary main contacts.
 - 1.5.2.1 Clean and dress.
 - 1.5.2.2 Remove and replate, as necessary.
 - 1.5.2.3 Replace contacts.
 - 1.5.3 Movable main contacts.
 - 1.5.3.1 Clean and dress.
 - 1.5.3.2 Remove and replate, as necessary.
 - 1.5.3.3 Replace contacts.
 - 1.5.4 Check for proper wipe and alignment.
 - 1.5.5 Check for proper torque on connections.
- 1.6 Current Carrying Components**
 - 1.6.1 Line and load connections.
 - 1.6.1.1 Clean and degrease.
 - 1.6.1.2 Replate, as necessary.
 - 1.6.2 Hinge/pivot joints.
 - 1.6.2.1 Clean and degrease.
 - 1.6.2.2 Replate, as necessary.
 - 1.6.3 Other current carrying components.
 - 1.6.3.1 Clean and degrease.
 - 1.6.3.2 Replate, as necessary.
- 1.7 Control Wiring**
 - 1.7.1 Replace any control wire that is damaged or shows signs of overheating.
 - 1.7.2 Replace any loose and defective terminal connectors.
 - 1.7.3 Record results on appropriate PEARL Inspection and Test Form.
- 1.8 Instantaneous Trip Unit**
 - 1.8.1 Replace or repair any instantaneous unit that failed to operate within the instantaneous band based upon the manufacturer's recommendations or Table 4 of Section 6000.
 - 1.8.2 Adjust any instantaneous band based upon the manufacturer's recommendations. Make all adjustments per manufacturer's instructions. In the absence of manufacturer's instructions, these adjustments will be based upon a procedure that will ensure the original manufacturer's design.
 - 1.8.3 Record results on appropriate PEARL Inspection and Test Form.
- 1.9 Shunt Trip Unit**
 - 1.9.1 Replace or repair any defective shut trip unit.
 - 1.9.2 Adjust any shunt trip unit to operate within the design characteristic based upon the manufacturer's recommendations. In the absence of manufacturer's instructions, these adjustments will be based upon a procedure that will ensure the original manufacturer's design.
 - 1.9.3 Record results on appropriate PEARL Inspection and Test Form.

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1.10 Undervoltage Trip Unit

1.10.1 Replace or repair any defective undervoltage trip unit.

1.10.2 Adjust any undervoltage trip unit to operate within the design characteristic based upon the manufacturer's recommendations. In the absence of a manufacturer's instructions, these adjustments will be based upon a procedure that will ensure the original manufacturer's design.

1.10.3 Record results on appropriate PEARL Inspection and Test Form.

1.11 Checks and adjustments

1.11.1 Check arcing contacts for proper wipe, pressure and gap.

1.11.2 Check main contacts for proper wipe, pressure and gap.

1.11.3 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.

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

1.12 Torque

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

1.12.2 Record results on appropriate PEARL Inspection and Test Form.

1.13 Final Assembly

1.13.1 Ensure that the nameplate/label data is complete, correct and legible.

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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 Motor circuit protector in the open position

2.1.1.1.1 Line to load

2.1.1.1.2 Line to ground

2.1.1.1.3 Load to ground

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 Motor circuit protector in the closed position

2.1.1.2.1 Phase to phase

2.1.1.2.2 Phase to ground

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

2.1.3 Record results on appropriate PEARL Inspection and Test Form.

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

2.1.4 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 motor circuit protector.

2.2.2 Record results on appropriate PEARL Inspection and Test Form.

2.2.3 An alternate 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.

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

2.3 Instantaneous Trip Test

2.3.1 Perform an instantaneous trip test to the motor circuit protector.

2.3.2 Use specific length and size of wire that meet or exceeds manufacturer's guidelines or NEC standards.

2.3.3 Record results on appropriate PEARL Inspection and Test Form.

2.3.4 Compare results to manufacturer's recommendations or Table 4 of Section 6000.

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

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2.4 Operation

- 2.4.1** Verify proper operation of the shunt trip feature of the motor circuit protector.
- 2.4.2** Verify proper operation of the undervoltage trip feature of the motor circuit protector.
- 2.4.3** All devices must operate properly in order for the product to become a PEARL labeled product.
- 2.4.4** Record results on appropriate PEARL Inspection and Test Form.

IV PEARL CERTIFICATION

This product has now been reconditioned under the PEARL Reconditioning Standard. The PEARL label and/or seal may be placed on it.