

PEARL Inspect & Test Standards			
LOW VOLTAGE MAGNETIC STARTERS COMBINATION	Revision		
	Standard	Number	Date
	1530-I	3	6-2009

This standard is designed to verify that a low voltage combination magnetic starter 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 1100: *Low Voltage Disconnect Switches*
- Section 1200: *Molded Circuit Breakers*
- Section 1400: *Low Voltage Transformers*
 - Standard 1420 – Low Voltage Transformer Control Power
 - Standard 1430- Low Voltage Transformers Instrumentation Voltage
- Section 1700: *Protection Relays*
- Section 1800: *Low Voltage Contractors and Relays*
- Section 1900: *Apparatus Accessories*

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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 or more of the following pieces of test equipment may be required to perform the testing requirements of this standard depending on the accessories:

1. AC Voltage Supply
2. AC Current Supply with means to perform timing test
3. AC 3-Phase Voltage Supply
4. DC Voltage Supply
5. Digital Low Resistance Ohmmeter (DLRO - 10 amp unit is sufficient.)

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II EVALUATION

The following procedures shall be used to determine the condition of a low voltage combination magnetic starter under this standard.

1 INSPECTION

1.1 Frame/Enclosure

- 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 for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.1.4 Inspect for rust and corrosion.
- 1.1.5 Check for plumb and square.
- 1.1.6 Inspect for unused openings.
- 1.1.7 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 mechanism 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 Low Voltage Disconnect Switch (if applicable)

- 1.3.1 Low voltage disconnect switches will be evaluated in accordance with PEARL Standards found in Section 1100.
- 1.3.2 Record results on an approved PEARL Evaluation Form.

1.4 Molded Case Circuit Breaker (if applicable)

- 1.4.1 Molded case circuit breakers will be evaluated in accordance with PEARL Standards found in Section 1200.
- 1.4.2 Record results on an approved PEARL Evaluation Form.

1.5 Molded Case Motor Circuit Protector (if applicable)

- 1.5.1 Molded case motor circuit protectors will be evaluated in accordance with PEARL Standards found in Section 1200.
- 1.5.2 Record results on an approved PEARL Evaluation Form.

1.6 Molded Case Switch (if applicable)

- 1.6.1 Molded case switches will be evaluated in accordance with PEARL Standards found in Section 1200.
- 1.6.2 Record results on an approved PEARL Evaluation Form.

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- 1.7 Current Carrying Components**
 - 1.7.1 Inspect line and load connections for signs of overheating.
 - 1.7.2 Inspect line and load connections for missing and defective parts.
 - 1.7.3 Inspect hinge/pivot joints for signs of overheating.
 - 1.7.4 Inspect hinge/pivot joints for missing and defective parts.
 - 1.7.5 Inspect any other current carrying components for signs of overheating.
 - 1.7.6 Inspect any other current carrying components for missing and defective parts.
 - 1.7.7 Record results on an approved PEARL Evaluation Form.
- 1.8 Interlocks**
 - 1.8.1 Check all enclosures for interlock function.
 - 1.8.2 Record results on an approved PEARL Evaluation Form.
- 1.9 Devices**
 - 1.9.1 Instrumentation and controls**
 - 1.9.1.1 Inspect all indicator lights, push buttons, switches and control devices for:
 - 1.9.1.1.1 Damage
 - 1.9.1.1.2 Proper ratings
 - 1.9.1.1.3 Loose connections
 - 1.9.1.2 Inspect all control wiring for signs of:
 - 1.9.1.2.1 Deterioration
 - 1.9.1.2.2 Overheating
 - 1.9.1.2.3 Loose connections
 - 1.9.1.3 Verify accuracy and legibility of all applicable wiring schematics and drawings.
 - 1.9.1.4 Record results on an approved PEARL Evaluation Form.
 - 1.9.2 Control Power Transformers** (if applicable)
 - 1.9.2.1 Control power transformers will be evaluated in accordance with PEARL Standards found in Section 1400.
 - 1.9.2.2 Record results on an approved PEARL Evaluation Form.
 - 1.9.3 Instrumentation Transformers** (if applicable)
 - 1.9.3.1 Instrumentation transformers will be evaluated in accordance with PEARL Standards found in Section 1400.
 - 1.9.3.2 Record results on an approved PEARL Evaluation Form.
 - 1.9.4 Current Transformers** (if applicable)
 - 1.9.4.1 Current transformers will be evaluated in accordance with PEARL Standards found in Sections 1400.
 - 1.9.4.2 Record results on an approved PEARL Evaluation Form.
 - 1.9.5 Control Relays** (if applicable)
 - 1.9.5.1 Control relays will be evaluated in accordance with PEARL Standards found in Section 1800.
 - 1.9.5.2 Record results on an approved PEARL Evaluation Form.

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1.9.6 Protective Relays

1.9.6.1 Protective relays will be evaluated in accordance with PEARL Standards found in Section 1700.

1.9.6.2 Record results on approved PEARL Evaluation Form.

1.9.7 Contactors

1.9.7.1 Control relays will be evaluated in accordance with PEARL Standards found in Section 1800.

1.9.7.2 Record results on an approved PEARL Evaluation Form.

1.9.8 Meters (if applicable)

1.9.8.1 Meters will be evaluated in accordance with PEARL Standards found in Section 1900.

1.9.8.2 Record results on an approved PEARL Evaluation Form.

1.9.9 Fuse Assembly (if applicable)

1.9.9.1 Verify the accuracy and legibility of all markings.

1.9.9.2 Inspect line and load connections for signs of overheating.

1.9.9.3 Inspect for missing and defective parts.

1.9.9.4 Inspect insulation structure for signs of overheating and deterioration.

1.9.9.5 Inspect fuse clips for signs of damage or deterioration.

1.9.9.6 Inspect for corrosion.

1.9.9.7 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 Phase to ground

2.1.1.2 Phase to phase

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 Low Voltage Disconnect Switch (if applicable)

2.2.1 Low voltage disconnect switches will be tested in accordance with PEARL Standards found in Section 1100.

2.2.2 Record results on an approved PEARL Evaluation Form.

2.3 Molded Case Circuit Breaker (if applicable)

2.3.1 Molded case circuit breakers will be tested in accordance with PEARL Standards found in Section 1200.

2.3.2 Record results on an approved PEARL Evaluation Form.

2.4 Molded Case Motor Circuit Protector (if applicable)

2.4.1 Molded case motor circuit protectors will be tested in accordance with PEARL Standards found in Section 1200.

2.4.2 Record results on an approved PEARL Evaluation Form.

2.5 Molded Case Switch (if applicable)

2.5.1 Molded case switches will be evaluated in accordance with PEARL Standards found in Section 1200.

2.5.2 Record results on an approved PEARL Evaluation Form.

2.6 Control Power Transformers (if applicable)

2.6.1 Control power transformers will be tested in accordance with PEARL Standards found in Section 1400.

2.6.2 Record results on an approved PEARL Evaluation Form.

2.7 Instrumentation Transformers (if applicable)

2.7.1 Instrumentation transformers will be tested in accordance with PEARL Standards found in Section 1400.

2.7.2 Record results on an approved PEARL Evaluation Form.

2.8 Current Transformers (if applicable)

2.8.1 Current transformers will be tested in accordance with PEARL Standards found in Section 1400.

2.8.2 Record results on an approved PEARL Evaluation Form.

2.9 Protective Relays

2.9.1 Protective relays will be tested in accordance with PEARL Standards found in Section 1700.

2.9.2 Record results on an approved PEARL Evaluation Form.

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- 2.10 Control Relays** (if applicable)
 - 2.10.1** Control relays will be tested in accordance with PEARL Standards found in Section 1800.
 - 2.10.2** Record results on an approved PEARL Evaluation Form.
- 2.11 Contactors**
 - 2.11.1** Contactors will be tested in accordance with PEARL Standards found in Section 1800.
 - 2.11.2** Record results on an approved PEARL Evaluation Form.
- 2.12 Meters** (if applicable)
 - 2.12.1** Meters will be reconditioned in tested with PEARL Standards found in Section 1900.
 - 2.12.2** Record results on an approved PEARL Evaluation Form.

NOTE: If the original equipment manufacturer has designed the parts to be field installed, then the devices may be replaced as necessary. Otherwise, if changes are made to the accessories then the PEARL Reconditioning Standards need to be followed.

- 2.13 Checks and Adjustments**
 - 2.13.1** 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.
 - 2.13.2** All checks and adjustments must be within the guidelines recommended in order for the product to become a PEARL labeled product.
 - 2.13.3** Record results on an approved PEARL Evaluation Form.
- 2.14 Torque**
 - 2.14.1** Check all screw and bolt connections for the proper torque per manufacturer's recommendations or Table 1 of Section 6000.
 - 2.14.2** Record results on an approved PEARL Evaluation Form.
- 2.15 Final Operation**
 - 2.15.1** Ensure that all components, structures, devices and assemblies are complete and equipment is ready for service prior to beginning operations.
 - 2.15.2** Manually operate the device a minimum of ten (10) times while checking for proper operation of the quick-make and quick-break feature.
 - 2.15.3** All devices must operate properly in order for the product to become a PEARL labeled product.
 - 2.15.4** Record results on appropriate PEARL Evaluation Form.

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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.