

PEARL Reconditioning Standards			
LOW VOLTAGE SWITCHBOARDS AND SWITCHGEAR	Revision		
	Standard	Number	Date
	1320	5	11-2008

The term "reconditioning" is defined as "the process of returning electrical equipment to safe and reliable operating condition based on the design of the original manufacturer at the time of manufacturing."

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.

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*
 - Standard 1130 – Low Voltage Disconnect Switches Manual Trip Power Non-Fusible
 - Standard 1134 – Low Voltage Disconnect Switches Manual Trip Power Fusible
 - Standard 1140 – Low Voltage Disconnect Switches Electric Trip Power Non-Fusible
 - Standard 1144 – Low Voltage Disconnect Switches Electric Trip Power Fusible
- 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 reconditioning standard:

1. Insulation Resistance Test Set (Megohmmeter) 1000 Vdc minimum

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

1. AC Voltage Supply
2. AC Current Supply
3. AC 3-Phase Voltage Supply
4. 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 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 exterior for missing screws, bolts, nuts, fasteners, retainers and keepers.
- 1.1.4 Inspect for unused openings.
- 1.1.5 Inspect for improper covers.
- 1.1.6 Inspect for rust and corrosion.
- 1.1.7 Inspect main lugs for signs of overheating and missing and defective parts.
- 1.1.8 Inspect insulation structure for signs of overheating and deterioration.
- 1.1.9 Inspect for proper alignment of each section.
- 1.1.10 Check that cabinets are plumb and square.
- 1.1.11 Record results on an approved PEARL Evaluation Form.

1.2 Phase Bus

- 1.2.1 Inspect for signs of overheating.
- 1.2.2 Inspect for rust and corrosion.
- 1.2.3 Inspect for missing and defective parts.
- 1.2.4 Inspect all connection points.
- 1.2.5 Inspect insulation structure for signs of overheating and deterioration.
- 1.2.6 Inspect for loose connections.
- 1.2.7 Record results on an approved PEARL Evaluation Form.

1.3 Neutral Bus

- 1.3.1 Inspect for signs of overheating.
- 1.3.2 Inspect for rust and corrosion.
- 1.3.3 Inspect all connection points.
- 1.3.4 Inspect for missing and defective parts.
- 1.3.5 Inspect for loose connections.
- 1.3.6 Record results on an approved PEARL Evaluation Form.

1.4 Ground Bus

- 1.4.1 Inspect for signs of overheating.
- 1.4.2 Inspect for rust and corrosion.
- 1.4.3 Inspect all connection points.
- 1.4.4 Inspect for missing and defective parts.
- 1.4.5 Inspect for loose connections.
- 1.4.6 Record results on an approved PEARL Evaluation Form.

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- 1.5 Panel Indicators**
 - 1.5.1 Check all lens covers.
 - 1.5.2 Check all light bulbs for operation.
 - 1.5.3 Inspect all control wiring.
 - 1.5.4 Record results on an approved PEARL Evaluation Form.
- 1.6 Instrumentation**
 - 1.6.1 Check all function switches.
 - 1.6.2 Inspect all meters.
 - 1.6.3 Inspect all control wiring.
 - 1.6.4 Record results on an approved PEARL Evaluation Form.
- 1.7 Bus Support**
 - 1.7.1 Inspect for signs of overheating.
 - 1.7.2 Inspect for signs of deterioration.
 - 1.7.3 Inspect for chips, cracks and broken insulators.
 - 1.7.4 Record results on an approved PEARL Evaluation Form.
- 1.8 Control Wiring**
 - 1.8.1 Inspect all control wiring.
 - 1.8.2 Inspect for signs of deterioration.
 - 1.8.3 Inspect for signs of overheating.
 - 1.8.4 Inspect for loose connections.
 - 1.8.5 Check all interconnecting wiring terminal blocks.
 - 1.8.6 Verify accuracy and legibility of all applicable wiring schematics and drawings.
 - 1.8.7 Record results on an approved PEARL Evaluation Form.
- 1.9 Interlocks**
 - 1.9.1 Check all cabinets for interlock function.
 - 1.9.2 Check all Kirk key systems.
 - 1.9.3 Record results on an approved PEARL Evaluation Form.
- 1.10 Cabinets/Cubicles**
 - 1.10.1 Check operation of all racking mechanisms.
 - 1.10.2 Check all cell switches for proper operation.
 - 1.10.3 Record results on an approved PEARL Evaluation Form.
- 1.11 Molded Case Circuit Breakers** (if applicable)
 - 1.11.1 Molded case circuit breakers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1200.
- 1.12 Low Voltage Disconnect Switches** (Bolt-Loc, HPC, Pringle, etc.) (if applicable)
 - 1.12.1 Low voltage disconnect switches will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1100.
- 1.13 Control Power Transformers** (if applicable)
 - 1.13.1 Control power transformers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1400.
- 1.14 Instrumentation Transformers** (if applicable)
 - 1.14.1 Instrumentation transformers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1400.

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- 1.15 Current Transformers** (if applicable)
 - 1.15.1** Current transformers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1400.
- 1.16 Ground Fault Relay** (if applicable)
 - 1.16.1** Ground Fault Relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 1.17 Ground Fault Sensor** (if applicable)
 - 1.17.1** Ground Fault Sensors (current transformers) will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 1.18 Meters** (if applicable)
 - 1.18.1** Meters will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 1.19 Protective Relays** (if applicable)
 - 1.19.1** Protective relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1700.
- 1.20 Control Relays** (if applicable)
 - 1.20.1** Control relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1800.

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.

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III RECONDITIONING PROCEDURES

The following procedures are in a recommended order and are required to recondition this product. PEARL recognizes that, based on actual product design and 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 Frame/Enclosure

1.1.1 Disassemble to clean.

1.1.2 Clean all parts of contamination and corrosion.

1.1.3 Prepare the frame/enclosure to paint, as necessary.

1.1.4 Paint frame/enclosure.

1.2 Missing or Defective Components, Parts and Hardware

1.2.1 Replace or repair any missing or defective components, parts and hardware found during the inspection phase of this standard.

1.3 Phase Bus

1.3.1 Ensure that all bus connection points are clean.

1.3.2 Replate connection points or bus (silver or tin, depending on the application).

1.4 Neutral Bus

1.4.1 Ensure that all bus connection points are clean.

1.4.2 Replate connection points or bus (silver or tin, depending on the application).

1.5 Ground Bus

1.5.1 Ensure that all bus connection points are clean.

1.6 Molded Case Circuit Breakers (if applicable)

1.6.1 Molded case circuit breakers will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1200.

1.7 Low Voltage Disconnect Switches (Bolt-Loc, HPC, Pringle, etc) (if applicable)

1.7.1 Low voltage disconnect switches will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1100.

1.8 Control Power Transformers (if applicable)

1.8.1 Control power transformers will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1400.

1.9 Instrumentation Transformers (if applicable)

1.9.1 Instrumentation transformers will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1400.

1.10 Current Transformers (if applicable)

1.10.1 Current transformers will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1400.

1.11 Protective Relays (if applicable)

1.11.1 Protective relays will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1700.

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- 1.12 Control Relays** (if applicable)
 - 1.12.1** Control relays will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1800.
- 1.13 Ground Fault Relay** (if applicable)
 - 1.13.1** Ground Fault Relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 1.14 Ground Fault Sensor** (if applicable)
 - 1.14.1** Ground Fault Sensors (current transformers) will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 1.15 Meters** (if applicable)
 - 1.15.1** Meters will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1900.
- 1.16 Lubrication**
 - 1.16.1** Lubricate hinges.
- 1.17 Torque**
 - 1.17.1** Check all screw and bolt connections for the proper torque per manufacturer's recommendations or Table 1 of Section 6000.
- 1.18 Final Assembly**
 - 1.18.1** Ensure that frame is plumb and square.
 - 1.18.2** Cover any unused openings.
 - 1.18.3** 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 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 Reconditioning Test Form.

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

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

2.2 Instrumentation and Controls

2.2.1 Verify the electric operation of all control lights.

2.2.2 Verify the electric operation of all control switches.

2.2.3 Verify the mechanical operation of all cell switches.

2.2.4 Test all lockout circuits.

2.2.5 Test ground fault circuits.

2.2.6 Test differential ground fault circuits.

2.2.7 Test zone interlock circuits.

2.2.8 Test control power rollover circuits.

2.2.9 Perform function test of all trip circuits from protection sensing device to circuit clearing protective device.

2.2.10 Test all meters and monitors for proper functioning.

2.2.11 Perform an insulation resistance to the control wiring at 500 Vdc to ground.

2.2.12 Record results on an approved PEARL Reconditioning Test Form.

2.3 Molded Case Circuit Breakers (if applicable)

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

2.4 Low Voltage Disconnect Switches (Bolt-Loc, HPC, Pringle, etc) (if applicable)

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

2.5 Control Power Transformers (if applicable)

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

2.6 Instrumentation Transformers (if applicable)

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

2.7 Current Transformers (if applicable)

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

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- 2.8 Protective Relays** (if applicable)
 - 2.8.1** Protective relays will be tested in accordance with PEARL Reconditioning Standards found in Section 1700.
- 2.9 Control Relays** (if applicable)
 - 2.9.1** Control relays will be tested in accordance with PEARL Reconditioning Standards found in Section 1800.
- 2.10 Ground Fault Relay** (if applicable)
 - 2.10.1** Ground Fault Relays (if applicable) will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 2.11 Ground Fault Sensor** (if applicable)
 - 2.11.1** Ground Fault Sensors (current transformers) will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.
- 2.12 Meters** (if applicable)
 - 2.12.1** Meters will be tested in accordance with PEARL Reconditioning Standards found in Section 1900.

IV PEARL CERTIFICATION

This product has now been reconditioned under the PEARL Reconditioning Standard. The blue PEARL Reconditioning Quality Seal may now be placed on the device.