

PEARL Reconditioning Standards			
MEDIUM VOLTAGE SWITCHGEAR	Revision		
	Standard	Number	Date
	2310	5	11-2008

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."

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 5: Overpotential Test Voltages for Non-Inductive 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 1200: *Molded Circuit Breakers*
- Section 1400: *Low Voltage Transformers*
- Section 1700: *Protection Relays*
- Section 1800: *Low Voltage Contractors and Relays*
- Section 1900: *Apparatus Accessories*

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 is required to perform the testing requirements of this reconditioning standard:

1. AC Overpotential Test Set (Hipot)
2. DC Overpotential Test Set (Hipot)
3. Digital or Analog Multimeter

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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 Exterior

- 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 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 Bus

- 1.2.1 Inspect phase bus for proper connection, missing hardware and signs of overheating.
- 1.2.2 Inspect ground bus for proper connection, missing hardware and signs of overheating.
- 1.2.3 Check for a continuous current-carrying path on all bussing.
- 1.2.4 Check for proper insulation based on voltage rating.
- 1.2.5 Check for proper clearance distance based on voltage rating.
- 1.2.6 Record results on an approved PEARL Evaluation Form.

1.3 Panel Indicators

- 1.3.1 Check all lens covers.
- 1.3.2 Check all light bulbs for operation.
- 1.3.3 Inspect all control wiring.
- 1.3.4 Record results on an approved PEARL Evaluation Form.

1.4 Bus Support

- 1.4.1 Inspect for signs of overheating.
- 1.4.2 Inspect for signs of deterioration.
- 1.4.3 Inspect for chips, cracks and broken insulators.
- 1.4.4 Record results on an approved PEARL Evaluation Form.

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- 1.5 Control Circuits**
 - 1.5.1** Inspect all control wiring
 - 1.5.1.1** Inspect for signs of deterioration.
 - 1.5.1.2** Inspect for signs of overheating.
 - 1.5.1.3** Inspect for loose connections.
 - 1.5.2** Check all function switches.
 - 1.5.3** Check all interconnect wiring terminal blocks.
 - 1.5.4** Verify accuracy and legibility of all applicable wiring schematics and drawings.
 - 1.5.5** Record results on an approved PEARL Evaluation Form.
- 1.6 Interlocks**
 - 1.6.1** Check all cabinets for interlock function.
 - 1.6.2** Check all Kirk key systems.
 - 1.6.3** Record results on an approved PEARL Evaluation Form.
- 1.7 Cabinets/Cubicles**
 - 1.7.1** Check operation of all operating mechanisms.
 - 1.7.2** Check all cell switches for proper operation.
 - 1.7.3** Check all elevating mechanisms for proper operation.
 - 1.7.4** Check all control wiring.
 - 1.7.5** Record results on an approved PEARL Evaluation Form.

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- 1.8 Devices**
 - 1.8.1 Molded Case Circuit Breakers**
 - 1.8.1.1** Molded case circuit breakers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1200.
 - 1.8.2 Control Power Transformers**
 - 1.8.2.1** Control power transformers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1400.
 - 1.8.3 Instrumentation Transformers**
 - 1.8.3.1** Instrumentation transformers will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1400.
 - 1.8.4 Current Transformers**
 - 1.8.4.1** Current transformers will be evaluated in accordance with PEARL Reconditioning Standards found in Sections 1400.
 - 1.8.5 Control Relays**
 - 1.8.5.1** Control relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1800.
 - 1.8.6 Protective Relays**
 - 1.8.6.1** Protective relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1700.
 - 1.8.7 Contactors**
 - 1.8.7.1** Control relays will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1800.
 - 1.8.8 Surge Arrestors**
 - 1.8.8.1** Surge arrestors will be evaluated in accordance with PEARL Reconditioning Standards found in Sections 1900
 - 1.8.9 Meters**
 - 1.8.9.1** Meters will be evaluated in accordance with PEARL Reconditioning Standards found in Section 1900.

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2 TESTING

2.1 Insulation Resistance

2.1.1 Perform an insulation resistance at test values specified in Table 2 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 results to manufacturer's recommendations or industrial standards (Table 2).

2.2 Devices

2.2.1 Molded Case Circuit Breakers

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

2.2.2 Control Power Transformers

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

2.2.3 Instrumentation Transformers

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

2.2.4 Current Transformers

2.2.4.1 Current transformers will be tested in accordance with PEARL Reconditioning Standards found in Sections 1400.

2.2.5 Control Relays

2.2.5.1 Control relays will be tested in accordance with PEARL Reconditioning Standards found in Section 1800.

2.2.6 Protective Relays

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

2.2.7 Contactors

2.2.7.1 Control relays will be tested in accordance with PEARL Reconditioning Standards found in Section 1800.

2.2.8 Surge Arrestors

2.2.8.1 Surge arrestors will be tested in accordance with PEARL Reconditioning Standards found in Section 1900

2.2.9 Meters

2.2.9.1 Meters will be tested in accordance with PEARL Reconditioning Standards found in Section 1900.

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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 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 Phase Bus

- 1.2.1 Ensure that all bus connection points are clean.
- 1.2.2 Reinsulated bus, as necessary.
- 1.2.3 Replate connection points or bus, as necessary (silver or tin, depending on the application).

1.3 Ground Bus

- 1.3.1 Ensure that all bus connection points are clean.

1.4 Disassemble to replace/repair any defective components

- 1.4.1 Replace or repair any defective parts found during the inspection phase of this standard.

1.5 Replacements of missing components and hardware

- 1.5.1 Replace all missing hardware found during the inspection phase of this standard.
- 1.5.2 Replace all missing parts found during the inspection phase of this standard.

1.6 Devices

1.6.1 Molded Case Circuit Breakers

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

1.6.2 Control Power Transformers

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

1.6.3 Instrumentation Transformers

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

1.6.4 Current Transformers

- 1.6.4.1 Current transformers will be reconditioned in accordance with PEARL Reconditioning Standards found in Sections 1400.

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1.6.5 Control Relays

1.6.5.1 Control relays will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1800.

1.6.6 Protective Relays

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

1.6.7 Contactors

1.6.7.1 Control relays will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1800.

1.6.8 Surge Arrestors

1.6.8.1 Surge arrestors will be reconditioned in accordance with PEARL Reconditioning Standards found in Section 1900.

1.6.9 Meters

1.6.9.1 Meters will be tested in reconditioned with PEARL Reconditioning Standards found in Section 1900.

1.6.10 Record results on an approved PEARL Reconditioning Test Form.

1.7 Lubrication

1.7.1 Lubricate hinges.

1.8 Torque

1.8.1 Check all screw and bolt connections for the proper torque per manufacturer's recommendations or industrial standards (Table 1).

1.8.2 Record results on an approved PEARL Reconditioning Test Form.

1.9 Final Assembly

1.9.1 Ensure that frame is plumb and square.

1.9.2 Cover any unused openings.

1.9.3 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 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 industrial standards (Table 2).

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 Overpotential Test

2.2.1 Perform an overpotential test at test voltage specified in Table 5 as follows:

2.2.1.1 Phase to ground

2.2.1.2 Phase to phase

2.2.2 Record results on an approved PEARL Reconditioning Test Form.

2.2.3 Compare results to manufacturer's guidelines or industrial standards.

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 Instrumentation and Controls

2.3.1 Verify the electric operation of all control lights.

2.3.2 Verify the electric operation of all control switches.

2.3.3 Verify all protective relay trip circuits.

2.3.4 Verify the mechanical operation of all cell switches.

2.3.5 Test all lockout circuits.

2.3.6 Test ground fault circuits.

2.3.7 Test control power rollover circuits.

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

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

2.3.10 Record results on an approved PEARL Reconditioning Test Form.

2.3.11 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 Devices**
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 - 2.4.3 Instrumentation Transformers**
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 - 2.4.4 Current Transformers**
 - 2.4.4.1** Current transformers will be tested in accordance with PEARL Reconditioning Standards found in Sections 1400.
 - 2.4.5 Control Relays**
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 - 2.4.6 Protective Relays**
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 - 2.4.9 Meters**
 - 2.4.9.1** Meters will be tested in accordance with PEARL Reconditioning Standards found in Section 1900.
 - 2.4.10** Record results on an approved PEARL Reconditioning Test Form.
 - 2.4.11** Compare results to manufacturer's guidelines or industrial standards.

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.