

PEARL Inspect & Test Standards		
LOW VOLTAGE SWITCHBOARDS AND SWITCHGEAR	Revision	
	Standard	Number
	1320-I	3
	Date	6-2009

This standard is designed to verify that a low voltage circuit breaker switchboard and/or switchgear 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*
 - 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 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 standard:

1. AC Voltage Supply
2. AC Current Supply
3. AC 3-Phase Voltage Supply
4. DC Voltage Supply

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II EVALUATION

The following procedures shall be used to determine the condition a low voltage switchboard and/or switchgear 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 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 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 Standards found in Section 1400.
- 1.14 Instrumentation Transformers** (if applicable)
 - 1.14.1 Instrumentation transformers will be evaluated in accordance with PEARL 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 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 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 Standards found in Section 1900.
- 1.18 Meters** (if applicable)
 - 1.18.1** Meters will be evaluated in accordance with PEARL Standards found in Section 1900.
- 1.19 Protective Relays** (if applicable)
 - 1.19.1** Protective relays will be evaluated in accordance with PEARL Standards found in Section 1700.
- 1.20 Control Relays** (if applicable)
 - 1.20.1** Control relays will be evaluated in accordance with PEARL 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.
- 2.2 Torque**
 - 2.2.1** Check all screw and bolt connections for the proper torque per manufacturer's recommendations or Table 1 of Section 6000.
 - 2.2.2** Record results on an approved 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.

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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.