



POWER SYSTEMS, INC.

OHIO BRASS

**Design and Type Test Report
Veri*Lite Type PDI-15 and PDI-25
Distribution Insulators
Tests Performed in Accordance with
Canadian Electric Association
Purchase Specification LWIWG-01 (91)**

This report records the test results of laboratory tests made on Ohio Brass PDI Distribution Insulators.

Tests were performed in accordance with Canadian Electrical Association (CEA) purchasing specification LWIWG-01 (91), "Dead-end/Suspension Composite Insulator for Overhead Distribution Lines," sections 5.0 and 6.0.

The PDI insulators met all applicable requirements of the specification.

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The results of the Design and Type Tests are reported against sections 5.0 and 6.0 respectively.

5.0 DESIGN TESTS

Design tests verify the suitability of the manufacturer's design, materials, manufacturing process and technology. When an insulator is subjected to the design tests, the results shall be considered valid for all insulators of the same design (as defined in 4.2) that are represented by the tested one.

The design tests are performed once. Each test can be performed independently on new test specimens where appropriate. The test specimens shall be taken from production runs. Where there is a choice of test methods, the choice will be at the discretion of the manufacturer.

NOTE: The housing material, fiberglass rod, rod diameter, weathershed profile, metal end fittings, and design and manufacturing process are the same for both PDI-15 and PDI-25 insulators. Consequently, design tests conducted on one type apply to the other.

5.1 Water Penetration Test

Test Specimens

- Select three insulators for this test.

Test Procedure

- Determine the power frequency flashover voltage of the insulators in accordance with 7.1.2 of ANSI C29.11.
- Measure the hardness of two sheds of each insulator in accordance with ASTM D 2240 with a Shore A durometer.
- Boil each insulator in water having 0.1% by weight of NaCl, for 100 hours.
- At the end of boiling, allow each insulator to remain in the water until the water cools to about 50°C. Maintain this temperature in the water until the following tests start. All tests shall be completed within 48 hours.

Test Evaluation

- Visual Examination
 - Inspect the housing of each insulator.
 - There shall be no cracks and no signs of dissolving or crumbling.
- Hardness Test
 - Measure the hardness of the two sheds of each insulator in accordance with ASTM D 2240 with a Shore A durometer at the same temperature $\pm 5K$ that the pre-boiling measurements were taken.

- The hardness must not change from the pre-boiled specimen by more than 20%.
- Steep-Front Impulse Voltage Test
 - Subject each insulator to a steep front impulse of at least 1000 kV/ μ s in accordance with 9.2.5 of IEC 60-2. Each insulator must be subjected to 10 positive impulses and 10 negative impulses.
 - Each insulator must cause external flashover.
 - Punctures must not occur.
- Power Frequency Voltage Test
 - Each insulator shall be tested and evaluated in accordance with 7.1.6.3 of ANSI C29.11.

RESULTS

All test specimens passed this test.

Visual Examination

No cracks or any signs of dissolving or crumbling were evident.

Hardness Test Data

The change in hardness before and after boiling was well within the limit specified.

Hardness Test Data

| Insulator Type | # | Before Boiling | | After Boiling | |
|----------------|---|----------------|----------|---------------|----------|
| | | Top Shed | Bot Shed | Top Shed | Bot Shed |
| PDI-25 | 1 | 78-81 | 79-81 | 75-78 | 76-78 |
| | 2 | 79-82 | 78-82 | 75-78 | 77-78 |
| | 3 | 80-82 | 77-80 | 77-79 | 76-79 |

Power Frequency Voltage Test PDI - 25

| PDI-25 | Test # | Before Boiling | | After Boiling | |
|--------|---------|----------------|-----------------|---------------|-----------------|
| | | Test Value | Corrected Value | Test Value | Corrected Value |
| Unit 1 | 1 | 136 | 158 | 135 | 159 |
| | 2 | 134 | 156 | 132 | 156 |
| | 3 | 134 | 156 | 142 | 168 |
| | 4 | 138 | 160 | 132 | 156 |
| | 5 | 133 | 155 | 133 | 157 |
| | Average | 135 | 157 | 135 | 159 |
| Unit 2 | 1 | 130 | 151 | 144 | 170 |
| | 2 | 140 | 163 | 150 | 177 |
| | 3 | 140 | 163 | 148 | 175 |
| | 4 | 136 | 158 | 146 | 172 |
| | 5 | 135 | 157 | 150 | 177 |
| | Average | 136 | 158 | 148 | 175 |
| Unit 3 | 1 | 137 | 159 | 145 | 171 |
| | 2 | 137 | 159 | 141 | 166 |
| | 3 | 141 | 164 | 139 | 164 |
| | 4 | 143 | 166 | 145 | 171 |
| | 5 | 144 | 167 | 142 | 168 |
| | Average | 140 | 163 | 142 | 168 |

Steep-Front Impulse Voltage Test

The PDI-25s were subjected to steep-front impulse of about 2000 kV/ μ s in accordance with 9.2.5 of IEC 60-2. Each impulse caused external flashover. No punctures occurred. All test specimens passed this test.

5.2 Aging or Accelerated Weathering Test

Test Specimen

- Select three specimens of shed and housing materials for this test.

Test Procedure

- Test each specimen for 1000 hours by one of the following test methods.
 - Xenon-Arc Methods: ASTM G26
ASTM D 2565
 - Fluorescent UV Method: ASTM G 53

NOTE: Tests without water are not permitted.

Test Evaluation

- Surface defects such as cracks and blisters are not permitted.

RESULTS

Three samples of PDI weathershed material were subjected to an accelerated weathering test in accordance with IEEE Standard 1024, Section 8.1.3, using the fluorescent UV method of ASTM G53-1988. Each sample was inspected at 300, 600, and 1000 hours. No cracks or blisters were observed on any of the samples.

5.3 Dye Penetration Test

The test specimens, test, and evaluation of three insulators shall be in accordance with 7.4.1 of ANSI C29.11.

RESULTS

Three 10 mm long samples from the cross section of the test specimen were tested in accordance with 7.4.1 of ANSI C29.11. The samples were cut with a diamond saw and placed upright on a layer of glass beads in a 1% solution of fuchsin dye. After 15 minutes the samples were inspected. The dye did not rise through the samples. All specimens passed this test.

5.4 Water Diffusion Test The test specimens, prestressing, test, and evaluation of three insulators shall be in accordance with 7.4.2 of ANSI C29.11.

RESULTS

A boiling vessel was used to handle the samples. All samples were cleaned with isopropyl alcohol. The vessel was filled with salt water and boiling was initiated October 23, 1989, at 8.00 a.m. The samples were removed from the boiling salt water solution on October 27, 1989, at 12.01 p.m. and placed in room temperature tap water.

The withstand test was begun at 12.45 p.m. and was concluded at 1.36 p.m. Leakage currents were monitored and recorded. The results are tabulated below:

| Sample # | Applied Voltage kV (rms) | Peak Milliamperes | |
|----------|--------------------------|-------------------|-----------|
| | | Capacitive | Resistive |
| 1 | 12 | 0.02 | 0.005 |
| 2 | 12 | 0.02 | 0.005 |
| 3 | 12 | 0.02 | 0.005 |
| 4 | 12 | 0.02 | 0.005 |
| 5 | 12 | 0.02 | 0.005 |
| 6 | 12 | 0.02 | 0.005 |

The samples tested met all requirements as outlined in 7.4.2 of ANSI Standard C29.11.

5.5 Power Arc Test

Test Specimens

- Select three insulators for this test.

Test Procedure

- Tension each insulator to 14 kN and hold for the duration of this test.
- Initiate an arc across each insulator by a copper shorting fuse wire having 0.127 mm diameter. The arc shall burn 15 to 30 cycles and its current magnitude is determined by the ampere–time product ($I \times t$) equal to 150 kA cycles minimum.

Test Evaluation

- Visual Examination
 - Inspect the housing and metal fittings of each insulator.
 - Each insulator is acceptable if there is:
 - no exposure of the core,
 - no mechanical separation of the insulator, and
 - no cracks in the housing.
- Moisture Penetration test
 - Submerge each insulator end in dye, composed of 1 gram of fuchsin in 100 grams of methanol, for a minimum of 15 minutes.
 - Remove from the solution and wipe dry.
 - Cut each insulator 90° to the axis of the core and about 50 mm from both metal fittings.
 - Cut both metal fittings on each insulator longitudinally into two halves and strip

off the housing.

- Evidence of the dye penetration at the interfaces shall constitute failure.

RESULTS

Three PDI-15 insulator samples with ferrous end fittings were tested in accordance with IEEE Standard 1024, Section 8.2.5. The samples were tested for power arc endurance while tensioned at 3,000 lb (13.4 kN). The arc was initiated by means of a fuse wire and was allowed to burn for 150 kA cycles.

The three insulators passed all requirements of this evaluation. There was no evidence of dye penetration to the housing/core interface.

Since PDI-25 insulator uses the same end fitting designs as the PDI-15, these tests apply to PDI-25. The results are summarized below.

| Insulator # | Amperes rms | Time cycles | Ampere-Cycles kA-cycles |
|-------------|-------------|-------------|-------------------------|
| 1 | 5460 | 30 | 163.8 |
| 2 | 5480 | 28 | 153.4 |
| 3 | 5480 | 28 | 153.4 |

NOTE: No insulator separated mechanically during the test.

5.6 Tracking and Erosion Test

Test Specimens

- Select three insulators for this test.

Test Transformer

- A test transformer shall be used
- The test circuit when loaded with a resistive current of 250 mA(rms) on the high voltage side shall experience a maximum voltage drop of 5%.

Test Procedure

- Determine the power frequency flashover voltage of the insulators in accordance with 7.1.2 of ANSI C29.11.
- Test the insulators using one of the methods below.
 - **Method 1:**
Each insulator is energized continuously on Wheel #1.
 - **Method 2:**
Each insulator is energized only in the vertical position on Wheel #2.

NOTE: Variation of the recommended test parameters to reflect different pollution severity levels are under consideration.

Test Evaluation

- Each insulator is acceptable if there is:
 - no tracking,
 - no erosion to the core, and
 - no shed or housing puncture.

- In addition, immediately after the tracking wheel test each insulator shall be tested and evaluated to the following tests that must be completed within 48 hours:
 - Steep-Front Impulse Voltage Test detailed in 5.1 of this Specification.
 - Power Frequency Voltage Test detailed in 5.1 of this Specification.

RESULTS

Method 2 was chosen where each insulator was energized only in the vertical position. The test parameters are listed below:

Electrical stress applied..... 40 V/mm of leakage distance
 NaCl content of water..... 1.40±6 g/l
 Duration..... 30,000 cycles
 Stationary time..... 43 seconds
 Travel time..... 8 seconds

The samples were removed from the wheel after completion of 30,000 cycles. There was no evidence of tracking, erosion of the core, shed puncture, or housing puncture on any of the samples. The steep-front impulse voltage and power frequency voltage test results are summarized below.

Steep-Front Impulse Voltage Test

The PDI-25s were subjected to steep-front impulse of about 2000 kV/μs in accordance with 9.2.5 of IEC 60-2 after removing them from the tracking wheel. Each impulse caused external flashover. No punctures occurred. All test specimens passed this test.

Tracking and Erosion Test

Power Frequency Voltage Test

| PDI-25 | Test # | Before Test | | After Test | |
|--------|---------|-------------|-----------------|------------|-----------------|
| | | Test Value | Corrected Value | Test Value | Corrected Value |
| Unit 1 | 1 | 141 | 165 | 134 | 155 |
| | 2 | 139 | 163 | 136 | 157 |
| | 3 | 135 | 158 | 135 | 156 |
| | 4 | 136 | 159 | 138 | 160 |
| | 5 | 136 | 159 | 136 | 156 |
| | Average | 137 | 161 | 136 | 157 |
| Unit 2 | 1 | 142 | 166 | 140 | 162 |
| | 2 | 135 | 158 | 144 | 167 |
| | 3 | 139 | 163 | 147 | 170 |
| | 4 | 133 | 156 | 141 | 163 |
| | 5 | 138 | 162 | 141 | 163 |
| | Average | 137 | 161 | 143 | 168 |
| Unit 3 | 1 | 138 | 162 | 135 | 156 |
| | 2 | 138 | 162 | 136 | 157 |
| | 3 | 134 | 157 | 135 | 156 |
| | 4 | 135 | 158 | 139 | 161 |
| | 5 | 135 | 158 | 139 | 161 |
| | Average | 136 | 159 | 137 | 158 |

5.7 Tensile Load Test

Three insulators shall be tested and evaluated in accordance with 9.4 of ANSI C29.11.

RESULTS

Ten PDI-15 insulator samples with ferrous end fittings were subjected to tension tests. Since the PDI-25 insulator uses the same diameter fiberglass rod and the same end fittings as PDI-15, these tests apply to PDI-25 also. Results are summarized in the following table:

| Insulator # | Tensile Strength, lb |
|-------------|----------------------|
| 1 | 21850 |
| 2 | 21350 |
| 3 | 21850 |
| 4 | 22700 |
| 5 | 22050 |
| 6 | 21550 |
| 7 | 20600 |
| 8 | 22200 |
| 9 | 22000 |
| 10 | 21350 |
| Average | 21750 |
| Std Dev | 544 |

**5.8 Torsional
Load Test**

Test Specimen

- Select five insulators for this test.

Test Procedure

- Test each insulator in accordance with 5.1.1 and 5.1.4.2 of ANSI C29.1 for the torsional load as noted in Table 1.

Test Evaluation

- All the five insulators after torsion must pass the dye penetration test in 5.3 of this Specification.

RESULTS

Five PDI-15 insulator samples were subjected to torsional load test in accordance with 5.1.1 and 5.1.4.2 of ANSI C29.1. Since the PDI-25 insulator uses the same diameter fiberglass rod and the same end fittings as PDI-15, these tests apply to PDI-25.

The test specimens were loaded in torsion to 55 N·m (40 ft-lb), after which they were subjected to a dye penetration test. There was no evidence of any dye penetration in any of the sample.

5.9 Thermal Mechanical Test

Test Specimen

- Select three insulators for this test.

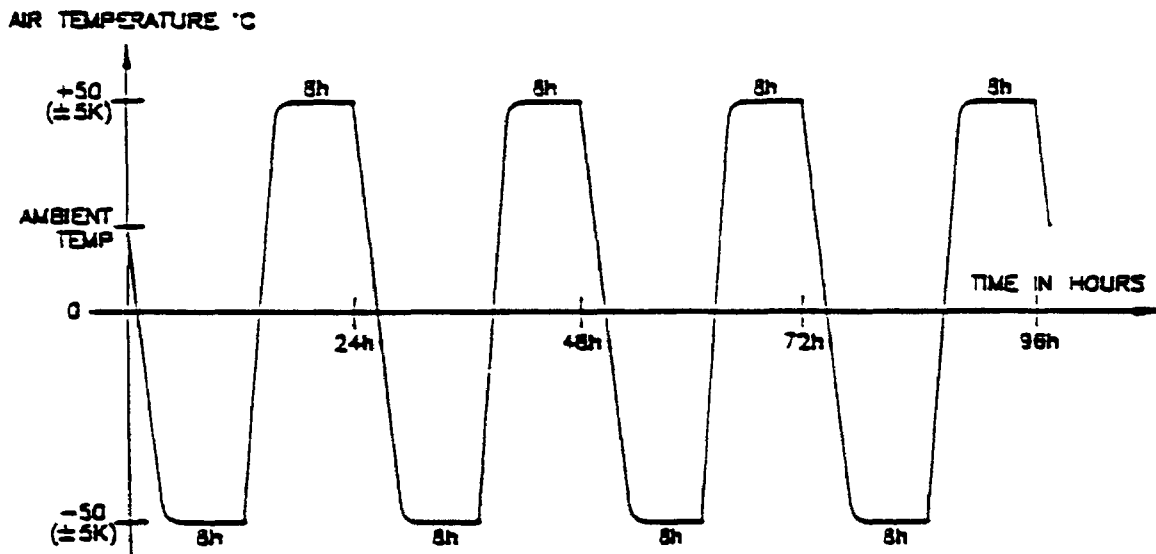
Test Procedure

- Tension each insulator to 5% of the S.M.L for 1 minute at ambient temperature.
- During this time, measure the length of each insulator. The measurement of the reference length shall be made to include the end fittings but exclude the couplings. The measurement accuracy shall be at least 0.5 mm. This is the reference length.
- Submit each insulator to thermal variations from $-50^{\circ}\text{C} \pm 5\text{K}$ to $+50^{\circ}\text{C} \pm 5\text{K}$ while under a permanent mechanical load of 50% or greater of S.M.L for 96 hours. The time at each temperature shall be at least 8 hours per cycle. The thermal test cycles are shown below.
- At the end of thermal cycling, allow each insulator to reach the original ambient temperature and measure the length, using the same load as for the reference length.

Test Evaluation

- The test is regarded as passed if:
 - the increase in each insulator length is equal to or less than 2 mm, and

- each insulator passes the Moisture Penetration Test in 5.5 of this specification.



Thermal Test Cycles

RESULTS

Three PDI-15 insulators were tested in accordance to the above specification at Detroit Testing Laboratory, Inc., Warren, Michigan. Since the PDI-25 insulator uses the same end fitting design and same fiberglass rod, these tests apply to PDI-25.

The test specimens were placed on the test fixture and loaded to 750 lbs at ambient temperature. Reference measurements were performed at this time. The specimens, under a load of 7500 lbs for 96 hours, were subjected to the thermal cycling.

Measurement was taken at the end of the thermal cycling after allowing the specimens to reach the ambient temperature. The following table summarizes the results.

| Insulator # | Reference Length, mm | Final Length, mm | Increase mm |
|-------------|----------------------|------------------|-------------|
| 1 | 353.8 | 353.8 | 0 |
| 2 | 355.8 | 356.1 | 0.3 |
| 3 | 355.5 | 355.7 | 0.2 |

The specimens were subjected to the Moisture Penetration Test as described in 5.5 of this Specification. There was no evidence of dye penetration at the interfaces.

6.0 TYPE TESTS

Type tests verify the main characteristics of the insulator, which depend mainly on its shape and size. They shall be repeated when the design, shape, or size of the insulator changes.

Three production line insulators of the relevant type shall meet the requirements as noted in Table 1.

**6.1 Low-Frequency
Dry Flashover Test**

The insulators shall be tested in accordance with 8.2.1 of IEEE Std 1024.

RESULTS

Tests were performed in accordance with IEEE 1024. Three insulator samples of PDI-15 and PDI-25 were tested. Results, adjusted for standard atmospheric conditions according to ANSI C29.1-1968, are summarized in the following table.

| PDI-15 Sample # | Dry Flashover kV | Dry Withstand kV |
|--------------------|---------------------|---------------------|
| 1 | 114 | 101 |
| 2 | 114 | 103 |
| 3 | 114 | 106 |

| PDI-25 Sample # | Dry Flashover kV | Dry Withstand kV |
|--------------------|---------------------|---------------------|
| 1 | 153 | 144 |
| 2 | 156 | 144 |
| 3 | 155 | 144 |

**6.2 Low Frequency
Wet Flashover Test**

The insulators shall be tested in accordance with 8.2.2 of IEEE Std 1024.

RESULTS

Tests were performed in accordance with IEEE 1024. Three insulator samples of PDI-15 and PDI-25 were tested. Results, adjusted for standard atmospheric conditions according to ANSI C29.1, are summarized in the following table.

| PDI-15 Sample # | Wet Flashover kV | Wet Withstand kV |
|--------------------|---------------------|---------------------|
| 1 | 77 | 74 |
| 2 | 78 | 72 |
| 3 | 77 | 74 |

| PDI-25 Sample # | Wet Flashover kV | Wet Withstand kV |
|--------------------|---------------------|---------------------|
| 1 | 136 | 133 |
| 2 | 134 | 132 |
| 3 | 137 | 134 |

**6.3 Positive Critical
Impulse Flashover
Test**

The insulators shall be tested in accordance with 8.2.3 of IEEE Std 1024.

RESULTS

Tests were performed in accordance with IEEE 1024. Three insulator samples of PDI-15 and PDI-25 were tested. Results adjusted for standard atmospheric conditions according to ANSI C29.1-1968, are summarized in the following table.

| PDI-15 Sample # | Positive Impulse Critical Flashover kV | Positive Impulse Critical Withstand kV |
|--------------------|---|---|
| 1 | 150 | 132 |
| 2 | 161 | 138 |
| 3 | 158 | 137 |

| PDI-25 Sample # | Positive Impulse Critical Flashover kV | Positive Impulse Critical Withstand kV |
|--------------------|---|---|
| 1 | 271 | 261 |
| 2 | 265 | 241 |
| 3 | 267 | 256 |

**6.4 Radio-Influence
Voltage Test**

The insulators shall be tested in accordance with 8.2.6 of IEEE Std 1024.

RESULTS

Tests were performed in accordance with IEEE 1024, Section 8.2.6. Three insulator samples of PDI-15 and PDI-25 were tested. Results are summarized in the following tables.

| PDI-15 Sample # | Test Voltage L-G, rms kV | RIV @ 1000 kHz (Microvolts) |
|--------------------|--------------------------------|-----------------------------------|
| 1 | 30.0 | 0.5 |
| 2 | 41.5 | 0.5 |
| 3 | 30.0 | 0.5 |

| PDI-25 Sample # | Test Voltage L-G, rms kV | RIV @ 1000 kHz (Microvolts) |
|--------------------|--------------------------------|-----------------------------------|
| 1 | 45.0 | 0.5 |
| 2 | 46.0 | 0.5 |
| 3 | 47.5 | 0.5 |

TABLE 1

DEAD-END/SUSPENSION COMPOSITE INSULATOR REQUIREMENTS

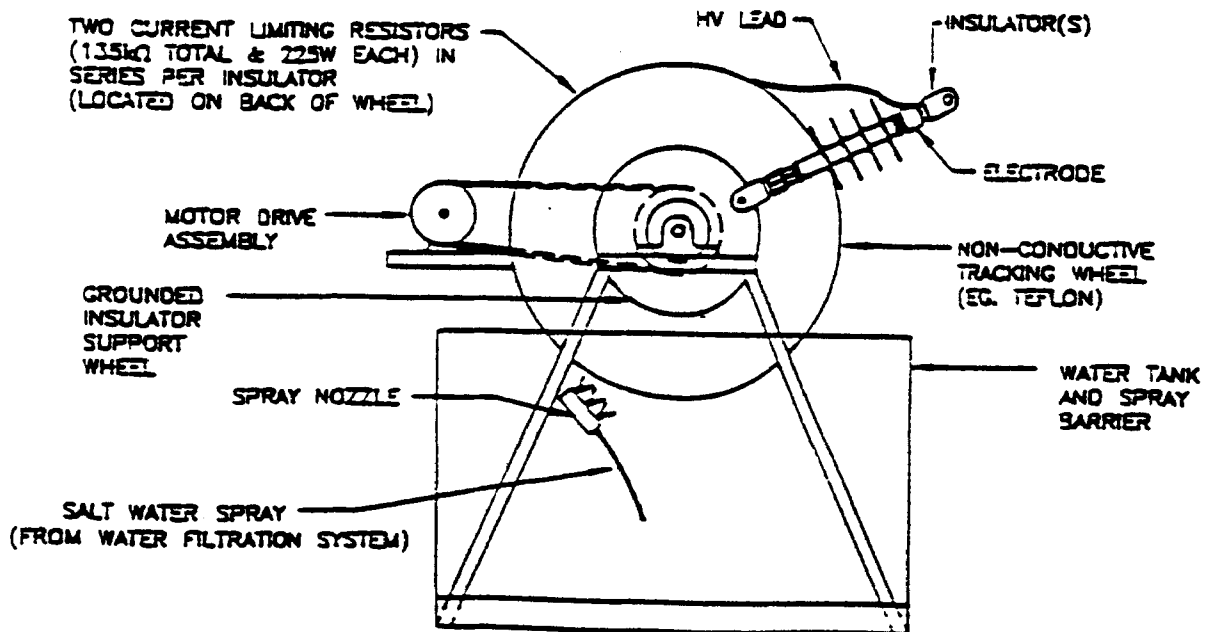
| REQUIREMENTS | UNITS | INSULATOR TYPE | | | | |
|---|-----------|----------------|--------|--------|--------|--------|
| | | D/S-15 | D/S-28 | D/S-35 | D/S-46 | D/S-69 |
| DIMENSIONS | | | | | | |
| ● Section Length | mm | 330±15 | 430±25 | 475±25 | 565±25 | 860±25 |
| ● Min. Leakage Distance | mm | 360 | 585 | 720 | 950 | 1420 |
| ● Min. Arcing Distance | mm | 170 | 280 | 320 | 415 | 710 |
| ELECTRICAL RATINGS | | | | | | |
| ● Low Frequency Dry Flashover | kV (rms) | 90 | 130 | 145 | 180 | 275 |
| ● Low Frequency Wet Flashover | kV (rms) | 65 | 110 | 130 | 145 | 215 |
| ● Positive Critical Impulse Flashover | kV (peak) | 140 | 190 | 225 | 280 | 390 |
| ● Radio-Influence Voltage -Min. Test Voltage -Max. RIV @ 1000 kHz | | | | | | |
| | kV (rms) | 10 | 20 | 25 | 30 | 45 |
| | μV | 10 | | | | |
| MECHANICAL RATINGS | | | | | | |
| ● Min. S.M.L. | kN | 70 (15000 lb) | | | | |
| ● Min. Torsional Load | N·m | 55 (40 lb·ft) | | | | |

APPENDIX A
TRACKING WHEEL # 1

Description Tracking Wheel # 1 (see diagram below) subjects composite insulators to a continuous, current limited 60 Hz voltage while rotating the insulators. Two series current limiting resistors, total value of 135 k Ω (225 W each), are dedicated for each composite insulator. The insulators are radially passed through a saline solution (NaCl in the de-ionized or distilled water), water spray at the bottom of the rotating cycle. The positioning of the spray nozzle and flow rate of the doped water shall be such that the insulator is completely wetted. The distance between the spray nozzle and the test sample shall not be less than 125 mm. The insulators shall be positioned in such a manner as to promote water runoff when insulators with a non-uniform shed design are tested.

Test Parameter Minimum electrical stress 35 V/mm of leakage distance
 NaCl content of water 0.22 \pm 0.01 g/l
 Minimum duration 1000 h
 Speed of rotation 60 \pm 10 r/h

Diagram



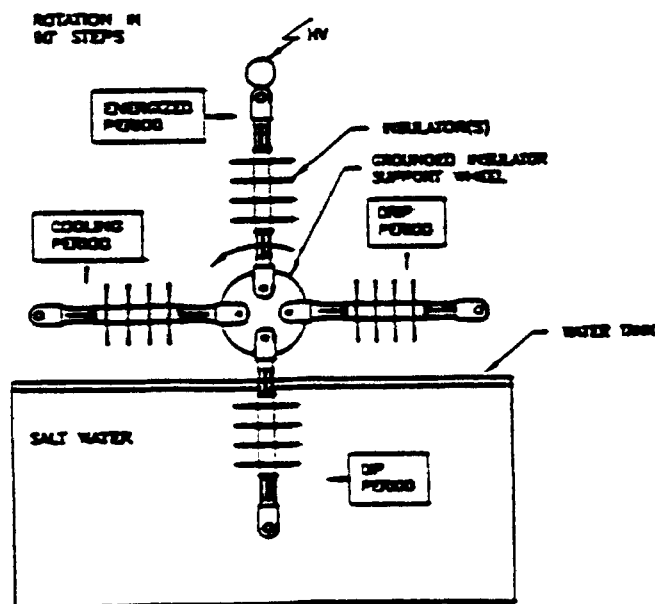
APPENDIX B

TRACKING WHEEL # 2

Description In the tracking wheel # 2 (see diagram below) the insulators go through four positions in one cycle. This is illustrated below. Each insulator remains stationary for about 40 s (or less if discharges stop earlier) in each of the four positions. The 90° rotation from one position to the next takes about 8 s. In the first part of the cycle the insulator is dipped into a saline solution (NaCl in the de-ionized or distilled water). The second part of the test cycle permits the excess saline solution to drip off the insulator ensuring that the light wetting of the surface gives rise to sparking across dry bands that will form in the third part of the cycle. In that part of the cycle the insulator is submitted to a 60 Hz voltage. In the last part of the cycle the insulator surface that had been heated by the dry band sparking is allowed to cool.

Test Parameter Minimum electrical stress 35 V/mm of leakage distance
NaCl content of water 1.40 ± 0.06 g/l
Minimum duration 30,000 cycles

Diagram



APPENDIX C

GUIDELINES FOR SELECTION OF INSULATORS ON LEAKAGE DISTANCE

The minimum nominal leakage distance of an insulator used phase to ground is as follows:

Min. nominal leakage distance = (Min. leakage distance from the table below) X (Max. phase-to-phase operating voltage)

| Pollution Level (Max S.D.D.) | Examples of Typical Environments | Min. Leakage Distance |
|---|--|--------------------------|
| I-Light (0.06mg/cm ²) | <ul style="list-style-type: none"> ● Areas without industries and low density of houses equipped with heating plants. ● Areas with low density of industries or houses but subjected to frequent winds and/or rainfall. ● Agricultural areas (use of fertilizers can lead to a higher pollution level). ● Mountainous areas. <p>Note: All these areas shall be situated at least 10 km to 20 km from the sea and shall not be exposed to winds directly from the sea.</p> | 16 mm/kV |
| II -Medium (0.2mg/cm ²) | <ul style="list-style-type: none"> ● Areas with industries not particularly polluting smoke and/or with average density of houses equipped with heating plants. ● Areas with high density of houses and/or industries but subjected to frequent winds and/or rainfall. ● Areas exposed to wind from the sea but not too close to the sea coast (at least several km distant). | 20 mm/kV |
| III -Heavy (0.60 mg/cm ²) | <ul style="list-style-type: none"> ● Areas with high density of industries and suburbs of large cities with high density of heating plants producing pollution. ● Areas close to the sea or in any case exposed to relatively strong winds from the sea. | 25 mm/kV |
| IV -Very Heavy (>0.60mg/cm ²) | <ul style="list-style-type: none"> ● Areas generally of moderate extent, subjected to conductive dusts and to industrial smoke producing particularly thick conductive deposits. ● Areas generally of moderate extent, very close to the coast and exposed to sea spray or to very strong and polluting winds from the sea. ● Desert areas, characterized by no rain for long periods, exposed to strong winds carrying sand and salt, and subjected to regular condensation. | 31 mm/kV |

NOTE: The table above is based on ceramic and glass insulators (Ref. IEC 815)
S.D.D. = Salt Deposit Density

NOTE: Because Ohio Brass has a policy of continuous product improvement, we reserve the right to change design and specifications without notice.



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