# CONDUCTOR CONTINUITY TEST – QUICK REFERENCE GUIDE

## For Transmission Line Commissioning and Maintenance

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## TEST OBJECTIVE

Verify that each conductor of the overhead line is properly connected and continuous from sending end to receiving end with correct phase identification.

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## PRE-TEST REQUIREMENTS



✓ Transmission line must be de-energized
✓ Insulation test must be completed first (confirm no short circuits)
✓ All safety procedures and lockout/tagout in place
✓ Two-person team with clear communication
✓ Test equipment calibrated and in good condition
✓ Weather conditions suitable (avoid rain/lightning)

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## EQUIPMENT NEEDED

- 5kV or 10kV Insulation Tester (Megger)
- High-voltage test leads
- Ground clamps
- Multimeter with continuity function
- Two-way communication device
- Safety equipment (PPE, arc-rated clothing)
- Thermometer (to document ambient temperature)
- Test recording sheet

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# BASIC CONTINUITY TEST – 3 SIMPLE STEPS

### STEP 1: R-PHASE TEST

**Sending End:** Close R-Phase ground switch, Open Y & B Phase ground switches
**Receiving End:** Measure IR between R-Phase and Ground
**Expected Result:** Zero or Low (< 0.1 Ω)

### STEP 2: Y-PHASE TEST

**Sending End:** Close Y-Phase ground switch, Open R & B Phase ground switches
**Receiving End:** Measure IR between Y-Phase and Ground
**Expected Result:** Zero or Low (< 0.1 Ω)

### STEP 3: B-PHASE TEST

**Sending End:** Close B-Phase ground switch, Open R & Y Phase ground switches
**Receiving End:** Measure IR between B-Phase and Ground
**Expected Result:** Zero or Low (< 0.1 Ω)



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# PHASE MARKING TEST – VERIFY CORRECT PHASE IDENTIFICATION

### TEST COMBINATION 1: R-Y PHASES

**Sending End:** Connect R & Y phases together, Open B phase
**Receiving End:** Measure IR between R-Y
**Expected Result:** Zero/Low (confirms connection)

### TEST COMBINATION 2: R-B PHASES

**Sending End:** Connect R & B phases together, Open Y phase
**Receiving End:** Measure IR between R-B
**Expected Result:** Zero/Low (confirms connection)

### TEST COMBINATION 3: Y–B PHASES

**Sending End:** Connect Y & B phases together, Open R phase
**Receiving End:** Measure IR between Y-B
**Expected Result:** Zero/Low (confirms connection)

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## RESISTANCE INTERPRETATION GUIDE

| Resistance | Condition | Action |
|---|---|---|
| 0 - 0.01 Ω | **EXCELLENT** - Continuous | ✓ Proceed to commissioning |
| 0.01 - 0.1 Ω | **GOOD** - Acceptable | ✓ Proceed to commissioning |
| 0.1 - 1 Ω | **ACCEPTABLE** - Monitor | ⚠ Document & monitor |
| 1 - 10 Ω | **POOR** - Investigate | ✗ Stop testing, investigate |
| > 10 Ω | **BROKEN** - Severe damage | ✗ Stop testing, repair required |



## TYPICAL RESULTS FOR DIFFERENT LINE LENGTHS

| Line Length | Typical Resistance | Condition |
|---|---|---|
| 10 km | 0.001 Ω | Excellent |
| 25 km | 0.0025 Ω | Excellent |
| 50 km | 0.005 Ω | Excellent |
| 100 km | 0.01 Ω | Good |
| 150 km | 0.015 Ω | Good |

*Note: Actual values depend on conductor size, material, temperature, and condition*

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## SAFETY CHECKLIST

Before Starting:

- [ ] Line is de-energized and properly isolated
- [ ] Voltage confirmed absent using non-contact detector
- [ ] All personnel briefed on test procedure
- [ ] Safety equipment distributed and in place
- [ ] Two-way communication established
- [ ] Test equipment checked and calibrated
- [ ] Weather conditions are suitable

During Testing:

- [ ] Never touch conductor terminals directly
- [ ] Keep proper distance from live circuit components
- [ ] Always use high-voltage rated test leads
- [ ] Monitor all test equipment continuously
- [ ] Maintain clear communication with remote end
- [ ] Stop immediately if any hazardous condition arises



After Testing:

- [ ] Fully discharge line capacitance
- [ ] Remove all test equipment safely
- [ ] Document all results clearly
- [ ] Store equipment properly
- [ ] Debrief team on findings

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## COMMON PROBLEMS & SOLUTIONS

| Problem | Possible Cause | Solution |
|---|---|---|
| High resistance reading | Broken conductor, corrosion, loose connection | Stop test, inspect physically, repair if needed |
| Intermittent readings | Poor contact at ground clamp | Clean contacts, ensure proper connection |

| Problem | Possible Cause | Solution |
|---|---|---|
| Temperature variation | Ambient temperature changing | Document temperature, allow stabilization |
| Phase confusion | Incorrect marking or cross-connection | Verify physical phase positions, correct marking |
| Shortened line reading | Phase-to-phase leak through insulation | Return to insulation test, identify fault location |

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## TEST DOCUMENTATION REQUIREMENTS

Record the following in your test report:

- Date and time of test
- Ambient temperature and weather conditions
- Equipment used (model numbers and calibration date)
- Insulation tester settings used (5kV or 10kV)
- All resistance measurements for each phase
- Phase marking verification results
- Any anomalies or concerns noted
- Pass/Fail status for each test
- Technician names and signatures
- Photographs of test setup (optional but recommended)



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## PASS/FAIL CRITERIA

### PASS REQUIREMENTS:

✓ All three phases show zero or low resistance (<0.1 Ω)
✓ No phase-to-phase leakage detected
✓ Phase marking matches actual conductor positions
✓ All measurements consistent and repeatable
✓ No visible damage to conductors or connections

**FAIL REASONS:**

✗ Any phase showing resistance > 10 Ω
✗ Phase-to-phase short circuit detected
✗ Phase marking does not match connections
✗ Visible damage to conductors or joints
✗ Unable to verify phase continuity

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## QUICK REFERENCE – VOLTAGE LEVELS

**For 132 kV Lines:** Use 5kV test voltage
**For 220 kV Lines:** Use 5-10kV test voltage
**For 400 kV Lines:** Use 10kV test voltage
**For Double Circuits:** Test each circuit separately

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## BEFORE ENERGIZING THE LINE

Confirm:

- ✓ Conductor continuity test PASSED
- ✓ Phase marking verification PASSED
- ✓ Insulation resistance test PASSED
- ✓ Earth resistance within limits
- ✓ Visual inspection completed
- ✓ All test documentation filed
- ✓ No safety concerns identified
- ✓ All stakeholders informed

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## IMPORTANT NOTES

1. **Temperature Effects:** Conductor resistance increases ~4% per 10°C. Record ambient temperature.
2. **Long Lines:** For lines > 50 km, use 10kV test voltage for better accuracy.

3. **Corrosion:** Oxidized or corroded connections will show elevated resistance.
4. **Phase Identification:** Incorrect phase marking can cause equipment damage during operation.
5. **Maintenance Testing:** Repeat continuity tests every 3-5 years during routine maintenance.
6. **Double Circuits:** Test each circuit completely before testing the next one.

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## REFERENCE STANDARDS

- IS 5613: Overhead Alternating Current Power Lines
- CEA Guidelines for Transmission Line Testing
- IEEE Standards for Power System Testing
- IEC 60060: High Voltage Testing Techniques

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## CONTACT & RESOURCES



For more detailed information, visit:

- Main Blog: https://wiringuru.com