

# Cable Qualification Procedure for $\pm 190\text{Vdc}$ Line Power Circuits

Per ATIS-0600030.201 Standard



Your Power Solutions Partner

**Purpose :** The following procedures should be used to determine if a cable pair can be used for Line Power service. In the event a fault condition is discovered, the document instructs the technician to use his or her company's OSP troubleshooting practices.

**Assumptions:** (1) the cable insulation rating has been confirmed to be 300V or higher; (2) the cable pair must be non-loaded and free of bridged taps or laterals; (3) surge protection devices used on  $\pm 190\text{Vdc}$  line power circuits must have a line to ground rating of 300Vdc or higher, and must not be included when testing the cable pairs.

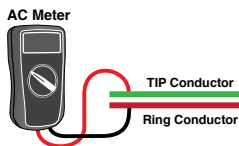
**Test Equipment:** Digital MultiMeter (DMM) • Analog Volt-Ohm Meter (VOM) • Multifunction Test Set • Insulation Resistance Meter

**Technician Qualifications:** Anyone conducting this procedure should be knowledgeable with OSP cable management, troubleshooting practices, and OSP test equipment.

## Test the pair for AC (Alternating Current) voltage (Vac)

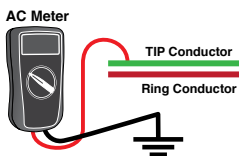
Connect a meter to the pair as shown in the diagrams below. Do not terminate the far end of the pair.

**WARNING:** If the voltage exceeds 50Vac, the testing should be stopped immediately due to potential hazardous conditions (e.g., the cable pair may be crossed with AC phase power).



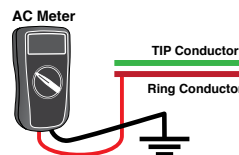
### TIP TO RING

- If  $V_{T-R} < 10\text{Vac}$ , proceed to the next test.
- If  $V_{T-R} \geq 10\text{Vac}$ , the fault must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.



### TIP TO GROUND

- If  $V_{T-G} < 10\text{Vac}$ , proceed to the next test.
- If  $V_{T-G} \geq 10\text{Vac}$ , the fault must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.

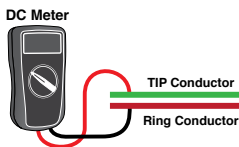


### RING TO GROUND

- If  $V_{R-G} < 10\text{Vac}$ , proceed to the next test.
- If  $V_{R-G} \geq 10\text{Vac}$ , the fault must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.

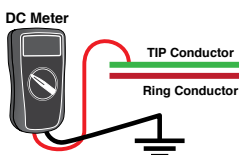
## Test the pair for DC (Direct Current) voltage (Vdc)

Connect a meter to the pair as shown in the diagrams below. Do not terminate the far end of the pair.



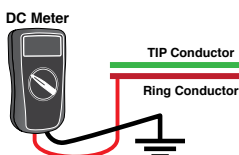
### TIP TO RING

- If  $V_{T-R} < 3\text{Vdc}$ , proceed to the next test.
- If  $V_{T-R} \geq 3\text{Vdc}$ , the fault must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.



### TIP TO GROUND

- If  $V_{T-G} < 3\text{Vdc}$ , proceed to the next test.
- If  $V_{T-G} \geq 3\text{Vdc}$ , the fault must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.



### RING TO GROUND

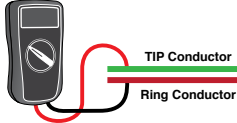
- If  $V_{R-G} < 3\text{Vdc}$ , proceed to the next test.
- If  $V_{R-G} \geq 3\text{Vdc}$ , the fault must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.

## Test the pair for Insulation Resistance

Connect a meter to the pair as shown in the diagrams below. Do not terminate the far end of the pair. For the Tip to Ring test, use 500Vdc as the source voltage. For Tip to Ground and Ring to Ground tests, use 250Vdc as the source voltage.

**CAUTION: When performing this test, customer equipment must be removed or damage may occur.**

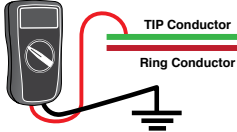
Megohmmeter



### TIP TO RING

- Apply **500Vdc** to the pair.
- If  $R_{T,R} > 100M\Omega$ , proceed to the next test.
- If  $R_{T,R} \leq 100M\Omega$ , there is a possible problem in the line that must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.

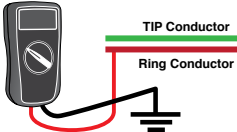
Megohmmeter



### TIP TO GROUND

- Apply **250Vdc** between Tip and Ground.
- If  $R_{T,G} > 100M\Omega$ , proceed to the next test.
- If  $R_{T,G} \leq 100M\Omega$ , there is a possible problem in the line that must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.

Megohmmeter



### RING TO GROUND

- Apply **250Vdc** between Ring and Ground.
- If  $R_{R,G} > 100M\Omega$ , proceed to the next test.
- If  $R_{R,G} \leq 100M\Omega$ , there is a possible problem in the line that must be cleared in order to use the pair for Line Power service. Consult your local company practices to identify and resolve the problem.

## Test the pair for DC Loop Resistance

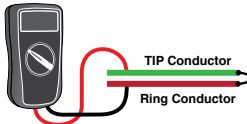
This test can be used to compare the measured resistance to the calculated resistance of the loop. It also verifies end-to-end continuity in the cable.

$$R_{\text{Calculated}} = (L_{26} * R_{26}) + (L_{24} * R_{24}) + (L_{22} * R_{22}) + (L_{19} * R_{19})$$

### CALCULATED LOOP RESISTANCE

- Record the calculated value for comparison with the measured loop resistance.
- Note:  $L_{\#}$  is the length of #AWG cable (kft, excluding bridged taps)  
 $R_{\#}$  is the DC resistance of #AWG cable

OHM Meter



### MEASURED LOOP RESISTANCE

- At the far end of the loop, place a short between Tip and Ring. Measure the resistance on the test set.

$$\text{Ratio} = R_{\text{Calculated}} \div R_{\text{Measured}}$$

### COMPARE

- Divide the calculated loop resistance by the measured loop resistance. If the difference is greater than  $\pm 2.5\%$ , you should employ troubleshooting measures per local company practice to determine if there is a fault in the cable pair or an error in the cable records.
- If the difference between the measured and calculated resistance is less than  $\pm 2.5\%$  and all the above tests passed, the pair is suitable for  $\pm 190Vdc$  Line Power service.

This procedure is intended as a tool to help with the cable qualification process. However, Alpha accepts no liability nor provides any guarantees that the procedure will result in 100% success.


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