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MODEL RF-IT INFORMATION BULLETIN

Two common methods used to measure a pipeline insulator are DC resistance and Radio Frequency Skin Effect.

To measure an insulator using the DC resistance method, the technician typically places the probes of a DC resistance meter (or multimeter) across the insulator and reads the resistance from the display. However, this often becomes impractical because in order for the measurement to be accurate any cathodic voltage applied to the pipe and/or structure must be removed. DC resistance measurements will also be effected by pipe diameter, material, and the distance of the meter probes from the insulator under test. It should also be noted that when testing insulators placed in series, one shorted insulator might cause erroneous readings from the other insulators.

The other method is to measure the insulator using a Radio Frequency Skin Effect meter. Skin effect is the phenomenon where the apparent resistance of a conductor increases as the frequency increases. At DC, the charge carriers have an even distribution throughout the area of the conductor. However, as the frequency increases, the charge carriers subsequently move towards the edge of the wire, decreasing the effective area and increasing the apparent resistance.

To measure an insulator using the Radio Frequency method is similar to that of the DC measurement. The probes are placed across the insulator and the technician reads the display. Maximum deflection of the meter indicates a resistance of a high enough value as to indicate a good insulator, whereas if the insulator is shorted or has a low electrical resistance, the meter will only show one or two bars (new analog-style digital meter reads to the left of top center).

Because the Radio Frequency meter does not use a DC voltage, it is unaffected by DC or AC voltages under 50 volts and there is no need to disconnect the cathodic protection voltage applied to the pipe and/or structure. Another advantage of the skin effect is that errors due to diameter, relative permeability of the pipe and insulator distance are negligible.

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