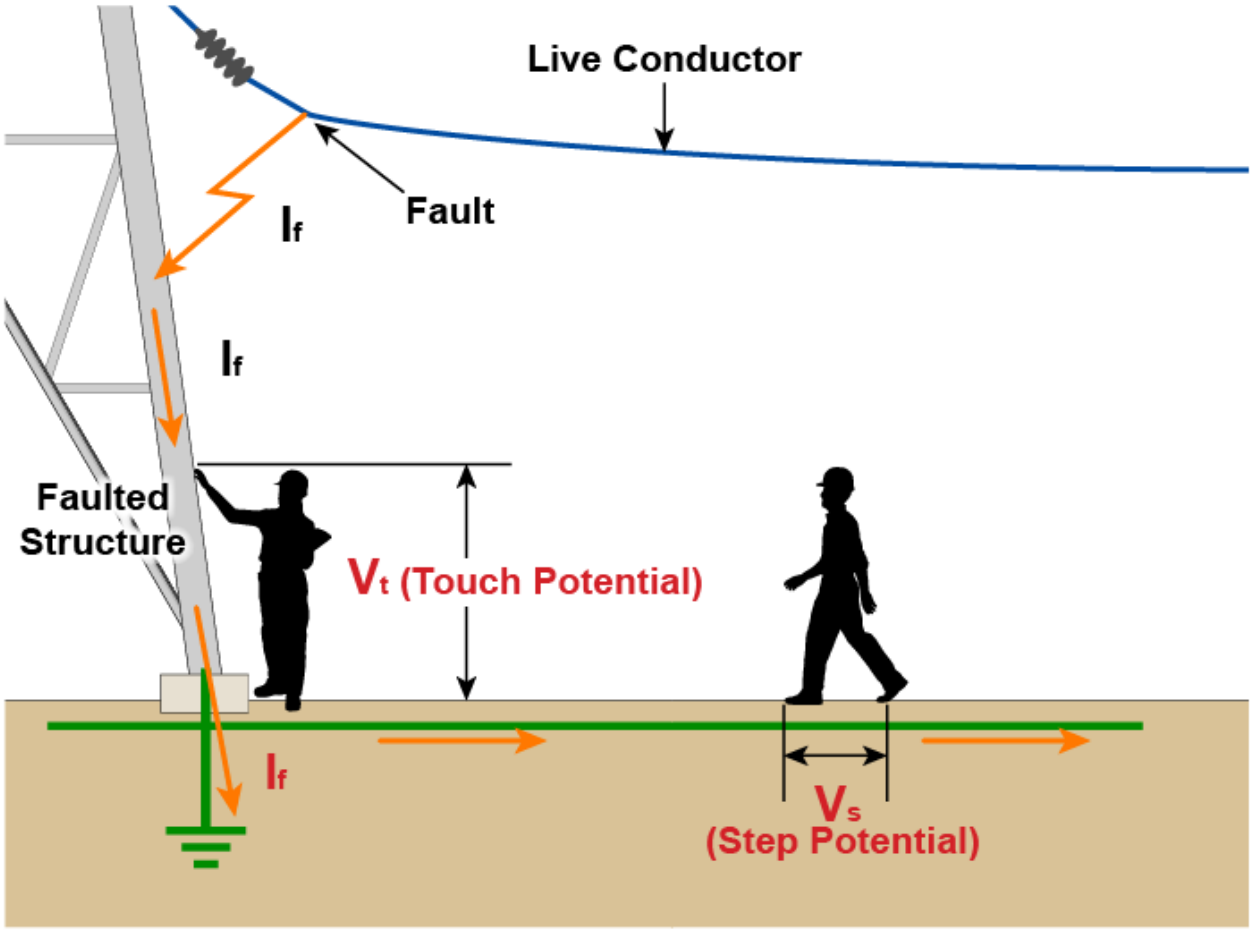
Touch and Step Potential Testing



Touch and Step Potential Testing

Why

- Ground faults could reasonably be expected to occur near the area to be tested or near equipment grounded by the ground to be tested

What you need

- A 4 pole Ground Resistance Tester
- Three auxiliary electrodes and test leads for Step Potential testing
- Two auxiliary electrodes for Touch Potential testing

What you will Measure

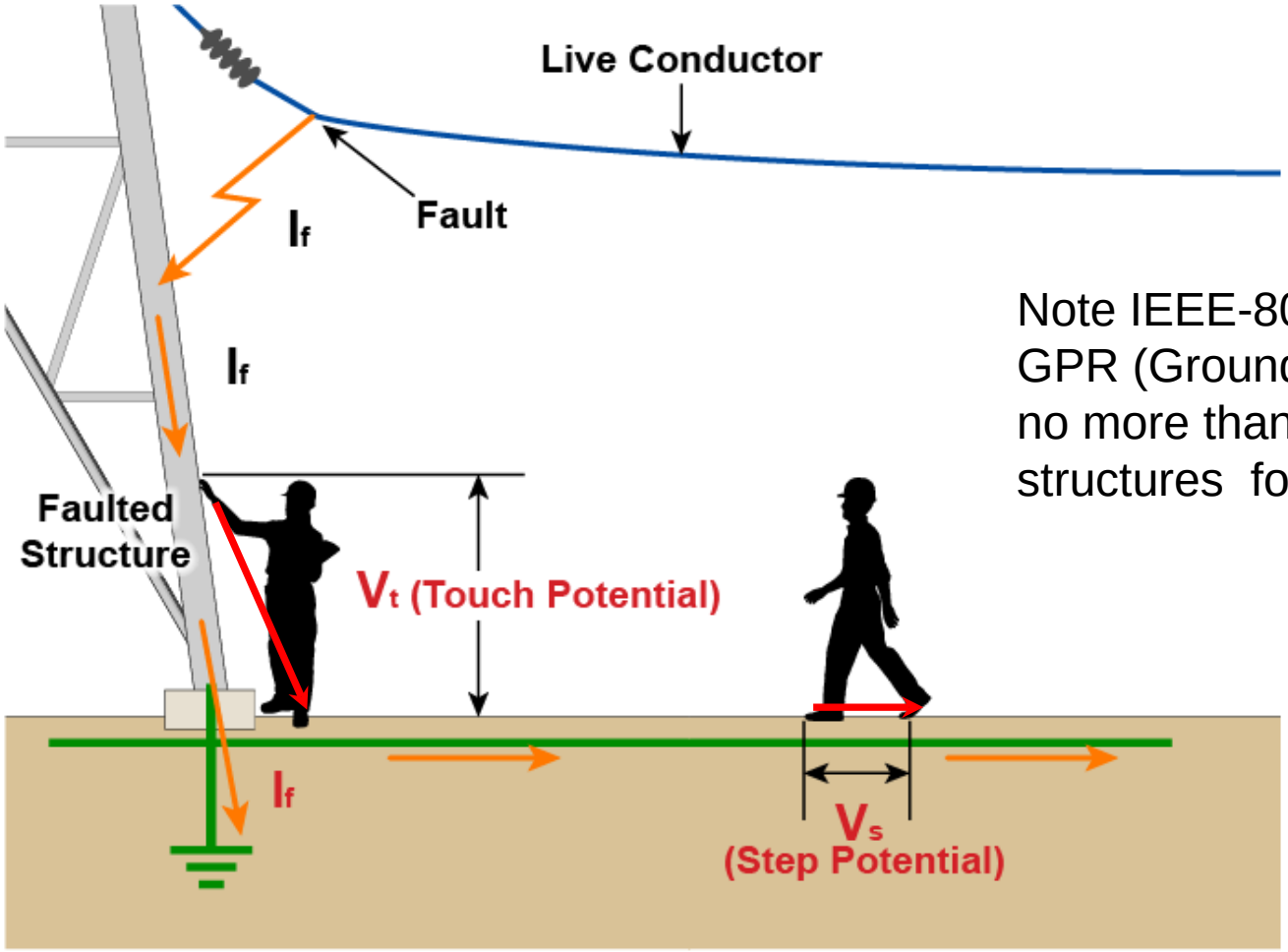
- The values determined by the instrument for both Step and Touch potential are in ohms

What you will Calculate

- Estimate the anticipated fault current and multiply it by the measured resistance to calculate the potential voltage. The potential voltage will determine the degree of danger.

The importance of testing and designing a low resistance grounding system

Touch and Step Potential



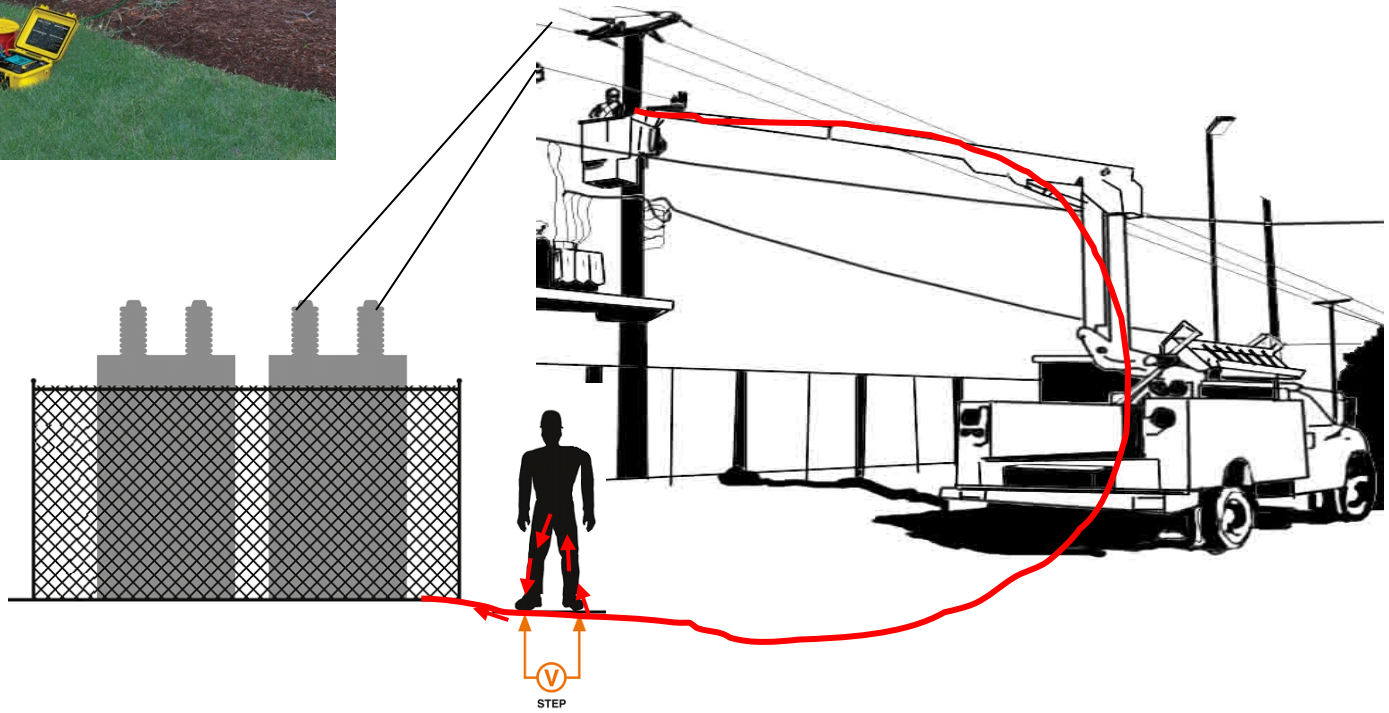
Note IEEE-80 recommends that GPR (Ground potential rise) be no more than 130V between structures for safety reasons.

I_f = Fault Current

The importance of testing and designing a low resistance grounding system

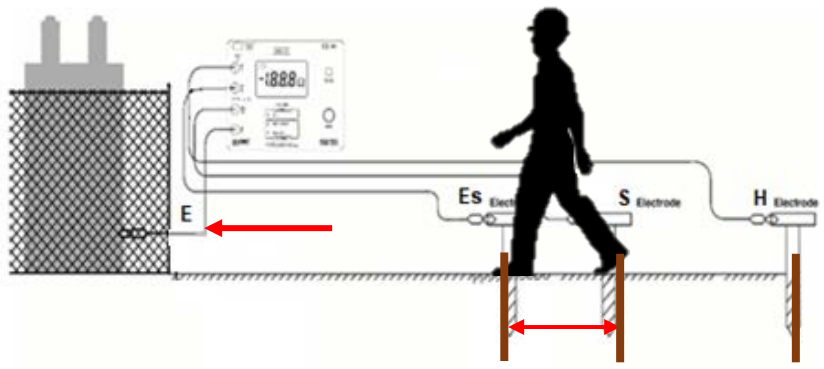
Step Potential: Difference in surface potential experienced by a person's feet bridging a one step distance of approximately 1 meter (3 feet) without contacting any other grounded surface.

The permissible voltage thresholds for Step Potential can be higher than for Touch Potential.



Step Potential Test

1. **Connect the E lead to the grounding system**
2. Insert the injector electrode at the approximate distance away from the grounding system where the anticipated fault will occur and connect the H lead to it
3. Insert two electrodes 3 feet apart (the distance of a human step) at the approximate location of the expected position of the person and attach the Es and S leads to them . All electrodes should be in a straight line.
4. Start the test using the 4-point Ground Test Mode and record the resistance reading
5. Estimate the expected fault current (I) and multiply it by the measured resistance reading (R) to determine the step potential voltage V=I*R Example 1000 Amps



1 Meter (3 Ft)

Example:

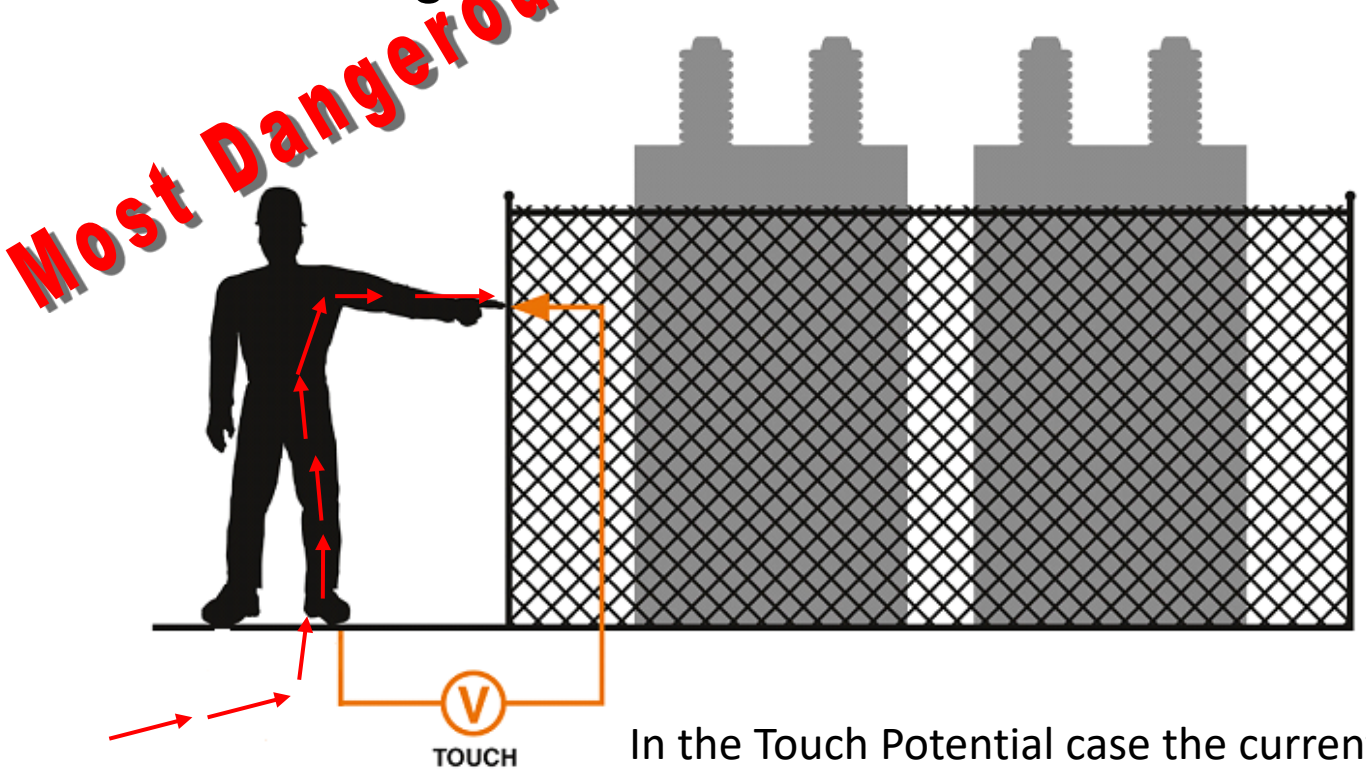
Resistance reading (R) = 0.4Ω

Fault current (I) = 1000 Amps

Step potential (V) = R*I = 0.4*1000= 400 Volts

The importance of testing and designing a low resistance grounding system

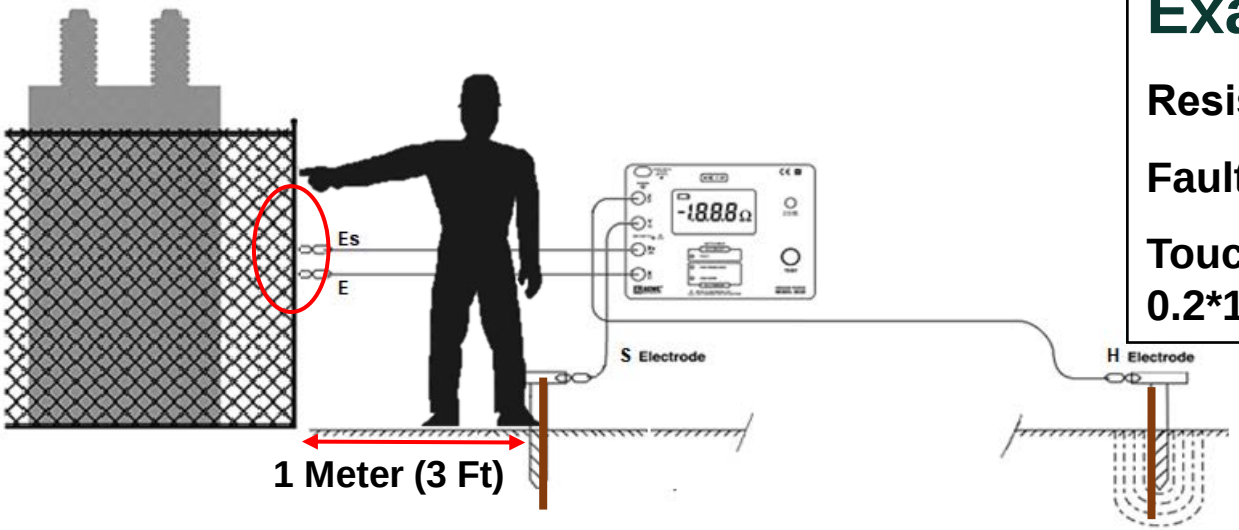
Touch Potential: Potential difference between grounded metallic structure and the surface potential at the point where a person is standing, while at the same time having hands in contact with a grounded structure



In the Touch Potential case the currents flow almost directly through and around the heart itself.

Touch Potential Test

1. **Connect the E and Es leads to the metal object that would be touched**
2. Insert an electrode approximately 1-meter (3 ft) from the object and connect the S lead to it.
3. Insert an electrode at the approximate location of the expected fault and connect the H lead to it.
4. Start the test using the 4-point Ground Test Mode and record the resistance reading.
5. Estimate the expected fault current (I) and multiply it by the measured resistance reading (R) to determine the touch potential voltage V=I*R Example 1000 Amps



Example:

Resistance reading (R) = 0.2Ω

Fault current (I) = 1000 Amps

Touch potential (V) = R*I = 0.2*1000= 200 Volts