**High Impedance Grounding System**

The High Impedance Grounding System shall be provided with the generator. High Impedance Grounding System shall limit the ground fault current to the levels manageable for continuous system operation under the line to ground fault conditions, yet high enough to allow for reliable detection of the line to ground fault conditions.

Design criteria:

The vendor should demonstrate to the Engineer conformance of the High Impedance Grounding System to the following design criteria:

1. The High Impedance Grounding System should be properly fluxed (over-fluxed) to minimize the effect of magnetizing inrush when the ground fault occurs. System should be sized to minimize its contribution to creation of Ferro resonant circuit in the power system.
2. Transformer resistance combination should be provided as and if required and sized to introduce the amount of zero sequence resistive fault current which exceeds the amount of capacitive ground fault current.
3. Transformer and resistor should have matched duty rating.
4. High restriking voltages should be considered in the equipment sizing and design.
5. Total system capacitance shall be calculated by the manufacturer and used for proper sizing of the High Impedance Grounding System.
6. The High Impedance Grounding System shall be designed for the continuous duty operation. The system shall be designed to allow capacity for at least 30% expansion/safety factor.

Construction:

1. The High Impedance Grounding System shall be housed in outdoor NEMA 1 rated enclosure for installation inside the engine-generator enclosure. The enclosure shall be UL508A listed for NEMA 1 applications.
2. The ground-overvoltage fault sensing relay, Device 59G, with adjustable voltage and time delay settings shall be provided as part of the system and installed and integrated in the High Impedance Grounding System enclosure. The control power for the 59G relay and related control and annunciation circuits shall be derived from the generator set starting batteries, 24 VDC.
3. Ground fault shutdown Enable/Disable switch shall be installed on the inner, hinged, swing-out panel inside the High Impedance Grounding System enclosure. With switch in Disable position the Ground fault shutdown of the generator set shall be disabled. With the switch in Enable position the system shall operate as described below.
4. Ground fault condition shall be always annunciated by the red indicating light mounted on the outer door of the High Impedance Grounding System enclosure.
5. Set of the dry contacts shall be provided for remote annunciation of the Ground fault condition.
6. All indicating lights shall be of high visibility, LED type with lenses of at least 1 inch outside diameter with service life of 100,000 hours at 77 degrees F temperature.
7. Each control switch, indicating light or other component mounted on the door shall be identified by a nameplate.
8. The nameplates shall be produced from clear textured polycarbonate, laminated on high performance pressure sensitive adhesive. The printing shall be done on the interior surface of the laminate to avoid scratching or other deterioration of text. The lettering shall be white on black background.

System operation:

1. High Impedance Grounding System shall include all the necessary components and equipment to accommodate described system operation unless otherwise noted.
2. Upon sensing of the phase to ground fault condition and if the generator mounted circuit breaker is open, the operation of the ground-overvoltage relay (device 59G) shall cause the generator set to shut down.
3. If the generator circuit breaker in the switchgear is closed, the operation of the ground-overvoltage relay (device 59G) shall cause alarm only or tripping of the generator mounted circuit breaker, annunciated as described above, based on the position of the Ground Fault Trip Enable/Disable switch.