

Request to modify

18.47(b) A battery-powered machine shall not have a nameplate rating exceeding 240 volts nominal, except that a machine may have a nameplate rating greater than 240 volts but not exceeding 550 volts, when the following conditions are complied with:

(1) Adequate clearances and insulation for the particular voltage(s) are provided in the design and construction of the equipment, its wiring, and accessories.

(2) A continuously monitored, failsafe continuity system is provided that will maintain the frame of the equipment and the frame of the battery housing at the same potential. Also, the equipment, including its controls, will be deenergized automatically at a point of isolation internal to the battery housing, upon the occurrence of an incipient ground fault. *Propose we warn the operator similar to 18.54(e) so the machine can be trammed to a safe area for repair and not deenergize.*

(3) The cable connecting the equipment and the battery housing shall include a ground conductor and a ground check conductor. *Not in favor of a ground check monitor mainly due to the limitations in pins inside the connectors.*

Justification

- In the case of a single fault to ground
 - no significant current flows under the current regime or the proposed regime
 - the fault is detected in the new regime
 - the fault is interrupted in the new regime if the fault is past the first interrupter (in the battery housing)
 - the voltage stress to ground is higher in the new regime but this is mitigated by 18.47(b)(1)
- in the case of two simultaneous faults to ground
 - under the old regime the fault is detected and interrupted only if
 - the current exceeds the CB trip level (greater than normal load, 100's of amperes) and
 - one fault is downstream of the first interrupter
 - under the new regime
 - the fault is detected in any case
 - the fault is interrupted if one fault is downstream of the first interrupter (no change)
- in addition, if one fault is on the battery housing and one on the car, current flows between these two frames
 - under the old regime, any impedance between the two frames results in a potential drop
 - under the new regime this impedance is monitored

[This is trading off the higher voltage for fixing two weaknesses in the current system (no first fault detection and no monitoring of the ground connection between the two boxes). It's difficult to quantify this trade off (how much "worse" than 240 V is 550 V?) but the strength of the argument is that our proposed 18.47(b) looks like the current 18.47(d).]