

NAFLIC

National Association For Leisure Industry Certification

Standards & Related Documents Committee

TECHNICAL BULLETIN - AUGUST 1999

186. 240 volt Single Phase Electrical Generators

It has come to our notice that there exists a considerable number of 240 volt single-phase generators where the earth is derived from the centre of the secondary winding giving a 120 v : 0 v : 120 v configuration.

Whilst this would give a full 240 volt output to drive equipment, any voltages to earth would be at 120 volts from either side of this supply.

In amusement devices, particularly in lighting equipment, it is common for the switching to be inserted into only one pole of the network. This is the same as you would find in a normal domestic dwelling. Problems occur in two areas :-

1. The control circuits of some equipment rely upon one side of the control circuit being referenced to earth to guard against short circuits to earth and giving earth fault detection. With the centre-tapped system described above it is possible that switching-off procedures, particularly during an emergency, could be impaired (reference BS 5304: 1988, figure 93; and EN 60204-1: 1998). It is possible that control circuits using a separate transformer having one side of its secondary winding referenced to earth may not suffer from this precise problem. However, some other faults external to the control circuit may not be detected.
2. Where lampholders, or similar, use Edison screw receptacles it is normal for the outer screw to be easily touchable during lamp replacement. In a normal domestic system, this conductor would be the neutral, which is referenced to earth, and there would be negligible shock risk. With the system outlined above, however, this conductor would be sitting at 120 volts with respect to earth at all times and a shock / burn danger would result. Whilst the shock risk can be reduced by providing double pole switching and similar automatic two-pole disconnection (such as circuit breakers) it is extremely unlikely that the majority of equipment that might be used on a fairground would have these characteristics.

The serious problem with both of the remedies described above is that, by their very nature, these types of generators are portable and are very likely to be swapped and used for different

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equipment that may not have the necessary protective measures. It is also our information that generators wired in this configuration are not always appropriately marked or provided with adequate written instructions.

It is normal, and indeed, preferred that 110 volt building site supplies are configured in the above manner but, as the resultant voltage to earth is only 55 volts and not the 120 volts as described, it is considered that risks comply with safety standards.

In contrast the safe use of these generators in fairgrounds and amusement parks relies on the configuration of equipment to which they are connected. Since this is often unknown it is our view that such generators should never be used without seeking the advice of an electrical expert who is :-

- acquainted with the contents of this Technical Bulletin; and
- familiar with both the configuration of the generator and with the precise configuration of the equipment to which it is to be connected.