relatively high voltage and current ratings. For example, many refrigerated shipping containers operate at 480 volts AC and 8-15 amps.

SUMMARY

[0005] In general, in one embodiment, there is provided an electrical connector testing system, the system comprising: a first plug connector end; a controller coupled to first plug connector end, wherein the controller is disposed between the first plug connector end and a power source configured to provide power; and an electrical load coupled to the first plug connector end, wherein the electrical load comprises an electrical cable and a second plug connector end coupled to an end of the electrical cable, wherein the controller determines whether an adverse electrical condition exists with respect to the electrical load before allowing the power to flow between the first plug connector end and the second plug connector end, wherein the first plug connector end and the second plug connector end are removably coupled to each other, and wherein the adverse electrical condition comprises a phase-to-phase fault.

[0006] In one aspect, there is provided a reefer receptacle comprising: a plug connector end configured to couple to an electrical load comprising an electrical cable and an electrical connector of a reefer container; an electrical interlock coupled to the plug connector end; a breaker coupled to the electrical interlock; a power supply coupled to the breaker; and a controller coupled to the power supply, wherein the controller is configured to perform at least one test to determine if an adverse electrical condition exists prior to putting the reefer container in service, wherein the controller is configured to determine whether the adverse electrical condition exists with respect to the electrical load before allowing operating power to flow between the plug connector end and the electrical connector of the reefer container, wherein the adverse electrical condition comprises at least one of a group consisting of a phase-to-phase fault, a loss of phase, and a phase-to-ground fault, and wherein the controller is further configured to determine a location of the adverse electrical condition along the electrical load when the adverse electrical condition is detected.

[0007] These and other aspects, objects, features, and embodiments will be apparent from the following description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The drawings illustrate only example embodiments and are therefore not to be considered limiting in scope, as the example embodiments may admit to other equally effective embodiments. The elements and features shown in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the example

CLAIMS

1. A reefer receptacle comprising:

    a plug connector end configured to couple to an electrical load comprising an electrical cable and an electrical connector of a reefer container;

    an electrical interlock coupled to the plug connector end;

    a breaker coupled to the electrical interlock;

    a power supply coupled to the breaker; and

    a controller coupled to the power supply, wherein the controller is configured to perform at least one test to determine if an adverse electrical condition exists prior to putting the reefer container in service,

    wherein the controller is configured to determine whether the adverse electrical condition exists with respect to the electrical load before allowing operating power to flow between the plug connector end and the electrical connector of the reefer container,

    wherein the adverse electrical condition comprises at least one of a group consisting of a phase-to-phase fault, a loss of phase, and a phase-to-ground fault,

    and wherein the controller is further configured to determine a location of the adverse electrical condition along the electrical load when the adverse electrical condition is detected.

2. The reefer receptacle of Claim 1, wherein the controller is further configured to determine, when the adverse electrical condition comprise a phase-to-phase fault, a phase on which the phase-to-phase fault is located.

3. The reefer receptacle of Claim 1, wherein the controller further evaluates whether the adverse electrical condition exists after allowing the power to flow between the plug connector end and the electrical connector, wherein the controller prevents power from continuing to flow between the first plug connector end and the electrical connector until the adverse electrical condition has been eliminated.

4. The reefer receptacle of Claim 1, wherein the electrical interlock comprises at least one selected from a group consisting of a solenoid, a contactor, and a switch.

5. The reefer receptacle of Claim 1, wherein the controller comprises a self-test circuit, wherein the self-test circuit comprises at least one switch for controlling the at least one test.

6. The reefer receptacle of Claim 5, wherein the at least one switch controls, while performing the at least one test, when a signal is received by the controller from the electrical load.

7. The reefer receptacle of Claim 1, wherein the controller comprises an energy metering module that is coupled to a first portion of the electrical load, and wherein a remainder of the controller is coupled to a second portion of the electrical load.

8. The reefer receptacle of Claim 7, wherein the energy metering module is coupled to a first portion of the electrical load, and wherein remaining modules of the controller are coupled to a second portion of the electrical load.

9. The reefer receptacle of Claim 8, wherein the controller identifies an electrical open between the first portion of the electrical load and the second portion of the electrical load.

10. The reefer receptacle of Claim 1, wherein the controller and the electrical interlock are electrically coupled in series with each other.

11. The reefer receptacle of Claim 1, wherein the controller and the electrical interlock are electrically coupled in parallel with each other.

12. The reefer receptacle of Claim 1, wherein the breaker comprises a first lug port and a second lug port, wherein the controller is coupled to the first lug port, and wherein a power conductor is coupled to the second lug port.

13. The reefer receptacle of Claim 1, wherein the controller comprises a sensing circuit that is configured to identify the adverse electrical condition.

14. The reefer receptacle of Claim 1, further comprising a plurality of resistors used to regulate test signals for performing the at least one test.

15. The reefer receptacle of Claim 1, further comprising at least one pulse generator used to generate test signals for performing the at least one test.