

(ii) All leads on the registered equipment intended for connection to non-registered equipment when these leads are tied together.

The peak current drawn from the surge generator shall not be limited to less than 200 amperes by the capabilities of the surge generator.

(3) Six 2500 volt peak surges (three of each polarity) having a 2 microsecond *maximum* rise time to crest and a 10 microsecond *minimum* decay time to half crest applied between the phase and neutral terminals of the ac power line. The peak current drawn from the surge generator must not be limited to less than 1000 amperes by the capabilities of the surge generator.

All other equipment leads (telephone connections, auxiliary leads, and terminals for connection to non-registered equipment) not being surged or connected to those being surged should be terminated in a manner which is no less severe than that which would occur in normal use and affect compliance with subpart D. Also, equipment states which cannot be achieved by normal means of power shall be achieved artificially by appropriate means, if necessary to comply with the above requirements.

(f) *Failure modes resulting from the application of metallic and longitudinal surges.* Registered terminal equipment and registered protective circuitry are permitted to reach a failure-mode state in violation of longitudinal balance requirements of §68.310, and for terminal equipment connected to Local Area Data Channels a failure-mode state in violation of the longitudinal signal power requirements of §68.308, after application of the electrical surges specified in paragraphs (d) and (e) herein, provided that:

(1) Such failure results from an intentional, designed failure mode which has the effect of connecting telephone or auxiliary connections with earth ground; and,

(2) If such a failure-mode state is reached, the equipment is designed in such a manner that it would become substantially and noticeably unusable by the user, or an indication is given to the user (e.g., an alarm), in order that

such equipment can be immediately disconnected or repaired.

NOTE: The objective of this subsection is to allow for safety circuitry which diverts lightning-like transients to earth ground, but which may continue to maintain the earth ground connections after the transients have ceased. Such a failure-mode has the potential for causing interference resulting from longitudinal imbalance, and therefore designs must be adopted which will cause the equipment either to be disconnected or repaired rapidly after such a state is reached, should it occur in service. This subsection does not apply to tie trunk interface leads.

[45 FR 20853, Mar. 31, 1980, as amended at 50 FR 47549, Nov. 19, 1985; 51 FR 944, Jan. 9, 1986; 51 FR 16689, May 6, 1986; 58 FR 44907, Aug. 25, 1993]

**§68.304 Leakage current limitations.**

Registered terminal equipment and registered protective circuitry shall assure that, if a voltage source is connected to the combinations listed in the table below, of the following points on such equipment:

- (a) All telephone connections,
- (b) All power connections,
- (c) All possible combinations of exposed conductive surfaces on the exterior of such equipment or circuitry excluding terminals for connection to other terminal equipment,
- (d) All terminals for connection to nonregistered equipment,
- (e) Points having a conducting path to the secondaries of any power supply,
- (f) All auxiliary lead terminals, and
- (g) All E&M lead terminals,
- (h) All PR, PC, CY1 and CY2 leads,

and is gradually increased, from zero to the values listed in the table below, over a thirty second time period, then applied continuously for one minute, the current in the mesh formed by the voltage source and these points shall not exceed 10 milliamperes peak at any time during this 90 second time interval.

VOLTAGE APPLIED FOR VARIOUS COMBINATIONS OF ELECTRICAL CONNECTIONS

Voltage sources connected between	Value*
(a) and (c) note (5) .....	1000
(a) and (d) note (5) .....	1000
(a) and (f) note (5) .....	1000
(a) and (g) note (5) .....	1000

VOLTAGE APPLIED FOR VARIOUS COMBINATIONS OF ELECTRICAL CONNECTIONS—Continued

Voltage sources connected between	Value*
(a) and (h) note (6) .....	1000
(b) and (c) .....	1500
(b) and (d) .....	1500
(b) and (e) .....	1500
(b) and (h) .....	1500
(c) and (f) .....	1000
(c) and (g) .....	1000
(d) and (f) .....	1000
(d) and (g) .....	1000
(f) and (h) .....	1000

\* Value to which test voltage is gradually increased, rms, 60 Hertz.

NOTES: (1) If, in any operational state, one of the telephone connections, auxiliary leads or E&M leads has an intentional conducting path to earth ground, that lead may be excluded from the leakage current test in that operational state. Connections excluded for this reason must comply with the requirements of §68.306(c) in addition to the other applicable rules. However, leakage current tests between telephone connections and auxiliary leads, and between telephone connections and E&M leads are required unless both points have intentional conducting paths to earth ground.

(2) Terminal port connections to registered protective circuitry shall be treated as point (d) leads for the purposes of leakage current limitation.

(3) Leakage current limitations shall be met between each of the point (d) and point (f) leads and all pairs of tip and ring telephone connections. (Testing all pairs may be done by a sequence of appropriate combinations of pairs.)

(4) Equipment states which cannot be achieved by normal means of power shall be achieved artificially by appropriate means, if necessary to comply with the requirements of this section.

(5) For multi-unit equipment interconnected by cables, which is evaluated and registered as an interconnected combination or assembly, the specified 10 milliamperes peak maximum leakage current limitation, other than between power connection points and other points, may be increased as described here to accommodate cable capacitance. The leakage current limitation may be increased to  $(10N+0.13L)$  milliamperes peak where L is the length of interconnecting cable in the leakage path in meters and N is the number of equipment units which the combination or assembly will place in parallel across a telephone connection. However, all combinations of electrical connections requiring the increased limitation and involving point (c) (exposed conductive surfaces) surfaces must comply with the requirements of §68.306(c) in addition to other applicable rules.

(6) Leakage current limitations shall be met between each of the point (h) leads and all pairs of tip and ring telephone connections.

[45 FR 20853, Mar. 31, 1980, as amended at 51 FR 944, Jan. 9, 1986; 58 FR 44907, Aug. 25, 1993]

**§ 68.306 Hazardous voltage limitations.**

(a) *General.* Under no condition of failure of registered terminal equipment or registered protective circuitry, or of equipment connected thereto, which can be conceived to occur in the handling, operation or repair of such equipment or circuitry, shall the open circuit voltage on telephone connections exceed 70 volts peak for more than one second, except for voltages for network control signaling and supervision, which, in any case, should be consistent with standards employed by the telephone companies.

(1) Registered terminal equipment shall assure that at the MR channel interface, no continuous ac or dc voltages appear across the tip (MR) and ring (MR) leads, from the tip (MR) lead to PBX ground, or from the ring (MR) lead to PBX ground.

(2) Registered terminal equipment shall assure that during normal operation, at an AIOD data channel interface, (i) no significant ac voltage to ground other than for data transmission appears on the tip (AI) and ring (AI) leads; (ii) no open circuit dc voltage to ground appears on the tip (AI) and ring (AI) leads other than in the range from 0 to -56.5 volts.

(3) Registered terminal equipment shall also assure that at either the MR channel interface or an AIOD data channel interface, voltage transients appearing on either the tip (AI or MR) or ring (AI or MR) to ground as a result of inductive components in the registered terminal equipment shall not be capable of delivering more than 2 joules to a 500 ohm resistive termination.

(4) *Type I E&M leads.* Conditions for "A" side of interface with conditions for "B" side in parentheses. Registered terminal equipment shall assure that the dc current in the E lead does not

\*The ac component should not exceed 5 volts peak or the dc component 5 volts, where not otherwise controlled by §68.308.