be displayed on the device. All lettering on the label must be discernible without magnification.

[45 FR 20853, Mar. 31, 1980, as amended at 51 FR 944, Jan. 9, 1986; 61 FR 42187, Aug. 14, 1996; 61 FR 42392, Aug. 15, 1996; 61 FR 54953, Oct. 23, 1996]

§ 68.302 Environment simulation.

Registered terminal equipment and registered protective circuitry shall comply with all the criteria contained in the rules and regulations in this subpart, both prior to and after the application of each of the mechanical and electrical stresses specified in this section, not withstanding that certain of these stresses may result in partial or total destruction of equipment.

(a) *Vibration.* The equipment shall be subjected to vibration while in the condition that it is normally shipped or transported. That is, during the following vibration test the equipment shall be vibrated while packaged if shipped packaged, or the equipment shall be vibrated while unpackaged if shipped unpackaged. The following sinusoidal vibration should be applied once in each of three orthogonal directions, however, for large equipments, the unit should rest on the base or side on which it is normally shipped: One sweep at a level of 0.5g peak from 5 to 100 Hz, and one sweep at a level of 1.5g peak from 100 to 500 Hz. The 5 to 100 Hz sweep should be conducted at a sweep rate of 0.1 octave/min. (approximately 45 minutes) and the 100 to 500 Hz sweep at a rate of 0.25 octave/min. (approximately 10 minutes).

(b) *Temperature and humidity.* Cycling at any convenient rate through the following temperature and humidity conditions three times: 30 minutes at 65° C (150° F) and 15 percent relative humidity, followed by 30 minutes at 32° C (90° F) and 90 percent relative humidity, followed by 30 minutes at −40° C (−40° F) and any convenient humidity.

(c) *Shock.* (1) Registered Terminal Equipment and Registered Protective Circuitry Equipment Unpackaged:

Hand-Held Items Normally Used at Head Height:

18 random drops from a height of 150 cm (60 in) onto concrete covered with 3 mm (⅛ in) asphalt tile or similar surface.

Normally Customer Carried Equipment:

6 random drops from a height of 75 cm (30 in) onto concrete covered with 3 mm (⅛ in) asphalt tile or similar surface.

Equipment Not Normally Customer Carried:

These tests are made onto concrete covered with 3 mm (⅛ in) asphalt tile or similar surface.

0–10 kg (0–20 lbs): One 15 cm (6 in) face drop on each normal or designated rest face, one 7 cm (3 in) drop on all other faces, and one 7 cm (3 in) corner drop on each corner.

10–20 kg (20–50 lbs): One 10 cm (4 in) face drop on each normal or designated rest face, one 5 cm (2 in) face drop on all other faces, and one 5 cm (2 in) corner drop on each corner.

20–50 kg (50–100 lbs): One 5 cm (2 in) face drop on each normal or designated rest face. One edgewise drop and one cornerwise drop from a height of 5 cm (2 in) on each edge and corner adjacent to the rest face.

50–500 kg (100–1000 lbs): One 2 cm (1 in) face drop on each normal or designated rest face. One edgewise drop and one cornerwise drop from a height of 2 cm (1 in) on each edge and corner adjacent to the rest face.

Over 500 kg (1,000 lbs): One 2 cm (1 in) face drop on each normal or designated rest face. One edgewise drop from a height of 2 cm (1 in) on each edge adjacent to this rest face.

(2) The drop tests specified in the mechanical shock conditioning stresses shall be performed as follows:

FACE DROP—The unit should be dropped such that the face to be struck is approximately parallel to the impact surface.

CORNER DROP—The unit should be dropped such that upon impact a line from the struck corner to the center of gravity of the packaged equipment is approximately perpendicular to the impact surface.

EDGEWISE DROP—The unit should be positioned on a flat test surface. One edge of the rest face should be supported with a block so that the rest face makes an angle of 20° with the horizontal. The opposite edge should be lifted the designated height above the test surface and dropped.

CORNERWISE DROP—The unit should be positioned on a flat test surface. One corner of the test face should be supported with a block so that the rest face makes an angle of 20° with the horizontal. The opposite corner should be lifted the designated height above the test surface and dropped.

RANDOM DROP—The unit should be positioned prior to release to ensure as nearly as possible that for every six drops there is one impact on each of the six major surfaces and that the surface to be struck is approximately parallel to the impact surface.

(d) *Metallic voltage surge.* Two 800-volt peak surges of a metallic voltage (one

of each polarity) having a 10-microsecond *maximum* rise time to crest and a 560-microsecond *minimum* decay time to half crest applied between (1) tip and ring of a 2-wire connection; (2) between tip and ring, and tip 1 and ring 1 of a 4-wire connection; (3) between tip and tip 1 (with tip and ring tied together and tip 1 and ring 1 tied together) of a 4-wire connection which uses simplexed pairs for signaling; and (4) any other pair of connections on which lightning surges may occur (with one of the connections of the pair under test grounded) with the equipment in each of the following states:

(i) Any operational state which can affect compliance with the requirements of part 68;

(ii) Any state in which the equipment might be connected to the telephone network and from which it is capable of transferring to an operational state by an automatic or manual action required for proper use of the equipment and provided that any such state can affect compliance with the requirements of part 68; and

(iii) Any state in which the equipment might be connected to the telephone network through an automatic or manual action under all reasonably foreseeable possibilities of disconnection of connections of such equipment with primary commercial power sources (including possible loss of equipment grounding through disconnection of a third-wire ground connection contained in a primary power source plug).

All other equipment leads (telephone connections, auxiliary leads, and terminals for connection to nonregistered equipment) not being surged or connected to those being surged should be terminated in a manner which is no less severe than that which 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. The peak current drawn from the surge generator must not be limited to less than 100 amperes by the capabilities of the surge generator except for the simplexed arrangement in case (3), which must not be limited to less than 200 amperes.

(e) *Longitudinal voltage surge.* With registered terminal equipment in each of the following states: first, any operational state which can affect compliance with the requirements of part 68, second, any state in which the equipment might be connected to the telephone network and from which it is capable of transferring to an operational state by an automatic or manual action required for proper use of the equipment and provided that each state can affect compliance with the requirements of part 68 and third, any state in which the equipment might be connected to the telephone network through an automatic or manual action under all reasonably foreseeable possibilities of disconnection of connections of such equipment with primary commercial power sources (including possible loss of equipment grounding through disconnection of a third-wire ground connection contained in a primary power source plug):

(1) Two 1500 volt peak surges (one of each polarity) having a 10 microsecond *maximum* rise time to crest and a 160 microsecond *minimum* decay time to half crest applied separately between each of the following leads individually and (i) and (ii) below, and where available, also between all of the following leads tied together and (i) and (ii) below: Tip, ring, tip 1, ring 1, M (only for registered terminal equipment located on the ''A'' side of a Type I E&M interface).

(i) Earth ground; and

(ii) All leads on the registered equipment intended for connection to nonregistered equipment when these leads are connected together.

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

(2) Two 1500 volt peak surges (one of each polarity) having a 10 microsecond *maximum* rise time to crest and a 160 microsecond *minimum* decay time to half crest applied between pairs of connections other than tip and ring on which lightning surges may occur, connected together, and individually to (i) and (ii) below:

(i) Earth ground; and

(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