GENERAL ORDER NO. 138

Public Utilities Commission of the State of California

RULES FOR THE CONNECTION OF CUSTOMER-PROVIDED EQUIPMENT TO PUBLIC UTILITY TELEPHONE COMPANY SYSTEMS.

Adopted April 22, 1975. Effective May 20, 1975
(Decision No. 84364, Case No. 9625.)

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1. GENERAL

1.1 Intent.

a. Purpose. The purpose of these rules is to establish uniform minimum standards for direct electrical connection of customer-provided equipment of the classes specified herein to the telecommunications network of telephone utilities.[1] These rules provide a basis for:

(1) The direct connection of customer-provided equipment (including customer-provided protective couplers) which meets the minimum network requirement specifications set forth in these rules.

(2) The use of utility-provided protective couplers with customer-provided equipment which does not meet the minimum network requirement specifications set forth in these rules.

b. Acoustical or Inductive Interconnection. Interconnection of customer-provided equipment by acoustical or inductive means is covered by the filed tariffs of the respective utilities and is not subject to these rules.

c. Limits of Order. These rules are devised solely to protect utility personnel from hazards and the telecommunications network from actual harm. Compliance with these rules and certification does not imply Commission approval of customer-provided equipment design nor constitute a guarantee of its performance.

d. Absence of Civil Liability. The establishment of these rules shall not impose upon utilities, and they shall not be subject to, any civil liability for damages, which liability would not exist at law if these rules had not been adopted.

e. Revision of Scope. These rules may be revised on the basis of experience gained in their application and as changes in the art of telephony may require.

1.2. Applicability.

These rules are applicable to all utilities and interconnected parties within the State of California.

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[1] As used hereinafter "telecommunications network" refers to the public-switched telephone network (MTS).

1.3 Definitions.

Terms not specifically defined in this section and used in these rules are to be construed within the meaning given them in the *Institute of Electrical and Electronic Engineers Standard Dictionary of Electrical and Electronic Terms* (IEEE Standard No. 100-1972), published by the Institute of Electrical and Electronic Engineers, 345 East 47th Street, New York, N. Y. 10017, and in the *Glossary of Communications* by Emerson E. Smith, published in 1971 by the Telephony Publishing Corporation, 53 West Jackson Boulevard, Chicago, Illinois 60604.

Acoustical Connection—Coupling between customer-provided equipment and utility equipment accomplished by means of electromagnetic to acoustic and acoustic to electromagnetic transducers without direct electrical connection.

Ancillary Equipment—Line or Station Auxiliary Device Equipment fulfilling the needs of customer to improve the value of utility-provided telephone service in a way which is privately beneficial to him without causing harm to the network. This category includes but is not restricted to answering devices, automatic dialers, conferencing devices, call diverters, call restrictors, traffic monitoring equipment, and similar equipment connected with other customer-provided equipment or utility-provided equipment. Ancillary equipment does not include main or extension telephones; however, the features of an extension telephone may be included in ancillary equipment where such features are an integral part of the device and secondary to the functions provided by the ancillary device.

Common Equipment—Centrally located equipment of a PBX, KTS, or other switching system that is shared by other components of the system.

Conferencing Equipment—Equipment which interconnects three or more telephones and permits all parties to converse at random.

Connecting Device—An arrangement without protective features located at the interface between the utility-owned and customer-provided facilities which permits direct electrical connection and disconnection of the two systems. Connecting devices include jack and plug arrangements and terminal block arrangements.

Customer-Provided Equipment—Any device, system, or protective coupler not provided by the utility which is connected to the telecommunications network or to other facilities furnished by the utility.

Direct Connection—Connection of customer-provided equipment to the telecommunications network by means of a direct metallic contact between the utility's wiring or equipment and customer-provided equipment.

Harm—Harm consists of hazards to personnel, damage to utility equipment, and impairment of service to persons other than the user of the customer-provided equipment. Types of harm include, but shall not be limited to, voltages dangerous to personnel, destruction of or damage to utility equipment, induced noise or cross talk, incorrect dial pulsing, failure of supervision, false answer, incorrect billing, absence of voice band transmission path for call progress signals, and loss of capability to answer an incoming call.

Inductive Connection—Electromagnetic coupling between customer-provided equipment and utility equipment by means of mutual inductance between an inductor in the utility equipment and a customer-provided inductor external to the utility equipment.

Interconnection—The method by which telecommunications facilities of a utility are arranged to transmit to or receive information from customer-provided equipment.

Interface—The junction or point of interconnection between customer-provided equipment and the facilities of the utility.

Inter-system Wiring—Any wiring required on the utility side of the protective coupler but on the customer's side of the point of demarcation with the utility's wiring.

Intra-system Wiring—Any wiring required on the customer side of the protective coupler.

Line—Any communication path or circuit between the terminal equipment of a subscriber and the switched network.

Network control signaling—Transmission of signals used in the exchange and toll network of the utility which perform the functions of supervision (control, status, and charging signals), address signaling (e.g., dialing), calling progress signals indicating recorder or busy conditions, alerting, coin denominations, coin collect, and coin return tones, which function to control the operation of the central office equipment in the exchange and toll network.

Network Control Signaling Unit—Terminal equipment designed for and capable of providing network control signaling functions.

Portable Equipment—An appliance which is actually moved or can be easily moved from one place to another in normal use.

Protective Coupler—An arrangement at the interface between utility-owned and customer-provided facilities which effects coupling between the two systems in such manner that no harmful or undesirable voltages, signals, or other physical quantities can pass from the customer-provided equipment to the telecommunications network. This arrangement may be a self-contained device or incorporated as an integral and separately identifiable part of the terminal equipment.

Registered Electrical Engineer—A person who holds a valid certificate of registration in Electrical Engineering issued in accordance with Chapter 7 of Division 3 of the California Business and Professions Code. The Registered Electrical Engineer's seal and signature on the certifying document is a representation that an equipment evaluation has been made by him, that he is qualified to make such evaluation, and that evaluation is in accord with these rules.

1.4 General Conditions on Direct Interconnection.

a. Customer-provided equipment shall not endanger the safety of the utility employees or the public, damage or require changes in or alterations of the equipment or other facilities of the utility, interfere with the proper function of said equipment or facilities, infringe upon privacy of communications, or otherwise injure the public in its use of the utility's services.

b. Customer-provided equipment shall meet minimum protection criteria set forth in Section 5 of these rules.

c. Customer-provided equipment shall be designed in such manner that in the event of damage or failure said equipment will become inoperative and will not be capable of exposing hazardous voltages or currents to personnel or to the telecommunications network.

1.5 Accessibility of Information to the Public.

The utilities shall maintain, open for public inspection in their main offices in California, copies of all reports submitted to this Commission in compliance with these rules and a list of customer-provided equipment that may be connected to the telecommunications network either directly or through a utility-provided protective coupler. Reports shall be held for one year. A copy of these reports and lists shall also be maintained and be available for public inspection at the Commission's San Francisco and Los Angeles offices. Utilities shall make available on request standards and minimum specifications for the connection of customer-provided equipment to the telecommunications network either directly or through a utility-provided protective coupler.

1.6 Accessibility of Records to the Commission.

All records required by these rules shall be made available to representatives, agents, or employees of the Commission upon reasonable notice.

1.7 Reports to the Commission.

Utilities, manufacturers or vendors, and certifying engineers shall furnish to the Commission, at such times and in such form as the Commission may require, the results and/or summaries of any measurements and/or tests required by these rules.

1.8 Deviations from Any of These Rules.

In cases where the application of any of these rules results in undue hardship or unreasonable expense to the parties to certification proceedings, they may request specific relief by filing a formal application in accordance with the Commission's Rules of Procedure, except that where the relief to be requested is of minor importance or temporary in nature, the Commission may accept an application and showing of necessity by letter.

1.9 Revision of Rules.

Parties subject to these rules may, individually or collectively, file an application with this Commission for the purpose of amending these rules. The application shall clearly set forth the changes proposed and the reasons therefor.

1.10 Resale of Service Not Authorized.

Nothing in these rules shall be construed as authorization for resale of utility service through use of customer-provided equipment and systems.

1.11 Violations.

a. Any person or corporation making any willfully false or misleading statement or claim with respect to any filing of equipment certification or request for equipment registration is in violation of this General Order.

b. Any person or corporation making representation that equipment is certified by this Commission when such is not the fact or when certification has been suspended or revoked is in violation of this General Order.

c. Any person or corporation making representation that customer-provided equipment may be directly connected to the telecommunications network, except as provided by this General Order, or as otherwise provided by the filed tariffs of the utility, is in violation of this General Order.

d. Any complaint alleging violation of this General Order and the rules set forth herein shall be filed in the manner and form prescribed for formal complaints by the Commission's Rules of Procedure.

e. The Commission may, in its administration of this General Order and the rules set forth herein, investigate on its own motion any violation or noncompliance with these rules by any public utility or any corporation or person other than a public utility.

1.12 Penalties.

a. Any public utility which violates or fails to comply with this General Order and the rules set forth herein is subject to the penalties set forth in Section 2107 of the California Public Utilities Code and such other penalties as may be provided by law.

b. Any corporation or person, other than a public utility and its officers, agents, or employees, which or who knowingly violates or fails to comply with this General Order and the rules set forth herein is subject to the penalties set forth in Section 2111 of the California Public Utilities Code and such other penalties as may be provided by law.

2. CERTIFICATION

2.1 Certifying Authority.

a. Certification of customer-provided equipment shall be made by a registered electrical engineer who has had direct work experience with the design and/or testing of the equipment specified in Section 5.1 of this General Order. The certifying engineer shall have no interest, pecuniary or otherwise, in any manufacturer, vendor or utility that is a party to the certification proceeding.

b. The certifying engineer shall file with the Commission an affidavit in which he shall set forth a statement of qualifying education and experience pursuant to which the certification studies required by these rules will be undertaken.

c. The Commission shall keep a roster of engineers having filed such affidavits. Such roster along with the affidavits shall be open to public inspection. No engineer shall file a certificate without first being so listed.

2.2 Facts Examined by the Certifying Engineer.

a. The certifying engineer shall examine the design specifications, operating characteristics, and interaction of the customer-provided equipment with the telecommunications network. This examination shall include an evaluation of the production and quality control methods used in the manufacture of the customer-provided equipment to determine if said methods are adequate and shall include the direction, supervision, and performance of tests necessary to ensure compliance with standards set forth in these rules.

b. The certifying engineer shall ensure, as a condition of certification, that adequate installation, maintenance, and servicing instructions are prepared and published by the manufacturer or vendor of the customer-provided equipment.

c. The certifying engineer shall examine the quality control methods in use by the manufacturer and include an adequate description of the quality control program with each certificate. Such examination must include a personal visit to the manufacturer's plant where the quality control is actually carried out. In cases where the manufacturer's production plant is located overseas, the equipment may be tested first to establish if it meets the prescribed standards and the

quality control evaluation performance subsequent to testing. Where imported equipment is subject to a 100% acceptance test, such testing may be deemed to be a substitute for manufacturer's quality control testing if such acceptance tests assure full compliance with these rules.

2.3 Preparation and Filing of the Certificate.

a. Upon determining that customer-provided equipment complies in all respects with the standards established in these rules and that the production and quality control methods used in the manufacture of said equipment are adequate, the certifying engineer shall prepare a certificate in which he shall set forth the description of customer-provided equipment being certified, its mode of operation, operating parameters, tolerances, tests performed, facilities and apparatus used in testing, statistical data on testing, and other relevant facts. The certificate shall state that the customer-provided equipment was found to comply with all requirements for direct electrical connection to the telecommunication network and shall bear the seal and signature of the certifying engineer. Equipment not found to comply with all requirements for direct electrical connection shall not be certified.

b. The certificate shall contain the following information:
   (1) A description of the customer-provided equipment.
   (2) A description of the mode of operation of the equipment.
   (3) The number of units tested.
   (4) The operating parameters and tolerances of the customer-provided equipment.
   (5) The tests performed.
   (6) Facilities and apparatus used in testing.
   (7) Statistical data on testing.
   (8) Results of required tests.
   (9) Required Quality Control and Quality Assurance programs and anticipated objectives (Manufacturer's or Agent's strategy for handling critical and major defects).
   (10) Attestation that the customer-provided device (power supply) meets the requirements of California Administrative Code, Title 24.
   (11) Statement whether equipment can be used for monitoring or recording purposes and the equipment's method of providing notice to *all* parties of a communication being monitored or recorded.

c. The following material shall be attached to the certificate:
   (1) Photographs of the customer-provided equipment with cover(s) removed and with cover(s) in place.

(2) Schematic drawing(s) of the circuitry of the customer-provided equipment, including all power supply, interface, and protective circuitry. Proprietary control circuitry may be shown in block diagram form.
(3) Circuit description of the customer-provided equipment.
(4) Component list with a detailed description of each component.
(5) Installation and maintenance instructions.
(6) Operating instructions.
(7) Description of the maintenance strategy and approval of same.
(8) Which class the device belongs to as defined in Section 5 of this General Order.
(9) A list of the authorized Service Centers or Repair Stations.

d. Every certificate of equipment compliance filed with the Commission shall show the name, title, address, and business affiliations of the person requesting certification, and a statement whether the manufacturer has provided the quality control data and access to the production plant to the certifying engineer. In instances where certification is made for a single item, as opposed to the type, this fact should be clearly stated on the certificate.

2.4 Registration, Acceptance and Suspension of Certificates by the Commission.

a. Certificates prepared by the certifying engineer shall be filed with the Commission which shall maintain a permanent record of such certificates. Copies of certificates shall be mailed to each telephone utility in California or to their designated representative. All photographs, drawings, and other bulky materials constituting part of the certificate shall be on a microfiche size 4" x 6" contained in an envelope attached to the certificate.

b. Upon the filing date of the certificate the Commission shall issue a registration number which along with the ringer equivalence number shall be included on an equipment identification plate attached to the certified equipment. The registration shall become effective on the 30th day following the filing of the engineer's certificate with the Commission unless deferred or suspended by the Commission.

c. Where questions arise regarding the showing set forth in a certificate, the effective date of the certification may be deferred pending completion of review by the Commission staff.

d. The Commission may suspend the effective date of the certificate due to protest received before the 20th day following

such filing or upon the Commission's own initiative. If the effective date of any certification is suspended, the Commission shall set the matter for hearing. The burden of proof that the customer-provided equipment complies in all respects with this General Order shall be on the party seeking the certificate.

2.5 Equipment Registration.

Equipment registration shall constitute authorization by the Commission for the direct connection of the customer-provided equipment to the telecommunications network.

Equipment registration shall be based on certification submitted by the certifying engineer.

Equipment registration shall apply to all units which are manufactured equivalents to the tested sample(s) and to all other manufactured units which have not been changed in a manner that results in a deviation of performance characteristics from the specifications on which the certification of the type is based.

Issuance of registration by the Commission shall not constitute either approval or disapproval of the certifying engineer's judgment. The responsibility for certification shall remain with the certifying engineer at all times.

2.6 Assurance of Continued Proper Maintenance of Certified Equipment.

a. The manufacturers or vendors of certified customer-provided equipment shall be responsible for continued availability of maintenance, repairs, and parts for the certified equipment.

b. The manufacturers or vendors of certified equipment shall as a condition of certification offer a maintenance agreement in the form of a maintenance contract for a specified period with provisions for renewal. The agreement shall provide for prompt service calls, repairs by qualified personnel, and replacement of parts.

2.7 Assurance of Continued Quality of Certified Equipment.

The manufacturer of certified equipment shall keep a record of quality control data and procedures and make this information available to the certifying engineer.

Each item of equipment produced shall have a serial number assigned and permanently affixed to the equipment. The record of quality control data will include a listing of equipment produced with the serial numbers and production dates of each production run. Any changes in manufacturing methods, procedures, testing, or components used shall be noted on the quality control records along with the serial numbers of units affected by such changes. The certifying engineer shall examine such records on a yearly basis to determine whether the

quality and design of the manufactured equipment continues to conform to the standards of Section 5 of these rules. A report of said annual examination shall be filed with the Commission by the certifying engineer. Such a report shall be filed within 30 days after the completion of the first year after the date of certification and within 30 days of the completion of each subsequent year.

2.8 Decertification.

a. Certified equipment that causes actual harm to the telecommunications network shall be decertified upon a showing before and a finding by the Commission that actual harm to the telecommunications network has occurred and that said harm is attributable to failure of the customer-provided equipment to meet the minimum standards set forth in these rules.

b. Equipment that was certified as a result of the certifying engineer's error shall be decertified as of the date when it was originally issued upon a showing before and finding by the Commission.

c. Where it is shown that units produced after a certain date fail to meet the standards of these rules, the Commission may order decertification of units produced after that date.

d. Failure to make a timely filing of assurance of continued Quality of Certified Equipment pursuant to Section 2.7 of these rules shall constitute automatic decertification.

e. The burden of proof that a device does not meet the certification standards shall be on the party initiating the decertification proceedings.

f. Decertification shall apply to all items of customer-provided equipment having the same registration number.

g. The registration number issued to customer-provided equipment that is decertified shall not be issued again.

h. Any party may initiate a decertification proceeding. The petition for decertification shall be filed in the form and manner specified for formal complaints in the Commission's Rules of Procedure.

2.9 Evidence of Network Harm Required for Decertification.

Potential harm shall not be considered cause for action.

Allegations of actual harm shall be fully documented when brought to the attention of the Commission.

Evidence supporting allegations of actual harm to the telecommunications network shall, when applicable, include information concerning the sampling methodology and key statistical parameters relied upon to establish said harm.

Evidence of actual harm attributable to customer-provided equipment shall be considered only when accompanied by statistics on performance of equivalent utility-provided equip-

ment tested under similar circumstances to serve as a control. This requirement does not apply when equivalent utility-provided equipment is not available.

In assessing the statistics, data, and other evidence of actual harm to the telecommunications network, it shall be determined if systematic statistical differences exist with respect to the actual harm between the customer-provided equipment or the utility-provided equipment.

Customer-provided equipment shall not be deemed to cause harm to the telecommunications network if its failure to operate within the minimum standards of these rules is attributable to utility-provided protective coupler.

2.10 Protests.

Protests against certification of customer-provided equipment shall include a statement signed and sealed by a Registered Electrical Engineer, who shall specify, with particularity, the standards of these rules which the equipment fails to meet and the degree in which the equipment deviates from the standards.

The report of the protesting party's engineer shall be prepared in like manner and include the same elements as prescribed in Section 2.3 of these rules.

2.11 Foreign Quality Standards.

Customer-provided equipment manufactured in a state or country which has established quality standards shall be certified only if it complies with the quality standards of its state or country of origin.

Compliance with said quality standards shall be a prerequisite but not a substitute for certification.

2.12 Individually Designed Custom-Built or Prototype Equipment.

Custom-built or prototype equipment may be certified if such equipment can be shown to operate within the prescribed standards and if there is reasonable assurance that it will not be modified or otherwise tampered with. In such cases the certificate must clearly state that it applies only for the specific item and describe the circumstances and use that will be made of such equipment. There shall also be reasonable assurances on the part of the certifying engineer that the certified equipment is a final design prototype or custom-built item, that it is constructed in a manner that will not lend itself readily to disassembly and modification, and that if the equipment is altered, modified, or disassembled the PUC will be notified with the understanding that the certificate of such disassembled item will be cancelled.

2.13 Prevention of Fraudulent Use.

The certifying engineer in examining equipment, such as call diverters, which may be accessed from the telephone network,

shall determine if in any mode of operation the equipment is capable of access by unauthorized persons who may subsequently utilize the equipment to make calls into the telephone network which will be billed to the subscriber who has such equipment connected. If such unauthorized access is possible purchasers of such equipment must be informed of their responsibility for any charges resulting from unauthorized access to the network through their equipment. This notice must be given on a label attached to the equipment and in the instructions furnished with it. The certifying engineer shall include a statement in the certificate whether the equipment conforms with this requirement. All equipment manufactured on and after October 1, 1976, shall be constructed in such a manner as to positively prevent access to the toll network by unauthorized persons who may reach the customer-owned equipment on incoming lines. No certification may be made for equipment not meeting this requirement manufactured after such date.

2.14 Inter-system Wiring:

Installers of customer-provided PBX, KTS, or other switching equipment that have inter-system wiring as defined in Section 1.3 shall file with the Commission and the particular utility involved the following information:

(1) A description of the customer-provided system.

(2) Schematic drawings of all inter-system wiring on the premises showing the spacing between the presently existing power lines, earth ground, and the inter-system wiring of the customer-provided equipment.

(3) A statement by the installer that the inter-system wiring complies with the rules and regulations of Section 5.3 and 5.4 of this order.

3. PROCEDURES ON CERTIFIED DEVICES

3.1 Notification to Utilities.

The customer shall inform the utility of his intention to use certified equipment. Upon receiving such notification, and after payment of any required advance charges, the utility shall provide a connecting device and such information necessary to effect the interconnection of the certified equipment to the telecommunications network. Rates and charges for connecting devices shall be set forth in the utility's tariffs on file with this Commission.

3.2 Notification to Purchasers of Equipment.

Manufacturers or vendors shall be responsible to notify the users of customer-provided equipment that the equipment has been certified and that the registration by the Commission means only that the equipment has been certified as harmless

to the telecommunciations network without expressing or implying any guarantee of its continued satisfactory performance in other respects.

3.3 Advertising and Promotion Requirements.

No person shall, in any advertising matter, brochures, or other promotional material, use or make reference to equipment certification in a deceptive or misleading manner, or convey the impression that customer-provided equipment registration implies more than a determination that the device is capable of compliance with the applicable minimum standards set forth in these rules. Failure to comply with the provisions of this section may result in a suspension of certification. A suspension of certification shall not affect customer-provided equipment directly connected to the telecommunications network prior to the suspension. However, no customer-provided equipment, whose certification has been suspended, may thereafter be directly connected to the telecommunications network during such time as the suspension of certification remains in effect.

3.4 Demarcation of the Utility and Customer-Provided Equipment.

In all installations where customer-provided equipment and circuits are connected to utility-provided equipment and circuits the boundaries between the two classes shall be readily accessible and clearly marked so that lines of demarcation shall be easily discernible.

3.5 Malfunction Testing.

Whenever feasible there shall be provision for easy and immediate disconnection of customer-provided equipment to enable users, in the event of service malfunction, to determine if the malfunction is still present when the customer-provided equipment is disconnected from the telecommunications network. When the malfunction is still present with the customer's equipment removed, it may be assumed that the difficulty exists in the utility's system. When the malfunction terminates upon removal of the customer's equipment, it may be presumed that the difficulty exists in the customer's equipment.

3.6 Procedure When Harm to Network Occurs.

a. Utilities may require customers causing actual harm to the telecommunications network facilities or services to cease from causing said harm.

b. Upon notifying the Commission, a utility may immediately discontinue service to any customer causing that type of actual harm which results in hazards to personnel or in serious degradation of service affecting other than the customer using customer-provided equipment.

c. Except as provided above, a utility may not disconnect a

customer's service for non-compliance with these rules except upon five days' notice in writing to the affected customer.

d. The utility may in situations described under sections (b) and (c) of this paragraph substitute installation of a protective coupler for the disconnection of service.

3.7 Service Call Charges.

The utility is authorized to charge for service calls when such calls are found to be attributable to malfunctions of customer-provided equipment. Such charges shall be specified in the utility's filed tariffs.

3.8 Reporting Procedure for Noncompliance.

A reporting procedure on customer-provided equipment which fails to continue to meet the minumum standards set forth in these rules shall be developed after the standards and the initial procedures have been promulgated. This reporting procedure shall establish the need for further testing and for decertification of equipment.

3.9 Responsibility of the Utility When Making Changes in Telecommunications Network.

a. When the utility decides to make technical changes or modifications in the telecommunications network and such changes or modifications require an alteration of the minimum standards that must be met by customer-provided equipment, it shall promptly inform the Commission and all users of customer-provided equipment connected to the telecommunications network as well as the manufacturers or vendors of said customer-provided equipment of the forthcoming change and of the new minimum standards that will have to be met by the customer-provided equipment.

b. Upon a showing before and a finding by the Commission that the technical changes or modifications in the telecommunications network require revision of the minimum standards set forth in these rules, manufacturers, vendors, and users of customer-provided equipment shall be required to have their equipment certified with respect to the new standards within 90 days after the establishment of such standards.

c. When the utility makes technical changes or modifications in its system which do not require an alteration of minimum standards, but which may affect the operation of the customer-provided equipment, the utility shall provide reasonable public notice of such change or modification. Examples of such changes include changes in dialing characteristics, dial tone, loop loss, etc.

4. PROCEDURES ON NON-CERTIFIED DEVICES

4.1 Requirements for Connecting Arrangements.

a. Non-certified customer-provided equipment shall be connected through a protective coupler unless otherwise provided by the utility's filed tariffs.

b. The protective coupler may be provided either by the utility or by the customer. A customer-provided protective coupler must be certified under the provisions of these rules. Customer-provided protective couplers shall be used only with those classes of equipment specified in Rule 5.1.

4.2 Notices by Utility to Purchasers of Equipment.

Upon request the utility shall inform a customer of the type of protective coupler required for the customer-provided equipment in which the customer expresses interest.

4.3 Notices by Utility to Manufacturers and Vendors.

Upon request the utility shall inform a manufacturer or vendor of customer-provided equipment of the type of protective coupler required for the equipment which it manufactures or offers for sale.

5. GENERAL STANDARDS FOR INTERCONNECTION

5.1 Classes of Customer-Provided Equipment for Direct Electrical Connection.

a. Class 1—Station Auxiliary Equipment—Ancillary Equipment.

Equipment used in connection with primary station equipment. Such equipment shall have a customer-provided plug to be connected to the telecommunications network only through a utility-provided jack. The jack and plug shall be arranged in such a way as to permit disconnection of the customer-provided equipment without disrupting the utility's facilities.

b. Class 2—Multi-Line Station Auxiliary Equipment—Ancillary Equipment.

Equipment used in connection with primary station equipment or systems involving connection with more than one central office line. Such equipment shall be provided with one of the following means of disconnection:

(1) A plug to be used in conjunction with a utility-provided jack.

(2) A patching panel wired to the customer-provided equipment with a terminal block to which the utility line extensions are connected.

(3) A switching or other disconnect arrangement wired to the customer-provided equipment with a terminal block to which the utility line extensions are connected.

(4) A combination of the above. The disconnection facilities

shall be arranged to permit disconnection of the customer-provided equipment without disruption of the utility's facilities.

c. Class 3—Customer-Provided Station Equipment.

Equipment used as telephone instruments, such as key and non-key telephones, on a single central office line. Such equipment shall have a customer-provided plug to be connected to the telecommunications network only through a utility-provided jack. The jack and plug shall be arranged in such a way as to permit disconnection of the customer-provided equipment without disrupting the utility's facilities. Coin telephones and customer-provided equipment working in conjunction with them are excluded from this class. Party-line telephones are excluded from this class.

d. Class 4—Customer-Provided Data Terminal Equipment.

Data modems and devices used instead of utility-provided terminal equipment on a single central office line.

e. Class 5—Protective Couplers for Customer-Provided Primary Station Equipment.

Devices used for interconnecting multiple line telephone instruments or other terminal equipment, such as PBX or Key Telephone Systems which may be selectively connected to two or more central office lines. The coupler shall be connected to a utility-provided jack or connecting block. The disconnection facilities shall be arranged in such a way as to permit disconnection of the customer-provided equipment without disruption of the utility's facilities. Equipment working behind protective couplers that do not meet the requirements of Sections 5.6, 5.9 or 5.10 of this General Order must be certified to meet the requirements specified in these sections.

5.2 Maintenance and Disconnection.

a. General Requirement.

The maintenance of customer-provided equipment is the responsibility of the customer. The equipment while connected to the utility's system shall be maintained in such a manner as to assure absence of harm to the network.

b. Requirements According to Class.

(1) Class 1—No specific maintenance requirement.

(2) Class 2—No specific maintenance requirement except where two utility lines are connected together to provide a continuous communications path and an amplifier is inserted in such path in which case adjustments affecting circuit gain shall be made by a qualified technician.

(3) Class 3—No specific maintenance requirement.

(4) Class 4—No specific maintenance requirement except

where signal levels applied to the line are amplified or electronically generated in which case adjustments of signal level shall be made only by a qualified technician.

(5) Class 5—No specific maintenance requirement.

c. Persons Authorized to Perform Maintenance.

All maintenance shall be carried out only by qualified technicians.

d. Disconnection of Equipment Causing Actual Harm.

Customer-provided equipment shall be disconnected from the telecommunications network if actual harm is indicated and attributed to the customer-provided equipment. Such equipment shall not be reconnected until the malfunction causing actual harm to the telecommunications network is corrected.

e. Records of Maintenance.

Users of customer-provided equipment shall keep and make available for inspection records of maintenance and repair work carried out in accordance with these rules. Such records shall show the date and description of all work and tests performed on said equipment and the name and address of the person performing the maintenance. Absence of maintenance records shall create a presumption that equipment maintenance requirements have not been met and may subject the particular equipment to disconnection from the telecommunications network.

f. Manuals.

Manufacturers or vendors of customer-provided equipment shall furnish appropriate installation and maintenance instruction manuals with each item of customer-provided equipment.

5.3. Power Supplies and Wiring Methods.

a. Connection to Commercial Power Sources.

No connection of customer-owned equipment shall be made to commercial alternating current power and lighting sources except through an isolation transformer which is a constituent part of the customer-provided equipment. Transformers used in this service shall have a breakdown voltage rating of not less than 1500 volts rms between primary and secondary windings and between either winding and ground.

b. Connection to Communication Utility Power Supply.

Customer-provided equipment may be connected to sources of low-voltage, current-limited power provided by the utility pursuant to the rates, charges, and conditions set forth in the utility's filed tariffs.

c. Battery Power.

Customer-provided equipment may be operated by self-

contained battery supplies. Any battery charging apparatus connected to commercial alternating current power sources shall meet the requirements of paragraph a., above.

d. Wiring Methods.

Wiring methods used to interconnect units of customer-provided equipment shall be in accordance with the provisions of California Administrative Code, Title 24, Article E725 for Class 2 remote control and signal circuits.

5.4. Hazardous Voltages and Currents.

Voltages and currents in the telecommunications network are considered hazardous if they are present at sufficiently high levels to endanger the safety of personnel, cause irreversible damage to the utility plant or equipment, or interfere with the service.

a. Voltages and Currents Applied to Central Office Lines of the Telecommunciations Network.

(1) No alternating current potentials shall be applied between tip and ring conductors or between tip and ring to ground except for the tip and ring signal in the transmission mode.

(2) No direct current energy sources shall be applied to the telephone lines except in the case of customer-provided equipment using ground start signaling.

(3) Transients applied to telecommunications network shall consist only of interruptions of the central office battery power.

(4) In instances where transients are generated in the customer-provided equipment transient suppression circuits shall be included in the equipment to limit the peak transient voltage applied to the telecommunications network to not more than 600 volts and the decay time of said transient voltage to not more than 5 milliseconds.

b. Voltages and Currents Applied to Customer-Provided Facilities and Equipment of Utility-Provided Private Lines.

(1) Steady-state voltages applied at the point of connection to the utility's facilities shall be limited as follows:

(a) The peak alternating current voltage between the tip and ring conductors shall not exceed 71 volts. In cases where the peak voltage between either conductor and ground does not exceed 71 volts, the voltage between the two conductors shall not exceed 142 volts.

(b) The direct current voltage between tip and ring conductors shall not exceed 135 volts. In cases where the voltage between either conductor and ground does not exceed 135 volts the direct current

voltage between the two conductors shall not exceed 270 volts.

(c) The peak alternating current voltage between either conductor and ground shall not exceed 71 volts.

(d) The direct current voltage between either conductor and ground shall not exceed 135 volts.

(2) The short circuit current in any conductor shall not exceed 0.35 amperes rms.

(3) The maximum continuous current in either the tip or ring conductor shall not, except when permitted by the utility, exceed 0.12 amperes rms.

(4) Transient voltages associated with current interruptions shall not exceed 600 volts with a decay time limited to 5 milliseconds.

c. Leakage Current.

(1) The leakage current from the connecting device leads (connected together) to the power conductors (connected together) and from power conductors (connected together) to exposed surfaces of customer-provided equipment shall not exceed 2.5 milliampere rms when the applied test voltage is 1,500 volts rms at 60 hertz or 2,250 volts dc in cases where equipment includes capacitors connected to ground for interference control.

(2) The leakage current from the connecting device leads (connected together) to exposed surfaces must be less than 2.5 milliampere rms when the applied test voltage is 1,000 volts rms at 60 hertz.

The duration of the test must be no shorter than the time required for establishing a steady state.

(3) In cases where the above prescribed voltages could damage solid state component of the equipment appropriately modified tests may be substituted to establish compliance with insulation standards.

d. Components or modules of customer-provided equipment in which voltages in excess of 150 volts are required shall be designed so that:

(1) None of said voltages may appear on any external leads or terminals of such equipment at any time.

(2) All external handles, controls, and cables accessible to operating personnel shall be effectively grounded.

(3) Parts where high voltage is present shall be enclosed in a metal frame or grid, or separated from other parts by a barrier or other equivalent means, all metallic parts of which shall be effectively grounded.

(4) All access to parts where high voltage is present shall be

provided with interlocks which will disconnect all voltages in excess of 150 volts when any access door is opened.

(5) Proper bleeder resistors or other automatic means shall be installed across the capacitor banks to lower any residual voltage to less than 150 volts within 5 seconds after the access door is opened.

5.5 Surge Voltage Protection.

Protective devices providing a path to ground for voltages exceeding 600 volts shall be installed between the telecommunications network connecting device and any customer-provided equipment exposed either by metallic contact or by induction to extraneous voltages exceeding 600 volts.

5.6 Signal and Noise Power.

a. Reference Transmission Level Point.

A suitable point shall be designated as the reference transmission level point. Said point shall be designated as zero level point in all plans and other documents. All level points on either the utility-provided or customer-provided portion of the circuit shall be referred to the reference transmission level point by the difference in the nominal loss or gain in decibels between these points at a frequency of 1,000 hertz.

b. Signal Power Limit.

The power of the signal in the 300–3,995 Hz frequency band generated by customer-provided equipment received at the central office shall not exceed 12 decibels below one milliwatt when averaged over any 3-second interval. This requirement is deemed to be met when the level at the customer-provided equipment does not exceed 9 decibels below one milliwatt when averaged over any 3-second interval.

The power of the signal applied by the customer-provided equipment to the connecting device shall be specified for each type of equipment, but in no case shall it exceed one milliwatt when averaged over any 3-second interval.

c. Out of Band Signal Power.

The signal power delivered by customer-provided equipment shall meet the following limits:

Frequency Range	*Maximal Allowed Power*
3,995– 4,005 hertz	−18 db*
4,005–10,000 hertz	−16 dbm
10,000–25,000 hertz	−24 dbm
25,000–40,000 hertz	−36 dbm
40,000 hertz and above	−50 dbm

* The power in this frequency range shall be at least 18 db below the power specified in paragraph 5.5 b.

d. Single Frequency Restriction.

The power delivered by customer-provided equipment at the connecting device in the 2,450 to 2,750 hertz frequency band shall never exceed the power present at the same time in the 800 to 2,450 hertz band.

e. Longitudinally Applied Signals.

Any alternating current signal applied longitudinally between the tip and/or ring simplexed to ground terminals shall not exceed −40 dbm in power.

f. Noise to Noise Plus Signal Power.

Noise power introduced by customer-provided equipment shall be limited so that the noise power shall be at least 40 decibels below the noise plus signal power.

5.7 Nonlinearity Distortion at Signaling.

When signaling for network purposes, nonlinearities in customer-provided equipment circuits shall not produce harmonic components or intermodulation products that are less than 30 decibels below the composite signal level for any of the 16 dual-tone multifrequency pairs specified for tone address signaling for any composite signal power levels lower than +3 decibels above one milliwatt.

5.8 Longitudinal Balance.

At all frequencies between 200 and 4,000 hz, for currents between 20 and 120 milliamperes, the voltages, referenced to ground, on the conductors to be connected to a 2-wire loop, shall not differ in value by more than one percent.

5.9 Dial Pulsing Characteristics.

a. Coordination with Utility Specifications.

Utilities shall publish in their tariffs technical criteria for network control signaling and supervision. Any method of network control signaling shall be coordinated in detail with the utility specifications.

The certifying engineer shall submit records of measurements to document compliance with the required network control signaling specifications.

b. Digit Codes.

A dialed address digit shall consist of a number of pulses (interruptions or breaks in line current) numerically equal to the value of the digit dialed between 1 and 9, and be equal to 10 pulses when the digit 0 is dialed.

c. Allowable Speed.

Dial pulses shall have a repetition rate falling in the range of 8 to 11 pulses per second and be uniform in speed. The speed uniformity requirement for make intervals T_n and break intervals t_n measured in seconds shall be $0.091 < t_n + T_n < 0.125$ and $0.091 < T_{n+1} + T_n < 0.125$, where n is the sequential index of the intervals in a pulse train.

d. Allowable Percent Break.

The pulses shall be generated in a uniform train by breaking and making the line current with a 58 to 64 percent break. The percent break uniformity requirement is met if the break intervals t_n and make intervals T_n satisfy the conditions $0.58 < t_n/(t_{n+1} + T_n) < 0.64$ and $0.58 < t_n/(T_{n-1} + t_n) < 0.64$.

e. Interdigital Time.

For an automatically operated dialing function the time between the end of the last pulse of a given digit and the beginning of the first pulse of the succeeding digit shall be greater than 700 milliseconds and less than three seconds. The three-second restriction shall not apply if the digits concerned are separated by a dialing pause. Equipment with interdigital time of not less than 600 milliseconds may be used in instances where such delay is compatible with the utility's switching system.

f. Chatter and Split Pulses.

Pulsing contact chatter shall not exceed 3 milliseconds. Split pulses shall not occur.

g. Pulsing Pair Impedance.

(1) Nonpulsing State.

The dialed circuit pulsing impedance shall be substantially nonreactive and of such magnitude that the voltage drop across the device shall not exceed 5 volts for currents in the range between 20 and 120 milliampere. The dialer circuit shall be capable of carrying a continuous current of 200 milliampere dc and a surge of 330 milliampere for 1 second.

(2) Pulsing State.

The pulsing circuit impedance Z shall be resistive and smaller than 1 ohm during the make periods and have an impedance satisfying the condition $Z > 150$ kilohm for $0 < f < 5$ hertz; $Z > 750/f$ kilohm for $5 < f < 3{,}400$ hertz where f denotes the frequency in hertz, during the break period.

h. Muting Pairs.

During the nonmuting state, the magnitude of the impedance between leads of each muting pair shall satisfy the condition $Z > 2{,}000$ kilohm for $10 < f < 200$ hertz; $Z > 2 \times 10^5/f^{0.85}$ kilohm for $200 < f < 3{,}400$ hertz.

The muting contacts shall return to the nonmuting state in less than 2 seconds after pulsing is completed or after stopping for dialing pause.

i. Spurious Opens.

Short interruptions (spurious opens) in loop current not associated with the make-to-break dial pulse transitions shall

be limited to not more than one millisecond. The spurious interruptions shall be separated by at least 100 milliseconds and must not occur in the period starting 100 milliseconds before the first make-to-break transition and ending 100 milliseconds after the last break-to-make transition of any dial pulse train.

5.10 Tone Address Signaling.

a. (1) Assigned Frequency Pairs.

The frequency pairs assigned for signaling shall be as follows:

High Group					
Low Group	*1209*	*1336*	*1477*	*1633*	*Hertz*
697	1	2	3	—	
770	4	5	6	—	
852	7	8	9	—	
941	*	0	#	—	
hertz					

Frequency pairs not assigned to a character are indicated by dashes.

(2) The signal power levels shall be as follows:

Nominal level per frequency	−6 to −4 dbm
Minimum level per frequency	
Low Group	−10 dbm
High Group	−8 dbm
Maximum difference in levels between frequencies	4 db
Maximum level per frequency pair	+2 dbm

b. Frequency Deviation.

Frequency deviation shall not exceed ± 1.5 percent of the nominal value.

c. Extraneous Frequency Components.

The total power of all extraneous frequencies accompanying the signal shall be at least 20 db below the signal power in the voice band above 500 hertz.

d. Voice Suppression.

Voice energy from the telephone transmitter or other source should be suppressed at least 40 db during tone signal transmission. In the case of automatic dialing the suppression shall be maintained continuously until pulsing is completed.

e. Rise Time.

Each of the two frequencies of the signal shall attain at least 90 percent of full amplitude within 5 milliseconds and preferably within 3 milliseconds for automatic dialers, from the time that the first frequency begins.

f. Pulsing Rate.

Pulsing rates shall be as follows:

Minimum duration of two-frequency tone signal: 50 milliseconds

Minimum interdigital time: 45 milliseconds

Minimum cycle time (period): 100 milliseconds

g. Tone Leak.

The power of the tone leak during signal off time shall be less than −55 dbm.

h. Transient Voltages.

Peak transient voltages generated during tone signaling shall not be greater than 12 db above the zero-to-peak voltage of the composite two-frequency tone signal.

5.11 Impedance.

a. On-hook Impedance

(1) Customer-provided equipment shall have an on-hook impedance between tip and ring terminals of not less than the equivalent impedance of four ringers of 2,500 ohms resistence in series with a capacitance of 0.5 microfarad in the frequency range between 16 and 67 hertz.

(2) Customer-provided equipment shall have an impedance of not less than 20,000 ohms in the frequency range between 300 and 3,400 ohms.

(3) During the on-hook condition, the application of ringing signals shall not cause the customer-provided equipment to draw more than 15 milliamperes of current prior to line seizure.

b. Off-hook Impedance.

(1) The magnitude of the off-hook impedance between the tip and ring terminals of customer-provided equipment shall be greater than 400 ohms over the frequency range between 250 to 3,400 hertz.

(2) The off-hook direct current resistance from tip or ring to ground shall be greater than 10 kilohms.

(3) The impedance of the customer-provided equipment shall be designed for optimum voice signal power transfer.

5.12 Environmental Conditions.

Operating parameters of customer-provided equipment subject to minimum standard requirements prescribed in these rules shall remain within the specified minimum standard limits under the following conditions (not measured simultaneously).

a. Temperature range between −10 degree and +50 degree Celsius.

b. Relative humidity range between 10 and 95 percent.

c. Mechanical shock that may be expected in normal handling

including a drop from an elevation of 0.75 meter for portable equipment.

Storage environment temperatures between −40 degree and +65 degree Celsius shall not cause the operating parameters to remain permanently outside the minimum standard limits prescribed by these rules.

Degradation of capability to meet minimum standards at temperatures below the freezing point due to a continuous frost buildup shall not be considered failure to meet the requirements of this section.

Approved and dated at San Francisco, California, this 22nd day of April, 1975.

PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

By WILLIAM R. JOHNSON
Secretary

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