

(v) The charging equipment shall be provided with a means for indicating a failure of charging current whether due to ac power failure, an internal failure in the charger, or to other circumstances which might cause the output voltage of the charger to drop below the battery voltage. Where a supplementary constant current charger is used, an alarm shall be provided to indicate a failure of the charger.

(vi) Audible noise developed by the charging equipment shall be kept to a minimum. Acoustic noise resulting from operation of the rectifier shall be expressed in terms of dB indicated on a sound level meter conforming to American National Standards Institute S1.4, and shall not exceed 65 dB (A-weighting) measured at any point 5 feet (1.5m) from any vertical surface of the rectifier.

(vii) The charging equipment shall be designed so that neither the charger nor the central office equipment is subject to damage in case the battery circuit is opened for any value of load within the normal limits.

(5) *Power panel.* (i) Battery and charger control switches, dc voltmeters, dc ammeters, fuses and circuit breakers, supervisory and timer circuits shall be provided as required. Portable or panel mounted frequency meters or voltmeters shall be provided as specified by the owner.

(ii) Power panels, cabinets and shelves, and associated wiring shall be designed initially to handle the line concentrator terminal when it reaches its ultimate capacity as specified by the owner.

(iii) The power panel shall be of the "dead front" type.

(6) *Ringling equipment.* The ringling system shall provide sufficient ringling on a bridged basis over the voltage and temperature limits of this section and over subscriber drops within the limits stated by the bidder. The ringling system shall be without operational problems such as bell tapping during dialing. The bidder shall state the minimum number (not less than two) of main station ringers that can be used for each ringling option available.

(7) *Interrupter equipment.* The interrupter may be an integral part of the system or may be part of the associated central office equipment connected to the line concentrator central office terminal.

(8) *Special systems.* Manufacturers of LC systems that operate by extending ringling current from the central office shall state their required input ringling (voltage and frequency) and the limitations on the connected subscriber loop.

(m) *Fusing requirements—(1) General.*

(i) The equipment shall be completely wired and equipped with fuses, trouble signals, and all associated equipment for the wire capacity of the frames or cabinets provided.

(ii) Design precautions shall be taken to prevent the possibility of equipment damage arising from the insertion of an electronic package into the wrong connector or the removal of a package from any connector or improper insertion of the correct card in its connector.

(2) *Fuses.* Fuses and circuit breakers shall be of an alarm and indicator type, except where the fuse or breaker location is indicated on the alarm printout. Their rating shall be designated by numerals or color codes on the fuse or the panel.

(n) *Trouble location and test—(1) Equipment.* (i) Trouble indications in the system may be displayed in the form of lights on the equipment units or printed circuit boards.

(ii) When required, a jack or other connector shall be provided to connect a fault or trouble recorder (printer or display).

(2) *Maintenance system.* (i) The maintenance system shall monitor and maintain the system operation without interruption of call processing except for major failures.

(ii) The maintenance system shall be arranged to provide the ability to determine trouble to an individual card, functional group of cards, or other equipment unit.

(o) *Spare parts.* Lists of spare parts and maintenance tools as recommended by the bidder shall be provided. The cost of such tools and spare parts shall be indicated and shall not be included in the base price.

(p) *Drawings and printed material.* (1) The bidder shall supply instructional material for each line concentrator system involved at the time of delivery of the equipment. It is not the intent of this section to require system documentation necessary for the repair of individual circuit boards.

(2) Three complete sets of legible drawings shall be provided for each central office to be accessed. Each set shall include all of the following:

(i) Drawings of major equipment items such as frames, with the location of major component items of equipment shown therein;

(ii) Wiring diagrams indicating the specific method of wiring used on each item of equipment and interconnection wiring between items of equipment;

(iii) Maintenance drawings covering each equipment item that contains replaceable parts, appropriately

identifying each part by name and part number; and

(iv) Job drawings including all drawings that are individual to the particular line concentrator involved such as mainframe, power equipment, etc.

(3) The following information shall also be furnished:

(i) A complete index of required drawings;

(ii) An explanation of electrical principles of operation of overall concentrator system;

(iii) A list of tests which can be made with each piece of test equipment furnished and an explanation of the method of making each test;

(iv) A sample of each form recommended for use in keeping records;

(v) The criteria for analyzing results of tests and determining appropriate corrective action;

(vi) A set of general notes on methods of isolating equipment faults to specific printed circuit cards in the equipment;

(vii) A list of typical troubles which might be encountered, together with general indications as to probable location of each trouble; and

(viii) All special line concentrator system grounding requirements.

(4) When installation is to be done by the bidder a complete set of drawings shall be provided by the owner, such as floor plans, lighting, grounding and ac power access.

(q) *Installation and acceptance.—(1) General.* Paragraphs (q)(2)(i) through (q)(3)(xxi) of this section covers the general requirements for the installation of line concentrator equipment by the bidder, and outlines the general conditions to be met by the owner in connection with such installation work. The responsibilities apply in both the central office installation and remote terminal installations, unless otherwise noted.

(2) *Responsibilities of owner.* The owner shall:

(i) Allow the bidder and its employees free access to the premises and facilities at all hours during the progress of the installation;

(ii) Provide access to the remote site and any other site for development work needed during the installation;

(iii) Take such action as necessary to ensure that the premises are dry and free from dust and in such condition as not to be hazardous to the installation personnel or the material to be installed (not required when remote terminal is not installed in a building);

(iv) Provide heat or air conditioning when required and general illumination in rooms in which work is to be performed or materials stored;