

7.0 CUSTOMER EQUIPMENT

7.01 GENERAL

The Customer shall notify the Company prior to adding electrical equipment so that facilities of proper capacity may be provided to assure satisfactory operation of the Customer's equipment and to protect both the Customer's and the Company's equipment against damage. The Customer is required to provide protection that will prevent damage to equipment from normal operations of the Company's supply system. This equipment includes motors, welders, heating equipment, voltage sensitive devices, harmonic producing equipment, x-ray equipment, and other equipment that may require special starting and protection.

7.02 MOTOR INSTALLATIONS

It is characteristic for most motors to draw a heavy momentary current on starting. The starting current for A-C motors can be on the order of three to ten times the normal running current. If sufficient capacity is not present in the Customer's circuits and in the Company's facilities serving them, the motor may not start properly, resulting in overheating, blown fuses or damage to the motor and other equipment. In addition, it may result in excessive voltage fluctuations and light flicker that may be objectionable to the Customers using the motor, as well as to other Customers supplied from the same lines. It is, therefore, necessary for the Company to place restrictions on the starting current of a motor either by limiting the size of the motor or by requiring the Customer to install suitable starting devices.

Motors installed should be suitable for operation at the service voltage available. The Customer shall consult the Company (1-800-255-3443) prior to purchasing or installing any motor to verify the voltage, frequency and phase characteristics of the services to be supplied, the capacity available, and the suitability of the proposed equipment for operation at the intended location.

The following maximum permissible motor starting currents shall apply to the installation of motors:

Equipment for Operation at:	Total Locked Rotor Current Not to Exceed:
Single-Phase	
120 volts	50 amp
240 volts	
2 hp or less	60 amp
2 hp to 6.5 hp	60 amp plus 20 amp per hp in excess of 2 hp
Over 6.5 hp	Consult Company*
Three-Phase	
240 volts**	
2 hp or less	50 amp
2 hp to 19.9 hp	50 amp plus 14 amp per hp in excess of 2 hp
Over 19.9 hp	Consult Company

*Upon proper application, the Company will investigate the possibility of serving single-phase capacitor start, capacitor run motors larger than 6.5 hp where such service does not adversely affect our Customers.

****Three-phase supply is not available for residential rate schedule service.**

For poly-phase motors and equipment to be operated at voltages other than 240 volts, the locked rotor currents specified for 240 volts shall be multiplied by the inverse ratio of the voltages.

Where equipment, ratings or starting characteristics other than those covered in the preceding table are being considered, the Company will furnish information regarding higher starting currents for single-phase motors and 3-phase motors which will be permitted under specific conditions. Permissible starting currents will depend upon the size of the motor, the frequency of the starting, the character of the Customer's load, and the design and capacity of the Company's supply system in the area. Generally, this will be equivalent to the maximum starting current that, in the Company's opinion, can be supplied without causing undue interference with service to other Customers. Whenever a starting current that is not covered in the preceding table causes undue interference with service to other Customers, the Customer shall provide a starting device of a type that will reduce the starting current to the value required to eliminate such interference.

The Customer shall contact the Company prior to the installation of any D-C motor or adjustable speed drive.

7.03 REQUIRED EQUIPMENT PROTECTION

It is the **Customer's responsibility** to provide protection in accordance with the Customer's requirements and any applicable codes.

Specifically, the use of phase-failure and phase-reversal relays, are **required** on all new poly-phase motor installations. It is also highly recommended that existing poly-phase motor installations be retrofitted with phase-failure and phase-reversal relays to protect the motors from damage. Single-phasing conditions in the electrical supply system may damage motors. The Customer has several options to provide phase-failure and phase-reversal protection. Some of the options are as follows:

- (a) One phase-failure and phase-reversal device may protect single motor or a group of motors.
- (b) The phase-failure and phase-reversal device can be installed on each motor and open all motor contacts

and/or the device can activate an alarm to alert the Customer that a phase-failure or reversal condition exists.

The Company will not be responsible in any way for damage to the Customer's equipment that is due to failure of the Customer to provide adequate protection.

7.04 AIR CONDITIONERS, CENTRAL SPACE HEATING, HEAT PUMPS, INCLUDING SUPPLEMENTAL HEATING ELEMENTS IN HEAT PUMPS

Thermostatically controlled electric furnaces, boilers, and supplemental resistance heating elements in heat pumps with an installed capacity greater than 12kW shall be switched in 6kW (max.) increments at minimum intervals of 10 seconds, whether incrementally increasing or decreasing the load.

For installations greater than 24kW, the Company shall be consulted to determine staging parameters, unless switching can be accomplished in stages of 6kW as indicated in the preceding paragraph.

A Customer, installing a heat pump or air conditioner, in excess of 5 ton (single-phase) or 20 ton (three-phase), shall contact the Company prior to installation of the equipment.

7.05 ELECTRIC WATER HEATERS

The heating elements of residential electric water heaters and tank-less water heaters shall be limited to a maximum of 5,500 watts each, shall be 208 or 240 volts, thermostatically controlled and connected to prevent simultaneous operation. All water heaters shall be equipped with an American Standards Association approved pressure-temperature relief valve located in the top of the tank, a two-pole, manual reset over-temperature cutoff switch with 190°F maximum cutoff of electric supply and UL listed.

The Company shall be consulted before installing electric water heating equipment with heating elements in excess of 5,500 watts.

All bathtubs, showers, sinks, and washtubs shall have all their metallic parts, metallic water pipes, and metallic drainpipes bonded and grounded.

7.06 ELECTRIC WELDING, X-RAY, RADIO, ELECTRONIC EQUIPMENT, ETC.

Electric welding equipment shall not be connected to the Company's lines without first consulting the Company. Electric welding equipment may cause serious flicker in the Customer's lighting as well as that of other neighboring Customers. On rural lines and urban residential distribution

systems, welding equipment shall be limited to a maximum of 50 amperes when supplied at 240 volts. A transformer-type welder is recommended for use on the Company's lines. Straight resistance line voltage welders are not acceptable. Electric apparatus (such as X-ray equipment, radio, television and electronic transmitting equipment, and other electronic applications), which have an adverse effect on the Company's ability to supply adequate service to all its Customers, shall not be installed on and operated from the Company's lines until the Customer has secured specifications and available capacity from the Company.

7.07 LIGHTNING AND SURGE PROTECTION

The Company provides protection on its lines to minimize damage from lightning. The Company will not be responsible for damage to Customer's equipment because the Customer did not provide adequate lightning or surge protection or due to the failure of any such devices.

7.08 THREE-PHASE CONVERTER

Phase converters may be used to supply energy to 3-phase motors from a single-phase service. 3-phase motors served from phase converters may cause serious flicker in the Customer's lighting or adversely affect the operation of other equipment in the Customer's premises. The phase converter shall be sized properly for the load to be served in order to minimize the magnitude of voltage fluctuations caused by motor starting. The Company shall be consulted before a phase converter is installed to insure that its operation will not affect other neighboring Customers. The Company reserves the right to refuse service to a phase converter installation if it is determined that it would adversely affect the Company's ability to supply adequate service to all its Customers.