

ELECTRIC RULE 2—DESCRIPTION OF SERVICE

A. GENERAL

1. The type of service available at any particular location should be determined by inquiry at IPUC's local office.
2. Alternating-current service will be regularly supplied at a frequency of approximately 60 Hertz (cycles per second).
3. In areas where a certain standard secondary voltage is presently being served to one or more customers, an Applicant applying for new service in such areas may be required by IPUC to receive the same standard voltage supplied to existing customers.
4. All electric service described in this rule is subject to the conditions in the applicable rate schedule and other pertinent rules.
5. It is the responsibility of the Applicant to ascertain and comply with the requirements of governmental authorities having jurisdiction.
6. Service to a premise is normally established at one delivery point, through one meter, and at one voltage class. Other arrangements for service at multiple service delivery points, or for services at more than one voltage class, are permitted only where feasible and with the approval of IPUC. For purposes of this rule, distribution service voltage classes, delta or wye connected, are described as:
 - a. 0-600 volt source, single -phase, 1Ø
 - b. 0-600 volt source, three-phase, 3Ø
 - c. above 600 volt source, three-phase
7. Direct-current (d-c) or two-phase service is not available.

B. SERVICE DELIVERY VOLTAGES

1. Following are the standard service voltages normally available, although not all of them are or can be made available at each service delivery point:

Distribution Voltages		
Single-phase Secondary	Three-phase Secondary	Three-phase Primary
120/240, 3-wire	240/120, 4-wire 480/277, 4-wire*	12,000, 3-wire 2,400, 3-wire*
120/208, 3-wire*	208Y/120, 4-wire	4,160, 3-wire*
	480Y/277, 4-wire*	4,160Y/2,400, 4-wire*
		12,000Y/6,930, 4-wire*

2. All voltages referred to in this rule and appearing in some rate schedules are nominal service voltages at the service delivery point. IPUC's facilities are designed and operated to provide sustained service voltage at the service delivery point, but the voltage at a particular service delivery point, at a particular time, will vary within fully satisfactory operating range limits established in Section C.
3. The point of delivery and point of metering will normally be at the same voltage and within close proximity to each other. When IPUC determines it is not feasible for the point of delivery and point of metering to be at the same voltage and within close proximity to each other, the demand and energy meter readings used in determining the charges will be adjusted to correct for transformation and line losses. An estimated transformer loss adjustment factor of two percent (2%) will be applied to the demand and energy meter readings for each stage of transformation between the point of delivery and the point of metering, unless IPUC and the customer agree that specific transformer manufacturer test data support a different transformer loss adjustment. Line losses will be calculated as a function of the current through, and the electrical characteristics of, the line between the point of delivery and point of metering.

C. VOLTAGE AND FREQUENCY CONTROL

1. CUSTOMER SERVICE VOLTAGES

- a. Under all normal load conditions, IPUC's distribution circuits will be operated so as to maintain secondary service voltage levels to customers within the service voltage ranges specified below:

Nominal Two-Wire And Multi-Wire Service Voltage	Minimum Voltage To All Services	Maximum Service Voltage On All Services
120	114	126
208	197	218
240	228	252
277	263	291
480	456	504

IPUC's distribution voltage will be regulated to the extent practicable to maintain service voltage on residential and commercial distribution circuits within the minimum and maximum voltages specified above.

- b. Exceptions to Voltage Limits Exceptions to voltage limits voltage may be outside the limits specified when the variations:
- 1) Arise from the temporary action of the elements.
 - 2) Are infrequent momentary fluctuations of a short duration
 - 3) Arise from service interruptions.
 - 4) Arise from temporary separation of parts of the system from the main system.
 - 5) Are from causes beyond the control of IPUC, and which may be sustained duration.
- c. Where the operation of the Applicant's equipment requires unusually stable voltage regulation or other stringent voltage control beyond that supplied by IPUC in the normal operation of its system, the Applicant, at his own expense, is responsible for installing, owning, operating, and maintaining any special or auxiliary equipment on the load side of the service delivery point as deemed necessary by the Applicant.
- d. The Applicant shall be responsible for designing and operating his service facilities between the service delivery point and the utilization

equipment to maintain proper utilization voltage at the line terminals of the utilization equipment.

2. CUSTOMER UTILIZATION VOLTAGES

- a. All customer-owned utilization equipment must be designed and rated in accordance with the following utilization voltages specified by the American National Standard Institute C84.1 if customer equipment is to give fully satisfactory performance:

Nominal Utilization Voltage	Minimum Utilization Voltage	Maximum Utilization Voltage
120	100	125
208	191	216
240	220	250
277	254	289
480	440	500

Minimum utilization voltages from ANSI C84.1 are shown for customer information only as IPUC has no control over voltage drop in customer's wiring.

D. GENERAL LOAD LIMITATIONS

1. SINGLE-PHASE SERVICE

Single-phase service normally will be three-wire, 120/240 volts where the size of any single motor does not exceed 7.5 horsepower (10 horsepower at the option of IPUC). For any single-phase service, the maximum demand as determined by IPUC is limited to the capability of a 100-kva transformer and 400 amp main disconnect unless otherwise approved by IPUC. If the load requires a transformer installation in excess of 100 kva, the service normally will be three-phase.

2. THREE-PHASE SERVICE (less than 600 VOLTS)

- a. Secondary service from underground primary distribution systems (where IPUC maintains existing 3-phase primary circuits):

Nominal Voltage	Minimum Load	Maximum Demand
240/120	10 hp, 3-phase connected	500 kva
480Y/277	Demand load justifies a 75 kVa transformer	3,000 kva

- b. Where three-phase service is supplied, IPUC reserves the right to use single-phase transformers connected open-delta or closed-delta, or three-phase transformers.
- c. Three-phase service will be supplied on request for installations aggregating less than the minimums listed above where existing transformer capacity is available and approved by IPUC.
- d. Three-phase metering for one service voltage supplied to installations on one premise at one delivery location normally is limited to a maximum of a 4,000 ampere service rating. Metering for larger installations, or installations having two (2) or more service switches with a combined rating in excess of 4,000 amperes, or service for loads in excess of the maximum demand load permitted, may be installed provided approval of IPUC has been first obtained as to the number, size, and location of switches, circuits, transformers and related facilities. Service supplied to such approved installations in excess of one 4,000 ampere switch or breaker at one service delivery point may be totalized for billing purposes.

3. THREE-PHASE SERVICE (OVER 600 VOLTS)

- a. Following are three-phase voltages that may be transformed from higher existing primary distribution voltages and provided only as isolated services for a single Applicant where the Applicant's demand load justifies, as determined by IPUC, the installation of the minimum size transformer bank used by IPUC:

Nominal Voltage	Minimum Size Bank Installed	Maximum Demand Load Permitted
2,400*	500 kVa	5,000 kVa
4,160*	500 kva	5,000 kva
12,000	500 kva	12,000 kva

*Limited Availability.

- b. For its operating convenience and necessity, IPUC may elect to supply an Applicant whose demand load is in excess of 2,000 kva from a substation on the Applicant's premises supplied from a transmission source.
- c. IPUC reserves the right to change its distribution or transmission voltage to another standard service voltage when, in its judgment, it is necessary or advisable for economic reasons or for proper service to its customers.

Where a customer is receiving service at the voltage being changed, the customer then has the option to: (1) accept service at the new voltage, (2) accept service at the secondary side of an additional stage of transformation to be supplied by IPUC at a location on the customer's premises in accordance with IPUC's requirements, or (3) contract with IPUC for an additional stage of transformation to be installed as Special Facilities (including any applicable Contributions in Aid of Construction taxes) under the provisions of Section I, below, whereby the customer will be considered as accepting service at the primary side of the additional stage of transformation. Metering not relocated to the primary side of the additional stage of transformation will be subject to a transformer loss adjustment in accordance with Section B.4 of this Rule. The option to contract with IPUC for an additional stage of transformation (option 3, above) is available only once in conjunction with a change in standard voltage by IPUC.

4. LOAD BALANCE

The Applicant must balance his demand load as nearly as practicable between the two sides of a three-wire single-phase service and between all phases of a three-phase service. The difference in amperes between any two phases at the customer's peak load should not be greater than 10 percent or 50 amperes (at the service delivery voltage), whichever is greater; except that the difference between the load on the lighting phase of a four-wire delta service and the load on the power phase may be more than these limits. It will be the responsibility of the customer to keep his demand load balanced within these limits.

E. PROTECTIVE DEVICES

1. It shall be the Applicant's responsibility to furnish, install, inspect and keep in good and safe condition at his own risk and expense, all appropriate protective devices of any kind or character, which may be required to properly protect the Applicant's facilities. IPUC shall not be responsible for any loss or damage occasioned or caused by the negligence, or wrongful act of the Applicant or of any of his agents, employees or licensees in omitting, installing, maintaining, using, operating or interfering with any such protective devices.
2. It shall be the Applicant's responsibility to select and install such protective devices as may be necessary to coordinate properly with IPUC's protective devices to avoid exposing other customers to unnecessary service interruptions.
3. It shall be the Applicant's responsibility to equip his three-phase motor installations with appropriate protective devices, or use motors with inherent

features, to completely disconnect each such motor from its power supply, giving particular consideration to the following:

- a. Protection in each set of phase conductors to prevent damage due to overheating in the event of overload.
 - b. Protection to prevent automatic restarting of motors or motor driven machinery, which has been, subjected to a service interruption and, because of the nature of the machinery itself or the product it handles, cannot safely resume operation automatically.
 - c. Open-phase protection to prevent damage due to overheating in the event of loss of voltage on one phase.
 - d. Reverse-phase protection where appropriate to prevent uncontrolled reversal of motor rotation in the event of accidental phase reversal. (Appropriate installations would include, but are not limited to, motors driving elevators, hoists, tramways, cranes, pumps, conveyors, etc.)
4. The available short-circuit current varies from one location to another, and also depends on the ultimate design characteristics of IPUC's supply and service facilities. Consult IPUC for the ultimate maximum short-circuit current at each service termination point.
 5. Where an Applicant proposes to use a ground-fault sensing protective system which would require special IPUC-owned equipment, such a system may be installed only where feasible and with written approval of IPUC.
 6. Any non-IPUC-owned emergency standby or other generation equipment that can be operated to supply power to facilities that are also designed to be supplied from IPUC's system shall be controlled with suitable protective devices by the Applicant to prevent parallel operation with IPUC's system in a fail-safe manner, such as the use of a double-throw switch to disconnect all conductors, except where there is a written agreement or service contract with IPUC permitting such parallel operation.

F. INTERFERENCE WITH SERVICE

1. GENERAL

IPUC reserves the right to refuse to serve new loads or to continue to supply existing loads of a size or character that may be detrimental to IPUC's operations or to the service of its customers. Any customer who operates or plans to operate any equipment such as, but not limited to, pumps, welders, saw mill apparatus, furnaces, compressors or other equipment where the use of electricity is intermittent, causes intolerable voltage fluctuations, or

otherwise causes intolerable service interference, must reasonably limit such interference or restrict the use of such equipment upon request by IPUC. The customer is required either to provide and pay for whatever corrective measures are necessary to limit the interference to a level established by IPUC as reasonable, or avoid the use of such equipment, whether or not the equipment has previously caused interference.

2. HARMFUL WAVE FORM

Customer shall not operate equipment that superimposes a current of any frequency or waveform upon IPUC's system, or draws current from IPUC's system of a harmful waveform, which causes interference with IPUC's operations, or the service to other customers, or inductive interference to communication facilities.

3. CUSTOMER'S RESPONSIBILITY

Any customer causing service interference to others must diligently pursue and take corrective action after being given notice and a reasonable time to do so by IPUC. If the customer does not take corrective action in the time set, or continues to operate the equipment causing the interference without restriction or limit, IPUC may, without liability, after giving five (5) days written notice to customer, either install and activate control devices on its facilities that will temporarily prevent the detrimental operation, or discontinue electric service until a suitable permanent solution is provided by the customer and it is operational.

4. MOTOR STARTING CURRENT LIMITATIONS

- a. The starting of motors shall be controlled by the customer as necessary to avoid causing voltage fluctuations that will be detrimental to the operation of IPUC's distribution or transmission system, or to the service of any of IPUC's customers.
- b. If the starting current for a single motor installation exceeds the value listed for Class C or better (per N.E.C., Section 430) and the resulting voltage disturbance causes or is expected to cause detrimental service to others, reduced voltage starters or other suitable means must be employed, at the customer's expense, to limit the voltage fluctuations to a level equivalent to a Class C motor.
- c. Where service conditions permit, subject to IPUC's approval, motor starters may be deferred in the original installation. IPUC may later order the installation of a suitable starter or other devices when it has been determined that the operation of the customer's motors interfere with service to others. Also, IPUC may require starting current values

lower than those set forth herein where conditions at any point on its system require such reduction to avoid interference with service to other customers.

- d. Starters may be omitted on the smaller motors of a group installation when their omission will not result in a starting current in excess of the allowable starting current of the largest motor of the group. Where motors start simultaneously, they will be treated as a single unit equal to the sum of their individual starting currents.
- e. IPUC may limit the maximum size and type of any motor that may be operated at any specific location on its system to that which will not be detrimental to IPUC's system operations or to the service of its customers, as determined by IPUC.
- f. For installations of motors where the equipment is started automatically by means of float, pressure, or thermostat devices, such as with pumps or wind machines for frost protection, irrigation pumps or other similar installations, IPUC may require the customer to install, at his own expense and in accordance with IPUC's operating requirements, suitable preset time-delay devices to stagger the automatic connection of load to the supply system and to prevent simultaneous start-up for any reason.

G. POWER FACTOR

When lighting devices, such as neon, fluorescent, luminous gaseous, mercury vapor, and other lighting equipment having low power factors are served on street lighting or area lighting schedules, the customer shall provide, at his own expense, power factor corrective equipment to increase the power factor of each complete lighting device to not less than 90 percent.

H. CONNECTED LOAD RATINGS

1. The connected load is the sum of the rated capacities of all of the customer's electric utilization equipment that is served through one metering point and that may be operated at the same time, computed to the nearest one-tenth of a horsepower, kilowatt or kilovolt-ampere. Motors will be counted at their nameplate ratings in horsepower output and other devices at their nameplate input ratings in kW or kVa, except that resistance welders will be rated in accordance with the section of this rule regarding "Welder Service." Unless otherwise stated in the rate schedule, conversions between horsepower, kW and/or kVa ratings will be made on a one-to-one basis.
2. The normal operating capacity rating of any motor or other device may be determined from the nameplate rating. Where the original nameplate has

been removed or altered, the manufacturer's published rating may be used or the rating determined by test at the expense of the customer.

3. Motor-generator sets shall be rated at the nameplate rating of the alternating-current drive motor of the set.
4.
 - a. X-ray equipment shall be rated at the maximum nameplate kVa input operating at the highest rated output amperes. If the kVa input rating is not shown, it will be determined for single-phase loads by taking the product of the amperes input rating times the input voltage rating divided by 1,000. For three-phase equipment, multiply this product times the square root of three (1.73).
 - b. Where X-ray equipment is separately metered and supplied from a separate transformer installed by IPUC to serve the X-ray installation only, the kVa rating of IPUC's transformer or the total X-ray equipment input capacity, whichever is smaller, will be considered the load for billing purposes.

I. CONNECTED LOAD RATINGS

1. Where a customer operates a complete unit of equipment connected for three-phase service but consisting of single-phase components which cannot be readily reconnected for single-phase service, shall consider the connected load of such a unit as three-phase load.
2. Where a customer has, or expects to have, permanently-connected, three-phase load that is used infrequently or for short duration, such as, but not limited to, equipment for fire pumps, frost protection, flood control, emergency sirens or other similar installations which make it impractical to record proper demands on a monthly basis for billing purposes, the customer may, for his own reasons and with IPUC's approval, guarantee an appropriate billing demand or connected three-phase load for billing purposes in order to reserve suitable capacity in IPUC's facilities.

J. SPECIAL FACILITIES

1. IPUC normally installs only those standard facilities, which it deems are necessary to provide regular service in accordance with the tariff schedules. Where the Applicant requests IPUC to install Special Facilities and IPUC agrees to make such an installation, the additional costs thereof shall be borne by the Applicant, including such continuing ownership costs as may be applicable.

2. Special Facilities are (a). facilities requested by an Applicant which are in addition to or in substitution for standard facilities which IPUC would normally provide for delivery of service at one point, through one meter, at one voltage class under its tariff schedules, or (b). a pro rata portion of the facilities requested by an Applicant, allocated for the sole use of such Applicant, which would not normally be allocated for such sole use. Unless otherwise provided by IPUC's filed rate schedules, Special Facilities will be installed, owned and maintained by as an accommodation to the Applicant only if acceptable for operation by IPUC, and the reliability of service to IPUC's other customers is not impaired and Applicant funds construction and pays incremental costs.
3. Special Facilities will be installed under the terms and conditions of a contract in the form on file with the Board. Such contract will include, but is not limited to, the following terms and conditions:
 - a. Where new facilities are to be installed for Applicant's use as Special Facilities, the Applicant shall advance to IPUC the estimated additional installed cost of the Special Facilities over the estimated cost of standard facilities. At IPUC's option, IPUC may finance the new facilities.

K. WELDER SERVICE

1. RATING OF WELDERS

Electric welders will be rated for billing purposes as follows:

- a. MOTOR-GENERATOR ARC WELDERS - The horsepower rating of the motor driving a motor-generating type arc welder will be taken as the horsepower rating of the welder.
- b. TRANSFORMER ARC WELDERS - Nameplate maximum kva input (at rated output amperes) will be taken as the rating of transformer type arc welders.
- c. RESISTANCE WELDERS - Resistance welder ratings will be determined by multiplying the welder transformer nameplate rating (at 50 percent duty cycle) by the appropriate factor listed below:

TYPE OF WELDER	TRANSFORMER NAMEPLATE RATING @ 50% Duty Cycle**	FACTOR IPUC Owned Distrib. Transf.
1. Rocker Arm, Press or Projection Spot	20 kVa or less	0.60
2. Rocker Arm, Press	Over 20 kva	0.80

Spot Project Spot Flash or Butt Seam or Portable Gun	21 to 75 kva, inclusive 100 kva or over All sizes	
3. Flash or Butt	67 to 100 kva, inclusive	***
4. Projection Spot Flash or Butt	Over 75 kva 66 kva or less	1.20
<p>** The kva rating of all resistance welders to which these rating procedures are applied must be at or equivalent to 50 percent duty cycle operation. Duty cycle is the percent of the time welding current flows during a given operating cycle. If the operating kva nameplate rating is for some other operating duty cycle, then the thermally equivalent kva rating at 50 percent duty cycle must be calculated.</p> <p>*** Each flash or butt welder in this group will be rated at 80 kva.</p>		

- d. Ratings prescribed by a., b. and c. above normally will be determined from nameplate data or from data supplied by the manufacturer. If such data are not available or are believed by either IPUC or customer to be unreliable, the rating will be determined by test at the expense of the customer.
- e. If established by seals approved by IPUC, the welder rating may be limited by the sealing of taps, which provide capacity greater than the selected tap, and/or by the interlocking lockout of one or more welders with other welders.
- f. When conversion of units is required for tariff application, one welder kva will be taken as one horsepower for tariffs stated on a horsepower basis and one welder kva will be taken as one kilowatt for rates stated on a kilowatt basis.

2. BILLING OF WELDERS

Welders will be billed at the regular rates and conditions of the tariffs on which they are served, subject to the following provisions:

- a. CONNECTED LOAD TYPE OF SCHEDULE. Welder load will be included as part of the connected load with ratings as determined under Section 1, above, based on the maximum load that can be connected at any one time, and no allowance will be made for diversity between welders.
- b. DEMAND METERED TYPE OF SCHEDULE. Where resistance welders are served on these schedules, the computation of diversified resistance welder load shall be made as follows:

Multiply the individual resistance welder ratings, as prescribed in Sections 1.c. to 1.f. inclusive, above, by the following factors and adding the results thus obtained:

1.0 times the rating of the largest welder

0.8 times the rating of the next largest welder

0.6 times the rating of the next largest welder

0.4 times the rating of the next largest welder

0.2 times the ratings of all additional welders

If this computed, diversified, resistance welder load is greater than the metered demand; the diversified resistance welder load will be used in lieu of the metered demand for rate computation purposes.