Section 8 – Policies and Code

8-1 Policies and Regulations – Table of Contents

The following section is a listing of general Company policies and State laws regarding service entrance designs. It is assumed that everyone has access to the National Electric Code. The State laws included here are ones that are commonly encountered but to which not everyone may have easy access.

The following is a listing of abbreviations:

UPPCO	Upper Peninsula Power Company
NEC	National Electric Code
NESC	National Electric Safety Code (rules governing utilities)
MPSC	Michigan Public Service Commission (regulatory & rule making policy)

8-1 Policies and Regulations – Table of Contents (Cont'd)

8-2 Company Policies - General

Code Compliance and Inspection and Re-connects

All wiring shall be done in accordance with requirements of Michigan Law (in particular the National Electrical Code as adopted by Michigan Rule 408.30801 and revised by subsequent sections of law), the Company's rules and other local requirements, whichever applies.

The Company will not inspect customer's wiring or equipment for compliance with the applicable codes.

In new wiring installations or when changes in existing wiring are made which require the removal of meters or the disconnection of service, the Company shall not connect or resume service until the facility is inspected and approved by a certified inspector (MI Rule 408.30818).

The Company does not require inspection to reconnect an inactive account if no modifications have been made. It is the customer's responsibility to make sure that the electrical system is in a safe condition when requesting reconnection of a service. Note that some local jurisdictions may require inspection before a reconnection. Some jurisdictions may require the service to be upgraded. The Company may refuse to connect some inactive services due to out-of-date metering or obvious safety hazards at the service entrance. Common problems include A-Base bottom connected meters, 30 and 60 amp meter sockets in poor condition, as well as deteriorated insulation between the meter socket and weather head and/or service entrance wire.

The Company will not interpret the electrical code. Questions concerning code interpretations should be referred to the local or state electrical inspector.

The Company will inspect for compliance with its rules and may refuse or discontinue electric service if its rules are not complied with or if a hazardous condition exists.

Company crews setting meters or connecting new services test for infinite resistance at the meter socket load terminals. If this check indicates connected load at the load terminals, the meter shall not be set. It is mandatory that the service disconnect switch be left open to avoid the indication of connected load at the meter base. COMPANY CREWS WILL NOT ENTER A BUILDING TO OPEN OR INSPECT THE SERVICE DISCONNECT SWITCH AND THE METER WILL NOT BE SET.

Continuity and Quality of Service

Michigan

The Company will endeavor to, but does not guarantee to furnish a continuous supply of electric energy and to maintain voltage and frequency within reasonable limits.

The Company shall not be liable for interruptions in the service, phase failure or reversal, or variations in the service characteristics, or for any loss or damage of any kind or character occasioned thereby, due to causes or conditions beyond the Company's control, and such causes or conditions shall be deemed to specifically include, but not be limited to, the following: acts or omissions of customers or third parties; operation of safety devices except when such operation is caused by the negligence of the Company, absence of an alternate supply of services; failure, malfunction, breakage, necessary repairs or inspection of machinery, facilities or equipment when the Company has carried on a program of maintenance consistent with the general practices prevailing in the industry; act of God; war; action of the elements; storm or flood; fire; riot; labor dispute or disturbances; or the exercise of authority or regulation by governmental or military authorities.

The customer shall be responsible for giving immediate notice to the Company of interruptions or variations in electric service so that appropriate corrective action can be taken.

8-2 Company Policies – General (Cont'd)

The Company reserves the right to temporarily interrupt service for construction, repairs, emergency operations, shortages in power supply, safety and State or National emergencies and shall be under no liability with respect to any such interruption, curtailment or suspension.

All motors, appliances or equipment connected to the Company's system shall be designed, installed, and operated not to cause interference to other customers' service equipment nor to handicap the Company in maintaining proper system conditions.

It shall be the responsibility of the customer to provide motor protection for undervoltage, overcurrent, short circuit, loss of a phase and phase reversal. Note that the NEC has required protection on all phases where overload relays are used, since 1971 for continuous duty motors. This should provide single-phase protection. (NEC 430.37).

The voltage provided to the customer is intended to comply with the requirements of the Administrative Code (MI Rule 460.3702). This code allows occasional voltage transients, which may adversely affect the operation of certain sensitive equipment. It is the customer's responsibility to prevent undesirable operation of sensitive equipment caused by these transients.

Neutral Voltages

It is normal for the Company's system neutral to carry low voltage levels, particularly in rural areas. This voltage creates no difficulty for most customers. When a customer experiences a problem due to this voltage, he/she can use available measures to eliminate the problem. The customer and his electrician can help mitigate the problem by ensuring proper grounding of wiring, bonding, and other electrical connections on the customer's premise.

Carrier Current

The Company reserves the right to use carrier frequency signals on its system for communication, system operation, and equipment control and shall not be held liable for potential damages. The customer should install suitable protective equipment if such frequencies might damage or interfere with their apparatus. The use by the customer of any part of the Company's distribution system for carrying foreign electric currents or for carrier current transmission, broadcasting, or control is forbidden. Customers using carrier current or any control frequency other than 60 hertz shall be required to install suitable equipment to prevent these frequencies from being imposed upon or entering the Company's distribution system.

Company Equipment on Customer's Premises

The Company shall have the right to install, inspect and maintain its equipment on the customer's premises as necessary to furnish proper service. All such equipment shall remain Company property, and the Company shall have the right to remove it when it discontinues service.

The customer shall be responsible for damages and losses resulting from interference or tampering with such equipment caused or permitted by the customer. In the event that the Company equipment is interfered with or damaged, the Company may require the customer to change his wiring, at his own expense, to permit the installation of other Company equipment or to permit the relocation of Company equipment to avoid further interference or damage (Michigan Rule 460.3409 and 750.282).

8-2 Company Policies – General (Cont'd)

Sealing of Equipment

Meters and all associated metering equipment, service termination boxes, wire raceways, and service entrance switches containing unmetered conductors are sealed by the Company. This equipment must be designed with provisions for seals or locks as specified by the Company.

Unauthorized removing of Company seals is unlawful and may result in a billing for the investigation and replacement of the seal, as well as criminal prosecution.

Associated with removing seals is the issue of pulling electric meters. The customer/electrician cannot pull electric meters. Electric meters were never designed or intended to be used as a switch to de-energize a facility. There is a serious potential for injury when pulling or re-installing an electric meter. Common problems are the jaw breaking, not lining up correctly, accidental shorts, failures of the bypass switch, lightning damage, closing in on a fault, attempting to open under fault or high load conditions, etc. If an arc occurs, a tremendous amount of heat is generated. It is common to have this heat explode the cover of the meter like a bomb. This subjects the individual that is installing or removing the meter to shrapnel and a very high-intensity thermal flash and possible electrical contact. There are specific requirements for installing or removing electric meters. These are required by MIOSHA and NFPA 70E.

In addition to the above concerns, there are many installations where pulling the meter will not de-energize the electrical feed. In these cases, the metering is done through a current transformer. Pulling the meter in this case actually creates a very high-voltage situation at the meter socket. This may cause personnel injuries and will cause damage to the current transformers.

The Company will de-energize the electrical feed for you if you need to work on your service entrance equipment.

Arc Flash WARNING

Company electrical facilities have the potential of delivering very high levels of energy during an arc flash incident, potentially causing severe injury or death. Follow the appropriate requirements of MIOSHA and NFPA - 70E if exposed to energized parts of electrical service entrance equipment and electrical metering.

Line Extensions on Private Property

Extensions of the Company's distribution lines onto property of the customer to be served will be made in accordance with the Company's extension rules, which are on the Company Web Page. These rules provide, among other things, that the Company will own and be responsible for the maintenance and operation of such lines and shall have the right of access at all reasonable times for construction, reconstruction, tree-trimming, maintenance inspection, rebuilding, maintenance and operation of lines and equipment with the right to remove poles and other equipment upon discontinuance of service. The Company shall also be granted the right to extend its facilities to serve other customers from such lines.

The Company will prepare all necessary easements along the route selected. The customer requesting service shall be responsible for obtaining all signatures and all associated easement costs. Some existing facilities are there by "prescriptive rights" (MI 15 year-Rule 600.580).

Permanent survey stakes identifying property lines may be required by the Company before installing facilities.

When installed at customer request, the customer shall grant rights-of-way satisfactory to the Company for the installation and maintenance of the underground electric facilities.

8-2 Company Policies – General (Cont'd)

Line Extensions on Other Than Private Property

The Company shall obtain all necessary licenses or permits for rights-of-way along the route which are not on private right-of-way. Examples are highway permits, railroad licenses, etc. The customer applying for service is responsible for associated permit and license fees.

Overhead/Underground Conductor Clearances

Contact Company prior to construction near or beneath overhead or underground power lines.

Underground Line Extensions on Private Property

The customer shall identify all privately owned underground equipment before the Company installs underground electric facilities. Damage to customer-owned underground equipment not located and/or identified by the customer shall be the customer's responsibility.

The customer shall grant right-of-way satisfactory to the Company for the installation and maintenance of the underground electric facilities.

The customer shall provide the following at no expense to the Company:

1. The right-of-way as designated by the Company shall be cleared of trees and other obstructions.
2. The route of underground facilities shall be within 4" of finished grade to ensure proper installation.
3. Conductors located beneath pavement or other obstructions should be placed in conduit extending 3 feet beyond the obstruction. (NEC 300.5). Note conduit policy for underground services in subsection 8-3.

If obstructions are placed on the service right-of-way after the service is installed, additional repair costs incurred due to the obstruction will be billed to the customer if repairs to the service become necessary.

Foreign Attachments on Company Poles

Attachments to Company-owned poles are not allowed. Exceptions are normal contractual users such as communication companies, other electric power utilities, and municipalities (Christmas lighting, etc.). Examples of unacceptable attachments are signs, posters, notices, fencing, birdhouses, clotheslines, satellite dishes, customer switchgear, customer electrical feeders, customer communication circuits, etc. Traffic control signs will be accepted on Company-owned poles if there is no conflict with the use of the pole or safety issues.

Note: This includes political advertisements on utility poles.

Fault Current

It is very important to consider available fault current levels when the customer/electrician is installing electrical service entrance equipment. Subsection 3-13 gives information on maximum expected fault current levels. Because of current designs for residential systems (common use of 50 kva transformers), it is necessary to use a minimum of 22,000 amp short-circuit rated service entrance equipment for residential one- and two-family homes.

Standard Service Allowances

All allowances are 125 feet unless indicated otherwise.

800 Amp	100 feet
1000 thru 1200 Amp	75 feet
1600 thru 2000 Amp	50 feet
2500 thru 3000 Amp	25 feet

8-3 Company Policies - Metering

Service Location

The location of the customer's service entrance shall in all cases be designated by the Company. The Company or its representatives shall make all connections to its lines. In no case shall these connections be made by anyone other than a Company representative. To avoid misunderstanding and additional expense, the Company shall be consulted concerning all new service connections.

Customer Service Laterals

1. The customer service laterals (conductors past the metering point on underground installations) are owned and maintained by the customer. If this is direct buried cable, great care must be taken with its installation. The customer is responsible for maintaining and locating this cable. (NEC 300.5 requires the use of locating ribbon for customer-owned service laterals). There may be charges involved in de-energizing this cable so that maintenance can be done. The Company highly recommends that an overcurrent protection device be installed ahead of such direct buried cable, if possible (subsection 2-3).

2. Code allows multiple service entrances as long as there is only one service drop or service lateral (generally the utility's system). This allows multiple sites for main disconnects, but all of the metering must be at one location. The Company requires a single termination point unless multiple termination points are mutually beneficial. Note that code defines it as one service drop as long as it starts at a common bus, follows the same route, and terminates beside each other. (NEC 230.2 & 230.40). Consult your local inspector on any of these installations. (See also subsection 6-1).

Lockable Main Disconnects

The Company requires that all main disconnects rated over 400 Amp be provided with a means of locking the disconnect in the open position. This meets the MIOSHA Rule 408.14004 lock-out procedure.

Increased Loads

In cases where a customer's load requirements are changed necessitating a larger meter or transformer, the Company shall be given reasonable notice so it may provide a meter, service drop, and transformer of the proper capacity. Delays, poor service or a burned-out meter or transformer will thus be avoided. This applies particularly to customers who connect temporary or portable equipment. The Company may charge for the replacement cost of damaged Company equipment.

Relocation of Services

A customer may be billed for any change he requests in the point of service termination or removal and reinstallation of service conductors.

Conduit Policy for Underground Services

Company service conductors shall be placed in conduit if conditions warrant. Examples of where conditions warrant include areas under blacktop or concrete where laying out conductors on the ground for emergency conditions is not practical. Other cases are where soil conditions warrant, such as rock, gravel, frost heave problems, problems with crushed rock sub-grade under blacktop to concrete. Consult subsection 3-5 on conduit size and number requirements.

Because of settling problems, it is necessary to provide adequate compaction under the normal UG service conductor depth (30") for disturbed soils. This needs to be done with sand or gravel. Frozen material and un-compacted clay are not acceptable.

8-3 Company Policies – Metering (Cont'd)

These conduits shall be limited to a maximum of 270 degrees of total bends. This means 3-90 degree bends or 2-90 degree and 2-45 degree bends. The maximum length of the conduit run shall be 75 feet (shorter for very large entrances such as 1600 amps and up). Anything with more bends or longer lengths needs Regional Engineer involvement. Note that large entrances are limited to less than 75 feet to avoid voltage problems or damage when pulling the cables.

Conduit shall be buried at least 24 inches deep. If problems are encountered, consult NEC Table 300.5. Note that NEC 300.5(D) requires exposed PVC conduit to be Sch. 80 from 18 inches below ground to 8 feet above ground.

Transformers--Three-Phase (Ground Settings)

For Company-owned transformer ground setting transformers, the customer shall provide, according to Company specifications, the necessary space, grading, fill, crushed stone, equipment, any formed structured foundations or formed transformer pad, protective barriers and window barriers at no cost to the Company. The Company shall furnish the enclosing fence, if required.

Services Above 1600 Amperes

For service capacities above 1600 Amperes, contact the Company for details.

Resale of Energy

Service shall be for the customer's use only and may not be sold, re-metered or otherwise disposed of by the customer to lessee, tenants or others, except with the consent of the Company in accordance with the Company's appropriate rate and appropriate state laws.

This does not prohibit the installation of test or check meters for informational purposes.

Including the cost of electric service in the rent without identification as such is permitted.

Theft of Service

The Company will investigate for the possibility of theft of service whenever tampering with meter seals, meters, service conductors, and service connections is reported or detected. Only Company-authorized persons are permitted to make connections to Company lines.

If the investigation determines that electricity is being stolen, the service may be disconnected.

Prior to restoration of service, the customer's service entrance equipment shall be made tamper resistant in accordance with Company requirements; and satisfactory arrangements will have been made for payment of the estimated amount of unmetered electricity.

Theft of service may result in criminal prosecution.

For Michigan rules dealing with theft or interference with the providing of electric or gas service, see Rule 460.3409 - Utility Rights and Requirements, Rule 750.282 - Utility interference Penal Code, and Rule 750.356 - Larceny Penal Code.

8-3 Company Policies – Metering (Cont'd)

Wiring for Meters

1. The Company will under no circumstance permit "jumpers" to be placed in meter sockets which results in unbilled energy.

2. Metered and unmetered conductors shall not be installed in the same conduit or raceway (Company policy).

3. The Company shall not permit meters or instruments other than its own to be connected to its meter wiring.

Metering - Specific Requirements (See also subsection 2-0)

1. Meter Sockets Thru 200 Amp

   Meter sockets must be UL listed, ringless, have at least bypass horns, must be sealable, and no covers allowed over the meter (problems with meter access and special meter equipment fitting inside the cover and automated metering).

   A. Single Phase Overhead Thru 200 Amp

      No approved list other than above requirements. Minimum of 100 Amp socket. Service entrance size can be as small as 15 Amp except for residential which must be at least 100 Amp per code. No two-wire 120 volt systems are allowed.

   B. Single Phase Underground Thru 200 Amp

      See approved lists in Section 2.

   C. Single Phase Network Meters Thru 200 Amp

      The fifth jaw must be in the 9 o'clock position. See subsection 5-5 for details.

   D. Three Phase Meter Sockets Thru 200 Amp

      A manual bypass lever is required. See subsection 2-7 for details and approved list.

2. 400 Amp Services

   A. 320 Class Meter Sockets - Single Phase (The Company does not allow 320 Class Three Phase metering)

      This type of meter socket is acceptable for residential, farm, or commercial customers. An underground pedestal is required for single meter underground services per subsection 3-1. Note that this meter socket is not rated for 100 percent duty at 400 Amp. The general requirements under "A" above still apply.

   B. 400 Class Bolt-in Meters

      This type of meter is acceptable for residential, farm, or commercial customers. See subsection 3-2 and 3-3 on bolt-in meters. This type of meter is rated 480 amp continuous and 600 amp intermittent. This type of meter is no longer acceptable for 277/480 volt service. See subsection 2-0.

8-3 Company Policies – Metering (Cont'd)

C. Current Transformer installations for 400 Amp

CT metering is standard for 277/480 volts. For other voltages it is not standard and there will be a special facility charge.

3. 600 Amp Services

A. 480 Class 600 Amp Bolt-In Meters

These are acceptable where a 100 percent duty factor is not required. See subsection 3-2 and 3-3 for details. This type of meter is no longer acceptable for 277/480 volt service.

B. Current Transformer Metering

These are acceptable for all applications. See subsection 3-4.

Metering - General Requirements

1. Customers shall provide a suitable location for meters and associated equipment determined by and without charge to the Company.

2. Meters shall be installed in an accessible location to enable them to be safely read, inspected and tested at reasonable times with a minimum of inconvenience to the customer and Company. The electric meter shall be outside. Effort shall be made to locate Company gas and electric meters in the same general area.

3. Multiple meter installations served from a single entrance shall be grouped at a location or locations approved by the Company.

4. Single-phase and self-contained polyphase meter installations shall be located out of doors.

5. Meters shall not be installed in patio, porch, deck or carport areas or areas likely to be enclosed. (subsection 3-12).

6. At earth-bermed buildings that do not have an exposed side suitable for the meter location, the service shall be terminated at a meter pedestal. (subsection 2-3).

7. Meters shall not be fastened to mobile homes. (subsection 2-6) [NEC 550.32(A)].

8. Indoor meter locations, if allowed, shall be dry and free of hazardous conditions such as explosive materials or injurious fumes.

9. The meter location shall be on a solid structure free from vibration and possible mechanical damage.

10. The customer shall be responsible for providing protection for the meter(s) from damage caused by falling ice, snow or other objects. In locations where the meter is not protected by roof overhang, the customer shall provide a protective shield. (See subsection 3-14 for shield specifications).

11 The clear working space in front of meter panels shall be a minimum of 3 feet and a vertical clearance of 6 feet 6 inches. The working space in front of the meter must also be level. Two feet of horizontal clearance on either side shall also be provided. Free space in front of instrument transformer cabinets shall be 2 feet beyond the cover in the extended position or a minimum of 3 feet, whichever is greater. [See NEC 110.26(A)].

8-3 Company Policies – Metering (Cont'd)

12 If changes are made on the customer's premises making the existing meter location unsafe or inaccessible for reading and testing, the customer shall be required to make changes in the wiring so that the meter may be relocated to comply with these rules. If a customer fails to correct his wiring to comply with these rules within a reasonable length of time after receiving a written notification of being in noncompliance, the Company reserves the right to discontinue electric service until the customer has changed his wiring as outlined above.

13 Pedestal-style meter sockets shall be required for underground applications through 200 amperes. This is for single meter applications.

14 Metering equipment shall be adequately supported to maintain the meter socket in a level and plumb position. [NEC 110.13(A)].

15. On group installations, each meter socket and service switch shall be permanently marked, identifying the location to be served. The location being served shall be identified in the same manner. This identification shall be made on the outside of the metering panels (for the benefit of tenants and meter readers), inside the meter enclosure (non-movable part) (cover panels are usually interchangeable), and at the service panel that the meter serves. A label at the service panel is critical because labeling systems for apartments change, making it difficult to trace. This identification is often done with permanent black markers or white paint. (NEC 110.22).

16. Meter sockets shall have a minimum of 4 inches' clearance on all sides of the meter socket. (Company practical rule).

17. Insulated neutral or grounded conductors of a service entrance shall be identified by a white or natural gray color. Four-wire 120/240 volt Delta installations shall have the conductor with the higher voltage to ground identified orange over its entire length or shall be identified with orange paint or tape at any point when a connection is to be made.

18. Soil or groundwater conditions generally require the installation of above-ground entry of underground service conductors to prevent seepage or water entering through the entrance conduit. The Company is not responsible for any damage caused by water seeping into the building through the customer's raceway or conduit.

19. Customer-owned lightning arresters or other surge protection devices, if used, shall be installed on the load side of the customer's service overcurrent protective devices unless specific approval has been received from the Company to install them ahead of the overcurrent protective devices.

20. The Company requires all facilities to be metered. This includes billboards, traffic signal lights, CATV amplifiers, telephone remote switches, etc. (Note MI Rule 460.3301, which requires all facilities to be metered unless consumption can be readily computed).

21. The Company cannot terminate on main disconnects because of the use of 90°C conductor. See NEC 110.14.

22. Metering in a padmount transformer must be approved by the Company. The transformer cannot be in a position to serve more than one customer. The service must also be at least 800 Amps. This option is available for three-phase installations. The customer must install, own, and maintain the service lateral from the padmounted transformer.

8-3 Company Policies – Metering (Cont'd)

23. Service Entrance equipment where Company conductors terminate shall meet the minimum space requirements of subsection 3-5. The equipment also must be able to accept the standard service conductor sizes and quantities per this section. Failure to do so may make it necessary to add a termination enclosure alongside the Service Entrance Equipment in order to accommodate the Company conductors (see subsection 3-7). Note that modification of manufactured switchgear often voids the warranty and UL listing (some have tried to do this to accommodate Company conductors). Consult the Company with any questions.

24. NEC 312.11 deals with internal clearances for live parts inside of cabinets. Generally, it requires 1/2 inch for under 250 volts and 1 inch for 251 to 600 volts.

25. The Company uses radio communications with some of its automated meter reading equipment. Because of this, covering an electric meter with metal is not acceptable.

Cellular Tower Policy

Only one service shall be run to a tower or a group of towers under one management (owner). This also means one service to the combination of a telephone central office switch/tower site. Special facilities are normally not an option because of code issues.

We will terminate the service at a single location. Acceptable points are pre-manufactured multiple meter packs (if UL listed, ringless design, have bypass horns, and are sealable) or approved termination enclosures (see subsection 3-5). We cannot terminate on a main breaker because of our service conductor, which is rated 90 degrees C.

Meter Socket Devices (Such as MOV Arresters or Generator Transfer Switches)

MOV arresters and generator transfer switches that plug into a standard single phase meter socket are being marketed. The meter, in turn, is plugged into this device. In some areas in the USA, these are being provided by the local utility for a fee. In other areas, they are sold to the customer. The meter socket enclosure is not considered as service equipment per NEC 230.66. These devices are considered as service equipment and therefore must meet AIC fault current ratings, which they do not, and be UL listed, which they are not. There are also problems with snow and ice damage with extending the meter out farther from the wall. If a customer installs an MOV device, the Company recommends that it be put on the load side of the breaker in the customer's main switch. See also NEC 230.82.

8-4 Company Policies – Utilization of Equipment

Motors - General

1. All of the following motor equipment connected to the Company's system is subject to approval by the Company with respect to starting characteristics and frequency of starts:

   Single-Phase Motors
   120 Volt - 1 HP and Larger
   240 Volt - 3 HP and Larger
   Three-Phase Motors
   10 HP and Larger
   Single-Phase Air Conditioners over 2 Ton (may need soft start capacitors)
   (excessive cycling - more than four times per hour - may cause problems also).

2. Motor installations including starting devices, shall be designed to have starting characteristics that will not cause an objectionable voltage drop or lighting flicker to other customers' service. Note that this also applies to infrequent motor starts or infrequent motor load swings. The Company follows the IEEE 1453-2004 voltage flicker standard. We follow the Annex A, Fig. A-1 flicker curve in this standard.

3. Installations of motors used to drive equipment requiring a variable torque, such as compressors, reciprocating type pumps, sawmills, etc., shall be required to limit the variation of the motor current so it will not interfere with service to other customers. The Company reserves the right to require the customer to provide, at his own expense, equipment to control the fluctuations within limits prescribed by the Company. The maximum allowable variation of motor current for each specific installation may be obtained upon application to the Company.

4. All customer-owned equipment shall be protected from excessive current which may result from overload, undervoltage, single-phase operation of three-phase motors, etc., with fuses, thermal cutouts, overload relays, or other protective devices designed to protect the individual motor. Under-voltage release coils shall be installed on all motors which require starting compensators. Reverse-phase relays and circuit-breakers or their equivalent are required on all elevator installations and are recommended on crane or other installations where phase reversal may cause damage or injury.

5. It is recommended that single-phase motors be connected for 240 volt operation where feasible, since this will reduce lighting flicker for both the user and other customers.

6. If the size or number of motors contemplated is such that it necessitates the installation of special Company equipment to prevent interference with proper service, either to the customer using the service or to other customers, service to such motors will be delivered under the special facilities clause of the Company extension rules.

Water Heating

1. Water heaters may be connected to 120-volt or 240-volt service. Water heaters shall be equipped with thermostatically-controlled non-inductive heating elements. The maximum allowable wattage of the element is 1650 watts at 120 volts or 5500 watts at 240 volts. Water heaters having dual elements shall have them connected or interlocked to limit the connected load to the above limits.

2. Non-storage, instant recovery water heaters with wattages above 5500 watts may cause service interference. Special facility charges may be necessary to correct this interference.

8-4 Company Policies – Utilization of Equipment (Cont'd)

Electric Space Heating

1. Electric space heating equipment may be connected to the general service meter under the residential, farm or commercial rate.

2. Permanently installed electric space heating designed to operate at 120 volts shall be limited to 1650 watts controlled by a single thermostat. Electric space heating designed to operate at 208 volts and above shall be limited to 6000 watts per element. Multiple elements installed in or as part of a unit exceeding 6000 watts shall be energized in stages not to exceed 6000 watts per stage and at time intervals of not less than three seconds between each stage.

Lighting Systems

Lighting systems utilizing ballasts or transformers as part of the fixtures or as auxiliary equipment to the fixtures which are installed as the major lighting source for a building, space or area shall maintain not less than 90 percent lagging power factor for individual units or the entire lighting installation.

Electric Welders and Furnaces

Before any electric welder is connected, the consent of the Company shall be obtained; and any changes in the customer's wiring and in the Company's facilities necessary to permit welder operation under safe conditions and without interference to the service of other customers shall be completed.

The Company facilities are designed to provide reasonably adequate voltage and sufficient capacity for normal system loads. When a customer uses a welder that creates voltage variations that exceed normal operating voltage limits, these variations are not considered a violation of voltage codes (MI Rule 460.3702).

High-Frequency Apparatus

1. All wiring carrying high-frequency current used in connection with high-frequency apparatus shall be located as remotely as possible from the meter and wiring of the building. Motor generator sets supplying such apparatus shall be subject to the rules applying to motors. For the protection of meters supplying high-frequency apparatus, the Company may require the installation of an isolation transformer or suitable filters.

2. Equipment causing high-frequency current or harmonics must comply with IEEE Standard 519.

Fire Protection Systems

Options for Service from the Company:

A. Source side tap in outside CT cabinet. CT cabinet cannot be near the main disconnect.
B. Two separate services from the same transformer. One of these would be for the fire pump system. They cannot go to the same location on the building. This second service would be at a "special facilities" cost. This would involve at least two separate meters (main feed and the fire pump system).
C. Customer runs two services, from the Company padmounted transformer, if the Company has CT metering available in the padmount (see subsection 3-6).
D. Separate transformer setting, just for the fire pump system. This would involve "special facilities" costs for the transformer, system, and service. This can be at a different voltage than the main feed.

8-4 Company Policies – Utilization of Equipment (Cont'd)

Codes (some of the codes that may apply):

NEC 230.1(A)(1)	Allows an additional service for a fire pump.
NEC 230.72(A)Excep.	Allows the fire pump disconnect to be remote from the other disconnects.
NEC 230.82(5)	Allows a tap to the Supply Side of the service disconnect for fire pump equipment and fire alarms and sprinkler alarms.
NEC 230.94 Excep. #4	Allows for separate overcurrent protection device tapped supply side of the service overcurrent device for fire pumps and fire alarm systems.
NEC 695.3(A)	Source must be capable of supplying locked rotor current plus associated equipment. This is not normally an issue with the utility source (primary system capacity).
NEC 695.3(A)(1)	Does not allow the fire pump system to be tapped inside of the service entrance disconnecting enclosure. This means that the fire pump tap cannot be made inside of the building or in a weatherproof, main disconnect, service entrance enclosure located outside. The only options are a separate CT cabinet on the outside. This CT cabinet can also not be located right next to an outdoor rated disconnect, for the rest of the building. The only other option is a tap at the transformer or a totally separate feed. This is new in 2005. Look at the actual wording of the NEC for specific details.
NEC 695.4(B)(1)	Requires the overcurrent protection for the fire pump system to handle full locked rotor current continuously. It does not require the conductor or other devices such as the utility transformer to be rated for full locked rotor current. This means that the conductor may be rather small for most pumps.
NEC 695.4(B)(2)	Requires the fire pump disconnect not to be located within enclosures that feed other loads. It must also be located remote from other disconnecting means to reduce the chance of accidental operation. The next couple sections further define this and labeling requirements. This section requires the fire pump disconnect to be lockable in the closed position.
NEC 695.5(A)	This section deals with customer-owned transformers feeding the fire pump system. This transformer must be able to supply 125% of the normal load current of the pump plus 100% of associated equipment.
NEC 695.6(A)	Requires the service entrance conductors for fire pumps to be located outside of the building with only a few, very special exceptions.
NEC 695.7	Motor voltage shall not drop more than 15% on starting on the output of the controller (reduced voltage starter or SCR drive). The maximum voltage drop at 115% of load is 5%. These stipulations may be a problem with large 120/208 motors, without reduced voltage starter or SCR drives.

Standby Generating Equipment

The customer shall install an approved double-throw switch or throwover switches that are mechanically interlocked, are of adequate current and voltage rating and are so connected that the customer's generating equipment cannot energize the Company's supply lines. (NEC Article 701 and 702) (Must be rated as Service Entrance Equipment if ahead of the main; UL listed as a transfer switch is covered under UL 1008).

The double-throw or throwover switch may be manually or automatically operated. Customer-owned generating equipment shall not operate in parallel with the Company's system except under specific contract with the Company covering the conditions of such operation.

8-4 Company Policies – Utilization of Equipment (Cont'd)

The simple installation involves operating a generator in an open area and simply running a cord in to run one appliance at a time. Most refrigerators and freezers are good for about 24 hours if the door is not opened. Beyond that, four to six hours of run time on a generator is usually adequate per day. Follow good food preservation practices, as suggested by "The Extension Service" or other similar authorities.

Generators should always be run in open areas because of the potential for carbon monoxide poisoning. The same applies to the use of charcoal grills in confined areas. Also, do not attempt to heat a home with unvented appliances, such as a gas oven.

If you are installing a permanent standby generator system, consult an expert. There are other potential problems in addition to the need for the transfer switch. One problem is Ground Fault Interrupters (GFI's) installed on most portable generators. Another problem is that some generators are rated to only supply 240 volt or 120 volt loads and not both at the same time (120 / 240 rating)(center tapped).

Care also needs to be taken in sizing generators. Normally, generators must be oversized to handle the in-rush of a starting motor. Also, they need to be oversized if there is a lot of electronic load on it. A special concern with electronic loads is the operation of the generator as it runs out of fuel (the internal voltage regulation may not be able to protect electronic equipment connected to the generator).

Parallel Generation System

A parallel generation system allows the transfer of electrical energy from the customer's generator into the Company's distribution system. Consult the Company for specific details. There are safety, liability, and contractual issues.

8-5 State Code Information

Michigan Rule 460.3301 Metered Measurement of Electricity Required; Exceptions

1. All electricity that is sold by a utility shall be on the basis of meter measurement, except where the consumption can be readily computed or except as provided for in a utility's filed rates.

2. Where practicable, the consumption of electricity within the utility or by administrative units associated with the utility shall be metered.

Michigan Rule 460.3505 Utility Line Clearance Program

Each utility shall adopt a program of maintaining adequate line clearance through the use of industry-recognized guidelines. A line clearance program shall recognize the National Electric Safety Code standards that are adopted by reference in R 460.811 et seq. The program shall include tree trimming.

Michigan Rule 460.3605(2) Metering Electrical Quantities

Every reasonable effort shall be made to measure at one point all the electrical quantities necessary for billing a customer under a given rate.

Michigan Rule 460.3702 Standard Nominal Service Voltage; Limits; Exceptions

1. Each utility shall adopt and submit standard nominal service voltages.

2. With respect to secondary voltages, the following provision shall apply:

   A. For all retail service, the variations of voltage shall be not more than 5% above or below the standard nominal voltage as submitted pursuant to subrule (1) of this rule, except as noted in subrule (4) of this rule.

   B. Where 3-phase service is provided, the utility shall exercise reasonable care to ensure that the phase voltages are balanced within practical tolerances.

3. With respect to primary voltages, the following provisions shall apply:

   A. For service rendered principally for industrial or power purposes, the voltage variation shall not be more than 5% above or below the standard nominal voltages as submitted pursuant to subrule (1) of this rule, except as noted in subrule (4) of this rule.

   B. The limitations in subdivision (a) of this subrule do not apply to special contracts in which the customer specifically agrees to accept service with unregulated voltage.

4. Voltages outside the limits specified in this rule shall not be considered a violation if the variations are infrequent fluctuations or occur from adverse weather conditions, service interruptions, causes beyond the control of the utility, or voltage reductions that are required to reduce system load at times of supply deficiency or loss of supply.

8-5 State Code Information (Cont'd)

Michigan Rule 460.813 Standards of Good Practice; Adoption by Reference

Parts 1, 2, and 3 and sections 1, 2, 3, and 9 of the National Electrical Safety Code, 1997 edition (ANSI-C2-1997), are adopted by reference in these rules as standards of accepted good practice. Parts 1, 2, and 3 and sections 1, 2, 3, and 9 of the National Electrical Safety Code, 1997 edition (ANSI-C2-1997) are available from the Michigan Public Service Commission, P.O. Box 30221, Lansing, MI 48909, (at a cost), or from the Institute of Electrical and Electronics Engineers, Service Center, P.O. Box 1331, Piscataway, NJ 08855-1331, (at a cost).

Michigan Rule 408.30801 National Electrical Code; Adoption by Reference; Inspection; Purchase

(exceptions also)