300) Introduction

300.00.10) The design and construction of control circuits have a major effect upon the proper operation of the service circuit breakers and interrupter switches with which they are associated. We Energies has a vital interest in circuits which influence the ability of Customer–owned service equipment to perform switching and fault clearing functions. The design and construction of control circuits often receive less attention than the related power circuits, but a power system can operate only as effectively as permitted by its control circuits.

300.00.20) All control circuits for service circuit breakers and electrically operated interrupter switches shall be constructed in accordance with the requirements listed in following Section II. We Energies will specify the type, range, and settings of overcurrent relays and the associated current transformer ratios.

310) Control Circuit Practices

Circuit breakers or automatic switches should open for overcurrent conditions as specified by We Energies.

310.10) Control Circuit Relays

310.10.10) Standard device function numbers shall be assigned to identify the functions of all relays. Device function numbers may be found in American National Standard C37.2.

310.10.20) Relays shall be connected to provide proper operation and phasing for the intended application.

310.20) Control Circuits

A means shall be provided to disable the control package for purposes of securing a hold off position.

310.30) Bus Fault Detection

310.30.10) A bus fault detection system shall act to detect a fault and then open all incoming line switches or circuit breakers.

310.30.20) The alternate line switch or circuit breaker shall be blocked from closing after operation of bus fault detection system.

310.30.30) Bus fault protection requirements may vary with equipment insulation medium, construction, proximity of protective device, unprotected bus exposure, system application, interrupting duty, etc.

310.40) Instrument Transformer Connections

310.40.10) Each current or potential transformer secondary circuit shall have only one ground connection, constructed so that it can be conveniently removed without disturbing the circuit. The ground connection is to be located at the terminal block of the relay electrically nearest the instrument transformer.

310.40.20) All current transformer secondary circuit connections shall be made with copper #14 AWG gauge minimum stranded wire, containing no rotary switches, receptacles for test plugs, or tee joints. All connectors shall be of proven reliability.

310.40.30) All potential transformer secondary circuits shall be fused. Indicating lamps or alarm relays shall be provided to monitor all potential transformer secondary circuit fuses, unless the circuit contains relays which always cause a trip operation upon loss of voltage.

310.50) Keyed Permissive Switches

310.50.10) Customer substations energized by more than one supply line must be constructed so that the supply lines cannot normally be connected together through the substation bus. This is accomplished by wiring the control circuits for the line and bus tie circuit breakers or interrupter switches so that at least one circuit breaker or interrupter switch is open at all times. Provisions may be included, however, to permit We Energies only to close all of the circuit breakers or interrupter switches at the same time. This will enable We Energies to perform closed transition switching operations during abnormal power system conditions, and avoid the momentary service interruptions resulting from open transition switching.

310.50.20) A keyed permissive switch (Device 69) is recommended in all customer substations having more than one supply line. A contact of this switch is connected in the closing control circuit of each line and bus tie circuit breaker or interrupter switch. The keyed permissive switch for a substation with two supply lines shall have the following features:

Switch Contact	Position 1 Key Out	Position 2 Key In and Turned	Key Held Captive	
			Position 1	Position 2
K1	—| |—	—|/|—	No	Yes
K2	—| |—	—|/|—	No	Yes
K3*	—| |—	—|/|—	No	Yes

*Contact K3 need not be provided if a bus tie circuit breaker or an interrupter switch is not installed.

310.50.30) All keys for the device 69 keyed permissive switch must be given to the We Energies Start–Up Engineer after the Customer has proven to the Start–Up Engineer the operation of the circuit breaker or interrupter switch control circuits prior to placing the substation in service. All of the keys will be retained by We Energies

310.60) Miscellaneous Devices
Additional control circuit requirements are as follows:

310.60.10) All indicating lamps shall be color coded to indicate the functions of the lamps, as specified below:

Color	Function
Red	Close
Green	Open
Blue	Alarm
Orange	D–C Potential
White	A–C Potential
Clear	Ground Detection

310.60.20) All circuit breaker trip circuit fuses shall be monitored with indicating lamps or alarm relays.

320) Automatic Transfer Control for Switchgear and Circuit Breakers

The following are items pertain specifically to the installation and utilization of automatic transfer and control equipment. Any new control package must be carefully reviewed by We Energies to evaluate equipment integrity for the purpose of protecting the customer service reliability, and to protect the We Energies distribution system, minimizing disturbances to other customers. Additional requirements relative to supply conductor terminations, grounding provisions for supply conductors, service disconnected means, overcurrent protective devices, surge protection, interlock systems, and metering facilities are contained in Parts 1 and 2 of this book.

320.10) Position and Transfer

320.10.02) An open transition transfer scheme shall be incorporated into the control scheme to guarantee that during an automatic source transfer the incoming lines will not be tied together.

320.10.04) A loss–of–source voltage timer is necessary to delay source transfer and establish that the loss of source is not a transient condition. This will mitigate unnecessary switching. The loss–of–source (voltage) timers must be adjustable in a minimum 1–10 second range to allow for coordination with upstream We Energies protective devices.