

Voltage Zones



1. Scope

This work practice establishes preferred Seattle City Light (SCL) voltages of alternating current supply systems from generator to points of utilization.

2. Application

This work practice provides typical voltages supplied throughout the Seattle City Light (SCL) transmission and distribution systems. It is intended for use by SCL engineering, customer service, operations, and voltage control personnel.

For phase relations, refer to SCL 0035.04.

These voltage zones shall not be construed as indicating system or individual customer regulation.

Except as modified herein, ANSI C84.1-2011, American National Standard for Electric Power Systems and Equipment – Voltage Ratings (60 Hz) are applicable.

3. Definitions

Nominal Voltages are a common designation for all systems whose operating voltages lie within the same general voltage class. This design standard is in agreement with nominal voltages set forth in SCL Department Requirements for Electric Service Connection and the Seattle Municipal Code (SMC) Electric Rates Ordinance, latest revision and the WAC 480-100-373, Standard Voltage and Permissible Variation.

Design Criteria Voltage Zone is that range of normal load condition voltages which shall be used as the basis for all system design and operation.

Tolerable Voltage Zone is that range of normal voltages which may be experienced under unfavorable conditions of design or operation. Where it is shown that voltages between the design and tolerable zone cause customer trouble, all reasonable measures shall be taken to correct the situation.

Point of Common Coupling is the point at which measurements are taken. It is commonly referred to as the customer service entrance or service entrance.

4. Voltage Zones

The values below are measured 1 minute average voltages as defined in ANSI C84.1.

		Voltage Zones (City Light Practice)				
Customer	Nominal Voltage	Tolerable Minimum	Design Criteria		Tolerable Maximum	Point of Common Coupling
			Minimum	Maximum		
Customer	120/240 Secondary	115/230	116/232	124/248	127/254	Service Entrance
	208Y/120 Secondary	199Y/115	201Y/116	214Y/124	220Y/127	Service Entrance
	240/480 Secondary	230/460	232/464	248/496	254/508	Service Entrance
	480Y/277 Secondary	460Y/265	464Y/268	496Y/286	508Y/293	Service Entrance
	4160Y/2400 Primary	4088Y/2360	4157Y/2400	4330Y/2500	4434Y/2560	Primary Customer
	13,800 Primary (Network Service only)	13,200	13,420	13,750	14,080	Primary Customer
	26,400 Overhead	24,550	24,950	26,650	27,300	Primary Customer
System	4160Y/2400 Primary/Overhead	4088Y/2360	4157Y/2400	4330Y/2500	4434Y/2560	Primary of Distribution Transformer
	4330Y/2500 Sec. Network U.G.	4160Y/2400	4226Y/2440	4360Y/2520	4434Y/2560	Primary of Distribution Transformer
	13,800 Primary Sec. Network U.G.	13,200	13,420	13,750	14,080	Primary of Distribution Transformer
	26,400Y/15,000 Primary /Overhead	24,550Y/14,174	24,950Y/14,405	26,650Y/15,386	27,300Y/15,762	Primary of Distribution Transformer
	4160Y/2400 Overhead Primary	4088Y/2360	4226Y/2440	4330Y/2500	4434Y/2560	Distribution Substation Bus, Regulated
	13,800 Primary Sec. Network U.G.	13,200	13,420	13,750	14,080	Substation Bus
	26,400 Distribution	24,550	24,950	26,650	27,300	Receiving Substation Bus
	115,000 Transmission	113,000	115,000	118,800	119,750	Receiving Substation Bus
	230,000 Transmission	215,000	229,000	239,000	242,000	Receiving Substation Bus
	230,000 Transmission	220,000	230,000	242,000	242,000	Station Bus, Generating

5. References

ANSI C84.1-2011; American National Standard for Electrical Power Systems and Equipment – Voltage Ratings (60 Hz)

Hanson, Brett; SCL Standards Engineer, subject matter expert and originator for 9058.09 (brett.hanson@seattle.gov)

SCL Construction Standard 0035.04; “Phase Relations”

SCL Construction Guideline E1-4.1/NGE-40; “Voltage Zones” (canceled)

WAC 480-100-373; Standard Voltage and Permissible Variation