FACILITY CONNECTION REQUIREMENTS

REQUIREMENTS FOR TRANSMISSION SYSTEM INTERCONNECTIONS FOR GENERATION, TRANSMISSION AND END-USER FACILITIES

Rev.	Date	Description	By	Approval
Version 1.0	06/21/10	New document	Greg Coco	Greg Coco APPROVED
Version 1.1	06/28/2010	Renamed document from FAC-001 V1.0.docx to FACILITY CONNECTION REQUIREMENTS V1.1.docx	Louis Guidry	
Version 1.2	07/06/2011	Corrected Table of Contents	Louis Guidry	

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INTRODUCTION

Cleco Power LLC (Cleco) is a regulated electric utility serving approximately 276,000 customers in Louisiana. For more details regarding Cleco refer to www.cleco.com.

Cleco owns a network of transmission lines which interconnect its generating plants to various transmission and distribution substations serving the loads of the Cleco service territory and to transmission lines of adjacent utilities. The Cleco transmission system is physically interconnected with the transmission systems of Entergy Louisiana LLC, Entergy Gulf States Louisiana LLC, AEP Southwestern Electric Power Company, and the Lafayette Utility System.

The requirements herein are for all interconnections to the Cleco transmission system.

PURPOSE

Cleco has prepared this document to establish the requirements for interconnection to the Cleco transmission system for generation, transmission and end-user facilities. These requirements are intended to promote safe operation, system integrity and reliability of the Cleco and interconnected systems. These requirements are minimums to be used as a guide toward Cleco's processing of interconnection requests. A thorough review and understanding of these requirements will assist a requesting party in obtaining timely and mutually satisfactory responses.

Each request for an interconnection will be evaluated on a case-by-case basis and will be subject to meeting the reasonable needs of the requesting party. The requesting party may be an Independent Power Producer (IPP), another electric utility, a municipality, or a retail customer. Interconnections must meet electric utility standards, such as the North American Electric Reliability Corporation (NERC) standards and Cleco standards. The review and approval requirements detailed here shall apply to all interconnected facilities regardless of which party performs the design, construction, or installation work.

This document will be revised as needed to meet current conditions and NERC Reliability Standards. Cleco shall make this document available within five business days to the users of the transmission system, the Regional Reliability Organization, and NERC on request.

RESPONSIBILITY

The General Manager of Transmission Services is responsible for reviewing and approving the requirements within this document.

GENERAL REQUIREMENTS

Interconnections to the Cleco transmission system must be consistent with Cleco standards and with standard utility practices. A proposed interconnection must not degrade the reliability, operating flexibility or safety of the existing power system. System studies will be required to evaluate the impact of the requested interconnection.

All generation and transmission interconnections shall comply with the requirements of North American Electric Reliability Corporation (NERC) and the Southwest Power Pool (SPP).

TECHNICAL REQUIREMENTS FOR GENERATION, TRANSMISSION AND END-USER FACILITIES

1. INTERCONNECTION STUDIES

1.1. Cleco will conduct a System Impact Study (SIS), at the expense of the requesting party, as needed to substantiate system impact, reliability and capability of the transmission system with the addition of the proposed interconnection. If the customer agrees to move forward with the interconnection process, a Facilities Study (FS)), at the expense of the requesting party, will be performed and may include, but not be limited to, power flow, system stability, short circuit, breaker duty, surge protection, insulation coordination, equipment ratings, system grounding, safety, voltage level, MW capacity, and MVAR capacity. Evaluation of alternatives to the proposed interconnection, such as lower voltage construction, reactive support facilities, or upgrading facilities, may be requested or conducted. Power flow analysis will include 10-year load or resource growth projections and the planned facilities needed to satisfy such requirements.

1.2. If the SIS predicts that the new interconnection will impact another transmission system, Cleco will so inform the requesting party. Cleco and the requesting party will coordinate with the appropriate parties to determine if the impact is valid and determine the facility additions that may be required to be constructed to mitigate the impact. The requesting party shall have the option to modify the interconnection request to a level that can be sustained without causing an impact on the other transmission system.

2. NOTIFICATION OF NEW OR MODIFIED FACILITIES

2.1. Cleco will notify SPP and appropriate parties affected by the new or modified facilities that will be interconnected to the Cleco transmission system. This notification will occur when the interconnecting party agrees to proceed with construction of the interconnection facilities and prior to the energization or commercial operation date of the planned facilities.

3. VOLTAGE LEVEL AND MW/MVAR CAPACITY

3.1. Cleco Transmission System Voltages - Nominal transmission system voltages presently on the Cleco transmission are 230kV, 138kV, and 69kV. Cleco does have joint ownership of the Dolet Hills 345kV station and ownership of approximately 66 miles of 500kV transmission lines.

3.2. Interconnection Supply Voltage – the interconnecting facility supplied from the transmission system, which under system normal and single transmission element outage conditions, will generally have voltages that range between 92% and 105% of nominal.

3.3. Interconnection Capacity for Load – the load connected to the transmission system cannot exceed the MW and MVAR capacity or demand levels requested and studied in the System Impact Study. If these levels need to be exceeded, another System Impact Study and Facilities Study may need to be performed.

3.4. Interconnection Capacity for Generators -- The interconnecting generator facility cannot exceed the MVA level studied in the System Impact Study. If the interconnecting generator wishes to exceed the studied MVA level, another System Impact Study, and if required a Facility Study may need to be performed. The generator owner will pay for all costs, including the studies and any resulting new facilities.

4. BREAKER DUTY AND SURGE PROTECTION

4.1. Circuit breaker minimum duty and design criteria are listed in Appendix A. Depending on the interconnecting facilities and the location of the interconnection, higher interrupting and/or continuous current ratings may be required.

4.2. Lightning Arresters shall be installed on the high and low side of all transformers. If there are no transformers at the station, then each line terminal shall have arresters installed. The arresters station class metal oxide varistor (MOV) type with a maximum continuous phase to ground (MCOV) rating of:

4.2.1. 24kV to 25kV for 34.5kV systems

4.2.2. 96kV to 100kV for 138kV systems

4.2.3. 150kV to 154kV for 230kV systems

5. SYSTEM PROTECTION AND COORDINATION

5.1. The interconnecting party shall provide protective relaying systems consistent with the guidelines listed below. Proposed protective relaying requirements for each interconnection will be subject to review and approval by Cleco for proper coordination after receipt of a preliminary single-line drawing of the proposed interconnection and a single-line drawing and drawings of the party's interconnected system.

5.2. The interconnecting party shall provide recloser and fuse ratings, relaying data, relay bill of materials, and line and transformer impedances in coordination with Cleco.

5.3. Overcurrent relaying and backup overcurrent relaying are required for 34.5 kV and below interconnections. Some applications will require directional overcurrent relays. Specialized relaying, such as direct transfer trip, may be required to provide automatic load or generation shedding, or interconnected system separation.

5.4. High-speed pilot primary relaying, high-speed non-pilot secondary relaying and breaker failure relaying are required for 138 kV and higher interconnections. Specialized relaying, such as direct transfer trip, may be required to provide automatic load or generation shedding, or interconnected system separation.

5.5. High-speed pilot primary relaying, high-speed pilot secondary relaying, high speed dual-channel transfer trip and breaker failure relaying maybe required at certain interconnections. The primary and secondary pilot channels and direct transfer trip channels shall be on separate systems such as power line carrier and fiber optics. Specialized relaying, such as direct transfer trip, may be required to provide automatic load or generation shedding, or interconnected system separation.

5.6. Transformer protection shall include the following: differential relay, sudden pressure relay, pressure relief devices, high side overcurrent backup and low side overcurrent backup. High side protection must be a power circuit breaker with adequate interrupting capability.

5.7. Cleco will not be responsible for protection of the interconnected party's facilities. The party is solely responsible for protecting their equipment in such a manner that faults, unbalances, or other disturbances on the Cleco or the surrounding transmission systems do not cause damage to the party's facilities. Sync check and synchronizing of interconnected facilities is the responsibility of the interconnected facility owner.

6. METERING AND TELECOMMUNICATIONS

6.1. General – Unless otherwise agreed by the parties, Cleco shall install the metering equipment to the operation of the interconnecting facilities and shall own, operate, test and maintain such equipment. Power flows to and from the interconnecting facility shall be measured in analog and/or digital form as required by Cleco. The interconnecting party shall bear all reasonable documented costs associated with the purchase, installation, operation, testing and maintenance of the metering equipment.

6.2. Current transformers – current transformers used for revenue metering circuits must meet the accuracy standards, as specified under the American National Standards Institute (ANSI) C57.13, for an accuracy class of 0.3 percent at all burdens. Current transformers shall have a thermal rating factor of at least 2.0.

6.3. Voltage transformers – voltage transformers used for revenue metering circuits must meet the accuracy standards, as specified under ANSI C57.13, of 0.3 percent accuracy with the following burdens:

6.3.1. “W” through “Y” burden for 5 kV through 25 kV; and

6.3.2. “W” through “Z” burden for 25 kV and above.

6.4. Check Meters - the interconnecting party, at its option and expense, may install and operate, on its premise, one or more check meters to check Cleco’s meters. Such check meters shall be for check purposes only and shall not be used for the measurement of power flows. The check meters shall be subject at all reasonable times to inspection and examination by Cleco or its designee. The installation, operation and maintenance thereof shall be performed entirely by interconnecting party in accordance with Good Utility Practice.

6.5. Standards - Cleco shall install, calibrate, and test revenue quality metering equipment in accordance with applicable ANSI standards.

6.6. Testing of the Metering Equipment - Cleco shall inspect and test all metering equipment upon installation and at least once every two (2) years thereafter. If requested to do so by the interconnecting party, Cleco, at the interconnecting party’s expense, inspect or test the metering equipment more frequently than every two (2) years. Cleco shall give reasonable notice of the time when any inspection or test shall take place, and the interconnecting party may have representatives present at the test or inspection. If at any time the metering equipment is found to be inaccurate or defective, it shall be adjusted, repaired or replaced at the interconnecting party's expense, in order to provide accurate metering, unless the inaccuracy or defect is due to Cleco's failure to maintain, then Cleco shall pay. If the metering equipment fails to register, or if the measurement made by the metering equipment during a test varies by more than two percent from the measurement made by the standard meter used in the test, Cleco shall adjust the measurements by correcting all measurements for the period during which the metering equipment was in error by using the interconnecting party's check meters, if installed. If no such check meters are installed or if the period cannot be reasonably ascertained, the adjustment shall be for the period immediately preceding the test of the metering equipment equal to one-half the time from the date of the last previous test of the metering equipment.

6.7. Metering Data - At the interconnecting party’s expense, the metered data shall be telemetered to one or more locations designated by Cleco and one or more locations designated by the interconnecting party.

6.8. Voice Communications – the interconnecting party shall maintain satisfactory operating communications with Cleco’s transmission system dispatcher or other designated representative. The interconnecting party shall provide standard voice line, dedicated voice line (generator interconnections only) and facsimile communications at its control room or central facility through use of either the public telephone system or a separate voice communications system.

6.9. Data communications - The interconnecting party shall also provide the dedicated data circuit(s) necessary to provide interconnecting facility data to Cleco as required for reliable transmission system operation. Any required maintenance of such data

circuit(s) shall be the responsibility of the interconnecting party. Operational communications shall be activated and maintained under, but not be limited to, the following events: system paralleling or separation, scheduled and unscheduled shutdowns, equipment clearances, and hourly and daily load data.

6.10. Remote Terminal Unit – Prior to the operation of the interconnecting facilities a Remote Terminal Unit shall be installed by the interconnecting party, or by Cleco at the interconnecting party's expense, to gather accumulated and instantaneous data to be telemetered to Cleco's Coughlin Transmission Operation Center. The communication protocol for the data circuit(s) shall be specified by Cleco. Instantaneous bi-directional analog real power and reactive power flow information must be telemetered directly to the location(s) specified by Cleco. Each party will promptly advise the other party if it detects or otherwise learns of any metering, telemetry or communications equipment errors or malfunctions that require the attention and/or correction by the other party. The party owning such equipment shall correct such error or malfunction as soon as reasonably feasible

7. GROUNDING AND SAFTEY ISSUES

7.1. The grounding system design and construction shall meet the requirements listed in Appendix E.

7.2. When making an interconnection to Cleco's transmission system, the requesting party shall comply with applicable safety laws and building and construction codes, including provisions of applicable Federal, State, or local safety, health, or industrial regulations or codes, and the Cleco Safety Manual and programs.

7.3. Cleco will make final determination as to whether the Cleco facilities are properly protected before an interconnection is energized. The interconnecting facility owner is responsible for proper protection of their own equipment and for correcting such problems before the facilities are energized or interconnected operation begins. Cleco may determine the measures to maintain the safe and reliable operation of the Cleco transmission system.

8. INSULATION AND INSULATION COORDINATION

8.1. Power system equipment is designed to withstand voltage stresses associated with expected operation. Adding or connecting new facilities can change equipment duty, and may require that equipment be replaced or switchgear, telecommunications, shielding, grounding and/or surge protection be added to control voltage stress to acceptable levels. Interconnection studies include the evaluation of the impact on equipment insulation coordination. Cleco may identify additional requirements to maintain an acceptable level of transmission system reliability, equipment insulation margins, and safety. Voltage stresses, such as lightning or switching surges, and temporary overvoltages may affect equipment duty.

8.2. 34.5kV facilities shall be design for a Basic Impulse Insulation Level of 200kV.

8.3. 138kV facilities shall be design for a Basic Impulse Insulation Level of 650kV.

8.4. 230kV facilities shall be design for a Basic Impulse Insulation Level of 900kV.

9. VOLTAGE, REACTIVE POWER, AND POWER FACTOR CONTROL

9.1. Voltage Schedule for Generation – The interconnecting generator shall maintain the following voltage schedule, however the operating limits of the generator shall not be exceeded in an effort to follow the voltage schedule.

9.1.1. 138kV interconnecting bus voltage – 144kV

9.1.2. 230kV interconnecting bus voltage – 240kV

9.1.3. 345kV interconnecting bus voltage – 352kV

9.2. Voltage for Loads - It is the responsibility of the interconnecting facility owner to incorporate appropriate voltage regulation equipment in their facility if the interconnecting facility's supply voltage requirements are more restrictive than a range from 92% to 105% of nominal voltage.

9.3. Reactive Power/Power Factor for Generator - The interconnected generator shall be designed and operate to maintain a composite power delivery at the continuous rated power output at a power factor between 0.95 lagging and 0.95 leading.

9.4. Reactive Power/Power Factor for Load - The interconnected facility shall be responsible for providing their own reactive power needs in order to maintain a power factor between 0.95 lagging and 0.95 leading. All reactive resources must be capable of operating within the voltage limits stated in the current NERC Standards and SPP Criteria for normal and emergency conditions. Switched reactive resources must be designed to not cause voltage transients on the system.

10. POWER QUALITY IMPACTS

10.1. Power Quality - Adequate design precautions must be taken by the interconnected facility owner to prevent excessive and deleterious harmonic voltages and/or currents from occurring on the Cleco system. The interconnected facility must be designed to operate with normal harmonic voltage and currents that originate from Cleco. Voltage and current harmonic levels need to be below the stated values in the current IEEE Standard 519 document. Excessive harmonics originating from within the interconnected facility will be the responsibility of the interconnected facility owner to correct at their own expense.

10.2. Voltage Flicker - Voltage surges or flicker caused by the operation, synchronization, or

isolation of the interconnected facility shall be within the standards set forth in the International Electrotechnical Commission (IEC) voltage flicker curves. The interconnected facility shall provide suitable equipment to limit voltage flicker to below the "Border Line of Irritation" curve on the IEC voltage flicker chart at the point of interconnection.

10.3. Phase Unbalance – unbalanced phase voltages and currents can affect coordination of protective relaying, create higher flows of current in neutral conductors, and cause thermal overloading of transformers and motors. The measurement of voltage unbalance, Negative Sequence Unbalance Factor (NSUF) is the ratio of the negative sequence voltage divided by the positive sequence voltage, expressed as a percentage. The NSUF limits listed herein applies to normal system operations. For connections at 230 kV and above, the voltage unbalance should not exceed 1%. For connections below 230 kV, the contribution at the interconnection point should not be allowed to cause a voltage unbalance greater than 1.3%. System problems such as a blown transformer fuse or open conductor on a transmission system can result in extended periods of phase unbalance. It is the interconnecting facility owner's responsibility to protect all of its connected equipment from damage that could result from such an unbalanced condition.

11. EQUIPMENT RATINGS

11.1. Equipment ratings shall be suitable for the ambient temperature range of -40° C to 50°C. Equipment ratings shall be sized for load and system expansion for the 15-20 year time frame. Equipment ratings shall comply with the latest ANSI, IEEE, NEMA, and NERC requirements and must be in accordance with the Cleco methodology for determining facility ratings.

11.2. Cleco will provide all large power transformers with a high side voltage greater then 138kV. Contractor shall supply control power transformers.

11.3. Coupling Capacitive Voltage Transformer (CCVT) minimum design criteria are listed in Appendix B.

11.4. Wave trap minimum design criteria are listed in Appendix C.

11.5. Potential Transformer (PT) and Current Transformer (CT) minimum design criteria are listed in Appendix D.

11.6. Air break disconnect switches shall be as follows:

11.6.1. 138kV system - USCO AVR-13820 (vertical break), AGCH5-13820 (center side break) and AGCH-5V13820 (vee)

11.6.2. 230kV system - USCO AVR-23020-9 (vertical break), AGCH5-23020 (center side break) and AGCH-5V23020 (vee)

11.6.3. Where motor operated air break switches are specified Pascor Atlantic MO-10 motor operators shall be installed.

12. SYNCHRONIZING OF FACILITIES

Synchronization of an interconnected generator shall be accomplished by providing suitable equipment to measure both the phase angle across the breaker and the voltage on each side of the breaker. If possible, the phase rotation should be slowed to a near stop condition and the phase angle reduced to 10 degrees or less before interconnection is made.

13. MAINTENANCE COORDINATION

13.1. Obligations – Cleco and the interconnecting party shall maintain their facilities in a safe and reliable manner in accordance with Good Utility Practice.

13.2. Coordination - Cleco and the interconnecting party shall confer regularly to coordinate the planning, scheduling and performance of preventive and corrective maintenance on the interconnecting facilities.

13.3. Secondary Systems – Cleco and the interconnecting party shall cooperate with the other in the inspection, maintenance, and testing of control or power circuits that operate below 600 volts, AC or DC, including, but not limited to, any hardware, control or protective devices, cables, conductors, electric raceways, secondary equipment panels, transducers, batteries, chargers, and voltage and current transformers that directly affect the operation of the interconnecting facilities and equipment which may reasonably be expected to impact the other party. Cleco and the interconnecting party shall provide advance notice to the other party before undertaking any work on such circuits, especially on electrical circuits involving circuit breaker trip and close contacts, current transformers, or potential transformers.

14. OPERATIONAL ISSUES

14.1. Abnormal Frequency Conditions -- It shall be the responsibility of the interconnecting facility owner to provide adequate protection or safeguards to prevent damage to Cleco caused by over/under frequency originating in the interconnected facility. The interconnecting facility owner shall provide adequate protection and safeguards to protect the interconnected facility from inadvertent over/under voltage conditions originating from the Cleco electrical system. Steady-state voltages must be maintained within the normal and emergency limits as defined in the current NERC Standards and SPP Criteria.

14.2. Abnormal Frequency Conditions Specific for Generators – the transmission system is designed to automatically activate a load shed program in the event of an under

frequency system disturbance. The interconnected generator shall implement under and over frequency relay set points to endure “ride through” capability of the transmission system. The generator’s response to frequency deviations of pre-determined magnitudes shall be studied and coordinated with Cleco.

14.3. Generator Frequency Control - A speed governor system is required on all synchronous generators. The governor regulates the output of the generator as a function of the system frequency. That function must be coordinated with the governors of other resources, all located within the same control area, to assure proper system response to frequency variations.

14.4. Abnormal Voltages - It shall be the responsibility of the interconnecting facility owner to provide adequate protection or safeguards to prevent damage to Cleco caused by over/under voltages originating in the interconnected facility. The interconnecting facility owner shall provide adequate protection and safeguards to protect the interconnected facility from inadvertent over/under voltage conditions originating from the Cleco electrical system. Steady-state voltages must be maintained within the normal and emergency limits as defined in the current NERC Standards and SPP Criteria.

15. INSPECTION REQUIREMENTS FOR EXISTING OR NEW FACILITIES

15.1. Pre In-service Operation Testing and Inspection - Prior to the new interconnection facilities being placed in service, Cleco shall inspect, test, or witness the testing of the interconnecting facilities to ensure their safe and reliable operation. Similar testing may be required after initial operation. Cleco and the interconnecting party shall make any modifications to its facilities that are found to be necessary as a result of such testing. The interconnecting party shall bear the cost of all such testing, inspection, and modifications.

15.2. Post In-service Operation Date Testing and Modifications – Cleco and the interconnecting party perform routine inspection and testing of its interconnecting facilities and equipment in accordance with Good Utility Practice as may be necessary to ensure the continued interconnection of the new facility in a safe and reliable manner. Both Cleco and the interconnecting party shall have the right, upon advance written notice, to request additional testing of the other’s interconnecting facilities.

15.3. Advance Notice - Both Cleco and the interconnecting party shall notify the other party in advance of its performance of tests of the interconnecting facilities. The other party has the right, at its own expense, to observe such testing.

15.4. Right to Inspect – Cleco and the interconnecting party shall have the right, but shall have no obligation to:

15.4.1. observe the other party’s tests and/or inspection of any of its system protection facilities and other protective equipment;

15.4.2. review the settings of the other party's system protection facilities and other protective equipment; and

15.4.3. review the other party's maintenance records relative to the interconnection facilities, the system protection facilities and other protective equipment.

15.5. Exercise rights - Cleco and the interconnecting party may exercise these rights from time to time as it deems necessary upon reasonable notice to the other party. The exercise or non-exercise by a party of any such rights shall not be construed as an endorsement or confirmation of any element or condition of the interconnection facilities or the system protection facilities or other protective equipment or the operation thereof, or as a warranty as to the fitness, safety, desirability, or reliability of same.

16. COMMUNICATIONS AND PROCEDURES

16.1. General -- Operational communications between in the interconnected facility and the Cleco Transmission Operations Center shall be active and maintained under both normal and emergency conditions.

16.2. Normal Conditions -- include, but not limited to, the following events: system paralleling or separation, scheduled and unscheduled shutdowns, equipment clearances, and hourly and daily load data.

16.3. Emergency Conditions -- are events or scenarios in which immediate action must be taken to ensure safety, prevent equipment damage, or jeopardize the reliability of the Cleco or interconnected party's system.

16.4. Failure of Communications -- Emergency telecommunications conditions may develop that affect telecommunications equipment with or without directly affecting power transmission system facilities. Therefore, the interconnecting facility owner shall provide equipment redundancy and telecommunications route redundancy to protect against certain kinds of failure and telecommunications path interruption. A repair team dedicated to the telecommunications of the interconnecting facility should be retained along with an adequate supply of spare components.

16.5. Backup Communications Strategy -- Where commercial, public telephone network facilities or services support important power system telecommunications, a backup strategy should always be developed by the Requester to protect against interruption of such services. Backup methods could include redundant services, self-healing services, multiple independent routes, carriers and combinations of independent facilities such as wireline and cellular, fiber and radio, etc. Backup telecommunications system equipment such as emergency standby power generators with ample on-site fuel storage and reserve storage battery capacity must be incorporated in critical telecommunications facilities. Backup equipment should also be considered for certain

non-critical telecommunications to provide continued operation of telecommunications during interruption of transmission services.

TRANSMISSION SERVICES CONTACT

If there are any questions concerning these requirements, please telephone, email or write:

Cleco Power LLC
Greg Coco, P.E.
General Manager – Transmission Services
P.O. Box 5000
Pineville, LA 71361-5000

318-484-7520

greg.coco@cleco.com

Appendix A

Circuit Breaker

Minimum Design Criteria	Units	Breaker Voltage			
		38kV	72.5kV	138kV	242kV
Maximum Line-to-Line Voltage	kV	38	72.5	138	242
Nominal Line-to-Line Voltage	kV	34.5	69	145	230
Insulation Withstand Test Voltages					
Low Frequency - 1 minute dry	kV rms	80	160	310	425
Low Frequency - 10 seconds wet	kV rms	75	140	275	350
Impulse - Full Wave Withstand	kV crest	200	350	650	900
Impulse - Interrupter Full Wave	kV crest			488	675
Impulse - Chopped Wave (2E-6 sec)	kV crest	258	452	838	1160
Impulse - Chopped Wave (3E-6 sec)	kV crest	230	402	748	1040
Continuous Current Rating	A	2000	2000	2000	2000
Closing & Latching Current Capability	kA peak	82	82	104	104
3 Second Current Capability	kA rms	31.5	31.5	40	40
Rated Short Circuit Current	kA rms	31.5	63	40	40
Maximum Symmetrical Interrupting	kA rms	31.5	31.5	40	40
Maximum Interrupting Time	cycles	5	5	3	3
Maximum Closing Time	cycles	20	20	20	20
Auxiliary Control Voltages					
AC - Heaters and Motors*	V	240	240	240	240
DC - Trip & Close Circuit	V	125	125	125	125
Bushing BIL	kV	200	350-	650	900
Bushing Creepage	inches	28	42	84	140

Appendix B

Coupling Capacitor Voltage Transformer

Minimum Design Criteria	Units	Coupling Capacitor Voltage Transformer		
		362kV	242kV	145kV
Maximum Line-to-Line Voltage	kV	362	242	145
Nominal Line-to-Line Voltage	kV	345	230	138
Nominal Line-to-Ground Voltage	kV	207	138	80.5
Nominal Secondary Voltages	V	69 and 115	69 and 115	67.08 and 115
Ratio		1800 and 3000	1200 and 2000	700 and 1200
Radio Influence Voltage				
Test Voltage	kV	209	140	84
Maximum Voltage	microvolts	250	250	250
1 minute overvoltage	kV	289.8	193.2	112.7
Power Frequency Withstand Test				
Dry (1 minute)	kV	785	525	320
Wet (10 seconds)	kV	680	460	275
BIL	kV	1550	1050	650
Capacitance range	picofarads	1900 to 2400	2900 to 3300	4800 to 5500
Porcelain Creepage Distance	inches	230	154	92

Coupling Capacitor Voltage Transformer – High Capacitance

		High Capacitance CCVT	
Minimum Design Criteria	**Units**	**242kV**	**145kV**
Maximum Line-to-Line Voltage	kV	242	145
Nominal Line-to-Line Voltage	kV	230	138
Nominal Line-to-Ground Voltage	kV	138	80.5
Ratio		1200 and 2000	700 and 1200
Nominal Secondary Voltages	V	69 and 115	67.08 and 115
Radio Influence Voltage			
Test Voltage	kV	140	84
Maximum Voltage	microvolts	250	250
1 minute overvoltage	kV	193.2	112.7
Power Frequency Withstand Test			
Dry (1 minute)	kV	525	320
Wet (10 seconds)	kV	460	275
BIL	kV	1050	650
Capacitance range	picofarads	10000 - 25000	16500 - 20800
Porcelain Creepage Distance	inches	154	92

Appendix C

Wave Traps

Minimum Design Criteria	Units	Wave Trap		
		362kV	242kV	145kV
Maximum Line-to-Line Voltage	kV	362	242	145
Nominal Line-to-Line Voltage	kV	345	230	138
Nominal Line-to-Ground Voltage	kV	207	138	80.5
Continuous Current Rating	A	2000	2000	2000
Short Time Current Rating	kA	63	63	63
Main Coil Inductance	mH	0.265	0.265	0.265
Radio Influence Voltage				
Test Voltage	kV	209	140	84
Maximum Voltage	mV	250	250	250
Self Resonance Frequency	Hz	>500	>500	>500
Tuning Range	kHz	100 to 300	100 to 300	100 to 300 or 50 to 200
Precision of Tuning	%	+/- 0.5	+/- 0.5	+/- 0.5
Blocking Impedance	Ohms	400	400	400
Varation of Blocking Characteristic	%	<2	<2	<2
Impulse Withstand	kV	80	80	80
Mechanical Strength	kA	160	160	160

Appendix D

Potential Transformer

Minimum Design Criteria	Units	Potential Transformer				
		362kV	242kV	145kV	38kV	38kV
Quantity				1	8	4
Maximum Line-to-Line Voltage	kV	362	242	145	38	38
Nominal Line-to-Line Voltage	kV	345	230	138	34.5	34.5
Nominal Line-to-Ground Voltage	kV	207	138	80.5	20.125	24
Ratio		1800 and 3000	1200 and 2000	700 and 1200	175 and 300	200 and 346
Nominal Secondary Voltages	V	69 and 115	69 and 115	67.08 and 115	67.08 and 115	69.3 and 120
Thermal burden						
One secondary	VA	5000	5000	5000	2500	2500
Divided between secondaries	VA	7500	7500	7500	3000	3000
Impulse						
Full wave withstand	kV crest	1300	900	550	200	200
Chopped wave (3 x 10-6 sec)	kV	1500	1035	630	230	230
Power Frequency Withstand Test						
Wet (10 seconds)	kV rms	555	385	230	95	95
BIL	kV	1300	900	550	200	200
Applied potential Test						
Primary	kV rms	575	395	230	70	70
Secondaries	kV rms	2.5	2.5	2.5	2.5	2.5
Porcelain Creepage Distance	inches	205	135	79	26	26

Current Transformer

Minimum Design Criteria	Units	Potential Transformer			
		362kV	242kV	145kV	38kV
Maximum Line-to-Line Voltage	kV	362	242	145	38
Nominal Line-to-Line Voltage	kV	345	230	138	34.5
Nominal Line-to-Ground Voltage	kV	207	138	80.5	20.125
Ratio		1000/2000:5	1000/2000:5	1000/2000:5	400/800:5
BIL	kV	1300	900	550	200
Continuous Thernal Rating Factor		2	2	2	2
Short Time Mechanical Rating	kA	40	40	40	40
Minimum Leakage Distance	inches	205	135	79	26

APPENDIX E

GROUNDING SYSTEM DESIGN AND CONSTRUCTION

1.1 The substation grounding system shall be designed to protect personnel and equipment during faults. All substation equipment, structures and metallic conduits shall be connected to the grid. The design calculations and soil resistivity test data shall be submitted to Cleco for approval. The ground grid shall be designed in accordance with IEEE 80 based on following minimum requirements. Software such as SES or WinIGS (or other software approved by Cleco) may be used.

1.1.1 Maximum clearing time:..... 0.417 sec.

1.1.2 Maximum ground fault grid current:.....40 kA

1.1.3 Soil Resistivity: ..... to be determined by Contractor

1.1.4 Ground rods:.....Per design and at breaker and lightning arrester.

1.1.5 Grid size: .....The grid shall extend 3 ft outside the substation fence.

1.1.6 Grid Burial depth:.....1.5 ft

1.1.7 Grid conductor (minimum size)..... Bare 4/0

1.2 All steel structures shall have a hole for a ground clamp approximately 8" above grade.

1.3 The fencing shall be grounded at all corner posts, fence posts, and where the internal grid crosses the fence.

1.4 All below grade connection shall be exothermic type.

1.5 All switch stands shall have ground clamps on two diagonal legs. Clamps shall be provided such that a 4/0 copper ground cable can be run up to the vertical operating pipe. A flexible braided strap shall be clamped from the switch stand ground to the switch's vertical operating pipe. Also, a 4/0 ground lead shall be exothermically welded to the switch stand ground and clamped onto the 30" x 36" grounding mat.

1.6 For all duct systems, two 1/0 copper ground cables shall be run through the top corner conduits (or attached to the top corners in trench type systems). A tail from the station grid shall protrude through the concrete bottom of all manholes and connect to both of these ground cables. In trench type systems, the two ground cables shall be connected to the ground grid approximately every 100'. This connection shall be the parallel grove compression type. Both of these cables shall be connected to the ground bus in the control house junction box.

1.7 For all breakers, PTs, CTs, CCVTs and associated junction boxes, a 1/0 ground wire shall be run from the ground wires in the duct system, clamped along the conduits to the equipment, then terminated on the equipment grounding lug.

1.8 The control house, equipment cabinets and panels shall be solidly grounded from two separate points on the station grid (one per duct entrance).

1.9 All shield wires connecting to dead end structures shall be bonded to a 4/0 ground cable running up the tower leg. The connection shall be made with a tinned bronze clamp.

1.10 All excavations shall be backfilled by compacting the native soil into the excavation (trench) in lifts not to exceed nine inches. The minimum acceptable density of the compacted backfill is that of the existing undisturbed soil. Special care shall be exercised while compacting the first lift to ensure that the soil is compacted tightly around the grounding conductor such that no void exists.

1.11 A Cleco representative must inspect all below grade grounding before backfilling. There shall be no exceptions. Failure to allow for inspection shall be cause for uncovering the grounding at the Contractor's expense.

1.12 Lightning Protection - Overhead shield wires and lightning masts installed on the take-off towers shall be provided for protection from direct lightning strikes. Freestanding lightning mast shall also be supplied, if required, to protect the substation. The shield system shall be tied into the substation ground grid. The lightning protection design shall be per IEEE 998 Guide, Classical Empirical Method.

1.13 The grounding system shall be tested in accordance with IEEE Std. 81.

APPENDIX F

CONNECTIONS TO TRANSMISSION LINES

1.1. Proposed connections to the Cleco transmission system are subject to approval on a case-by-case basis.

1.2. Connections to transmission lines shall meet the following minimum criteria:

1.2.1. A proposed interconnection to a transmission line, whenever possible, will be connected at an existing substation. Interconnects at a new location on an existing line will require the requesting party to provide a substation site suitable for breakers, relaying and transformer installations.

1.2.2. The interconnecting transmission lines shall have overhead ground wire (OHGW) shielding over the entire length of the line.

1.3. If the interconnecting party does not require highly reliable service, the use of line sectionalizing devices may be employed. Only gas insulated circuit breakers shall be installed in the line sectionalizing positions for all interconnected substations. These circuit breakers would be used to de-energize line sections without interruption of the connected loads. Cleco would assume ownership of the sectionalizing breakers. The bus configuration shall provide isolation of the interconnection while maintaining the integrity of the Cleco system by employing a bypass breaker similar to a three terminal ring bus configuration.

1.4. Parties constructing transmission lines shall submit verification that the transmission line structures and foundations have been, or will be, designed in accordance with standard utility practice.