KISSIMMEE UTILITY AUTHORITY
Engineering and Operations Department

KUA KISSIMMEE UTILITY AUTHORITY	**PLANNING DOCUMENTS**	**Document No.** PL.42.100.10.00		**Prepared By** M. J. Simpson
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DESIGN CRITERIA FOR INTERCONNECTION TRANSMISSION LINES

GENERAL. This document covers the design criteria to be used for transmission lines associated with the interconnection of transmission facilities. It covers both 230 kV and 69 kV transmission lines. This document is intended to give general design criteria. Actual designs, structure specifications, bills of material, etc. shall be submitted to KUA for review and approval before proceeding with procurement and construction activities.

CODES AND STANDARDS. The transmission lines shall meet NESC, State, County, and local codes and ordinances as well as IEEE, ASCE, and other applicable industry standards. Design shall meet NESC Grade B requirements.

RIGHT OF WAY. Sufficient right of way shall be acquired to accommodate insulator swing, structure deflection, structure configuration, and conductor blowout in order to maintain minimum NESC electrical clearances as defined below. Right of way width shall also be sufficient to meet Florida PSC requirements for electrostatic and electromagnetic field strengths.

TRANSMISSION STRUCTURES. Structures shall be designed to accommodate the required conductor and wind conditions as defined in the NESC (IEEE C2, latest revision) and in ASCE's Guidelines for Transmission Line Structural Loading. Unless otherwise stated in the Transmission Interconnection Agreement, transmission structures shall either be tubular steel or spun concrete monopole design. Foundation design for normal soil types shall be direct embedded with crushed rock or concrete backfill or drilled pier. Special foundation designs may be required for adverse soil conditions.

GROUNDING DESIGN. Each transmission structure shall be solidly grounded in accordance with NESC requirements with a grounding resistance of 10 ohms or less. Grounding shall be accomplished with the use of multiple ground rods and counterpoise as required. In addition, all pole hardware shall be connected to the structure ground.

LIGHTNING PROTECTION. The transmission lines shall have direct stroke protection provided by shield wire(s) providing a shielding angle of 30 degrees or better. Shield wires shall be sized to accommodate the expected fault current and duration identified in the System Interconnection Planning Study without damage to the conductor including optical fibers if OPGW shield wire is used.

COMMUNICATION CIRCUITS. Unless otherwise stated in the Transmission Interconnection Agreement, the interconnection transmission lines shall include fiber optic communication circuits either utilizing OPGW shield wire or ADSS cable. A minimum of 96 fibers shall be provided for KUA use. Fibers will be used for relay circuits, SCADA communications, metering, internal phone circuits and other public convenience and need.

INSULATOR SELECTION. Insulators shall be silicon based polymer in accordance with the minimum requirements indicated below. Insulator strength shall be based on specific design parameters and the actual conductor size used. All hardware strength ratings shall be equal or greater than the related insulator strength.

230 kV Insulators	Dead End	Braced Post/Jumper Support
Leakage Distance, Inches	250	220
Dry Arc Distance, Inches	99	93
60 Hz Flashover, Dry, kV	940	875
60 Hz Flashover, Wet, kV	690	630
Impulse Flashover, Positive, kV	1,570	1,425
Impulse Flashover, Negative, kV	1,615	1,440

69 kV Insulators	Dead End	Braced Post/Jumper Support
Leakage Distance, Inches	106	93
Dry Arc Distance, Inches	42	38
60 Hz Flashover, Dry, kV	412	360
60 Hz Flashover, Wet, kV	350	330
Impulse Flashover, Positive, kV	650	560
Impulse Flashover, Negative, kV	690	630

CONDUCTOR SELECTION. The conductor size shall be in accordance with the System Interconnection Planning Study. The minimum conductor size for 230 kV transmission lines is 954 ACSR, “Cardinal”. The minimum conductor size for 69 kV shall be 795 ACSR, “Drake”. Conductor ratings shall be based on IEEE 738, latest revision given the following conditions:

Wind velocity	2 ft/sec
Conductor temperature at continuous rating	90 degrees C
Conductor temperature at emergency rating,	100 degrees C
Wind direction	Perpendicular to the conductor
Latitude	28.3 Degrees North
Solar absorptivity	0.5
Emissivity	0.5
Atmosphere	Clear
Summer Ambient Temperature	104F
Winter Ambient Temperature	25F

Tension control shall be 18% of the conductor’s rated breaking strength at 30F, Final, No Ice, No Wind.

ELECTRICAL CLEARANCES. Electrical clearances shall be in accordance with the NESC plus 2 feet to allow for construction deviations. Clearances shall be based on maximum conductor emergency operating temperatures, not anticipated loads. Minimum conductor spacing shall be as follows:

System	Phase – Phase	Phase – Ground
69 kV	5’-0”	4’-0”
230 kV	12’-0”	9’-6”

Revision Tracking

No.	Date	Description
0	12/21/05	Initial Issue
1	06/01/07	Revised Emergency Conductor Temperature
2	04/24/13	Revised Conductor Selection Article