KZDX Transmission System

Transmitter Power Output Calculations

This exhibit has been included to explain the basis for the transmitter power output utilized to achieve the authorized effective radiated power of 27 kW.

The antenna system consists of a circularly polarized ERI SHPX-5 antenna. The antenna has a power gain of 2.7154 at 99.9 mHz. Therefore, an antenna input power of 9,943 watts is required to achieve 27,000 watts.

The transmission line used to get from the transmitter to the antenna input is Andrew HJ8-50 (3 1/8 inch) air dielectric heliax. With 37 meters of length, the transmission line attenuation is 0.21 dB yielding an efficiency of 95.35%. Therefore, a power of 10,428 watts is required at the input of the transmission line, which is also the transmitter output, to achieve the authorized effective radiated power. After rounding, a transmitter power output of 10.4 kilowatts is needed to achieve the permitted ERP.

Feed System Efficiency:

In calculating the Feed System Efficiency, the following values were used based on the insertion loss data provided by each manufacturer.

Andrew HJ8-50 Heliax (37 meters)
Insertion Loss = 0.21 dB (at 99.9 mHz)

Antenna Gain:

In calculating the Antenna Gain, the following value was used based on data provided by the manufacturer:

ERI SHPX - 5
Power Gain: 2.7154 dB

TPO Calculations:

$$\frac{\text{Effective Radiated Power}}{(\text{Antenna Power Gain} * \text{Feed System Efficiency})} = \text{TPO}$$

$$\frac{27\text{ kW}}{(2.7154 * 95.35\%)} = \mathbf{10.428\ kW = 10.4\ kW\ TPO}$$