

Viking Power Turbine Major Inspection Summary

The following is a technical inspection summary of the Viking gas turbine units which have low operating hours and have had a major inspection and parts upgrade.

Drivers:

- 1- Viking Gas Turbine Model KG2-3C (1982) w/147 hours of Operation & 496 Starts
- 3- Viking Gas Turbines Model KG2-3A (1977) w/122,129,117 Hours of Op & 1127,949,1075 Starts

The model KG2 is a radial flow gas turbine with a single stage compressor and a single stage turbine with a 3.8:1 pressure ratio. The machine has an air flow of 28.2#/s at ISO conditions. The compressor, turbine and combustion system are no different between the 3A and the 3C units. The 3A is an earlier model with more stringent design limitations on firing temperature (load). The 3A machines have temperature limitations with the turbine shroud, the volute mounting system, and the volute wall thickness and an outstanding Service Bulletin on the turbine rotor tension sleeve. A major inspection has been conducted on all four machines. All Service Bulletins have been implemented and new tension sleeves installed. To address the design deficiencies in the 3A machines, a volute mounting system modification has been conducted on all three of the machines to eliminate this limitation. Two of the three turbine shrouds of the 3A machines were cracked and only two 3C grade turbine shrouds were available to upgrade the units. Thus one machine was reassembled with 3A components (turbine shroud & volute (1mm)) and will have to be run at the reduced 3A firing temperatures. The volutes come in three thickness'. The 3A units were found to contain 1mm volute construction thickness and the 3C machine was found to contain a volute 1.5mm construction thickness. Current standard for volutes is 2mm wall thickness. There were no flaws at all detected in the 3C machine, however, it was reassembled a new 2.0 mm volute. The 3A machines were upgraded to thicker volutes (1.5 mm & 2.0MM) now allowing higher firing temperatures as in the 3C machine. The following is a matrix of the modifications made to the units by unit number.

Unit#	Original Model	Turbine Shroud	Volute	Volute Mounting	Upgrade Status
1	KG2-3A	Replaced New Design	2.0 mm	Ugraded Mounts	KG2-3C
2	KG2-3A	Replaced New Design	1.5 mm	Ugraded Mounts	KG2-3C
3	KG2-3A	Replaced New Design	1.5 mm	Ugraded Mounts	KG2-3C
4	KG2-3C	Original/Current Stndrd	2.0 mm	Current Standard	KG2-3C

As indicated, the Viking Power fleet has been upgraded to 3C status and can all be fired as current technology 3C machines.

An inspection of the reduction gears and bearings was conducted on all four machines and the components were found to be in what appeared to be new condition.

The combustion systems were disassembled and inspected. One fuel nozzle was found to be damaged and was repaired. Several combustion system liners were found to have minor defects. All crack indications were removed or repaired.