# Inspection Intervals

Following is a list of inspection categories and intervals recommended by Westinghouse Service Bulletins.

| | Intervals* | | |
|---|---|---|---|
| | Hours | or | Starts |
| Inspection Type | | | |
| Combustor | 8,000 | | 400 |
| Hot Gas Path Major | 24,000 | | 1,200 |
| Major | 48,000 | | 2,400 |

**Combustor Section Inspection**

Combustor inspections involve removal of fuel nozzles and all combustor components. These parts should be thoroughly cleaned, inspected, and repaired in accordance with appropriate service bulletin information. Turbine row 1 vanes should be inspected visually in place.

**Hot Path Major Inspection**

This turbine inspection includes all the components of the combustor inspection as well as the remainder of the turbine hot gas path made accessible by removal of the turbine cylinder cover and blade rings. All blades and associated parts should be removed from the rotor, cleaned, and inspected. Disc and blade root serrations should be also cleaned and inspected at this time. Vanes and ring segments should be removed from the blade ring as required for cleaning and inspection and interstage vane seals and baffles should be inspected before disassembly. All cleaning, inspection, and repair or replacement criteria are specified in applicable Service Bulletins.

**Major Inspection**

The major inspection is the most comprehensive inspection carried out on the combustion turbine. It includes all of the scope of a turbine section (hot

* The intervals shown are for a gas fired base loaded machine. For other operating conditions, these intervals will be modified as outlined under "Equivalent Operating Hours" located in this section of the proposal.

path) inspection as well as lifting of the compressor and compressor-combustor cylinder covers. Compressor diaphragms are removed, cleaned, and inspected. All cleaning, inspection, and repair or replacement criteria are specified in applicable service bulletins.

The inspections and intervals stated herein may be modified or supplemented by special instructions. These include any additional requirements specified by Availability Improvement Bulletins (AIB's) or Product Improvement Bulletins (PIB's) or Service Bulletins (SB's) as recommended in Outage Planning Manuals and Outage Plans as established for a specific unit.

For high unit reliability and availability, it is recommended that maintenance programs be established and performed on a routine basis. Assuming approximately 8,000 operating hours per year, inspection intervals for a three year period, based on a W501D5 gas-fired, base load turbine are:

| Year | Type | Inspection Interval Operating Hours | Starts | Available Period Hours | Period Hours |
|---|---|---|---|---|---|
| 1 | Combustor | 8,000 | 400 | 8,664 | 8,760 |
| 2 | Combustor | 16,000 | 800 | 17,328 | 17,520 |
| 3 | Hot Path Major | 24,000 | 1,200 | 25,812 | 26,280 |

To maintain high unit availability and minimize scheduled Outage durations, the scenario below is recommended.

Scenario: 2 10-hour shifts per day, 6 days per week

A. Combustor - 80 hours = 8 10-hour shifts
   4 calendar days = 96 period hours = 98.9% availability
   5 men = 400 man-hours (craft labor)

B. Hot Path Major - 210 hours = 21 10-hour shifts
11.5 calendar days = 276 period hours = 96.8% availability
7 men = 1,470 man-hours (craft labor)

C. Major - 310 hours = 31 10-hour shifts
17.5 calendar days = 420 period hours = 95.2% availability
7 men = 2,170 man-hours (craft labor)

Average availability as a result of scheduled outages over the three year period is 98.2%.* *

**Determination of Total Equivalent Operating Hours**

For the purpose of determining the elapsed time status of the warranty period, the Total Equivalent Operating Hours for the equipment shall be determined from certified station logs and other pertinent station data, using the following equation:

$$EOH = a\,(BLOH) + b\,(PLOH) + c\,(NS) + d\,(ES) + e\,(TGH) + f\,(TS)$$

where: EOH = Total Equivalent Operating Hour

BLOH = (GBLOH + 1.25 OBLOH)

BLOH = Base Load Operating Hours
= Number of Hours Equipment Operated at Continuous Base Load or Lower Power Setting

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***Determining Unit Availability**

$$\frac{PH - (SOH + FOH)}{PH} \times 100\%$$

PH = Period Hours
SOH = Scheduled Outage Hours
FOH = Forced Outage Hours

GBLOH = Base Load Operating Hours on Gas Fuel at Continuous Base Load or Lower Power Setting

OBLOH = Base Load Operating Hours on Oil Fuel at Continuous Base Load or Lower Power Setting

PLOH = (GPLOH + 1.25 OPLOH)

PLOH = Peak Load Operating Hours
= Number of Hours Equipment Operated at a Load Beyond the Base Load

GPLOH = Peak Load Operating Hours on Gas Fuel at Power Setting Greater than Base Load

OPLOH = Peak Load Operating Hours on Oil Fuel at Power Setting Greater than Base Load

NS = Number of Normal Starts

ES = Number of Emergency Starts

TGH = Turning Gear Hours
= Number of Hours the Engine is on Turning Gear Operation

TS = Number of Tripped Shutdowns, Where the Equipment is Shut Down Without Any Attempt to Control the Rate of Shutdown

a = Factor Relating BLOH to EOH = 1.0
b = Factor Relating PLOH to EOH = 3.0

| | | |
|---|---|---|
| c | = | Factor Relating NS to EOH = 20.0 |
| d | = | Factor Relating ES to EOH = 400 |
| e | = | Factor Relating TGH to EOH = 0.01 |
| f | = | Factor Relating TS to EOH = 20.0 |