



# Steam Inlet Guide Tube Upgrade

## Steam inlet guide tube upgrade for BBC IT-Series steam turbines

GE supports existing BBC IT-series steam turbines by offering improved inlet guide tubes for continuous operation.

### Reliability and Maintainability Improvement

Valves are a key element for the safe and reliable operation of a steam turbine. The core elements of the valves from the BBC IT-series, including the steam inlet guide tube have been modified in order to improve the reliability of the main stop and control valve.

The BBC IT-series valves are installed in industrial as well as combined-cycle power plant applications.

### Background

A typical BBC IT family steam turbine has a valve block with three control valves (Fig.1). The valve block with the three guide tubes is welded to the turbine casing and the valves are controlled with a camshaft above the block. The steam flow after the control valve is guided through a tube to the inlet nozzle segments.

The main function of the tube is to shield the inlet casing walls from high temperature, avoiding stress concentrations in the casing walls during operation.

Originally the tubes were not fixed but standing on the nozzle casing and could shift out of position under certain conditions. The sealing is a pure metallic contact at the tube ends.

After some years of operation, wear of the sealing part, loose or cracked tubes and high noise levels during operation have been observed.

### Solution

GE offers a new modification for the inlet tubes (Fig. 2). The improved tubes consist of the integrated valve seat with diffuser. New bushings and piston rings connect the inlet guide tube and casing. Both new features (bushing and piston rings as well as integrated valve seat with diffuser) are standard and proven systems, already used in other GE steam turbines.

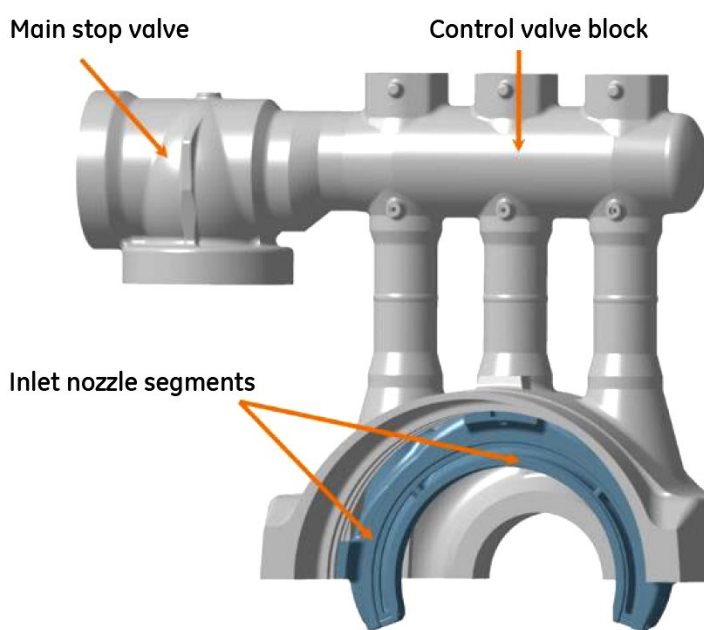


Fig 1: BBC IT typical IT valve arrangement

The new tube is manufactured from austenitic steel and consists of an integrated valve seat and adjacent diffuser followed by the tube. The tube end is specially shaped to integrate the new sealing. This sealing is made out of two piston rings. The construction allows sufficient displacement in transverse and longitudinal direction at the tube end which also facilitates the assembly of the new tube.

The implementation of the new solution requires on-site machining at the nozzle casing in order to adjust the bushing and adapt the fixation at the valve chest and the inlet casing.

For the installation of the new tubes into the valve chest, neither heating nor freezing is required, simplifying the assembly procedure. The upgrade can be performed during a major overhaul on the steam turbine or in parallel with a control valve upgrade or repair.

## Benefits

- Improved reliability
- Improved availability
- Improved maintainability
- Reduced outage time
- Life-time extension

## Applicability

The control valve upgrade package may be applied to all BBC IT-Series steam turbines.

## Reference

The upgraded inlet tubes with integrated diffusers is a solution derived from the proven architecture applied in GE's medium reheat steam turbine range.

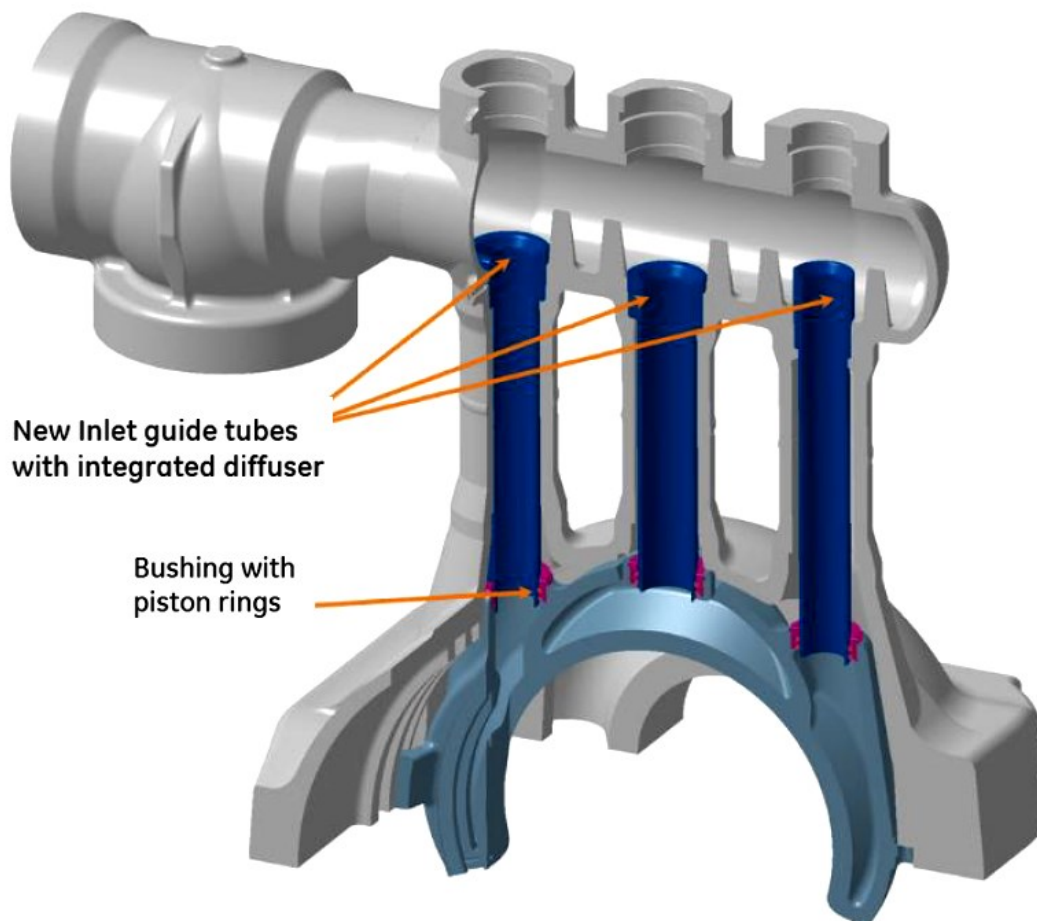


Fig 2: BBC IT inlet guide tubes with insert rings