

MAIN STOP VALVE UPGRADE

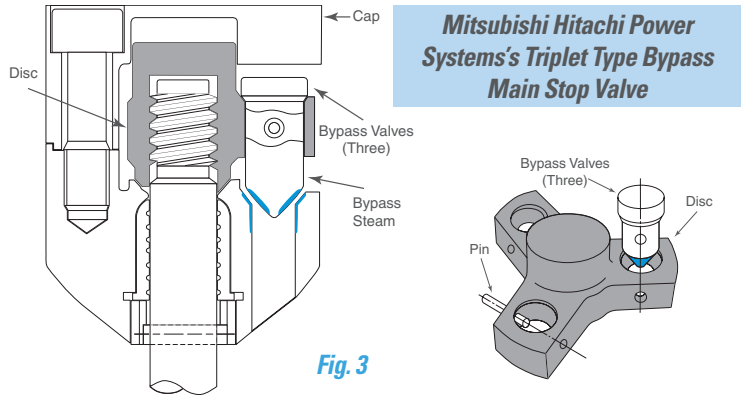
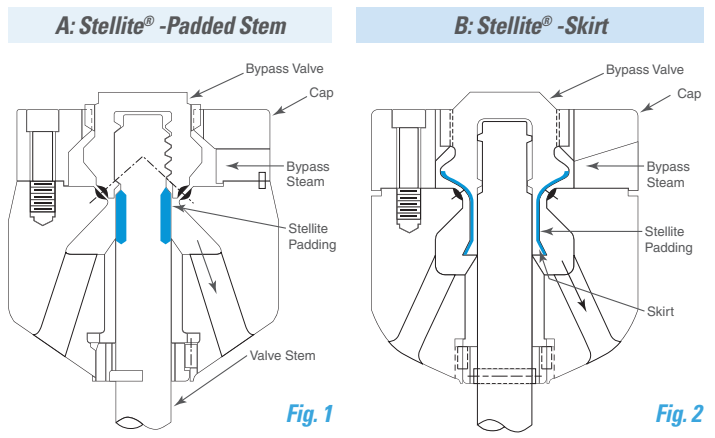
Triplet Type Bypass Main Stop Valve

A thorough investigation of stem erosion on Main Stop Valves led to an engineering design study of these issues by Mitsubishi Hitachi Power Systems engineers. This study resulted in the design of MHPS's Triplet Type Main Stop Valve Upgrade as an effective countermeasure to the solid particle erosion seen in conventional designs.

There are two types of conventional valve designs:

- The first type (Fig. 1) is designed with a Stellite® padded stem. The Stellite® layer protects the stem itself from erosion. However, the Stellite® protection eventually erodes, leaving the stem vulnerable to high velocity steam erosion.
- The second type (Fig. 2) is designed with a Stellite® skirt that covers the upper portion of the stem. This protects the stem from high velocity steam containing erosive solid particles. Although the stem is shielded, the skirt itself remains susceptible to erosion.

Mitsubishi Hitachi Power Systems's Triplet Type Bypass Main Stop Valve (Fig. 3) addresses these issues with a configuration that allows for high velocity bypass steam to flow parallel to the stem, thus eliminating stem erosion issues.



Triplet Type Bypass Valve vs. Traditional Designs

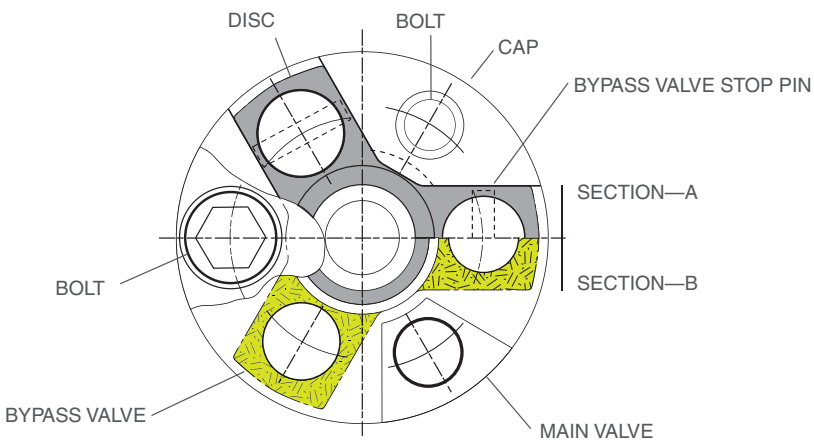
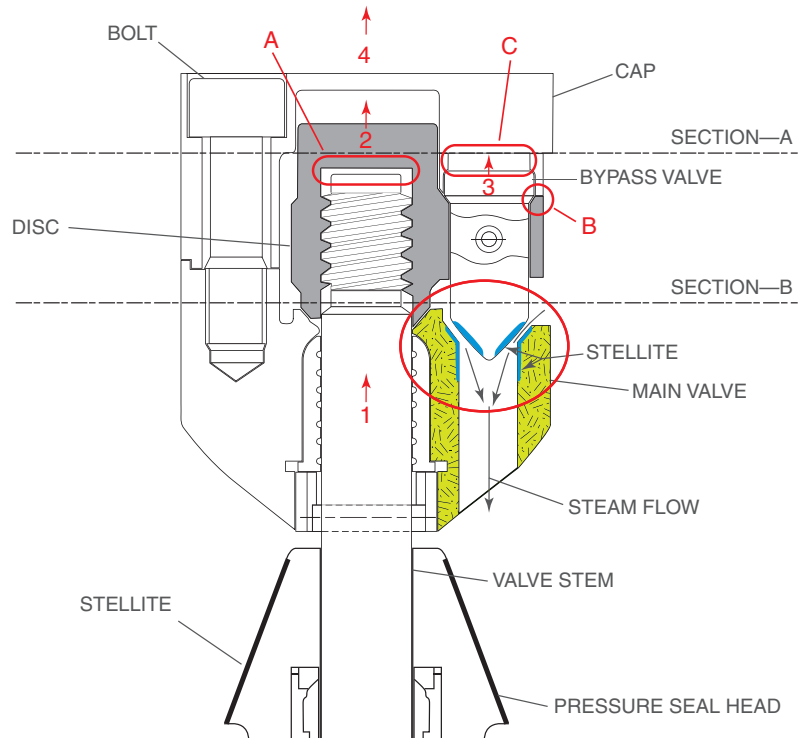
Valve Type	Stellite®-Padded Type A	Stellite®-Skirt Type B	Multi-Valve (Triplet) Type
Example of Application	Subcritical	Supercritical	All Types
Potential Issues	Steam jet collides directly with stem and erosion occurs	Steam jet is directed away from stem; however, Stellite®-padded skirt can still erode	Complex valve structure Design features additional valve seats
Characteristics	Stem is padded with Stellite® to prevent erosion	Valve skirt is padded with Stellite®	Steam jet is controlled by three bypass valves with flow parallel to valve stem

Advantages of Triplet Type Bypass Main Stop Valve

- High Velocity Steam Jet Flows Parallel To Stem And Significantly Reduces Erosion On Valve Stem / Skirt
- Reduced Valve Maintenance
- Applicable To Subcritical And Supercritical Plant Applications
- 29+ Years Of Replacement Experience (175 MW to 700 MW)

Description of Valve Opening Sequence

- (1) Stem moves upwards and contacts disc surface (A).
- (2) Disc moves upwards and contact is established at bypass valve (BV) seat surface (B).
- (3) Contact pushes BV upwards with disc until top of BV contacts with cap surface at (C).
- (4) Resulting contact causes valve cap to start moving upwards and this opens the main valve.



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