

Bi-Directional Sealing Ram

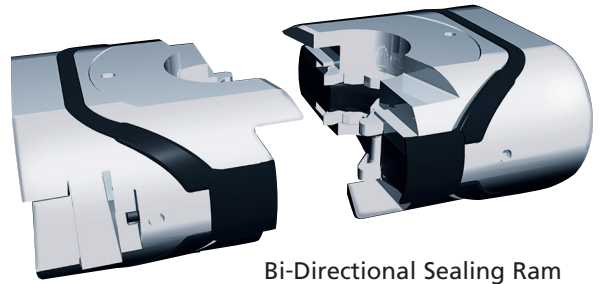
In current practice, there are two ways to perform routine testing of a subsea BOP stack:

The first method is to retrieve the drill string, substitute a test plug and test tool for the bottom hole assembly, and run the drill string and test tool into the hole to test the stack. This method is time-consuming and expensive.

The second method is to test against the lowest BOP in the stack. This means that a BOP cavity must be added to the stack with a special ram assembly (typically a standard pipe ram turned upside down) that can withstand the application of pressure from above the ram. Adding this cavity entails major stack frame and handling modifications, additional height and weight, and the addition of major functions to the control pods.

Cameron's bi-directional sealing ram utilizes sealing geometry that permits the application of pressure from both above and below. The benefits of using this ram include:

- The ram can be used as a standard VBR™ during normal drilling operations and it can also be used to test against during routine BOP testing operations
- There is no need to have a dedicated ram-BOP for testing, saving stack height, and weight
- There are no required major modifications to the stack frame
- Only minor modifications are required to the control system to accommodate the bi-directional ram system



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