

WHAT IS CLAIMED IS:

1. A high pressure ball valve, comprising:
 - an outer wall;
 - an inner wall disposed in the outer wall;
 - a tubing defined by an inner diameter of the inner wall;
 - an annulus defined by an outer diameter of the inner wall and an inner diameter of the outer wall;
 - a lower chamber formed in the annulus; and
 - a relief valve fluidically coupled to the lower chamber, the relief valve configured to close when a difference between a pressure in the lower chamber and a pressure in the tubing is below a minimum cycling pressure of a high pressure ball valve and open when the difference between the pressure in the lower chamber and the pressure in the tubing exceeds a pressure that causes the tubing to flex.
2. The high pressure ball valve of claim 1, further comprising a sealing element preventing fluid flow between an upper chamber and the lower chamber at the relief valve.
3. The high pressure ball valve of claim 1, further comprising a fluid disposed in the lower chamber.
4. The high pressure ball valve of claim 3, wherein the fluid is a compressible fluid.
5. The high pressure ball valve of claim 3, wherein the fluid is a silicone oil.
6. The high pressure ball valve of claim 1, further comprising an inlet fluidically coupling the tubing, the annulus, and the lower chamber.
7. The high pressure ball valve of claim 1, further comprising:
 - a check valve fluidically coupling the tubing and the lower chamber such that the check valve allows a fluid to flow into the lower chamber and prevents the fluid from flowing out of the lower chamber.
8. A method for operating a high pressure ball valve, comprising:
 - applying a tubing pressure to a tubing of a high pressure ball valve by pumping a fluid downhole to the tubing;
 - increasing a chamber pressure in a lower chamber of the high pressure ball valve through fluid flow from the tubing to the lower chamber;
 - decreasing the tubing pressure by pumping the fluid uphole from the tubing to create a pressure differential between the chamber pressure and the tubing pressure exceeds a minimum cycling pressure of the high pressure ball valve; and
 - opening a relief valve fluidically coupled to the lower chamber if the chamber pressure exceeds the tubing pressure by a predetermined threshold, the predetermined threshold corresponding to a pressure that causes the tubing to flex.

9. The method of claim 8, further comprising closing the relief valve when a pressure differential between the chamber pressure and the tubing pressure falls below the predetermined threshold.
10. The method of claim 8, further comprising:
 - operating a piston fluidically coupled to the lower chamber; and
 - activating a mechanism to open the high pressure ball valve.
11. The method of claim 8, wherein the lower chamber is filled with a fluid.
12. The method of claim 11, wherein the fluid is a compressible fluid.
13. The method of claim 11, wherein the fluid is a silicone oil.
14. A subterranean operation system, comprising:
 - a production tubing disposed in a wellbore; and
 - a high pressure ball valve coupled to the production tubing, the high pressure ball valve including:
 - an outer wall;
 - an inner wall disposed in the outer wall;
 - a tubing defined by an inner diameter of the inner wall;
 - an annulus defined by an outer diameter of the inner wall and an inner diameter of the outer wall;
 - a lower chamber formed in the annulus; and
 - a relief valve fluidically coupled to the lower chamber, the relief valve configured to close when a difference between a pressure in the lower chamber and a pressure in the tubing is below a minimum cycling pressure of the high pressure ball valve and open when the difference between the pressure in the lower chamber and the pressure in the tubing exceeds a pressure that causes the tubing to flex.
15. The subterranean operation system of claim 14, the high pressure ball valve further including sealing element preventing fluid flow between an upper chamber and the lower chamber at the relief valve.
16. The subterranean operation system of claim 14, the high pressure ball valve further including a fluid disposed in the lower chamber.
17. The subterranean operation system of claim 16, wherein the fluid is a compressible fluid.
18. The subterranean operation system of claim 17, wherein the fluid is a silicone oil.
19. The subterranean operation system of claim 14, the high pressure ball valve further including an inlet fluidically coupling the tubing, the annulus, and the lower chamber.
20. The subterranean operation system of claim 14, the high pressure ball valve further including:

a check valve fluidically coupling the tubing and the lower chamber such that the check valve allows a fluid to flow into the lower chamber and prevents the fluid from flowing out of the lower chamber.