CLAIMS

1. A cooled isolation valve, comprising:

a valve body;

a stationary element coupled to the valve body and stationary with respect to the valve body;

a movable closure element being movable with respect to the stationary element between a closed position in which the movable closure element and the stationary element are brought together and an open position, one of the movable closure element and the stationary element comprising a sealing element, in the closed position of the movable closure element, the sealing element providing a seal between the movable closure element and the stationary element;

a fluid channel formed in contact with the movable closure element and movable with the movable closure element with respect to the stationary element, such that a fluid in the fluid channel effects heat transfer in the movable closure element; and

a temperature control system which controls temperature in the cooled isolation valve, the temperature control system including an actuator configured to modulate flow of the fluid fed into the fluid channel.

2. The cooled isolation valve of claim 1, further comprising

a sensor for detecting whether the movable closure element is in the open position or the closed position, wherein

the actuator is configured to inhibit flow of the fluid when the sensor detects that the movable closure element is in the closed position.

3. The cooled isolation valve of claim 1, further comprising:

a pneumatic actuation device for controlling movement of the movable closure element; and

a bellows for isolating the pneumatic actuation device from an environment within the valve body, the bellows being disposed adjacent to the pneumatic actuation device radially from a longitudinal axis of the valve and at least partially overlapping the pneumatic actuation device along the longitudinal axis.

4. The cooled isolation valve of claim 1, wherein the sealing element comprises an O-ring.

5. The cooled isolation valve of claim 4, further comprising:

a groove in one of the stationary element and the movable closure element, the O-ring being disposed in the groove, and a surface of the O-ring protruding from the groove; and

a protrusion in a surface of the other of the stationary element and the movable closure element, the protrusion contacting a portion of the protruding surface of the O-ring when the movable closure element is in the closed position, such that the O-ring is free to expand and contract.

6. The cooled isolation valve of claim 4, further comprising:

a groove in one of the stationary element and the movable closure element, the O-ring being disposed in the groove, and a surface of the O-ring protruding from the groove; and

a concave feature in a surface of the other of the stationary element and the movable closure element, the concave feature contacting a portion of the protruding surface of the O-ring when the movable closure element is in the closed position, such that the O-ring is free to expand and contract, the O-ring being deformed when the movable closure element is in the closed position.

7. The cooled isolation valve of claim 1, wherein the valve is a poppet valve.

8. The cooled isolation valve of claim 7, wherein the movable closure element comprises a nosepiece of the poppet valve.

9. The cooled isolation valve of claim 8, wherein the stationary element comprises a valve seat of the poppet valve.

10. The cooled isolation valve of claim 8, wherein at least a portion of the fluid channel is formed in the nosepiece.

11. The cooled isolation valve of claim 8, wherein the nosepiece is coupled to a movable stem of the cooled isolation valve.

12. The cooled isolation valve of claim 11, wherein at least a portion of the fluid channel is formed in the stem.

13. The cooled isolation valve of claim 7, wherein the sealing element comprises an O-ring in a groove, the groove being formed in a nosepiece of the poppet valve.

14. The cooled isolation valve of claim 1, wherein:

the valve is a gate valve; and

the movable closure element comprises a gate movable between the closed position and the open position and a shaft fixedly attached to the gate, rotation of the shaft causing movement of the gate between the open and closed positions.

15. The cooled isolation valve of claim 14, wherein the stationary element comprises a valve seat.

16. The cooled isolation valve of claim 14, wherein at least a portion of the fluid channel is formed in the gate.

17. The cooled isolation valve of claim 14, wherein at least a portion of the fluid channel is formed in the shaft.

18. The cooled isolation valve of claim 14, wherein the sealing element comprises an O-ring in a groove, the groove being formed in the gate.

19. The cooled isolation valve of claim 1, wherein:

the valve is a butterfly valve; and

the movable closure element comprises a flapper movable between the closed position and the open position and a shaft fixedly attached to the flapper, rotation of the shaft causing movement of the flapper between the open and closed positions.

20. The cooled isolation valve of claim 19, wherein the stationary element comprises walls of an opening through the valve.

21. The cooled isolation valve of claim 19, wherein at least a portion of the fluid channel is formed in the flapper.

22. The cooled isolation valve of claim 19, wherein at least a portion of the fluid channel is formed in the shaft.

23. The cooled isolation valve of claim 1, wherein the fluid comprises a gas.

24. The cooled isolation valve of claim 1, wherein the fluid comprises a liquid.

25. The cooled isolation valve of claim 1, wherein the fluid comprises air.

26. The cooled isolation valve of claim 1, wherein the fluid comprises nitrogen (N_2).

27. The cooled isolation valve of claim 1, wherein the fluid comprises water.

28. The cooled isolation valve of claim 1, wherein the fluid comprises a heat transfer fluid.

29. The cooled isolation valve of claim 1, wherein the actuator comprises a pilot valve.

30. The cooled isolation valve of claim 1 or 29, wherein the temperature control system further includes a temperature sensor for sensing temperature in the cooled isolation valve.

31. The cooled isolation valve of claim 30, wherein the temperature sensor comprises a thermocouple.

32. The cooled isolation valve of any one of claims 1, 29, 30 and 31, wherein the temperature control system is configured to be active when temperature in the cooled isolation valve reaches a predetermined temperature set point.