What is claimed is:

1. A valve having a stem seal assembly comprising:

a valve body defining a flow passage and a body cavity perpendicular to the flow passage;

the valve body further defining a stem opening extending from an exterior of the body into the body cavity;

a valve member moveable between an open position and a closed position, the valve member blocking the flow passage in the closed position, and allowing flow through the flow passage in the open position;

a valve stem having a valve stem axis coupled to. the valve member, the valve stem extending from the body cavity to an exterior of the valve body through the valve stem opening for moving the valve member from the closed position to the open position;

a spring energized first seal ring positioned within the valve stem opening to seal the valve stem to the valve body;

a second seal ring positioned within the valve stem opening to seal the valve stem to the valve body; and

a load ring assembly stationarily mounted to and defining a portion of the valve body between the first seal ring and the second seal ring that isolates the first seal ring and the second seal ring so that a force applied to the first seal ring in a direction toward the second seal ring transfers to the load ring assembly.

2. The valve of Claim 1, wherein the first seal ring comprises:

a chevron profile defining a first and a second leg extending from an apex of the chevron profile radially outward, the first and second legs sealing the stem and the body to opposing annular surfaces; and

a back ring having a chevron channel that receives the apex of the chevron profile, the back ring having a greater stiffness to radial movement than the first and second legs to limit radial deformation of the first and second legs.

3. The valve of Claim 2, wherein the first seal ring further comprises:

an annular seal stand off having a first end and a second end;

wherein a chevron profile is positioned on the seal standoff so that the second end of the seal stand off inserts into the chevron profile;

an energizing spring having a chevron profile interposed between the seal stand off and the chevron profile, the energizing spring exerting an expanding force on legs of the chevron profile so that the chevron profile will remain in sealing contact with the opposing annular surfaces;

wherein the energizing spring may be deflected in response to a fluid pressure on the chevron profile opposite the energizing spring to allow fluid flow past the chevron profile; and

wherein the first end of the seal stand off has a substantially flat portion positioned on a supportive shoulder of the packing assembly and the second end of the seal stand off is in operative engagement with the chevron profile of the energizing spring.

4. The valve of Claim 2, wherein the chevron profile is formed of a polymer and the back ring is formed of a polymer having a greater hardness than the polymer of the chevron profile.

5. The valve of Claim 2, wherein the channel of the back ring extends only partially to distal ends of each leg of the chevron profile.

6. The valve of Claim 2, wherein:

a width of the back ring is smaller than a distance between outer side of distal ends of the seal ring legs; and

an inner gap is located between the back ring and the stem and an outer gap is located between the back ring and the body.

7. The valve of Claim 2, wherein the channel of the back ring extends from the apex of the chevron profile over only part of the chevron profile.

8. The valve of Claim 2, wherein:

the chevron profile has two exterior angled portions meeting at a junction; and

the angled portion from the apex to the junction has a larger angle relative to an axis passing through the apex than the angled portion from the junction to the distal ends of each seal ring leg.

9. The valve of Claim 2, further comprising a plurality of bumps circumferentially spaced

apart on the back ring, defining a plurality of fluid channels, allowing fluid to vent past the surface of the chevron profile.

10. The valve of Claim 1, wherein the first seal ring further comprises a bump formed on an outer surface of the first seal ring opposite an end of the seal ring that seals to the valve stem and the valve body, the bump forming one or more fluid channels, allowing fluid to vent past the sealing surface of the seal ring.

11. The valve of Claim 1, wherein the second seal comprises a spring energized seal.

12. A valve stem packing assembly for sealing a valve stem to a valve body having a body cavity, the packing assembly comprising:

first spring energized seal ring positioned within a valve stem opening extending axially through the body to seal the valve stem to the valve body;

a second seal ring positioned within the valve stem opening to seal the valve stem to the valve body; and

a load ring assembly mounted to and forming a part of the body having a first end in engagement with the first seal ring and a second end in engagement with the second seal ring, such that an axial force applied to the first seal ring transfers to load ring assembly, an axial force in an opposite direction on the second seal ring transfers to the load ring assembly.

13. The packing assembly of Claim 12, wherein the first seal comprises:

an annular seal stand off having a first end and a second end;

a seal ring having a chevron profile positioned on the seal standoff so that the second end of the seal stand off inserts into the chevron profile;

wherein the seal ring defines a first and a second leg extending from an apex of the chevron profile radially outward, the first and second legs sealing to opposing annular surfaces of the stem and the body;

an energizing spring having a chevron profile interposed between the seal stand off and the seal ring, the energizing spring exerting an expanding force on legs of the seal ring so that the seal ring will remain in sealing contact with the opposing annular surfaces;

wherein the energizing spring may be deflected in response to a fluid pressure on the seal ring opposite the energizing spring to allow fluid flow past the seal ring;

a back ring having a chevron channel that receives an apex of the seal ring, the back ring

having a greater stiffness to radial movement than the first and second legs of the seal ring to limit radial deformation of the first and second legs of the seal ring; and

wherein the first end of the seal stand off has a substantially flat portion positioned on a supportive shoulder of the packing assembly and the second end of the seal stand off is in operative engagement with the chevron profile.

14. The valve of Claim 13, further comprising a plurality of bumps circumferentially spaced apart on the back ring, defining a plurality of fluid channels, allowing fluid to vent past the sealing surface of the seal ring.

15. The valve of Claim 13, wherein the first seal ring further comprises a bump formed on an outer surface of the back ring opposite an end of the seal ring that seals to the valve stem and the valve body, the bump forming one or more fluid channels so that fluid may vent past the sealing surface of the first seal ring.

16. The valve of Claim 13, wherein:

the seal ring is formed of a polymer; and

the back ring is formed of a polymer having a greater hardness than the polymer of the seal ring.

17. The valve of Claim 12, wherein the second seal ring comprises a spring energized seal.

18. A seal ring for a valve stem comprising:

an annular seal stand off having a first end and a second end;

a seal ring having a chevron profile positioned on the seal standoff so that the second end of the seal stand off inserts into the chevron profile;

wherein the seal ring defines a first and a second leg extending from an apex of the chevron profile radially outward, the first and second legs sealing to opposing annular surfaces of the valve stem and a valve body;

an energizing spring having a chevron profile interposed between the seal stand off and the seal ring, the energizing spring exerting an expanding force on legs of the seal ring so that the seal ring will remain in sealing contact with the opposing annular surfaces;

wherein the energizing spring may be deflected in response to a fluid pressure on the seal ring opposite the energizing spring to allow fluid flow past the seal ring;

a back ring having a chevron channel that receives an apex of the seal ring, the back ring having a greater stiffness to radial movement than the first and second legs of the seal ring to limit radial deformation of the first and second legs of the seal ring;

wherein the first end of the seal stand off has a substantially flat portion positioned on a supportive shoulder of the packing assembly and the second end of the seal stand off is in operative engagement with the chevron profile;

wherein the seal ring is formed of a polymer and the back ring is formed of a polymer having a greater hardness than the polymer of the seal ring;

wherein the channel of the back ring extends only partially to distal ends of each leg of the seal ring;

wherein a width of the back ring is smaller than a distance between outer sides of the distal ends of the seal ring legs;

wherein an inner gap is located between the back ring and the stem and an outer gap is located between the back ring and the valve body;

wherein the channel of the back ring extends from the apex of the seal ring over only part of the seal ring; and

a plurality of circumferentially spaced apart bumps formed on an outer surface of the back ring, defining a plurality of fluid channels so that fluid may vent past the sealing surface of the seal ring.

19. The valve of Claim 18, wherein:

the seal ring has two angled exterior portions meeting at a junction; and

the angled portion from the apex to the junction has a larger angle relative to an axis passing through the apex than the angled portion from the junction to the distal ends of each seal ring leg.

CLAIMS

1. A valve having a stem seal assembly comprising:

a valve body defining a flow passage and a body cavity perpendicular to the flow passage;

the valve body further defining a stem opening extending from an exterior of the body into the body cavity;

a valve member moveable between an open position and a closed position, the valve member blocking the flow passage in the closed position, and allowing flow through the flow passage in the open position;

a valve stem having a valve stem axis coupled to the valve member, the valve stem extending from the body cavity to an exterior of the valve body through the valve stem opening for moving the valve member from the closed position to the open position;

a spring energized first seal ring positioned within the valve stem opening to seal the valve stem to the valve body, the first seal ring comprising:

a chevron profile defining a first and a second leg extending radially outward from an interior radius defined in an apex of the chevron profile, the first and second legs sealing the stem and the body to opposing annular surfaces;

a back ring having a chevron channel that receives the apex of the chevron profile, the back ring having a greater stiffness to radial movement than the first and second legs to limit radial deformation of the first and second legs; and

an annular seal standoff having a first end and a second end, wherein the first end is positioned on a supportive shoulder of the stem seal assembly and the second end inserts into the interior radius defined in the apex of the chevron profile to support the chevron profile on the standoff;

a second seal ring positioned within the valve stem opening to seal the valve stem to the valve body; and

a load ring assembly stationarily mounted to and defining a portion of the valve body between the first seal ring and the second seal ring that isolates the first seal ring and the second seal ring so that a force applied to the first seal ring in a direction toward the second seal ring transfers to the load ring assembly.

2. The valve of claim 1, wherein the first seal ring further comprises:

an energizing spring interposed between the seal stand off and the chevron profile, the energizing spring exerting an expanding force on the legs of the chevron profile so that the chevron profile will remain in sealing contact with the opposing annular surfaces; and

wherein the energizing spring may be deflected in response to a fluid pressure on the chevron profile opposite the energizing spring to allow fluid flow past the chevron profile.

3. The valve of claim 1, wherein the chevron profile is formed of a polymer and the back ring is formed of a polymer having a greater hardness than the polymer of the chevron profile.

4. The valve of claim 1, wherein the channel of the back ring extends only partially to distal ends of each leg of the chevron profile.

5. The valve of claim 1, wherein:

a width of the back ring is smaller than a distance between outer side of distal ends of the seal ring legs; and

an inner gap is located between the back ring and the stem and an outer gap is located between the back ring and the body.

6. The valve of claim 1, wherein the channel of the back ring extends from the apex of the chevron profile over only part of the chevron profile.

7. The valve of claim 1, wherein:

the chevron profile has two exterior angled portions meeting at a junction; and

the angled portion from the apex to the junction has a larger angle relative to an axis passing through the apex than the angled portion from the junction to the distal ends of each seal ring leg.

8. The valve of claim 1, further comprising a plurality of bumps circumferentially spaced apart on the back ring, defining a plurality of fluid channels, allowing fluid to vent past the surface of the chevron profile.

9. The valve of claim 1, wherein the second seal comprises a spring energized seal.

10. A valve stem packing assembly for sealing a valve stem to a valve body having a body cavity, the packing assembly comprising:

a first spring energized seal ring positioned within a valve stem opening extending axially through the body to seal the valve stem to the valve body, the first seal ring comprising:

a chevron profile defining a first and a second leg extending radially outward from an interior radius defined in an apex of the chevron profile, the first and second legs sealing the stem and the body to opposing annular surfaces;

a bump formed on an outer surface of the first seal ring opposite an end of the seal ring that seals to the valve stem and the valve body, the bump forming one or more fluid channels, allowing fluid to vent past the sealing surface of the first seal ring; and

an annular seal standoff having a first end and a second end, wherein the first end is positioned on a supportive shoulder of the stem seal assembly and the second end inserts into the interior radius defined in the apex of the chevron profile to support the chevron profile on the standoff;

a second seal ring positioned within the valve stem opening to seal the valve stem to the valve body; and

a load ring assembly mounted to and forming a part of the body having a first end in engagement with the first seal ring and a second end in engagement with the second seal ring, such that an axial force applied to the first seal ring transfers to load ring assembly, an axial force in an opposite direction on the second seal ring transfers to the load ring assembly.

11. The valve stem packing assembly of claim 10, wherein the first seal further comprises:

an energizing spring having a chevron profile interposed between the seal stand off and the seal ring, the energizing spring exerting an expanding force on the legs of the seal ring so that the seal ring will remain in sealing contact with the opposing annular surfaces;

wherein the energizing spring may be deflected in response to a fluid pressure on the seal ring opposite the energizing spring to allow fluid flow past the seal ring; and

a back ring having a chevron channel that receives an apex of the seal ring, the back ring having a greater stiffness to radial movement than the first and second legs of the seal ring to limit radial deformation of the first and second legs of the seal ring.

12. The valve stem packing assembly of claim 11, further comprising a plurality of bumps circumferentially spaced apart on the back ring, defining a plurality of fluid channels, allowing fluid to vent past the sealing surface of the seal ring.

13. The valve stem packing assembly of claim 11, wherein the first seal ring further comprises a bump formed on an outer surface of the back ring opposite an end of the seal ring that seals to the valve stem and the valve body, the bump forming one or more fluid channels so that fluid may vent past the sealing surface of the first seal ring.

14. The valve stem packing assembly of claim 11, wherein:
the seal ring is formed of a polymer; and

the back ring is formed of a polymer having a greater hardness than the polymer of the seal ring.

15. The valve stem packing assembly of claim 10, wherein the second seal ring comprises a spring energized seal.

16. A seal for a valve stem comprising:
an annular seal stand off having a first end and a second end;

a seal ring having a chevron profile positioned on the seal standoff so that the second end of the seal stand off inserts into the chevron profile;

wherein the seal ring defines a first and a second leg extending from an apex of the chevron profile radially outward, the first and second legs sealing to opposing annular surfaces of the valve stem and a valve body;

an energizing spring having a chevron profile interposed between the seal stand off and the seal ring, the energizing spring exerting an expanding force on the legs of the seal ring so that the seal ring will remain in sealing contact with the opposing annular surfaces;

wherein the energizing spring may be deflected in response to a fluid pressure on the seal ring opposite the energizing spring to allow fluid flow past the seal ring;

a back ring having a chevron channel that receives an apex of the seal ring, the back ring having a greater stiffness to radial movement than the first and second legs of the seal ring to limit radial deformation of the first and second legs of the seal ring;

wherein the first end of the seal stand off has a substantially flat portion positioned on a supportive shoulder of the packing assembly and the second end of the seal stand off is in operative engagement with the chevron profile;

wherein the seal ring is formed of a polymer and the back ring is formed of a polymer having a greater hardness than the polymer of the seal ring;

wherein the channel of the back ring extends only partially to distal ends of each leg of the seal ring;

wherein a width of the back ring is smaller than a distance between outer sides of the distal ends of the seal ring legs;

wherein an inner gap is located between the back ring and the stem and an outer gap is located between the back ring and the valve body;

wherein the channel of the back ring extends from the apex of the se& ring over only part of the seal ring; and

a plurality of circumferentially spaced apart bumps formed on an outer surface of the back ring, defining a plurality of fluid channels so that fluid may vent past the sealing surface of the seal ring.

17. The seal of claim 16, wherein:

the seal ring has two angled exterior portions meeting at a junction; and

the angled portion from the apex to the junction has a larger angle relative to an axis passing through the apex than the angled portion from the junction to the distal ends of each seal ring leg.