CLAIMS

1. A tangential flow filtration system, comprising:

a vessel;

a tangential flow filtration cassette comprising a plurality of permeate channels, the tangential flow filtration cassette substantially enclosed within the vessel such that a permeate flow from each end of the plurality of permeate channels flows into the vessel;

first and second end plates disposed about first and second sides of the tangential flow filtration cassette and the vessel, the first and second end plates positioned to form a fluid-tight seal with at least one of the tangential flow filtration cassette and the flexible vessel; and

a clamping mechanism including a first clamping element disposed adjacent to the first end plate, a second clamping element disposed adjacent to the second end plate, and a plurality of projections coupling the first clamping element to the second clamping element, the plurality of projections extending through a plurality of openings formed in the first and second end plates, the vessel and the tangential flow filtration cassette.

2. The tangential flow filtration system of claim 1, wherein the vessel is elastically deformable.

3. The tangential flow filtration system of claim 1, wherein (a) the tangential flow filtration cassette comprises a plurality of interleaved retentate channels with the plurality of permeate channels, the interleaved retentate and permeate channels separated by at least one filtration membrane, (b) the retentate channels are in fluid communication with a feed port and a retentate port of the tangential flow filtration cassette and are fluidly sealed from the vessel, and (c) the permeate channels are in fluid communication with the vessel.

4. The tangential flow filtration system of claim 3, wherein each retentate channel comprises sealed ends between the retentate channel and the vessel.

5. The tangential flow filtration system of claim 1, wherein the tangential flow filtration cassette comprises a plurality of layered membranes, each layered

membrane comprising two slotted fenestrations at opposing ends of each layered membrane.

6. The tangential flow filtration system of claim 5, wherein alternating layered membranes further comprise a seal disposed about each of the two slotted fenestrations.

7. The tangential flow filtration system of claim 5, wherein alternating layered membranes further comprise a seal disposed along opposing ends of each alternating layer outside of the two slotted fenestrations.

8. The tangential flow filtration cassette of claim 11, wherein the tangential flow filtration cassette includes an outer body defining an exterior, the at least one feed channel including a plurality of feed channels, at least one of the plurality of feed channels being fluidly sealed from the exterior of the cassette but is open to each of the first and second elongate fenestrations, and the at least one permeate channel is open to the exterior of the cassette but sealed from both the first and second elongate fenestrations.

9. The tangential flow filtration cassette of claim 11, further comprising a feed screen configured to substantially fill a volume of the enclosed membrane area defined by the feed channel seal.

10. The tangential flow filtration cassette of claim 11, further comprising a permeate screen configured to substantially fill a volume of the permeate channel outside of the first and second permeate channel seals.

11. A tangential flow filtration system comprising:

a tangential flow filtration cassette, comprising:

a stack of interleaved layers defining at least one feed channel and at least one permeate channel, the stack of interleaved layers comprising:

a membrane comprising first and second elongate fenestrations disposed at first and second ends thereof;

a feed channel seal disposed on a first side of the membrane, the feed channel seal defining an enclosed membrane area comprising the first and second elongate fenestrations; and

first and second permeate channel seals disposed on a second side of the membrane opposite the first side, the first and second permeate channel seals disposed about each of the first and second elongate fenestrations thereby sealing the first and second elongate fenestrations from the corresponding permeate channel;

a flexible vessel enclosing at least a portion of the tangential flow filtration cassette, the flexible vessel comprising a permeate outlet;

first and second end plates disposed about first and second sides of the tangential flow filtration cassette and the flexible vessel, the first and second end plates positioned to form a fluid-tight seal with at least one of the tangential flow filtration cassette and the flexible vessel, at least one of the first and second end plates defining a fluid inlet and a fluid outlet aligned with the elongate apertures of the tangential flow filtration cassette; and

a clamping mechanism including a first clamping element disposed adjacent to the first end plate, a second clamping element disposed adjacent to the second end plate, and a plurality of projections coupling the first clamping element to the second clamping element, the plurality of projections extending through a plurality of openings formed in the first and second end plates, the flexible vessel and the tangential flow filtration cassette.

12. The tangential flow filtration system of claim 11, wherein the flexible vessel comprises a fluid connector that is reversibly connectable to a conduit for permeate.

13. The tangential flow filtration system of claim 1, wherein the first end plate includes one or more reinforcing ribs extending therefrom.

14. The tangential flow filtration system of claim 1, wherein the first and second end plates are manufactured from a polymer.

15. The tangential flow filtration system of claim 14, wherein the first and second end plates are non-porous and non-perforated to prevent fluid flow therethrough.

16. The tangential flow filtration system of claim 1, wherein the first end plate includes a fluid manifold with a feed port, the fluid manifold providing a sealing surface between the vessel and an outer surface of the cassette.

17. The tangential flow filtration system of claim 1, wherein the first end plate includes a feed flow path and a retentate flow path extending therethrough so that permeate flows from the cassette and into the vessel.

18. The tangential flow filtration system of claim 1, wherein the first and second end plates are bonded to the vessel.

19. The tangential flow filtration system of claim 1, wherein one of the first and second end plates is configured to attach the system to a support structure.