provides a path for hydraulic control fluid, chemical injections, or the like to be passed through the wellhead and into the well bore. Additionally, the tubing hanger provides a path for production fluid to be passed through the wellhead and exit the wellhead through a production flow bore to an external production flow line. Accordingly, the hanger may include seals that are compressed between a body of the hanger and a component of the wellhead (e.g., a tubing spool) to seal off an annular region between the hanger and the wellhead. For example, the seals may be disposed about the production flow bore to isolate the production flow bore from annular region between the hanger and the wellhead. The seals generally prevent pressures of the production flow bore from manifesting through the wellhead. Typically, the seals are integrated with the hanger. As a result, seal replacement involves removing the hanger from the wellhead, which involves the use of a derrick, blowout preventers, and other equipment that is expensive to use and operate.

SUMMARY OF THE INVENTION

[0003a] According to a first aspect of the invention, there is provided a mineral extraction system, comprising: a hanger configured to support casing or tubing; and a seal assembly comprising: a main body comprising a production fluid port, a first portion, and a second portion, wherein the first portion is moveable relative to the second portion during installation and/or removal of the seal assembly in and/or from the mineral extraction system; a first annular seal supported by the main body and disposed on a first side of the production fluid port; and a second annular seal supported by the main body and disposed on a second side of the production fluid port, wherein the seal assembly is configured to be disposed in an annular region between the hanger and a tubing spool of a mineral extraction system, the first annular seal and the second annular seal are configured to isolate the production fluid port from the annular region, and the seal assembly is removably coupled to the hanger.

[0003b] According to a second aspect of the invention, there is provided a method, comprising: running a hanger in a horizontal tubing spool tree of a mineral extraction system; landing the hanger in the horizontal tubing spool tree of the mineral extraction system; positioning a seal assembly within an annular region between the hanger and the horizontal tubing spool tree of the mineral extraction system, wherein

positioning the seal assembly within the annular region comprises positioning a first annular seal on a first side of a production flow bore of the horizontal tubing spool tree and positioning a second annular seal on a second side of the production flow bore of the horizontal tubing spool tree, wherein positioning the seal assembly within the annular region comprises moving a first portion of a main body of the seal assembly relative to a second portion of the main body of the seal assembly; and removing the seal assembly from the horizontal tubing spool tree without removing the hanger from the horizontal tubing spool tree.

[0003c] According to a third aspect of the invention, there is provided a seal assembly, comprising: a main body comprising a production fluid port configured to align with a production fluid bore of a tubing spool of a mineral extraction system, wherein the main body comprises a first portion and a second portion, wherein the first portion is moveable relative to the second portion during installation and/or removal of the seal assembly in and/or from the mineral extraction system; a first annular seal supported by the main body and disposed on a first side of the production fluid port; and a second annular seal supported by the main body and disposed on a second side of the production fluid port, wherein the seal assembly is configured to be disposed in an annular region between a hanger and the tubing spool of the mineral extraction system, the first annular seal and the second annular seal are configured to isolate the production fluid port from the annular region, and the seal assembly is configured to be removed from the tubing spool without the hanger.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Various features, aspects, and advantages of the present invention will become better understood when the following detailed description is read with reference to the accompanying figures in which like characters represent like parts throughout the figures, wherein:

[0005] FIG. 1 is a block diagram that illustrates a mineral extraction system, in accordance with an embodiment of the present disclosure;

[0006] FIG. 2 is a cross-section of a wellhead assembly with a tubing hanger and a tubing spool, in accordance with an embodiment of the present disclosure;

[0007] FIG. 3 is a cross-section of an embodiment of a seal assembly, in accordance with an embodiment of the present disclosure;

[0008] FIG. 4 is a cross-section of an embodiment of the seal assembly disposed within the tubing spool, in accordance with an embodiment of the present disclosure;

CLAIMS

1. A mineral extraction system, comprising:

a hanger configured to support casing or tubing; and

a seal assembly comprising:

a main body comprising a production fluid port, a first portion, and a second portion, wherein the first portion is moveable relative to the second portion during installation and/or removal of the seal assembly in and/or from the mineral extraction system;

a first annular seal supported by the main body and disposed on a first side of the production fluid port; and

a second annular seal supported by the main body and disposed on a second side of the production fluid port,

wherein the seal assembly is configured to be disposed in an annular region between the hanger and a tubing spool of a mineral extraction system, the first annular seal and the second annular seal are configured to isolate the production fluid port from the annular region, and the seal assembly is removably coupled to the hanger.

2. The system of claim 1, wherein the seal assembly and the hanger are in threaded engagement with one another.

3. The system of claim 1, wherein the hanger comprises a locking ring configured to engage with a recess of the tubing spool.

4. The system of claim 1, wherein the first annular seal comprises a first metal-to-metal seal, and the second annular seal comprises a second metal-to-metal seal.

5. The system of claim 1, wherein the main body comprises an alignment slot configured to engage with an alignment pin of the hanger, and wherein the alignment slot enables alignment of the production fluid port with a production fluid bore of the tubing spool.

6. The system of claim 5, wherein the alignment slot comprises:

a wide mouth configured to capture the alignment pin;

a notch configured to engage with the alignment pin; and

a plurality of angled surfaces configured to guide the alignment pin to the notch.

7. The system of claim 1, wherein the

first portion comprises a threaded portion of an inner diameter of the main body, the first portion is rotatable during installation and/or removal of the seal assembly in and/or from the mineral extraction system,

the second portion comprises the first annular seal and the second annular seal, the second portion is stationary during installation and/or removal of the seal assembly in and/or from the mineral extraction system, and the main body comprises a plurality of ball bearings disposed between the first portion and the second portion.

8. The system of claim 1, wherein the first annular seal comprises a first metal end cap seal, and the second annular seal comprises a second metal end cap seal.

9. The system of claim 1, wherein the first annular seal comprises a first elastomer seal, and the second annular seal comprises a second elastomer seal.

10. A method, comprising:

running a hanger in a horizontal tubing spool tree of a mineral extraction system;

landing the hanger in the horizontal tubing spool tree of the mineral extraction system;

positioning a seal assembly within an annular region between the hanger and the horizontal tubing spool tree of the mineral extraction system, wherein positioning the seal assembly within the annular region comprises positioning a first annular seal on a first side of a production flow bore of the horizontal tubing spool tree and positioning a second annular seal on a second side of the production flow bore of the horizontal tubing spool tree, wherein positioning the seal assembly within the annular region comprises moving a

first portion of a main body of the seal assembly relative to a second portion of the main body of the seal assembly; and

removing the seal assembly from the horizontal tubing spool tree without removing the hanger from the horizontal tubing spool tree.

11. The method of claim 10, wherein positioning the seal assembly within the annular region between the hanger and the horizontal tubing spool tree of the mineral extraction system comprises engaging a first threaded portion of the seal assembly with a second threaded portion of the hanger.

12. The method of claim 10, wherein positioning the seal assembly within the annular region between the hanger and the horizontal tubing spool tree of the mineral extraction system comprises landing the seal assembly against a load ring of the hanger.

13. The method of claim 10, comprising locking the hanger within the horizontal tubing spool tree by engaging a locking ring of the hanger with a recess of the horizontal tubing spool tree.

14. The method of claim 10, comprising aligning a production flow port of the seal assembly with the production flow bore of the horizontal tubing spool tree, wherein aligning the production flow port of the seal assembly with the production flow bore of the horizontal tubing spool tree comprises engaging an alignment slot of the seal assembly with an alignment pin of the hanger.

15. The method of claim 10, comprising independently setting the first and second annular seals within the annular region by shearing a first shear pin of the first annular seal to radially expand the first annular seal and engage the first annular seal with the hanger and the horizontal tubing spool tree and subsequently shearing a second shear pin of the second annular seal to radially expand the second annular seal and engage the second annular seal with the hanger and the horizontal tubing spool tree.

16. A seal assembly, comprising:

a main body comprising a production fluid port configured to align with a production fluid bore of a tubing spool of a mineral extraction system, wherein the main body comprises a first portion and a second portion, wherein the first portion is moveable relative to the second portion during installation and/or removal of the seal assembly in and/or from the mineral extraction system;

a first annular seal supported by the main body and disposed on a first side of the production fluid port; and

a second annular seal supported by the main body and disposed on a second side of the production fluid port,

wherein the seal assembly is configured to be disposed in an annular region between a hanger and the tubing spool of the mineral extraction system, the first annular seal and the second annular seal are configured to isolate the production fluid port from the annular region, and the seal assembly is configured to be removed from the tubing spool without the hanger.

17. The seal assembly of claim 16, wherein the first annular seal and the second annular seal comprise a metal-to-metal seal, a metal end cap seal, an elastomer seal, or any combination thereof.

18. The seal assembly of claim 16, wherein the

first portion comprises a threaded portion of an inner diameter of the main body, the first portion is rotatable by a tool during installation and/or removal of the seal assembly in and/or from the mineral extraction system,

the second portion comprises the first annular seal and the second annular seal, the second portion is not rotatable by the tool during installation and/or removal of the seal assembly in and/or from the mineral extraction system, and

the main body comprises a plurality of ball bearings disposed between the first portion and the second portion to enable rotation of the first portion relative to the second portion.

19. The seal assembly of claim 16, wherein the main body comprises an alignment slot configured to engage with an alignment pin of the hanger, and wherein the alignment slot

enables alignment of the production fluid port with the production fluid bore of the tubing spool.

20. The seal assembly of claim 16, wherein the seal assembly is configured to be manually or hydraulically threaded about the hanger.