CLAIMS

1. A method for completing a wellbore in a subsurface formation, the method comprising:

providing a packer, the packer comprising:

an inner mandrel,

alternate flow channels along the inner mandrel, and

a sealing element external to the inner mandrel;

connecting the packer to a tubular body;

running the packer and connected tubular body into the wellbore;

setting the packer by actuating the sealing element into engagement with the surrounding subsurface formation;

injecting a gravel slurry into an annular region formed between the tubular body and the surrounding formation; and

injecting the gravel slurry through the alternate flow channels to allow the gravel slurry to at least partially bypass the sealing element so that the wellbore is gravel-packed within the annular region below the packer.

2. The method of claim 1, wherein:

the wellbore has a lower end defining an open-hole portion;

the packer and tubular body are run into the wellbore along the open-hole portion;

the packer is set within the open-hole portion of the wellbore;

the tubular body is (i) a sand screen comprising a base pipe, alternate flow channels, and a surrounding filter medium, or (ii) a blank pipe having alternate flow channels; and

the base pipe or the blank pipe is made up of a plurality of joints.

3. The method of claim 1, wherein the step of injecting the gravel slurry through the alternate flow channels comprises bypassing the sealing element so that the open-hole portion of the wellbore is gravel-packed above and below the packer after the packer has been set in the wellbore.

4. The method of claim 2, wherein the packer further comprises:

a movable piston housing retained around the inner mandrel; and

one or more flow ports providing fluid communication between the alternate flow channels and a pressure-bearing surface of the piston housing.

5. The method of claim 4, further comprising:

running a setting tool into the inner mandrel of the packer;

manipulating the setting tool to mechanically release the movable piston housing from its retained position; and

communicating hydrostatic pressure to the piston housing through the one or more flow ports, thereby moving the released piston housing and actuating the sealing element against the surrounding wellbore.

6. The method of claim 5, wherein:

the packer further comprises a release sleeve along an inner surface of the inner mandrel; and

manipulating the setting tool comprises pulling the setting tool through the inner mandrel to shift the release sleeve.

7. The method of claim 6, wherein shifting the release sleeve shears at least one shear pin.

8. The method of claim 7, wherein:

running the setting tool comprises running a washpipe into a bore within the inner mandrel of the packer, the washpipe having the setting tool thereon; and

releasing the movable piston housing from its retained position comprises pulling the washpipe with the setting tool along the inner mandrel, thereby shifting the release sleeve and shearing the at least one shear pin.

9. The method of claim 8, wherein:

the packer further comprises a centralizer; and

releasing the piston housing further actuates the centralizer into engagement with the surrounding open-hole portion of the wellbore.

10. The method of claim 9, wherein communicating hydrostatic pressure to the piston housing moves the piston housing to actuate the centralizer, which in turn actuates the sealing element against the surrounding wellbore.

11. The method of claim 3, wherein the packer assembly comprises:

the first mechanically-set packer; and

a second mechanically-set packer spaced apart from the first mechanically-set packer, the second mechanically-set packer being substantially a mirror image of or substantially identical to the first mechanically-set packer.

12. The method of claim 11, wherein each of the first and second packers further comprises:

a movable piston housing retained around the inner mandrel; and

one or more flow ports providing fluid communication between the alternate flow channels and a pressure-bearing surface of the piston housing.

13. The method of claim 12, further comprising:

running a setting tool into the inner mandrel of each of the packers;

manipulating the setting tool to mechanically release the movable piston housing from its retained position along each of the respective first and second packers; and

communicating hydrostatic pressure to the piston housings through the one or more flow ports, thereby moving the released piston housings and actuating the sealing element of each of the first and second packers against the surrounding wellbore.

14. The method of claim 13, wherein:

running the setting tool comprises running a washpipe into a bore within the inner mandrels of the respective first and second packers, the washpipe having the setting tool thereon; and

releasing the movable piston housing from its retained position comprises pulling the washpipe with the setting tool along the inner mandrels of the respective first and second packers, thereby shifting release sleeves in each of the first and second packers, and shearing respective shear pins.

15. The method of claim 3, further comprising:

producing hydrocarbon fluids from at least one interval along the open-hole portion of the wellbore.

16. A downhole packer for sealing an annular region between a tubular body and a surrounding wellbore, comprising:

an inner mandrel;

an alternate flow channel along the inner mandrel;

a sealing element external to the inner mandrel and residing circumferentially around the inner mandrel; and

a movable piston housing retained around the inner mandrel, the movable piston housing having a pressure-bearing surface at a first end, and being operatively connected to the sealing element, wherein the piston housing acts against the sealing element in response to hydrostatic pressure.

17. The downhole packer of claim 16, further comprising:

one or more flow ports providing fluid communication between the alternate flow channels and the pressure-bearing surface of the piston housing;

a release sleeve along an inner surface of the inner mandrel; and

a release key connected to the release sleeve, the release key being movable between a retaining position wherein the release key engages and retains the moveable piston housing in place, to a releasing position wherein the release key disengages the piston housing, thereby permitting the hydrostatic pressure to act against the pressure-bearing surface of the piston housing and move the piston housing along the inner mandrel to actuate the sealing element.

18. The downhole packer of claim 17, further comprising:

at least one shear pin releasably connecting the release sleeve to the release key.

19. The downhole packer of claim 16, wherein the sealing element is an elastomeric cup-type element.

20. The downhole packer of claim 22, further comprising:

a centralizer having extendable fingers, the fingers extending in response to movement of the piston housing.

21. The downhole packer of claim 20, wherein:

the centralizer is disposed around the inner mandrel between the piston housing and the sealing element; and

the downhole packer is configured so that force applied by the piston housing against the centralizer actuates the sealing element against the surrounding wellbore.

22. The downhole packer of claim 17, further comprising:

a piston mandrel disposed circumferentially around the inner mandrel;

an annulus provided between the inner mandrel and the surrounding piston mandrel, wherein the annulus defines the alternate flow channel; and

wherein the one or more flow ports is disposed within the piston mandrel.

23. The downhole packer of claim 22, wherein the piston housing and the sealing element reside circumferentially around the piston mandrel.

24. The downhole packer of claim 22, further comprising:

a metering orifice configured to regulate a rate at which the piston housing translates along the piston mandrel, thereby slowing the movement of the piston housing and regulating the setting speed for the packer.

25. The downhole packer of claim 22, further comprising:

a load shoulder disposed around the piston mandrel at an upper end, and configured to support the packer during make-up with a working string.

26. The downhole packer of claim 22, further comprising:

a coupling connected to the piston mandrel at the upper end, the coupling defining a tubular body configured to receive the inner mandrel, and to form a part of the alternate flow channel between the inner mandrel and the surrounding coupling.

27. A method for setting a packer within a wellbore, comprising:

providing a packer, the packer comprising:

an inner mandrel,

alternate flow channels along the inner mandrel, and

a sealing element external to the inner mandrel;

connecting the packer to a tubular body;

running the packer and connected tubular body into the wellbore;

running a setting tool into the inner mandrel of the packer;

pulling the setting tool to mechanically shift a release sleeve from a retained position along the inner mandrel of the packer, thereby releasing the piston housing for axial movement; and

communicating hydrostatic pressure to the piston housing through the one or more flow ports, thereby axially moving the released piston housing and actuating the sealing element against the surrounding wellbore.

28. The method of claim 27, wherein:

the wellbore has a lower end defining an open-hole portion;

running the packer into the wellbore comprises running the packer into the open-hole portion of the wellbore;

the tubular body is (i) a sand screen comprising a base pipe, alternate flow channels, and a surrounding filter medium, or (ii) a blank pipe comprising alternate flow channels; and

the method further comprises:

injecting a gravel slurry into an annular region formed between the tubular body and the surrounding open-hole portion of the wellbore, and

further injecting the gravel slurry through the alternate flow channels to allow the gravel slurry to bypass the sealing element so that the open-hole portion of the wellbore is gravel-packed below the packer after the packer has been set in the wellbore.

29. The method of claim 28, wherein the step of further injecting the gravel slurry through the alternate flow channels comprises bypassing the sealing element so that the open-hole portion of the wellbore is gravel-packed above and below the packer after the packer has been set in the wellbore.

30. The method of claim 28, wherein:

shifting the release sleeve shears at least one shear pin;

running the setting tool comprises running a washpipe into a bore within the inner mandrel of the packer, the washpipe having the setting tool thereon; and

releasing the movable piston housing from its retained position comprises pulling the washpipe with the setting tool along the inner mandrel, thereby shifting the release sleeve and shearing the at least one shear pin.

31. The method of claim 28, wherein the step of further injecting the gravel slurry through the alternate flow channels comprises bypassing the sealing element so that the open-hole portion of the wellbore is gravel-packed above and below the packer after packer has been set in the wellbore.

CLAIMS

1. A method for completing a wellbore in a subsurface formation, the method comprising:

providing a packer, the packer comprising:

an inner mandrel,

alternate flow channels along the inner mandrel,

a movable piston housing retained around the inner mandrel,

one or more flow ports providing fluid communication between the alternate flow channels and a pressure-bearing surface of the piston housing, and

a sealing element external to the inner mandrel;

connecting the packer to a tubular body;

running the packer and connected tubular body into the wellbore;

running a setting tool into the inner mandrel of the packer;

manipulating the setting tool to mechanically release the movable piston housing from its retained position;

setting the packer by communicating hydrostatic pressure to the piston housing through the one or more flow ports, thereby moving the released piston housing to actuate the sealing element into engagement with the surrounding wellbore;

injecting a gravel slurry into an annular region formed between the tubular body and the surrounding wellbore; and

injecting the gravel slurry through the alternate flow channels to allow the gravel slurry to at least partially bypass the sealing element so that the wellbore is gravel-packed within the annular region below the packer.

2. The method of claim 1, wherein the injecting steps take place after the packer has been set in the wellbore.

3. The method of claim 2, wherein:

the wellbore has a lower end defining an open-hole portion;

the packer and tubular body are run into the wellbore along the open-hole portion;

the packer is set within the open-hole portion of the wellbore;

the tubular body is (i) a sand screen comprising a base pipe, alternate flow channels, and a surrounding filter medium, or (ii) a blank pipe having alternate flow channels; and

the base pipe or the blank pipe is made up of a plurality of joints.

4. The method of claim 3, further comprising:

connecting the packer between two of the plurality of joints of the base pipe.

5. The method of claim 3, wherein the packer is a first mechanically-set packer that is part of a packer assembly.

6. The method of claim 5, wherein the packer assembly comprises:

the first mechanically-set packer; and

a second mechanically-set packer spaced apart from the first mechanically-set packer, the second mechanically-set packer being substantially a mirror image of or substantially identical to the first mechanically-set packer.

7. The method of claim 6, wherein each of the first and second packers further comprises:

a movable piston housing retained around the inner mandrel; and

one or more flow ports providing fluid communication between the alternate flow channels and a pressure-bearing surface of the piston housing.

8. The method of claim 7, further comprising:

running a setting tool into the inner mandrel of each of the packers;

manipulating the setting tool to mechanically release the movable piston housing from its retained position along each of the respective first and second packers; and

communicating hydrostatic pressure to the piston housings through the one or more flow ports, thereby moving the released piston housings and actuating the sealing element of each of the first and second packers against the surrounding wellbore.

9. The method of claim 8, wherein:

running the setting tool comprises running a washpipe into a bore within the inner mandrels of the respective first and second packers, the washpipe having the setting tool thereon; and

releasing the movable piston housing from its retained position comprises pulling the washpipe with the setting tool along the inner mandrels of the respective first and second packers, thereby shifting release sleeves in each of the first and second packers, and shearing respective shear pins.

10. The method of claim 3, further comprising:

producing hydrocarbon fluids from at least one interval along the open-hole portion of the wellbore.

11. The method of claim **3**, wherein:

the packer further comprises a centralizer; and

setting the packer further comprises actuating the centralizer into engagement with the surrounding open-hole portion of the wellbore.

12. The method of claim **2**, wherein the step of injecting the gravel slurry through the alternate flow channels comprises bypassing the sealing element so that the open-hole portion of the wellbore is gravel-packed above and below the packer after the packer has been set in the wellbore.

13. The method of claim **1**, wherein:

the packer further comprises a release sleeve along an inner surface of the inner mandrel; and

manipulating the setting tool comprises pulling the setting tool through the inner mandrel to shift the release sleeve.

14. The method of claim **13**, wherein shifting the release sleeve shears at least one shear pin.

15. The method of claim **14**, wherein:

running the setting tool comprises running a washpipe into a bore within the inner mandrel of the packer, the washpipe having the setting tool thereon; and

releasing the movable piston housing from its retained position comprises pulling the washpipe with the setting tool along the inner mandrel, thereby shifting the release sleeve and shearing the at least one shear pin.

16. The method of claim **15**, wherein the sealing element is an elastomeric cup-type element.

17. The method of claim **15**, wherein:

the packer further comprises a centralizer; and

releasing the piston housing further actuates the centralizer into engagement with the surrounding open-hole portion of the wellbore.

18. The method of claim **17**, wherein communicating hydrostatic pressure to the piston housing moves the piston housing to actuate the centralizer, which in turn actuates the sealing element against the surrounding wellbore.

19. The method of claim **1**, wherein setting the packer comprises setting the packer along either a non-perforated joint of casing, or an open-hole portion.

20. A downhole packer for sealing an annular region between a tubular body and a surrounding wellbore, comprising:

an inner mandrel;

an alternate flow channel along the inner mandrel;

a sealing element external to the inner mandrel and residing circumferentially around the inner mandrel;

a movable piston housing retained around the inner mandrel, the movable piston housing having a pressure-bearing surface at a first end, and being operatively connected to the sealing element, wherein the piston housing acts against the sealing element in response to hydrostatic pressure;

one or more flow ports providing fluid communication between the alternate flow channels and the pressure-bearing surface of the piston housing;

a release sleeve along an inner surface of the inner mandrel; and

a release key connected to the release sleeve, the release key being movable between a retaining position wherein the release key engages and retains the moveable piston housing in place, to a releasing position wherein the release key disengages the piston housing, thereby permitting the hydrostatic pressure to act against the pressure-bearing surface of the piston housing and move the piston housing along the inner mandrel to actuate the sealing element.

21. The downhole packer of claim **20**, further comprising:

at least one shear pin releasably connecting the release sleeve to the release key.

22. The downhole packer of claim **20**, wherein the sealing element is an elastomeric cup-type element.

23. The downhole packer of claim **20**, wherein the sealing element is about 6 inches (15.2 cm) to 24 inches (61 cm) in length.

24. The downhole packer of claim **23**, further comprising:

a centralizer having extendable fingers, the fingers extending in response to movement of the piston housing.

25. The downhole packer of claim **24**, wherein:

the centralizer is disposed around the inner mandrel between the piston housing and the sealing element; and

the downhole packer is configured so that force applied by the piston housing against the centralizer actuates the sealing element against the surrounding wellbore.

26. The downhole packer of claim **20**, further comprising:

a piston mandrel disposed circumferentially around the inner mandrel;

an annulus provided between the inner mandrel and the surrounding piston mandrel, wherein the annulus defines the alternate flow channel; and

wherein the one or more flow ports is disposed within the piston mandrel.

27. The downhole packer of claim **26**, wherein the piston housing and the sealing element reside circumferentially around the piston mandrel.

28. The downhole packer of claim **26**, further comprising:

a metering orifice configured to regulate a rate at which the piston housing translates along the piston mandrel, thereby slowing the movement of the piston housing and regulating the setting speed for the packer.

29. The downhole packer of claim **26**, further comprising:

a load shoulder disposed around the piston mandrel at an upper end, and configured to support the packer during make-up with a working string.

30. The downhole packer of claim **26**, further comprising:

a coupling connected to the piston mandrel at the upper end, the coupling defining a tubular body configured to receive the inner mandrel, and to form a part of the alternate flow channel between the inner mandrel and the surrounding coupling.

31. A method for setting a packer within a wellbore, comprising:

providing a packer, the packer comprising:

an inner mandrel,

alternate flow channels along the inner mandrel,

a movable piston housing retained around the inner mandrel,

one or more flow ports providing fluid communication between the alternate flow channels and a pressure-bearing surface of the piston housing, and

a sealing element external to the inner mandrel;

connecting the packer to a tubular body;

running the packer and connected tubular body into the wellbore;

running a setting tool into the inner mandrel of the packer;

pulling the setting tool to mechanically shift a release sleeve from a retained position along the inner mandrel of the packer, thereby releasing the piston housing for axial movement; and

communicating hydrostatic pressure to the piston housing through the one or more flow ports, thereby axially moving the released piston housing and actuating the sealing element against the surrounding wellbore.

32. The method of claim **31**, wherein:
the wellbore has a lower end defining an open-hole portion;
running the packer into the wellbore comprises running the packer into the open-hole portion of the wellbore;
the tubular body is (i) a sand screen comprising a base pipe, alternate flow channels, and a surrounding filter medium, or (ii) a blank pipe comprising alternate flow channels; and
the method further comprises:
injecting a gravel slurry into an annular region formed between the tubular body and the surrounding open-hole portion of the wellbore, and
further injecting the gravel slurry through the alternate flow channels to allow the gravel slurry to bypass the sealing element so that the open-hole portion of the wellbore is gravel-packed below the packer after the packer has been set in the wellbore.

33. The method of claim **32**, wherein the step of further injecting the gravel slurry through the alternate flow channels comprises bypassing the sealing element so that the open-hole portion of the wellbore is gravel-packed above and below the packer after the packer has been set in the wellbore.

34. The method of claim **32**, wherein:
shifting the release sleeve shears at least one shear pin;
running the setting tool comprises running a washpipe into a bore within the inner mandrel of the packer, the washpipe having the setting tool thereon; and
releasing the movable piston housing from its retained position comprises pulling the washpipe with the setting tool along the inner mandrel, thereby shifting the release sleeve and shearing the at least one shear pin.

35. The method of claim **34**, wherein the packer further comprises one or more flow ports providing fluid communication between the alternate flow channels and a pressure-bearing surface of the piston housing.

36. The method of claim **35**, wherein:
the packer further comprises a centralizer; and
releasing the piston housing further actuates the centralizer into engagement with the surrounding open-hole portion of the wellbore.

37. The method of claim **32**, wherein the step of further injecting the gravel slurry through the alternate flow channels comprises bypassing the sealing element so that the open-hole portion of the wellbore is gravel-packed above and below the packer after packer has been set in the wellbore.

38. The method of claim **32**, further comprising:

producing formation fluids from a subsurface formation below the packer and up through the inner mandrel of the packer to an earth surface.

39. The method of claim **32**, further comprising:

injecting a solution from an earth surface, through the inner mandrel below the packer, and into a subsurface formation.

40. The method of claim **39**, wherein:

the solution is aqueous solution, an acidic solution, or a chemical treatment; and

the method further comprises circulating the aqueous solution, the acidic solution, or the chemical treatment to clean a near-wellbore region along the wellbore.

41. The method of claim **39**, wherein:

the solution is aqueous solution: and

the method further comprises continuing to inject the aqueous solution into the subsurface formation as part of an enhanced oil recovery operation.