WELL FLOW CONTROL WITH ACID ACTUATOR

BACKGROUND

[0001] In completing a well, drilling fluids, such as drilling mud and other fluids in the well during drilling, are circulated out of the well and replaced with a completion fluid. For example, the completion fluid is pumped down the bore of a production string to displace the drilling fluids up the annulus between the production string and wellbore wall, or vice versa. The completion fluids can take different forms, but are typically a solids-free liquid meant to maintain control over the well should downhole hardware fail, without damaging the subterranean formation or completion components. The fluid is typically selected to be chemically compatible with the formation, for example, having a specified pH.

DESCRIPTION OF DRAWINGS

[0002] FIG. 1 is side partial cross-sectional views of an example well system.

[0003] FIG. 2 is a detail half cross-sectional view of a production device.

[0004] Like reference symbols in the various drawings indicate like elements.

SUMMARY

[0004a] A first aspect of the present invention provides a well screen assembly, comprising:

a tubular base tubing;

a filtration screen around the base tubing;

a plug sealing a flow path between an interior of the filtration screen and an interior center bore of the base tubing; and

a dissolving fluid chamber comprising a bladder containing a dissolving fluid adapted to dissolve the plug when in contact with the plug; and

an actuator configured to rupture the bladder to release the dissolving fluid into contact with the plug and open the flow path to communicate fluid between the interior of the filtration screen and the interior of the base tubing.

[0004b] A second aspect of the present invention provides a well production device, comprising:

a production tubing comprising a fluid passage between the exterior of the tubing and a center bore of the tubing;

a fluid barrier sealing the fluid passage;

a chamber comprising a bladder containing a dissolving fluid adapted to dissolve the fluid barrier when in contact with the fluid barrier; and

an actuator configured to rupture the bladder to release the dissolving fluid into contact with the fluid barrier.

[0004c] A third aspect of the present invention provides a method of controlling flow in a well, the method comprising:

containing a dissolving fluid in a bladder of a dissolving fluid chamber;

receiving, in a flow control device, flow in a path between an interior center bore of a tubular base tubing and a filtration screen about the base tubing;

sealing the path against communication with the center bore using a plug; and

in response to a signal, releasing ~~a~~ the dissolving fluid contained in the dissolving fluid chamber~~flow control device~~ into contact with the plug by rupturing the bladder, the dissolving fluid ~~and~~ dissolving the plug to allow flow through the path.

DETAILED DESCRIPTION

[0005] FIG. 1 shows an example well system 10 in an open hole completion configuration. The well system 10 is shown as a horizontal well, having a wellbore 14 that deviates to horizontal or substantially horizontal in a subterranean zone of interest 24. A type of production tubing, referred to as casing 16, is cemented in the wellbore 14 and coupled to a wellhead 18 at the surface 20. The casing 16 extends only through the vertical portion of the wellbore 14. The remainder of the wellbore 14 is completed open hole (i.e., without casing). A production tubing string 22 extends from wellhead 18, through the wellbore 14 and into the subterranean zone of interest 24. The production string 22 can take many forms, for example, as a continuous tubing string between the subterranean zone 24 and the wellhead 18, as a length of production liner coupled to the casing 16 at a liner hanger with a tieback liner extending from the liner hanger to the wellhead 18, and/or another configuration. A production packer 26 seals the annulus

WHAT IS CLAIMED IS:

1. A well screen assembly, comprising:

a tubular base tubing;

a filtration screen around the base tubing;

a plug sealing a flow path between an interior of the filtration screen and an interior center bore of the base tubing; and

a dissolving fluid chamber comprising a bladder containing a dissolving fluid adapted to dissolve the plug when in contact with the plug; and

an actuator configured to rupture the bladder to release the dissolving fluid into contact with the plug and open the flow path to communicate fluid between the interior of the filtration screen and the interior of the base tubing.

2. The well screen assembly of claim 1, where the actuator is responsive to a hydraulic signal provided through the interior of the base tubing.

~~3. The well screen assembly of claim 1, where the dissolving fluid chamber comprises a bladder containing the dissolving fluid; and~~

~~where the actuator ruptures the bladder in releasing the dissolving fluid into contact with the plug.~~

~~4.~~3. The well screen assembly of claim 1, comprising an annular housing around the base tubing, the housing defining the dissolving fluid chamber; and

where the plug seals an opening from the dissolving fluid chamber to the center bore of the base tubing; and

comprising a second plug in an opening from the dissolving fluid chamber to the interior of the filtration screen.

~~5.~~4. The well screen assembly of claim ~~4~~ 3, ~~where the dissolving fluid chamber comprises a bladder containing the dissolving fluid; and~~

where the actuator ruptures the bladder in releasing the dissolving fluid into contact with the first mentioned plug and second plug.

6.5. The well screen assembly of claim 54, where the actuator comprises a piston in the housing, the piston movable to rupture the bladder in response to pressure from the center bore of the base tubing.

7.6. The well screen assembly of claim 65, comprising a shear fastener fixing the piston against movement until the shear fastener is sheared, the shear fastener sized to shear when pressure in the center bore of the base tubing is at least a specified actuation pressure.

8.7. The well screen assembly of claim 65, comprising a weep passage configured to allow pressure to weep from the dissolving fluid chamber when the piston is moved.

9.8. The well screen assembly of claim 1, comprising an inflow control device and where the inflow control device comprises the plug sealing a flow path through the inflow control device.

10.9. The well screen assembly of claim 1, comprising a flow restriction in the flow path adapted to produce a specified flow restriction to flow through the flow path.

11.10. The well screen assembly of claim 1, where the plug comprises aluminum and the dissolving fluid comprises acid.

12.11. A well production device, comprising:

a production tubing comprising a fluid passage between the exterior of the tubing and a center bore of the tubing;

a fluid barrier sealing the fluid passage;

a chamber comprising a bladder containing a dissolving fluid adapted to dissolve the fluid barrier when in contact with the fluid barrier; and

an actuator configured to rupture the bladder to release the dissolving fluid into contact with the fluid barrier.

13.12. The well device of claim 1211, where the production tubing comprises a filtration screen around a tubular base tubing.

14.13. The well device of claim 1211, where the actuator is responsive to release the dissolving fluid when pressure in the center bore of the production tubing is at least a specified actuation pressure.

~~15.~~14. The well device of claim ~~12~~11, comprising:

~~a bladder in the chamber containing the dissolving fluid; and~~

a piston responsive to pressure to rupture the bladder and release the dissolving fluid into contact with the fluid barrier.

~~16.~~15. The well device of claim ~~12~~11, where the fluid passage extends through the chamber and the fluid barrier seals an opening to the chamber; and

comprising a second fluid barrier in a second opening to the chamber.

~~17.~~16. The well device of claim ~~12~~11, where the fluid barrier comprises an aluminum plug and the dissolving fluid comprises an acid adapted to dissolve the aluminum plug.

~~18.~~17. A method of controlling flow in a well, the method comprising:

containing a dissolving fluid in a bladder of a dissolving fluid chamber;

receiving, in a flow control device, flow in a path between an interior center bore of a tubular base tubing and a filtration screen about the base tubing;

sealing the path against communication with the center bore using a plug; and

in response to a signal, releasing ~~a~~ the dissolving fluid contained in the ~~flow control device~~ dissolving fluid chamber into contact with the plug ~~and~~ by rupturing the bladder, the dissolving fluid dissolving the plug to allow flow through the path.

~~19.~~18. The method of claim ~~18~~17, comprising releasing a piston of the flow control device to move and release the dissolving fluid in response to pressure of at least a specified actuation pressure.

~~20.~~19. The method of claim ~~18~~17, further comprising, after dissolving the plug, restricting flow through the path to a specified flow.