

RETRIEVABLE PRE-TENSION PACKING ASSEMBLY

TECHNICAL FIELD

The present disclosure relates generally to a packer assembly used in wells, and
5 specifically, to a retrievable pre-tension packing assembly for mid-expansion applications.

BACKGROUND

After a well is drilled and a target reservoir has been encountered, completion and
production operations are performed, which may include running a tubing string downhole
10 within the wellbore. Often, a first zone of the tubing string is isolated from a second zone of
the tubing string. In order to isolate the first zone from the second zone, a packing assembly,
such as a bridge plug that includes a seal element is extended into the tubing string. The
bridge plug is “set” moved into an expanded state such that the seal element sealingly engages
an inner surface of the tubing string to isolate the first zone from the second zone.

15 Often, a seal element is run downhole in a neutral configuration (*i.e.*, undergoing no
axial tensile or compression loading) and then expands to contact the inner surface of the
tubing string, which often results in a high amount of stress and strain on the seal element.
This may result in poor sealing performance and retrievability issues.

The present disclosure is directed to a retrievable pre-tension packing assembly for
20 mid-expansion applications that addresses one or more of the foregoing issues.

SUMMARY

According to a first aspect of the present invention, there is provided a packing
assembly adapted to extend within a pre-existing structure, the pre-existing structure defining
a circumferentially extending inner surface defining an inner diameter, the packing assembly
25 comprising: an elongated base pipe; and a seal element disposed on the base pipe; wherein the
packing assembly is radially shrinkable from a first configuration to a second configuration
and radially expandable from the second configuration to a third configuration; wherein,
when the packing assembly in the first configuration, the seal element has a first diameter;
wherein, when the packing assembly in the second configuration, the seal element has a
30 second diameter that is less than the first diameter and less than the inner diameter; and

wherein, when the packing assembly in the third configuration, the seal element has a third diameter that is greater than the second diameter and equal to or less than the inner diameter.

According to a second aspect of the present invention, there is provided a method comprising: providing a plug assembly in a first configuration at a surface of a well in which a tubing string extends, the plug assembly comprising: an elongated base pipe adapted to extend within the tubing string; and a seal element disposed on the base pipe and defining a first outer diameter while in the first configuration; applying a tensile axial force to the seal element to move the plug assembly to a second configuration, the seal element defining a second outer diameter while the plug assembly is in the second configuration; disposing the plug assembly in the tubing string; positioning the plug assembly while in the second configuration between a first zone and a second zone of a passage defined by the tubing string; removing the tensile axial force while the plug assembly is positioned between the first zone and the second zone such that the plug assembly moves to a third configuration, the seal element defining a third outer diameter while in the third configuration; and compressing the seal element while the plug assembly is in the third configuration to move the plug assembly to a fourth configuration such that the seal element is expanded in a radially outward direction to sealingly engage an inner surface of the tubing string; wherein while the plug assembly is in the fourth configuration, the seal element fluidically isolates the first zone of the passage from the second zone of the passage.

BRIEF DESCRIPTION OF THE DRAWINGS

Various embodiments of the present disclosure will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the disclosure. In the drawings, like reference numbers may indicate identical or functionally similar elements.

FIG. 1 is a schematic illustration of an offshore oil and gas platform operably coupled to a packing assembly, according to an exemplary embodiment of the present disclosure;

FIG. 2 illustrates a sectional view of a portion of the packing assembly of **FIG. 1** in a first configuration, according to an exemplary embodiment of the present disclosure;

FIG. 3 is a flow chart illustration of a method of operating the packing assembly of **FIG. 1**, according to an exemplary embodiment of the present disclosure;