

1. A system for an enhanced interconnect for downhole tools along a drill string used in subterranean operations, comprising:

a first drill string segment comprising a first conductive element;

a second drill string segment coupled to the first drill string segment; and

a tool connect assembly disposed within an internal bore of the second drill string segment, wherein:

the tool connect assembly comprises a second conductive element electrically connected to the downhole tool, and

the second conductive element is electrically coupled to the first conductive element through at most two electrical interfaces.

2. The system of claim 1, further comprising a first connector coupled to the first conductive element and a second connector coupled to the second conductive element.

3. The system of claim 2, wherein the first connector and the second connector form a connector pair.

4. The system of claim 3, wherein the tool connect assembly comprises a hanger assembly positioned within a chamber of the second drill string segment, and the second connector is at least partially disposed within the hanger assembly.

5. The system of claim 4, further comprising at least one spacer positioned between the hanger assembly and the bottom of the chamber.

6. The system of claim 2, further comprising an adapter positioned between the tool connect assembly and the first drill string segment, wherein the first connector and the second connector are electrically coupled through the adapter.

7. The system of claim 6, wherein the adapter comprises:

a third connector corresponding to the first connector, wherein the third connector and the first connector form a first connector pair;

a fourth connector corresponding to the second connector, wherein the fourth connector and the second connector form a second connector pair.

8. The system of claim 7, wherein the at most two electrical interfaces comprise the first connector pair and the second connector pair.

5 9. The system of claim 8, wherein the tool connect assembly comprises an annular connect assembly.

10. A method for an enhanced interconnect for downhole tools along a drill string used in subterranean operations, comprising:

10 introducing a first drill string segment into a borehole, wherein the first drill string segment comprises a first conductive element;

positioning a tool connect assembly within an internal bore of a second drill string segment, wherein the tool connect assembly comprises a second conductive element;

15 threadedly engaging the second drill string segment to the first drill string segment;

electrically coupling the second conductive element to a downhole tool, and

electrically coupling the second conductive element to the first conductive element through at most two electrical interfaces.

20 11. The method claim 10, wherein the first drill string segment comprises a first connector coupled to the first conductive element, and wherein the tool connect assembly comprises a second connector coupled to the second conductive element.

25 12. The method of claim 11, wherein electrically coupling the second conductive element to the first conductive element through at most two electrical interfaces comprises forming a connector pair using the first connector and the second connector.

30 13. The method of claim 12, wherein the tool connect assembly comprises a hanger assembly positioned within a chamber of the second drill string segment, and the second connector is at least partially disposed within the hanger assembly.

14. The method of claim 13, further comprising positioning at least one spacer between the hanger assembly and the bottom of the chamber.

15. The method of claim 11, further comprising positioning an adapter between the tool connect assembly and the first drill string segment, wherein the first connector and the second connector are electrically coupled through the adapter.

5 16. The method of claim 15, wherein the adapter comprises:
a third connector corresponding to the first connector, wherein the third connector and the first connector form a first connector pair;
a fourth connector corresponding to the second connector, wherein the fourth connector and the second connector form a second connector pair.

10 17. The method of claim 16, wherein the at most two electrical interfaces comprise the first connector pair and the second connector pair.

15 18. The method of claim 17, wherein the tool connect assembly comprises an annular connect assembly.

19. A system for an enhanced interconnect for downhole tools along a drill string used in subterranean operations, comprising:

20 a first drill string segment comprising a first conductive element and a first connector coupled to the first conductive element;

a second drill string segment coupled to the first drill string segment and a second connector coupled to the second conductive element; and

a tool connect assembly disposed within an internal bore of the second drill string segment, wherein:

25 the tool connect assembly comprises a second conductive element electrically connected to the downhole tool,

the second conductive element is electrically coupled to the first conductive element through the first connector and the second connector; and

30 the second conductive element are not electrically coupled through a wire splice.

20. The system of claim 19, wherein the second conductive element is electrically coupled to the first conductive element through at most two electrical interfaces.

CLAIMS

1. A system for an enhanced interconnect for downhole tools along a drill string used in subterranean operations, comprising:

a first drill string segment comprising a first conductive element;

a second drill string segment coupled to the first drill string segment;

a chamber of the second drill string segment, the chamber being defined in part by an inner wall of the second drill string segment with a diameter greater than the borehole diameter of the second drill string segment; and

a tool connect assembly disposed within an internal bore of the second drill string segment, wherein:

the tool connect assembly comprises a second conductive element electrically connected to the downhole tool, and

the second conductive element is electrically coupled to the first conductive element through at most two electrical interfaces.

2. The system of claim 1, further comprising a first connector coupled to the first conductive element and a second connector coupled to the second conductive element.

3. The system of claim 2, wherein the first connector and the second connector form a connector pair.

4. The system of claim 3, wherein the tool connect assembly comprises a hanger assembly positioned within a chamber of the second drill string segment, and the second connector is at least partially disposed within the hanger assembly.

5. The system of claim 4, further comprising at least one spacer positioned between the hanger assembly and the bottom of the chamber.

6. The system of claim 2, further comprising an adapter positioned between the tool connect assembly and the first drill string segment, wherein the first connector and the second connector are electrically coupled through the adapter.

7. The system of claim 6, wherein the adapter further comprises:

a third connector corresponding to the first connector, wherein the third connector and the first connector form a first connector pair; and

a fourth connector corresponding to the second connector, wherein the fourth connector and the second connector form a second connector pair, optionally,

wherein the at most two electrical interfaces comprise the first connector pair and the second connector pair, further optionally,

wherein the tool connect assembly comprises an annular connect assembly.

8. A method for an enhanced interconnect for downhole tools along a drill string used in subterranean operations, comprising:

introducing a first drill string segment into a borehole, wherein the first drill string segment comprises a first conductive element;

positioning a tool connect assembly within an internal bore of a second drill string segment, wherein the tool connect assembly comprises a second conductive element, and a chamber of the second drill string segment, the chamber being defined in part by an inner wall of the second drill string segment with a diameter greater than the borehole diameter of the second drill string segment;

threadedly engaging the second drill string segment to the first drill string segment;

electrically coupling the second conductive element to a downhole tool, and electrically coupling the second conductive element to the first conductive element through at most two electrical interfaces.

9. The method claim 8, wherein the first drill string segment comprises a first connector coupled to the first conductive element, and wherein the tool connect assembly comprises a second connector coupled to the second conductive element.

10. The method of claim 9, wherein electrically coupling the second conductive element to the first conductive element through at most two electrical interfaces comprises forming a connector pair using the first connector and the second connector.

11. The method of claim 10, wherein the tool connect assembly comprises a hanger assembly positioned within a chamber of the second drill string segment, and the second connector is at least partially disposed within the hanger assembly.

12. The method of claim 11, further comprising positioning at least one spacer between the hanger assembly and the bottom of the chamber.

13. The method of claim 9, further comprising positioning an adapter between the tool connect assembly and the first drill string segment, wherein the first connector and the second connector are electrically coupled through the adapter.

14. The method of claim 13, wherein the adapter comprises:

a third connector corresponding to the first connector, wherein the third connector and the first connector form a first connector pair; and

a fourth connector corresponding to the second connector, wherein the fourth connector and the second connector form a second connector pair, optionally,

wherein the at most two electrical interfaces comprise the first connector pair and the second connector pair, further optionally,

wherein the tool connect assembly comprises an annular connect assembly.

15. The system of any one of claims 1 to 7, wherein the system does not comprise a wire splice.