Claims

1. A hose assembly comprising:

an inner core tube;

a connector comprising a stem portion inserted into a distal end of the inner core tube;

an outer metal tube substantially coaxial with and surrounding the inner core tube, the outer metal tube terminating at a distal end axially inward of the distal end of the inner core tube; and

a collar substantially coaxial with and surrounding the distal end of the inner core tube, the collar including a flared first end welded to the distal end of the outer metal tube, a second end welded to the connector, and an intermediate portion between the first end and the second end, wherein the intermediate portion is in radial compression against the distal end of the inner core tube to secure the distal end of the inner core tube to the connector stem portion.

2. The hose assembly of claim 1, wherein the outer metal tube comprises a corrugated tube.

3. The hose assembly of claim 2, wherein the first end of the collar comprises a counterbore sized to receive an endmost corrugation of the corrugated tube.

4. The hose assembly of claim 2, wherein the first end of the collar is crimped over an endmost corrugation of the corrugated tube.

5. The hose assembly claim 1, wherein the inner core tube comprises plastic.

6. The hose assembly of claim 1, wherein the inner core tube comprises a reinforcement layer secured to a tubular core element.

7. The hose assembly of claim 6, wherein the reinforcement layer is secured to an outer surface of the core element.

8. The hose assembly of claim 1, wherein the outer metal tube and the inner core tube are separated by a radial gap.

9. The hose assembly of claim 1, wherein the intermediate portion of the collar is crimped against the distal end of the inner core tube.

10. The hose assembly of claim 1, wherein the stem portion comprises an outer barbed portion for retention of the distal end of the inner core tube.

11. The hose assembly of claim 1, wherein the distal end of the outer metal tube is axially spaced apart from the connector.

12. The hose assembly of claim 1, wherein the second end of the collar is welded to an annular rib of the connector.

13. The hose assembly of claim 1, wherein the second end of the collar is welded to a cylindrical shoulder of the connector.

14. The hose assembly of claim 1, wherein the second end of the collar is crimped against an annular rib of the connector.

15. The hose assembly of claim 1, wherein the second end of the collar is crimped against a cylindrical shoulder of the connector.

16. A hose assembly comprising:

an inner core tube;

a connector secured to a distal end of the inner core tube;

an outer metal tube substantially coaxial with and surrounding the inner core tube, the outer metal tube terminating at a distal end axially inward of the distal end of the inner core tube; and

a collar substantially coaxial with and surrounding the distal end of the inner core tube, the collar including a first end welded to the distal end of the outer metal tube and a second end welded to the connector,

wherein the second end of the collar comprises one or more raised portions on an outer surface of the second end of the collar, the one or more raised portions being radially deformed.

17. The hose assembly of claim 16, wherein the one or more raised portions comprises a plurality of annular ribs.

18. A method of making a hose assembly, the method comprising:

providing a metal tube having a distal end welded to a flared first end of a collar;

providing a core tube having a distal end receiving a stem portion of a connector;

inserting the core tube into the metal tube;

positioning the core tube and the connector such that a second end of the collar aligns with the connector and the distal end of the core tube extends axially outward of the distal end of the metal tube and aligns with an intermediate portion of the collar;

radially compressing the intermediate portion of the collar against the distal end of the inner core tube to secure the distal end of the inner core tube to the connector stem portion; and

welding the second end of the collar to the connector.

19. A hose assembly comprising:

an inner core tube;

a connector comprising a stem portion inserted into a distal end of the inner core tube;

an outer metal tube substantially coaxial with and surrounding the inner core tube, the outer metal tube terminating at a distal end axially inward of the distal end of the inner core tube; and

a collar substantially coaxial with and surrounding the distal end of the inner core tube, the collar including a flared first end welded to the distal end of the outer metal tube and a second end welded to the connector.

20. The hose assembly of claim 19, wherein the outer metal tube comprises a corrugated tube.

21. The hose assembly of claim 20, wherein the first end of the collar comprises a counterbore sized to receive an endmost corrugation of the corrugated tube.

22. The hose assembly of claim 20, wherein the first end of the collar is crimped over an endmost corrugation of the corrugated tube.

23. The hose assembly of claim 19, wherein the inner core tube comprises plastic.

24. The hose assembly of claim 19, wherein the inner core tube comprises one of PFA and PTFE.

25. The hose assembly of claim 19, wherein the inner core tube comprises a reinforcement layer secured to a tubular core element.

26. The hose assembly of claim 25, wherein the reinforcement layer comprises a braided material.

27. The hose assembly of claim 19, wherein the outer metal tube and the inner core tube are separated by a radial gap.

28. The hose assembly of claim 19, wherein the stem portion comprises an outer barbed portion for retention of the distal end of the inner core tube.

29. The hose assembly of claim 19, wherein the distal end of the outer metal tube is axially spaced apart from the connector.

30. The hose assembly of claim 19, wherein the collar comprises a leak detection port.

31. The hose assembly of claim 19, wherein the second end of the collar is welded to an annular radial projection of the connector.

32. The hose assembly of claim 19, wherein the second end of the collar is crimped against an annular radial projection of the connector.

33. A method of making a hose assembly, the method comprising:

welding a first end of a collar to a distal end of a metal tube;

inserting a stem portion of a connector into a distal end of a core tube;

inserting the core tube into the metal tube;

positioning the core tube and the connector such that a second end of the collar aligns with the connector and the distal end of the core tube extends axially outward of the distal end of the metal tube and aligns with an intermediate portion of the collar; and

welding the second end of the collar to the connector.

34. The method of claim 33, further comprising crimping the second end of the collar against an annular radial projection of the connector.

35. The method of claim 33, wherein welding the second end of the collar to the connector comprises welding the second end of the collar to an annular radial projection of the connector.

36. The method of claim 33, further comprising crimping a second end of the collar against the connector.

37. The method of claim 33, wherein the metal tube comprises a corrugated tube, wherein welding the first end of a collar to the distal end of the metal tube comprises receiving an endmost corrugation of the corrugated tube in a counterbore of the first end portion of the collar.