CLAIMS:

1. A hose comprising a tubular hose portion extending continuously between two end fittings, wherein said hose portion comprises a tubular body disposed between inner and outer gripping members, wherein the tubular body comprises at least one sealing layer and at least one reinforcing layer, and wherein the internal diameter of the hose portion is at least 200mm and the length of the hose portion is at least 30m.

2. A hose according to claim 1, wherein the length of the hose portion is at least 35m.

3. A hose according to claim 1, wherein the length of the hose portion is from 30 to 50m.

4. A hose according to claim 1, 2 or 3, wherein the internal diameter of the hose portion is at least 300mm.

5. A hose according to claim 1, 2 or 3, wherein the internal diameter of the hose portion is at least 400mm.

6. A hose according to claim 1, 2 or 3, wherein the internal diameter of the hose portion is from 400mm to 600mm.

7. A hose according to claim 1, 2 or 3, wherein the length of the hose portion is from 30 to 50m, and the internal diameter of the hose portion is from 400mm to 600mm.

8. A hose comprising a tubular hose portion extending continuously between two end fittings, wherein said hose portion comprises a tubular body disposed between inner and outer gripping members, wherein the tubular body comprises at least one sealing layer and at least one reinforcing layer, and wherein the internal diameter of the hose portion is at least 300mm and the length of the hose portion is at least 5m.

9. A hose according to claim 8, wherein the length of the hose portion is at least 10m.

10. A hose according to claim 8, wherein the length of the hose portion is at least 30m.

11. A hose according to claim 8, 9 or 10, wherein the internal diameter of the hose portion is at least 400mm.

12. A hose according to claim 8, 9 or 10, wherein the internal diameter of the hose portion is from 400mm to 600mm.

13. A hose according to claim 8, wherein the length of the hose portion is from 10m to 50m, and the inner diameter of the hose portion is from 400mm to 600mm.

14. A hose according to any preceding claim, further comprising an axial strengthening means adapted to exert a radially inward force on at least part of the tubular body when the axial strengthening means is subjected to axial tensioning.

15. A hose according to claim 14, wherein the axial strengthening means comprises a braid in the form of a tubular sheath.

16. A hose according to claim 14 or 15, wherein the tubular body comprises a sealing layer sandwiched between two reinforcing layers.

17. A hose according to any preceding claim, which is capable of operating at pressures above 500 kPa without leaking.

18. A hose according to any preceding claim, which is capable of operating at pressures above 1000 kPa without leaking.

19. A hose according to claim 17 or 18, which is capable of operating at temperatures from -100°C to -220°C without leaking.

20. The use of a hose according to any preceding claim at a pressure from 500kPa to 2,500 kPa without leakage of the hose.

21. The use of a hose according to any one of claims 1 to 19 at a pressure from 1,000kPa to 2,000 kPa without leakage of the hose.

22. The use according to claim 20 or 21 at a temperature from -100°C to -220°C.

23. A method of manufacturing hose comprising a tubular hose portion extending continuously between two end fittings, wherein said hose portion comprises a tubular body disposed between inner and outer gripping members and the tubular body comprises at least two layers and includes at least one sealing layer and at least one reinforcing layer, wherein said method comprises winding the inner gripping member around a non-metallic mandrel, wrapping a first of the layers of the tubular body around the inner gripping member, wrapping a second of the layers of the tubular body around the first layer of the tubular body, winding the outer gripping member around the second reinforcing layer, applying a respective one of the end fittings[wi] to each end of the hose portion, and removing the hose from the mandrel.

24. A method according to claim 23, wherein the mandrel has sufficient radial stiffness that the hose portions can be formed on the mandrel without causing any substantial change to the cross-sectional shape of the mandrel.

25. A method according to claim 23 or 24, wherein the mandrel is formed of a paper based material, a wood based material or a plastics polymer based material, or mixtures thereof.

26. A method according to claim 23, 24 or 25, wherein the mandrel is cardboard.

27. A method according to any one of claims 23 to 26, wherein the mandrel is

formed of a material having a ratio of Young's Modulus (E) to density (ρ) in the range 0.3 to 10 GPa.m^3/Mg (i.e. giga Pascal x metre^3/megagram).

28. A method according to any one of claims 23 to 26, wherein the mandrel is formed of a material having from 0.8 to 3 GPa.m^3/Mg.

29. A method according to claim 23 or 24, wherein the mandrel is made of a composite material having a ratio of Young's Modulus (E) to density (ρ) in the range 20 to 22 20 GPa.m^3/Mg and a density in the range 1.0 to 3.0 20 Mg/m^3.

30. A method according to any one of claims 23 to 29, wherein the mandrel is of substantially cylindrical shape.

31. A method according to any one of claims 23 to 30, wherein the mandrel is hollow, so that a drive shaft may be disposed longitudinally within the mandrel.

32. A method according to any one of claims 23 to 31, wherein a plug is disposed in at least one end of the mandrel, the arrangement being such that the plug is fixedly secured to the mandrel, whereby rotation of the plug causes rotation of the mandrel.

33. A method according to claim 32, when dependent upon claim 32, wherein the drive shaft is preferably secured to the or each plug, and has a projecting end which can be connected to a drive motor, whereby rotation of the drive shaft causes rotation of the or each plug and thereby rotation of the mandrel.

34. A method according to any one of claims 23 to 33, wherein the mandrel is a sacrificial mandrel, in order to aid removal of the hose from the mandrel.

35. A method according to any one of claims 23 to 34, wherein the mandrel is pre-coated, prior to assembly of the hose, in order to assist with removal of the completed hose from the mandrel.

36. A method according to any one of claims 23 to 35, wherein the mandrel has an

outer diameter of at least 200 mm.

37. A method according to any one of claims 23 to 36, wherein the mandrel has an outer diameter of at least 300 mm.

38. A method according to any one of claims 23 to 37, wherein the mandrel has a length of at least 5m.

39. A method according to any one of claims 23 to 38, wherein the mandrel has a length of at least 30m.

40. Apparatus for manufacturing hose of the type comprising a tubular hose portion extending continuously between two end fittings, wherein said hose portion comprises a tubular body disposed between inner and outer gripping members and the tubular body comprises at least two layers and includes at least one sealing layer and at least one reinforcing layer, wherein said apparatus comprises a hollow substantially cylindrical non-metallic mandrel, around which the hose may be arranged, a plug disposed at each end of the mandrel, the plugs being fixed to the mandrel, whereby torque applied to the plugs is transmitted to the mandrel to rotate the mandrel about its longitudinal axis, and a drive shaft extending longitudinally along the interior of the mandrel, the drive shaft being connected to the plugs, whereby torque applied to the drive shaft is transmitted to the plugs to rotate the plugs, the drive shaft projecting outwardly from the plugs and mandrel at least one end of the mandrel.

41. Apparatus according to claim 40, wherein the mandrel has sufficient radial stiffness that the hose portions can be formed on the mandrel without causing any substantial change to the cross-sectional shape of the mandrel.

42. Apparatus method according to claim 40, wherein the mandrel has sufficient bending stiffness to keep it straight enough that adjacent corrugated sections of the hose portion can be brought into substantial alignment around substantially the entire circumference of the ends thereof prior to securing the corrugated sections together.

43. Apparatus according to claim 40, 41 or 42, wherein the mandrel is formed of a paper based material, a wood based material or a plastics polymer based material, or mixtures thereof.

44. Apparatus according to claim 43, wherein the mandrel is cardboard.

45. Apparatus according to any one of claims 40 to 44, wherein the mandrel is formed of a material having a ratio of Young's Modulus (E) to density (ρ) in the range 0.3 to 10 GPa.m^3/Mg (i.e. giga Pascal x metre^3/megagram).

46. Apparatus according to any one of claims 40 to 44, wherein the mandrel is formed of a material having from 0.8 to 3 GPa.m^3/Mg.

47. Apparatus according to claim 40, 41, or 42, wherein the mandrel is made of a composite material having a ratio of Young's Modulus (E) to density (ρ) in the range 20 to 22 20 GPa.m^3/Mg and a density in the range 1.0 to 3.0 20 Mg/m^3.

48. Apparatus according to any one of claims 40 to 47, wherein the mandrel has an outer diameter of at least 200 mm.

49. Apparatus according to any one of claims 40 to 48, wherein the mandrel has an outer diameter of at least 300 mm.

50. Apparatus according to any one of claims 40 to 49, wherein the mandrel has a length of at least 5m.

51. Apparatus according to any one of claims 40 to 50, wherein the mandrel has a length of at least 30m.

52. Apparatus according to any one of claims 40 to 51, wherein the mandrel projects outwardly from the plugs and mandrel at each end of the mandrel.

53. Apparatus according to any one of claims 40 to 52, further comprising a drive

motor arranged to rotate the drive shaft.

The invention claimed is:

1. A method of manufacturing a composite cryogenic hose that comprises a tubular hose portion having an inner diameter of at least 200 mm, a length greater than 25 m, and extending continuously between two end fittings, wherein the hose portion comprises a tubular body disposed between inner and outer gripping members and the tubular body comprises at least two layers and includes at least one sealing layer and at least one reinforcing layer, wherein the method comprises:

a. winding the inner gripping member around a non-metallic hollow mandrel while the mandrel is being rotated by a drive motor operatively connected with the mandrel wherein

i. the mandrel is formed from a material selected from the group consisting of (I) a material having a ratio of Young's Modulus (E) to density (ρ) E/ρ in the range 0.1 to 10 $GPa \cdot m^3/Mg$ and (II) a material having a ratio of Young's Modulus (E) to density (ρ) E/ρ in the range 20 to 22 $GPa \cdot m^3/Mg$ and a density in the range 1.0 to 3.0 Mg/m, and

ii. the mandrel has an outer diameter of at least 200 mm

b. wrapping a first of the layers of the tubular body around the inner gripping member,

c. wrapping a second of the layers of the tubular body around the first layer of the tubular body,

d. winding the outer gripping member around the second reinforcing layer,

e. applying a respective one of the end fittings to each end of the hose portion, and

f. removing the hose from the mandrel.

2. A method according to claim 1, wherein the mandrel is formed of a paper based material, a wood based material or a plastics polymer based material, or mixtures thereof.

3. A method according to claim 1, wherein the mandrel is cardboard.

4. A method according to claim **1**, wherein the mandrel is formed of a material having from 0.8 to 3 $GPa \cdot m^3/Mg$.

5. A method according to claim **1**, wherein the mandrel is of substantially cylindrical shape.

6. A method according to claim **1**, further including a drive shaft disposed longitudinally within the mandrel.

7. A method according to claim **1**, wherein a plug is disposed in at least one end of the mandrel, such that the plug is fixedly secured to the mandrel, whereby rotation of the plug causes rotation of the mandrel.

8. A method according to claim **1**, wherein the mandrel is a sacrificial mandrel, in order to aid removal of the hose from the mandrel.

9. A method according to claim **1**, wherein the mandrel is pre-coated, prior to assembly of the hose, in order to assist with removal of the completed hose from the mandrel.