CLAIMS

1. An electrical connection sealer (10) for insertion of an electrical connection (50) formed from at least a bundle of first wires and a second wire therein, the electrical connection sealer (10) comprising:

(a) an outer jacket (12) comprising a first piece of heat-shrinkable tubing, the outer jacket (12) having a pre-sealed end (22) and an open end (20) opposite the pre-sealed end (22), the pre-sealed end (22) being closed, and the first piece of heat-shrinkable tubing at the open end (20) being heat-recoverable within a heat-recovery temperature range and forming a cavity (16) for insertion of the electrical connection (50);

(b) an inner core (14) on an inner surface of the outer jacket (12), the inner core (14) comprising an inner core sealant along the length of the inner core (14), wherein the inner core sealant has viscosity greater than 300 Pa · s within the heat recovery temperature range of the first piece of the heat-shrinkable tubing; and

(c) a first sealant (18) in the form of an adhesive ring extending as an inner circumferential band around a portion of the inner surface of the inner core (14), the first sealant comprising a thermoplastic sealant selected from the group consisting of polyolefin-based sealants where the base polymer is polyethylene, metallocene-formed polyethylene copolymer, metallocene-formed polypropylene copolymer, maleic anhydride functionalized polyethylene; polyolefin copolymer based sealants where the base polymer is ethylene-vinyl acetate copolymer; polyamide based sealants; thermoplastic elastomer based sealants; polyolefin and polyamide mixture based sealants; polyolefin and polyolefin copolymer mixture based sealants; polyolefin copolymer and polyamide mixture-based sealants; fluoropolymers or combinations thereof, wherein the thermoplastic sealant has viscosity less than 300 Pa · s within the heat recovery temperature range of the first piece of the heat-shrinkable tubing,

wherein upon application of heat to the electrical connection sealer (10) with the electrical connection (50) inserted therein:

(i) the first sealant (18) is configured to flow across and through the bundle of first wires (62) and the second wire (72); and

(ii) the first piece of heat-shrinkable tubing is configured to shrink to encapsulate the electrical connection (50) and seal the electrical connection (50) and the first sealant (18) substantially within the outer jacket (12).

2. A method of sealing an electrical connection (50) in an electrical connection sealer (10) to create an electrical connection sealing assembly (80), the method comprising:

(a) inserting the electrical connection (50) into the cavity (16) of the electrical connection sealer (10); and

(b) applying heat to the electrical connection sealing assembly (80), the electrical connection sealing assembly (80) comprising:

(i) the electrical connection sealer (10) comprising:

(1) an outer jacket (12) comprising a first piece of heat-shrinkable tubing, the outer jacket (12) having a pre-sealed end (22) and an open end (20) opposite the pre-sealed end (22), the pre-sealed end (22) being closed, and the first piece of heat-shrinkable tubing at the open end (20) being heat-recoverable within a heat-recovery temperature range and forming a cavity (16) for insertion of the electrical connection (50);

(2) an inner core (14) on an inner surface of the outer jacket (12), the inner core (14) comprising an inner core sealant along the length of the inner core (14), wherein the inner core sealant has viscosity greater than 300 Pa · s within the heat recovery temperature range of the first piece of the heat-shrinkable tubing; and

(3) a first sealant (18) in the form of an adhesive ring extending as an inner circumferential band around a portion of the inner surface of the inner core (14), the first sealant comprising a thermoplastic sealant selected from the group consisting of polyolefin-based sealants where the base polymer is polyethylene, metallocene-formed polyethylene copolymer, metallocene-formed polypropylene copolymer, maleic anhydride functionalized polyethylene; polyolefin copolymer based sealants where the base polymer is ethylene-vinyl acetate copolymer; polyamide based sealants; thermoplastic elastomer based sealants; polyolefin and polyamide mixture based sealants; polyolefin and polyolefin copolymer mixture based sealants; polyolefin copolymer

and polyamide mixture-based sealants; fluoropolymers or combinations thereof, wherein the thermoplastic sealant has viscosity less than 300 Pa · s within the heat recovery temperature range of the first piece of the heat-shrinkable tubing; and

(ii) the electrical connection (50), the electrical connection (50) formed from:

(1) a first insulated electrical wiring (60) having a multi-wire configuration comprising a bundle of first wires (62) having a first end extending into the cavity (16); and

(2) at least one second insulated electrical wiring (70) comprising at least one second wire (72) extending into the cavity (16),

wherein the applying heat heat-recovers the portion of the first piece of heat-shrinkable tubing not previously heat-recovered and causes the first sealant (18) to flow across and through the first wires (62) and the at least one second wire (72), such that the first piece of heat-shrinkable tubing shrinks to encapsulate the electrical connection (50) and seal the electrical connection and substantially seal the first sealant (18) within the outer jacket (12).

3. The method of claim 2, wherein the applying heat comprises a step selected from the group consisting of placing the electrical connection sealing assembly (80) in an infrared oven and applying hot air to the electrical connection sealing assembly (80).

4. The method of claim 2, wherein the first piece of heat-shrinkable tubing has a predetermined hoop stress and wherein the predetermined hoop stress is adequate for pushing the first sealant (18) into interstices in the first wires (62) and the at least one second wire (72).

5. The method of claim 2, wherein the electrical connection (50) is an end splice connection.

6. The method of claim 2, wherein the pre-sealed end (22) is pre-sealed by heat-recovering the first piece of heat-shrinkable tubing at the pre-sealed end (22) or by molding the outer jacket (12) at the pre-sealed end (22).