Patent claims

1. An induction connection sleeve for connecting by fusing plastic pipes, comprising:

- a sleeve body made from an injection-molded thermoplastic plastics material, having a first and a second receptacle portion for receiving first and second connection portions of the plastic pipes to be connected, said receptacle portions being disposed in a mutually coaxial manner;
- a first induction heating element which is configured in a bush-shaped manner and has recesses that are disposed in the circumference, said first induction heating element being embedded in the sleeve body, wherein the first induction heating element surrounds the first receptacle portion of the sleeve body;
- a second induction heating element which is configured in a bush-shaped manner, and has recesses arranged in the circumference said second induction heating element being embedded in the sleeve body, wherein the second induction heating element surrounds the second receptacle portion of the sleeve body;

wherein that the sleeve body comprises an internal part, said internal part configuring the two receptacle parts, and the induction heating elements being received on said internal part in such a manner that the recesses of the induction heating elements are penetrated by the internal part, said recesses on the external shell surfaces thereof in the region of the induction heating elements terminating flush with the internal part, and wherein the sleeve body comprises an external part which is connected in a materially integral manner to the internal part and surrounds the external shell surfaces of the induction heating elements, wherein the induction heating elements are entirely enclosed by the internal part and by the external part.

2. The induction connection sleeve as claimed in claim 1, wherein the internal part of the sleeve body is formed from a first plastics from the group of thermoplastic plastics which has a first melting point, and the external part of the sleeve body is formed from a second plastics, different from the first plastics, from the group of thermoplastic plastics which has a second melting point, wherein the melting point of the second plastics is higher than the melting point of the first plastics.

3. The induction connection sleeve as claimed in either of claims 1 and 2, wherein an adhesive agent layer is configured between the internal part and the external part.

4. The induction connection sleeve as claimed in any one of the preceding claims, wherein a continuous receptacle portion having a cylindrical internal shell surface for receiving connection portions of the plastic pipes to be connected is configured on the internal part, wherein the first and the second receptacle portion are configured in the continuous receptacle portion.

5. The induction connection sleeve as claimed in any one of the preceding claims, wherein an external shell surface of the external part is configured so as to emanate from the longitudinal center of the sleeve body and taper in the direction toward an end face of the sleeve body.

6. The induction connection sleeve as claimed in any one of the preceding claims, wherein the wall thickness of the induction heating element is between 40% and 60% in relation to the wall thickness of the internal part of the sleeve body.

7. The induction connection sleeve as claimed in one of the preceding claims, wherein the width of the first and the second induction heating element is between 25% and 35% in relation to a width in the axial direction of the sleeve body.

8. The induction heating element as claimed in any one of the preceding claims, wherein at least one position-securing element is disposed on the sleeve body, said position-securing element in relation to one of the receptacle portions being disposed so as to project radially in the direction toward the center of the sleeve body.

9. A method for producing an induction connection sleeve, in particular an induction connection sleeve as claimed in one of the preceding claims, wherein the production method comprises the following method steps:

- laying up a first induction heating element in a first injection-mold half, wherein the first injection-mold half has a first molding cavity for receiving the first induction heating element, said first molding cavity having an available diameter which corresponds to the external diameter of the first induction heating element, wherein the first induction heating element is received in a positioned manner in the first injection-mold half;
- laying up a second induction heating element in a second injection-mold half that interacts with the first injection-mold half, wherein the second injection-mold half has a second molding cavity for receiving the second induction heating element, said second molding cavity having an available diameter which corresponds to the external diameter of the second induction heating element, wherein the second induction heating element is received in a positioned manner in the second injection-mold half;
- mutual compressing of the first and the second injection-mold half, wherein the first and/or the second injection-mold half have/has a first mold core which for receiving the induction heating elements is disposed so as to be centric to the molding cavities and serves for molding a first and a second receptacle portion of the induction connection sleeve;
- injecting a thermoplastic plastics material into the first and the second molding cavity, wherein an internal part of a sleeve body of the induction connection sleeve is formed, said internal part in the internal side having the first and the second receptacle portion, and the induction heating elements at least in regions being embedded in said internal part, wherein recesses that are disposed in the circumference of the induction heating elements are penetrated by the plastics material of the internal part;
- opening the first and the second injection-mold half;
- ejecting the internal part of the sleeve body having the induction heating elements from one of the injection-mold halves;
- laying up the internal part of the sleeve body having the induction heating elements in a third injection-mold half, wherein the third injection-mold half has a third molding cavity for receiving the internal part of the sleeve body, a further mold core for positioning the internal part being disposed in said third molding cavity, and wherein a radial gap for molding an external part of the sleeve body is configured between the external circumference of the internal part and the third molding cavity;
- closing the third molding cavity;

- injecting a thermoplastic plastics material into the third molding cavity, wherein an external part of the sleeve body is formed;
- opening the third molding cavity;
- ejecting the finished induction connection sleeve.

10. The method for producing an induction connection sleeve as claimed in claim 9, wherein a fourth injection-mold half having a fourth molding cavity is provided for closing the third molding cavity, said fourth molding cavity interacting with the third molding cavity of the third injection-mold half.

11. The method for producing an induction connection sleeve as claimed in claim 10, wherein the first and the third injection-mold half are disposed on a common clamping plate, and the second and the fourth injection-mold half are disposed on a common clamping plate, wherein the first and the third injection-mold half form a nozzle side, and the second and the fourth injection-mold half form an ejector side and are moved simultaneously.

12. The method for producing an induction connection sleeve as claimed in any one of claims 9 to 11, wherein the ejecting of the internal part of the sleeve body having the induction heating elements molded thereon and/or ejecting the finished induction connection sleeve are/is carried out by means of ejectors which are disposed in one of the injection-mold halves.

13. A method for producing a welded connection between a first plastic pipe and a second plastic pipe, in particular while using an induction connection sleeve as claimed in one of claims 1 to 8, wherein the method comprises the following method steps:
- providing the first plastic pipe;
- providing the induction connection sleeve having a sleeve body which has a width in the axial direction;

- push-fitting the induction connection sleeve onto the first plastic pipe such that the induction connection sleeve by way of the entire width of the sleeve body surrounds the first plastic pipe;
- providing the second plastic pipe;
- coaxially aligning the second plastic pipe in relation to the first plastic pipe and disposing the former directly next to the latter;
- axially displacing the induction connection sleeve such that the latter in part surrounds the first plastic pipe and the second plastic pipe;
- positioning an inducing device in the region of the induction connection sleeve and by means of the inducing device inducing a current in the induction connection sleeve such that the sleeve body at least in part is plasticized and connects in a materially integral manner to the two plastic pipes.

14. The method as claimed in claim 13, wherein for producing a welded connection between double-walled plastic pipes, each having one internal pipe and one external pipe, prior to the method step of axially displacing the induction connection sleeve in which the induction connection sleeve in part surrounds the first plastic pipe and the second plastic pipe, at least the following method step is additionally carried out:
- welding the two internal pipes of the double-walled plastic pipes.

15. The method as claimed in claim 14, wherein the two internal pipes of the double-walled plastic pipes at the end side are welded by heating-element butt welding by means of a welding mirror.

16. The method as claimed in either of claims 14 and 15, wherein, after the welding of the two internal pipes of the double-walled plastic pipes and before the method step of axially displacing the induction connection sleeve in which the induction connection sleeve in part surrounds the first plastic pipe and the second plastic pipe, the mutually welded internal pipes are subjected to a pressure test.