cleanliness from itself and an inliner-less container has a higher background of contaminations. In other words, the relative impact of a contamination is higher when an inliner is used in a tank container.

Therefore, with the higher standards of cleanliness that can be imposed due to the use of inliners, there is an increased need for creating aseptic conditions during the filling and discharging of a tank container. However, proper means for disinfection are not yet available. In particular, there is no equipment that ensures that all parts where the liquid charge passes remain aseptic, and that the inliner's interior is closed off from the outside environment at all times.

SUMMARY OF THE INVENTION

Embodiments of the invention provide a method and equipment that solves one more of the above problems.

According to a first aspect of the present invention, there is provided a method for realizing an aseptic connection between a valve unit and a tank container that comprises an inliner, the method comprising providing

1) a tank container and an inliner which is present in an interior of the tank container, wherein
   - the tank container as well as the inliner comprises a spout for the supply and discharge of a liquid;
   - the spout of the inliner is placed in the spout of the tank container;
   - the spout of the inliner is closed by a closure element separating an inner environment of the inliner from an outer environment, which closure element is capable of being punctured and/or displaced from the spout so as to allow supply and discharge of liquid through the spout;
2) a valve unit comprising a tube having
   - a first end portion comprising a valve that is configured to open and close the tube at the first end portion;
   - a second end portion that is capable of displacing the closure element from the spout and/or of or puncturing the closure element;
   - an interior that extends from the valve to the second end portion;

   wherein the valve unit is equipped with fastening means for fastening the valve unit to the spout of the tank container (or to the tank container itself) to ensure an aseptic connection between the valve unit and the tank container, in particular between the tube of the valve unit and the spout of the inliner;
3) a disinfection unit comprising a wall defining an interior space, wherein
   - the wall comprises an opening for receiving into the interior space the valve unit that is to be disinfected, which opening is adapted to abut and/or enclose the spout of the tank container;
   - the disinfection unit comprises means for exposing the interior of the tube of the valve unit to a disinfection fluid and/or to electromagnetic radiation;

- the disinfection unit is provided with means for changing the position of the valve unit in the disinfection unit and for pressing the second end portion of the tube of the valve unit against the closure element of the inliner when 1) the valve unit is contained in the interior space of the disinfection unit; and 2) the opening of the disinfection unit is placed against and/or around the spout of the tank container;

and thereafter performing the steps of

a) placing the valve unit into the interior space of the disinfection unit and placing the opening of the disinfection unit against or around the spout of the tank container; thereafter
b) disinfecting the valve unit by exposing the interior of the tube of the valve unit to a disinfection fluid and/or to electromagnetic radiation while the valve is in an open position; thereafter
c) closing the valve of the valve unit; thereafter
d) pressing the second end portion of the tube of the valve unit against the closure element that is present in the spout of the inliner so that the closure element becomes displaced or punctured and a fluid connection is generated between the second end portion of the tube and the spout, providing the inner environment of the inliner and the interior of the tube in fluid communication; thereafter
e) removing the disinfection unit from the valve unit and fastening the valve unit to the spout of the tank container to ensure an aseptic connection between the valve unit and the tank container, in particular between the tube of the valve unit and the spout of the inliner; thereafter
f) optionally covering the first end portion of the tube with a cap.

The invention further relates to an assembly suitable for use in this method and to a tank container comprising such assembly.

According to a second aspect of the present invention, there is provided an assembly of a valve unit and a disinfection unit, for use in the above method, wherein

- the disinfection unit comprises
  - a wall defining an interior space, the wall comprising an opening for receiving into the interior space the valve unit, which opening is adapted to abut and/or enclose the spout of a tank container;
  - means for exposing the interior of the tube of the valve unit to a disinfection fluid and/or to electromagnetic radiation;
- the valve unit
  - is present in the interior space of the disinfection unit;
  - comprises a tube having
    - a first end portion comprising a valve that is configured to open and close the tube at the first end portion;
    - a second end portion;
    - an interior that extends from the valve to the second end portion;

  - is equipped with fastening means for fastening the valve unit to the spout of a tank container to ensure an aseptic connection between the valve unit and the tank container;
- the disinfection unit and/or the valve unit is/are provided with means to change the position of the valve unit in the disinfection unit.

According to a third aspect of the present invention, there is provided a tank container comprising the above assembly, wherein the tank container comprises

- a spout for the supply and discharge of a liquid;
- an inliner in an interior of the tank container, wherein the inliner comprises an inner environment and a spout for the supply and discharge of a liquid, which spout is present in the spout of the tank container;

wherein

- the second end portion of the tube is present in the spout of the inliner so that there is a fluid connection between the second end portion of the tube and the spout;
- the valve unit is fastened to the spout of the tank container to ensure an aseptic connection between the valve unit and the tank container.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 displays a cross-sectional view of a disinfection unit (10) in the method of the invention.

Figure 2 displays a cross-sectional view of a valve unit (20) in the method of the invention.

Figure 3 displays a cross-sectional view of an assembly (30) of a valve unit and a disinfection unit of the invention.

Figure 4 displays a cross-sectional view of a tank container (40) in the method of invention.

Figure 5 displays a cross-sectional view of a tank container (40) comprising an assembly (30) of the invention.

Figure 6 is a representation of the different steps of the method of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help improve understanding of various exemplary embodiments of the present invention. Furthermore, the terms “first”, “second”, and the like herein, if any, are generally used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order.

In the context of the invention, by the term “aseptic” is meant “free or freed from germs and any other unwanted micro-organism”. By an aseptic connection is meant a connection that is gas-tight and liquid-tight, and so does not