

Cleaning Disinfection and Drying System

The invention relates to a cleaning, disinfection and
5 drying system for preparing accessory parts and/or
items for washing in general, in particular in
pharmaceutical production and medical technology,
comprising a washing compartment which is provided with
an access door and in or on which supply devices for
10 washing liquids and drying air are arranged on spray
nozzles and washing arms with spray nozzles.

The invention relates to a cleaning, disinfection and
drying system comprising an isolator system for
15 preparing accessory parts and/or items for washing in
general in pharmaceutical production.

DE 3608776 A1 discloses a box-shaped cleaning appliance
which has an opening on a side surface, through which a
20 gloved hand holding the part to be cleaned can reach
into the interior of the container, wherein objects to
be cleaned can be cleaned in the cleaning appliance
with the aid of a spray device without infection
carriers being able to pass onto the user's skin or in
25 an uncontrolled manner into the environment. However,
an arrangement of this type is awkward to use in the
event of a multiplicity of objects to be cleaned and
does not have any devices for protecting against the
escape of infection carriers into the environment.

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US 4,354,514 discloses an apparatus for tubular or
balloon-shaped objects, the apparatus having a cleaning
and drying chamber with an incoming air filter for
cleaning the ambient air and an outgoing air fan. The
35 objects to be cleaned are pulled onto perforated tubes
which can be acted upon with pressurized cleaning agent
and drying air for the objects to be cleaned. By this
means, both internal and external cleaning of the
objects to be cleaned are possible. Possibilities for

manual handling and of the cleaning or processing operation are not provided.

5 The invention is based on the object of providing a cleaning, disinfection and drying system of the type mentioned at the beginning which can be used for all clean room classes used in pharmaceutical production or medical technology.

10 This object is achieved by the features specified in claim 1.

Advantageous refinements and developments of the invention emerge from the dependent claims.
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In the case of the cleaning, disinfection and drying system according to the invention, the washing compartment is designed as an isolator system and has carriers for items for washing, incoming air and
20 outgoing air guide devices provided with filters, a glove carrier, which is arranged in a wall of the washing chamber, for gloves extending into the washing chamber for manipulating the item for washing located in the washing chamber, wherein the incoming air and
25 outgoing air guide devices are designed for maintaining a differential pressure between the washing chamber and a work area in which the system is arranged.

Separate feed and drainage devices, which are provided
30 with filters, for washing liquids and drying air can be connected to the washing chamber.

The glove carrier can be part of a front window for observing the interior of the washing compartment.
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The lateral axis opening which is closable by a door can have devices for connecting to material locks for the loading and unloading of the washing compartment.

The material locks can have ventilation and venting devices which are separate here from the washing compartment.

5 In the system according to the invention, personal protection is paramount, this being achieved by interaction between the cleaning system and isolator system, i.e. cleaning and isolator function in a single washing chamber.

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It is the aim to separate the operator reliably and consistently from the product or from the production thereof in a closed system. In isolators where, for example, cytostatic drugs are produced, a permanent
15 negative pressure prevails.

The invention will be explained in more detail below with reference to an exemplary embodiment which is illustrated in the drawings.

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In the drawing:

figure 1 shows a schematic partial view of a preferred
embodiment of the system according to the
25 invention;

figure 2 shows a partially broken-away view of the
upper side of an embodiment of the washing
chamber 2;

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figure 3 shows a view of the upper side of the washing
chamber, on which an adjustable nozzle holder
is arranged.

35 Figure 1 shows a schematic view of the cleaning, disinfection and drying system 1. The system 1 has a washing chamber 2 which is preferably produced from stainless steel and does not have any dead space, and therefore can be readily cleaned. A support grate 4 on

which an item for washing contained in an initially hermetically sealed container 3, only illustrated schematically, can be deposited via a loading system, not illustrated, is arranged in the washing chamber 2.

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The loading system is connectable to a lateral access opening 16 of the washing chamber 2, wherein a material lock can be provided between the washing chamber 2 and the loading system. The connection between the washing
10 chamber 2 and the loading system and optionally the material lock can be sealed by suitable hermetic seals, wherein a material lock has a separate ventilation and venting system.

15 On the front side, the washing chamber 2 has a glove carrier 7 for gloves extending into the washing chamber for manipulation of the item for washing located in the washing chamber. The glove carrier 7 can be formed by a glass panel which bears frames 8 for the fastening of
20 the open end of respective gloves. The glove carrier 7, the frame 8 and the outer circumferences of the gloves themselves are hermetically sealed from one another. When the system (1) is not in use, the glove carrier 7 can be covered by a covering flap 9.

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Filter stubs 10, 11 for the ventilation and venting of the washing chamber 2 are arranged on the upper side 12 of the washing chamber 2, as can be seen in particular from figure 2. Of the two filter stubs 10, 11, one is
30 connected via a connecting line to the ventilator, while the other can be connected via a separate connecting line to the external air. Throttle valves which are controllable via control devices in order to obtain a desired positive or negative pressure in the
35 washing chamber 2 can be arranged in both connecting lines.

Furthermore, a sealing arrangement 16 for a nozzle holder 14 which is movable both axially and also

pivotably therein is arranged on the upper side 12 of the washing chamber 2. Said nozzle holder 14 is connected by a connecting line 15 to the washing agent and drying air supply of the washing chamber and, by manual or mechanical control, a jet can be directed onto otherwise difficult to reach regions of the item for washing and/or of the container initially receiving said item for washing.

As can furthermore be seen from figure 3, rotatable washing arms 17, 18 with nozzles directed onto the item for washing, which is placed in the support grate 4, are arranged in the region of the bottom 19 of the washing chamber 2. Identical or similar washing arms can be arranged below the upper side 12 of the washing chamber 2 or else on the side surfaces thereof.

The lateral opening, denoted by 6 in figures 1 to 3, of the washing chamber 2 is hermetically tightly closable preferably by means of a sliding door.

The washing chamber 2 is arranged in a support framework 5 which, in addition to the washing chamber 2, bears the supply devices, which are required for operation of the latter, in a further chamber 6.

The operation of the system may take place in the manner described below, but this merely constitutes an example:

The fully automatic sliding door in front of the lateral opening of the washing chamber is opened, whereupon the loading system, on which the item for washing and which is to be cleaned is located, is positioned in the washing compartment of the machine, wherein said positioning optionally takes place via a material lock in front of the lateral opening.

The contaminated item for washing is arranged in a hermetically sealed container, and therefore a, for example, highly potent contamination cannot come into contact with the operator.

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If the loading operation has ended, the automatic sliding door on the lateral access opening is closed again, and the door seal assigned thereto is charged with compressed air. The entire system is therefore
10 hermetically sealed off.

The operator can then remove the item for washing and which is to be cleaned via the gloves located on the front side and can place same into the necessary
15 cleaning positions.

The cleaning, decontamination and drying operation can then be started.

20 After the decontamination cycles are ended, for example, the sliding door arranged on the lateral access opening can be opened for setting up the item for washing, or the item for washing can alternatively, however, be assembled outside the washing compartment.

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The unloading operation corresponds to the loading operation as described previously. The above-described system 1 or the washing chamber 2 thereof, as already indicated, is equipped with filter technology, which is
30 controllable by electronic control, for ambient air, incoming air and outgoing air, can be equipped with connections for a particle and microbial count, monitors air velocity and differential pressure for the filters and work area, has a front window with a glove
35 port and also material locks for the loading and unloading of the isolator, which is formed by the washing chamber, with separate ventilator technology.

This results in consistent barrier technology for an automated, validatable decontamination system which permits rapid and highly efficient decontamination cycles and meets all product and personal protection
5 requirements in the processing of highly potent products.

Patent Claims

1. A cleaning, disinfection and drying system (1) for preparing accessory parts and/or items for washing in general, in particular in pharmaceutical production and medical technology, comprising a washing chamber (2) which is provided with an access door and in which supply devices for washing liquids and drying air are arranged on spray nozzles and washing arms with spray nozzles, characterized in that the washing chamber (2) is designed as an isolator system and has carriers (4) for items for washing, incoming air and outgoing air guide devices (10-13) provided with filters (10, 11), a glove carrier (7), which is arranged in a wall of the washing chamber (20), for gloves extending into the washing chamber for manipulation of the item for washing (3) located in the washing chamber (2), and in that the incoming air and outgoing air guide devices (10-13) are designed for maintaining a differential pressure between the washing chamber (2) and a work area in which the system (1) is arranged, a sealing arrangement (16) is arranged on the upper side (12) of the washing chamber (2) for a nozzle holder (14) which is movable both axially and also pivotably in the latter, said nozzle holder being connected by a connecting line (15) to the washing agent and drying air supply of the washing chamber (2) and being designed in order, by manual or mechanical control, to direct a jet onto otherwise difficult to reach regions of the item for washing and of the container initially receiving said item for washing.

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2. The system (1) as claimed in claim 1, characterized in that separate feed and drainage devices, which are provided with

filters, for washing liquids and drying air are connected to the washing chamber (2).

3. The system (1) as claimed in claim 1 or 2, characterized in that the glove carrier is part of a front window for observing the interior of the washing chamber.
4. The system (1) as claimed in one or more of the preceding claims, characterized in that a lateral access opening which is closable by the access door has connecting devices for material locks for the loading and unloading of the washing chamber.
5. The system (1) as claimed in claim 4, characterized in that ventilation and venting devices which are separate from the ventilation and venting devices of the washing chamber (2) are provided for material locks.