

**Method for decontaminating surfaces of a protected clean room,
protected clean room and corresponding use**

The invention relates to a method for decontaminating surfaces in a protected clean room, wherein the method comprises at least one method step in which a decontamination agent is introduced into the protected clean room and/or acts in the
5 protected clean room.

Protected clean rooms can be, in particular, isolators and/or restricted access barrier systems (RABS, open/closed RABS).

Protected clean rooms are used in particular in the pharmaceutical industry and in medical technology for filling
10 medications or processing medical devices. Protected clean rooms are subject to strict hygiene guidelines, compliance with which requires certain measures to be taken. For example, the protected clean room and all exposed surfaces within it
– must be decontaminated at regular intervals, such as after
15 opening or switching off the protected clean room.

Hydrogen peroxide or ethylene oxide is used as a decontamination agent in the protected clean room. The decontamination agent is introduced into the protected clean room in gaseous form and distributed evenly throughout the
– 20 working chamber of the protected clean room so that all exposed surfaces come into contact with/are wetted by the decontamination agent.

The introduction of the decontamination agent in gaseous form can also refer to introduction by means of steam and/or
25 aerosols. For the purposes of this description, a mixture of a gas phase and suspended particles, for example particles or liquid droplets, can be regarded as gas.

However, a decontamination agent can also be radiation, for

example UV light radiation.

A particular problem with the methods known to date for decontaminating surfaces in a protected clean room is the even distribution of the decontamination agent on all surfaces.

5 Surfaces that are covered by other objects and/or surfaces in the protected clean room are particularly problematic, as the decontamination agent cannot reach these hard-to-access surfaces at all or only with great effort. Furthermore, contamination, e.g., due to abrasion of movable elements in
10 the protected clean room, can form an encapsulating film through which the decontamination agent cannot penetrate or can only penetrate insufficiently.

The invention also relates to a protected clean room, in particular an isolator and/or a barrier system for restricted
15 access, comprising at least one magnetically levitatable conveying unit and at least one drive surface associated with it. The magnetically levitatable conveying unit and the drive surface assigned to it form a drive unit whose functionality is performed via two separate surfaces in the protected clean
20 room, wherein these surfaces overlap at least temporarily. During operation, the drive surface generates a controllable magnetic field, which can be produced, for example, by
position-adjustable permanent magnets and/or by coil
arrangements that can be selectively energized, in order to be
25 able to position and/or move the conveying unit, which responds to magnetic fields, in a targeted manner.

It is the object of the invention to improve and/or further develop the decontamination of surfaces in a protected clean room, in particular so that magnetically levitatable conveying
30 units can be used in the protected clean room.

The application is based, for example, on commercially

available systems, see for example

<https://de.wikipedia.org/wiki/Planarmotor> and the commercial suppliers mentioned there, in particular Beckhoff

<https://www.beckhoff.com/de-de/produkte/motion/xplanar-planarmotorantriebssystem/>

The various functions (levitation, coupling to the drive surface, tilting, etc.) are shown there. Comparable levitation systems are also offered by Bosch Rexroth,

<https://apps.boschrexroth.com/microsites/ctrlx-automation/de/portfolio/ctrlx-flow/>.

Levitating conveying units are therefore known to those skilled in the art from the prior art.

To solve the aforementioned object, the features of claim 1 are provided according to the invention. In particular, in order to solve the aforementioned object in a method of the type described at the beginning, the invention proposes that at least one magnetically levitatable conveying unit, which can be magnetically coupled or is magnetically coupled to a drive surface, is transferred into at least one decontamination position and/or held in at least one decontamination position before or during the at least one method step. This allows the decontamination agent to be introduced into the protected clean room and/or to act in the protected clean room in a time-correlated manner, while the magnetically levitatable conveying unit is moved into and/or held in the decontamination position.

The following decontamination agents are introduced into the protected clean room and/or act therein: hydrogen peroxide and/or ethylene oxide and/or radiation, in particular wave radiation, for example UV light radiation, and/or particle radiation, for example electron radiation. Magnetic coupling

of the conveying unit to the stator arrangement refers to any magnetic coupling known to those skilled in the art. The stator arrangement can be designed to generate a controllably variable magnetic field that levitates and/or moves the conveying unit. The stator arrangement thus acts as a levitation generator.

Magnetic coupling can thus be achieved by electromagnetic coupling of the conveying unit to the stator arrangement. The stator arrangement may comprise at least one electromagnet. The conveying unit may, for example, have at least one permanent magnet or be designed to be magnetically active and/or responsive in another way.

Alternatively or additionally, both the stator arrangement and the conveying unit may each comprise at least one permanent magnet. Movement of the conveying unit can be initiated, terminated, and/or controlled in particular by changing the magnetic field formed by the stator arrangement. The stator arrangement can thus comprise, in particular, movable permanent magnets that are in operative connection with the conveying unit and/or can be brought into such connection. The movable permanent magnets can, for example, be motor-driven. Controlled movement of the permanent magnets can thus generate a controllably variable magnetic field, which can be used to drive movement of the conveying unit. Furthermore, it may be provided, for example, that the stator arrangement is designed with at least one electro-permanent magnet.

The magnetic coupling serves in particular to realize a relative movement, a positioning, and/or an orientation of the conveying unit relative to the stator arrangement in a controlled manner.

The at least one method step is in particular a first method

step.

Another advantage of the method according to the invention may be that by transferring the magnetically levitatable conveying unit to the decontamination position, a change in location and/or by holding the magnetically levitatable conveying unit at the decontamination position, a change in distance of the magnetically levitatable conveying unit to the drive surface and/or other surfaces in the protected clean room can be achieved. This allows, for example, successive sections or areas of the drive surface and/or other surfaces to be released for decontamination one after the other. The method according to the invention thus has the advantage of preventing sections or areas and surfaces in the protected clean room from remaining covered. The method according to the invention thus improves the decontamination of surfaces in a protected clean room. Furthermore, electrically levitatable conveying units can be used in the protected clean room thanks to the improved and/or advanced decontamination options. These advantages are particularly relevant for isolators and/or barrier systems for restricted access, in which the method can be and/or is preferably carried out.

The drive surface can, for example, be arranged horizontally and/or vertically and/or at an angle in the protected clean room, wherein the method according to the invention can be carried out or is carried out for at least the described arrangements of the drive surface.

The decontamination position can in particular be part of a drive unit of a transport device, in particular as described and/or claimed herein. An advantage of this can be that the transfer of the at least one magnetically levitatable conveying unit to the decontamination position can be carried out without any loss of time and without any structural

measures that would take up valuable space in the protected clean room. This design can be advantageous if the at least one magnetically levitatable conveying unit is transferred to the decontamination position and/or held at the
5 decontamination position, in particular during the first method step.

Alternatively or additionally, the decontamination position can be a position in the protected clean room, which is formed by surfaces and/or functional units formed in the protected
10 clean room. These surfaces and/or functional units are, in particular, not formed as part of the transport device or drive unit described and/or claimed herein. This design can be advantageous if the at least one magnetically levitatable conveying unit is transferred to the decontamination position,
15 in particular before the first method step, and is held at the decontamination position, in particular during the first method step.

The at least one magnetically levitatable conveying unit can be transferred to several decontamination positions. In this
20 way, the at least one magnetically levitatable conveying unit can successively release partial areas of the drive surfaces by changing location, for example by moving along the drive surface, in particular during the first method step. This
allows the decontamination agent to reach the drive surfaces,
25 as well as other surfaces of the protected clean room, so that they can be decontaminated.

In an advantageous design, it may be provided that the at least one magnetically levitatable conveying unit performs a relative movement to the at least one surface located in the
30 protected clean room, in particular the drive surface, during transfer to the decontamination position. This allows the at least one magnetically levitatable conveying unit to change

position within the protected clean room so that at least the
at least one surface located in the protected clean room is
exposed during the introduction of the decontamination agent
and/or during the exposure and is therefore not covered by the
5 at least one magnetically levitatable conveying unit.

An area can be, for example, the aforementioned drive surface,
a housing surface of the protected clean room, an area of a
functional unit, and/or an area of a decontamination unit, in
particular as described and/or claimed herein. Such an area
10 can be, for example, flat or curved in one or two directions.

Alternatively or additionally, the magnetically levitatable
conveying unit can perform a relative movement relative to the
area during transfer at the decontamination position. In
particular, it can be provided that the at least one
15 magnetically levitatable conveying unit performs a lifting
and/or tilting movement at the decontamination position. Thus,
the magnetically levitatable conveying unit can simultaneously
perform a change in distance to the decontamination position
and to a surface in the protected clean room, so that more
20 surface area per time can be supplied with decontamination
agent. It can therefore be said that this embodiment can
reduce and/or change shadows particularly effectively.

In an advantageous design, it may be provided that the at
least one magnetically levitatable conveying unit is jacked up
25 at the decontamination position. Thus, by jacking up the at
least one magnetically levitatable conveying unit, a change in
distance between the at least one magnetically levitatable
conveying unit and the surface, in particular the drive
surface, can be achieved. This has the particular advantage of
30 increasing the volume described and/or claimed herein between
the magnetically levitatable conveying unit and the drive
surface.

The volume refers, for example, to the space between a drive surface and the underside of a levitated or levitating conveying unit magnetically coupled to this drive surface.

In an advantageous design, it may be provided that at least one magnetically levitatable conveying unit levitates during at least one method step. This embodiment is particularly advantageous when the at least one magnetically levitatable conveying unit is held at the decontamination position. By levitating the at least one magnetically levitatable conveying unit, the change in distance between the magnetically levitatable conveying unit and the drive surface can be achieved in such a way that the decontamination agent can reach the drive surface, which may be covered by the magnetically levitatable conveying unit, during the first method step.

Alternatively or additionally, it may be provided that the at least one magnetically levitatable conveying unit moves in at least one degree of freedom. This embodiment is particularly advantageous if the at least one magnetically levitatable conveying unit is transferred to the decontamination position during the first method step, in particular if it levitates after the transfer and during the first method step.

Preferably, it is provided that the at least one magnetically levitatable conveying unit moves in at least two degrees of freedom. Thus, the magnetically levitatable conveying unit can move not only linearly, but also in at least two degrees of freedom, so that the transfer or a change of location can be realized variably in the protected clean room. This embodiment allows a method for decontaminating surfaces to be implemented, in particular, even if more than one magnetically levitatable conveying unit is located in the protected clean room.

Alternatively or additionally, it may be provided that the magnetically levitatable conveying unit moves around a point of the conveying unit. The point refers in particular to a point located in the volume formed by the conveying unit. In
5 this way, a tilting movement, in particular as described and/or claimed herein, can be advantageously performed by the conveying unit. This also allows the relative movement described above to be performed with respect to at least one surface located in the protected clean room. This embodiment
10 is also preferred when the magnetically levitatable conveying unit is held at the decontamination position.

In particular, it may be provided that the magnetically levitatable conveying unit moves around its center point, which may be particularly advantageous when the magnetically
15 levitatable conveying unit rotates. By moving the magnetically levitatable conveying unit around its center, in particular during a rotational movement, the decontamination agent can be distributed, at least in a supporting manner, in particular
- while the unit is held in the decontamination position in the protected clean room, as may be advantageously provided.
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In an advantageous design, it may be provided that the at least one magnetically levitatable conveying unit distributes
- the decontamination agent, at least in a supporting manner, during transfer in the protected clean room. In this way, the
25 at least one magnetically levitatable conveying unit can distribute the decontamination agent to particularly difficult-to-reach places in the protected clean room. In particular, the magnetically levitatable conveying unit can at least assist in supplying the volume described and/or claimed
30 below between the conveying unit and the drive surface with decontamination agent.

Alternatively or additionally, it may be provided that the at

least one magnetically levitatable conveying unit distributes the decontamination agent in the protected clean room, at least in a supporting manner, while the magnetically levitatable conveying unit is held in the decontamination position. This embodiment is particularly advantageous if the magnetically levitatable conveying unit rotates at the decontamination position so that surfaces spaced laterally from the magnetically levitatable conveying unit can also be supplied with decontamination agent.

10 In an advantageous design, it may be provided that the method may comprise at least a second method step, wherein the at least second method step comprises a ventilation phase. The second method step preferably follows the first method step in time. Thus, the protected clean room, in particular the at least one magnetically levitatable conveying unit, can be ventilated to remove any remaining decontamination agent from the surfaces. This advantageously prevents damage to components or subsequently introduced products in the protected clean room, in particular surfaces of the at least one magnetically levitatable conveying unit.

Alternatively or additionally, during the second method step, the magnetically levitatable conveying unit performs a relative movement to a surface, for example that described and/or claimed herein. The ventilation phase can advantageously remove any remaining decontamination agent that could not be removed from the working chamber of the protected clean room. This ensures that no harmful decontamination agent remains in the protected clean room during a work process or during operation in the protected clean room.

30 The relative movement can in particular be a displacement and/or a lifting and/or a tilting movement of the magnetically levitatable conveying unit, wherein a variety of movement

possibilities can be realized by the magnetically levitatable conveying unit. Thus, a magnetically levitatable conveying unit can be effectively moved, in particular during the ventilation phase, in order to remove decontamination agents.

5 In an advantageous design, it may be provided that the magnetically levitatable conveying unit is transferred to a ventilation position during the second method step. At the ventilation position, the magnetically levitatable conveying unit can be freed of decontamination agents.

10 Alternatively or additionally, it may be provided that the magnetically levitatable conveying unit is exposed to a preferably concentrated ventilation flow. This can be achieved, for example, at the ventilation position as described above. The concentrated ventilation flow can
 15 ventilate the at least one magnetically levitatable conveying unit particularly effectively and in a short time in order to remove the decontamination agent, in particular from the protected clean room.

Alternatively or additionally, the magnetically levitatable
 20 conveying unit may be exposed to a ventilation flow that can be concentrated. Thus, ventilation of the magnetically
 25 levitatable conveying unit may only take place, for example, when the magnetically levitatable conveying unit is located, for example, in the ventilation position. This allows for advantageous resource savings, in particular energy savings.

In an advantageous design, it may be provided that the magnetically levitatable conveying unit moves during the displacement at a decontamination speed which is slower and/or faster on average over time than an operating speed which the
 30 magnetically levitatable conveying unit has during operation. Operation can refer, for example, to a process that is carried

out before or after a method for decontaminating surfaces of a protected clean room. This can be, for example, a filling and/or assembly process in the protected clean room. Different processes can require the same or different operating speeds
5 of the magnetically levitatable conveying units.

An advantage of a faster and/or slower decontamination speed may be that the magnetically levitatable conveying unit can either (if the conveying unit moves more slowly on average) distribute the decontamination agent evenly over at least part
10 of the drive surface, or (if the conveying unit moves faster on average) only briefly covers the drive surface on average, so that the decontamination agent introduced into the protected clean room can be distributed evenly over the drive surface. Slow movement can also ensure that surfaces that are
15 only exposed in certain sections of the movement are in contact with the decontamination agent for a sufficiently long time.

In an advantageous design, it may be provided that the decontamination speed is equal to the operating speed or a
20 speed close to it. Thus, the magnetically levitatable conveying unit can move at a decontamination speed during the first method step in particular, which is equal to the operating speed or a speed close to it of the magnetically
levitatable conveying unit. Thus, a decontamination speed can
25 be adapted to an operating speed of the magnetically levitatable conveying unit. This is particularly advantageous if the magnetically levitatable conveying unit moves at a high operating speed during operation, so that the decontamination speed is also high during the first method step in particular.
30 This allows at least partial distribution of the decontamination agent in the protected clean room, and in particular on the drive surface.

In an advantageous design, it may be provided that the decontamination duration is calculated such that the local dwell time of the magnetically levitatable conveying unit differs in time from the exposure time of the decontamination agent on the surface. This advantageously ensures that the decontamination agent has sufficient time to act on the surface, in particular on the drive surface. This is particularly possible if, as may be provided for in particular, the local dwell time of the magnetically levitatable conveying unit is shorter than the exposure time of the decontamination agent on the surface.

In an advantageous design, it may be provided that the decontamination position is formed as part of a decontamination unit in which the magnetically levitatable conveying unit is decontaminated alternatively or additionally to decontamination using the decontamination agent. This has the advantage that the magnetically levitatable conveying unit can be decontaminated in a decontamination unit.

The decontamination of the magnetically levitatable conveying unit in the decontamination unit can take place in addition to or as an alternative to the decontamination of the protected clean room. This allows the magnetically levitatable conveying unit to be decontaminated particularly efficiently, while at the same time keeping drive surfaces in the protected clean room free.

In particular, it may be provided that the decontamination of the magnetically levitatable conveying unit in the decontamination unit is carried out by applying a decontamination agent, in particular the one already mentioned. Thus, the magnetically levitatable conveying unit and the protected clean room can be decontaminated using the same decontamination agent, which can be particularly

economically advantageous for a user.

The decontamination agent may, for example, be gaseous, in particular in the form of aerosols, hydrogen peroxide and/or peracetic acid and/or ethylene oxide.

- 5 Alternatively or additionally, the magnetically levitatable conveying unit can be advantageously decontaminated by radiation at the decontamination unit.

The radiation is preferably implemented by means of UV light radiation.

- 10 Alternatively or additionally, pulsed light radiation and/or electron radiation may be provided, which is used in the decontamination unit to decontaminate the magnetically levitatable conveying unit. These decontamination options can also be used to decontaminate the magnetically levitatable
15 conveying unit as an alternative or in addition to decontaminating the protected clean room, so that a user has a variety of options available for decontaminating the at least one magnetically levitatable conveying unit.

- In an advantageous embodiment, it may be provided that at
20 least one magnetically levitatable conveying unit, in particular the aforementioned conveying unit, with a drive surface, for example the aforementioned drive surface, forms a drive unit of a transport device, wherein a part of the drive unit remains outside the protected clean room, in particular
25 during the at least one method step, and is then introduced in a preferably decontaminated state. It may thus be preferably provided that the magnetically levitatable conveying unit remains outside the protected clean room, in particular in an airlock. In particular, the magnetically levitatable conveying
30 unit can be decontaminated in an airlock so that it can then

be introduced into the protected clean room in a decontaminated state during the method.

The transport device is then formed from at least one magnetically levitatable conveying unit and a drive surface, which is preferably formed by a stator arrangement of the protected clean room, which is preferably located outside the protected clean room.

A particularly advantageous feature of the design is that the protected clean room can be decontaminated separately from the at least one magnetically levitatable conveying unit and/or from the stator arrangement, which has the advantage that areas that are difficult to access, in particular the drive surface of the magnetically levitatable conveying unit, can be reached by the decontamination agent.

In an advantageous design, it may be provided that the at least one magnetically levitatable conveying unit is packed in packaging and brought into the protected clean room and unpacked. This is particularly advantageous if the magnetically levitatable conveying unit is to be brought into the protected clean room in a decontaminated state.

The introduction can preferably be carried out by means of a receptacle as described and/or claimed below.

Alternatively or additionally, it may be provided that the surface and at least one outer side of the packaging are decontaminated. This is preferably carried out after the packaged conveying unit has been brought into the protected clean room. The surface provided is in particular the drive surface described herein and/or an inner surface of the protected clean room that is not used or usable as a drive surface. An advantage of this embodiment is that a different

decontamination agent can be used to decontaminate the magnetically levitatable conveying unit than for decontaminating the protected clean room, in particular in a method as described herein. Thus, an already decontaminated, 5 magnetically levitatable conveying unit can be brought into the protected clean room and unpacked.

In an advantageous design, it may be provided that the at least one magnetically levitatable conveying unit is held at the decontamination position during the first method step and 10 is then transferred to the drive surface. For example, it may be provided that the magnetically levitatable conveying unit is held in its packaging in its decontamination position and is only transferred to the drive surface after decontamination of at least one outer side of the packaging and the drive 15 surface has been completed.

For example, it may be provided that the magnetically levitatable conveying unit is arranged before or during the first method step, for example in a jacked-up position, as described and/or claimed herein, and is only transferred to 20 the drive surface after the first method step. This transfer can be carried out, for example, by a handling system known to the person skilled in the art or by manual intervention, i.e., manually.

The transfer of the magnetically levitatable conveying unit 25 may be provided in particular in a method step following the first method step, in particular the second method step described herein. For example, during and/or after transfer to the drive surface, the magnetically levitatable conveying unit can be transferred to a decontamination position, for example 30 in a decontamination unit described herein, and/or to a ventilation position, in particular one as described herein.

In an advantageous design, it may be provided that a volume located between, for example, the aforementioned magnetically levitatable conveying unit and/or a drive surface assigned to it is changed by a preferably recurring and/or transversely aligned movement of the magnetically levitatable conveying unit during at least one or a method step. An advantage of a recurring movement of the magnetically levitatable conveying unit aligned with the drive surface may be that the volume can be changed over time, so that during this execution the decontamination agent can be distributed evenly at least to the drive surface associated with the magnetically levitatable conveying unit while the magnetically levitatable conveying unit is held at the drive surface. The volume can, for example, be open in the main directions of movement of the conveying unit and/or limited by the dimensions of the conveying unit.

An advantage of the movement of the magnetically levitatable conveying unit aligned transversely to the drive surface may be that the magnetically levitatable conveying unit releases the drive surface assigned to it at least for a short period of time, so that the decontamination agent can reach the drive surface and/or another surface, in particular during the first method step.

Alternatively or additionally, the features of the alternative independent claim directed to a protected clean room are provided according to the invention to solve the aforementioned object. In particular, in order to solve the aforementioned object in the protected clean room of the type described at the outset, the invention proposes that the protected clean room has a decontamination unit into which the at least one magnetically levitatable conveying unit can be transferred and/or held before and/or during and/or after a method for decontaminating surfaces of a protected clean room.

Thus, the at least one magnetically levitatable conveying unit can be transferred to and/or held in a decontamination unit for decontamination. This is particularly advantageous if, as may be providedd, the magnetically levitatable conveying unit is to be transferred to and/or held in a decontamination position during a method claimed herein. However, it may also be provided that the magnetically levitatable conveying unit is to be transferred to and/or held in a decontamination unit before and/or after a method described and claimed herein.

Thus, a decontamination unit can decontaminate a magnetically levitatable conveying unit during a decontamination process and/or before and/or after a decontamination process. This has the advantage that the decontamination of a magnetically levitatable conveying unit can be carried out independently of the decontamination of the protected clean room, even if, as described and/or claimed herein, the decontamination unit is located within a housing of the protected clean room, and/or wherein the decontamination unit is designed to be separable from the working chamber.

Alternatively or additionally, the decontamination unit is assigned to the decontamination position of the magnetically levitatable conveying unit described herein. Thus, the decontamination unit can be located close to the magnetically levitatable conveying unit during the method so that the decontamination agent can quickly and completely decontaminate the conveying unit.

The decontamination unit can be formed from the drive surface and/or as part of the drive surface. This has the advantage that the at least one magnetically levitatable conveying unit can pass over and/or past the decontamination unit, so that the decontamination agent can be transferred directly to the at least one magnetically levitatable conveying unit and/or to the surface covered by the conveying unit. The at least one

magnetically levitatable conveying unit can also be transferred or driven into the decontamination unit for decontamination, in order to be held there, in particular at the decontamination position described herein.

5 In an advantageous design of the protected clean room, it may be provided that the drive surface forms a first drive surface and the decontamination unit forms a second drive surface in which the at least one magnetically levitatable conveying unit can be transferred and/or held. Thus, a magnetically
10 levitatable conveying unit can be transferred and/or held by the protected clean room via the first drive surface to or in the decontamination unit, i.e., a second drive surface. This is particularly advantageous if the decontamination unit forms a decontamination position as described and/or claimed herein
15 and/or if the decontamination unit is designed to be separable from the protected clean room.

It may be provided that the second drive surface has a surface area that corresponds at least to the surface area of a side of the at least one magnetically levitatable conveying unit
20 facing the second drive surface. Thus, a decontamination position, in particular as described and/or claimed herein, can advantageously be formed in or on the decontamination
unit.

Preferably, the surface area of the second drive surface is
25 larger than the facing side of the magnetically levitatable conveying unit, whereby the magnetically levitatable conveying unit can be used to perform various relative movements with respect to the second drive surface, in particular those described and/or claimed herein. Thus, a change in distance to
30 the second drive surface can also be achieved by the magnetically levitatable conveying unit, whereby decontamination of the drive surface can also be carried out

when the magnetically levitatable conveying unit is held at the second drive surface, in particular during the first method step.

In an advantageous design of the protected clean room, it may be provided that the decontamination unit has a distribution device for a preferably fluidic decontamination agent. This embodiment is particularly advantageous if the magnetically levitatable conveying unit is held on the decontamination unit by applying one or, in particular, the decontamination agent described herein to the decontamination unit.

Alternatively or additionally, it may be provided that the decontamination unit may be provided with a radiation source, preferably a UV light source, a pulsed light source, or an electron beam source. Thus, decontamination of the at least one magnetically levitatable conveying unit can be carried out at the decontamination unit, in particular as described and/or claimed herein, by application of UV light radiation and/or by pulsed light radiation and/or by electron radiation.

In an advantageous design of the protected clean room, it may be provided that the protected clean room, in particular the decontamination unit, has a coupling device to which the at least one magnetically levitatable conveying unit can be detachably connected. Thus, the at least one magnetically levitatable conveying unit can be detachably connected to the coupling device, whereby in particular the at least one magnetically levitatable conveying unit can be jacked up. This is particularly advantageous if, as described herein, the at least one magnetically levitatable conveying unit is transferred to a jacked-up position during the first method step in particular. This allows the magnetically levitatable conveying unit to be moved and/or held at a distance from the surface, in particular a drive surface assigned to it, during

the introduction and/or application of the decontamination agent.

Preferably, the coupling device is movable so that the coupling device together with the magnetically levitatable conveying unit can perform at least one lifting and/or tilting movement of the magnetically levitatable conveying unit, which can be particularly advantageous during the method described and/or claimed herein.

In an advantageous design of the protected clean room, it may be provided that the current supply to the first and/or second drive surface can be regulated. This allows the relative movement of the magnetically levitatable conveying unit on the first and/or second drive surface to be regulated, which in particular allows transfer and/or holding at the decontamination position and/or in the decontamination unit to be regulated.

In particular, it may be provided that the current supply can be amplified. This may be particularly advantageous if the at least one magnetically levitatable conveying unit is to be held at the at least first and/or second drive surface, and/or if, as described herein, a volume located between the magnetically levitatable conveying unit and the drive surface assigned to it is changed by a recurring and/or transversal movement of the magnetically levitatable conveying unit relative to the drive surface during the at least one or a method step.

Alternatively or additionally, it may be provided that a magnetic force at the first working surface and/or the second working surface is adjustable. Thus, the volume between the magnetically levitatable conveying unit and the drive surface assigned to it can be changed. In this case, a movement of the

magnetically levitatable conveying unit can be initiated, terminated, and/or controlled in particular by changing the magnetic field formed by a stator arrangement, in particular as described herein. The stator arrangement comprises, in particular, movable permanent magnets which are and/or can be brought into operative connection with the magnetically levitatable conveying unit. The movable permanent magnets are preferably motor-driven. By means of a controlled movement of the permanent magnets, a controllably variable magnetic field can be generated, which can be used to drive a movement of the magnetically levitatable conveying unit.

In an advantageous design of the protected clean room, it may be provided that the decontamination unit is arranged on a housing of the protected clean room. Thus, the magnetically levitatable conveying unit can be transferred to and/or held in the decontamination unit without leaving the protected clean room. This prevents contamination from being transferred from outside the protected clean room into the protected clean room.

In particular, the decontamination unit is arranged adjacent to a working chamber of the protected clean room. Thus, the decontamination unit can be designed, for example, as an airlock or a rapid transfer port as described herein.

Alternatively or additionally, it may be provided that the decontamination unit may be designed to be separable from the working chamber. This allows the at least one magnetically levitatable conveying unit to be transferred to the decontamination unit and/or held therein and decontaminated. The separation from the working chamber ensures that the working chamber is not affected by the decontamination agent applied in the decontamination unit during the decontamination of the at least one magnetically levitatable conveying unit in

the decontamination unit. This prevents mixing and/or unwanted entry of the decontamination agent from the decontamination unit into the protected clean room. This is particularly advantageous if, as described above, the decontamination unit
5 is located within a housing of the protected clean room.

In an advantageous design of the protected clean room, it may be provided that the protected clean room has a receptacle for a preferably packaged magnetically levitatable conveying unit. Thus, a packaged, already decontaminated, magnetically
10 levitatable conveying unit can be picked up from outside the closed clean room, in particular during or after the first method step. The receptacle may in particular be a surface, in particular a drive surface associated with the at least one magnetically levitatable conveying unit. However, it is also
15 conceivable that the receptacle forms a receiving surface that is not designed to drive the at least one magnetically levitatable conveying unit, for example a surface of a coupling device described herein or a suspension, in particular a hook. In particular, however, it may be provided
20 that the receptacle allows at least one, in particular all, sides of the packaging in which the magnetically levitatable conveying unit is packaged to be decontaminated. This prevents contamination from entering the protected clean room when the
- packaging is introduced during or after the first method step.
25 This allows decontaminated, magnetically levitatable conveying units to be fed into a protected clean room.

In an advantageous design of the protected clean room, it may be provided that the protected clean room comprises at least one ventilation system for the at least one magnetically
30 levitatable conveying unit and/or the ventilation position. The ventilation system is designed in particular to form a ventilation flow as described and/or claimed herein. This allows the at least one magnetically levitatable conveying

unit to be advantageously transferred to the or a ventilation position so that, in particular during the second method step described herein, a ventilation phase ventilates the at least one magnetically levitatable conveying unit. This allows
5 decontamination agents to be advantageously removed from the surfaces.

The invention thus enables, according to an aspect of potentially independent inventive quality, the use of a magnetically levitatable conveying unit for distributing air
10 enriched with a decontamination agent in a protected clean room. This makes it possible, for example, to make areas that are difficult to reach accessible to the decontamination agent, for example by exposing these areas and/or by actively conveying the decontamination agent through the at least one
15 magnetically levitatable conveying unit.

Alternatively or additionally, the invention thus enables, according to an aspect of possibly independent inventive quality, a use of externally decontaminable packaging for transferring a decontaminated, magnetically levitatable
20 conveying unit into a protected clean room. Thus, for example, a conveyor system with conveying units can be easily decontaminated by unpacking the conveying units, which are
decontaminated in themselves, only after decontamination of the protected clean room and moving them into their working
25 position.

In an advantageous design of the protected clean room, it may be provided that the decontamination position is formed outside a coupling area of the drive surface. This means that, particularly during the first method step, the drive surface
30 can be free of magnetically levitatable conveying units, which are transferred to the decontamination position during the method. This means that few or no areas of the drive surface

can be covered by magnetically levitatable conveying units while the decontamination agent is being introduced and/or taking effect.

5 The coupling area refers in particular to the area that just allows magnetic coupling of the magnetically levitatable conveying unit to the drive surface assigned to it. If the decontamination position is outside the coupling area, the conveying unit that has been moved away from this coupling area and transferred to the decontamination position cannot
10 couple to the drive surface in order to levitate, for example.

— The embodiment is particularly advantageous if the protected clean room has at least one coupling device onto which the magnetically levitatable conveying unit is or can be jacked up. This embodiment is particularly advantageous if, as
15 intended, the decontamination position is formed within the protected clean room.
—

The invention is now described in more detail with reference to exemplary embodiments, but is not limited to these exemplary embodiments. Further exemplary embodiments result
20 from combining the features of individual or several claims with each other and/or with individual or several features of the exemplary embodiments, wherein:
—

Fig. 1: shows a protected clean room according to the invention,

25 Fig. 2: shows the protected clean room according to the invention from Fig. 1 with an additional ventilation system,

Figs. 3 and 4: show the protected clean room according to the invention from Fig. 1 during the
30 application (Fig. 3) and introduction (Fig.

4) of the decontamination agent,

5 Figs. 5 and 6: show an alternative embodiment of a protected clean room with a coupling device before the introduction (Fig. 5) and during the introduction (Fig. 6) of the decontamination agent,

10 Fig. 7: shows a further alternative embodiment of a protected clean room with a coupling device during the introduction of the decontamination agent,

Fig. 8 and 9: show a schematic representation of the movement possibilities of the magnetically levitatable conveying unit as a side view (Fig. 8) and as a top view (Fig. 9),

15 Fig. 10: shows the protected clean room according to the invention from Fig. 1 with three additional decontamination units,

20 Fig. 11: shows an alternative embodiment of a protected clean room with a decontamination unit that can be separated from the working chamber,

25 Fig. 12: shows the protected clean room according to the invention from Fig. 1 with a focus on the volume located between the magnetically levitatable conveying unit and the drive surface,

Fig. 13: shows a further alternative embodiment of a protected clean room with a radiation source,

Fig. 14: shows a further alternative embodiment of a protected clean room with two radiation sources arranged between drive surfaces, and

5 Fig. 15: shows an alternative embodiment of a protected clean room with a gripping robot having a receptacle for packaged conveying units.

Fig. 1 shows a protected clean room 1 designed as an isolator
 10 2. The protected clean room 1, 2 has, for example, four magnetically levitatable conveying units 4 and - also for example - two drive surfaces 7 assigned to the conveying units 4, wherein the protected clean room 1, 2 has a decontamination unit 10 (see Fig. 10) into which the at least one magnetically
 15 levitatable conveying unit 4 is formed before and/or during a method and/or after a method for decontaminating surfaces 6 of a protected clean room 1, 2.

In further exemplary embodiments, other numbers of conveying units 4 and/or other numbers and/or designs of drive surfaces
 20 7 are present.

A magnetically levitatable conveying unit 4 from Fig. 1 forms
 a drive unit 11 of a transport device 12 together with the drive surface 7. The drive surface 7 is formed by the stator arrangement 22 arranged outside the housing 19 of the
 25 protected clean room 1, 2. The stator arrangement 22 contains a current-carrying coil arrangement and/or controllably movable permanent magnets for generating a levitating magnetic field.

The following describes a method for decontaminating the
 30 interior surfaces 6 of the protected clean room 1, 2, as it

can be or is carried out in the protected clean room 1, 2.
Reference is made to further figures in addition to Fig. 1.
Components and functional units that are functionally and/or
structurally similar or identical to those described in Fig. 1
5 are designated with the same reference signs and are not
described separately again. The explanations for Fig. 1
therefore apply accordingly to Figs. 2 to 15.

The method comprises a first method step in which a
decontamination agent 3 is introduced into the working chamber
10 20 of the protected clean room 1, 2 via a mandatory
distribution device 23 of the protected clean room 1, 2 (Fig.
4) and acts in the protected clean room 1, 2 (Fig. 3). In the
method, the four magnetically levitatable conveying units 4
are transferred or held in at least one decontamination
15 position 5 during the at least one method step.

Before the decontamination agent 3 is introduced, two
magnetically levitatable conveying units 4 move away from
their associated drive surfaces 7 (the movement is shown by
arrows) (Fig. 1). In the process, these two magnetically
20 levitatable conveying units 4 are transferred to and held in
the decontamination position 5 (Fig. 4).

The two other magnetically levitatable conveying units 4 are
already in the decontamination position 5 (Fig. 1) before the
method step (Fig. 1), in particular before the decontamination
25 agent is introduced. Although not limited to these two
magnetically levitatable conveying units 4, these two
magnetically levitatable conveying units 4 move in six degrees
of freedom (represented by six arrows) during the introduction
(Fig. 4) and/or during the action (Fig. 3) of the
30 decontamination agent 3. In particular, these magnetically
levitatable conveying units 4 perform a tilting movement (two
curved arrows) at the decontamination position 5, whereby the

decontamination agent 3 is optimally distributed between the hard-to-reach areas between the undersides of the magnetically levitatable conveying unit 4 and the drive surfaces 6, 7.

Similarly, the magnetically levitatable conveying units 4 rotate around their center during the holding phase, wherein the decontamination agent 3 is distributed at least in a supporting manner in the protected clean room 1, 2 (Figs. 3 and 4).

During the first method step, the magnetically levitatable conveying units 4 move at a decontamination speed that is slower and/or faster on average than the operating speed of the magnetically levitatable conveying unit 4 during operation. Preferably, the movement of the magnetically levitatable conveying units 4 is slower on average than the operating speed. Thus, no surface 6, in particular drive surface 7, remains covered by a magnetically levitatable conveying unit 4 for long, so that the decontamination agent 3 can reach and act on the surface 6, 7. In a non-shown embodiment, the decontamination speed is equal to the operating speed of the magnetically levitatable conveying unit 4.

In particular, as shown in Figs. 8 and 9, it may be provided that at least one magnetically levitatable conveying unit 4 performs a constant movement, for example along several tiles of the drive surface, at least during the first method step in order to perform a change of location during the first method step (Fig. 9).

The magnetically levitatable conveying units 4 can also be jacked up. The jacked-up conveying units 4 are detachably connected to a coupling device 18 (Figs. 5 to 7). In this case, seven movable magnetically levitatable conveying units 4

can be jacked up on a vertical wall 6, 7 or on a horizontal wall 6, 7 to enable a change in distance or a change in volume (see Fig. 12), so that more decontamination agent 3 can pass between the magnetically levitatable conveying units 4 and the
5 respective associated drive surfaces 6, 7 during the method. The jacking up of the magnetically levitatable conveying units 4 can be carried out actively, e.g. by increased current supply to the drive surface 6, 7 (see Figs. 5 and 6) and the resulting lifting movement of the conveying unit 4, or
10 passively, e.g. by a gripping robot 24 (see Fig. 7). The jacking up of the magnetically levitatable conveying unit 4 can be carried out in particular by increasing the magnetic force of the stator arrangement 22.

In all embodiments shown in Figs. 1 to 15, the decontamination
15 duration is calculated such that the local dwell time of the magnetically levitatable conveying unit 4 is shorter than the exposure time of the decontamination agent on surface 6, 7.

The protected clean room 1, 2 further has two additional decontamination units 10 arranged on the housing 19, wherein
20 each decontamination unit 10 forms a decontamination position 5 in the working chamber 20, which is assigned to a magnetically levitatable conveying unit 4 (e.g., Fig. 10).
Thus, the magnetically levitatable conveying units 4 can alternatively be decontaminated in addition to decontamination
25 using the decontamination agent 3 introduced from the distribution device 23. In the embodiment shown here, the magnetically levitatable conveying units 4 are decontaminated by application with decontamination agent 3 from an additional distribution device 17 of the decontamination unit 10, in
30 particular on the undersides. This allows the decontamination agent 3 to reach precisely between the drive surface 6, 7 and the underside of the magnetically levitatable conveying unit 4.

Fig. 7 shows that the decontamination position 5 is formed outside a coupling area of the drive surface 6, 7. This means that the drive surface 6, 7 remains free of magnetically levitatable conveying units 4 during the introduction and
5 action of the decontamination agent 3 by the distribution device 23, which were transferred to the decontamination position 5 by the gripping robot 24 during the method and jacked up, suspended and/or fastened to a coupling device 18.

The embodiment is particularly advantageous if the protected
10 clean room has at least one coupling device on which the magnetically levitatable conveying unit is or can be jacked up. This embodiment is particularly advantageous if, as intended, the decontamination position is formed within the protected clean room.

15 In alternative embodiments of protected clean rooms 1, 2, the decontamination agent 3 is radiation 30, for example UV light radiation, which is introduced into the protected clean room 1, 2 by a radiation source 27 or a UV light source 28 (Figs. 13 and 14). However, pulse light sources and/or electron beam
20 sources may also be provided alternatively or additionally in such embodiments.

Fig. 14 shows that the two UV light sources 28 are arranged between drive surfaces 6, 7 so that the at least one magnetically levitatable conveying unit 4 can pass over them
25 in order to be decontaminated by the radiation 30 emitted by the UV light source 28, in particular the underside of the magnetically levitatable conveying unit 4. As can also be seen, the radiation source 27, 28 can be arranged on horizontal and vertical walls, but also on sloping walls (not
30 shown) of the protected clean room 1, 2.

In a further alternative embodiment of a protected clean room

1, 2, the decontamination unit 10 is designed as an airlock 25, in which there is a distribution device 17 for applying the decontamination agent 3. As shown in Fig. 11, during the first method step, a magnetically levitatable conveying unit 4 is transferred to a decontamination position 5 in the airlock 25, which is designed to be separable from the protected room 1, 2 (dashed vertical line). The airlock 25 thus forms a second drive surface 16 to which the magnetically levitatable conveying unit 4 can be transferred from the first drive surface 6, 7.

Another magnetically levitatable conveying unit 4 is transferred in a decontaminated state via a rapid transfer port 26 into the working chamber 20.

The current supply to the first drive surfaces 6, 7 and the second drive surfaces 16 is adjustable. Thus, as in all the embodiments shown, the movement of the magnetically levitatable conveying units 4, which is aligned with the drive surfaces 6, 7 or 16 assigned to them, can be changed during the first method step by a preferably recurring movement transverse to the drive surface 6, 7 or 16, during the first method step. Thus, a change in distance, for example by means of a recurring lifting and/or tilting movement, can change the volume 15 so that decontamination between the magnetically levitatable conveying units 4 and the drive surfaces 6, 7 or 16 is enabled or improved.

Alternatively or additionally, a magnetic force on the first working surfaces 6, 7 and the second working surfaces 16 can be regulated in order to change the volume 15 between magnetically levitatable conveying units 4 and the drive surfaces 6, 7 or 16 assigned to them. In this case, movement of the magnetically levitatable conveying unit 4 is initiated, terminated, and/or controlled in particular by changing the

magnetic field formed by a stator arrangement 22. The stator arrangement 22 comprises in particular movable permanent magnets which are and/or can be brought into operative connection with the magnetically levitatable conveying unit 4.

5 The movable permanent magnets are preferably motor-driven. A controlled movement of the permanent magnets can thus generate a controllably variable magnetic field, which is used to drive a movement of the magnetically levitatable conveying unit 4.

A further magnetically levitatable conveying unit 4 of the embodiment shown in Fig. 11 is also (or alternatively) packed in a packaging 13 in the working chamber 20, so that during the method, the outside 14 of the packaging 13 is decontaminated before the magnetically levitatable, decontaminated conveying unit 4 located in the packaging 13 is
15 unpacked and transferred to the work surface 6, 7 (the dashed representation of the conveying unit 4 shows the conveying unit 4 after transfer) (see Fig. 15). The magnetically levitatable conveying unit 4 is transferred by a gripping robot 24 of the protected room 1, 2, which removes the
20 conveying unit 4 from a receptacle 21 designed as a suspension 30. The gripping robot 24 can grip and store the magnetically levitatable conveying unit 4 during the method (see also Fig. 7).

The introduction of the magnetically levitatable conveying unit 4 from the airlock 25 and/or from the rapid transfer port 26 and/or from the packaging 13 into the protected clean room 1, 2 preferably takes place after the first method step. In the alternative embodiments shown in Figs. 11 and 15, it is technically possible and carried out that a part of the drive
30 unit 11, in this case the magnetically levitatable conveying unit 4, remains outside the protected clean room 1, 2 during at least one method step and is then introduced in a decontaminated state.

After decontamination has been completed, the decontamination agent is removed from the protected clean room 1, 2. The method comprises a second method step, wherein the second method step comprises a ventilation phase, which follows the first method step in time.

During the second method step, the magnetically levitatable conveying units 4 perform a relative movement, in particular a movement and/or a lifting and/or tilting movement, towards the surface 6, 7 or 16.

10 In the second method step, the magnetically levitatable conveying units 4 are transferred to a ventilation position 8 of a ventilation system 29 and exposed to a concentrated ventilation flow 9 in order to remove any remaining decontamination agent 3 from the surfaces of the magnetically
15 levitatable conveying units 4.

After decontamination, the magnetically levitatable conveying units 4 of the embodiments shown can be moved to their working position. This can be carried out, for example, by moving the magnetically levitatable conveying units 4 on the drive
20 surface 6, 7 (or from drive surface 16 to drive surface 6, 7), by manual glove intervention, or by the gripping robot 24.

The method described herein improves the decontamination of surfaces 6 of a protected clean room 1, 2, and magnetically levitatable conveying units 4 can be used in this protected
25 clean room 1, 2.

The invention generally proposes a method for decontaminating surfaces 6 of a protected clean room 1, in particular an isolator 2 and/or a barrier system for restricted access. The method comprises at least one method step in which a
30 decontamination agent 3 is introduced into the protected clean

room 1 and/or acts in the protected clean room 1, and is further characterized in that at least one magnetically levitatable conveying unit 4, which is magnetically couplable to or coupled to a drive surface 7, is transferred to at least one decontamination position 5 before or during the at least one method step and/or is held in a decontamination position 5. The invention also proposes a protected clean room 1 and a corresponding use.

/ List of reference signs

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List of reference signs

	1	Protected clean room
	2	Isolator
	3	Decontamination agent
5	4	Magnetically levitatable conveying unit
	5	Decontamination position
	6	Area of 1
	7	Drive area of 4
	8	Ventilation position
10	9	Ventilation flow
—	10	Decontamination unit
	11	Drive unit
	12	Transport device
	13	Packaging
15	14	Outside of 13
	15	Volume between 4 and 7
—	16	(Second) drive surface, in 10
	17	Distribution device for 3 of 10
	18	Coupling device
20	19	Housing of 1
	20	Working chamber of 1
	21	Receptacle of 1
	22	Stator arrangement
—	23	Distribution device for 3 of 1
25	24	Gripping robot
	25	Airlock
	26	Rapid transfer port
	27	Radiation source
	28	UV light source
30	29	Ventilation system
	30	Suspension

/ Claims

CLAIMS:

1. Method for decontaminating surfaces (6) of a protected clean room (1), in particular an isolator (2) and/or a barrier system for restricted access, wherein the method
5 comprises at least one method step in which a decontamination agent (3) is introduced into the protected clean room (1) and/or acts in the protected clean room (1), **characterized in that** at least one magnetically levitatable conveying unit (4), which can be magnetically coupled or is
10 magnetically coupled to a drive surface (7), is transferred into at least one decontamination position (5) and/or is held in a decontamination position (5) before or during the at least one method step.
2. Method according to claim 1, wherein the at least one
15 magnetically levitatable conveying unit (4) performs a relative movement to at least one surface (6) located in the protected clean room (1), in particular the drive surface (7), and/or wherein the at least one magnetically levitatable conveying unit (4) is jacked up at the
20 decontamination position (5).
3. Method according to one of the preceding claims, wherein
during the at least one method step, the at least one magnetically levitatable conveying unit (4) levitates and/or moves in at least one degree of freedom, preferably
25 in at least two degrees of freedom, and/or wherein the magnetically levitatable conveying unit (4) moves, in particular rotates, around a point of the conveying unit (4), in particular its center.
4. Method according to one of the preceding claims, wherein
30 the at least one magnetically levitatable conveying unit (4) distributes the decontamination agent (3) during

transfer and/or holding, at least in a supporting manner,
 in the decontamination position (5) in the protected clean
 room (1), and/or wherein the method comprises at least a
 second method step, wherein the at least second method step
 5 comprises a ventilation phase and preferably follows the
 first method step in time, and/or wherein the at least one
 magnetically levitatable conveying unit (4) performs a
 relative movement, in particular a displacement and/or a
 lifting and/or tilting movement, relative to the or a
 10 surface (6) during the second method step.

5. Method according to one of the preceding claims, wherein
 the at least one magnetically levitatable conveying unit
 (4) is transferred to a ventilation position (8) during the
 second method step and/or is exposed to a preferably
 15 concentrated and/or concentratable ventilation flow (9)
 and/or wherein the at least one magnetically levitatable
 conveying unit (4) moves during the method, in particular
 during the first method step, at a decontamination speed
 which is slower and/or faster on average over time than an
 20 operating speed which the at least one magnetically
 levitatable conveying unit (4) has during operation.

6. Method according to one of the preceding claims, wherein
 the decontamination speed is equal to the or an operating
 speed and/or wherein the decontamination duration is
 25 dimensioned such that a local dwell time of the at least
 one magnetically levitatable conveying unit (4) is
 different in time, in particular shorter, than an exposure
 time of the decontamination agent (3) on the surface (6).

7. Method according to one of the preceding claims, wherein
 30 the decontamination position (5) is designed as part of a
 decontamination unit (10) in which the at least one
 magnetically levitatable conveying unit (4) is

decontaminated alternatively or additionally to decontamination by means of the decontamination agent (3), in particular wherein the decontamination of the at least one magnetically levitatable conveying unit (4) at the decontamination unit (10) is carried out by application of the or a decontamination agent (3), in particular radiation (30), preferably UV light radiation and/or pulsed light radiation and/or electron radiation.

8. Method according to the preamble of claim 1 or according to one of the preceding claims, wherein the or at least one magnetically levitatable conveying unit (4) forms a drive unit (11) of a transport device (12) with the or a drive surface (7), **characterized in that** a part of the drive unit (11), in particular the at least one magnetically levitatable conveying unit (4), remains outside the protected clean room (1), in particular during the at least one method step, and is then introduced in a preferably decontaminated state.

9. Method according to one of the preceding claims, wherein the at least one magnetically levitatable conveying unit (4) is brought into the protected clean room (1) packed in a packaging (13) and unpacked, and/or wherein the surface (6), in particular the drive surface (7), and at least one outer side (14) of the packaging (13) are decontaminated and/or wherein the at least one magnetically levitatable conveying unit (4) is held at the decontamination position (5) during the first method step and is then transferred to the drive surface (7), preferably in a subsequent method step.

10. Method according to the preamble of claim 1 or according to one of the preceding claims, **characterized in that** a volume (15) located between the or a magnetically levitatable

conveying unit (4) and the or one of the drive surfaces (7) associated therewith is changed by a preferably recurring and/or transversely aligned movement of the at least one magnetically levitatable conveying unit (4) during the at least one or one method step.

11. Protected clean room (1), in particular isolator (2) and/or barrier system for restricted access, comprising at least one magnetically levitatable conveying unit (4) and at least one drive surface (7) associated therewith,
characterized in that the protected clean room (1) has a decontamination unit (10) into which the at least one magnetically levitatable conveying unit (4) can be transferred and/or held before and/or during and/or after a method for decontaminating surfaces (6) of a protected clean room (1), in particular after a preceding claim directed to a method.

12. Protected clean room (1) according to the preceding claim, wherein the drive surface (7) forms a first drive surface (7) and wherein the decontamination unit (10) forms a second drive surface (16) into which the at least one magnetically levitatable conveying unit (4) can be transferred and/or held, and/or wherein the decontamination unit (10) has a distribution device (17) for a fluidic decontamination agent (3) and/or a radiation source (27), preferably a UV light source (28), a pulsed light source, or an electron beam source.

13. Protected clean room (1) according to one of the preceding claims relating to a protected clean room (1), wherein the protected clean room (1), in particular the decontamination unit (10), has a preferably movable coupling device (18) with which the at least one magnetically levitatable conveying unit (4) can be detachably connected, and/or

wherein the current supply to the first and/or second drive surface (7, 16) can be regulated, in particular amplified, and/or wherein a magnetic force on the first and/or second drive surface (7, 16) can be regulated.

5 14. Protected clean room (1) according to a preceding claim directed to a protected clean room (1), wherein the decontamination unit (10) is arranged on a housing (19) of the protected clean room (1), in particular adjacent to a working chamber (20), and/or wherein the decontamination
10 unit (10) is designed to be separable from the working chamber (20), and/or wherein the decontamination unit (10) is assigned to the or a decontamination position (5) of the magnetically levitatable conveying unit (4).

15 15. Protected clean room (1) according to a preceding claim directed to a protected clean room (1), wherein the protected clean room (1), preferably the decontamination unit (10), has a receptacle (21), in particular a suspension (30), for a preferably packaged magnetically levitatable conveying unit (4) and/or wherein the protected
20 clean room (1) comprises at least one ventilation system (29) for the at least one magnetically levitatable conveying unit and/or the ventilation position and/or wherein the decontamination position (5) is formed outside a coupling area of the drive surface (7), preferably within
25 the protected clean room (1).

16. Use of a magnetically levitatable conveying unit (4) for distributing air enriched with a decontamination agent in a protected clean room (1), in particular in a protected clean room according to one of the preceding claims 11 to
30 15 and/or in a method according to one of the preceding claims 1 to 10.

17. Use of an externally decontaminable package for
transferring a decontaminated, magnetically levitatable
conveying unit (4) into a protected clean room (1), in
particular into a protected clean room according to one of
5 the preceding claims 11 to 15 and/or in a method according
to one of the preceding claims 1 to 10.
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