

Door System for an Elevator Installation

The invention relates to a door system for an elevator installation and to an elevator
5 installation comprising such a door system.

Elevator installations are typically arranged in an elevator shaft, which connects a
plurality of floors. At the height of the individual floors, the elevator shaft has shaft door
openings. Shaft doors are arranged at these shaft door openings. The elevator installation
10 comprises an elevator cabin, which is arranged so as to be movable within the elevator
shaft. The elevator cabin has a cabin door opening. A cabin door is arranged at this cabin
door opening. The shaft doors as well as the at least one cabin door typically each have at
least one door leaf.

WO2009/050327A1 shows an elevator door system, which is embodied as folding door
system. The door system comprises a shaft and a cabin door. The shaft door comprises a
plurality of shaft door leaves. The cabin door comprises a same number of cabin door
leaves. In the open position of the folding door system, the cabin door leaves are folded
on the cabin side and the shaft door leaves are folded on the floor side. In the open
20 position of the folding door system on the floor side as well as on the cabin side, this
leads to a large space requirement.

It is thus the object of the invention to propose a door system for an elevator installation,
which has a small space requirement.

The object is solved by means of a door system for an elevator installation, which
comprises an elevator cabin, the door system comprising a pivotable first cabin door leaf
and a pivotable first shaft door leaf, wherein the first cabin door leaf can be mounted at a
cabin door opening of the elevator cabin, and the first shaft door leaf can be mounted at a
30 shaft door opening of the elevator installation, wherein at least a part of the shaft door
opening can be closed by the first shaft door leaf in the closed position thereof and a shaft
door plane is formed along the shaft door leaf, which can be arranged in the closed
position thereof, wherein at least a part of the cabin door opening can be closed by the
first cabin door leaf in the closed position thereof and a cabin door plane is formed along

the cabin door leaf, which can be arranged in the closed position thereof, wherein the cabin door leaf, in the open position thereof, extends through the shaft door plane, or the shaft door leaf, in the open position thereof, extends through the cabin door plane.

5 The object is also solved by means of an elevator installation comprising such a door system.

The invention is based on the knowledge that the door leaf of the cabin door or the door leaf of the shaft door, respectively, is only arranged in the open position thereof when the elevator cabin is arranged at a shaft door opening so as to be blocked in the elevator shaft. It is thus only necessary to maintain the door sill gap between the cabin door and one of the shaft doors while the elevator cabin is moved in the elevator shaft. While the elevator cabin moves in the elevator shaft, such a door sill gap prevents that components of the elevator cabin collide with components, which are fixedly arranged in the elevator shaft. When the elevator cabin stands still, the components of the shaft or cabin door, respectively, can thus extend through said gap. To obtain the desired saving of space, the shaft door leaves can thus extend through the cabin door plane, or the cabin door leaves can extend through the shaft door plane while the door system is in the open position. The shaft door plane and the cabin door plane are preferably arranged parallel to each other, preferably vertically. Such a door system can be formed as folding door system.

In the case of a further development of the door system, the first cabin door leaf can be mounted at a main pivot axis arranged at the elevator cabin, and the first shaft door leaf can be mounted at a further main pivot axis, wherein the main pivot axis assigned to the cabin door leaf is arranged in parallel to the main pivot axis assigned to the shaft door leaf. A pivoting of the shaft door leaf or of the cabin door leaf, respectively, makes it possible that these door leaves, in the open position thereof, do not require a significant amount of space on the side of the cabin door or of the shaft door opening, respectively.

30 A further development of the door system comprises a second cabin door leaf, which second cabin door leaf is pivotably mounted at a secondary pivot axis at the first cabin door leaf in such a manner that the first and the second cabin door leaf form a folding door, and a second shaft door leaf, wherein the second shaft door leaf is pivotably mounted at a secondary pivot axis at the first shaft door leaf in such a manner that the

first and the second shaft door leaf form a folding door, wherein the secondary pivot axes are arranged in parallel to the main pivot axes. It is thus made possible that the door leaves can be formed so as to be short in horizontal direction, but can nonetheless close the entire door width of the shaft or cabin door, respectively.

5

In the case of a further development of the elevator installation, the first shaft door leaf and the first cabin door leaf, in the open position thereof, are arranged so as to be stacked directly next to each other, and the second shaft door leaf and the second cabin door leaf, in the open position thereof, are arranged so as to be stacked directly next to each other. A straight line formed in the horizontal cross section, which extends through both secondary pivot axes, can thus be arranged substantially vertically to the cabin door or to the shaft door plane, respectively. This provides for space savings of the door system in the open position thereof in contrast to common door systems, because the two shaft door and cabin door leaves are stacked inside each other. This means that subsequent door leaves, in the open position thereof, are arranged in succession along the cabin door or shaft door plane, respectively, according to a first embodiment alternative: the first shaft door leaf, followed by the first cabin door leaf, followed by the second cabin door leaf, followed by the second shaft door leaf or according to a second embodiment alternative, respectively: the first cabin door leaf, followed by the first shaft door leaf, followed by the second shaft door leaf, followed by the second cabin door leaf.

10
15
20

In the case of a further development of the door system, the second cabin door leaf has a bearing shaft, which bearing shaft is arranged so as to be capable of being displaced along the cabin door plane during an opening or closing, respectively, of the door system. As an alternative or in addition, the second shaft door leaf can have a further bearing shaft, wherein the bearing shaft, which can be assigned to the shaft door, is arranged so as to be capable of being displaced along the shaft door plane during an opening or closing, respectively, of the door system. A bearing or guiding, respectively, of these ends of the door leaves is thus made possible. A distance of the cabin door leaves to the shaft door leaves can furthermore be adjusted in the open position thereof.

25
30

In the case of a further development of the door system, the first and the second cabin door leaf, in the open position thereof, form an opening angle in the range of between 5 and 15 degrees, preferably 10 degrees. In addition or in the alternative, the first and the

second shaft door leaf, in the open position thereof, can form an opening angle in the range of between 5 and 15 degrees, preferably 10 degrees. It can be ensured in this manner that the corresponding door leaves, in the open position thereof, have minimum dimensions in the open position thereof, parallel and vertically to the cabin door or shaft door plane, respectively. Said opening angle can be detected, when the door leaves, which are assigned to the opening angle, are viewed according to a horizontal cross section.

In the case of a further development of the door system, the pivot axes, thus the main or secondary pivot axes, respectively, are arranged substantially vertically. Such an arrangement provides for a simple design of the door system, because even though the door leaves, in the open position thereof, are arranged in the door openings, they do not make it more difficult for elevator passengers to enter or leave, respectively, the elevator cabin.

In the case of a further development of the door system, the first shaft door leaf, in the closed position thereof, has a horizontally oriented width parallel to the shaft door plane, and the first cabin door leaf, in the closed position thereof, has a horizontally oriented width parallel to the cabin door plane, wherein the widths, which can be assigned to the first shaft door leaf and to the first cabin door leaf, are largely identical.

In addition, the second shaft door leaf, in the closed position thereof, can have a horizontally oriented width parallel to the shaft door plane, and the second cabin door leaf, in the closed position thereof, can have a horizontally oriented width parallel to the cabin door plane, wherein the widths, which can be assigned to the second shaft door leaf and to the second cabin door leaf, are largely identical, and wherein the width, which can be assigned to the first cabin door leaf, is largely identical to the width, which can be assigned to the second cabin door leaf. A particularly space-saving folding of the door system in the open position thereof is made possible in this manner.

The invention will be explained in more detail below by means of figures.

Figure 1 shows an elevator installation comprising a door system;

Figure 2 shows the door system in horizontal cross section; and

Figure 3 shows a door of the door system.

Figure 1 shows an elevator installation 2. The elevator installation 2 comprises an elevator shaft 1. The elevator shaft 1 has a plurality of shaft door openings arranged at floors. The elevator installation 2 comprises a plurality of shaft doors 6.1, 6.2, 6.3, wherein a first one of the shaft doors 6.1 is arranged at a first one of the shaft door openings and a second one of the shaft doors 6.2 is arranged at a second one of the shaft door openings. The elevator installation 2 has an elevator cabin 4 comprising a cabin door 7.

The elevator cabin 4 is movably arranged in the elevator shaft 1. To ensure sufficient safety while the elevator cabin 4 moves, the elevator cabin 4 is sufficiently spaced apart from the components, which are fixed in the elevator shaft 1, in particular the shaft doors 6.1, 6.2, 6.3. This distance is identified by a door sill gap S. It is prevented by means of the door sill gap S that components of the elevator cabin 4, for example the cabin door 7, touch the components fixed in the elevator shaft 1 or collide with them, respectively, while the elevator cabin 4 moves.

Figure 2 shows a part of the elevator cabin 4 shown in Figure 1, which is arranged at a floor, in a horizontal cross section. The cabin door 7 of the elevator cabin 4 comprises a first cabin door leaf 20 and can comprise a further cabin door leaf 21. The shaft door 6 arranged at the floor comprises a first shaft door leaf 22 and can comprise a further shaft door leaf 23.

The first cabin door leaf 20 is mounted at the elevator cabin 4 by means of a main pivot axis 24, which is preferably arranged vertically. The second cabin door leaf 21 is mounted at a secondary pivot axis 25 at the first cabin door leaf 20 in such a manner that the cabin door 7 is formed as folding door. The main and secondary pivot axis 24, 25 assigned to the cabin door 7 are preferably arranged in parallel. In a closed position of the cabin door 7, the at least one cabin door leaf 20, 21 is substantially arranged along a cabin door plane 10. This means that at least one cabin door leaf 20, 21, in the closed position of the cabin door 7, substantially forms this cabin door plane 10. The cabin door plane 10 is preferably arranged vertically in the elevator installation.

The second cabin door leaf 21 has a bearing shaft 28. This bearing shaft 28, which can be assigned to the cabin door 7, can be arranged along an end of the second cabin door leaf

21 or – as shown in Figure 2 – in the direct vicinity thereof. When the cabin door 7 is closed, this first end is formed by means of the end of the second cabin door leaf 21, which is spaced apart from the main pivot axis 24, which can be assigned to the cabin door 7. The bearing shaft 28, which can be assigned to the cabin door 7, can be displaced
5 along the cabin door plane 10 during an opening or closing movement, respectively, of the cabin door 7.

The first shaft door leaf 22 is mounted at the floor side, preferably at a component of the shaft door 6, which is fixedly connected to the elevator shaft, by means of a main pivot
10 axis 26. The main pivot axis 26, which can be assigned to the shaft door leaf 22, is preferably arranged in parallel to the main pivot axis 24, which can be assigned to the first cabin door leaf 20. The second shaft door leaf 23 is mounted at a secondary pivot axis 27 at the first shaft door leaf 22 in such a manner that the shaft door 6 is formed as folding door. In the closed position thereof, the at least one shaft door leaf 22, 23 is
15 arranged along a shaft door plane 12.

The second shaft door leaf 23 has a bearing shaft 29. This bearing shaft 29, which can be assigned to the shaft door 6, can be arranged along an end of the second shaft door leaf 23 or – as shown in Figure 2 – in the direct vicinity thereof. When the shaft door 6 is closed,
20 this end, which can be assigned to the second shaft door leaf 23, is formed by the end of the second shaft door leaf 23, which is spaced apart from the main pivot axis 26, which can be assigned to the shaft door 6. The bearing shaft 29, which can be assigned to the shaft door 6, can be displaced along the shaft door plane 12 during an opening or closing movement, respectively, of the shaft door 6.

To guide the second shaft or cabin door leaf 21, 23, respectively, the shaft or cabin door 6, 7, respectively, comprises a non-illustrated guide device. A guide shoe can in each case be arranged at the corresponding bearing shaft 28, 29 at and upper and/or lower end of the second shaft or cabin door leaf 21, 23, respectively. In an exemplary manner, the at least
30 one guide shoe can in each case be guided by a guide groove, which is arranged at the upper and/or lower closure of the cabin or shaft door opening, respectively, along the cabin door or shaft door plane 10, 12, respectively.

The first and second cabin door leaf 20, 21, in the open position thereof, can form an

opening angle α of 5-15 degrees, preferably 10 degrees. The first and the second shaft door leaf 22, 23, in the open position thereof, can form an opening angle β of 5-15 degrees, preferably 10 degrees. The door sill gap S is arranged between the cabin door plane 10 and the shaft door plane 12, wherein, vertically to the shaft or cabin door plane 10, 12, this door sill gap S can have a smaller dimension than the cabin door plane 10 is spaced apart from the shaft door plane 12.

According to Figure 2, the first shaft door leaf 22 and the first cabin door leaf 20, in the open position thereof, are arranged so as to be stacked directly next to each other. The second shaft door leaf 23 and the second cabin door leaf 21, in the open position thereof, are likewise arranged so as to be stacked directly next to each other. A straight line formed in the horizontal cross section, which extends through both secondary pivot axes 25, 27, is thus arranged substantially vertically to the cabin door 10 or to the shaft door plane 12, respectively.

Figure 3 shows a cabin door 7, which is arranged at a cabin door opening, of a door system in the closed position thereof. The cabin door opening has a door opening width B. In an exemplary manner, the cabin door 7 comprises a plurality of cabin door leaves 20, 21, 30, 31. The cabin door leaves 20, 21, 30, 31, in the closed position thereof, cover the cabin door opening substantially completely. This means that a first one of these cabin door leaves 20, 21, 30, 31 covers or closes, respectively, at least a part of the cabin door opening.

In the closed position thereof, a first one of the cabin door leaves 20, which is pivotably mounted at a main pivot axis 24, has a horizontally oriented width BK1 in the direction of the door opening width B. Spaced apart from the main pivot axis 24, a second one of the cabin door leaves 21 can be pivotably mounted at the first cabin door leaf 20 at a secondary pivot axis 25, wherein the first and the second cabin door leaf 20, 21 form a fold of a folding door. In the closed position thereof, the second cabin door leaf 21 has a horizontally oriented width BK2 in the direction of the door opening width B. Preferably, the widths BK1 and BK2 of the door leaves 20, 21 are largely identical.

Figure 3 and the description provided thereto also apply to a shaft door of the door system.

Patent Claims

1. A door system for an elevator installation (2), which comprises an elevator cabin (4), the door system comprising:
- 5 a pivotable first cabin door leaf (20) and
a pivotable first shaft door leaf (22),
wherein the first cabin door leaf (20) can be mounted at a cabin door opening (7) of the elevator cabin (4), and the first shaft door leaf (22) can be mounted at a shaft door opening (6) of the elevator installation (2), wherein at least a part of the shaft door opening (6) can be closed by the first shaft door leaf (22) in the closed position thereof and a shaft door plane (12) is formed along the shaft door leaf (22), which can be arranged in the closed position thereof, wherein at least a part of the cabin door opening (7) can be closed by the first cabin door leaf (20) in the closed position thereof and a cabin door plane (10) is formed along the cabin door leaf (20), which can be arranged in the closed position thereof, wherein the cabin door leaf (20), in the open position thereof, extends through the shaft door plane (12), or the shaft door leaf (22), in the open position thereof, extends through the cabin door plane (10), wherein the first cabin door leaf (20) can be mounted at a main pivot axis (24) arranged at the elevator cabin (4), and the first shaft door leaf (22) can be mounted at a further main pivot axis (26), wherein the main pivot axis (24) assigned to the cabin door leaf (20) is arranged in parallel to the main pivot axis (26) assigned to the shaft door leaf (22), wherein the door system
- 10 - comprises a second cabin door leaf (21), which second cabin door leaf (21) is pivotably mounted at a secondary pivot axis (25) at the first cabin door leaf (20) in such a manner that the first and the second cabin door leaf (20, 21) form a folding door,
- 25 and
- comprises a second shaft door leaf (23), wherein the second shaft door leaf (23) is pivotably mounted at a secondary pivot axis (27) at the first shaft door leaf (22) in such a manner that the first and the second shaft door leaf (22, 23) form a folding door, wherein the secondary pivot axes (25, 27) are arranged in parallel to the main pivot axes (24, 26), wherein the first shaft door leaf (22) and the first cabin door leaf (20), in the open position thereof, are arranged so as to be stacked directly next to each other, and wherein the second shaft door leaf (23) and the second cabin door leaf (21), in the open position thereof, are arranged so as to be stacked directly next to each other.
- 30

2. The door system according to claim1, wherein the second cabin door leaf (21) has a bearing shaft (28), which bearing shaft (28) is arranged so as to be capable of being displaced along the cabin door plane (10) during an opening or closing, respectively, of the door system and/or wherein the second shaft door leaf (23) has a further bearing shaft (29), wherein the bearing shaft (29), which can be assigned to the shaft door (6), is arranged so as to be capable of being displaced along the shaft door plane (12) during an opening or closing, respectively, of the door system.
3. The door system according to one of the preceding claims, wherein the first and the second cabin door leaf (20, 21), in the open position thereof, form an opening angle in the range of 5-15 degrees, and/or wherein the first and the second shaft door leaf (22, 23), in the open position thereof, form an opening angle in the range of 5-15 degrees.
4. The door system according to one of the preceding claims, wherein the main or secondary pivot axes (24, 25, 26, 27) are arranged substantially vertically.
5. The door system according to one of the preceding claims, wherein the door system is formed as folding door system.
6. The door system according to one of the preceding claims, wherein the first shaft door leaf (22), in the closed position thereof, has a horizontally oriented width parallel to the shaft door plane (12), and the first cabin door leaf (20), in the closed position thereof, has a horizontally oriented width (BK1) parallel to the cabin door plane (10), wherein the widths, which can be assigned to the first shaft door leaf (22) and to the first cabin door leaf (20), are largely identical.
7. The door system according to claim6, wherein the second shaft door leaf (23), in the closed position thereof, has a horizontally oriented width parallel to the shaft door plane (12), and the second cabin door leaf (21), in the closed position thereof, has a horizontally oriented width (BK2) parallel to the cabin door plane (12), wherein the widths, which can be assigned to the second shaft door leaf (23) and to the second cabin door leaf (21), are largely identical, and wherein the width (BK1), which can be assigned to the first cabin door leaf (20), is largely identical to the width (BK2), which can be assigned to the second cabin door leaf (21).

8. An elevator installation comprising a door system according to one of claims 1 to 7, comprising a first cabin door leaf (20), which is pivotably mounted at an elevator cabin (4), and a first shaft door leaf (22), which is pivotably mounted at a shaft door opening (6), wherein at least a part of the shaft door opening can be closed by the first shaft door leaf (22) in the closed position thereof and at least a part of the cabin door opening (7) can be closed by the first cabin door leaf (20) in the closed position thereof, wherein a cabin door plane (10) is formed along the cabin door leaf (20), which can be arranged in the closed position thereof, and a shaft door plane (12) is formed along the shaft door leaf (22), which can be arranged in the closed position thereof, wherein the cabin door leaf (20), in the open position thereof, extends through the shaft door plane (12), or the shaft door leaf (22), in the open position thereof, extends through the cabin door plane (10).